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Management of safety and health using a management system approach has been recognised worldwide as one important way to manage safety and health at the workplace. The Workplace Safety and Health (Shipbuilding and Ship-repairing) Regulations also require the occupier of a shipyard to implement and maintain a safety and health management system to ensure the safety and to protect the health of every person in the shipyard.

This manual is a joint effort by the Workplace Safety and Health Council Marine Industries Committee, Ministry of Manpower (MOM) and Association of Singapore Marine Industries (ASMI) to provide companies in the marine industry with a reference for the management of workplace safety and health using a systemic approach.

The structure of this manual closely follows that of a typical safety management system based on the Plan-Do-Check-Act (PDCA) continual improvement cycle. Each main section of the manual can be matched to a corresponding clause in the Singapore Standards SS506 on Occupational Safety and Health Management System. The manual starts with a general introduction, reference standards, and terms and definition. As with the SS506, the key contents are in Section 4, which provides the relevant elements of the management system. In particular, sections 5.2 SHE Policy, 5.3 Planning, 5.4 Implementation and Operation, 5.5 Checking and Corrective Actions, 5.6 Management Review, and their subsections provide the bulk of the management system elements. This structure allows easy reference for the users, and makes development, implementation, audit and review of the management system easier with respect to that of Singapore and even international safety, health and environmental management standards. Similarly, it also provides easy update, expansion and amendment of this manual to stay in line with the SS506.

The manual contents were developed in close reference to the following:

- Safety Health and Environmental Manual, 1999, ASMI
- Guidelines on Safety Management System for the Shipbuilding and Ship-repairing Industry
- Workplace Safety and Health (Shipbuilding and Ship-repairing) Regulations 2008
- Current good practices in ASMI companies

Matters relating to implementation and operational controls of safety and health, including the requirements under the SS506 and the Workplace Safety and Health (Shipbuilding and Ship-repairing) Regulations can be found in Section 4.4. In addition, useful information such as risk assessments in the marine industry, checklists, training requirements etc., are included in the Annexes to this manual for reference. A mapping of the relevant sections in this manual with the corresponding clauses in other safety and health management systems is also included in the Annex.

The above mentioned structure and content, makes the manual an apt reference for the development and implementation of control measures and management system. It is also suitable for use for audit purposes and by personnel in the shipbuilding and ship-repairing industry, especially those involved in the preparation, supervision and execution of repair, conversion and new building works for all types of vessels in shipyards.
2. Introduction

2.1 Purpose

This manual provides guidelines for the preparation of a company’s safety, health and environmental management system. The guidelines are general since an individual company’s requirements vary with the size of the company, range of operations, types of vessel handled, management policy etc.

The objectives of the manual are to:

- Highlight the important aspects of safety, health and environmental protection to assist companies in planning, implementing and auditing management systems in order to satisfy company, legal and social obligations; and
- Assist companies to put in place safe work practices and management systems to enhance their safety performance.

3. Reference Standards

The following reference standards were used during the development of this manual:

3.1 Singapore Standards SS506 Occupational Safety and Health Management System
3.2 ISO 14001 Environmental Management System
3.3 Occupational Safety and Health Assessment Series 18001

The structure of this manual is similar to that of the above standards, which are representative of SHE management systems. Similar to these standards, the Plan-Do-Check-Act continual improvement framework has been adopted for this manual.

4. Terms and Definitions

4.1 Definitions

The following terms are used in this manual with the meanings as shown below:

**Accident**
An unplanned event resulting in actual ill health or injury, damage to property, plant, ships or environment, production losses or increased liabilities.

**Act**
Unless otherwise stated, “Act” refers to The Workplace Safety and Health Act 2006

**Action Verbs**

- **Must**: Action which is mandatory
- **Should**: Action which is essential unless the company has an equally effective alternative approach
- **May**: Action which is at the discretion of the company
- **May not**: Action which is prohibited

**Administrative Control**
Implementation of any administrative requirement which includes a permit-to-work system, safe work procedures (including that during emergency), warnings and signs, work-rest regime etc.

**Competent Person**
A person who has sufficient experience and training to perform the work required.
Confined Space
An area where dangerous fumes are liable to be present to such an extent as to involve risk of persons being overcome thereby; or ‘the supply of air is inadequate’, or is likely to be reduced to be inadequate, for sustaining life, as defined in Section 25, WSH (General Provision) Regulations.

Contractor
Any company or individual engaged by the shipyard to perform work in the shipyard or to provide labour, equipment, facilities or material to be used in the shipyard.

Designated Person
A competent person appointed in writing by:
- An occupier of a shipyard;
- An employer of persons carrying out work in a shipyard or on board a ship in a harbour; or
- A principal who gives direction to persons on the work carried out by those persons in a shipyard or on board a ship in a harbour, to perform any task or duty prescribed under these Regulations.

Element
An aspect of safety to be taken into account in the comprehensive management of safety within the enterprise. In particular, the list defined in Second Schedule, WSH (General Provisions) Regulations.

Engineering Control
- The application of any scientific principle for the control of any workplace hazard; and
- Includes the application of physical means or measures to any work process, equipment or the work environment such as the installation of any barrier, enclosure, guarding, interlock or ventilation system.

Environmental Aspect
Element of an organisation's activities or products or services that can interact with the environment.

Environmental Impact
Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects.

Hazard
A source, situation or act with the potential for harm in terms of:
- Ill health or injury, or both;
- Damage to property, plant or ships;
- Pollution of environment;
- Production losses or increased liabilities.

Hazardous Work
Any work that is likely to endanger the life of any person in a shipyard or on board a ship in a harbour and includes any type of work which is specified by the Commissioner in writing as hazardous work.

Hot Work
Riveting, welding, flame cutting or burning and includes any other work involving the use or generation of heat or the production of sparks.

Incident
An unplanned event which results in, or has the potential to result in:
- Ill health or injury;
- Damage to property, plant, ships or environment; and
- Production losses or increased liabilities.

In-house Rules
Instructions and prohibitions relating to behaviour, discipline and administration within the shipyard. Organisation, company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration.
Procedure
The step-by-step method for carrying out a task safely and to the quality level required.

Regulation
A statutory requirement issued in association with an Act passed by the Singapore Government, unless otherwise stated Regulation means any regulation made under the Workplace Safety and Health (Shipbuilding and Ship-repairing) Regulations 2008.

Responsible Person
In relation to any work carried out in a shipyard or on board a ship in a harbour, means:
- In the case of a shipyard, the occupier of the shipyard; and
- In the case of a ship in a harbour:
  - The employer of any person who carries out the work; or
  - The principal under whose direction any person carries out the work.

Shipyard
Shipyard includes any dry or wet dock, wharf, jetty and quay, and the precincts thereof.

Risk
The combination of the probability of an incident and its consequences. All WSH risk must be reduced by either making an incident less likely to happen or / and the consequences less serious to a level that is As Low As Reasonably Practicable (ALARP).

Risk Assessment
The process of evaluating the probability and consequences of injury or illness arising from exposure to an identified hazard, and determining the appropriate measures for risk control.

Safe Work Practices
Any procedure for carrying out work safely, and includes any procedure which is to be taken to protect the safety and health of persons in the event of an emergency. Safe work procedure may take the form of an instruction, whether written, pictorial, or conveyed by training and supervision for safe performance of tasks such as welding, operation of machines, access to work locations. Safe work procedure should also include procedures to be taken in the case of emergency.

Safety
Freedom from unacceptable risk of harm including:
- The protection of people from physical or health hazards;
- The protection of assets; and
- The maintenance of production capability.

System
The organisation, responsibilities, procedures, resources and processes by which an enterprise plans to achieve its policy and objectives. In this document, unless otherwise stated, system refers to Safety, Health and Environmental Management System, which is the means by which the organisation implements its safety, health and environmental policy and objectives.

Principal
A person who, in connection with any trade, business, profession or undertaking carried out by him, engages any other person otherwise than under a contract of service:
- To supply any labour for gain or reward; or
- To do any work for gain or reward.

4.2 Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ASMI</td>
<td>Association of Singapore Marine Industries</td>
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<tr>
<td>BCD</td>
<td>Building Control Department</td>
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<tr>
<td>CP</td>
<td>Code of Practice</td>
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<td>MOM</td>
<td>Ministry of Manpower</td>
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<td>MPA</td>
<td>Maritime and Port Authority of Singapore</td>
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<tr>
<td>SDS</td>
<td>Safety Data Sheet</td>
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<td>NEA</td>
<td>National Environmental Agency</td>
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<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
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<tr>
<td>SCDF</td>
<td>Singapore Civil Defence Force</td>
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</table>
5. Safety Health and Environmental Management Element

5.1 General Requirements

Administered by the Ministry of Manpower, the WSH (Shipbuilding and Ship-repairing) Regulations require that “the occupier of a shipyard shall implement a safety management system...” The elements that should be included in the safety management systems (SMS) are stipulated in the Second Schedule, WSH (General Provisions) Regulations. The element of the mandatory safety and health management system is shown in Annex A-2. Occupiers of shipyards should meet the requirements of the Regulations and establish, document, implement and continually improve the system.

Under the National Environmental Agency, organisations that store, use or transport large quantities of hazardous substances are required to implement a safety management system and have it audited by approved auditors.

There are also voluntary SHE Management Systems such as:
- SS506 Occupational Safety and Health Management System
- OHSAS18001 Safety Management System
- ISO14001 Environmental Management System

This manual serves as a management guide for shipyards. It is structured using the typical SHE management system framework of Plan-Do-Check-Act approach for continual improvement. A reference on the correspondence between the various safety and health management systems is show in Annex A-1.

5.2 SHE Policy

The shipyard’s management should provide the vision, establish the framework and set expectations, and provide the resources for responsible management of the shipyard’s operations. Leadership and visible commitment to improve safety and health performance are essential to continual improvement of safety and health in the shipyard.

The SHE policy should:
- Be appropriate to the nature and scale of the WSH and environmental risks;
- Include a commitment to comply with legal and other requirements applicable to the organisation;
- Include a commitment to continual improvement and the importance to protect the safety, health and the general well-being of every personnel working in the shipyard;
- Be documented, implemented and maintained;
- Be communicated to all employees;
- Be endorsed by senior management;
- Be available to interested parties; and
- Reviewed periodically to ensure it remains relevant and appropriate to the organisation.

The SHE should address the following:
- Setting of the framework for general intentions, direction and approach for which the safety and health of people and the protection of the environment are being managed;
- The recognition that safety and health is an integral part of business performance;
- Consideration of the interests of the company’s stakeholders such as employees, customers, contractors, regulatory agencies, public etc. and include accountability for the safety and health function by top management;
- Allocation and delegation of duty and responsibility for safety and health from the top management to the line staff;
- Emphasis on the importance of shaping the behaviour of employees and management staff so as to protect the safety and health and the general well-being of every personnel working in the shipyard;
- Commitment of sufficient resources towards the achievement of safety and health goals and objectives; and
- Responsibilities at all levels in preventing incidents through group and personal communication.
5.3 Planning

5.3.1 Hazard Identification, Risk Assessment and Risk Control

5.3.1.1 WSH Hazard Identification, Risk Assessment and Risk Control

Under the WSH (Risk Management) Regulations, employer, self-employed and principal should conduct risk assessment in relation to WSH risks posed to any person who may be affected by his undertakings. The employer, self-employed and principal must take reasonably practicable measure to eliminate the risks. Where elimination is not reasonably practicable, the employer, self-employed person or principal should implement such reasonably practicable measures to minimise the risk; and such safe work procedures to control the risk.

The organisation should establish and document procedures for ongoing identification of hazards, assessment of risks and implementation of control measures. A risk management programme should be established and include the following:

Formation of a Risk Management Team
The team should be lead by a person competent in risk management and comprise persons from relevant functions, with appropriate knowledge and experience. The duty and responsibilities of team members should be clearly defined.

Hazard Identification
The identification process should also include consideration of:
- The way work is organised, managed and carried out, including any changes that has occurred;
- The design of workplaces, work processes, materials, plant and equipment;
- The fabrication, installation, commissioning, handling and disposal of materials, workplaces, plant and equipment;
- The purchasing of goods and services;
- The contracting and sub-contracting of plant, equipment, services and labour including contract specifications and responsibilities to and by contractors; and
- The inspection, maintenance, testing, repair and replacement of plant and equipment.

Risk Assessment
All risk associated with the hazards identified should be evaluated and assessed and assigned control priorities based on the established level of risk.

Prevention and Control Measures
Preventive and protective measures should be implemented in the following order of priority:
- Eliminate the hazard / risk, and where elimination is not possible;
- Substitute the hazard / risk by replacing it with one that presents a lower risk;
- Control the hazard / risk at source, through the use of engineering controls or organisational measures; minimise the hazard / risk by the design of safe work systems which include administrative control measures; and
- Where residual hazards / risks cannot be controlled by collective measures, the employer should provide for appropriate personal protective equipment including clothing, at no cost, and should implement measures to ensure its use and maintenance.

The preventive and protective measures should be documented and approved by the shipyard’s management.

Training
The shipyard should ensure that the maintenance personnel are trained and competent in the relevant work practices and maintenance procedures.

Documentation and Record Keeping
The shipyard should keep its documentation, data and records concerning the identification of hazards, and the assessment and control of risks up-to-date in respect of on-going activities. Documentation and keeping of records should also be extended to cover new developments and new or modified activities, before these are introduced.

Communication and Provision of Information
The shipyard should communicate and inform any persons affected by the risks about:
- The nature of the risks involved; and
- The control measures or safe work procedures to be taken to address the risks involved.
Review
The risk assessment should be reviewed and revised:

- At least once every 3 years; and
- Upon the occurrence of any body injuries to any person as a result of exposure to a hazard in the workplace; or
- Where there is a significant change in work practices or procedures.

The MOM “Workplace Safety and Health Management: Risk Assessment – Risk Assessment Guidelines” attached in Annex C-1 provides helpful guides for the conduct of risk assessment. ASMI recommends the use of the 5x5 matrix for risk assessment. The matrix is attached as Annex C-2.

Risk matrices and templates drawn up by the members of ASMI during a workshop are available for download for reference at the ASMI website. Eight samples for common operations such as scaffolding, tank cleaning, steel work, painting and blasting, mechanical work, electrical work, marine piping and marine transporting are attached in Annex C-3.

Samples of the compendium of typical hazards in the shipbuilding and ship-repairing industry are also available at the MOM and the Workplace Safety and Health Council websites.

5.3.1.2 Environmental Aspects and Impact
Organisations should identify the environmental aspects associated with its activities, products or services and determine those that are significant. Priority should be given to address the significant aspects so as to minimise their impact.

Examples of environmental aspects may include:

- Releases into water and sea;
- Emissions into the air;
- Use of raw materials, including chemicals;
- Use of natural resources, such as water;
- Use of energy;
- Aesthetics, such as shape, colour, appearance of the environment; and
- Generation of waste from ship repair activities.

The environmental impact of the corresponding aspects should be assessed to identify its significance. This can be done using methods similar to that for risk assessment for safety and health hazards, such as the risk matrix.

5.3.1.3 Risk Register
The organisation should conduct WSH risk assessment and identify the environmental aspects of all its activities. This process should consider normal and abnormal operating conditions, shut-down and start-up conditions, as well as reasonably foreseeable emergency situations. Organisations should establish records of the WSH risk assessments and the identified environmental aspects that list all its SHE risks. This may take the form of a WSH risks and environmental risks register.

5.3.2 Legislation, Standards and Codes of Practice
Organisations involved in shipyard activities and ship repair must commit to compliance with all legal and other requirements that are applicable to the activities, products and services. These requirements include the relevant Primary Legislative Status (Acts) passed by the Parliament, the Subsidiary Legislations (Regulations, Notification and Orders) issued by the relevant governmental agencies, and the applicable Singapore Standards and Codes of Practice. Organisations should also comply with the relevant industrial standards and codes.

To enable compliance, organisations must identify all the legal and other requirements, applicable to their activities, products or services. A procedure(s) should be established, implemented and maintained for identifying and accessing the legal and other SHE requirements that are applicable to it. The organisation should ensure that these applicable legal requirements and other requirements are taken into account in establishing, implementing and maintaining its SHE management system.

The organisation must ensure that it keeps the information on the applicable legal and other requirements up-to-date.

These relevant information on legal and other requirements should be communicated to persons working under the control of the organisation, and other relevant interested parties.
5.3.2.1 Primary Legislation
The following table provides a brief description of the area of application of the primary legislation (Acts) relevant to shipyards:

<table>
<thead>
<tr>
<th>Legislation</th>
<th>Area of Application</th>
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<tbody>
<tr>
<td><strong>Safety and Health</strong></td>
<td></td>
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</tbody>
</table>
| Protection and Management Act, previously titled Environmental Pollution Control Act (Chapter 94A) | Workplace safety and health of person at work including making provisions for:  
- General duties of persons at workplaces, such as employers, occupiers, principals, persons at work, manufacturer and suppliers, machine installer etc.;  
- Investigations, inquiries and reporting of accidents, dangerous occurrences and occupational diseases;  
- Safety and health management arrangements;  
- Codes of practice applicable for providing practical guidance with respect to the requirements of this Act relating to safety, health and welfare at work. |
| Fire Safety Act (Chapter 109A)                                             | Fire protection against safety, persons and property.                                                                                                                                                                 |
| Radiation Protection Act 2007                                               | Import, manufacturing, sales, transport, storage, disposal, possession and use of radioactive materials and irradiating apparatus.                                                                                     |
| **Environment**                                                            |                                                                                                                                                                                                                      |
| Environmental Protection and Management Act, previously titled Environmental Pollution Control Act (Chapter 94A) | Protection and management of the environment and resource conservation including:  
- Control of:  
  - Air, water and land pollution;  
  - Hazardous substances;  
  - Environmental noise;  
  - License and industrial plant works;  
  - Pollution control measures;  
  - Energy conservation. |
| Environmental Public Health Act (Chapter 95)                               | Matters pertaining to environmental public health such as:  
- Removal of refuse;  
- Cleanliness in public areas;  
- Disposal and treatment of industrial waste;  
- Public nuisances;  
- Sanitary requirements;  
- Health requirements for buildings. |
| Sewerage and Drainage Act (Chapter 294)                                    | The treatment and discharge of industrial wastewater into public sewers.                                                                                                                                             |
| Control of Vectors and Pesticides Act (Chapter 59)                         | - Control on the types of pesticides used for vector control, including pesticides and repellents to ensure that they are safe for use by vector control operators.  
- Make provisions for labelling requirements for pesticides products.  
- Registration of vector control companies and licensing of supervisors and workers. |
| Prevention of Pollution of the Sea (Amended) Act 1996                      | Prevention of pollution of sea from:  
- Land and apparatus;  
- Ships;  
- Prevention measures against pollution of sea. |
| Work Injury Compensation Act 2008                                          | Make provision for compensation of employees due to injury and illnesses arising from work.                                                                                                                             |
## 5.3.2.2 Subsidiary Legislation

Below is the list of relevant subsidiary legislation made under the above Acts.

<table>
<thead>
<tr>
<th>Primary Legislation</th>
<th>Subsidiary Legislation</th>
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</thead>
<tbody>
<tr>
<td>Safety and Health</td>
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</table>
| Workplace Safety and Health Act (Chapter 104) | WSH (Workplace Safety and Health Officers) Regulations 2007  
WSH (General Provisions) Regulations 2006  
WSH (Registration of Factories) Regulations 2006  
WSH (Construction) Regulations 2007  
WSH (First Aid) Regulations 2006  
WSH (Incident Reporting) Regulations 2006  
WSH (Risk Management) Regulations 2006  
WSH (Exemption) Order 2006  
WSH (Composition of Offences) Regulations 2006  
WSH (Transitional Provision) Regulations 2006  
WSH (Safety Officers) Regulations 2007  
WSH (Shipbuilding and Ship-repairing) Regulations 2008  
Regulations under the repealed Factories Act which are still applicable:  
Factories (Abrasive Blasting) Regulations  
Factories (Asbestos) Regulations  
Factories (Certificate of Competency - Examinations) Regulations  
Factories (Explosive Powered Tools) Regulations  
Factories (Medical Examinations) Regulations  
Factories (Noise) Regulations  
Factories (Operations of Cranes) Regulations  
Factories (Persons-In-Charge) Regulations  
Factories (Registration and Other Services - Fees and Forms) Regulations  
Factories (Safety Committees) Regulations  
Factories (Safety Training Courses) Order  
Factories (Scaffolds) Regulations 2004  |
| Fire Safety Act (Chapter 109A) | Fire Safety (Building Fire Safety) Regulations 1994  
Fire Safety, (Registered Inspectors) Regulations 1994  
Fire Safety (Fire Safety Managers) Regulations 1994  
Fire Safety (Fire Emergency Plan) Regulations 1994  
Fire Safety (Designation of Premises Requiring Fire Emergency Plan) Notification 1994  
Fire Safety (Exemption) Order 1994  
Fire Safety (Specification of Premises Requiring Fire Safety Managers) Notification 1995  
Fire Safety Act - Fire Safety (Building Fire Safety) (Amendment) 2004  
Fire Safety (Fire Safety Engineers) Regulations 2004  
Fire Safety Act - Fire Safety (Fire Safety Engineers) (Code of Professional Conduct and Ethics) Regulations 2004  
Fire Safety Act - Fire Safety (Registered Inspectors) (Amendment) Regulations 2004  
Fire Safety (Registered Inspectors) (Code of Professional Conduct and Ethics) (Amendment) Regulations 2004  
Fire Safety (Buildings Requiring Fire Certificate) Order 2004  
Fire Safety (Petroleum and Flammable Materials) Regulations 2005  
Fire Safety (Petroleum and Flammable Materials – exemption) Order 2005  
Fire Safety (Exemption - Amendment) order 2005  
Fire Safety Act - Fire Safety (Fire Safety Managers) (Amendment) Regulations 2007  
Fire Safety Act - Fire Safety (Fire Safety Managers) (Amendment No. 2) Regulations 2007  
Fire Safety (Occupier or Owner of Industrial Premises to Appoint Fire Safety Managers) Notification 1997  |
| Radiation Protection Act 2007 | Radiation Protection (Non-Ionising Radiation) Regulations  
Radiation Protection (Ionising Radiation) Regulations  
Radiation Protection (Transport of Radioactive Materials) Regulations  
Radiation Protection (Transit and Transhipment) (Exemption) Regulations 2007 |
<table>
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<tr>
<th>Primary Legislation</th>
<th>Subsidiary Legislation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td></td>
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</tbody>
</table>
| Environmental Protection and Management Act (Previously titled as Environmental Pollution Control Act (Chapter 94A)) | Environmental Pollution Control (Boundary Noise Limits for Factory Premises) Regulations  
Environmental Pollution Control (Control of Noise at Construction Sites) Regulations  
Environmental Pollution Control (Fees for Licences) Regulations  
Environmental Pollution Control (Hazardous Substances) Regulations  
Environmental Pollution Control (Trade Effluent) Regulations  
Environmental Pollution Control (Vehicular Emissions) Regulations  
Environmental Pollution Control (Air Impurities) Regulations  
Environmental Pollution Control (Ozone Depleting Substances) Regulations  
Environmental Pollution Control (Prohibition on the Use of Open Fires) Order |
| Environmental Public Health Act (Chapter 95) | Environmental Public Health (Burning of Joss Sticks and Candles) Regulations  
Environmental Public Health (Registration of Environmental Control Officers) Regulations  
Environmental Public Health (Public Cleansing) Regulations  
Environmental Public Health (Cooling Towers and Water Fountains) Regulations  
Environmental Public Health (Toxic Industrial Waste) Regulations  
Environmental Public Health (General Waste Collection) Regulations  
Environmental Protection and Management (Energy Conservation) Regulations 2007  
Environmental Protection and Management (Registrable Goods) Order 2007 |
| Sewerage and Drainage Act (Chapter 294) | Sewerage and Drainage (Surface Water Drainage) Regulations  
Sewerage and Drainage (Trade Effluence) Regulations  
Sewerage and Drainage (Sanitary Works) Regulations |
| Control of Vectors and Pesticides Act (Chapter 59) | Control of Vectors and Pesticides (Registration, Licensing and Certification) Regulations |
| The Prevention of Pollution of the Sea (Amended) Act 1996 | Prevention of Pollution of Sea from:  
- Land and Apparatus  
- Ships  
- Prevention Measures Against Pollution of Sea |
| Hazardous Waste (Control of Export, Import and Transit) Act, Cap. 122A | Hazardous Waste (Control of Export, Import and Transit) Regulations  
Hazardous Waste (Extend Meaning of Hazardous and other Wastes - Indonesia) Notification 2005  
Hazardous Waste (Extend Meaning of Hazardous and other Wastes - Malaysia) Notification 2005  
Hazardous Waste (Extend Meaning of Hazardous and other Wastes - Philippines) Notification 2005  
Hazardous Waste (Extend Meaning of Hazardous and other Wastes - Thailand) Notification 2005 |
Work Injury Compensation Act - Work Injury Compensation (Composition of Offences) Regulations 2008  
Work Injury Compensation Act - Workmen’s Compensation (Medical Board) (Amendment) Regulations 2008  
Work Injury Compensation Act - Workmen’s Compensation (Workers’ Fund) (Amendment) Regulations 2008  
Work Injury Compensation Act - Workmen’s Compensation Insurance (Amendment) Regulations 2008  
Work Injury Compensation Act - Workmen’s Compensation (Fees) (Amendment) Regulations 2008  
Workmen’s Compensation Act - Workmen’s Compensation (Cancellation) Notification 2008 |
Primary Legislation | Subsidiary Legislation
---|---
Electricity Act | Electricity (Electrical Workers) Regulations 2004
Electricity (Composition of Offences) Regulations 2004
Electricity (Cable Detection Workers) Regulations 2004
Electricity (Contestable Consumers) (No. 2) Regulations 2004
Electricity (Electrical Installations) Regulations 2004
Electricity (Electricity Generation and Retail Licence) (Exemption) Order 2004
Electricity (Electricity Generation Licence) (Exemption) (No. 2) Order 2004
Electricity (Licensing of Electrical and Supply Installations) (Exemption) Notification 2004
Electricity Act - Electricity (Electrical Workers) (Amendment) Regulations 2007
Electricity Act - Electricity (Cable Detection Workers) (Amendment) Regulations 2007
Electricity Act - Electricity (Electrical Installations) (Amendment) Regulations 2007

5.3.1.3 Code of Practices
In accordance with section 39 (3) of the WSH Act 2006, the Commissioner has approved 23 Codes of Practice for the purpose of providing practical guidance on safety and health to the industry. These Approved Codes of Practice (ACOP) is intended to be used as a yardstick to assess whether reasonable practical measures have been taken in regards to the upkeep of safety and health standards at the workplace.

List of MOM Approved Code of Practices

- CP 14 : 1996
  Code of Practice for Scaffolds
- CP 20 : 1999
  Code of Practice for Suspended Scaffolds
- CP 27 : 1999
  Code of Practice for Factory Layout - Safety, Health and Welfare Considerations
- CP 37 : 2000 (withdrawn and replaced by SS536: 2008, same title)
  Code of Practice for the Safe Use of Mobile Cranes
- CP 62 : 1995
  Code of Practice for Safe Use of Tower Cranes
- CP 63 : 1996
  Code of Practice for the Lifting of Persons in Work Platforms Suspended from Cranes
- CP 74 : 1998
  Code of Practice for Selection, Use and Maintenance of Respiratory Protective Devices
- CP 76 : 1999
  Code of Practice for Selection, Use, Care and Maintenance of Hearing Protectors
- CP 84 : 2000
  Code of Practice for Entry into and Safe Working in Confined Spaces
- CP 88 : Part 3 : 2004
  Code of Practice for Temporary Electrical Installations
  Part 3 : Shipbuilding and Ship-repairing Yards
- CP 91 : 2001
  Code of Practice for Lockout Procedure
- SS 98 : 2005
  Specification for Industrial Safety Helmets
- CP 101 : 2004
  Code of Practice for Safe Use of Powered Counterbalanced Forklifts
  Specification for Personal Eye-Protectors
  Part 1 : General Requirements
- SS 473 : Part 2 : 1999
  Specification for Personal Eye-Protectors
  Part 2 : Selection, Use and Maintenance
- SS 510 : 2005
  Code of Practice for Safety in Welding and Cutting (and Other Operations Involving the Use of Heat)
- SS 508 : Part 1 : 2004
  Specification for Graphical Symbols - Safety Colours and Safety Signs
  Part 1 : Design Principles for Safety Signs in Workplaces and Public Areas
5.3.3 Objectives and Programmes

Having identified and assessed the WSH risks and significant environmental aspects, the organisation should establish, implement and maintain documented SHE objectives to continually reduce its WSH risks and environmental impacts. Such objectives should be:

- Measurable;
- Consistent with the SHE policy; and
- Take into account the legal and other requirements and SHE risks.

The organisation should establish, implement and maintain a programme(s) for achieving its SHE objectives. To implement these programmes and achieve the objectives, the organisation should define clearly:

- Designation of responsibility and authority for persons accountable at all relevant functions and levels of the organisation;
- Resources allocation; and
- Time-frame by which the objectives are to be achieved.

The programme(s) should be reviewed at regular and planned intervals to monitor progress and ensure achievement of objectives.

5.4 Implementation and Operation

5.4.1 Resources, Roles, Responsibility, Accountability and Authority

The organisation should ensure that persons in the workplace take responsibility for aspects of SHE over which they have control, including adherence to the organisation's applicable OH and S requirements.

Top management should take ultimate responsibility in SHE and the Management System, and should ensure that:

- Necessary resources to establish, implement, maintain and improve the systems are made available. Such resources may include financial, human resources, specialised skill, technology and infrastructure.
- Staff roles, responsibilities, accountabilities on SHE are defined and authorities delegated for effective implementation of the system. These roles, responsibilities, accountabilities, and authorities should be communicated to the relevant persons and documented in the system.

5.4.1.1 General Duties of Persons at Workplaces as Defined in WSH Act

The following provides a brief description of the duties of persons as stipulated in the WSH Act:

a) Occupier of Workplace

1) Take reasonably practicable measures to ensure that:
   a) The workplace;
   b) All means of access to or egress from the workplace; and
   c) Any machinery, equipment, plant, article or substance kept on the workplace, are safe and without risks to health to every person within those premises, whether or not the person is at work or is an employee of the occupier.

b) Employers

1) Take reasonably practicable measures as are necessary to ensure the safety and health of:
   a) His employees at work;
   b) Persons (not being his employees) who may be affected by any undertaking carried on by him in the workplace

2) The measures necessary to ensure the safety and health of employees at work include:
   a) Providing and maintaining for those persons, a work environment which is safe, without risk to health, and adequate as regards to the facilities and arrangements for their welfare at work;
   b) Ensuring that adequate safety measures are taken in respect of any machinery, equipment, plant, article or process used by those persons;
c) Ensuring that those persons are not exposed to hazards arising out of the arrangement, disposal, manipulation, organisation, processing, storage, transport, working or use of things:
   i) In their workplace; or
   ii) Near their workplace and under the control of the employer;

d) Developing and implementing procedures for dealing with emergencies that may arise while those persons are at work; and
e) Ensuring that the person at work has adequate instruction, information, training and supervision as is necessary for that person to perform his work.

3) Where required by the regulations, give to persons (not being his employees) the prescribed information about such aspects of the way in which he conducts his undertaking as might affect their safety or health while those persons are at his workplace.

4) Assessment risks and take reasonably practicable measures to ensure the safety and health of persons at the workplace affected by his undertakings.

c) Self-employment Persons

1) Take reasonably practicable measures to ensure the safety and health of persons (not being his employees) who may be affected by any undertaking carried on by him in the workplace.

2) Give to persons (not being his employees) the prescribed information about such aspects of the way in which he conducts his undertaking as might affect their safety or health while those persons are at his workplace.

3) Assess risks and take reasonably practicable measures to ensure the safety and health of persons at the workplace affected by his undertakings.

d) Principals

1) Take reasonably practicable measures to ensure the safety and health of persons under his direction on the manner in which work is to be carried out. Such persons include:
   a) Any contractor engaged by the principal when at work;
   b) Any direct or indirect subcontractor engaged by such contractor when at work;
   c) Any employee employed by such contractor or subcontractor when at work.

2) Take reasonably practicable measures, and provide relevant information, as are necessary to ensure the safety and health of persons (other than a person referred to in subsection (1)(a), (b) or (c) working under the principal’s direction) who may be affected by any undertaking carried out by him in the workplace.

3) Assess risks and take reasonably practicable measures to ensure the safety and health of persons at the workplace affected by his undertakings.

e) Persons at Work

1) It shall be the duty of every person at work:
   a) To use in such manner so as to provide the protection intended, any suitable appliance, protective clothing, convenience, equipment or other means or thing provided (whether for his use alone or for use by him in common with others) for securing his safety, health and welfare while at work; and
   b) To co-operate with his employer or principal and any other person to such extent as will enable his employer, principal or the other person, as the case may be, to comply with the provisions of this Act.

2) Not to wilfully or recklessly interfere with or misuse any appliance, protective clothing, convenience, equipment or other means or thing provided (whether for his use alone or for use by him in common with others) pursuant to any requirement under this Act for securing the safety, health or welfare of persons (including himself) at work.

f) Manufacturers and Suppliers of Machinery, Equipment or Hazardous Substances Used at Work

1) Take reasonably practicable measures to ensure:
   a) That following information about the safe use of the machinery, equipment or hazardous substance is available to any person to whom the machinery, equipment or hazardous substance is supplied for use at work:
      i) The precautions (if any) to be taken for the proper use and maintenance of the machinery, equipment or hazardous substance;
      ii) The health hazards (if any) associated with the machinery, equipment or hazardous substance; and
      iii) The information relating to and the results of any tests or examinations of the machinery, equipment or hazardous substance under paragraph (c) that are relevant to its safe use;
   b) That the machinery, equipment or hazardous substance is safe, and without risk to health, when properly used;
   c) That the machinery, equipment or hazardous substance is tested and examined so as to comply with the obligation imposed by paragraph (b).

2) The duties imposed on any person specified in subsection (1) shall:
   a) Apply only if the machinery, equipment or hazardous substance is manufactured or supplied in the course of trade, business, profession or undertaking carried on by the person, whether for profit or not;
   b) Apply whether or not the machinery, equipment or hazardous substance is exclusively manufactured or supplied for use by persons at work; and
c) Extend to the supply of the machinery, equipment or hazardous substance by way of sale, transfer, lease or hire and whether as principal or agent, and to the supply of the machinery, equipment or hazardous substance to a person for the purpose of supply to others.

3) The duties imposed on any person specified in subsection (1) shall not apply to a person by reason only that the person supplies the machinery or equipment under a hire-purchase agreement, conditional sale agreement or credit-sale agreement to another (referred to in this section as the customer) in the course of a business of financing the acquisition of the machinery or equipment by the customer from others.

4) Where a person (referred to in this subsection as the ostensible supplier) supplies any machinery or equipment for use at work to a customer under a hire-purchase agreement, conditional sale agreement or credit-sale agreement, and the ostensible supplier:
   a) Carries on the business of financing the acquisition of goods by others; and
   b) In the course of that business acquired his interest in the machinery or equipment supplied to the customer as a means of financing its acquisition by the customer from a third person (referred to in this subsection as the effective supplier), the effective supplier shall be treated for the purposes of this section as supplying the machinery or equipment to the customer instead of the ostensible supplier, and any duty imposed by subsection (1) on a supplier shall accordingly apply to the effective supplier, and not on the ostensible supplier.

5) Where a person designs, manufactures or supplies any machinery, equipment or hazardous substance for use at work and does so for or to another on the basis of a written undertaking by that other to take specified steps sufficient to ensure, so far as is reasonably practicable, that the machinery, equipment or hazardous substance will be safe and without risk to health when properly used, the undertaking shall have the effect of relieving the firstmentioned person from the duty imposed by subsection (1)(b) to such extent as is reasonable having regard to the terms of the undertaking.

6) Any person required under subsection (1)(c) to ensure that any machinery, equipment or hazardous substance is examined and tested so as to comply with the obligation imposed by subsection (1)(b) shall be regarded as having complied with subsection (1)(c) to the extent that:
   a) The examination or test has already been carried out otherwise than by, or on behalf of, the person; and
   b) It is reasonable for the person to rely on that examination or test.

7) For the purposes of this section, an absence of safety, or a risk to health, shall be disregarded in so far as the case in or in relation to which it would arise is shown to be one the occurrence of which could not reasonably be foreseen.

8) In this section, “supplier”, in relation to any machinery, equipment or hazardous substance, does not include a manufacturer of those items when supplying, but includes an importer when supplying those items.

9) This section shall apply only to machinery, equipment or hazardous substance specified in the Fifth Schedule of the WSH Act.

g) Persons Who Erect, Install or Modify Machinery or Equipment and Persons in Control of Machinery for Use at Work

1) Take reasonably practicable measures to ensure that, the machinery or equipment is erected, installed or modified in such a manner that it is safe, and without risk to health, when properly used.

2) The duty imposed on a person erecting, installing or modifying any machinery or equipment under subsection (1) shall apply only if the machinery or equipment is erected, installed or modified in the course of the person's trade, business, profession or undertaking.

3) Ensure that any machinery or equipment is erected, installed or modified in such a manner that it is safe, and without risk to health, when properly used, shall be regarded as having complied with that subsection to the extent that:
   a) The person ensured, so far as is reasonably practicable, that the erecting, installation or modification was in accordance with the information supplied by the designer, manufacturer or supplier of the machinery or equipment regarding its erection, installation or modification; and
   b) It is reasonable for the person to rely on that information.

4) Where any machinery moved by mechanical power is used in any workplace, then notwithstanding anything in this Act, it shall be the duty of the owner of the machinery to ensure:
   a) So far as is reasonably practicable, that the machinery is maintained in a safe condition; and
   b) That the precautions (if any) to be taken for the safe use of the machinery and the health hazards (if any) associated with the machinery is available to any person using the machinery.

5) Where the owner of any machinery moved by mechanical power has entered into a contract of hire or lease with a hirer or lessee, the duty imposed under subsection (4) shall apply to the hirer or lessee of the machinery instead of the owner.

6) Where the owner, hirer or lessee of any machinery moved by mechanical power has entered into a contract with another person to maintain the machinery, the duty under subsection (4)(a) shall apply to that other person instead of the owner, hirer or lessee of the machinery.

7) Subsections (1), (2) and (3) shall apply only to machinery or equipment specified in Part I of the Fifth Schedule of WSH Act.
h) Ship Repair Manager
   1) Take charge of and coordinate all activities relating to the construction or repair of the ship.
   2) Approve works carried out on the ship.

i) Workplace Safety and Health Officer (WSHO)
   1) To assist the occupier of the workplace or other person in charge of the workplace to identify and assess any foreseeable risk arising from the workplace or work processes therein;
   2) To recommend to the occupier of the workplace or other person in charge of the workplace reasonably practicable measures to eliminate any foreseeable risk to any person who is at work in that workplace or may be affected by the occupier’s undertaking in the workplace;
   3) Where it is not reasonably practicable to eliminate the risks referred to in sub-paragraph (b), to recommend to the occupier of the workplace or other person in charge of the workplace:
      a) Such reasonably practicable measures to minimise the risks; and
      b) Such safe work procedures to control the risk; and
   4) To assist the occupier of the workplace or other person in charge of the workplace implement the measure or safe work procedure referred to in sub-paragraph (2) or (3), as the case may be.

j) Safety Supervisor
   1) Ensure that the provision under WSH Act and Factories (Shipbuilding and Ship-repairing) Regulations are complied with;
   2) Promote safe conduct of work in the shipyard or on board the ship; and
   3) Liaise with the workplace safety and health officer (WSHO) of the shipyard or the ship’s safety coordinator on safety and health matters.

k) Safety Coordinator
   1) Ensure that the provision under WSH Act and Factories (Shipbuilding and Ship-repairing) Regulations are complied with;
   2) Promote safe conduct of work in the shipyard or on board the ship; and
   3) Coordinate all work so that such work could be carried out safely.

l) Scaffold Supervisor
   1) Ensure that the scaffold is erected, added to or dismantled in accordance with the Regulation.

m) Other Related Duties of Occupiers and Employers
   1) An employer shall not:
      a) Deduct, or allow to be deducted, from the sum contracted to be paid by him to any employee of his; or
      b) Receive, or allow any agent of his to receive, any payment from any employee of his, in respect of anything to be done or provided by him in accordance with this Act in order to ensure the safety, health or welfare of any of his employees at work.
   2) An employer shall not dismiss or threaten to dismiss an employee because the employee:
      a) Has assisted (whether by the giving of information or otherwise) an inspector, authorised person or any other public authority in the conduct of any inspection or investigation under this Act for a breach or an alleged breach of this Act, or proposes to do so;
      b) Has in good faith sought the assistance of, or made a report to an inspector or authorised person in relation to a safety and health matter, or proposes to do so;
      c) Is performing his duties in good faith as a member of a workplace safety and health committee; or
      d) has complied with an order made under section 21 or otherwise complied with this Act, or proposes to do so.
   3) The occupier of a workplace shall cause to be kept in the workplace the following records:
      a) Every document issued in respect of the workplace by the Commissioner under the provisions of this Act;
      b) A copy of every notice furnished to the Commissioner as required under this Act; and
      c) All reports and particulars prepared in respect of the workplace under this Act.
   4) Any occupier of a workplace shall ensure that such records referred to in subsection (3) shall:
      a) Be kept for not less than 5 years from the date the records were made or such other period as may be prescribed; and
      b) Whenever required to do so within that period, produce and make available to an inspector for inspection a copy of the record.

n) Vessel Safety Committee
Plan and coordinate all work that is to be carried out on board the ship so that such work is done safely. The function of Vessel Safety Committee and the duties of its members, including Chairman, Secretary, are as in those stipulated in the Factories (Shipbuilding and Ship-repairing) Regulations.
5.4.1.2 Authorised Persons Under WSH Act

In the WSH Act various authorised persons, with recognised qualification and training, for types of work includes:

- An authorised examiner for the purpose of carrying out any prescribed examination or test of any:
  - Hoist or lift;
  - Lifting gear;
  - Lifting appliance or lifting machine;
  - Steam boiler;
  - Steam receiver;
  - Air receiver;
  - Refrigerating plant pressure receiver;
  - Pressure vessel; or
  - Any other machinery required by this Act to be examined or tested by an authorised examiner;

- WSH officer;
- WSH co-ordinator;
- WSH auditor;
- Accredited Training Provider / Organisation.

5.4.1.3 In-house Rules and Regulations

General

- The shipyard should establish a set of in-house safety rules and regulations to regulate safety behaviours and establish procedures to ensure that these rules and regulations are implemented and enforced diligently at the workplace.
- The in-house safety rules and regulations should be documented, effectively implemented and diligently enforced in the shipyard at all times.
- The in-house safety rules and regulations should include, but not be limited to the list as specified in Annex E-1.
- The in-house safety rules and regulations should at least conform to the WSH Act and its subsidiary legislations. In-house rules that are non-statutory should conform to existing standards or industry best practices.

Safety Signs

- The shipyard should establish a system of colour coding and safety signs to draw attention and provide information on potential hazards.
- The use of colour coding and safety signs should conform to existing standards or industry best practices.

Incentive and Disincentive System

- The shipyard should establish an incentive and disincentive system to encourage compliance with safety rules and regulations.
- The shipyard should invoke corrective procedures including disciplinary actions for failure to observe in-house safety rules and regulations. Individuals who blatantly flout or disregard such rules should be subjected to serious disciplinary action or counselling.
- The results of the incentive and disincentive system including the disciplinary actions and corrective measures should be communicated to all employees and contractors.

Communication, Training and Promotion

- The shipyard should ensure that the in-house safety rules and regulations are communicated to all levels of the organisation through safety promotion, training or other means.
- The in-house safety rules and regulations should be made readily available to all employees and contractors.

Documentation

- The shipyard should maintain its documentation and records on the in-house safety rules and regulations.
- The shipyard should update and review the documents periodically.

Review

- The shipyard should establish procedures to periodically review the in-house safety rules and regulations to ensure its relevance and effectiveness. Records of such reviews of in-house safety rules and regulations should be maintained.

5.4.2 Training Awareness and Competency

Every person must be aware of the SHE risks associated with the work being carried out at the workplace. Persons working at the shipyard must be given sufficient training, instruction and information on the measures taken to minimise such risks and be competent in performing their tasks that can impact safety, health and the environment.
The shipyard should establish procedures to identify training needs and provide adequate safety training for all levels of employees including contractors. The safety training should provide management staff with the knowledge and skills necessary for organising and managing occupational safety and health programmes; first-line supervisors and team leaders with leadership skills and knowledge to lead, implement and apply occupational safety and health activities; and workers with the knowledge, skills and right attitudes to enable them to work safely. The training should also include personal communication techniques of shaping human behaviour and promoting safe and responsible behaviour.

Training should be based on the logical sequence of:
- Training needs analysis - a comparison of a person’s skills level with the demands of his or her job and hence the identification of skills shortfalls: The shipyard should establish procedures to identify the training needs of managers, supervisory staff and workers to provide them with comprehensive training on in-house safety rules and regulations, statutory requirements, safe work practices, and other relevant occupational safety and health related training;
- Training resource identification - internal and external courses;
- Planning - the timing of courses to ensure that people are trained before they have to apply the skills;
- Administration - allocating people to initial and refresher courses and maintaining records of training completed;
- Implementation, including releasing personnel for training;
- Evaluation of training programmes; and
- Monitoring to ensure that the training is achieving the planned results;
- Review of need for refresher training to ensure competency.

5.4.2.1 Types of SHE Training
a) Mandatory Training

Safety training should cover the mandatory requirements for Ship Repair Manager, Workplace Safety and Health Officer (WSHO), Safety Supervisor, Safety Coordinator, Safety Assessor, Safety Auditor, Scaffolding Supervisor, Scaffolding Erector, Fire Safety Manager and other occupations.

Following table lists the course(s) required for various appointments:

<table>
<thead>
<tr>
<th>Appointment</th>
<th>Course(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Watchman</td>
<td>Fire Watchman Course</td>
</tr>
<tr>
<td>Lifting Supervisor</td>
<td>Safety Instruction Course for Lifting Supervisors</td>
</tr>
<tr>
<td>Marine Metal Scaffold Erector</td>
<td>Marine Metal Scaffolding Erector Course or Certificate of Competency Marine Metal Scaffolding Certificate</td>
</tr>
<tr>
<td>WSH Officer</td>
<td>Specialist Diploma in WSH</td>
</tr>
<tr>
<td>Safety Assessor (Hot Work)</td>
<td>Shipyard Safety Assessors (Hot Work Certification) Course</td>
</tr>
<tr>
<td>Safety Supervisor</td>
<td>Shipyard Safety Assistants Course</td>
</tr>
<tr>
<td>Supervisor</td>
<td>Shipyard Supervisor Safety Course</td>
</tr>
<tr>
<td>Marine Tradesman</td>
<td>Shipyard Safety Instruction Course (SSIC) – General Trade</td>
</tr>
<tr>
<td>Welder, Burner, Gouger, Pipe Worker, Steelworker</td>
<td>Shipyard Safety Instruction Course (SSIC) – General Trade and SSIC - Hot Work Trade</td>
</tr>
<tr>
<td>Ship Repair Manager</td>
<td>Shipyard Safety Instruction Course (SSIC) for Ship Repair Managers</td>
</tr>
<tr>
<td>Painter</td>
<td>Shipyard Safety Instruction Course (SSIC) – General Trade and SSIC - Painter Trade</td>
</tr>
<tr>
<td>Tower Crane Operator</td>
<td>Tower Crane Operator</td>
</tr>
<tr>
<td>Mobile Crane Operator</td>
<td>Mobile Crane Operator</td>
</tr>
<tr>
<td>Metal Scaffold Supervisor</td>
<td>Marine Metal Scaffolding for Supervisors Course</td>
</tr>
<tr>
<td>Noise Monitoring Officer</td>
<td>Noise Monitoring Course</td>
</tr>
<tr>
<td>Noise Control Officer</td>
<td>Noise Control Course</td>
</tr>
<tr>
<td>Rigger</td>
<td>Marine Rigger Course</td>
</tr>
<tr>
<td>Signalman</td>
<td>Marine Signalman Course</td>
</tr>
</tbody>
</table>

A table on mandatory safety training versus trade-related training matrix is appended at Annex D-1 for reference.
b) SHE Orientation and Awareness

The shipyard should also conduct safety and health orientation courses for new employees as well as direct and indirect (contract) workers. They should cover the company’s:

- SHE policy;
- WSH hazards and risks associated with operation and workplace;
- Significant environmental aspects and impacts associated with the activities, product or services;
- Control measure to be take to eliminate or minimise SHE risks, including:
  - Engineering control available,
  - Safe working systems and procedures;
  - Use of personal protective equipment;
  - Action to be carried out during emergency
- Emergency response procedures, such as fire fighting and evacuation procedures.

c) Skills Training

Apart from courses in subparagraphs a) and b), new employees should also be given training in the skills appropriate to their trades so as to improve their individual performance in their respective trades. There should be sufficient focus given to safety during skills training. For example, skills training in welding will develop ability to weld safely as well as to a required skill standard. The trainee should also be taught the safety precautions and hazards involved.

5.4.2.2 SHE Training Programme

There should be an in-house training programme for SHE-related training. Topics could cover:

- General SHE issues, policy, rules and regulations;
- Hazard identification and risk assessment;
- Safe work procedures, including those during emergency situations;
- Permit-to-work, isolations, gas freeing, confined space entry; emergency response;
- Company-specific methods and procedures, such as the safe use of new workshop machinery;
- Topics that are of concern (e.g. eye protection, scaffolding, slips, trips and falls, etc., that is of current concern);
- Tool-box or pre-task briefings, highlighting hazards and the method of dealing with them;
- Supervisory demonstrations of particular tasks;
- Development of supervisory skills; and
- Drills and exercises.

Training for Different Personnel at Various Organisation Level

This may include:

- **Training for Management Personnel**
  
  All relevant management staff should undergo safety training and be equipped with the proper understanding of the safety management system, safety policy and organisation, statutory requirements on safety, and their duties and responsibilities in safety and health in the shipyard. The training should also provide the relevant management staff with the tools and techniques needed for managing safety and health effectively at the workplace.

- **Training for Supervisory Personnel**
  
  All direct and contractors’ supervisory personnel should undergo the necessary training to achieve a better understanding of the safety aspect of the work operations to ensure tasks are carried out safely. All supervisory personnel should also be trained in the skills and methods required to perform their tasks competently and safely, and to lead workers in safe work practices.

- **Training for Workers**
  
  All new direct and contractors’ workers should undergo the shipyard’s in-house safety orientation training programme before they are allowed to commence work. The shipyard should ensure that no worker is assigned to carry out any high-risk or hazardous job unless he has been provided with the necessary training. The safety orientation training for workers should cover the relevant safe work practices, in-house safety rules and regulations, hazard identification in work areas and the response to emergency. Safety talks to workers should be conducted on a regular basis to inculcate safety awareness. Safety training programmes should be conducted in languages understood by the workers.
**Types of SHE Training**

The training programme should include types of SHE training such as those that are mandatory safety orientation and awareness and skill training as described in paragraphs 5.4.2.1.

- **Training Schedule**
  Training courses should be planned in advance and the information such as the course date, duration, training and assessment methods should be made available to the stakeholders soonest possible. Such information provided should include those for both in-house and external training.

- **Competency of Trainers**
  The shipyard should ensure that safety training programmes for its workers are conducted by competent or approved trainers.

  The shipyard may use accredited and competent external training providers for safety training, if and when internal resources are insufficient or not competent to conduct the specific or required training.

  The shipyard may consider qualifications such as Singapore Workforce Development Agency’s Advanced Certificate in Training and Assessment (ACTA), or its equivalent, together with relevant experience, as guides to recognition of competency for trainers and assessors.

- **Training Records**
  The shipyard should document and maintain records of all safety training received by all the workers.

  The safety training records kept should include the date of training, topics covered in the training programmes, trainers conducting the training and examination results of the training.

- **Training Programme Review**
  Safety training programmes should be documented and periodically reviewed.

  Reviews should be done to measure the effectiveness of the safety training, and to determine the degree to which the identified training needs are being met.

**5.4.2.3 Provisional Identification Labels for New and Inexperienced Workers**

All new and inexperienced workers should be identified with identification labels during the provision period.

**5.4.2.4 Safety Promotion**

Promotional programmes provide an ideal opportunity for involvement of the workforce in shipyard safety, health and environmental protection. This is a vital part of the company’s safety agenda, being one of the means by which it communicates its intentions to its workforce.

The main principles to be considered in the promotion programme include the following:

- Promotion activities must fit into the overall safety management system, addressing specific objectives within the SMS. The initiatives must be kept fresh; posters on the notice board for more than, say, a month at a time lose their impact. Promotion must attract the attention of the target audience and encourage a deliberate change of behaviour or at least cause them to examine their action to ensure compliance.

- Promotion is more effective if, the target audience sees ‘something in it for them’; For example, a competition is worthwhile if the competitors have a reasonable chance of winning and at the same time improve their safety behaviour.

- The promotion programme must not distract those involved, particularly the supervisors and Safety Department, from their other main tasks.

- The rules for competitions must be clear, fair and adhered to.

- Reinforcement is important. A single initiative, run once and then forgotten has no lasting positive effect.

Typical promotional activities may include:

**Poster Campaigns**

These should be deliberate, targeted and live. The posters should be aimed at prioritised areas of concern and should be changed frequently, typically every month.

**Magazine**

A magazine for internal circulation either wholly devoted to safety, health and environment issues or with a substantial section devoted to these topics given an opportunity, to highlight such items of interest such as: messages from senior management showing the management’s commitment to safety, major achievements, alerts and lessons learnt based on experience in the industry, progress of SHE initiatives, and personal stories.
**Competitions**

Competitions, with appropriate prizes to be awarded by the participants, may be organised to boost interest and participation rates among workers in the promotional activities. Such competitions should have theme(s) aimed at promoting certain identified safe behaviours, generating awareness or improving safety knowledge such that the participants gain and the organisation benefits in instilling safety values.

**Training and Publicity**

Additional and intensified safety training courses, workshops, seminars, briefing, meeting, feedback and consultation sessions, publicity etc., may be organised during the safety promotion period.

**Safety Exhibition**

Safety exhibitions and road shows can be held to promote safety. Exhibition boards may be displayed at the workplace for viewing by workers during the safety campaign period. Quiz or competition may be incorporated into these exhibitions and road shows so that the workers are more purposeful when they view the exhibition panel and also to boost interest.

**Proprietary Initiatives**

The company can also launch and implement proprietary initiatives and programmes such as those related to behaviour-based, operational excellence and quality, during safety promotion for the cultivation of safety culture and excellence.

**5.4.3 Consultation and Communication**

Participation and contribution to SHE practices from all those affected by shipbuilding and repair operations should be encouraged. This can be achieved through consultation and communication processes with regard to SHE hazards, control measures for SHE risks, including safe work procedures, and requirements of management system.

The organisation should establish, implement and maintain a procedure(s) for:

- Internal communication among the various levels and functions of the organisation;
- Communication with contractors and other visitors to the workplace;
- Receiving, documenting and responding to relevant communications from external interested parties.

Consultation and communication with stakeholders include SHE matters that can affect WSH and environment, such as changes in material, processes, and procedures; decision on implementation of processes and procedures to manage risks, hazard identification, review of risk assessment and control etc.

Consultant and communication processes may include:

**5.4.3.1 Small Group Meetings**

Small groups meetings should be established to promote communication and co-operation between management, employees and contractors and all affected by operations at the workplace to ensure that issues are addressed and appropriate actions taken to achieve and maintain the shipyard’s safety management objectives.

These groups include:

**WSH Committee**

WSH Committee is one platform on which representatives from various departments and functions, as well as contractors, work together on safety and health matters. The Factories (Safety Committee) Regulations requires the formation of Safety Committees for the purpose of improving, promoting and reviewing all matters relating to the safety and health of employees. The safety committee also acts as a channel for communicating and imparting knowledge and best practices on safety and health to all personnel in the shipyard.

**Vessel Safety Coordination Committee (VSCC)**

The WSH (Shipbuilding and Ship-repairing) Regulation requires a Vessel Safety Coordination Committee (VSCC) to be established for a ship where any hazardous work is to be carried out on board or on the structural part of the ship under construction by:

- The shipyard when the ship is in the shipyard; or
- The master, owner or agent of the ship, when the ship is in the harbour.

The VSCC is to meet daily including Sundays and Public Holidays when any hazardous work is being carried out on the ship and at such time the VSCC Chairman may decide.

The function and composition of the Safety Committee and Vessel Safety Committee and the duties of its members, including Chairman, Secretary, are stipulated in the Regulations and are listed as below:

- Review and discuss regularly all matters relating to the safety, health and welfare of the workers involved in the work;
- Draw up plans for the co-ordination of work to ensure that where different types of work are being carried out at the same time, the types of work are compatible;
• Ensure that all relevant first-line supervisors and the master, owner and agent of the ship or their representatives are informed of the plan;
• Review on a daily basis all work in progress on the ship;
• Plan and co-ordinate the movement and storage of hazardous materials;
• Review on a daily basis the validity of all permits issued;
• Specially monitor all hot works carried out on the ship and ensure that all safety measures are maintained throughout the period of such work;
• Ensure that every confined space is checked:
  - Before any worker enters into it; and
  - Regularly while work is being carried out, for concentrations of oxygen, dangerous gases and flammable vapours and to review the results of such checks;
• Ensure that every worker is provided with and uses the appropriate personal protective equipment for his work; and
• Make arrangements and determine the locations for the display of safety signs and permits on board the ship.

**Tool Box Meetings**

Tool box meetings involving supervisors and workers should be conducted before commencement of work for effective consultation, communication and coordination of work to be carried out on a daily basis before the commencement of work.

**5.4.3.2 Safety Information**

**Risk Assessment**

The employer, self-employed and principal should provide information to all persons at the workplace affected by the risk arising from his undertaking on:

- The nature of the risk involved; and
- Any measure or safe work procedure implemented.

**Safety Signs and Labels**

Safety signs should be provided by the occupier of a shipyard or the master, owner or agent of a ship in a harbour. The safety signs should conform to the Singapore Standard SS 508: 2004

- Specification for Graphical Symbols - Safety Colours and Safety Signs
  - The safety signs should be in languages understood by all persons working in the shipyard or on board any ship and should be placed at appropriate and suitable locations.
  - All containers in which hazardous materials are stored must be properly labelled with the attendant warning signs in accordance with acceptable international practice.
  - The occupier should provide standardised labels for hazardous materials to indicate their hazardous characteristics, including toxicity and flammability.

**Safety Handbook**

The occupier of a shipyard should provide a handbook on safety in languages easily understood by the workers in the shipyard.

The Safety Handbook should be an easy-to-read reference on safety aspects of common tasks and behaviour in the shipyard. The target readership should be stated. While the regulation does not specify the contents, it can contain:

- Safety rules for behaviour in the shipyard; and
- Safe work practices;
- Company’s policy statement on safety, health and environmental protection;
- Hazard identification and SHE risks involved; and
- Risk control measures.

It is not feasible to produce all the specific procedures detailed in the previous section of this Manual, covering the different trades and tasks in a ‘handbook’. The rules and general practices can be printed in all the relevant languages and illustrations in the form of cartoons, drawings or photographs can help to make the meaning clearer. The handbook can be presented as one composite document (taking care that it does not become too large for convenience) or as separate documents for different groups of workers.

In writing the handbook, it is important to note the following points:

- The document is a handbook and should therefore be small enough to handle and use.
- It should be written from the user’s point of view. It should be easy for him or her to understand and put into practice. This includes speakers of languages other than English.
- It should contain only information which is essential for the reader.
Typical Contents of Safety Handbook

The typical contents of a safety handbook can be:

Introduction
- Company safety policy;
- Objectives of the handbook; and
- Definitions and abbreviations.

Safety Rules
- See section in this manual, refer to Annex E-1.

Organisation for Safety
- Specific responsibilities - management, technical, trade supervision, manual workers, safety specialists;
- Committees constitution and function; and
- Ship’s crew responsibilities.

Safety At Work
- Personal protective equipment;
- Permit-to-work;
- Confined space entry, hot work permit, other permits (See section of manual on permit-to-work), gas freeing and monitoring;
- Inhibiting safety systems;
- Lifting and slinging;
- Certification of lifting equipment, crane signals, etc.;
- Manual handling;
- Access;
- Scaffolding, mobile towers, entry into confined space, etc.;
- Surface treatment;
- Cleaning, grit blasting, and painting;
- Electrical - work on electrical installations;
- Use of tools and equipment;
- Electrical, manual and workshop;
- Hazardous materials;
- Ship movements;
- Berthing and unberthing, floating dock, dry dock, slipway, launching, turning propeller and rudder, etc.;
- Ships and on-board systems; and
- Hydraulics, engine and propulsion, sea chest, etc.

Accidents and Emergencies
- Action in the event of injury or illness; and
- Action in emergency - this should be summarised and contact numbers listed in a prominent place, such as inside the front or back cover for quick access.

Means of Escape

Every worker reporting for work on board a ship should be given a briefing by his supervisor on the safe conduct of work and means of escape and exits in the area of his work.

Safety Data Sheets

All hazardous material brought into the shipyard or on board a ship should be accompanied by a material safety data sheet. Information to be provided include:
- The characteristics of the hazardous materials;
- The amount of the hazardous materials to be brought into the shipyard or on board a ship; and
- Any precautions that may be required to be taken in the handling of such materials.

Where hazardous material is to be used on board a ship, a copy of material safety data sheets should be given to the ship repair manager of that ship.

5.4.3.3 Other Forms of Consultation and Communication

Below are some ways through which consultation and communication can be made:
- SHE briefings for employees, and other interested parties,
- Safety Handbook;
- Internal magazines;
• Notice boards;
• Hazard communication programmes, such as labelling, safety signs; and
• Safety Data Sheet and its management system.

5.4.4 Documentation
The organisation should establish and maintain information in a suitable medium such as paper or electronic form for up-to-date and adequate documentation to ensure effective operation of the SHE management system. The documentation should provide adequate information that describe the elements of the management system and their interactions, and provide direction to related documents.

5.4.5 Document and Data Control
The organisation should establish and maintain procedures for controlling all relevant SHE documents and data. Such documents can include (but not limited to):

- SHE policy;
- Hazard identification records;
- Risk register;
- Legal register;
- Licenses, certificates, permits from government agency;
- Control methods: including process control and machine design, safe work procedures, in-house safety rules and regulations;
- Design drawings;
- SHE programme records;
- Organisation structure;
- Job descriptions and records of SHE responsibilities, accountability and authorities;
- SHE group meeting records;
- Records on communication and consultation with employees and stakeholders;
- Contractor’s records;
- Safety Data Sheets;
- Maintenance records;
- Training records;
- Drill reports;
- Inspection and audit records;
- Incident records;
- Operation records, such as permit-to-work;
- SHE performance records;
- Industrial hygiene monitoring reports;
- Medical and health surveillance records; and
- Management review.

The control of safety-related procedural documents is essential to ensure that they are reliable, valid, and an authentic source of information. This involves the following principles:

- A document should carry information showing:
  - Its identity: document name, and number;
  - The issuing and approval authority;
  - Its scope and application; and
  - Its revision history with revision number and date of revision and effective date.
- A circulation list for controlled copies should be maintained so that updates and revisions can be circulated to all copy-holders.
- The document should be withdrawn promptly when it has been superseded or becomes obsolete.
- Controlled documents should be clearly identified and kept updated at all times.
- Uncontrolled documents should also be clearly identified as being “Uncontrolled” and destroyed once their intended purposes are fulfilled.
- Documents should be legible, easy to locate and access.

5.4.6 Operational Control

5.4.6.1 General
In general all operations must be preceded by identification of the hazards involved and assessment of the associated risks. Organisations must then establish, implement and maintain documented procedure(s) to eliminate or control these WSH and environmental risks associated with their work activities, products and services. Such procedures must:

- Stipulate clearly the operating criteria, the steps and the rationale for carrying out such steps, for the prevention of incidents;
- Address the identified SHE risks of goods, equipment and services purchased and / or used by the shipyard;
• Establish the engineering standards for the design of workplace, process, installations, machinery, equipment maintenance operating procedures and work organisation, including their adaptation to human capabilities, in order to eliminate or reduce operational risks at their source;  
• Be communicated to the relevant parties including suppliers and contractors. Such control measures should be discussed, at the very least, between supervisors and workers, and must be properly communicated before commencing work to ensure that workers and other relevant persons involved are clear about the hazards, method of working, the equipment to be used, precautions and procedures to be taken and any need for teamwork and communication.

Operational control should be developed based on the risk assessment findings, to eliminate or reduce risks, using the following hierarchy of control:

• Elimination (most preferred);
• Substitution;
• Engineering Control;
• Administrative Control; and
• Use of Personal Protective Equipment (least preferred).

(Note: the meaning of Engineering Control and Administration are outlined in paragraph “3.1 Definitions”)

The following sections (5.6.2.2 – 5.6.2.4) provide guides on the typical (not exhaustive) types of operational controls for SHE at the shipyards.

5.4.6.2 Safe Work Practices

The shipyards should establish and implement a system of safe work practices to ensure that all works are carried out in a safe manner so as to eliminate or minimise occurrence of incidents.

Safe work practices should be established to reduce and control risks as identified by means of risk assessment techniques, such as job safety analysis, activity-based risk assessment, trade-based risk assessment, etc.

As a guide, safe work practices should be established for works including but not limited to the following:

• Work on any machinery where the fencing has been removed for the purpose of any examination, lubrication or other operations referred to in Section 13 of WSH (General Provisions) Regulations;
• Work at a place where a person is liable to fall a distance of more than 3 meters or into any substance that is likely to cause drowning, poisoning, chemical burns or asphyxiation;
• Work in any confined space;
• Work involving the application of heat, or the potential generation of any source of ignition, where any explosive or flammable substance is liable to be present;
• Work on process, plant, vessel or machinery that is liable to produce or give off any corrosive, toxic or flammable substances;
• Work in compressed air environment or underwater;
• Functional testing of pipelines and valves (mechanical, electrical, pneumatic or hydraulic);
• Hydrostatic or pneumatic pressure testing of pipelines and equipment;
• Pressurised testing of any pressure vessel or pipe;
• Spray painting;
• Dismantling of any pipe or equipment containing steam or substances that are flammable, toxic or corrosive;
• Any repair or maintenance work carried out on a pressurised hydraulic system;
• Radiography work;
• Grit blasting work;
• High pressure jetting;
• Erection and dismantling of scaffolds;
• Installation of equipment;
• Chemical cleaning;
• Electrical work;
• Explosive powered tools; and
• Crane and lifting operation.

5.4.6.3 Permit-to-Work System

The permit-to-work is the key control over hazardous operations in shipyards. Permit-to-work systems are implemented to:

• Ensure that due regard has been taken to ensure safety, health and welfare of workers.
• Prevent any incompatible work from being carried out at the same time in the shipyard or at any locations on board the ship and ensure that necessary safety precautions are taken and enforced when such work is being carried out.
• To contribute effectively to safety, the permit-to-work procedure must be rigorously applied in all its stages. Annex B-1 on “A Guide to the WSH (Shipbuilding and Ship-repairing) Regulations”, summarises the legislation on permit-to-work. Annex E-4 on Permit-to-Work Formats shows layouts for mandatory permit forms.
### Operations Requiring Permit-to-Work

The requirements on permit-to-work procedure are specified in Part IV of the Regulations and it applies to the list of ‘high-risk works’ listed in Regulation 17, as shown below:

- Work which involves the use of any hazardous, volatile, corrosive or flammable chemical, material or solvent in significant quantities;
- Work involving entry into any confined space;
- Spray painting work;
- Grit-blasting work carried out in a confined space;
- Testing or dismantling of any pipe or equipment that contains, or had contained, oil or substances that are flammable, toxic or corrosive; or contains steam;
- Ballasting and de-ballasting of a ship;
- Repair or maintenance work carried out on the hydraulic system of a ship;
- Bunkering and transferring of fuel oil;
- Radiography work; and
- Such other work as the Commissioner may specify in writing to the occupier of the shipyard or the master, owner or agent of the ship or the employer or principal of the person carrying out the work.

The permit-to-work procedure consists of stages which are described in Part IV of the Regulations. A summary is provided below:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Responsibility</th>
<th>Action</th>
</tr>
</thead>
</table>
| 1. Implementation of Permit-to-Work | Shipyard: Occupier | Ship in a Harbour: Master, Owner, or Agent of Ship | • Implement a permit-to-work system.  
• Appoint a safety assessor (a WSHO or competent person). |
| 2. Prohibition of high-risk works without a permit | Shipyard: Occupier, Employer, or Principal | | | |
| 3. Application of Permit-to-Work | Shipyard: Supervisor or Foreman of Person Who Carry out the High-risk Work | | • Apply permit-to-work in such form and manner required by ship repair manager.  
• State the measures which will be taken to ensure the safety and health of the person who carries out the high-risk work.  
• Address the permit to the ship repair manager and submit to safety assessor. |
| 4. Evaluation of Permit-to-Work | Shipyard: Safety Assessor | | • Assess whether all reasonably practicable measures have been taken to ensure the safety and health of the persons who will be carrying out the high-risk work.  
• Inspect the site (including its surroundings) where the high-risk work is to be carried out together with the supervisor or foreman of the person who is to carry out the work to ensure that the high-risk work can be carried out with due regard to the safety and health of the person or any other person at work in the shipyard or on board the ship in the harbour who may be affected.  
• Endorse the permit-to-work if satisfied that the high-risk work can be carried out with due regard to the safety and health of the person at work.  
• Exercise due diligence when performing evaluation and endorsement of permit-to-work. |
<table>
<thead>
<tr>
<th>Stage</th>
<th>Responsibility</th>
<th>Shipyard</th>
<th>Ship in a Harbour</th>
</tr>
</thead>
</table>
| 5.    | Issue of Permit-to-Work | Ship Repair Manager | Issue a permit-to-work in relation to the high-risk work if he is satisfied that:  
• There has been a proper evaluation of the risks and hazards;  
• No incompatible work which may pose a risk to the safety and health of the person who is to carry out the high-risk work and other persons at work in the shipyard or on board the ship in the harbour will be carried out at the same time and in the same vicinity as the high-risk work;  
• All reasonably practicable measures will or have been taken to ensure the safety and health of the persons who carry out or are to carry out the high-risk work; and  
• All persons who are to carry out the high-risk work are informed of the hazards associated with it. |
| 6.    | Posting of Permit-to-Work | Supervisor or Foreman of Person Who Carry out the High-risk Work | Clearly post a copy of the permit-to-work, including where possible a sketch of any area where the high-risk work is permitted, at the work area.  
Ensure that the copy is not removed until the date of expiry or date of revocation of the permit-to-work or on completion of the high-risk work. |
| 7.    | Monitoring of High-risk Work | Ship Repair Manager | Continually review the progress of all high-risk work carried out pursuant to any permit-to-work issued.  
Supervisor or Foreman of Person Who Carry out the High-risk Work | Ensure that the measures necessary to ensure the safety and health of the person at work are taken and are in place at all times during the validity period of the permit-to-work; and  
Inform the SRM of the completion of the work. |

To assist with the preparation of company procedures, reference should be made to the text of the sections on permit-to-work in the MOM publication ‘A Guide to the WSH (Shipbuilding and Ship-repairing) Regulations’ included in Annex B-1.

Safety Checklists

A ready-to-use guide in the form of checklists on the safety measures to be taken by the relevant trade workers would be very useful. One way is to obtain the checklists for various trades published by ASMI and distribute these to the workers. These are attached in Annex E-5.

5.4.6.4 Design and Engineering

The company should have clearly defined standards for all design and engineering work. Major contracts will already contain agreements on the basis of the standards to be applied. The design process must include the provision for systematic risk assessment including:

• The identification of the hazards, both in shipyard operations and the ship's crew in operation of the ship;  
• Assessment of the risk associated with these hazards; and  
• Management of the risk by avoidance of the hazard altogether, reduction by mitigation measures or by the provision of PPE or other means of protection.

The general principles which should be considered include the following:

• The design for the construction, reconstruction, repair, refitting, finishing or breaking up of vessels must be:  
  - Capable of being implemented safely;  
  - Capable of safe testing, including shell tests and other high pressure tests, safe for ship's crew to operate; and  
  - Safe to maintain, whether in a shipyard or at sea.
The work of designers and engineers should be consistent and in accordance with the company practice and standards.

- There should be procedures for design work, checking and risk assessment to be followed by designers and engineers to achieve the above.

5.4.6.5 Safe Access
Scaffolding and Staging
The Factories (Scaffolds) Regulations details the requirement to be met by scaffolding and staging. It also includes the requirements for materials and construction of scaffolds, and for scaffold erectors, supervisors and professional engineers. The MOM approved Codes of Practice CP 14: 1996 Code of Practice for Scaffolds and CP 20: 1999 Code of Practice for Suspended Scaffolds provide requirements related to scaffolds.

Hazards
Falls
The scaffolding or staging must not only provide access to work places at a height but also incorporate protection against falling.

Falling Objects
Care must be taken when working at a height to prevent objects falling and causing injury or damage.

Collapse
Scaffolding or staging may collapse, for example through inadequate construction, failure of the ground or the structure to which it is anchored, or overloading. This is likely to cause injury, not only to persons using the scaffold but also to persons on or around the work site, and also damage to the surroundings.

Procedures
The company must ensure that the legal requirements are met, including the design, construction, supervision, certification, and registration of the scaffold.

The company's procedures must include provision for the training of scaffold supervisors and erectors. The procedures must take into account the use of the scaffold, for example, to avoid overloading with equipment or accumulations of blasting grit.

Mobile Tower Scaffolding
There should be procedures covering the erection, use and dismantling of mobile tower scaffolding which must conform to Regulation 56 of the Factories (Scaffolds) Regulations.

Hazards
Falls
As for scaffolds and staging in the above.

Falling Objects
As for scaffolds and staging in the above.

Collapse
As for scaffolds and staging in the above.

Movement
The tower scaffold may move if it is erected on uneven ground or not properly secured by brakes.

Procedures
The procedures should cover such aspects as:

- Construction
  - The height of the scaffold does not exceed 8 times the lesser of the base dimensions of the scaffold;
  - The scaffold is effectively tied to the building or a rigid structure to prevent toppling when the height of the scaffold, excluding the handrails and their supports at the uppermost lift, exceed 3 times the lesser of the base dimensions of the scaffold; and
  - No more than 2 work platforms are used on the scaffold at any time.

- Stability
  - They should be used only on level ground;
  - If necessary, adequately weighted at the base;
  - They should be used on a firm and even surface.
• Locking
  - Wheels should be securely braked;
  - Provided with casters with a positive locking device to hold the scaffold in position.

• Movement
  - They must not be moved while someone is on the work platform;
  - Should only be moved by applying force at or near the base.

Aerial Work Platform

Aerial work platforms (‘cherry pickers’ - used to carry out work at height with less extensive preparation than scaffolding and staging.) Typically such work includes spray painting, blasting, job inspections and steel-work repairs.

Hazards

Working at Height
Risk of falling or dropping objects.

Failure in Service
Risk of personnel falling or being stranded or of equipment falling during failure of the equipment.

Procedures

Preparation
Check that:
  • The ground surface is firm and level;
  • All safety devices are operating correctly;
  • The lifting systems and directional controls are operating correctly;
  • There is no visual defects in the equipment falling during failure of the equipment.

Operation
  • Only authorised and trained personnel should operate the serial work platform;
  • Safety harness must be worn and anchored to the basket guard rails;
  • The Safe Working Load (SWL) must not be exceeded at any time;
  • The boom should be used only for lifting personnel and their immediate tools; and not for carrying materials or equipment;
  • Should not be operated on a slope;
  • In the event of leaks, damage and malfunctions, stop operations immediately and report to the maintenance authority.

Dock Arm

The use of dock arm as a means of access to a ship in a dry-dock must be covered by procedures relevant to the company.

Hazards

Mechanical Failure
Inadequate maintenance may cause failure in use with consequent risk to users.

Unauthorised Use
Operation by personnel who are not trained in its use may cause serious injury.

Procedures

Pre-operational
The following actions should be included in the procedures:
  • Grease the moving parts regularly;
  • Check hydraulic leads;
  • Check for corrosion of the dock arm rails;
  • Check for damaged or missing handrails; and
  • Check for mechanical or electrical malfunction of the controls.

During Operation
  • Only trained personnel should operate the dock arm;
  • The operator must be at the controls whenever the dock arm is in use;
  • Check that there is no obstruction along the travelling path of the dock arm;
  • Maintain communication between the operator and the personnel on the working platform before raising or lowering the arm;
• Personnel on the working platform must anchor their safety belts to the handrail;
• Only two personnel may be on the working platform at any one time; and
• There must be enough clearance between the working platform and ship-side to avoid a collision.

After Operation
• The dock arm must be anchored at the designated location;
• The power to the dock arm must be switched off and the control key removed; and
• Any damage or malfunction of the dock arm must be reported to the maintenance authority.

5.4.6.6 Hot Work
Hot work permit is required for cutting, burning and welding operations. It is applicable to any operations involving the use or generation of flame, heat and/or sparks. These operations include cutting, burning, welding etc.

Cutting, Burning and Welding
This includes hand-held electric arc and gas operations, automatic profile-cutting machines and others using high temperatures to cut, burn or weld metal, whether on board a vessel or in a workshop.

Hazards
Ignition Source
These operations are an ignition source. The permit-to-work must demonstrate that the appropriate precautions have been taken to ensure the area is free of gas, flammable sludge or film adhering to surfaces, and that no other structure or operation is at risk from the cutting, burning or welding. There should be a person available as fire watchman to raise the alarm in the event of fire and apply immediate fire-fighting measures.

Hazardous Substances
Hazardous substances may be entrained in the metal surfaces of tanks and vessels or may be present on the other side of a metal plate from the hot work location. These may be released as gases or liquids and cause fire or toxic atmospheres.

Tripping Hazard
Hoses and leads should be arranged so that trip hazards are avoided.

High Temperature
In addition to the fire risk, there is the possibility for wearers of contact lenses to find their eyes becoming dry. This may result in permanent damage.

Fumes
Some metals generate toxic fumes when being welded. The procedure should take account of ventilation requirements, even in the open air.

Confined Space
Cutting, burning and welding often take place in confined spaces such as tanks, lockers, engine space, steering flat, etc. The permit-to-work must take into account the need for gas freeing and regular checking.

Equipment Hazards to Worker - electric shock, gas escape, explosion or fire
Equipment used on site, whether owned by the shipyard or by contractors, must be inspected to ensure that it is safe and capable of the standard of workmanship required. There should be a procedure for checking equipment on arrival and for regular safety and maintenance checks thereafter, in accordance with legislation and company policy. There must be a record of checks of equipment, hoses, leads, and electrode holders.

Quality Failures
The procedures should provide for adequate quality checks on the work done, whether visual checks or non-destructive testing.

Sub-standard Workmanship
Persons using cutting, burning or welding equipment, whether hand-held or by workshop machine, must have demonstrated that they have the skills required to meet the shipyard’s quality standards. For each specific task, the instructions must be precise, adequate and understood. The procedures for issuing work should cover this aspect. The fire watchman person also requires skills in the use of firefighting equipment.

Procedures
The proposed hot work to be carried out is an agenda item for the VSCC meeting. The VSCC must ensure that all persons involved are aware of the work being done and that no incompatible work is carried out. The permit-to-work must provide a safeguard against incompatible work. The procedures for any such work must provide for such actions as the following:
Protection Against Fire
Check that there is no flammable material, gas or dry woodwork which could catch fire; and that surfaces which have been in contact with hydrocarbons or toxic substances are completely clean.

Isolation
If any pipes are still in service, ensure that they are de-pressurised, gas-freed and free from flammable substances or residues before they are subjected to any heat which could cause a rise in pressure and possible rupture.

PPE
The PPE required must be specified either in the procedures or in the permit-to-work or both. This includes:
- Eye protection by helmet, mask or goggles;
- Provision of appropriate breathing apparatus or adequate ventilation if there is a risk of dangerous fumes, particularly if working in a confined space;
- Other protective clothing according to the actual work environment.

Other Precautions
Protect any electrical, hydraulic and pneumatic lines nearby. Make sure that other people are not at risk from the welding or cutting operation.

Gas Cutting and Welding
Hazards
General hot work risks are as detailed above and include the following:

Gas Escape
The escape of oxygen, acetylene or LPG can cause a hazardous atmosphere which may result in fire or explosion. Acetylene or LPG escape can also cause oxygen deficiency which may result in asphyxiation.

Procedures
Gas hoses, torches, blowpipes, pressure regulators, nozzles, connections, flash-back arrestors and nonreturn valves must be inspected at least as often as the current legislation requires. Any equipment not complying with company and statutory requirements must be withdrawn and not used until it has been inspected and approved by a competent person. The procedures should specify safety precautions, such as disconnecting hoses from a manifold during breaks and at the end of the task and shift; isolation by valves alone is not adequate to prevent possible leakage.

Electric Arc Welding
Hazards
General hot work risks are as detailed in paragraph i) above and also include the following:

Electric Shock
While the voltage is low, wet skin or standing in water can increase the risk of shock.

Electric Arc
Exposed conductors or faulty connections can cause arcing with the possibility of overheating and fire.

Procedures
Welding transformer equipment, electrode holders, welding cables, connectors and low voltage shock preventers must be inspected at least as often as the current legislation requires. Any equipment not complying with company and statutory requirements must be withdrawn and not used until it has been inspected and approved by a competent person.

The procedures should specify safety precautions, such as:
- Checking the condition of all equipment before work;
- Suitable connections for the earth lead (not pipe-work containing flammable liquid or gas, hydraulic lines, cables and conduit, chains, wire ropes or scaffolding);
- Ensuring that the electrode is stowed in a position where it cannot come into contact with the metal structure when not in use; and
- Switching off the welding machine during breaks.
Grinding

Hazards
As detailed above in the section: Cutting, Burning and Welding; and also includes the following:

Eye Injury
Particles of metal from the work-piece or from the grindstone may cause eye injury.

Noise
Hearing loss may result from persistent exposure to high noise levels during grinding.

Other Injury
A grindstone can break and cause facial injury.

Procedures
Company rules and procedures must specify the precautions to be taken when grinding, whether using a fixed bench grinder or a portable electric or air-driven grinder.

The precautions include, as appropriate:

- The PPE which must be worn,
- Training in the use of the relevant grinder,
- Permit-to-work unless the grinding is a normal workshop operation, and
- Confined space entry and gas freeing.

5.4.6.7 Confined Space Entry
The company must have procedures and resources to carry out its obligations under Section 25, WSH (General Provision) Regulations. This covers a chamber, tank, vat, pit, pipe, flue or confined space in which the hazards listed below exist. The Section 25 also makes provisions which restrict the conditions for entry into confined space.

Hazards
Dangerous Fumes
Risk of being overcome.

Inadequate Supply of Air
Inadequate oxygen, to sustain life.

Inadequate Lighting
Structural: members, debris; sludge and other items may make access hazardous, particularly before lighting is adequate for the work to be done.

Assumptions of Safety
A confined space may have been used previously for harmless purposes such as water ballast but may be hazardous because of contamination by leakage of hydrocarbons or by microbiological action.

Procedures:

Resources
The company must have the following to support its confined space entry procedures:

- Adequate means of access to the confined space;
- Breathing apparatus, belts, ropes, resuscitator;
- Means of certifying that the atmosphere is safe for entry;
- A competent person to carry out that certification;
- Adequate ventilation;
- Records of tests for dangerous fumes; and
- A person keeping watch outside the confined space.

Record of Entry
Persons entering a confined space should record the fact, for example by a tally box or board located close to the point of entry. Each person should leave an identification card or tag in the box or on the board when entering and retrieve it when leaving.
Procedure
Section 25, WSH (General Provision) Regulations) makes provisions for the restriction and steps to be taken for entry into confined space. In accordance with section 39 (3) of the WSH Act, MOM has approved CP 84: 2000, Code of Practice for Entry into and Safe Working in Confined Spaces as the applicable practical guidance for safety and health for such work. It will be used as a yardstick to assess whether reasonable practical measures have been taken in regards to the upkeep of safety and health standards for confined space entry.

The procedures outlined in CP84 for entry into confined space include:

- Hazard identification and evaluation;
- Entry permit;
- Testing of atmosphere in a confined space;
- Authorised person to approve entry permit;
- Display of name tags;
- Period testing of atmosphere;
- Use of retrieval system; and
- Confined space vacated for a significant period of time.

It also contains guides on ventilation, training, appointment of attendant and rescue operation.

5.4.6.8 Surface Treatment
High Pressure Water Jetting or Steam Cleaning

Hazards
High Pressure and Temperature
These operations use high pressure and high temperature jets to treat the metal surface. These jets are hazardous to people and to electrical, hydraulic and pneumatic equipment. The workers must be aware of the hazards and follow company procedures including the use of appropriate PPE, to avoid injury. Pressure settings must be correct for the work. The lance must not be directed at any part of the human body.

Debris
Water jetting and steam cleaning are used to dislodge surface particles which can be propelled through the air. This may cause injury (particularly to the eyes) to the worker or to other persons nearby.

Trip Hazards
The pump and its supply lead or hose and delivery hoses should be located where they will not cause an obstruction to people.

Emergency Escape
The equipment and its leads and hoses must not obstruct an emergency escape route or the close off fire doors, bulkhead doors or other safety-critical protective provisions.

Noise
Where the equipment generates a high level of noise, provision must be made for hearing protection for the worker involved and of other personnel in the area.

Procedures

PPE
Specify the PPE to be used by workers involved in this work. This will include waterproof clothing, waterproof boots and goggles or face mask.

Preparation
Specify the checks on the equipment and the workplace to be carried out by the worker or his supervisor to ensure that other personnel cannot be injured by the operation. Barriers and warning signs should be erected around the area or work carried out at a time when other workers are not within range.

Operation
- Specify the method of working.
- Review the particular hazards and measures to reduce risk.
- Set up and check the equipment.
- Stop up pipes, valves, ducts, ventilators, etc.
- Provide precautions to be taken during breaks.
Shot Blasting, Grit Blasting and Chipping

The company must implement procedures which fulfil as a minimum, the provisions of the Factories (Abrasive Blasting) Regulations S 204/74.

Hazards

Air-borne Debris
Eye injuries and health problems may result from the blasting medium or from particles from the surface being treated.

Noise
There may be a high level of noise from the operation.

Contaminated Air
An air-fed mask must be supplied with suitable quality of air (refer to section 5.4.6.15 on acceptable air quality limits).

Procedures

The MOM has laid down noise control provisions for personnel using blasting equipment. The precautions include the following:

- A blasting helmet should be equipped with silencers or other noise reducing devices to lower the noise level inside the helmet to less than 85 dBA.
- Pressure reducing devices are required to maintain the breathing air in the blasting helmet at a pressure within the range recommended by the supplier.
- The blaster should use suitable earplugs. Hearing tests should be carried out for all blasters before employment and at yearly intervals.

Spray Painting

Regulation 15 of the Factories (Shipbuilding and Ship-repairing) Regulations covers spray painting. This should form the minimum requirement in the company's procedures. Points to be considered in the procedures should include the following hazards and procedures.

Hazards

Fire and Explosion
The vapour given off by spray painting is flammable and may build up, particularly when working in a confined space.

Residual Vapour
After the painting operation is completed, the atmosphere cannot be assumed to be safe until it is properly ventilated, tested and the paint surface is dried or cured completely.

Health Problems
The vapour may be injurious to health.

Procedures

The permit-to-work must ensure that no incompatible work is done in the area, particularly hot work. The permit-to-work procedures should also cover work done by the ship's crew. Such work must be controlled to ensure that it is compatible with tasks being carried out by shipyard personnel.

Preparation

The intention to carry out painting must be discussed at the VSCC; it should be made clear that no hot work may be done at the same time at the vicinity. The worksite must be made safe. If it had contained flammable or toxic substances, any gas, sludge, and film adhering to surfaces in the vicinity must be cleaned. The atmosphere must be tested before and during the painting operation.

Permit

The permit for painting should follow the company's permit procedures.

Hazardous Substances

Paints and solvents must be accompanied by a Safety Data Sheet (SDS). This must be brought to the attention of persons receiving, transporting, storing, using and disposing of such materials and to their supervisors. The provisions stipulated in the SDS should be adhered to.

Procedures

- Adequate ventilation must be maintained so that the space is gas free: This eliminates the danger of fire and paint intoxication.
- Electrical equipment must be suitable for use in a hazardous atmosphere and securely bonded to earth.
- Signboards should be prominently displayed around the work area, for example, 'No Smoking', 'No Hot Work' and 'Spray Painting in Progress'. All pipelines to other compartments should be blanked off.
- Lighting and electrical equipment must be suitable for use in a flammable atmosphere.
- Painters should use an approved type of air-fed mask.
Completion of Task
Once the painting operation is ended, the relevant personnel should be informed. After painting, a confined space must be made safe by ventilation and checked for the presence of flammable or toxic gases before subsequent operations begin, particularly hot work. This applies also to hot work on the opposite side of bulkheads, tanks, decks, etc.

Use of Hazardous Substances
This includes substances which are toxic, corrosive, volatile, explosive, irritant, carcinogenic and allergenic. These substances must be subject to procedures covering their purchase, receipt, transport, storage, handling, use and disposal. See under Section 5.4.6.15 on Occupational Health Hazards.

5.4.6.9 Testing
Pressure Testing
Hazards
High Pressure
Pressure testing of vessels, pipework, valves, pressure relief valves and tanks involve high pressures generated by compressors, pumps or hydrostatic head. Where high pressure is applied, there is a hazard of injury or drowning from loss of containment. There is also the danger of injury from projectiles.

Procedures
Barriers
When pressure testing is in progress, procedures should require that barriers are erected to prevent unauthorised entry to the area concerned.

Risk Assessment
Before commencing testing operations:
- The hazards should be identified;
- Their associated risk assessed;
- If necessary, means to mitigate the risk put in place; and
- The operation should be monitored to protect people, plant and ship or work area.

Use of Compressed Air
The pressure must be correct for the work to be tested. Gradual application allows the responsible personnel to spot failures before the released energy becomes dangerous.

5.4.6.10 Radiography
Hazards
Radiation
Radiation is a health hazard. The hazard may be invisible and its effects may not be apparent for a considerable time after exposure.

Procedures
Control of Sources
Procedures should specify the method of controlling the movement and use of radioactive sources, recording these movements and accounting for their removal from the company’s premises. The procedures should also specify the actions to be taken in the event of an exposed source, a lost source and damage to the protective container.

Health Monitoring
Workers involved in radiography must be trained and qualified in the work. Where the work is not done by a specialist contractor, procedures must specify:
- The training required;
- The routines for monitoring any dose received; and
- The action to be taken in the event of an excessive dose.

Where the work is done by a contractor, the company should satisfy itself that the contractor has adequate procedures in place for the protection of its own and other personnel nearby.
5.4.6.11 Diving

Hazards

Asphyxiation
A loss of air supply which can be caused by failure of air-line apparatus, exhaustion of a self-contained breathing apparatus cylinder or interruption of supply through an air-line pipe, can result in asphyxiation.

Bends
A failure to observe diving procedures for the rate of return to the surface may cause ‘bends’ or nitrogen release in the diver’s blood on decompression.

Snagging and Abrasion
Air-lines and communication lines can be snagged on underwater objects or abraded on rough surfaces.

Poor Visibility
The inshore water in which shipyard divers operate is often cloudy possibly leading to disorientation or difficulty in carrying out the work involved.

Hazards from Other Activities
Other activities in the vicinity of the diving operations can result in dropped objects, endangering a diver’s safety.

Procedures

Preparation
- Divers and their support team must be trained and qualified in the work to be done.
- Briefing of the divers must be adequate to ensure that they are aware of conditions underwater, including local hazards such as currents, intakes and outflows, submerged objects and dock machinery.
- The work plan must show clearly the work to be done.
- The life support systems must be checked and in good order.
- The surface team must be aware of the activities being carried out.

Systems
There must be procedures for the maintenance and operation of the life support systems. These systems should include means of communication. The systems available should include the following safety gadgets (as described in MOM’s Safety Circular dated 11 December 1998):
- Underwater communication system;
- Hands-free torchlight;
- Fluorescent dye; and
- Lifelines.

5.4.6.12 Ship Movements

Ship Crew Briefing

Hazards

Incompatible Operations
The ship’s crew may have tasks which are not compatible with the shipyard’s work. The crew’s work is subject to the same permit-to-work procedures and VSCC control as work done by shipyard personnel.

Unfamiliarity with the Shipyards
The ship’s crews are unlikely to be familiar with the shipyard’s layout, the company rules and the need for precautions related to other work in progress. This can lead to misunderstanding and infringement of the company’s rules and procedures.

Procedures

Briefing
The company should have a clear briefing document explaining matters such as:
- Company rules, particularly regarding smoking and access to the shipyard;
- The procedures for bringing materials and equipment into the shipyard;
- The function of the VSCC and the requirement for representation by the ship’s master;
- The operation of the permit-to-work system;
- The rules and procedures for transferring or discharging cargo, bunker fuel, slops, ballast and bilge contents;
- The precautions regarding propeller turning, rudder movements, hydraulic systems operations, winches, anchors, steam system operations, inserting and fire protection systems, etc.; and actions to be taken in an emergency.
Slipping and Launching

Hazards

Loss of Stability
Any loss of stability at the time of launching is a serious hazard to the vessel and to the personnel involved.

Collision
There is a danger of collision of the newly launched vessel with other craft in the area or with fixtures such as quays, dolphins, buoys or floating docks.

Failure of Gear
During slipping and launching operations, any winches or other mechanical gear used must be in good working order to prevent injury or damage from uncontrolled movement of the ship, cradle or other equipment.

Procedures

Preparation
The company should have generic procedures for slipping and launching, and a plan for each individual operation, taking into account the following:

- Nature of the vessel;
- Vessel's dimensions and gross weight;
- Conditions at the time;
- Position of the slip;
- Means of control of the vessel in the water;
- Provision for contingencies;
- Water clarity and depth, warping and berthing required; and
- Maintenance of winches, etc.

The plan must include consultation with the Maritime and Port Authority of Singapore (MPA) and obtaining its authorisation. It should include a thorough risk assessment, covering all the risks and means of eliminating or mitigating those risks.

Launch Procedure
The launch procedure including the allocation of duties to company personnel, contractors, ship's crew and representatives, should be prepared well before the launch. It should also cover the presence of distinguished guests. The procedure should cover (depending on the size and nature of the vessel, type of slip, method of control, etc.) the following:

- Allocation of duties;
- Layout of moorings and lines;
- Tug assistance;
- Port supervision and pilotage;
- Chock removal; and
- Restraint after launch etc.

Berthing and Unberthing

Hazards

Hazardous Materials
Previous or present cargo, bunker fuel, hydraulic oil, lubricating oil, paints, solvents, etc., must be declared.

Stability - Reason for Berthing
A vessel arriving for repair may have a fault which is hazardous. For example, its manoeuvrability may be affected, or it may have damage which affects its stability or its integrity may be breached, resulting in leakage and pollution.

Procedures

Preparation
The company should have procedures for the arrival of the vessel, including information such as:

- The name and call sign of the vessel;
- Country of registration;
- Overall length, draught and beam of the vessel;
- Estimated time of arrival;
- Nature of cargo, flash point and quantity;
- Distribution of cargo on board;
- The work to be done, such as tank cleaning, hull repair, etc.; and
- Need for tug assistance.

In addition, the MPA's procedures should apply.
Shipyard Equipment
There should be information on the shipyard’s berth layout, bollards, quick-release hooks and depth of water.

Berthing
There should be procedures for handling the vessel on arrival, including mooring, gangways and towers, connection of services, means of communications, etc. The master and crew must be briefed on the shipyard’s rules using the briefing document detailed above.

Dry-Docking and Flooding

Hazards
Damage to Ship
A ship may be damaged through failure to follow a fully prepared docking plan, e.g. through windage, current, failure of mooring systems, collision with other vessels. It is important that crew and shipyard personnel are fully briefed on the plan. A ship may be improperly set on blocks, particularly if it is not flat bottomed.

Injury and Drowning
Operations at a quay-side or dock-side are subject to the risk of injury from contact with mooring lines and winch equipment. There is a risk of falling in the water and possible drowning.

Falls
There is a risk of injury from falling into the dock when it has been drained of water. During the process of establishing access to the ship or vessel using a dock arm or gangway, the risk of flooding is particularly high.

Premature Flooding
See Section 5.4.7.3.b) vii) on Accidental Flooding of Dry Dock or Floating Dock.

Procedures

Preparation

- Dock Master: When vessel-docking instructions are received from the responsible authority, confirm the docking with the vessel’s agent (if the vessel is at anchorage) or the Captain (if the vessel is in the yard).
- Provide a vessel-docking plan for the block arrangement.
- Ensure that personnel affected are familiar with the emergency and evacuation procedures.
- Check the vessel before docking.
- Dock Master: Instruct the dock operator to flood the dock, if it is not already flooded.
- Deploy the line handler and mobilise tugs and machinery.
- Check electrical and cooling lines and other relevant systems and ensure they are operational. If the yard has an intermediate dock, inspect it for structural damage or defects.
- Inspect all rubber seal installations, pumps and electrical high water level sensors and test them to ensure that all is in working order.
- Ensure the bilge pump is ready to be operated manually should the high-level water sensors fail.
- Close the drain sump valves on both sides of the dock.
- Install polypropylene ropes at the 15m mark from the intermediate dock gate. Side-wall markings of 15m, 10m, 5m and 0m should be clearly marked and visible.
- Ensure that life buoys are in place and in good condition.

Docking

- Manoeuvre the ship into the dock according to the plan.
- Instruct divers to check the alignment of the vessel aft and forward. Place additional packing for a non flat-bottom vessel.
- When the vessel is in position, instruct the dock operator to pump the dock dry.
- When the dock is dry, check that the vessel is set correctly on the blocks. Re-pack the vessel if necessary.
- Install the gangway to the vessel.

Docking in Floating Dock

Hazards
Damage to Ship
A ship may be improperly set on blocks, particularly if it is not flat bottomed.

Drowning
Operations at a quay-side or on a floating dock are subject to the risk of falling in the water.
Falling
There is a risk of falling on to the dock floor from the sides.

Premature Flooding
See Section 5.4.7.3.b.vii) on Accidental Flooding of Dry Dock or Floating Dock.

Procedures
Preparation
- Dock Master: When vessel docking instructions are received from the responsible authority, confirm the docking with the vessel's
  agent (if the vessel is at anchorage) or the Master (if the vessel is in the yard).
- Provide a vessel-docking plan for the block arrangement.
- Check the vessel before docking.
- Dock Master: Instruct the dock operator to flood the dock.
- Deploy the line handler and mobilise tugs and machinery.
- Check electrical, cooling lines and other relevant systems and ensure they are operational.

Docking
- Manoeuvre the ship into the dock according to the plan.
- Instruct the divers to check the alignment of the vessel (aft and forward). Place additional packing for a non flat-bottom vessel.
- Dock Master: When the vessel is in position, instruct the dock operator to pump the dock dry.
- When the dock is dry, check that the vessel is set correctly on the blocks. Re-pack the vessel if necessary.
- Install the gangway to the vessel.

5.4.6.13 Transfers of Fluids between Tanks and to Shore
Ballasting and Deballasting
Hazards
Stability
The stability of the vessel is the responsibility of the ship's officers but the company must approve the operations to be carried out.

Draught
There must be sufficient draught for the operations to be carried out, taking into account the sea and tide conditions to prevent grounding. Excessive freeboard may cause problems (e.g. with mooring lines) in high wind.

Capacity of Shore Tanks
Deballasting into shore tanks requires the cooperation of the shipyard personnel to avoid exceeding tank capacity.

Other Operations On-board
Operations must be coordinated to ensure that personnel engaged in other operations are not endangered.

Procedures
Communication and Approval
The transfer of ballast into shore tanks or the transfer of ballast between tanks on board requires procedures to ensure that company personnel are not at risk and that the arrangements for transfer to shore are understood and followed. Each transfer must be subject to specific information and agreement.

Cargo Movements, Bunkering and Transferring of Fuel Oil
Hazards
Stability
As above for ballasting and deballasting.

Hydrocarbons
The movement of hydrocarbons including volatile components involves risks of loss of containment, fire or explosion.

Simultaneous Operations
The movement of cargo while at a berth must only be carried out subject to the work schedule as agreed at the VSSC meeting.
Procedures
Cargo Movements
There must be procedures in shipyards to which this requirement applies, covering:
• Communication between the ship and yard personnel;
• Agreement on the planned movement and the safety of other work being carried out;
• A risk assessment to ensure that hazards have been taken into account and provided for; and
• The effect on other work in progress, particularly the risk from operating pumps, pipe work, inverting system, etc.

5.4.6.14 Use of Tools and Equipment

Electric Tools
This includes portable drills, sanders, grinders, saws, etc. Legislation relating to such equipment is contained in Regulation 54.

Hazards
Electric Shock
Damaged, poorly maintained or wrongly used tools can cause electric shock, which are potentially fatal. Mains voltage electric tools used in wet weather are particularly hazardous.

Trips on Leads
Trailing leads across walkways and decks can cause trips.

Rotating Parts
Rotating parts can catch clothing. They can also whip about if not properly controlled, e.g. on starting or when catching on some part of the work.

Reciprocating Parts
These can catch on the work and jerk dangerously.

Procedures
Use of Tools
Companies should have procedures for:
• The issuance of hand tools;
• The use of bench tools;
• Ensuring that users are competent;
• Checking a tool and its cable and plug before use;
• Checking that appropriate guards are in place and in good condition;
• The use of the PPE appropriate to the job;
• The use of hand tools including a prohibition on use outside their capacity or specification;
• Switching off the power supply when the tool is not in use and disconnecting hand tools when they are not being used;
• Inspecting hand tools on their return to store; and
• Regular inspections.

Pneumatic Hand Tools
This includes air-driven drills, grinders, etc.

Hazards
Compressed Air
Faulty couplings, damaged hoses and unauthorised interference with the tool can cause serious injury from the release of compressed air.

Trips on Leads
Trailing hoses across walkways and decks can cause trips.

Rotating Parts
Clothing can be caught between rotating parts. Rotating parts can also whip about if they are not properly controlled, e.g. on starting or when catching on to some part of the work.

Reciprocating Parts
Reciprocating parts can be caught on the work and jerk dangerously.
Procedures
Use of Tools
Companies should have procedures for:

- Issuing of hand tools;
- Ensuring that users are competent;
- Checking a tool before use;
- Using of hand tools including restrictions on use outside their capacity or specification;
- Inspecting tools on their return to store; and
- Regular inspections.

Workshop Machinery
This applies to machinery in the shipyard and also to equipment operated on contractors’ premises. It includes lathes, boring machines, drills, grinding machines, cutting, bending and folding machines, forging and casting equipment, and all other fixed workshop equipment. It covers manually operated, numerically controlled and profiling machines.

Hazards
Moving Parts
Hands and clothing can be caught in the moving parts, particularly when setting up or maintaining machines or if the guards are faulty or disabled.

Unsecured Work-piece
Unless the work-piece and tool are, properly secured by clamps, vice, etc., there is a danger of injury.

Damage to the Work
Inexpert or careless work can cause extensive damage to work in progress.

Procedure
Guards
Companies must ensure that the machines are properly guarded in accordance with provisions made under the WSH (General Provisions) Regulations. Procedures for maintenance and lubrication should include provision for times when the guards are disabled.

Operation
Company rules must limit the operation of machinery to persons who are appropriately trained, experienced and supervised.

The instructions for a specific task should include an assessment of the risks involved and the means of avoiding or mitigating that risk. Where a change to an instruction becomes necessary, the change should be approved by a supervisor.

5.4.6.15 Compressed Air and Gases
Compressed Air
Hazards
Failure of Hose or Coupling
This can release a jet of compressed air which can cause serious injury. A hose and the tool-lance, jet, etc., can whip about causing injury to personnel or damage to equipment.

Failure of Valve
A hand-held control valve sticking open can cause an uncontrolled jet of compressed air. A valve failure at the manifold can leave equipment live when it is expected to be depressurised.

Horse-play
Applying a jet of compressed air to the body can cause deaths.

Procedures
Condition of Equipment
Procedures must ensure that equipment is inspected at regular intervals, and at least as often as any relevant legislation demands.

Use of Equipment
There should be procedures covering the use of compressed air and signs should warn of any hazards involved. Operations involving compressed air should be preceded by an assessment of the risks involved in the particular situation.

The use of equipment must be restricted to persons properly trained and qualified.
Compressed Gases

Hazard
Toxic Gases
Some gases are toxic or asphyxiating when present at a concentration greater than the permissible exposure level.

Escape of Flammable Gas
A concentration of flammable gas between its flammable limits can cause fire or explosion.

Procedures

Condition of Equipment
Procedures should ensure that the equipment is inspected at intervals which satisfy relevant legislation. This is specified in Regulation 54(3) for welding equipment.

Use of Equipment
Gas cylinders must be colour-coded to conform to the Singapore Standard 152: Identification of Contents of Industrial Gas Containers. This stipulates a colour code system for gas cylinders. The colours for hoses are defined in Singapore Standard 50: Code of Practice for Safety in Welding and Cutting (and other operations involving the use of heat):

<table>
<thead>
<tr>
<th>Gases Hose</th>
<th>Hose Colour</th>
<th>Cylinder Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetylene</td>
<td>Red</td>
<td>Maroon</td>
</tr>
<tr>
<td>Oxygen</td>
<td>Blue</td>
<td>Black</td>
</tr>
<tr>
<td>LPG</td>
<td>Orange</td>
<td>Grey*</td>
</tr>
</tbody>
</table>

* May vary from company to company.

There should be procedures covering the use of compressed / dissolved gases and including such aspects as the following:
- Permanent and temporary storage precautions;
- Handling gas cylinders (keeping upright in trolleys, quads, etc);
- Marking and segregating when empty;
- Protecting from impact, especially on valves, regulators, flashback, arrestors and non-return valves;
- Inspection before use to ensure no damage to fittings or hoses; and
- Certification of hoses at stipulated intervals.

5.4.6.16 Transport and Materials Handling

Forklift Trucks

Hazard
Unauthorised Use
Unauthorised personnel can cause serious injury or damage by driving forklift trucks without the necessary training or qualification.

Failure
Mechanical or electrical failure can make a forklift truck very dangerous. Such failures may involve the brakes, tyres, lights, motor or engine, hydraulic lifting systems, and reversing signal.

Procedures

Maintenance
There must be maintenance procedures and records to ensure that the equipment is regularly inspected, lubricated and maintained in accordance with the manufacturer's instructions.

Pre-use Checks
There should be a programme of checks carried out by the driver before using the forklift truck for the first time on a shift, covering the operation of the controls, condition of hoses, oil levels, coolant level, overhead guard, etc. A Forklift Inspection Checklist attached in Annex E-12 to this manual may be use for this purpose.
Security
Unauthorised personnel are not allowed to use the truck. For example, the immobiliser key should be removed when the truck is unattended.

Instructions
There should be shipyard-specific instructions on the use of forklift trucks defining where they may be used, who may use them, the types of trucks to be used for different purposes. Particular care should be taken when carrying wide loads such as tubulars. A side-lift is preferred to avoid hazards to personnel or assets at the side of a roadway.

Crane Operations and Lifting Equipment
These topics are contained in:

- Sections 19 to 22 of the WSH (General Provisions) Regulations,
- Part IX Material Handling Equipment in the Regulations,
- The Factories (Operation of Cranes) Regulations, and
- SS536:2008 Code of Practice for Safe Use of Mobile Crane

There are guidance notes issued by the MOM for application as an Approved Crane Contractor which include the standard application form and a Personnel Data Sheet. This information is available at the MOM website. The notes stipulate the requirements to be satisfied by the contractor and by crane erectors.

The WSH (General Provisions) Regulations defines lifting machine as including: ‘a crane, crab, winch, teagle, runway, transporter, piling frame and any suspended scaffold capable of being raised or lowered by climbers or winches.’ This is a comprehensive list and includes, for example, mooring winches. Under the Factories (Operation of Cranes) Regulations, only those crane contractors approved by the Commissioner of Factories are allowed to carry out the installation, repair alteration or dismantling of a mobile crane or tower crane.

A shipyard intending to carry out the installation, repair; alteration or dismantling of a mobile crane or tower crane on its own must apply to the Commissioner to become an Approved Crane Contractor. The MOM has issued a guide on the application as an Approved Crane Contractor, setting out the criteria for approval as an approved crane contractor, approved crane erector and the erection team.

Hazards
The lifting and transport of heavy loads is responsible for many accidents in industry. The availability and enforcement of the company’s procedures should reflect this concern.

Crane Failure
A brake failure can result in a dropped load. A failure of the limit switches and overload prevention systems can result in operation outside safe limits and crane failure.

Inadequate Maintenance
This may result in any of the above or in a structural failure. Other failures may include a seized sheave, inefficient engine, jammed line or worn bearing and stewing ring.

Shared Load
Where lifting devices are used in tandem, there is a risk of unequal load sharing and potential overload failure.

Planning and Risk Assessment
A failure to plan the details of a task adequately may result in injury and damage. For example, a mud door assessed on the basis of the weight of metal may cause a chain block to fail because the enclosed mud accounted for 150% extra weight.

Procedures
Procedures should detail:

- The use of crane;
- Methods of slinging; and
- Signalling:
- Training requirements; and
- Inspection and maintenance of slings.

Preparation
Before operating a mobile crane, the checks should include the following:

- All mobile cranes in operation should have a valid MOM certificate;
- Before taking over the crane, the operator should check for operations adjacent to the work site;
- The hook should have a safety catch which should be in good working condition;
- A checklist should be completed covering all operator-accessible and safety-critical items, such as engine oil level, operation of
controls, safety interlocks, brakes, electrical systems;
• There should be no signs of undue wear and damage on the wire ropes; and
• There should be no significant oil leakage.

**Operation**

• Ensure that the operator is trained on the appropriate type of crane and has a valid license.
• On road cranes, extend the stabilising outriggers fully and ensure that they are resting on firm ground.
• Operate only with a trained signalman.
• Ensure that the signalman has an uninterrupted view throughout the lift or, if that is not possible, use more than one signalman, each in full view of the other and able to communicate effectively with the crane operator.
• Ensure full visual and, if possible, voice communication between the signalman, crane operator and riggers.

### 5.4.6.17 Electrical Safety

Annex B-1 on “A Guide to the WSH (Shipbuilding and Ship-repairing) Regulations” in this manual includes the requirements for Electrical Safety in the Regulations.

**Hazards**

The general hazards arising from electrical installations and equipment include:

**Electric Shock**

• The use of equipment in unsuitable circumstances (too high a voltage or in wet surroundings).
• Inadequately maintained equipment.
• Damaged equipment.
• Unqualified entry to power distribution systems.

**Physical Injury**

• Hands or clothing being caught in rotating parts.
• Inadequate guards.
• Misuse of equipment.

**Procedures**

Rules and practices should be publicised for the use of particular types of tool or equipment and for particular operations (such as entry to switchboard panels) should be provided, including, provisions for safety.

Electrical installations and equipment must comply with the following:

• Regulation 14 of the WSH (General Provisions) Regulations;
• The Public Utilities (Electricity) Regulations;
• The Public Utilities (Electricity Supply) Regulations;
• Part VII of the WSH (Shipbuilding and Ship-repairing) Regulations which cover the requirements applying to electrical safety;
• The maximum voltage allowed for use in confined locations (55V AC. or 110V DC);
• The provision of earth leakage circuit breakers;
• Low voltage shock preventers should be used on electric arc welding sets;
• The use of heavy duty industrial plugs and sockets;
• Earthing of metal parts; and
• Code of practice CP 91: 2001: Code of Practice for Lockout Procedure should be applicable to prevent inadvertent turning on of energy sources during installation, troubleshooting, repair, and maintenance.

See also Section 5.4.6.9 of this manual on Use of Tools and Equipment.

### 5.4.6.18 Personal Protective Equipment

Personal protective equipment (PPE) should be used as a provision of last resort for control for WSH risks. It is the least preferred method of control in the hierarchy of control as mentioned in the earlier section (5.4.6.1). It is should be used in conjunction with other methods of controls.

**Types of PPE**

The types of PPE needed should be specified in the permit-to-work or work procedures. It includes the following:

• Protective clothing, e.g.
  - Safety helmets where there is a need to protect the head from obstructions such as pipework and from falling objects;
  - Air-supplied blasting helmets;
  - Overalls, boots and gloves (in accordance with the Factories (Abrasive Blasting) Regulations;
  - Aprons to protect from projectiles, particularly hot slag, and from chemical;
  - Splashes, rainwear such as jackets, boots, waterproof trousers, for exposed locations and especially where operations cannot be
suspended during heavy rain;
- Gloves of an appropriate material and standard, for protection against penetration, abrasion, heat, cold, fire, chemicals, and other hazards;
- Safety footwear where heavy objects may cause injury to feet.

- Protective equipment, e.g.
  - Safety glasses and goggles where wind-blown debris may cause eye injuries, such as grinding or in the vicinity of grit blasting, or where injury may be caused to operators or other personnel nearby by-welding flash;
  - Safety harnesses for those working at a height exceeding 2 metres;
  - Life-jackets for those in danger of falling into the water;
  - Respirators where the atmosphere may be contaminated and where air-line breathing apparatus is not appropriate;
  - Breathing apparatus, either self-contained or preferably air-line for toxic or oxygen-deficient atmospheres, hearing protectors, torchlight with battery kept charged if required to enter confined spaces.

Appropriate standards as referred to above should apply in the selection of PPE. This is necessary for:
- Instruction to workers and supervisors; and
- Setting the terms of contracts to ensure the suitability of contractors’ provision for their workers.

Selection of PPE

In selecting and specifying the requirement for PPE, consideration must be given to:
- Type of hazards and risk involved
  The type PPE selected should be in accordance with the hazards and risks for exposure. Information on the characteristics (such as concentration, energy level, power etc.) of the hazards must be available in order to select a PPE that provides the appropriate protection level.

- Standards specification
  Selection of type of PPE should be based on Singapore Standards or other reputable international standards. The following are mandatory Singapore Standards that are applicable to PPE:
  - CP 76 : 1999 : Code of Practice for Selection, Use, Care and Maintenance of Hearing Protectors
  - SS 98 : 2005 Specification for Industrial Safety Helmets
    Part 2 : General Requirements
    Part 3 : Selection, Use and Maintenance

- Location of use
  Clear instruction should be given to a person likely to be exposed to the hazards at the location where the hazards may be present. Warning signs should be put up at conspicuous places where PPE is required.

Use of PPE

Persons at the workplace much be made aware of the type(s) of PPE necessary to be worn prior to entry into the area where they are likely to be exposed to the hazards. For example, hearing protectors would be required at places where persons are likely to be exposed to excessive noise. Signs must be posted at conspicuous location(s) to warn people of such necessity. Where it is required, PPE must be worn by every person exposed, for the duration of the period of exposure.

Users should be given instructions as to the correct way of putting on PPE and of verifying whether the PPE has been put on correctly prior to exposure to the hazards. An example is when wearing respiratory protectors, the user should use the correct method of wearing the respirator and check using ‘fit test’ to ensure that the respirator has been put on with a good seal to prevent inhalation of any toxic substances.

Having decided what PPE is / are to be worn, the organisation should set rules on PPE and ensure that they are being enforced and followed. A blanket rule in an area requires compliance by all personnel in the area including supervisors, management and visitors. In some instances, it may be necessary to monitor the effectiveness of PPE by personal health checks.

Maintenance of PPE

Users of PPE must be trained on proper maintenance of their PPE to ensure the effectiveness of use and personal hygiene. Users must be aware of the useful life of PPE where applicable. PPE such as filter cartridges of respiratory protectors have expiry dates, or may ‘break-through’ from continuous use. These may render the PPE ineffective, and fail to provide the intended protection.
5.4.6.19 Environmental Protection and Waste Management

Planning Control of New Facilities

For the development of a new shipyard and ship-repair facility, proper submission must be given to the Pollution Control Department (PCD) during planning stage. The impact of all developments on the environment is assessed and considered before each development is allowed to proceed. PCD checks these proposals, assesses the impact on the environment and ensures that new shipyards and shiprepair developments are properly sited and are compatible with the surrounding land use. It also processes building plans and assesses the environmental impact to ensure that the prospective industries will not pose unmanageable health and safety hazards, and pollution problems.

Water Pollution Control

All wastewater (trade effluence) from shipbuilding and ship-repairing facilities must be discharged into the public sewerage system which is operated by the Public Utilities Board (PUB), or to a watercourse if the public sewer is not available. A permit must be applied for such discharge.

Trade effluence must be treated to the specified standards before discharge into a sewer. These standards, together with other requirements are set out in the Sewerage and Drainage Act and Sewerage and Drainage (Trade Effluent) Regulations and are administered by PUB. (If the public sewer is not available, trade effluence must be treated to standards specified in the Environmental Pollution Management (Trade Effluence) Regulations, which is administered by the Pollution Control Department, National Environmental Agency.)

Premises generating large quantities of acidic effluent are required to install a pH monitoring and shutoff control system to prevent the discharge of acidic effluent into the public sewer.

Shipyards can apply to PUB for permission to discharge their trade effluent containing biodegradable pollutants, as determined by their biochemical oxygen demand (BOD) and total suspended solids (TSS) loading exceeding the allowable standards, directly into the public sewers on payment of a tariff. The tariff is levied to recover the costs incurred in treating the additional pollution load at the sewage treatment works.

The provision, operation and maintenance of sewerage system are governed by the Sewerage and Drainage Act (SDA). The treatment and discharge of industrial wastewater into public sewers are regulated by the SDA. The Sewerage and Drainage Act its subsidiary regulations are administered by PUB.

Air Pollution Control

Shipyards equipped with pollution control equipment (such as diesel boilers, furnaces etc.) must comply with the air emission standards. The air emission standards are specified in the Environmental Protection and Management (Air Impurities) Regulations.

To minimise the emission of sulphur dioxide into the air, the sulphur content in fuels (such as diesel) used by industries is limited to not more than 1% by weight.

The use of open fires to dispose wastes is prohibited under the Environmental Pollution Control (Prohibition on the Use of Open Fires) Order.

Hazardous Substances Control

The control of hazardous substances is governed by the EPMA and the Environmental Protection and Management (Hazardous Substances) Regulations.

A licence is required for any person who wishes to import, sell, export, purchase, store, and / or use any hazardous substance controlled under the Act. A permit is required for any person who wishes to purchase, store and / or use any hazardous substance controlled under the Environmental Protection and Management (Hazardous Substances) Regulations.

Ozone Depleting Substances (ODS) are controlled as hazardous substances under the Environmental Pollution Control Act. Control of ODS covers the import, export, production and consumption and is regulated under the Environmental Protection and Management (Ozone Depleting Substances) Regulations.

General Waste Disposal

Shipyards should implement good waste control and management practices. Options available for the handling and treatment of waste include:

- Reduce (most preferred)
- Reuse
- Recycle
- Disposal (most preferred)

Organisations should systematically review their waste generation to identify the opportunities for waste minimisation. Besides minimising the impact to the environment, waste minimisation is usually accompanied by more efficient operation and cost saving. The most ideal approach is to minimise waste generation in the first place. Whenever possible, materials should be considered for reuse so as to minimise wastage. If reuse is not possible, the next best option would be to recycle the waste. This usually involves selling the waste as scrap to recyclers, who reprocess the scrap material into other forms or products. Where the above is not possible, waste should be properly disposed in accordance with the applicable legislations.
The disposal of waste is governed mainly by the following legislation:

- **Environmental Public Health Act**
  Makes provisions for environmental pollution issues likely to be caused by general public, including waste management and cleanliness in public places.

- **Environmental Public Health (General Waste Collection) Regulations**
  Sets requirements pertaining to the generation, storage, handling, transport and disposal of general waste, waste from grease interceptors, waste from sewerage systems, and waste from sanitary conveniences that are not part of a sewerage system.

- **Environmental Public Health (Toxic Industrial Waste) Regulations**
  As described in the following paragraph on Toxic Industrial Waste Control.

- **Radiation Protection Act**
  Regulates, among other aspects of radiation protection, the disposal of radioactive materials and irradiating apparatus.

- **Hazardous Waste (Control of Export, Import and Transit) Act and subsidiary legislations**
  Sets the requirements for controlling the movement or trans-boundary movement of hazardous waste in, through, and out of Singapore.

- **Code of Practice on Pollution**
  Provides, among other aspects of pollution control, guidelines for toxic industrial waste.

**Toxic Industrial Waste Control**

The management of toxic wastes in Singapore is under the purview of the Pollution Control Department and is carried out through the Environmental Public Health (Toxic Industrial Waste) Regulations 1988. It makes provisions for the requirements for the generation, storage, handling, transportation and disposal of general waste; waste from grease interceptors sewerage systems and sanitary conveniences that are not part of a sewerage system.

The types of toxic waste which are controlled are listed in the Schedule of the Environmental Public Health (Toxic Industrial Waste) Regulations. Example of toxic industrial waste generated in shipyards include: waste oil, spent solvents, spent etchants, waste acids / alkalis and waste sludges etc.

For toxic industrial waste (TIW) generators, the requirements on control measures under this regulation include:

- Maintaining a register, updated on a weekly basis, that contains the following information:
  - Types and quantities generated;
  - Manner of disposal;
  - Date and quantity supplied or sold to a toxic industrial waste collector;
  - Name and address of the toxic industrial waste collector; and
  - Quantity held in stock.

- Storing TIW in containers with design, construction and maintenance in accordance with approved code of practice and in an area which is restricted to authorised personnel and labelled with appropriate hazard warning signs as prescribed in the approved code of labelling;

- Storing and dealing with TIW in a manner not to threaten the safety and health of any person or cause pollution to the environment;

- Prohibiting the mixing of different types of TIW, or mixing of TIW with non-TIW are prohibited;

- Selling or supply to licensed collector only;

- Supplying accurate information about the TIW to the TIW collectors;

- Preparing and keeping up-to-date the emergency action plan detailing how spillage, leakage or accidents involving the TIW will be dealt with.

**5.4.6.20 Management of Change**

The shipyard should establish and maintain a procedure to ensure that all hazards arising out of any temporary or permanent changes to procedures, equipment, materials or personnel is evaluated, managed, controlled, documented and approved.

**Establishment of Procedure**

The shipyard should ensure that there is a system for evaluating, managing and controlling temporary and permanent changes.

The system should include, but not be limited to the following:

- Safe work procedures, practices or instructions;
- Facilities, layouts, statutory equipment;
- Statutory regulations and legislations;
- Load bearing parts or materials replacements on equipment; and
- Personnel appointments, trades and occupations.
The procedure should institute a systematic evaluation of the possible hazards or concerns arising from the change, and ensure that appropriate measures are put in place. A plan that clearly specifies the timeframe for the change and any control measures to be implemented should be developed.

The plan should be approved and authorised by the person responsible for the change. Any deviation, changes or extension required for the implementation of the plan should be subjected to review and authorisation by the appointed personnel responsible for the change.

5.4.6.21 Evaluation, Selection and Control of Contractors

The shipyard should establish a system to evaluate the safety performance of prospective contractors, select competent contractors who meet the safety requirements and expectations before contracting the works; and control the contractors' safety performance standards to ensure that all contractors working in the shipyard are aware of their safety obligations.

Evaluation of Contractors

The shipyard should establish procedures to evaluate the contractors' safety performance and competency. The result of these evaluations should be used as a criterion in the selection of contractors. The procedures should include, but not be limited to evaluating the contractor based on the following criteria:

- Contractors' safety policy and management commitment to safety;
- SHE risk management capability;
- Attainment or certification to SHE Management Standards such as SS 506, OHSAS 18001, ISO14001, ISO9000 and/or bizSAFE levels;
- Technology, engineering skill and competency available and deployed;
- Training, qualification and experience of managers, supervisors and workers;
- Robustness of control measures, including safe work procedures, to be used for the job;
- Safety plan, targets and objectives;
- Maintenance and state of all machinery and equipment;
- Effectiveness in communications;
- Safety track records.

Selection of Contractors

The shipyard should establish procedures to select contractors based on their ability to meet safety requirements. The procedures should include:

- Maintaining a list of approved contractors;
- Selecting bidders who are competent to carry out the work on a particular contract;
- Checking on the quality and safety aspects of their work before issuing an invitation to tender;
- Defining contract conditions, including safety-related aspects of the work and the relationship of contract personnel to the company's personnel, particularly identifying the company's supervision team responsible for their work. The written contract or agreement should stipulate the specific safety requirements for the contractors;
- Taking account of past safety performance, in addition to cost and deliver capabilities;
- Safety induction training of successful bidders and their personnel;
- Monitoring safety performance; and
- Applying consistent standards of discipline for contractors and employees.

Control of Contractors

The shipyard should establish procedures to effectively monitor and control the safety performance of contractors within its premises and ensure the safety requirements as specified in the written agreement are implemented.

The procedures should include:

- Monitoring the overall safety performance and management commitment of contractors;
- Conducting periodic inspections to ensure contractor's compliance with safety requirements;
- Verifying safety training records of contractors;
- Maintaining and monitoring incident statistics of contractors; and
- Maintaining a list of approved contractors who have regularly complied with the safety requirements.

5.4.6.22 Maintenance

General provisions can be found in Part IV of the WSH Act, stipulating that employers (under Section 12(3)(a)) and principals (Section 14(4)(a)) have the duty to, not only provide, but also maintain for those persons at work an environment which is safe, without risk to health, and adequate as regards facilities and arrangements for their welfare at work. Occupiers, employers, self-employed, principals, and other responsible persons also need to fulfil their general duties of ensuring safety and health of persons at the workplace. As such, they have to maintain the machinery, equipment, plant, article or substance at the workplace so that they continue to be in good condition and safe to operate or for use.
Hazards
Injury or damage from in service plant and equipment not adequately maintained.
Plant and equipment which are not adequately maintained may fail in service, e.g. vehicles, cranes and lifting equipment, compressed air and gas equipment, etc. This is especially serious on safety-critical items, which could endanger personnel, plant, vessels or, production in case of failure. Safety critical items should be given particular attention in the maintenance programme.

Procedures

Maintenance Regime
The WSH (General Provision) Regulations specifies ‘maintenance regime’ an element to be included in the safety management system. The shipyard should establish a maintenance programme to ensure safe and efficient operation of hand tools, machinery and equipment used in the shipyard. This maintenance programme should apply to hand tools, machinery and equipment owned by all suppliers and contractors. This procedure must include provision for inspection and certification where necessary. Contractors must also demonstrate that equipment for which they are responsible are properly maintained and, where applicable, certified.

Establishment of Maintenance Regimes
• The shipyard should establish preventive maintenance procedures or programme to ensure safe and efficient operation of machinery and equipment owned and used in the shipyard.
• The maintenance programme should also ensure suppliers and contractors have a preventive maintenance programme for the equipment provided and used by them.
• The maintenance programme should cover the repair, maintenance of machinery, equipment and hand tools specified under the WSH Act and its subsidiary legislation, relevant Code of Practices, Singapore Standards, and manufacturer’s specifications.
• The development and documentation of the maintenance programme should include, but not be limited to the following:
  - A list of the machinery and equipment;
  - Schedule of inspection and maintenance;
  - Procedure for breakdown repair; and
  - Record of inspection and maintenance.
• The maintenance programme should take into consideration the safety and health exposure of personnel carrying out the maintenance work. It should incorporate safety precautionary measures such as lock-out / tag-out procedures, permit-to-work system, job safety analysis, etc.
• The maintenance programme should take into consideration that the materials used in the maintenance of equipment continue to meet design specifications, and any substitution of materials shall be appropriately reviewed before use.

Training and Competency for Maintenance Works
The shipyard should ensure that the maintenance personnel are trained and competent in the relevant work practices and maintenance procedures. Where applicable, permit-to-work should be implemented on maintenance works similar to normal operations.

Maintenance Records
The shipyard should document and maintain records of all inspections, maintenance and repairs carried out by both in-house personnel and external parties.

Corrective Actions
After the maintenance operations, all faults and repairs that are required to be performed should be recorded with the appropriate follow-up actions and details of such actions to be taken to rectify the faults and repairs.
• The shipyard should establish a maintenance programme to ensure that hand tools, machinery and equipment, and working environment are kept in good condition and safe during operation.
• Equipment such as boilers, furnaces, waste treatment and disposal facilities, etc. should be properly maintained to ensure efficient operation and avoidance of catastrophic failure for minimisation of pollution.
• Maintenance regime should also be applicable to suppliers and contractors. They should also have a preventive maintenance programme for the equipment provided and used by them.
• Risk assessment should be conducted and appropriate measures taken to control risks during maintenance work. Measures such as lock-out / tag-out procedures, permit-to-work system, etc. should be incorporated into the maintenance programmes.
• During maintenance, code of practice CP 91: 2001: Code of Practice for Lockout Procedure is applicable to prevent inadvertent turning on of energy sources.
• The materials used in the maintenance of equipment should continue to meet design specifications. Any substitution of materials should be appropriately reviewed and approved before use.
The maintenance programme should include, but not be limited to the following:
- A list of machinery and equipment;
- Schedule of inspection and maintenance;
- Procedure for breakdown repair; and
- Record of inspection and maintenance.

5.4.6.23 Control of Hazardous Materials

The main risks associated with materials encountered in shipyards are flammability (risk of injury or damage); and toxicity (health risk). Some hazardous materials encountered are brought in for use by shipyard or ship’s crew, while others are residues remaining from cargoes or ship’s systems (hydraulic oil, cargo oil, fuel oil, etc.).

Hazardous Residues and Structural Materials

The main substances in this category are:
- Hydrocarbon - cargo, fuel, lubricating or hydraulic oil in tanks, pipe-work, valves, pumps, beneath rusty scales on bulkheads, pipes and insulation areas;
- Oily water in bilges;
- Contaminants such as mercury or hydrogen sulphide; and
- Asbestos insulation or friction materials;
- Petroleum cargo and oil tanks are potentially hazardous when the residual oil trapped in the sludge or lying behind scale evaporates due to a rise in temperature or when the surface has been disturbed. The pump rooms may have petroleum vapour due to leakage from pumps, pipelines or valves. The hazardous effect will depend mainly on the concentration and nature of the substance present.

The table below is a rough guide on the effects of various exposure duration to different concentrations of petroleum vapour:

<table>
<thead>
<tr>
<th>Hydrocarbon</th>
<th>% v/v in air</th>
<th>Time</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude oil, motor gasoline, jet fuel, kerosene, naphtha, white spirit, gas or diesel oil, heavy fuel oil</td>
<td>0.05 (500 ppm)</td>
<td>8 hours</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>0.20 (2000 ppm)</td>
<td>30 minutes</td>
<td>Giddiness and irritations</td>
</tr>
<tr>
<td></td>
<td>1.0 (10 000 ppm)</td>
<td>10 minutes</td>
<td>Loss of consciousness</td>
</tr>
<tr>
<td></td>
<td>2.0 (20 000 ppm)</td>
<td>-</td>
<td>Death</td>
</tr>
</tbody>
</table>

Hazards

Fire and Explosion

The hazard of hydrocarbons is greatest with the more volatile petroleum products. An accumulation of petroleum vapour in cargo tanks, pump rooms or any confined spaces in the presence of a source of ignition may result in an explosion or fire. The flash points of some hydrocarbons are given in the following table:

<table>
<thead>
<tr>
<th>Hydrocarbon</th>
<th>Flash Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil</td>
<td>- 40 to 200°F</td>
</tr>
<tr>
<td>Motor Gasoline</td>
<td>- 50°F</td>
</tr>
<tr>
<td>Jet Fuel</td>
<td>95°F to 145°F</td>
</tr>
<tr>
<td>Kerosene</td>
<td>100°F (min)</td>
</tr>
<tr>
<td>Naphtha</td>
<td>&lt; 0°F</td>
</tr>
<tr>
<td>Diesel Oil</td>
<td>100°F (min)</td>
</tr>
<tr>
<td>Lubricating Oil</td>
<td>300°F</td>
</tr>
</tbody>
</table>

Sources of Ignition
Hot work due to direct or indirect heat penetration, sparks from welding, cutting and grinding, and lighted cigarettes and cigarette butts.

Skin Disease
Contact with some hydrocarbons can result in skin disease.

Toxic Effects
Some substances which may be present in residues are toxic. The hazard of hydrogen sulphide is particularly serious, exposure to a concentration of 700 ppm will result in paralysis of the nervous system and death is likely within a few minutes.

Procedures
The permit-to-work system (see Section 4.4.6.3 on Permit-to-Work) is designed to ensure that the workplace is free of such hazards and must be adhered to rigorously. It should be supported by operational procedures, practices and safety rules.

Mitigation
There must also be provision to deal with incidents:
- Emergency procedures to deal with fire, explosion, etc.;
- Stand-by man to monitor the well-being of a person in a potentially hazardous location, particularly confined spaces;
- Trained first aiders and access to medical services; and
- Provision of suitable breathing apparatus, reviving apparatus and rescue equipment.

Hazardous Substances Used in Shipyards

Hazards

Chemical
These include toxins, asphyxiants, caustic, dust and fibres that may be allergenic or carcinogenic, and other health-damaging chemicals.

Physical
Physical hazards to health include noise, vibration and radiation. They also include high and very low temperature, and excessive or inadequate lighting.

Biological
Biological, hazards arise from such sources as water storage, unhygienic food handling and damage to the skin from chemicals.

Procedures
Where these hazards are present, the company must have a means for:
- Identifying the hazards which exist;
- Assessing the degree of risk associated with each hazard; and
- Evaluating the acceptability of the risk.

Taking the appropriate action to eliminate the hazard, mitigate its effects, or protect personnel and the workplace against the hazard.

The procedures should cover:
- Approval of the materials for receipt into the yard, including materials required by ship's crew and to be used on board;
- Contract details, including the provision of a Safety Data Sheet;
- Receipt into the shipyard of hazardous materials;
- Transport;
- Storage;
- Handling;
- Use; and
- Disposal.

A list of common hazardous materials is shown in Annex E-10.

Establishment of Hazardous Material Control Programme
The shipyard should establish a hazardous material control programme which should include but not be limited to the following:
- Procedures for approving the acquisition, receipt, transporting, storage and use of hazardous materials by all in the shipyard;
- Any person who brings any hazardous substance into a shipyard or on board a ship in a harbour should obtain approval to do so from:
  - In the case of a shipyard, the occupier of the shipyard; and
  - In the case of a ship in a harbour, the master, owner or agent of the ship. ("hazardous substance" means any hazardous substance specified in Part II of the Fifth Schedule to the Act.)
• Appointment of competent person to receive such materials and ensure its safe storage, movement and use;
• Maintenance of a register of hazardous materials held or used on site, supported by Safety Data Sheets (SDS), which should contain accurate and adequate information on the composition, physical and chemical properties of the material, and instruction for safe handling, storage, use and disposal. The register should show:
  - Identification (including generic or trade name);
  - Safeguards to be applied in the transportation, storage, handling and use of the hazardous materials;
  - Maximum quantity stored, and
  - Emergency measures to be taken including medical first aid in the event of an incident occurring in the handling or use of the hazardous materials.
• Establishment of procedures for labelling, storage, issue, distribution, movement and use;
• Communication of the hazards associated with the hazardous materials by the competent person to the users. This should include provision of instructions to the users, personal protective equipment, and correct method of transportation;
• Designation of storage areas which should be suitable for the materials and secured against unauthorised access. The hazardous materials should be returned to the designated storage areas when not in use; and
• Establishment and implementation of procedures for disposal of hazardous materials which should be carried out in accordance with statutory requirements or manufacturer’s recommendations.

The typical procedures for the acquisition and control of hazardous materials are shown below:

<table>
<thead>
<tr>
<th>Supervisor, Engineer</th>
<th>Request chemical with justification.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager, Ship's Master</td>
<td></td>
</tr>
<tr>
<td>Safety Department</td>
<td>Assess need for this substance.</td>
</tr>
</tbody>
</table>

If risk is low or there is no satisfactory alternative,

<table>
<thead>
<tr>
<th>Safety Department</th>
<th>Issue approval along with conditions, if necessary.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchasing Department</td>
<td>Issue order along with conditions, especially SDS.</td>
</tr>
<tr>
<td>Safety Department</td>
<td>Notify user, Security and Stores of substance, hazards, etc.</td>
</tr>
<tr>
<td>Gatehouse Security</td>
<td>Check goods agree with notification.</td>
</tr>
<tr>
<td>Gatehouse Security</td>
<td>Notify, Safety Department and user.</td>
</tr>
<tr>
<td>Safety Department</td>
<td>Check goods and approve if okay. Ensure all personnel affected know procedures, precautions and the means of storage, movement, use and disposal.</td>
</tr>
<tr>
<td>Safety Department</td>
<td>Include inspections to ensure hazards are properly controlled.</td>
</tr>
</tbody>
</table>

Safety Data Sheet

A material Safety Data Sheet (SDS) is provided by the manufacturer or supplier of a chemical to give information including:

- Chemical name, synonyms and trade names;
- Hazardous ingredients (% volume by volume or weight);
- Manufacturer’s and supplier’s name and address;
- Physical and chemical properties such as appearance, odour, melting point, boiling point, vapour pressure, density, and solubility;
- Fire and explosion data such as flash point, lower explosive limit, upper explosive limit, autoignition temperature, and fire-fighting measures;
- Health hazard information such as route of entry into body, acute effects, chronic effects, and recommended permissible exposure levels;
- First aid measures for eye or skin contact, inhalation and ingestion;
- Stability and reactivity data such as stable or unstable, decomposition products polymerisation, and incompatibility or conditions to avoid;
- Spill or leak procedures such as steps to be taken and waste disposal method;
- Exposure controls and personal protection such as hazard control measures, ventilation requirements, respiratory protection, skin and hand protection, and other protective appliances;
- Special precautions such as handling precautions, storage-precautions, and others;
- Other information, for example, name and designation of person who prepared the SDS, sources of key data, and date of issue of the SDS.
Asbestos

Hazards
Lung Disease
Inhaling asbestos fibres can lead to serious and frequently terminal illness. It was widely used as an insulating material and also for friction surfaces like brake shoes and pads.

Procedures
Where work has to be done which has a risk of disturbing asbestos, for example, by drilling or removing plates, the company must have procedures for the work. The essential safeguards include:

- The Factories (Asbestos) Regulations and MOM’s Guideline for handling asbestos must be adhered to;
- Notification to Department of Occupational Health within 28 days;
- The work should be carried out in a ‘habitat’, an enclosure which retains the asbestos dust and filters the ventilation air before releasing it to the atmosphere;
- The operators must use full body protective coveralls and breathing apparatus; and
- All residual dust must be cleaned up by a suitable vacuum cleaner.

Mercury

Tanks which have contained crude oil or condensate in floating storage units or offtake tankers may be contaminated with mercury.

Hazards
Mercury Poisoning
The results of inhaling mercury compounds include:

- Fever, chills, tiredness, breathlessness and chest pain;
- Burning pain in the mouth and stomach;
- Inflammation of the lungs;
- Diarrhoea;
- Vomiting, and ultimately collapse; and
- Kidney damage, leading to death.

Procedures
The following measures should be included in the procedures for companies in which workers are exposed to this risk:

- Test the surfaces and atmosphere before and during work, particularly hot work. If necessary, grit blast the surfaces to clear any mercury deposit;
- Train all workers close to blasting, hydro-washing, cleaning and hot work in contaminated tanks in the proper use of respirators;
- Use respiratory protection when working in these areas;
- Aid-fed mask for those conducting blasting operations;
- Particulate masks and disposable suits for those involved in cleaning grit and blasting debris;
- During blasting operations, take samples of dust to monitor the cumulative exposure;
- Hydro-wash cargo oil tanks after blasting and cleaning before hot work;
- Carry out tests to ensure that the National Environmental Agency standards are complied with:
  - Leachate test of spent grit prior to disposal; and
  - Water analysis after hydro-washing to verify that contaminant levels meet disposal requirements.
- During hot work, test the vapours produced with a mercury analyser to ensure that mercury levels are below the threshold limit value of 0.025 ppm;
- Use air blowers with trunking and air extractors in each tank where hot work is being carried out to prevent an accumulation of vapour;
- Screen the workers involved in or close to the operations to detect mercury poisoning and to ensure that protection measures are adequate;
- If a worker is exposed to mercury fumes or vapour, he or she should be given a thorough medical check.

Lead in Paint
Similar precautions to those for mercury should be taken when carrying out hot work on materials which have been treated with paint containing lead.

5.4.6.24 Control of Occupational Health Hazards
Occupational health issues should be controlled and managed similar to that of safety issues. The approach is similar to that for safety: identification of health hazards, evaluating the associated risks, implementing control measures to minimise the risks, monitoring the control measures, work place environment as well as health surveillance of persons exposed to agents which may be injurious to health.
Types of Hazards and Control

Chemical
- Fumes, gases, vapours, mists and liquids.

Physical
- Dust and powder, fibres, noise, vibration, lighting, temperature, pressure and radiation.

Biological
- Bacteria, viruses, moulds and fungi.

Ergonomic
- Psychological - especially stress, and physiological-working position, conditions.

The hierarchy of control: Elimination, Substitution, Engineering Control, Administrative Control followed by Personal Protective Equipment is also applicable here, as for safety. The management of occupational health typically covers areas of worker health significance, including but not limited to the following subjects or areas:

Chemical Hazard Control

Where hazardous chemicals are used or produced the occupier should appoint a designated person to co-ordinate a programme to control chemical hazards. The programme should cover the health and safety aspects of the transport, storage, handling and use of all hazardous chemicals within the company. The occupier should keep a register or a list of all hazardous chemicals used or produced in the company. This register should at least contain the inventory and location of use of the chemicals.

The occupier should obtain or prepare Safety Data Sheets (SDS) for all the chemicals listed in the register. He should assess all relevant information in the SDS and take the necessary precautionary measures to ensure the protection of workers. He should also ensure that the SDS are readily accessible to all workers who are exposed or have the potential of exposure to the chemicals. Such workers must be fully informed of the hazards and the precautionary measures.

The chemical hazard control programme should also cover the following:
- Selection and procurement procedures;
- Proper storage of chemicals;
- Proper labelling of containers;
- Safe handling procedures;
- Engineering control measures;
- Environmental monitoring;
- Medical surveillance;
- Personal protection equipment and appliances; and
- Emergency and first aid procedures.

The procedures for the above should be in writing, and proper documentation maintained. The responsibility for control of hazardous chemicals lies with the employer or the occupier of a factory. Essentially, the occupier or employer should identify those exposed employees and access the risk of exposure. If the risk is significant, appropriate control measures should be implemented to reduce the risk of exposure to as low a level as is practical. The control measures include elimination of the use of the hazardous chemicals, substitution with less hazardous chemicals, process automation, isolation or enclosure, installation of local exhaust ventilation or applying dilution ventilation or other engineering controls.

Hearing Conversation

A Hearing Conversation Programme (HCP) should be established and implemented for workers who are exposed to excessive noise (above 85 dBA over an 8-hour period). The objective of a HCP is to minimise the risk of hearing loss as a result of exposure to excessive noise. The programme should have the following key elements:
- Regular monitoring of noise levels for identification of noise sources and exposed workers;
- Reduction of noise exposure levels through engineering and administrative control measures where feasible;
- Selection and provision of hearing protectors and supervision of their usage; and
- Periodic audiometric examinations of exposed workers for early detection of hearing loss.
- Training and health education of workers on the hazards of noise and its prevention.

A responsible staff member should be in-charge of the programme. Each component activity could be delegated to a particular person. Written procedures should be drawn up and relevant records should be kept. The programme should be evaluated from time to time and targets set.
Industrial Ventilation

Local exhaust ventilation (LEV) systems are widely used to remove airborne contaminants such as toxic gases, vapours, dusts, fumes and mists from industrial operations and processes. A LEV system usually consists of exhaust hoods and ducts, an air-cleaning device and a fan and motor. A proper design of a LEV system is essential for the effective removal of airborne contaminants that would otherwise pollute the work environment resulting in occupational health hazards. The engineering drawings of a LEV system and the design specifications e.g. capture velocity, duct velocity, exhaust rates, fan capacity and fan static pressure should be kept for reference.

A new LEV system should be tested to check whether the design specifications are met.

Existing LEV systems should be maintained and tested regularly to ensure acceptable performance. Tests can be performed by using smoke tubes, anemometers, manometers and pilot tubes. Records of checking and testing performed should be kept.

Persons involved in the design or vetting of design, testing and maintenance of LEV systems should receive appropriate training.

Quality of Breathing Air

The quality of breathing air requires:

- The use of a separate compressor from that used for other purposes such as abrasive blasting unless the breathing air is suitably treated;
- A suitable type of compressor, preferably not oil lubricated;
- If an oil-lubricated compressor must be used, suitable filters on the compressor outlet to remove contaminants like ‘oil mist and particulates;
- A filter system to remove harmful gases, particularly CO and CO₂;
- A maintenance programme to ensure that the filters continue to function efficiently; a carbon monoxide monitor and alarm system to warn if CO is present above a threshold concentration; and
- Separation between the exhaust of any internal combustion engine and the compressor intake to avoid carbon monoxide in the air stream.

The acceptable limits for indoor air contaminants and physical factors are as follows:

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide</td>
<td>10 ppm</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Ozone</td>
<td>0.05 ppm</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>0.1 ppm</td>
</tr>
<tr>
<td>Volatile Organic Compounds</td>
<td>3 ppm</td>
</tr>
<tr>
<td>Bacterial Count</td>
<td>500 cfu/m³ *</td>
</tr>
<tr>
<td>Fungi Count</td>
<td>500 cfu/m³ *</td>
</tr>
<tr>
<td>Suspended Particulate Matter</td>
<td>0.15 mg/m³</td>
</tr>
<tr>
<td>Temperature</td>
<td>22.5 – 25.5 ºC</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>&lt;= 70%</td>
</tr>
<tr>
<td>Air Movement</td>
<td>&lt;=0.25 m/s</td>
</tr>
</tbody>
</table>

Source: MOM Guidelines on Office Ergonomics
* cfu = colony forming unit

Industrial Hygiene Monitoring

Occupiers have the responsibility to ensure that no persons at the workplace are exposed to toxic substances in excess of level as specified in the Schedule Five, WSH (General Provisions) Regulations. This is also discussed in section 5.5.1.2 of this manual.

An industrial hygiene monitoring programme (IHMP) should be established to achieve the above objective. The scope of the IHMP should be defined in writing. The programme document should include the following:

- Objective;
- Sampling methodology;
Sample preparation;
Instrument calibration;
Sampling procedures;
Sample collection;
Sample analysis;
Sampling strategies;
Location of monitoring;
Duration of monitoring;
Size of sampling; and
Frequency of monitoring.

An important aspect of the IHMP is the valid interpretation of the data collected on a continuing basis. The individual responsible for the IHMP should be qualified by training and experience in the practice of industrial hygiene monitoring.

A record of the result of every monitoring should be kept available for at least 5 years.

Medical Surveillance

Under the Factories (Medical Examinations) Regulations, workers are required to undergo preemployment and periodic medical examinations if they are employed in any hazardous occupations involving the exposure to excessive noise or list of substance stipulated therein (such as arsenic, asbestos, benzene, cadmium, raw cotton, lead, manganese, organophosphates, silica, etc.)

The objective of medical monitoring and supervision is to detect early signs of over-exposure to toxic chemicals or noise and thus help to prevent occupational diseases.

A medical surveillance programme should be established to achieve the above objective. The programme should include the following:

- Identification of the exposed workers;
- Arrangement for medical examinations;
- Evaluation of the results of medical examinations; and
- Maintenance of medical records.

Respiratory Protection

Workers who are exposed to a significant level of airborne contaminants e.g. toxic dusts, fumes, mists, gases and vapours should be protected by wearing respirators. This is complementary to environmental control measures taken.

There are basically two categories of respirators: air-filtering type (e.g. dust mask and chemical cartridge respirator) and air supplied type (e.g. air-line respirator and self contain breathing apparatus). Each respirator has its applications and limitations. To ensure that workers are adequately and effectively protected, a Respiratory Protection Programme (RPP) should be established.

The key elements in the RPP are:

- Regular monitoring of exposure levels to airborne contaminants to identify the need of respiratory protection;
- Selection of suitable types of respirators;
- Training and health education of workers on the proper use of respirators;
- Fit testing of respirators to ensure proper fit during issuance of respirators;
- Supervision of and checking the usage of respirators; and
- Maintenance of respirators.

In addition, appropriate signs should be displayed in areas where respiratory protection is required.

Confined Space Work

A confined space is a space with limited access, poor natural ventilation and lighting. It is not meant for continuous work.

The potential hazards in confined space work fall into three main categories:

- Lack of oxygen which can cause suffocation;
- Presence of flammable gases or vapours which can cause fire and explosion; and
- Presence of toxic gases or vapours which can cause health effects and poisoning.

Other dangers such as electrical and mechanical hazards, poor illumination level and adverse thermal environment may be encountered in confined, space work.

To minimise or eliminate these hazards, written procedures for confined space entry should be established, taking the following into consideration:

- Isolation of the confined space from other systems;
- Purging of space and providing mechanical ventilation;
- Testing for oxygen level, flammable and / or toxic gases and vapours;
- Administering a permit-to-enter system;
- Documenting the work practices and procedures;
• Providing safety equipment and appliances;
• Planning an emergency rescue procedure; and
• Training of workers on the health and safety aspects of confined space work.

Manual Handling

Manual handling is responsible for injuries, particularly back pain and trapped hands and feet. Companies should ensure that those involved in manual handling of heavy loads:

• Know how to lift without causing injury;
• Use mechanical assistance when the size or weight of the load requires it;
• Use kinetic techniques to facilitate the operation; and
• Use tag lines instead of hands and feet to guide loads being lifted by crane, pulley block or hoist.

Contract Work

Most companies engage contract workers to do maintenance work during shutdown or turnaround periods. Some companies engage contract workers to carry out routine unskilled work or other specialised projects.

Most contract work and projects are potentially hazardous. Due to the mobility of contract workers and the tight schedule of contracts, the safety and health aspects of the work are often overlooked. Hence accidents involving contract workers are not uncommon. Management should set up a system to ensure that contract work is carried out safely within the company.

First Aid Facilities

First aid is provided to mitigate the severity of injury and to preserve human life. More detailed discussions are included in section 5.4.7.6 on first aid.

Expert Advice

The Company should have access when necessary to occupational health matters including the following:

• Review the conditions in the shipyard;
• Carry out industrial hygiene monitoring such as measurements of exposure to air-borne contaminants, exposure level and received doses for physical agents such as noise, radiation, etc.;
• Assess concentration, noise level, etc. against tolerable limits; and
• Recommend action if required.

5.4.7 Shipyard and On-board Emergency Preparedness and Response

5.4.7.1 Principles of Emergency Planning and Response

The main principles of emergency response are:

• Procedures cannot be prescribed for all possible situations. The procedures are aimed at getting information quickly to the person responsible for managing the response and mobilising assistance;
• Emergency response consists of:
  - Decision-making based on the situation at the time;
  - Notification of external authorities including Singapore Civil Defence Force (SCDF) or Police to mobilise assistance, particularly fire-fighting, ambulance, crowd control, press, etc., and
  - Mobilisation of internal resources such as fire-fighting appliances, ambulance, first-aiders, stretcher parties, divers as appropriate, etc.
• An emergency is likely to consist of several different events at the same time. For example, an explosion may result in multiple injuries, people in the water, danger of sinking or capsizing, and danger to adjacent facilities or ships.
• Emergency response is a combination of:
  - Physical action such as fire-fighting, rescue, recovery of property;
  - Local direction to mobilise assistance; and
  - Management support to deal with major decisions, and with the outside authorities and interested parties.
• The company's priorities are to:
  - Prevent incidents, by defining and implementing its safety management system, carrying out risk assessment and control, ensuring that people are trained and motivated, maintaining equipment and its protective systems, and so on;
  - Detect a condition which could develop into an incident, for example, by gas detection, fire detection, reporting hazards;
  - Mitigate the effects of an incident if it should occur, for example, by providing fire-fighting equipment and personnel trained in its use at the site of hot work; ensuring that personnel are aware of the action they should take on detecting an incident, such as man overboard;
  - Restore operations as quickly as possible to minimise the disruption to ship owners, the company and the workers.
5.4.7.2 Identification of Types of Emergency

The company must identify the potential types of emergency situations that may arise from its operations and establish response to such situations. Such emergency situations may include:

- Fire and explosion;
- Gas escape;
- Oil or chemical spill;
- Structure collapse or loss of stability;
- Collision, capsise or sinking;
- Transport emergency;
- Accident flooding of dry dock or floating dock;
- Man overboard;
- Criminal acts;
- Medical emergency; and
- Epidemic sickness.

5.4.7.3 Emergency Response Procedures

The Singapore Civil Defence Force provides guides on drawing fire emergency plans on its websites. A sample is attached in Annex F for a typical format on fire emergency plan for an industrial site.

Emergency response procedures may comprise the following:

a) Alarms and Mobilisation

The means of raising an alarm should be explained. This leads to the mobilisation of the resources to deal with the emergency.

The means of raising an alarm may include:

- Activating fire alarm at call point;
- Raising siren;
- Calling security or emergency response organisations; and
- Shouting for help.

b) Actions on Specific Type of Incident

i) Fire or Explosion

The procedures for fire or explosion will depend on the extent to which the shipyard has available fire-fighting resources on site. It should include:

- Liaison with and assistance to the emergency services, for example by providing escorts to the location of the incident;
- Treatment of any injured personnel; and
- Shut-down of operations affected.

ii) Gas Escape

The procedures for gas escape should include:

- Identification of the nature of the gas and its source;
- Isolation of the source;
- Shut-down of all hot work in the vicinity;
- Ventilation of confined spaces potentially affected, using flameproof equipment;
- Gas testing to verify that the area is clear for work to re-commence.

iii) Oil or Chemical Spill

The procedures should include the following:

- Identification of the nature of the spill and its source;
- Assessment of the hazards associated with the substance spilled;
- Isolation of the source, taking care to protect personnel exposed to the hazard;
- Notification to the MPA;
- Mobilisation of limitation measures, including floating boom, dispersant or other means in consultation with the MPA; and
- Notification of the environment authority if the spill is on land and particularly if it is likely to affect drains or water-courses.

iv) Structural Collapse or Loss of Stability

On notification of potential or actual structural collapse or loss of stability, affecting a building, crane, vessel or other structure, the procedures should include:

- Making the area safe for personnel and placing barriers to prevent access to all but essential personnel;
- Treatment of injured personnel;
- Assessing the situation and deciding the appropriate action; and
- Informing the appropriate authorities and other bodies, particularly ship owner or agent.
v) Collision, Capsize or Sinking
An emergency afloat is a matter for the MPA who will take responsibility for the emergency response.

v) Transport Emergency
The procedures for a collision on land, affecting vehicles, crane, fixed structure or other asset should include:
• Rescue and treatment of injured personnel;
• Assessment of damage; and
• Notification of other parties involved, such as the owner of a vehicle.

vii) Accidental Flooding of Dry Dock or Floating Dock
The company’s safe operating procedures should include the precautions to be taken when docking or floating a vessel, including warning signals, visual checks, vessel preparation and moorings. In the event that a structural failure or premature flooding takes place, the emergency procedures should include:
• A warning signal to both ship and yard personnel;
• An assessment of the reason for the flooding - failure of the structure or the valve systems or improper operation of the systems;
• An assessment of danger to the vessel, particularly if the hull integrity is breached, e.g. at the propeller shaft stern tube or where plates have been removed;
• Rescue of personnel, whether on board, on scaffolding or on the dock floor;
• Action to arrest the flooding; and
• Action to make the vessel safe.

viii) Criminal Acts
Criminal acts include such events as:
• Personal attack;
• Unidentified object;
• Bomb threat; and
• Attack from outside the yard.

The procedures should be compiled in consultation with the Police.

x) Man Overboard
Procedures should include:
• A continuous watch to keep the person in view;
• A separate search and rescue, probably from a small craft;
• Mobilisation of resuscitation and medical assistance; and
• Notification to the MPA.

ix) Medical Emergency
Procedures should specify the action to be taken in the event of a medical emergency, arising from an accident (such as fall, amputation, overcome by gases etc.) or illness (such as heat exhaustion, heat stroke, heart attack etc.). This will include:
• First aid and medical assistance; and
• Briefing all relevant personnel on what to do in such a case, particularly that the injured person not be moved except by trained paramedics or medical experts.

xi) Epidemic Sickness / Flu Pandemic
There should be procedures for the early detection of such an epidemic, and response plan during an outbreak such as contact tracing, analysis to identify the source and action to isolate that source, quarantine actions, notification to the Ministry of Health etc. Companies should follow the recommendations and instruction as to the actions to be taken during a flu pandemic from the Ministry of Health. The guide: “A Flu Pandemic Business Continuity Guide for SME” has been developed and is available for download at the Ministry of Information, Communication and the Arts. It was developed using principles in the Business Continuity Management Technical Reference TR 19:2005, which was initiated by the Singapore Business Federation and supported by SPRING Singapore and the Economic Development Board. The Singapore Ministry of Health has come up with a Disease Outbreak Response System. The response plan allows a risk management approach appropriate to the transmissibility and virulence of the virus. A colour coding system is used to rate the stage of alert of the outbreak: green being the lowest lever of alert, followed by yellow, orange, red and black. Specific actions are recommended for each alert level. Depending on the mutation pattern of the virus, the intermediate colour codes may be skipped.

5.4.7.4 Emergency Organisation
The organisation which would be mobilised in an emergency must be defined. Action should be taken to ensure that all the personnel involved are properly trained in their respective emergency response functions. This involves:
• Managing on-scene action;
• Carrying out emergency response including notification of an incident, fire-fighting, first aid and rescue;
Management support including reporting to the authorities, partners, clients, owners, and other interested parties as well as handling inquiries from the news media and relatives of persons possibly involved;

Security who should control the access to the shipyard limiting this to the emergency services.

5.4.7.5 Emergency Response Resources

The extent to which a company invests in and maintains its own facilities for the combat of an emergency is largely a matter of policy, subject to legislation as outlined below:

**First Aid and First Aiders**

Section 5.4.7.6 on first aid contains guidance on the provisions for first aiders, first aid boxes and first aid rooms which are statutory requirements.

**Lifting Cages**

The use of lifting cages is subject to Regulation 120 of the Factories (Shipbuilding and Ship-repairing) Regulations. The use of a lifting cage has particular hazards such as injuries to hands if an occupant holds the outer rail or injuries resulting from swinging. The company should ensure that this type of operation is properly supervised and regulated.

**Rescue Operations**

The resources available for rescue include:

- Rescue from the sea - flotation devices, small craft, radio, facilities available from the MPA;
- Rescue from a vessel or workshop - stretchers and trained stretcher parties, first aiders, medical and other assistance from the external emergency services.

**Fire-fighting**

The company must make provisions for means of escape and effective warning devices in case of fire (Section 38 of WSH (General Provisions) Regulations).

- The provision for fire protection and means of escape for fire should follow that as stipulated by the SCDF Fire Code (2007) and the Singapore Standards and Code of Practices mentioned therein.
- Some of the fire emergency-related Singapore Standards and Code of Practice include:
  - **CP 10 : 2005**: Code of practice for the installation and servicing of electrical fire alarm systems;
  - **CP 45 : 1989**: Code of practice for Halon 1301 fire protection systems;
  - **CP 52 : 2004**: Code of practice for automatic fire sprinkler system;
  - **SS 299 - 1 : 1998**: Fire resistant cables - Performance requirements for cables required to maintain circuit integrity under fire conditions;
  - **SS 332 : 2007**: Specification for fire doors;
  - **SS 489 : 2001**: Fire shutters; and

Some shipyards provide mobile fire appliances as a first line of defence but in all cases, the reliance is on the SCDF. Portable fire extinguishers and hose-reels are the basic resources for general fire-fighting response in the first instance.

**Search Operations**

Search parties may be assembled from groups of personnel acquainted with the area to be searched.

This could include:

- Work parties familiar with specific ship projects;
- Divers for underwater searches; and
- Workshop personnel for searches in their work-places.

In the event of a bomb threat, the search may be a company’s responsibility and should be carried out by personnel familiar with each area within the scope of the search, subject to guidance from the SCDF and the Police.

5.4.7.6 First Aid

The WSH (First Aid) Regulations require the provision of first aid boxes, first aiders, a first aid room (where more than 500 persons are employed) and facilities for treatment.

Companies must have a scheme to ensure that first aiders qualifications are kept up-to-date by retraining at intervals not longer than 3 years.
The requirements for trained first aiders, first aid boxes and a first aid room are as follows:

**First Aiders**

For a shipyard with 26 to 100 workers, there must be at least one first aider.

For every additional 100 workers or part thereof, there must be another one first aider.

The ratio of first aiders listed above is applicable to the first aiders available in each work shift.

First aiders must:
- Be trained in an approved course to the standard defined in the WSH (First Aid) Regulations; and
- Record and maintain all records of all the treatment that they rendered.

**First Aid Boxes**

First aid boxes must be provided in numbers which depend on the physical layout of the shipyard and the number of workers employed. There should be at least one first aid box or container on each floor of a building. The minimum number of first aid boxes is listed in the legislation. The number of boxes is as follows:

<table>
<thead>
<tr>
<th>Number of Workers</th>
<th>Minimum Number and Type of Boxes or Containers</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 or less</td>
<td>One box (Type A)</td>
</tr>
<tr>
<td>Every 50 workers</td>
<td>One box (Type B) = Two boxes (Type A)</td>
</tr>
<tr>
<td>Every 100 workers</td>
<td>One box (Type C) = Two boxes (Type B)</td>
</tr>
</tbody>
</table>

The minimum contents of these boxes are also defined in the legislation as shown in the table below.

<table>
<thead>
<tr>
<th>Contents</th>
<th>Box A</th>
<th>Box B</th>
<th>Box C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Individually wrapped sterile adhesive dressings</td>
<td>20</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>2. Crepe bandage 5 cm</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3. Crepe bandage 10 cm</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>4. Absorbent gauze (packet of 10 pieces)</td>
<td>5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>5. Hypoallergenic tape</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6. Triangular bandages</td>
<td>4</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>7. Scissors</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>8. Safety pins</td>
<td>4</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>9. Disposable gloves (pairs)</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>10. Eye shield</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>11. Eye pad 2 4 6</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>12. Resuscitation mask (one-way)</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>13. Sterile water or saline in 100 ml containers</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>14. Torchlight</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

First Aid boxes must be:
- Properly maintained;
- Checked frequently to ensure that it is fully equipped;
- Filled with content whereby all the items in it are usable;
- Clearly identified as a first aid box;
- Placed in a location that is well-lit and accessible;
- Under the charge of a person appointed by the occupier of the workplace; and
- Kept with nothing else but the appliances or requisites for first aid listed in the above table.
First Aid boxes should be made of sturdy material and must be portable so that they can be taken to the site of an accident. Persons at work should be informed of the location of all the first aid boxes. The first aid boxes should contain at least the minimum contents as specified in the above table.

**First Aid Room**

Where more than 500 workers are employed, there must be a first aid room. In addition, a few chairs should be provided close to the first aid room for workers waiting for treatment.

The first aid room should be equipped with the following:

- Sink with running potable water;
- Paper towels;
- Smooth-topped working surfaces;
- Adequate supply of sterile dressings and other materials for wound treatment;
- Stretcher;
- Splints;
- Clinical thermometer;
- A couch with pillow and blanket;
- A suitable store for first aid equipment, e.g. stretchers, wheel chairs;
- Soap and nail brush;
- Clean garments for use by first aiders; and
- Suitable refuse container.

**First Aid for Exposure to Toxic or Corrosive Substances**

In shipyards where there may be risks of exposure to toxic or corrosive substances, provisions must be made for the emergency treatment of the person if so required by the Commissioner. Where the eyes or body of any person in a workplace may come into contact with toxic or corrosive substances, suitable facilities such as emergency shower and eye-wash must be provided for quick drenching or flushing of the eyes and body.

**5.4.7.7 Notification of an Emergency**

The emergency plan should include procedures for the notification to internal and external parties about the occurrence of incidents and emergency situations.

Internal notification may include:

- Senior management;
- Crisis management team; and
- Corporate management.

External notification may include:

<table>
<thead>
<tr>
<th>Emergency Incident</th>
<th>Government Agency to Notify</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dangerous occurrence as listed in the Second Schedule, WSH Act. (The list of</td>
<td>MOM</td>
</tr>
<tr>
<td>dangerous occurrence can be found in Section 5.5.2.1.a of this Manual)</td>
<td></td>
</tr>
<tr>
<td>Incidents that involve spill or release of hazardous substances having off-site</td>
<td>NEA</td>
</tr>
<tr>
<td>impact.</td>
<td></td>
</tr>
<tr>
<td>Fire</td>
<td>SCDF</td>
</tr>
<tr>
<td>Criminal act, bomb threats</td>
<td>Police</td>
</tr>
<tr>
<td>Building structural-related</td>
<td>Building Control Department</td>
</tr>
</tbody>
</table>

Requirements on incident reporting are also discussed in section 5.5.2.1 on Incident Report of this Manual.
5.5 Checking and Corrective Actions

5.5.1 Performance Measurement and Monitoring

Companies should identify and set key performance parameters to measure SHE performance.

These parameters may include:

- Both qualitative or quantitative measurements;
- Proactive in measuring compliance, operation criteria and management programmes performances;
- Reactive in measuring incident, accident and illness rates or other deficiencies in SHE performances;
- Monitoring the extent to which the SHE objectives are met; and
- Monitoring and measurements that facilitate preventive and corrective actions.

Where equipment and instruments are used for monitoring, they should be properly maintained and calibrated.

Equipment and instruments brought by contractors to the shipyard must also be subjected to the same requirements.

5.5.1.1 Proactive and Reactive Monitoring

Examples of proactive monitoring include:

- Number of workers trained in SHE;
- Effectiveness of SHE training;
- Number of promotional campaigns done;
- Employees participation in promotional campaigns and SHE programmes;
- Number of risk assessments conducted;
- Extent to which risk control measures are complied with;
- Frequency of safety inspection and audits done;
- Frequency and effectiveness of SHE committees and group meetings;
- Frequency and effectiveness of SHE communications;
- Number of SHE suggestions completed;
- Time to implement suggestions; and
- Compliance in use of PPE.

Examples of reactive monitoring include:

i) **Accident Frequency Rate**

Refers to the number of workplace accidents per million man-hours worked

\[
\text{Number of workplace accidents} \times 10^6 \\
\text{Man-hours worked}
\]

ii) **Accident Severity Rate**

Refers to the number of man-days lost to workplace accidents per million man-hours worked

\[
\text{Number man-days lost to workplace accidents} \times 10^6 \\
\text{Man-hours worked}
\]

iii) **Fatality Rate**

Refers to the number of workplace fatalities per 100,000 persons employed. Figures used are victim based

\[
\text{Number of workplace fatalities} \times 10^5 \\
\text{Number of persons employed}
\]

iv) **Injury Rate**

Refers to the number of fatal and non-fatal workplace injuries per 100,000 persons employed

\[
\text{Number of fatal and non-fatal workplace injury} \times 10^5 \\
\text{Number of persons employed}
\]

v) **Disease Incidence**

Refers to the number of occupational diseases (chronic confirmed cases) per 100,000 persons employed.

\[
\text{Number of chronic confirmed occupational diseases cases} \times 10^5 \\
\text{Number of persons employed}
\]

A confirmed case of occupational disease is one where there is definite evidence that the worker suffers from a disease which is related to his occupation.
vi) **Number of Reportable Dangerous Occurrences**

Number of dangerous occurrence as defined in the Second Schedule, WSH Act being reported.

vii) **Regulatory Enforcement Actions**

Number of regulatory enforcement action as taken against the company in the period.

### 5.5.1.2 Industrial Hygiene Monitoring

Industrial hygiene monitoring should be carried out for:

**Noise**

Where 10 or more persons are likely to be exposed to excessive noise at a shipyard, the occupier or employer should carry out noise monitoring at least once every 3 years in accordance with the Factories (Noise) Regulations.

The occupier or employer must appoint a person with recognised qualifications by MOM to carry out such noise monitoring and prepare a report in the manner specified in the Second Schedule of the Factories (Noise) Regulations (attached in Annex G-1 of this manual).

**Air Contaminants**

Regulation 40 of the WSH (General Provisions) Regulations, requires that occupiers should take all reasonably practicable measures to ensure that no person at work in the factory is exposed to the toxic substances specified in the First Schedule in excess of the permissible exposure levels specified in that Schedule.

In Regulation 39(6) of the WSH (General Provisions) Regulations, the atmosphere of any place of work in which toxic substances are manufactured, handled, used or given off should be tested by a competent person at sufficient intervals to ensure that toxic dust, fumes, gases, fibres, mists or vapours are not present in quantities liable to injure the health of persons at work.

The shipyard should therefore carry out regular monitoring of workers exposure to air contamination. A list of service providers offering such services can be found at MOM website.

### 5.5.1.3 Medical Surveillance

The Factories (Medical Examination) Regulations requires workers involved in hazardous occupations listed below:

Use or handling of or exposure to the fumes, dusts or vapour of:

- Arsenic, cadmium, lead, manganese or mercury or any of their compounds;
- Benzene, perchloroethylene, trichloroethylene;
- Asbestos, silica, or raw cotton;
- Tar, pitch bitumen or creosote;
- Exposure to excessive noise;
- Work in compressed air environment;

to undergo medical examination carried out by a designated factory doctor to:

- Certify fit to work before employment; and
- Periodically at interval undergo examination and investigation in accordance with Part II of the First Schedule of the Regulations.

The employer should keep a register of persons involved in these hazardous occupations.

The designated factory doctors should report his findings to the employer of the persons affected, and when appropriate, advise the person involved in the hazardous occupations accordingly, including suspension or cessation of employment in such occupations.
5.5.1.4 Inspection and Compliance Verification

**Equipment**

Inspect equipment regularly to ensure that it is in proper working order. Mobile equipment such as cranes and forklift trucks should be inspected by the operators at the start of each shift, with the aid of a checklist to ensure that essential items (such as brakes and tyres) are in good working order.

The company should keep an inventory of list of equipment subjected to statutory or technical inspection.

The general requirements for maintenance are detailed in the appropriate sections of the WSH (General Provisions) Regulations. The specific requirements for inspection or examination and test are as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Examination / Certification Requirements</th>
<th>Sections in WSH (General Provisions) Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifting gears</td>
<td>6 months</td>
<td>19(3)</td>
</tr>
<tr>
<td>(To be annealed: If regularly used, chains used in connection with molten metal or molten slag.)</td>
<td>12 months</td>
<td>20(3)</td>
</tr>
<tr>
<td>Other lifting gear If not regularly used</td>
<td>12 months As and when</td>
<td>20(4)(b)</td>
</tr>
<tr>
<td>Lifting appliances, lifting machine 12</td>
<td>12 months</td>
<td>21(3)</td>
</tr>
<tr>
<td>Steam boilers / receivers</td>
<td>24 months</td>
<td>29(6)</td>
</tr>
<tr>
<td>Air receivers</td>
<td>24 months</td>
<td>31(5)</td>
</tr>
<tr>
<td>Scissors</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Torchlight</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

The WSH (Shipbuilding and Ship-repairing) Regulation also specifies the inspection to be done by competent person for various equipments as listed in below table:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Examination / Certification Requirements</th>
<th>Sections in WSH (Shipbuilding and Ship-repairing) Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot Work Equipment: Electrode holders, welding cables, cable connectors and other arc welding equipment</td>
<td>Once every 30 days</td>
<td>61(2)</td>
</tr>
<tr>
<td>Equipment and fittings use for carrying out hot work: Gas hoses, torches, blowpipes, pressure regulators, nozzles connectors, etc.</td>
<td>14 days</td>
<td>61(3)</td>
</tr>
<tr>
<td>Safety Devices: Non-return valve or similar devices, flash-back arrester anti-leakage devices</td>
<td>12 months</td>
<td>61(4)</td>
</tr>
<tr>
<td>Crane, employee's lift or material handling machinery (employee's lift shall be examined and inspected by authorised examiner)</td>
<td>Before it is put into service for the first time in the shipyard or on board the ship in the harbour</td>
<td>68</td>
</tr>
</tbody>
</table>
The Factories (Scaffolds) Regulation also specifies the inspection to be done by a scaffold supervisor:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Examination / Certification Requirements</th>
<th>Sections in WSH (Scaffolds) Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaffolds</td>
<td>7 days prior to use</td>
<td>27</td>
</tr>
</tbody>
</table>

Clause 19.1 of CP 14:1996 Code of Practice for Scaffolds also stipulated that inspections on the scaffolds and additional equipment attached to the scaffolds to be conducted on a weekly basis.

**Work Conditions**

Criteria specifying the acceptable conditions at the shipyard should be established and documented.

Regular inspection should be conducted by the line supervisors and managers, and the safety committee members. An example of the safety inspection programme is as follows:

- Daily inspection – by supervisors;
- Weekly inspection – by departmental manager;
- Monthly inspection – by safety committee; and
- Middle and senior management should involve themselves in these inspections by taking part in the scheduled inspections or conducting inspections on their own.

Housekeeping patrols should be conducted on a regular basis to maintain housekeeping standards. One of the ways is to form a team tasked to carry out the patrol once a week.

**Occupational Health Inspection Audit**

Besides inspection of equipment and work condition for safety, occupational health aspects should also be taken into consideration for monitoring.

An inspection audit checklist is provided in Annex I for reference and used by shipyards in this area.

**5.5.2 Incident, Accident, Non-conformance, Corrective and Preventive Actions**

**5.5.2.1 Incident Reporting Requirements**

Incidents (including those resulting in reportable injuries and those which are classified as dangerous occurrences) must be reported as detailed in this section. The WSH (Incident Reporting) Regulations requires reporting to MOM on the following:

**a) Dangerous Occurrences**

Where any dangerous occurrence (refer to the following list) occurs at a workplace, the occupier of the shipyard should, as soon as is reasonably practicable, notify the Commissioner of the occurrence, and thereafter, not later than 10 days after the occurrence, submit a report to the Commissioner.

The list of dangerous occurrences is defined as in Second Schedule to the WSH Act.

1. Bursting of a revolving vessel, wheel, and grindstone or grinding wheel moved by mechanical power.
2. Collapse or failure of a crane, derrick, winch, hoist, piling frame or other appliance used in raising or lowering persons or goods, or any load bearing part thereof (except breakage of chain or rope slings), or the overturning of a crane.
3. Explosion or fire damage to the structure of any room or place in which persons are at work, or to any machine or plant contained therein, and resulting in the complete suspension of ordinary work in the room or place or stoppage of machinery or plant for not less than 5 hours, where the explosion or fire is due to the ignition of dust, gas or vapour, or the ignition of celluloid or substance composed wholly or in part of celluloid.
4. Electrical short circuit or failure of electrical machinery, plant or apparatus, attended by explosion or fire or causing structural damage thereto, and involving its stoppage or disuse for not less than 5 hours.
5. Explosion or fire affecting any room in which persons are at work and causing complete suspension of ordinary work therein for not less than 24 hours.
6. Explosion or failure of structure of a steam boiler or of a receiver or container used for the storage at a pressure greater than atmospheric pressure of any gas or gases (including air) or any liquid or solid resulting from the compression of gas.
7. Failure or collapse of formwork or its supports.
8. Collapse, in part or in whole, of a scaffold exceeding 15 metres in height or of a suspended scaffold or a hanging scaffold from which any person may fall more than 2 metres.
9. Accidental seepage or entry of seawater into a dry dock or floating dock causing flooding of the dry dock or floating dock.
b) Accident Leading to Injury

Where an employee meets with an accident at a workplace and is:

1) Granted more than 3 consecutive days of sick leave by a registered medical practitioner for that injury; or
2) Admitted in a hospital for at least 24 hours for observation or treatment;

the employer of that employee should, not later than 10 days after the accident, submit a report to the Commissioner. If the employee subsequently dies as a result of the injury, the employer of that employee should, as soon as is reasonably practicable, notify the Commissioner of the death. Where any person who is not at work or any self-employed person meets with an accident at a workplace which requires him to be taken to a hospital for treatment in respect of that injury, the occupier of the workplace should, as soon as is reasonably practicable, notify the Commissioner of the accident.

c) Occupational Diseases

The employer of that employee who suffers form occupational disease should, upon receiving a written statement prepared by a registered medical practitioner diagnosing the occupational disease, submit a report to the Commissioner not later than 10 days after receipt of the written diagnosis.

d) Notification to MOM

Immediate Notification

For incidents such as dangerous occurrences and death cases, the Commissioner of Workplace Safety and Health should be immediately notified via:

- Phone: (65) 6317 1111; or
- Fax: (65) 6324 7572.

The following information should be provided:

1) Date and time of the incident;
2) Place of the incident;
3) Name and identification number of the injured / deceased, if any;
4) Name of the employer and occupier;
5) Brief description of the incident; and
6) Name and contact details of the person making the notification.

For All Cases

The incident report should be submitted to the Commissioner of Workplace Safety and Health within 10 days via:

a) iReport (a web-base submission via MOM website); or
b) Faxing of 'Notice of Accident / Dangerous Occurrence / Occupational Disease' Form.

e) Record Keeping

Employers / occupiers are required to keep a record of any incident reports made. Such records should be kept at the employers’ / occupiers’ place of business for a period of three years from the time the report is made.

f) Workmen’s Compensation

There is no need to submit a separate report for workmen’s compensation; the incident report includes a section for that purpose.

5.5.2.2 Incident Investigation and Analysis

The statutory requirements for reporting accidents and dangerous occurrences are concerned mainly with outcomes - details of the person injured, data on his period of work; the nature and location of the injury. The company should investigate the history of events preceding any incident, to a depth of detail consistent with the potential of the incident to cause serious injury, damage or loss. The investigation should be designed to arrive at the following:

- The history of events before the incident in which errors had occurred;
- Basic and root causes, as distinct from the resulting injury or damage;
- The actions recommended to correct the failure at source; and
- Improved safety performance.

This involves:

- Thorough recording of the circumstances of causes (in addition to outcomes);
- Regular reviews of recurrent causes;
- Actions aimed specifically at these recurrent causes; and
- Monitoring of the effectiveness of those actions.

There are skills in incident investigation which should form part of the training of safety specialists and line supervisors.
The shipyard should establish, as an element in its SHE management system, written procedures to identify, record, investigate and analyse all incidents, to maintain these procedures and implement specific corrective actions to prevent recurrence. The procedures should include the following:

a) Identification and Record of Incidents

1) The shipyard should set up a system to identify and record all incidents (accidents and near misses) at work.
2) The incidents should be reported and recorded promptly, and should include incidents by all personnel including contractors.

b) Investigation of Incidents

1) The shipyard should establish procedures for the investigation of incidents.
2) The investigation of incidents should not be limited to the identification of unsafe conditions and unsafe acts but should probe into the underlying systemic cause and deficiencies of the safety management system.
3) Incident investigation procedures should include, but not be limited to the following:
   i) Identification of types of incidents to be investigated;
   ii) Prompt reporting of incidents to designated persons, including incidents involving contract workers;
   iii) Assignment of competent persons responsible for the investigation;
   iv) Establishment investigation procedures;
   v) Identification of root causes, and recommendation; and
   vi) Implementation of recommendations and corrective measures.
4) The Control Flow Chart for Accident / Incident Reporting and Investigation is shown in Annex G-2.
5) Line managers, supervisors, safety personnel and safety committee members should be included in the incident investigation team.

c) Implementation and Review of Corrective Actions

1) The shipyard should establish a system to ensure that recommendations arising from the investigations and corrective actions are followed through and effectively implemented.
2) The shipyard should prescribe short-term preventive actions by implementing corrective measures immediately to prevent recurrence of incident.
3) The shipyard should also seek to improve the overall safety management system with longterm corrective actions.
4) The shipyard should review all corrective actions implemented and their effectiveness in enhancing safety at the worksite.
5) Procedures should be established to ensure lessons learned from the incidents are communicated to all personnel working in the shipyard for information and awareness.

d) Analysis of Incident Statistics

1) The shipyard should establish procedures to monitor and analyse incident trends, and prescribe holistic preventive solutions.
2) Incident statistical analysis should include, but not be limited to the following:
   i) Types of incidents;
   ii) Agency of incidents;
   iii) Causes of incidents;
   iv) Human factors and behavioural considerations;
   v) Incident frequency rate; and
   vi) Incident severity rate.
3) The report of analysis should be made available to all key relevant personnel in the shipyard and maintained for future reference.
4) The shipyard should carry out analysis of all incident statistics periodically. This information should be used for the drawing up of safety and health workplans, promotional programmes and training courses.

5.5.2.3 Corrective and Preventive Actions

Where non-conformances are found during walk through, inspection, audit or arising from incident / accident investigation and performance analysis, corrective and preventive actions should be taken.

Corrective actions are actions taken to eliminate the root cause(s) of identified non-conformances, accidents or incident in order to prevent recurrence. This may include (but not limited to):

- Short term and long term actions;
- Evaluation of hazard identification and risk assessment results;
- Making changes to safe work procedures; and
- Implementing new or modifying existing control measures.

Preventive actions are actions to prevent occurrence of non-conformances, accidents, incident or ill health. Examples may include:

- Use of appropriate information such as workplace observation trends, audit report, employees’ feedback, expert advice, lesson learnt from other workplaces etc.;
• Identifying problems requiring preventive action through walk through, inspection, use of hazard identification and risk assessment tool such as checklists, job hazard analysis etc.;
• Initiating actions to ensure controls measures are effective.

The shipyard should ensure that correctives and preventive measures are assigned with owners for responsibility and accountability for completion date, be monitored and followed up for closure and the effectiveness evaluated. Sufficient resource should be provided for the implementation of such actions.

5.5.3 Records and Records Management
Companies should ensure that SHE records are properly identified, maintained reviewed, stored and disposed appropriately.

SHE records should be legible, identifiable and traceable to the activities involved. They should be kept in such a systematic manner that enable easy retrieval and protected against damage, deterioration or loss.

Examples of records that should be kept for the retention periods is as follows:

<table>
<thead>
<tr>
<th>Records</th>
<th>Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Factories (Shipbuilding and Ship-repairing) Regulations requires that:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Factories License</th>
<th>Valid Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Assessment Records</td>
<td>3 years</td>
</tr>
<tr>
<td>Incident Reports</td>
<td>3 years</td>
</tr>
<tr>
<td>Medical Examination Reports of Persons Involved in Hazardous Occupations</td>
<td>5 years</td>
</tr>
<tr>
<td>Noise Monitoring Reports</td>
<td>10 years</td>
</tr>
</tbody>
</table>

The Factories License regulates:

- Risk Assessment Records: 3 years
- Incident Reports: 3 years
- Medical Examination Reports: 5 years
- Noise Monitoring Reports: 10 years

5.5.4 Audit

5.5.4.1 Mandatory WSH Audit

Regulation 4 of the WSH (Shipbuilding and Ship-repairing) Regulations requires the occupier of a shipyard to implement and maintain at all times a safety and health management system to ensure the safety and protect the health of every person at work or employee of the occupier.

For shipyards with more than 200 workers, the occupier should appoint a WSH auditor or an external auditor to audit the safety management system at such time as may be specified by the MOM.

In shipyards where less than 200 workers are employed, the occupier must conduct an annual review of the safety management system. Where necessary, MOM may require an external audit to be conducted instead of a review of the safety management system.

The occupier shall, as far a practicable, implement the recommendations of the audit or the review without undue delay.

The content of this manual may serve as a guide for the establishment and maintenance of the safety management system. Annex A to this manual presents a table showing the corresponding requirements in the MOM safety and health management system, the Singapore Standard SS506 OSH Management System, and the corresponding sections in this manual.
5.5.4.2 SHE Management System Audit

Shipyards are encouraged to establish, implement and have the SHE management system audited or certified by an external independent auditor. Such systems may include:

- ISO14001 Environmental Management System
- SS506 Occupational Safety and Health Management System
- OHSAS18001 Safety Management System

The SHE system audit provides opportunities for the company to continually evaluate the effectiveness of its system.

The frequency and coverage of the SHE system audit should be related to the risk associated with the failure of the SHE management system elements, availability of performance data and the extent of changes.

The results of the audit should be updated to the relevant parties involved for corrective actions and to provide inputs for improvement of the system and SHE performances.

5.6 Management Review

The top management of a shipyard should, at regular interval, review the SHE management systems to ensure its suitability, adequacy and effectiveness. The review should include consideration of whether the SHE policy is still appropriate, update of objectives, risks level and adequacy of control measures, evaluation of performance, and whether changes to the element of management system are required. The WSH (Risk Management) Regulations requires that the employer, self-employed and principal review the risk assessment:

- At least once every 3 years; or
- Occurrence of any body injuries to any person as a result of exposure to a hazard in the workplace; or
- Where there is a significant change in work practices or procedures.

The WSH (Shipbuilding and Ship-repairing) Regulations also requires that the occupier of a shipyard with less than 200 persons employed conduct reviews of its safety management system annually.

A checklist, attached at Annex H-2 to this manual may serve as a checklist for the review of the Shipyard Safety Management System for the MOM Safety and Health Management System.
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Safety And Health Management System in Second Schedule, WSH (General Provision) Regulations

Elements of Safety and Health Management System

- Safety Policy, including the Allocation and Delegation of Responsibility for Safety
- Safe Work Practices
- Safety Training
- Group Meetings
- Incident Investigation and Analysis
- In-house Safety Rules and Regulations
- Safety Promotion
- System for the Evaluation, Selection and Control of Contractors
- Safety Inspections
- Maintenance Regime
- Risk Assessment
- Control of Movement and Use of Hazardous Chemicals
- Occupational Health Programmes
- Emergency Preparedness
Annex A-2:

Guidelines on Safety and Health Management System for the Shipbuilding and Ship-repairing Industry
Correspondence between Various Safety Management Systems

This table matches the corresponding clauses, elements or sections in the following:

- Second Schedule, WSH (General Provisions) Regulations; and
<table>
<thead>
<tr>
<th>Annex A-2:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Guideline on SMS</strong></td>
<td><strong>Guideline – S&amp;H Mgt</strong></td>
</tr>
<tr>
<td><strong>Second Schedule</strong></td>
<td><strong>Elements</strong></td>
</tr>
<tr>
<td><strong>Clause S506-3: 2006</strong></td>
<td><strong>Clause S506-1: 2006</strong></td>
</tr>
<tr>
<td><strong>0.1 General</strong></td>
<td><strong>0.1 General</strong></td>
</tr>
<tr>
<td><strong>0.2 Process approach</strong></td>
<td><strong>0.2 Process approach</strong></td>
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<tr>
<td><strong>0.3 Relationship with ISO 9004</strong></td>
<td><strong>0.3 Relationship with ISO 9004</strong></td>
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<td><strong>0.4 Compatibility with other management systems</strong></td>
<td><strong>0.4 Compatibility with other management systems</strong></td>
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<td><strong>1 Scope</strong></td>
<td><strong>1 Scope</strong></td>
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<td><strong>1.1 General</strong></td>
<td><strong>1.1 General</strong></td>
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<td><strong>1.2 Application</strong></td>
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<td><strong>2 Normative references</strong></td>
<td><strong>2 Normative references</strong></td>
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<tr>
<td><strong>3 Terms and definitions</strong></td>
<td><strong>3 Terms and definitions</strong></td>
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<tr>
<td><strong>5 OSH management system elements</strong></td>
<td><strong>5 OSH management system elements</strong></td>
</tr>
<tr>
<td><strong>5.1 General requirements</strong></td>
<td><strong>5.1 General requirements</strong></td>
</tr>
<tr>
<td><strong>5.2 OSH policy</strong></td>
<td><strong>5.2 OSH policy</strong></td>
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<tr>
<td><strong>5.3 Planning</strong></td>
<td><strong>5.3 Planning</strong></td>
</tr>
<tr>
<td><strong>5.3.1 Planning for hazard identification, risk assessment and risk control</strong></td>
<td><strong>5.3.1 Planning for hazard identification, risk assessment and risk control</strong></td>
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<tr>
<td><strong>5.3.1.1 Process safety information</strong></td>
<td><strong>5.3.1.1 Process safety information</strong></td>
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<tr>
<td><strong>5.3.1.2 Hazard identification, risk assessment and risk control</strong></td>
<td><strong>5.3.1.2 Hazard identification, risk assessment and risk control</strong></td>
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<td><strong>11 Risk assessment</strong></td>
<td><strong>11 Risk assessment</strong></td>
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<td><strong>11.1 Hazard analysis</strong></td>
<td><strong>11.1 Hazard analysis</strong></td>
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<td><strong>Annex A-2:</strong></td>
<td><strong>Annex A-2:</strong></td>
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<tr>
<td>5.3.2</td>
<td>Legal and other requirements</td>
</tr>
<tr>
<td>5.3.3</td>
<td>Objectives</td>
</tr>
<tr>
<td>5.3.4</td>
<td>OSH management programme(s)</td>
</tr>
<tr>
<td>5.4</td>
<td>Implementation and operation</td>
</tr>
<tr>
<td>5.4.1</td>
<td>Structure and responsibility</td>
</tr>
<tr>
<td>5.4.2</td>
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Annex B-1:

A Guide to the WSH (Shipbuilding and Ship-repairing) Regulations

The following paragraphs serve only as guides for the general understanding of the requirements of the WSH (Shipbuilding and Ship-repairing) Regulations. The readers are to refer to the actual Regulation document available at the Singapore National Printers for the actual Regulations.

1. Introduction

1.1 Overview of Content

The Regulation comprises 10 Parts (Part I to Part X) as listed below:

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</table>
1.2 Application
The WSH (Shipbuilding and Ship-repairing) Regulations 2008 is applicable to any work carried out in a shipyard or on board a ship in a harbour in connection with:

a) The construction, re-construction, repair, refitting, fitting painting, finishing, furnishing or breaking up of a ship;

b) The scaling, scurfing or cleaning of boilers (including combustion chambers and smoke boxes) in a ship;

c) The cleaning of any tank, bilges or holds in a ship; and

d) The survey or inspection of a ship or its contents (where such survey or inspection is not carried out by the crew of the ship).

1.3 Definition
1.3.1 In the Regulations, unless the context otherwise requires the meaning of terms used are as below:

<table>
<thead>
<tr>
<th>Terms</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>Competent Person</td>
<td>Person who has sufficient experience and training to perform the work required to be carried out;</td>
</tr>
<tr>
<td>Designated Person</td>
<td>A competent person appointed in writing by:</td>
</tr>
<tr>
<td></td>
<td>(a) An occupier of a shipyard;</td>
</tr>
<tr>
<td></td>
<td>(b) An employer of persons carrying out work in a shipyard or on board a ship in a harbour;</td>
</tr>
<tr>
<td></td>
<td>(c) A principal who gives direction to persons on the work carried out by those persons in a shipyard or on board a ship in a harbour, to perform any task or duty prescribed under these Regulations;</td>
</tr>
<tr>
<td>Employee’s Lift</td>
<td>A powered car operating in guides and used primarily to carry persons in a substantially vertical direction;</td>
</tr>
<tr>
<td>Fire Watchman</td>
<td>Means a fire watchman appointed under regulation 35(1);</td>
</tr>
</tbody>
</table>
Terms | Definition
--- | ---
**Hazardous Work** | Means any work that is likely to endanger the life of any person in a shipyard or on board a ship in a harbour and includes any type of work which is specified by the Commissioner in writing as hazardous work;

**Hot Work** | Riveting, welding, flame cutting or burning and includes any other work involving the use or generation of heat or the production of sparks;

**Responsible Person** | In Relation to any work carried out in a shipyard or on board a ship in a harbour, means:
(a) In the case of a shipyard, the occupier of the shipyard; and
(b) In the case of a ship in a harbour:
(i) The employer of any person who carries out the work; or
(ii) The principal under whose direction any person carries out the work;

**Safety Assessor** | A safety assessor appointed under regulation 18(1)(ii) or 27(1)(ii);

**Shipyard** | Includes any dry or wet dock, wharf, jetty and quay, and the precincts thereof;

**Ship Repair Manager** | Means a ship repair manager appointed under regulation 7.

2. **Safety and Health Management Arrangement**

2.1 **Safety Management System**
The occupier of a shipyard shall implement and maintain at all times a safety and health management system for the purpose of ensuring the safety and protecting the health of every person in the shipyard, whether or not the person is at work or is an employee of the occupier.

2.2 **Workplace Safety and Health Audit**

2.2.1 Where 200 or more persons are employed in a shipyard, the occupier of the shipyard should appoint a WSH auditor to audit the safety and health management system of the shipyard at such time as may be specified by the Commissioner.

2.2.2 Where less than 200 persons are employed in a shipyard, it should be the duty of the occupier of the shipyard to:
• Conduct annual reviews of the safety and health management system of the shipyard; and
• Appoint a workplace safety and health auditor to audit the safety and health management system of the shipyard if directed by the Commissioner.

2.2.3 The occupier of a shipyard should ensure that the WSH auditor appointed for the audit of safety and health management system of the shipyard is not a partner, an officer, an employee or an associate of the occupier of the shipyard. The WSH auditor appointed should not be:
• An employer of the occupier;
• Where the occupier is a body corporate:
  • A person who is a substantial shareholder of that body;
  • A director, secretary or similar executive officer of the body corporate;
• Where the occupier is a trustee,
• A beneficiary of the trust.

2.3 **Safety and Health Training**

2.3.1 The employer of any person, or the principal who direct any person to:
• Carry out hot work, spray painting and hazardous work;
• Oversees or supervises any work (including any process); should ensure that the person has undergone a safety and health training course approved by the Commissioner.

2.3.2 Every person who
• Carry out hot work, spray painting and hazardous work;
• Oversees or supervises any work (including any process); should not carry out the abovementioned tasks unless he has undergone a safety and health training course approved by the Commissioner.

2.3.3 The employer of any person, or the principal, should ensure that no person is appointed as a ship repair manager unless the person has received adequate safety and health training to ensure that he is able to co-ordinate safely all activities relating to the construction or repair of the ship.
2.4 Duties of Ship Repair Manager
The occupier of a shipyard, or in the case of a ship in a harbour, the master, owner, or agent of the ship should appoint a ship repair manager to take charge of and coordinate all activities relating to the construction or repair of the ship.

The master, owner, agent or crew of a ship in a shipyard or in a harbour should not carry out any work on the ship without the approval of the ship repair manager.

2.5 Notification of Work Carried Out On Board Ship in Harbour
The master, owner or agent of the ship should notify the Commissioner, 3 days in advance, prior to the commencement of any work as listed above in paragraph 1 a) to d).

3. Vessel Safety Co-ordination Committee (VSCC)
3.1 Establishment of a VSCC
Where any hazardous work is to be carried out on board any ship or the structural part of any ship under construction, the occupier of the shipyard, or in the case of a ship in a harbour, the master, owner or agent of the ship, should establish a vessel safety coordination committee for that ship.

3.2 Composition of VSCC
The vessel safety co-ordination committee should comprise:

- A chairman;
- A secretary; and
- As many members as may be necessary for the functions of the committee to be effectively carried out.

The ship repair manager should be the chairman of the vessel safety co-ordination committee.

The workplace safety and health officer, or such other person as may be appointed by the ship repair manager, should be the secretary of the vessel safety co-ordination committee. The master, owner or agent of the ship or his representative and the supervisors (including the contractor’s supervisors) from each trade involved in any work on board the ship should be members of the vessel safety co-ordination committee.

3.3 Roles of VSCC
The vessel safety co-ordination committee should:

- Review and discuss regularly all matters relating to the safety and health of the persons involved in the work;
- Draw up a plan for the co-ordination of the work to ensure that where different types of work are being carried out at the same time, the types of work are compatible;
- Ensure that all relevant first-line supervisors and the master, owner and agent of the ship or their representatives are informed of the plan;
- Review on a daily basis all work in progress on the ship;
- Plan and co-ordinate the movement and storage of hazardous materials;
- Review on a daily basis the validity of all permits issued under these Regulations;
- Specially monitor all hot works carried out on the ship and ensure that all safety measures are maintained throughout the period of such work;
- Ensure that every confined space is checked for concentrations of oxygen, dangerous gases and flammable vapours:
  - Before any person enters into it; and
  - Regularly while work is being carried out, and review the results of such checks;
- Ensure that every person is provided with and uses the appropriate personal protective equipment for his work; and
- Make arrangements and determine the locations for the display of safety signs and permits on board the ship.

3.4 Duty of Chairman
The chairman of the vessel safety co-ordination committee should have the following duties:

- To preside at every meeting;
- To decide who are the members required to attend each meeting;
- To ensure that every member who is to attend the meeting is informed in good time of the date, time and venue of the meeting;
- To ensure that the vessel safety co-ordination committee exercises its functions in accordance with this Part; and
- To ensure that every decision made at the meeting is implemented by the relevant member.

A chairman who contravenes above Regulations shall be guilty of an offence and shall be liable on conviction to a fine not exceeding $5,000 and, in the case of a second or subsequent conviction, to a fine not exceeding $10,000.
3.5 Duty of Secretary
The secretary of the vessel safety co-ordination committee should have the following duties:

- To make and keep a record of all matters discussed and decisions made at each meeting of the vessel safety co-ordination committee and extend a copy of such record to every member of the committee;
- To keep a copy of every permit issued under these Regulations; and
- To update the permit co-ordination notice board.

A secretary who contravenes the above Regulations shall be guilty of an offence and shall be liable on conviction to a fine not exceeding $2,000 and, in the case of a second or subsequent conviction, to a fine not exceeding $5,000.

3.6 Frequency of Meetings
The vessel safety co-ordination committee meets daily (including Sundays and public holidays) when any hazardous work is being carried out on the ship and at such other times as the chairman of the vessel safety co-ordination committee may decide. Unless the chairman of the vessel safety co-ordination committee otherwise decides, it should be the duty of every member of the vessel safety co-ordination committee to attend such meetings.

3.7 Handing-over Procedure for Shifts
3.7.1 Where any work is carried out in a shipyard or on board a ship in a harbour in shifts, it should be the duty of the responsible person to:

a) Provide a written handing-over procedure to be followed by the supervisor or the foreman of each out-going and in-coming shift, so that the supervisor or foreman of the in-coming shift:
   i) Will have a comprehensive and accurate knowledge of what occurred during the previous shift; and
   ii) Is apprised of his and his workers’ duties and responsibilities; and
b) Ensure that the written handing-over procedure referred to in subparagraph (a) is followed.

3.7.2 The written handing-over procedure referred to in paragraph 3.7.1. a) should include the handing over to the supervisor or foreman of the in-coming shift of:

a) The activities chart; and
b) A copy of the records of the latest vessel safety co-ordination committee meeting.

4. Permit-to-Work System
4.1 Types of Work that Require Permit-to-Work
Permit-to-work systems should be implemented to ensure that:

- The high-risk work is carried out with due regard to the safety and health of persons carrying out the work;
- The persons carrying out the work are informed of the hazards associated with the high-risk work and the precautions they have to take; and
- The necessary safety precautions are taken and enforced when the high-risk work is being carried out.

The permit-to-work system applies to the following high-risk works:

- Work which involves the use of any hazardous, volatile, corrosive or flammable chemical, material or solvent in significant quantities;
- Work involving entry into any confined space;
- Spray painting work;
- Grit-blasting work carried out in a confined space;
- Testing or dismantling of any pipe or equipment that:
  - Contains, or had contained, oil or substances that are flammable, toxic or corrosive; or
  - Contains steam;
- Ballasting and de-ballasting of a ship;
- Repair or maintenance work carried out on the hydraulic system of a ship;
- Bunkering and transferring of fuel oil;
- Radiography work; and
- Such other work as the Commissioner may specify in writing to the occupier of the shipyard or the master, owner or agent of the ship or the employer or principal of the person carrying out the work.

4.2 Implementation of Permit-to-Work
The occupier of a shipyard, or in the case of a ship in a harbour, the master, owner, or agent of the ship has duties to:

- Implement a permit-to-work system;
- Appointment a safety assessor (a WSHO or competent person) competent to perform the function and duty of safety assessor.
4.3 No High-risk Work without Permit-to-work

4.3.1 Following persons have the duty to ensure that no such high-risk work is carried out without a permit-to-work:

<table>
<thead>
<tr>
<th>Shipyard</th>
<th>Ship in a Harbour</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Occupier;</td>
<td>• Employer of any person who carries out the high-risk work; or</td>
</tr>
<tr>
<td>• Employer of any person who carries out the high-risk work; or</td>
<td>• Principal under whose direction any person carries out the high-risk work.</td>
</tr>
</tbody>
</table>

The only exception to such permit-to-work system is during special situations when the system may operate to interfere with or render unlawful any rescue work or other work necessary for the general safety of life or property.

4.4 Application for Permit-to-Work

An application for a permit-to-work should:

- Be made by the supervisor or foreman of a person who is to carry out any high-risk work;
- Be made in such form and manner as may be required by the ship repair manager of the ship to which the high-risk work relates;
- State the measures which will be taken to ensure the safety and health of persons who carry out the high-risk work; and
- Be addressed to the ship repair manager and submitted to the safety assessor of the shipyard or the ship in the harbour where the high-risk work is to be carried out.

4.5 Evaluation of Permit-to-Work

4.5.1 On receipt of the application for a permit-to-work, the safety assessor should:

- Assess whether all reasonably practicable measures have been taken to ensure the safety and health of the persons who will be carrying out the high-risk work; and
- Inspect the site (including its surroundings) where the high-risk work is to be carried out together with the supervisor or foreman of the person who is to carry out the work to ensure that the high-risk work can be carried out safely.

4.5.2 The safety assessor should endorse the application for the permit-to-work and forward the endorsed application to the ship repair manager if he is satisfied that the high-risk work can be carried out safely.

4.5.3 It should be the duty of the safety assessor to exercise all due diligence when performing his functions in relation to the evaluation and endorsement of an application for a permit-to-work.

4.6 Issue of Permit-to-Work

4.6.1 The ship repair manager may issue a permit-to-work in relation to any high-risk work if he is satisfied that:

- There has been a proper evaluation of the risks and hazards involved in the carrying out of the high-risk work based on the available information;
- No incompatible work which may pose a risk to the safety and health of the person who is to carry out the high-risk work and other persons at work in the shipyard or on board the ship in the harbour will be carried out at the same time and in the same vicinity as the high-risk work;
- All reasonably practicable measures will or have been taken to ensure the safety and health of the persons who carry out or are to carry out the high-risk work; and
- All persons who are to carry out the high-risk work are informed of the hazards associated with it.

4.6.2 The ship repair manager who issues a permit-to-work in respect of any high-risk work shall retain a copy of the permit-to-work.

4.6.3 It should be the duty of the ship repair manager to exercise all due diligence when performing his function in relation to the issuance of a permit-to-work.

4.6.4 A permit-to-work should be valid for the period stated therein, and if the high-risk work for which the permit-to-work is issued is not completed within the validity period, a fresh application should be made accordingly.

4.7 Posting of Permit-to-Work

The supervisor or foreman of any person who carries out any high-risk work should:

- Clearly post a copy of the permit-to-work issued in respect of that high-risk work, including where reasonably practicable, a sketch of any area where the high-risk work is permitted, at the work area where the work is carried out; and
- Ensure that the copy is not removed until the date of expiry or date of revocation of the permit-to-work or on completion of the high-risk work, whichever is the earlier.
4.8 Monitoring of High-risk Work

4.8.1 The ship repair manager should continually review the progress of all high-risk work carried out for which permit-to-work has been issued to ensure that the high-risk work is carried out safely.

4.8.2 The supervisor or foreman of any person who carries out any high-risk work should:

- Ensure that the measures necessary to ensure the safety and health of the person at work are taken and are in place at all times during the validity period of the permit-to-work; and
- To inform the ship repair manager upon completion of the high-risk work.

4.9 Duty to Report Incompatible Work

4.9.1 Any person who is aware of any work being carried out in a shipyard or on board a ship in a harbour which is incompatible with any high-risk work being carried out there is to immediately report the incompatible work to his supervisor, the workplace safety and health officer, the workplace safety and health co-ordinator or the ship repair manager who issued the permit-to-work in respect of that high-risk work.

4.9.2 In the above paragraph, any work which is carried out at or in the vicinity of any high-risk work and which is likely to pose a risk to the safety or health of persons at work in the shipyard or on board the ship in the harbour should be treated as incompatible work.

4.10 Revocation of Permit-to-Work

If, after issuing a permit-to-work in respect of any high-risk work, the ship repair manager is of the view that the carrying out of the high-risk work poses or is likely to pose a risk to the safety and health of persons at work in the shipyard or on board the ship in the harbour, he may order the high-risk work to cease immediately and revoke the permit-to-work.

5. Hot Work Permit System

5.1 Implementation of Hot Work Permit

The occupier of a shipyard, or in the case of a ship in a harbour, the master, owner, or agent of the ship has duties to:

- Implement a permit-to-work system;
- Appoint a safety assessor (a WSHO or competent person) to perform the function and duty of safety assessor.

The hot work permit system implemented shall ensure that:

- The hot work is carried out with due regard to the safety and health of persons carrying out the work;
- The persons carrying out the work are informed of the hazards associated with the hot work and the precautions they have to take; and
- The necessary safety precautions are taken and enforced when the high-risk work is being carried out.

5.2 No Hot Work Without Hot Work Permit

5.2.1 Following persons have the duties to ensure that no such high-risk work is carried out without a permit-to-work:

<table>
<thead>
<tr>
<th>Shipyard</th>
<th>Ship in a Harbour</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Occupier;</strong></td>
<td><strong>Employer of any person who carries out the hot work;</strong></td>
</tr>
<tr>
<td><strong>Employer of any person who carries out the hot work;</strong></td>
<td><strong>Principal under whose direction any person carries out the hot work</strong></td>
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</table>

The only exception to such permit-to-work system is during special situations when the system may operate to interfere with or render unlawful any rescue work or other work necessary for the general safety of life or property.

5.3 Application for Hot Work Permit

5.3.1 An application for a permit-to-work should:

- Be made by the supervisor or foreman of a person who is to carry out any high-risk work;
- Be made in such form and manner as may be required by the ship repair manager of the ship to which the high-risk work relates;
- State the measures which will be taken to ensure the safety and health of persons who carry out the high-risk work; and
- Be addressed to the ship repair manager and submitted to the safety assessor of the shipyard or the ship in the harbour where the high-risk work is to be carried out.

5.3.2 All hot work permit application should be accompanied by sketches showing the exact locations where the hot work is to be carried out.
5.4 Evaluation of Hot Work Permit

5.4.1 On receipt of the application for a hot work permit, the safety assessor should:

- Assess whether all reasonably practicable measures have been taken to ensure the safety and health of the persons who will be carrying out the high-risk work; and
- Inspect the site (including its surroundings) where the high-risk work is to be carried out together with the supervisor or foreman of the person who is to carry out the work to ensure that the hot work can be carried out safely.

5.4.2 The safety assessor should endorse the application for the hot work permit and forward the endorsed application to the ship repair manager if he is satisfied that the hot work can be carried out safely.

5.4.3 It should be the duty of the safety assessor to exercise all due diligence when performing his functions in relation to the evaluation and endorsement of an application for a hot work permit.

5.5 Issue of Hot Work Permit

5.5.1 The ship repair manager may issue a permit-to-work in relation to any high-risk work if he is satisfied that:

- It is necessary to carry out the hot work;
- There is no alternative work method to the hot work;
- There has been a proper evaluation of the risks and hazards involved in the carrying out of the hot work based on the available information;
- No incompatible work which may pose a risk to the safety and health of the person who is to carry out the high-risk work and other persons at work in the shipyard or on board the ship in the harbour will be carried out at the same time and in the same vicinity as the high-risk work;
- All reasonably practicable measures will or have been taken to ensure the safety and health of the persons who carry out or are to carry out the high-risk work; and
- All persons who are to carry out the high-risk work are informed of the hazards associated with it.

5.5.2 Hot work permit should be a controlled document and should be serialised.

5.5.3 The ship repair manager who issues a permit-to-work in respect of any high-risk work should retain a copy of the permit-to-work.

5.5.4 It should be the duty of the ship repair manager to exercise all due diligence when performing his function in relation to the issuance of a permit-to-work.

5.5.5 A permit-to-work should be valid for the period stated therein, and if the high-risk work for which the permit-to-work is issued is not completed within the validity period, a fresh application should be made accordingly.

5.5.6 Posting of the permit and the monitoring of the hot work should be done as that described in paragraphs 4.7 and 4.8 with necessary modification in respect to the hot work.

5.6 Person Carrying Out Hot Work to be Competent in Hot Work.

5.6.1 The employer of, or principal who gives direction to, persons who carry out the hot work should ensure that the person:

- Is sufficiently trained and is competent in hot work; and
- Has been fully instructed on the hazards and precautionary measures to be taken.

5.7 Measures for Hot Work

Before issuing a hot work permit, it should be the duty of the responsible person to:

- Ensure that the site of the intended hot work and its surrounding areas are free from any hazardous substance; and
- If necessary to prevent danger from the opposite side of the surface on which the hot work is to be carried out, keep watch for any fire and prevent the introduction of any hazardous substance.

5.8 Marking of Hot Work Area

Prior to the commencement of any hot work in a shipyard or on board a ship in a harbour, it should be the duty of the responsible person to ensure that the site where the hot work is to be carried out is clearly marked for easy identification.

5.9 Fire Watchman

5.9.1 It should be the duty of the responsible person to appoint a person who has been trained in fire fighting as a fire watchman where any hot work is carried out in a shipyard or on board a ship in a harbour.

5.9.2 It should be the duty of the responsible person to ensure that the fire watchman is provided with suitable and adequate fire fighting equipment.

5.9.3 It should be the duty of the fire watchman:

- To keep watch over the area in which the hot work is being carried out and the surroundings throughout the duration of the hot work; and
- To extinguish or control the fire if it is within his means to do so;
- To report to Singapore Civil Defence Force if unable to control the fire.
5.10 Duty to Report Incompatible Work

5.10.1 Any person who knows any work performed in a shipyard or on board a ship which is incompatible with the hot work being carried out should report to his supervisor, the workplace safety and health officer, the workplace safety and health coordinator or the ship repair manager who issued the hot work permit of that hot work immediately.

5.10.2 Incompatible work also includes any work in a shipyard or on board a ship in a harbour which is carried out at or in the vicinity of any hot work and likely to pose a risk to the safety or health of persons at work.

5.11 Daily Review and Revocation of Hot Work Permit.

5.11.1 The ship repair manager should review and assess the need of hot work on a daily basis and revoke the hot work permit.

5.11.2 The ship repair manager may order the hot work to cease immediately and revoke the hot work permit if he thinks the hot work poses a risk to the safety and health of persons at work in the shipyard or on board the ship in the harbour.


6.1 Safety of Equipment

6.1.1 In the event a person uses an equipment in a shipyard or on board a ship in a harbour for the purpose of any work to which these Regulations apply, the employer of or the principal under whose direction the person carries out the work should ensure that the equipment is of good construction, sound material and adequate strength; free from defects; and appropriate for the work.

6.2 Hazardous Substances

6.2.1 Any person should obtain approval from the occupier of the shipyard or mater / owner / agent of a ship in a harbour prior to bringing any hazardous substance into a shipyard or on board a ship in a harbour.

6.2.2 “Hazardous substance” refers to any hazardous substance specified in Part II of the Fifth Schedule to the Act.

6.3 Falling Hazards

6.3.1 The responsible person should take reasonably practicable measures where there is an open side or opening into or through which a person is liable to fall more than 2 meters in a shipyard or on board a ship in a harbour.

6.3.2 The reasonably practicable measures shall comply with the following:

- Every open side or opening shall be covered or guarded by effective guardrails, barriers or other effective means to prevent fall;
- Guard-rails, barriers or other effective means of fall prevention should:
  - Be of good construction, sound material and adequate strength to withstand the impact during the course of work;
  - Be placed on the inside of the uprights and secured so as to prevent accidental displacement; and
  - Be placed so as to prevent the fall of any person.
- Every guard-rail, barrier or other effective means of fall prevention may be removed if free access is required or work is actually in progress.
- Every guard-rail, barrier or other effective means of fall prevention which is removed shall be replaced immediately when free access is no longer required or work is no longer in progress.

6.4 Drowning Hazards

6.4.1 For a person carrying out work in a shipyard or on board a ship in a harbour and at risk of falling into water in which he may drown, the responsible person should provide adequate equipment to the person at all times during the exposure to the risk:

- For keeping the persons afloat;
- For promptly rescuing the persons from the water; and
- For resuscitating rescued persons.

6.5 Slipping Hazards

6.5.1 The responsible person should ensure that the passageway, scaffold, platform or other elevated working surface to be used by the person carrying out the work is kept free from slipping hazard.

6.6 Hazards Arising from Protruding Objects

6.6.1 The responsible person should ensure that:

- All passageways, stairs, platforms and other means of access or places of work are kept free from debris or protruding objects or any other obstructions that could cause tripping; and
- Any sharp projection which is present in any passageway, stair, platform and other means of access or place of work and may injure any person is removed or otherwise made safe.

6.7 Prevention of Accidental Closure of Hatch

6.7.1 The responsible person should ensure that effective means are provided to prevent accidental closure of any cover in the open position of a hatch opening.
6.8 Spray Painting

6.8.1 The employer or principal under whose direction a person is carrying out the spray painting work should comply with the following:

- Provide suitable and effective breathing apparatus for spray painting works to every person employed in spray painting work;
- Provide and maintain breathing apparatus that is:
  - Of good construction and sound material;
  - Free from defects; and
  - In accordance with the generally accepted principles of sound and safe practice.
- Ensure that any area or place where spray painting works are being carried is adequately ventilated.

6.8.2 Every person undertaking spray painting work in any tank, compartment or confined space should use a suitable breathing apparatus where fresh air is constantly supplied by an air-line.

6.8.3 Any person who fails to wear the provided breathing apparatus, upon conviction, is liable to a fine not exceeding $1,000; and for second or subsequent conviction, a fine not exceeding $2,000.

6.9 Vehicular Hazards

6.9.1 The owner of any vehicle used in a shipyard should ensure that the vehicle is of good construction and is roadworthy.

6.9.2 No person should drive a vehicle of any class or description in a shipyard prior to obtaining authorisation of the occupier of the shipyard.

6.9.3 A person who fails to obtain authorisation prior to operating a vehicle of any class or description is liable on conviction to a fine not exceeding $1,000 and, for second or subsequent conviction, to a fine not exceeding $2,000.

6.9.4 The occupier of a shipyard should ensure that no person drives a vehicle of any class or description in a shipyard prior to obtaining authorisation.

6.9.5 Employer of or principal under whose direction the person is driving a vehicle should ensure that he or she does not drive the vehicle unless he or she:

- Has been fully instructed as to the dangers likely to arise and the precautions to be observed; and
- Has received sufficient training to drive the vehicle.

6.10 Lighting

6.10.1 The responsible person should ensure that there is:

- Sufficient and suitable general lighting of either natural or artificial, in every part of the shipyard or ship in the harbour in which persons are at work or passing; and
- Emergency lighting which is sufficient in intensity and distribution for use in the event of a power failure affecting the general lighting to allow for the safe evacuation or rescue of persons in the shipyard or ship in the harbour.

6.11 Disposal of Debris

6.11.1 The responsible person should ensure that:

- The handling and disposal of any debris or other article is done in a manner which will not endanger persons;
- No debris is allowed to accumulate resulting as a hazard; and
- No debris is thrown from heights.

7. Electrical Safety

7.1 Electrical Installation, Equipment and Connections

7.1.1 For any work carried out in a shipyard or on board a ship in a harbour and in the course of which the person carrying out the work may come into contact with any part of an electrical installation or equipment, including motor generators, rectifiers, welding machines or welding sets, the responsible person should comply with the following:

- Provide and maintain all electrical installations and equipment of good construction and sound material; free from defects; and in accordance with the generally accepted principles of sound and safe practice;
- Take all practical measures to protect any person against the risk of electric shock arising from or in connection with the use of any electrical installation or equipment;
- Ensure all electrical connections are in accordance with the generally accepted principles of sound and safe practice;
- Ensure plugs and socket-outlets used for connecting any electrical equipment should be of heavy duty industrial types;
- Ensure any portable hand-held electrical equipment used in any confined space should be operated at a voltage not exceeding alternating current (AC) 55 volts between the conductor and earth or direct current (DC) 120 volts; and
- Protect all temporary electrical installations supplying electricity to any portable electrical equipment with effective residual current circuit breakers with a tripping current not exceeding 30 mA.
7.2 Electrical Welding Equipment

7.2.1 Any person who provides any alternating current (AC) electric arc welding equipment for use in a shipyard or on board a ship in a harbour should comply with the following:

- Fit all alternating current (AC) electric arc welding equipment with an effective low voltage shock preventer which reduces the open-circuit secondary voltage to not exceeding 25 volts;
- Ensure the low voltage shock preventer used is:
  - Fitted in accordance with the manufacturer’s instructions; and
  - Inspected and tested by a competent person once every 6 months.

8. Welding and Cutting Operations

8.1 Gas Cylinders

8.1.1 For welding or cutting work, it should be the duty of the responsible person to comply with the following:

- No cylinder which contains or has contained oxygen or any flammable gas or vapour should be taken:
  - Below the weather deck of a ship undergoing repair; or
  - Below the topmost completed deck of a ship under construction unless it is installed or placed in a part of the ship which is adequately ventilated to prevent any dangerous accumulation of gases.

8.1.2 Liquefied petroleum gas (LPG) should not be taken and used:

- On board a ship undergoing repair; or
- Below the topmost completed deck of a ship under construction, unless all gas outlets have been fitted with effective anti leakage devices.

8.1.3 The LPG mentioned in 8.1.3 does not apply to the LPG brought on board for the purpose of maintaining and running of the ship.

8.2 Gas Manifolds

8.2.1 It should be the duty of the occupier of a shipyard to ensure that all gas manifolds in the shipyard are clearly marked to indicate the substance they contain and are sited in a safe and accessible location in open air.

8.3 Pipe Lines and Gas Hoses

8.3.1 It should be the duty of the responsible person to ensure that all pipes and hoses for the supply of oxygen or any flammable gas or vapour to any apparatus for cutting, welding or heating of metal are:

- Of good construction and sound material;
- Free from defects; and
- Properly maintained.

8.4 Gas Equipment to be of Good Construction

8.4.1 The responsible person should ensure that all equipment used for the purpose of carrying out hot works such as gas torches, blowpipes, pressure regulators, nozzles and connections are:

- Of a design that is suitable for the gas or vapour being used;
- Of good construction and sound and suitable material;
- Free from defects; and
- Properly maintained.

8.5 Safety Devices

8.5.1 For work involving oxy-fuel and air-fuel gas equipment carried out in a shipyard or on board a ship in a harbour, the responsible person should comply with the following:

- A suitable non-return valve or any other equally effective means which prevents the backflow of gas should be fitted as per manufacturer’s instructions between each gas torch inlet and gas hose of every oxy-fuel and air-fuel gas equipment;
- A flashback arrestor or any other equally effective means which stops flashbacks should be fitted as per manufacturer’s instructions at every fuel gas and oxygen outlet and pressure regulator outlet of each gas cylinder; and
- An anti-leakage device or other equally effective means to stop a leak should be provided on every oxygen and fuel gas line used in a confined space.

8.6 Safety Measures During Break in Gas Welding and Cutting

8.6.1 For work involving welding or cutting carried out in a shipyard or on board a ship in a harbour, the responsible person should comply with the following:

- When welding and cutting operations cease for the day or for a substantial period or during a meal interval:
  - The supply valves of every gas cylinder and manifold should be securely closed; and
- Every gas torch, manifold and hose for flammable gases and oxidizing gases should be taken to the weather deck or the topmost completed deck or to a safe place that is adequately ventilated to prevent any dangerous accumulation of gases or vapours.

- Where it is impractical to comply with the requirements stated in 8.6.1 a (ii) during a meal interval, effective measures should be taken to ensure that the work area is safe before work resumes and such measures should include:
  - The provision of effective ventilation to prevent the accumulation of gases; and
  - The testing of the atmosphere for the presence of flammable gases.

8.7 Inspection of Hot Work Equipment

8.7.1 For hot work carried out in a shipyard or on board a ship in a harbour, the responsible person should comply with the following:
  • All electrode holders, welding cables, cable connectors and other arc welding equipment should be inspected by a competent person once every 30 days;
  • All equipment and fittings used for the purpose of carrying out hot work, including any gas hoses, torches, blowpipes, pressure regulators, nozzles and connections, should be inspected and tested by a competent person or a workplace safety and health officer once every 14 days to ensure that they are free from defects and leaks;
  • All safety devices should be inspected and tested by a competent person or a workplace safety and health officer once every 12 months to ensure that they are effective;

8.7.2 The competent person, or the workplace safety and health officer should:
  • Enter the results of the inspection and test into a register;
  • Keep the register of the inspection and test at the shipyard or on board the ship in the harbour; and
  • Produce the register for inspection upon request by an inspector.

8.7.3 Any competent person or workplace safety and health officer who fails to comply with 8.7.2 (a) to 8.7.2 (c) is guilty of an offence and is liable on conviction to a fine not exceeding $1,000.

8.8 No Welding in Wet Conditions

8.8.1 For electric arc welding work carried out in a shipyard or on board a ship in a harbour, the responsible person should ensure that, so far as is reasonably practicable, no electric arc welding work is carried out under wet conditions where there is risk of electrocution.

8.8.2 No person should carry out any electric arc welding in wet conditions where there is risk of electrocution.

8.8.3 Person who contravenes the above is guilty of an offence and upon conviction may be liable to a fine not exceeding $1,000.

8.8.4 No person should require, permit or direct any person to carry out electric arc welding in wet conditions where there is risk of electrocution.

8.8.5 Any person who contravenes the above is guilty of an offence and upon conviction may be liable to a fine not exceeding $20,000 or to imprisonment for a term not exceeding 2 years or to both.

8.9 Adequate Ventilation

8.9.1 For heating, welding, cutting or any other work involving the application of heat carried out in a shipyard or on board a ship in a harbour, the responsible person should comply with the following:
  • Provide adequate ventilation when heating, welding, cutting or other work involving the application of heat to be carried out in a confined space;
  • Provide effective local exhaust ventilation at the emission source when the heating, welding, cutting or other work involving the application of heat is to be carried out on materials containing lead, cadmium, beryllium, copper or other toxic or harmful substances.

8.9.2 Where the provision of ventilation is not practicable, provide breathing apparatus of the type where fresh air is being constantly supplied by an airline or other equally suitable breathing apparatus to the person carrying out the work.

8.10 Metallic Fumes

8.10.1 For heating, welding, cutting or any other work involving the application of heat carried out in a shipyard or on board a ship in a harbour, the responsible person should comply with the following:
  • Carry out all welding, cutting or other works involving the application of heat, so far as is reasonably practicable, in open air or in areas with good ventilation;
  • Provide effective local exhaust ventilation to remove any toxic or harmful fumes or other air impurities at the source of emission if work cannot be carried out in an area with good ventilation;
  • If the provision of local exhaust ventilation is not practicable,
    - Use of forced ventilation to dilute any toxic or harmful fumes or other air impurities; and
    - Provide breathing apparatus of the type where fresh air is being constantly supplied by an air-line or other equally suitable breathing apparatus to and used by the person carrying out the work.
8.11 Welding and Cutting of Containers that Held Flammable Substances

8.11.1 For operation involving welding or cutting in a shipyard or on board a ship in a harbour on any container that has held any explosive or flammable substance or in which flammable gases may have been generated, the employer of or the principal under whose direction any person who carries out the operation should ensure that no such operation is carried out on the container unless:

- The container has been thoroughly cleaned by steam or other equally effective means and is completely free from combustible gases or vapours; or
- The atmosphere in the container has been rendered non-flammable or non-explosive.

9. Cranes, Employee’s Lifts and Material Handling Machinery

9.1 Strength and Stability

9.1.1 The owner of a crane, an employee’s lift or a material handling machinery being used in a shipyard or on board a ship in a harbour should ensure that it is:

- Of good construction, sound material and adequate strength;
- Free from defects; and
- Properly maintained.

9.1.2 The operator of a crane or material handling machinery being used in a shipyard or on board a ship in a harbour should ensure that the crane or machinery, as the case may be, is positioned and operated so as to be stable.

9.2 Capacity Chart

9.2.1 The owner of any crane used in a shipyard or on board a ship in a harbour should comply with the following:

- Where the capacity of the crane is variable, a capacity chart should be provided.
- The capacity chart should:
  - Be posted and maintained in the crane which is clearly visible to the operator;
  - Set out the safe loads for various lengths of jib at various angles and radial distances; and
  - Be prepared and certified by an authorised examiner, unless it is furnished by the manufacturer or builder of the crane.

9.2.2 Where outriggers are provided, the safe loads with and without the use of outriggers should be specified in the capacity chart.

9.3 Thorough Examination and Inspection

9.3.1 Before any crane, employee’s lift or material handling machinery is put into service for the first time in the shipyard or on board the ship in the harbour, the responsible person should ensure:

- It has been thoroughly examined and inspected by a competent person; and
- In the case of a crane or an employee’s lift, such examination and inspection is conducted by an authorised examiner.

9.4 Handling of Suspended Loads

9.4.1 For crane or material handling machinery used in a shipyard or on board a ship in a harbour, the operator of the crane or material handling machinery should take, so far as is reasonably practicable, such measures as are necessary to ensure that a suspended load is not moved over the head of any person.

9.4.2 For any work involving lifting operations which is carried out in a shipyard or on board a ship in a harbour, the employer of or principal under whose direction any person who carries out the work, should ensure that loads that have a tendency to swing or turn freely during hoisting are controlled by tag lines.

9.5 Prohibition of Riding on Loads

9.5.1 For work involving the use of crane, hoisting machinery, material handling machinery or excavating machinery carried out in a shipyard or on board a ship in a harbour, the responsible person should ensure that:

- The use of every lifting cage as per the requirements on lifting gears in the Workplace Safety and Health (General Provisions) Regulations (Rg 1) and the requirements of any approved code of practice.
- No person rides on the loads, buckets, skips, cars, slings or hooks of the crane or machinery.

9.5.2 The above shall not apply to lifting cages specially designed to hold persons while it is suspended from a crane.

9.6 Cranes or Machinery at Rest

9.6.1 For work involving the use of a crane or material handling machinery carried out in a shipyard or on board a ship in a harbour, the employer of or the principal under whose direction any person who carries out the work should ensure that no load is left suspended on the crane or material handling machinery when it is not in use.

9.7 Operator of Employee’s Lift

9.7.1 The occupier of a shipyard shall ensure that:

- No employee’s lift in the shipyard is operated unless it is in the charge of a designated person stationed in the car as its attendant;
- No person other than the lift car attendant moves the car of the employee’s lift or opens the car door or gate of the employee’s lift.
9.7.2 The lift car attendant should:

- Not cause the lift car to move unless he is satisfied that the load is prepared for movement; and
- Exercise all due diligence when operating the employee's lift.

9.8 System for Calling Lifts

9.8.1 The occupier of a shipyard should ensure that a system for calling a lift car to every landing level where workers are required to board or alight from the lift car is implemented in the shipyard.

9.9 Offence

9.9.1 Any person who contravenes any provision of WSH (Shipbuilding and Ship-repairing) Regulations which imposes a duty on him shall be guilty of an offence and is liable on conviction to a fine not exceeding $20,000 or to imprisonment for a term not exceeding 2 years or to both.
### Annex B-2:

**List of SHE-Related Codes of Practice (CP) and Singapore Standards (SS)**

<table>
<thead>
<tr>
<th>CP / SS</th>
<th>Brief Content (as provided by SPRING e-shop on its website)</th>
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<tbody>
<tr>
<td><strong>Safety and Health</strong></td>
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</table>
| 1 | CP 5: 1998  
Code of Practice for Electrical Installations | Applies to the design, selection, erection, inspection and testing of electrical installations, other than those specifically excluded. Covers installation utilising extra-low voltage and low-voltage. Excludes systems for transmission and distribution of energy to the public; railway traction equipment, rolling stock and signalling equipment; electrical equipment of motor vehicles; equipment on board ships; equipment of mobile and fixed offshore installations; equipment of aircraft. Applies to items of electrical equipment only so far as selection and application of the equipment in the installation are concerned. Does not deal with requirements for the construction of prefabricated assemblies of electrical equipment, which are required to comply with appropriate specifications. |
| 2 | CP 16: 1991  
Code of Practice for Earthing | Gives guidance on the methods which may be adopted to earth an electrical system for the purpose of limiting the potential of current-carrying conductors forming part of the system, and non-current-carrying metalwork associated with equipment, apparatus and appliances connected to the system. Does not cover trains, ships and aircraft and is not intended to take the place of a detailed specification or to instruct untrained persons. |
| 3 | CP 17: 1991  
Code of Practice for the Maintenance of Electrical Switchgear for Voltages up to and Including 22kV (Under review) | Covers the maintenance of switchgear for voltages up to and including 22 kV to ensure the safe and effective operation of an electrical system with minimum risk of breakdown and the consequent interruption of supply. Provides information on an organised system of routine maintenance to keep electrical switchgear, both indoor and outdoor, and its associated apparatus in good working order. Also draws attention to the precautions taken in order to maximise the safety of personnel while maintenance work is in progress. Excludes special maintenance requirements relating to explosion protected switchgear and control gear. |
| 4 | CP 21: 1981  
Code of Practice for Safeguarding of Mechanical Power Presses | Establishes safety criteria with respect to the design, construction and application of safeguards to the points of operation of mechanical power presses. Applies only to those mechanically powered machines that shear, punch, form or assemble metal or other materials by means of tools or dies attached to slides, commonly referred to as mechanical power presses. |
| 5 | CP 27: 1999  
Code of Practice for Factory Layout - Safety, Health and Welfare Considerations | Provides guidelines on safety, health and welfare to be taken into consideration when planning factory layout. |
| 6 | CP 28: 1984  
Code of Practice for the Construction, Care and Safe Use of Shears | Establishes the safety criteria for the construction, care and use of shears designed primarily of metal shearing. Applies to machines constructed with a plate or cast-type ram or both, bed, table, hold-down and housings, utilizing one fixed and one moving non-rotary blade for the shearing action, and having a constant rake for any one shearing stroke. It is a useful guide (to be read in relation with the statutory requirements of the Factories Act, 1973) for all users, maintenance personnel and manufacture of shears. |
| 7 | CP 30: 1985  
Code of Practice for Safe Loading on Vehicles | Serves to guide transport operators, drivers and loading staff on basic safety principles that must be followed generally and the precautions to be taken in ensuring the safe carriage of the more common types of load. |
| 8 | CP 61 - 1: 1994  
Code of Practice for Packaging and Containers for Hazardous Substances - List of Commonly Used Hazardous Substances | Provides a list of commonly used and transported hazardous substances in Singapore. |
<table>
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<tr>
<td>9</td>
<td>Provides a guide to users on the packaging requirements of commonly used hazardous substances for the safe carriage of the substances.</td>
</tr>
<tr>
<td>10</td>
<td>Provides a guide to users on the container requirements of commonly used hazardous substances for the safe carriage of the substances.</td>
</tr>
<tr>
<td>11</td>
<td>Gives general guidance to the users on the safety aspect of practice regarding siting, stability, proximity hazards, erection, dismantling, operation, control, maintenance, inspection and repair of tower cranes.</td>
</tr>
<tr>
<td>12</td>
<td>Sets forth accepted practices for respirator users; provides information and guidance on the selection, use and maintenance of respirators and contains recommendations for establishing respirator protection programmes. Covers the use of respirators to protect against the inhalation of contaminants and against oxygen-deficient atmospheres in the workplace. Does not cover underwater breathing devices, the use of respirators in aircrafts, the use of respirators under military combat conditions and the use of life support respirators for medical or resuscitation purposes. Contains requirements and recommendations on respirator selection, respirator fit, training, medical fitness, respirator maintenance and breathing air quality.</td>
</tr>
<tr>
<td>13</td>
<td>Gives recommendations for the selection, use, care and maintenance of hearing protective devices.</td>
</tr>
<tr>
<td>14</td>
<td>Covers the elements of a safety, health and environmental management systems for the storage, handling, transfer, re-packing and transportation of hazardous chemicals in Singapore. Does not apply to transportation of chemicals by air, radioactive substances, infectious substances and arms and explosives.</td>
</tr>
<tr>
<td>15</td>
<td>Provides guidelines on the safety and health control measures relating to entry into and working in confined spaces at normal atmospheric pressure. Also covers the procedures for applying and issuing the permit-to-work for confined space entry.</td>
</tr>
<tr>
<td>16</td>
<td>Sets out safety requirements for the use of lasers for alignment, levelling, control and survey tasks in the building and construction industry. Does not cover the design and manufacture of lasers, nor the use of lasers in other applications.</td>
</tr>
<tr>
<td>17</td>
<td>Provides guidelines on the provision of appropriate lighting for optimum visual performance in indoor industrial premises. Covers the design, installation, maintenance and improvement of the lighting systems to ensure safety, comfort, well-being and productivity of the workers. Maintenance luminance is recommended for different types of industrial areas, tasks and processes.</td>
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<tr>
<td>18 CP 88-3: 2004 Code of Practice for Temporary Electrical Installations – Shipbuilding and Ship-repairing Yards</td>
<td>Deals principally with the provision of temporary electricity supply from the shore fixed installations or from mobile generating sets to vessel(s) under construction and during repair and conversion work. Covers all temporary electrical installations in the building and repairing of vessels in the yards. Applies to electrical installations set up for the provision of electricity supply during the execution of the works in: (a) shipbuilding and repairing yards; (b) vessels moored alongside the yards; and (c) confined spaces or locations or other similar situations on board vessels. Does not cover: (a) electricity supply for the vessel's electrical installation and any such part of such installation set up for the use by the crew on board vessels; (b) installations operating at voltages exceeding low voltage.</td>
</tr>
<tr>
<td>19 CP 91: 2001 Code of Practice for Lockout Procedure</td>
<td>Covers the servicing or maintenance of machines where any unexpected energisation or start up of the machines, or release of stored energy could cause injury to employees. Establishes minimum performance requirements for the control of such hazardous energy.</td>
</tr>
<tr>
<td>20 CP 98: 2003 Code of Practice for Preparation and Use of Material Safety Data Sheets (SDS)</td>
<td>Gives recommendations for the preparation, review, reissue and application of SDS. Covers the responsibility of the suppliers and manufacturers of chemical substances and preparations in the compilation and completion of an SDS, and that of users (employers and employees) to make use of the information in the SDS to prevent unnecessary exposure to persons in the workplace and in the community. Does not cover the use of pharmaceutical substances and preparations by medical physicians and veterinarians in the management of the health of a person or an animal, but applies to the production and use of these substances and preparations in an industrial process.</td>
</tr>
<tr>
<td>21 SS 98: 2005 Industrial Safety Helmets</td>
<td>Specifies physical and performance requirements, methods of test and marking requirements for industrial safety helmets which are intended primarily to provide protection to the wearer against falling objects and consequential brain injury and skull fracture.</td>
</tr>
<tr>
<td>22 CP 99: 2003 Code of Practice for Industrial Noise Control</td>
<td>Provides information on industrial noise control by engineering means such as barriers, enclosures, absorbers, damping materials, silencers and isolators. Complements the Factories (Noise) Regulations in recommending measures to control noise and prevent noise-induced deafness. With reference to proper noise criteria, applies to all industrial workplaces except for construction and demolition sites which have been covered by CP 49 - ‘Code of Practice for Noise Control on Construction and Demolition Sites’. Excludes community noise, transportation noise, construction noise and noise from public entertainment.</td>
</tr>
<tr>
<td>23 CP 101: 2004 Code of Practice for Safe Use of Powered Counterbalanced Forklifts</td>
<td>Specifies the safety requirements for the manufacture, application, operation and maintenance of powered counterbalance forklifts. Lays down the responsibilities of the various parties involved. Does not include industrial trucks that do not apply lifting with fork arms and the use of counterweights for balance.</td>
</tr>
<tr>
<td>24 SS 102: 1996 Valves and Safety Valves for Land Boilers, Steam Vessels and Piping Installations</td>
<td>Specifies the design, construction and testing of safety valves as well as other valves that are intended for use on land boilers, steam vessels and piping installations. Deals with safety valves, stop valves, feed valves, boiler blow down valves / cocks for application to boilers, main and auxiliary steam pipes, feed and boiler blowdown piping in connection therewith. Does not cover the selection, operation or application of valves. Archived July 2004.</td>
</tr>
<tr>
<td>26 SS 241: 1996 General Requirements for Electrical Accessories</td>
<td>Specifies requirements and tests to check the safety in normal use of electrical accessories which are not covered by other specific Singapore Standards. Such accessories are intended for use in household, commercial and light industrial premises where: - the normal supply voltage does not exceed 250 V a.c. single-phase, 50 Hz or 250 V d.c; - the rated current of the accessory does not exceed 63A; - the rated current of an accessory incorporating screwless terminals does not exceed 13A. Also covers ‘plug-in’ and other accessories in which electrical accessory components are incorporated, e.g. plug-pins, socket-contacts, switches, terminals etc.</td>
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<tr>
<td>27</td>
<td>SS 254 - 0: 2001 Electrical Apparatus for Explosive Gas Atmospheres - General Requirements</td>
</tr>
<tr>
<td>28</td>
<td>SS 254 - 11: 2003 Electrical Apparatus for Explosive Gas Atmospheres - Intrinsic Safety &quot;i&quot;</td>
</tr>
<tr>
<td>29</td>
<td>SS 254 - 6: 2003 Electrical Apparatus for Explosive Gas Atmospheres - Increased Safety &quot;e&quot;</td>
</tr>
<tr>
<td>30</td>
<td>SS 286 - 1: 1984 Caution Labelling for Hazardous Substances - Classification and Class Labels for Hazardous Substances</td>
</tr>
<tr>
<td>31</td>
<td>SS 402 - 1: 1997 Industrial Safety Belts and Harnesses - General Requirements</td>
</tr>
<tr>
<td>32</td>
<td>SS 402 - 2: 1997 Industrial Safety Belts and Harnesses - Permanent Anchors</td>
</tr>
<tr>
<td>33</td>
<td>SS EN 420: 2003 Protective Gloves - General Requirements and Test Methods</td>
</tr>
<tr>
<td>34</td>
<td>SS 473 - 1: 1999 Personal Eye Protectors - General Requirements</td>
</tr>
<tr>
<td>35</td>
<td>SS 473 - 2: 1999 Personal Eye Protectors - Selection, Use and Maintenance</td>
</tr>
<tr>
<td>36</td>
<td>SS 507: 2004 Business Continuity / Disaster Recovery (BC / DR) Service Providers</td>
</tr>
<tr>
<td>37</td>
<td>SS 506 - 1: 2004 Occupational Safety and Health (OSH) Management System - Specification</td>
</tr>
<tr>
<td>CP / SS</td>
<td>Brief Content (as provided by SPRING e-shop on its website)</td>
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</tr>
<tr>
<td>38 SS 506 - 2: 2004 Occupational Safety and Health (OSH) Management System - General Guidelines for the Implementation of OHS Management System</td>
<td>This standard is an adoption of the Occupational Health and Safety Assessment Series (OHSAS) 18002: 1999 and provides generic advice on the application of the OHS management system specification in Part 1 of this series. It explains the underlying principles of the specification and describes the intent, typical inputs, processes and typical outputs, against each requirement in the specification. This is to aid the understanding and implementation of OHS management system in the various sectors. This standard also provides a summary on the relationship with the elements in the safety management system under the Factories Act (Chapter 104).</td>
</tr>
<tr>
<td>39 SS 508 - 1: 2004 Graphical Symbols - Safety Colours and Safety Signs - Design Principles for Safety Signs in Workplaces and Public Areas</td>
<td>Applies to workplaces and all locations and all sectors where safety-related questions may be posed. Does not apply to the signalling used for guiding rail, road, river, maritime and air traffic. Establishes the safety identification colours and design principles for safety signs to be used in workplaces and in public areas for the purpose of accident prevention, fire protection, health hazard information and emergency evacuation. Also establishes the basic principles to be applied when developing standards containing safety signs.</td>
</tr>
<tr>
<td>40 SS 508 - 3: 2004 Graphical Symbols - Safety Colours and Safety Signs - Safety Signs used in Workplaces and Public Areas</td>
<td>Applies to workplaces and all locations and all sectors where safety-related questions may be posed. Does not apply to the signalling used for guiding rail, road, river, maritime and air traffic. Prescribes safety signs for the purposes of accident prevention, fire protection, health hazard information and emergency evacuation.</td>
</tr>
<tr>
<td>41 SS 510: 2005 Code of Practice on Safety in Welding and Cutting (and other operations involving the use of heat)</td>
<td>Covers the safety practices to protect persons from injury and illness, and properties (including equipment) from damage by fire and other causes arising from welding and cutting equipment, its installation, operation and maintenance. Includes specific provisions for gas welding, shielded metal arc welding, submerged arc welding, gas metal arc welding, gas tungsten arc welding, brazing, resistance welding, and thermit welding.</td>
</tr>
<tr>
<td>42 SS 513 - 1: 2005 Personal Protective Equipment - Footwear - Safety Footwear</td>
<td>Specifies basic and additional (optional) requirements for safety footwear.</td>
</tr>
<tr>
<td>43 SS 513 - 2: 2005 Personal Protective Equipment - Footwear - Test Methods for Footwear</td>
<td>Specifies methods for testing footwear designed as personal protective equipment.</td>
</tr>
<tr>
<td>44 TR 19: 2005 Technical Reference for Business Continuity Management (BCM)</td>
<td>Specifies the requirements for organisations intending to build competence, capacity, resilience and readiness to respond to and recover from events which threaten to disrupt normal business operations and activities. Stipulates the requirements to attain and maintain readiness to deal with risks and risk events faced by organisations due to the nature of their businesses, external environment or regulatory requirements. Does not prescribe how organisations should comply with the stipulations in this TR as each organisation's operations and environment are unique, and changes with advancement in technology, business operations and activities, external environment and industry practices, and the need to comply with regulatory requirements. Does not deal with the management of the BC Plan project, e.g. project initiation and gaining of executive management support to endorse the project.</td>
</tr>
<tr>
<td>Environmental Protection</td>
<td></td>
</tr>
<tr>
<td>45 CP 100: 2004 Code of Practice for Hazardous Waste Management</td>
<td>Sets out the procedures and practices on safe management and handling of hazardous wastes generated from industrial activities. Also sets out the key requirements for collection, transportation, storage, treatment and disposal of hazardous industrial wastes. Does not apply to biohazardous and radioactive wastes.</td>
</tr>
<tr>
<td>CP / SS</td>
<td>Brief Content (as provided by SPRING e-shop on its website)</td>
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</tr>
<tr>
<td>46</td>
<td><strong>SS ISO 14001: 2004</strong>&lt;br&gt;<strong>Environmental Management Systems - Requirements with Guidance for Use</strong>&lt;br&gt;Specifies requirements for an environmental management system to enable an organisation to develop and implement a policy and objectives which take into account legal requirements and other requirements to which the organisation subscribes, and information about significant environmental aspects. Applies to those environmental aspects that the organisation identifies as those which it can control and those which it can influence. Does not itself state specific environmental performance criteria. Annex B identifies the broad technical correspondences between this standard and ISO 9001: 2000 and vice versa.</td>
</tr>
<tr>
<td>47</td>
<td><strong>SS ISO 14004: 2004</strong>&lt;br&gt;<strong>Environmental Management Systems - General Guidelines on Principles, Systems and Supporting Techniques</strong>&lt;br&gt;Provides guidance on the establishment, implementation, maintenance and improvement of an environmental management system and its coordination with other management systems. Applicable to any organisation, regardless of its size, type, location or level of maturity. Guidelines in this standard are consistent with the ISO 14001 environmental management system model but they are not intended to provide interpretations of the requirements of ISO 14001.</td>
</tr>
<tr>
<td>48</td>
<td><strong>SS ISO 19011: 2002</strong>&lt;br&gt;<strong>Guidelines for Quality and / or Environmental Management Systems Auditing</strong>&lt;br&gt;Provides guidance on the principles of auditing, managing audit programmes, conducting quality management system audits and environmental management system audits, as well as guidance on the competence of quality and environmental management system auditors. Applicable to all organisations needing to conduct internal or external audits of quality and / or environmental management systems or to manage an audit programme. Application of this standard to other types of audit is possible in principle, provided that special consideration is paid to identifying the competence needed by the audit team members in such cases.</td>
</tr>
</tbody>
</table>

**Fire Safety**

<table>
<thead>
<tr>
<th>CP / SS</th>
<th>Brief Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td><strong>CP 25: 1999</strong>&lt;br&gt;<strong>Code of Practice for Emergency Voice Communication System in Buildings</strong>&lt;br&gt;Applies to the planning, design, installation, maintenance and testing of emergency voice communication systems in buildings and sets out requirements for the basic system. Gives recommended procedures for the use of the system and other information of an advisory nature.</td>
</tr>
<tr>
<td>50</td>
<td><strong>CP 29: 1998</strong>&lt;br&gt;<strong>Code of Practice for Fire Hydrant Systems and Hose Reels</strong>&lt;br&gt;Covers the planning, installation, testing and upkeep of fire hydrant, wet and dry rising main and hose reel systems on building premises.</td>
</tr>
<tr>
<td>51</td>
<td><strong>CP 10: 2005</strong>&lt;br&gt;<strong>Code of Practice for the Installation and Servicing of Electrical Fire Alarm Systems</strong>&lt;br&gt;Applies to the installation and servicing of electrical fire alarm systems in buildings. It covers alarm systems using manual call points, heat detectors, smoke detectors and flame detectors. The revision is intended to update existing requirements to bring the code in line with the latest fire alarm concepts and technologies.</td>
</tr>
<tr>
<td>52</td>
<td><strong>CP 45: 1989</strong>&lt;br&gt;<strong>Code of Practice for Halon 1301 Fire Protection Systems (Achieve)</strong>&lt;br&gt;Specifies minimum requirements for the design, construction, installation, testing commissioning, maintenance and operation of automatic Halon 1301 fire protection systems in building. Places emphasis on system reliability and fire safety.</td>
</tr>
<tr>
<td>53</td>
<td><strong>CP 52: 2004</strong>&lt;br&gt;<strong>Code of Practice for Automatic Fire Sprinkler System</strong>&lt;br&gt;Sets requirements for the installation of automatic sprinkler system in buildings and also provides for occupancy classification.</td>
</tr>
<tr>
<td>54</td>
<td><strong>CP 55: 1991</strong>&lt;br&gt;<strong>Code of Practice for Use and Maintenance of Portable Fire Extinguishers</strong>&lt;br&gt;Covers minimum requirements for the selection, installation, inspection, testing and maintenance of portable fire extinguishers.</td>
</tr>
<tr>
<td>55</td>
<td><strong>SS 232 - 1: 1999</strong>&lt;br&gt;<strong>Portable Fire Extinguishers - Description, Duration of Operation, Class A and B Fire Tests</strong>&lt;br&gt;Specifies the characteristics of description, duration, operation, residual charge and the efficiency test applicable to portable fire extinguishers.</td>
</tr>
<tr>
<td>CP / SS</td>
<td>Brief Content (as provided by SPRING e-shop on its website)</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>57 SS 232 - 3: 1999 Portable Fire Extinguishers - Construction, Resistance to Pressure, Mechanical Tests</td>
<td>Lays down technical specifications for extinguisher bodies and their accessories. Applies to the bodies of extinguishers in which the service pressure does not exceed 25 bar and to propellant gas cartridges. Also gives requirements relative to carbon dioxide extinguishers' bodies.</td>
</tr>
<tr>
<td>58 SS 232 - 4: 1999 Portable Fire Extinguishers - Charges, Minimum Required Fire</td>
<td>Specifies the charges of portable fire extinguishers and the minimum required fire i.e. the maximum quantity of extinguishing medium that is to be used for the extinction of a given fire size.</td>
</tr>
<tr>
<td>59 SS 232 - 5: 1999 Portable Fire Extinguishers - Specification and Supplementary Tests</td>
<td>Specifies the characteristics of effective range of operating temperatures, requirements for components, resistance to corrosion, brackets, identification of the extinguisher and periodical checking.</td>
</tr>
<tr>
<td>60 SS 299 - 1: 1998 Fire Resistant Cables - Performance Requirements for Cables Required to Maintain Circuit Integrity under Fire Conditions</td>
<td>Specifies the performance requirements and provide test methods for mechanical and fire tests applicable to cables rated at voltages not exceeding 600/1000 V.</td>
</tr>
<tr>
<td>61 SS 332: 2007 Specification for Fire Doors</td>
<td>Specifies requirements for the construction and installation of fire-resistant door sets used to protect openings in walls and partitions which are required to resist the passage of fire. Includes the test standards for various types of hardware. Excludes back check on door closers. Aligns the requirements on the vision panel location on fire doors with the latest Fire Code and Code of Barrier Free Accessibility (CBFA) to allow the wheelchair users to avoid being accidentally struck by the door swing.</td>
</tr>
<tr>
<td>62 SS 489: 2001 Fire Shutters</td>
<td>Specifies requirements and test methods to assess the fire-resistance of the shutter required to protect openings in walls and to resist passage of fire. Applies to fire-resistant vertical roller shutters, lateral shutter, horizontal roller shutters and folding sliding shutters. Does not include the requirements necessary for day-to-day operation of fire shutters.</td>
</tr>
<tr>
<td>63 SS 532: 2007 Code of Practice for the Storage of Flammable Liquids</td>
<td>Sets out requirements and recommendations for the safe storage and handling of flammable liquids, as classified in the chapter on the flammable liquids in the United Nations Globally Harmonised System of Classification and Labelling of Chemicals (GHS). Covers liquids of flash point up to 150 degrees Celsius. Does not apply to shipboard installations, mobile storage, plant or equipment in which liquid is processed, together with any vessels which form an integral part of the processing plant or equipment, bitumen and its mixtures prepared for road-making, flammable liquids stored in tanks exceeding 175 millibar above atmospheric pressure and liquefied gases that are maintained in the liquid phase for storage by means of pressure or refrigeration.</td>
</tr>
<tr>
<td>Ergonomics</td>
<td></td>
</tr>
<tr>
<td>64 SS 514: 2005 Code of Practice for Office ergonomics</td>
<td>Provides guidelines on the designs and improvements of working situations to make the workplace safer, more comfortable and more productive. It covers the fundamentals of office ergonomics including physical, environmental and psychosocial elements. For preliminary ergonomics audit, a sample checklist could be used to identify potential problems for further improvements on the design.</td>
</tr>
</tbody>
</table>
Annex C-1:

Workplace Safety and Health Management:
Risk Assessment Guidelines

Introduction to Risk Assessment Guides

Roles and Responsibilities

Risk Management is a key component of the new safety and health management framework underpinned by the new Workplace Safety and Health Act (WSHA). The Act aims to reduce risks at source by making stakeholders accountable for managing the risks they create.

Under the WSHA, risk management duties are imposed on every employer, self-employed person and principal (including contractor and sub-contractor). These parties must take all reasonably practicable measures to ensure that the workplace is safe and without risks to every person within its premises.

Where contractors and suppliers undertake work for their customers, they must take all reasonably practicable measures to eliminate any risk that may be posed by their machinery, equipment or hazardous substances.

Contractors and suppliers must also provide information of any machinery, equipment or hazardous substances to their customers who may require these information to conduct risk assessment in their workplaces. For example, contractors and suppliers should provide manual of operations, manuals of maintenance, material safety data sheet etc.

Risk Management

Risk Management entails:

- Risk assessment of any work activity or trade;
- Control and monitoring of such risks; and
- Communicating these risks to all persons involved.

These requirements are enshrined in the Workplace Safety and Health Management Regulations which is effective from 1 March 2006.

Risk Assessment

Risk assessment is an integral part of risk management. It is the process of:

- Identifying and analysing safety and health hazards associated with work;
- Assessing the risks involved; and
- Prioritising measures to control the hazards and reduce the risks.

Every workplace, including factories, should conduct risk assessments for all routine and non-routine work undertaken.

Risk Assessment Guidelines

This set of Guidelines provides a three-step process for Risk Assessment. The three steps are:

- Hazard identification;
- Risk evaluation; and
- Risk control.

Applying these basic principles of risk assessment will help you meet your obligations under the legislation.

Depending on the industry and nature of work activities, companies can adopt the activity-based or trade-based risk assessment approaches described in this Guide.

Alternatively, other approaches can be used to achieve the same or higher levels of protection against risks in your workplace.

The information in this Guide will be particularly useful for small and medium enterprises. Larger establishments, including process chemical plants with complex processes and operations, may adopt other established methods of hazard identification and risk analysis commonly used for process plant risk assessment, while still applying the basic principles in this Guide.
Risk Assessment Team
Risk assessments should be conducted by a team of persons who have a thorough knowledge of the work to be assessed. Team members should include management staff, process or facility engineers, technical personnel, supervisors, production operators, maintenance staff and safety personnel if available.

The team leader should also have undergone training in risk assessment. Alternatively, a safety consultant trained in job safety analysis and risk management and experienced in risk assessment could be engaged to conduct risk assessment.

The risk assessment team should also include contractor / supplier personnel who are involved with the work, whenever necessary.

Roles and Responsibilities

Risk management duties are imposed on every employer, self-employed person and principal (including contractor and sub-contractor). These parties must take all reasonably practicable measures to ensure that the workplace is safe and without risks to every person within its premises.

The Employer should:

- Designate, assign, appoint or engage a competent person leading a team of personnel (including contractors) associated with the process or activity to conduct risk assessments;
- Ensure that the risk control measures are implemented without undue delay after the completion of risk assessment;
- Inform all persons working at the workplace of the risks, and the means to minimise or, where possible, eliminate the risks;
- Provide a risk assessment register to record the findings of risk assessment;
- Endorse and approve the risk assessments conducted;
- Keep the risk assessment record for inspection by an inspector for at least three years from the date of the assessment; and submit the record to the Commissioner for Workplace Safety and Health if the Commissioner so requires;
- Review and update the risk assessment at least once every three years or earlier should there be a significant change in the work, or if there is reason to suspect that the assessment is no longer valid;
- Ensure that all employees are aware of the risk assessment for the work activity they carry out;
- Develop and implement safe work procedures for work which poses safety or health risks to workers; and
- Keep a written description of the safe work procedures and produce this to the inspector for inspection when requested.

The Team Leader should:

- Have adequate knowledge of the risk assessment method;
- Recommend appropriate risk control measures to reduce or eliminate the risks identified;
- Prepare a record of the risk assessment for the employer after completion of the assessment; and
- Assist management in monitoring the effectiveness of risk control measures after their implementation.

Employees should:

- Participate in the risk assessment or assist in conducting the risk assessment;
- Adhere to the safe work procedures established to reduce any safety and health risks at the workplace; and
- Inform their supervisors of any shortcomings in the safe work procedures or risk control measures.

Contractors and Suppliers

Whenever necessary, contractors and suppliers should work with the risk assessment team to identify hazards, evaluate and control the risks that machinery, equipment or hazardous substances may cause.

Risk Assessment Process

Unless the workplace or worksite is not ready, the risk assessment team should visit the workplace or worksite to ensure that all work areas are covered, including routine and nonroutine operations. Routine operations include activities such as preparatory and troubleshooting work activities. Non-routine operations include commissioning, repair and maintenance of plants.
The team should also consider the various environmental situations, e.g. weather and soil conditions, where these operations are carried out.

Depending on the industry and nature of work activities, companies can adopt the activity-based or trade-based risk assessment approaches described in this Guide.

Other methods of risk assessments may be adopted, but all methods should include the three basic steps of Hazard Identification, Risk Evaluation and Risk Control, and the selection of control measures must be based on the principles of Hierarchy of Control.

The outcome of the risk assessment conducted, regardless of the method used, should be effective risk control measures.

**Preparation Work**

Prior to conducting a risk assessment, the following information should be obtained as far as possible:

- Plant layout plan;
- Process flowchart;
- List of work activities and / or trades;
- List of chemicals used;
- List of machinery and tools used;
- Records of past incidents and accidents;
- Relevant legislation;
- Relevant codes of practice or specifications;
- Inspection records;
- Details of existing risk controls;
- Health and safety audit reports;
- Feedback from staff, clients, suppliers or other stakeholders;
- Safe work procedures;
- Other information such as material safety data sheet (MSDS), manufacturer's instruction manual; and
- Copies of any relevant previous risk assessments.

**Risk Assessment Process**

**Step 1. Hazard Identification**

Hazard identification is perhaps the most important step in risk assessment because hazards can only be controlled if they are identified.

Hazard identification involves identifying the hazards associated with the activity of each process and type of potential accidents or incidents. During this phase, the aim is to spot hazards, brainstorm on all the possible types of accidents and ill health that can happen due to the hazard, and identify the persons that can be victims of the accident or ill health.

Workplace safety and health hazards can be identified by considering:

- Method of work e.g. repeated tasks and unsafe work practices;
- Electrical and mechanical hazards;
- Manual material handling e.g. lifting, pulling and pushing;
- Chemicals e.g. corrosive substances;
- Machinery or plant e.g. unguarded machines;
- Temporary structure e.g. scaffolds;
- Environmental conditions, e.g. slippery surfaces, lighting level, unstable soil conditions; and
- Layout and location of equipment.

Possible types of accident or incident and ill health include:

- Person falling from height
- Slips or falls on the level
- Asphyxiation
- Object falling from height
- Electrocution
- Drowning
- Noise - induced deafness
- Skin dermatitis
- Collapse of structure
- Fire and explosion
- Struck by or against object
- Soft tissue damage (sprains, strains)

Persons-at-risk include:

- Persons directly involved in the operation;
- Persons not directly involved in the operation;
- Visitors of the workplace; and
- Members of the public.
Step 2. Risk Evaluation

Risk evaluation consists of:
- Identifying the existing risk control measures;
- Assessing the potential severity of the hazards;
- Determining the likelihood of occurrence; and
- Assessing the risk level based on the severity and likelihood.

Risk evaluation is the process of estimating the risk levels for the hazards and their acceptability. This is used as a basis for prioritising actions to control these hazards and to minimise safety and health risks.

Existing Risk Control

The presence of existing control measures should first be identified for individual activity for each process. By considering the effectiveness of the existing controls and the consequences of their failure, the risk of the activity can be assessed.

Examples of risk control measures include engineering controls, safe work procedures and personal protective equipment. For more details on risk control measures, please refer to STEP 3 of risk assessment.

Risk is made up of two parts:
1) Expected severity of the hazard; and
2) Likelihood of the occurrence of the accident / incident or ill health taking into account the existing risk controls.

Severity of Hazard

Severity is the degree or extent of injury or harm caused by the hazards, or as a result of an accident. The severity is classified into three categories as minor, moderate and major. These are described in Table 1.

Table 1 - Severity Categories and Description

<table>
<thead>
<tr>
<th>Severity</th>
<th>Description</th>
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<tr>
<td>Minor</td>
<td>No injury, injury or ill health requiring first aid treatment only (includes minor cuts and bruises, irritation, ill health with temporary discomfort)</td>
</tr>
<tr>
<td>Moderate</td>
<td>Injury requiring medical treatment or ill health leading to disability (includes lacerations, burns, sprains, minor fractures, dermatitis, deafness, work-related upper limb disorders)</td>
</tr>
<tr>
<td>Major</td>
<td>Fatal, serious injury or life-threatening occupational disease (includes amputations, major fractures, multiple injuries, occupational cancer, acute poisoning and fatal diseases)</td>
</tr>
</tbody>
</table>

As the severity of the hazard refers to the intrinsic or inherent nature of the adverse effect (e.g. cancer, amputation or fatal injury) that may result from the hazard, it does not depend on the controls in place. Therefore, in assigning the severity level, the existing controls should not be taken into account.

Likelihood of Occurrence

Likelihood of occurrence of an accident or incident or ill health is also classified into three categories as remote, occasional and frequent. These are described in Table 2.

Table 2 - Likelihood Categories and Description

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote</td>
<td>Not likely to occur</td>
</tr>
<tr>
<td>Occasional</td>
<td>Possible or known to occur</td>
</tr>
<tr>
<td>Frequent</td>
<td>Common or repeating occurrence</td>
</tr>
</tbody>
</table>

(Note: ASMI recommends the use of 5 x 5 matrix, as described in Annex C-3 of this Guideline, which should be used by the users in the marine industry.)
To minimise the subjectivity of estimating likelihood, in addition to looking at existing controls, the following sources of information should be considered:

- Past incident and accident records;
- Industry practice and experience; and
- Relevant published literature.

**Risk Level**

Once the severity and likelihood have been established, the risk level can be determined. One approach is to use the following 3 X 3 matrix. The risk level may be classified as low, medium or high and is at the intersection of the severity row and the likelihood column.

To determine the risk level, select the appropriate row for severity and the appropriate column for likelihood; the cell where they intersect indicates the risk level.

For example, if the severity is moderate and the likelihood is occasional, the risk level is medium risk.

Table 3 - Risk Matrix to Determine Risk Level

<table>
<thead>
<tr>
<th>Severity</th>
<th>Likelihood</th>
<th>Remote</th>
<th>Occasional</th>
<th>Frequent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td></td>
<td>Medium Risk</td>
<td>High Risk</td>
<td>High Risk</td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td>Low Risk</td>
<td>Medium Risk</td>
<td>High Risk</td>
</tr>
<tr>
<td>Minor</td>
<td></td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>Medium Risk</td>
</tr>
</tbody>
</table>

(Note: ASMI recommends the use of 5 x 5 matrix, as described in Annex C-3 of this Guideline, which should be used by the users in the marine industry.)

**Step 3. Risk Control**

Based on the risk level determined in STEP 2, risk controls should be selected to reduce the risk level to an acceptable level. This can be done by reducing the severity and / or likelihood.

As indicated in the risk matrix in Table 3, when the risk level is "High", effective and practicable risk controls must be implemented to bring down the high risk level to at least "Medium Risk".

Table 4 shows the acceptability of risk and recommended actions for different risk levels, which can be used to guide the selection of risk controls.

Table 4 - Acceptability of Risk and Recommended Actions

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Acceptability of Risk</th>
<th>Recommended Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Risk</td>
<td>Acceptable</td>
<td>No additional risk control measures may be needed. However, frequent review may be needed to ensure that the risk level assigned is accurate and does not increase over time.</td>
</tr>
<tr>
<td>Medium Risk</td>
<td>Moderately Acceptable</td>
<td>A careful evaluation of the hazards should be carried out to ensure that the risk level is reduced to as low as is practicable within a defined time period. Interim risk control measures, such as administrative controls, may be implemented. Management attention is required.</td>
</tr>
<tr>
<td>High Risk</td>
<td>Not Acceptable</td>
<td>High Risk level must be reduced to at least Medium Risk before work commences. There should not be any interim risk control measures and risk control measures should not be overly dependent on personal protective equipment or appliances. If need be, the hazard should be eliminated before work commences. Immediate management intervention is required before work commences.</td>
</tr>
</tbody>
</table>
It is essential for risks to be eliminated or reduced “at source”. If a risk cannot be controlled completely by engineering measures, it is necessary to protect the employees by administrative control or personal protection.

The control of hazards and reduction of risks can be accomplished by following the Hierarchy of Control measures below. These control measures are not usually mutually exclusive e.g. engineering controls can be implemented together with administrative controls like training and safe work procedures.

**Elimination**
Elimination of hazards refers to the total removal of the hazards and hence effectively making all the identified possible accidents and ill health impossible.
This is a permanent solution and should be attempted in the first instance. If the hazard is removed, all the other management controls, such as workplace monitoring and surveillance, training, safety auditing, and record keeping will no longer be required.
E.g. Laser marking of semiconductors eliminates the use of solvent for ink marking. Laser cutting eliminates noise hazard from powered saws.

**Substitution**
This involves replacing the hazard by one that presents a lower risk.
E.g. Asbestos can be substituted with non-asbestos materials. A water-based paint can be used instead of a solvent-based paint.

**Engineering Controls**
Engineering controls are physical means that limit the hazard. These include structural changes to the work environment or work processes, erecting a barrier to interrupt the transmission path between the worker and the hazard.
E.g. Isolation or containment of hazards, application of machine guards and manual handling devices.

**Administrative Controls**
These reduce or eliminate exposure to a hazard by adherence to procedures or instructions. Documentation should emphasise all the steps to be taken and the controls to be used in carrying out the activity safely.
E.g. Implementation of permit-to-work systems and scheduling of incompatible works; OSH training.

**Personal Protective Equipment**
This should be used only as a last resort, after all other control measures have been considered, or as a short term contingency during maintenance / repair or as an additional protective measure.
The success of this control is dependent on the protective equipment being chosen correctly, as well as fitted correctly and worn at all times when required by employees.

**Safe Work Procedures**
Arising from the risk assessment, safe work procedures for work which may pose safety and health risks should be established and implemented. The safe work procedures should include the safety precautions to be taken in the course of work and during an emergency, as well as the provision of personal protective equipment.

**Residual Risks**
The risk assessment team should ensure that the risk assessment is conducted properly, and that any residual risks are acceptable and manageable. Residual risks are the remaining risks for which the planned risk controls are not able to effectively remove or control. The risk assessment team should also highlight the residual risks of each of the controls.
For example, if the risk control involves the use of fall arrest harness and lanyards (a type of personal protective equipment), then one of the residual risks is that the workers may not hook up the lanyards to protect themselves. In this case, the risk assessment team may highlight training (administrative control) as a further measure to ensure that residual risk is further minimised.

Once all the risk controls are selected and their residual risks highlighted, the risk assessment team needs to identify the action officers and follow-up dates. In this way, the specific action officers to implement the controls can be clearly identified, and the follow-up dates will help to ensure timeliness in implementation.
Activity-based and Trade-based Approaches to Risk Assessment

This set of Guidelines also shows you how to conduct risk assessment, based on activity and trade. Worked examples to illustrate the use of both the Activity-Based and Trade-Based Risk Assessment Forms can be found in Appendixes A and D.

Activity-based Risk Assessment Form

The Activity-based Risk Assessment Form will help to facilitate the risk assessment process and enable you to record the findings of risk assessments based on a particular work activity.

This involves the steps of identifying the hazards in each work activity in a work process, evaluation of risk by outlining any existing risk control before determining the severity and likelihood of hazard occurrence to rank the risk level and listing possible additional risk control measures as well as indicating the action officer and follow-up date.

Trade-based Risk Assessment Form

The Trade-based Risk Assessment Form will help you to identify common hazards associated with a particular trade and determine existing or non-existing possible measures to eliminate or reduce the risks. It includes prompts to guide you in considering if these hazards are present in your work situation.

Unlike the activity-based approach which involves a more elaborate determination of risk level based on severity and likelihood of hazard occurrence, in the trade-based approach, the risk evaluation step essentially involves a “Yes” or “No” assessment.

“Yes” indicates that a risk is present regardless of whether the risk level is “High”, “Medium” or “Low”. “No” means that there is no risk present. In other words, as long as a hazard is identified, it is considered a risk, regardless of its severity or likelihood.

Other Methods

There are other methods of conducting risk assessments, but all methods should include the three basic steps of Hazard Identification, Risk Evaluation and Risk Control, and the selection of control measures must be based on the principles of Hierarchy of Control.

Implementation and Review

The results of risk assessment must be approved and endorsed by the top management. The employer should as far as is practicable, implement the recommended risk control measures as soon as possible.

An action plan should be prepared to implement the measures. The plan should include a time line of implementation and responsibilities of persons implementing the workplace safety and health measures. The plan should be monitored regularly until all the measures are implemented.

Regular review of the risk assessment plan is critical. While employers are required to review their plans every three years, a review should take place whenever:

- Whenever new information on safety and health risks surfaces;
- There are changes to the area of work; and / or
- After any accident or serious incident.

The risk assessment team should undertake the same three steps (hazard identification, risk evaluation and risk control) when conducting a risk assessment review.

Regular auditing is required to ensure that risk control measures have been implemented and are functioning effectively.
Record Keeping

A written description of the risk assessment must be kept for reference for three years. The Risk Assessment Form can be used for risk assessment and recording. All risk assessment records should be concise and kept in a register. The records should include the following information:

- Names and designations of risk assessment team members;
- Inventory of trades and/or work activities by process or location, associated with machinery, equipment and chemicals;
- Hazards identification for each work activity, and possible types of accident or incident;
- Existing risk control measures;
- Risk level for each hazard;
- Recommendations on additional risk controls required;
- Persons involved in implementing the measures on risk reduction;
- Signatures, date and designations of the persons conducting risk assessment; and
- Signature, date and designation of management approving or endorsing the assessment.

Offences and Penalties

All employers, self-employed persons or principals are required by the Workplace Safety and Health (Risk Management) Regulations to:

- Conduct a risk assessment for all routine and non-routine work undertaken in the workplace;
- Take reasonably practicable measures to eliminate the hazards identified or reduce safety and health risks and implement such safe work procedures to control the risks;
- Specify the roles and responsibilities of persons involved in the implementation of any measure or safe work procedure;
- Keep records of risk assessment and safe work procedures;
- Inform employees of the nature of the risks involved and any risk control measures or safe work procedure implemented; and
- Review or revise risk assessment.

Any person who fails to comply may be fined up to $10,000 for the first offence. For a second or subsequent offence, the person may be fined up to $20,000 or jailed up to 6 months or both.

<table>
<thead>
<tr>
<th>Terms</th>
<th>Definition</th>
</tr>
</thead>
</table>
| Contractor  | A person engaged by another person (referred to as principal) otherwise than under a contract of service -
- To supply any labour for gain or reward; or
- To do any work for gain or reward,
in connection with any trade, business, profession or undertaking carried on by the other person. |
| Hazard      | Anything or any source or situation with the potential to cause harm or injury. Hazards may be classified as:
- Chemical, e.g. acids, alkalis, solvents;
- Biological, e.g. bacteria, fungi and viruses;
- Electrical, e.g. frayed wires;
- Ergonomic, e.g. repetitive work, awkward postures, prolonged standing;
- Mechanical, e.g. damaged equipment, forklifts, cranes, overhead cranes, power press;
- Physical, e.g. excessive noise, heat, radiation;
- Psychosocial, e.g. overwork, poor supervision. |
| Likelihood  | Probability or frequency of an event occurring. |
| Principal   | A person who, in connection with any trade, business, profession or undertaking carried on by him, engages any other person otherwise than under a contract of service:
- To supply any labour for gain or reward; or
- To do any work for gain or reward. |
| Risk        | Likelihood that a hazard will cause a specific harm or injury to someone or something. More specifically, it is the likelihood of accidents or ill health occurring at work and the consequences of such occurrences. |
| Risk Assessment | Workplace safety and health risk assessment is the process of identifying hazards, evaluating the risks, and determining the appropriate options for risk control. |
| Risk Management | Workplace safety and health risk management involves the assessment of risks associated with any work activity or trade, control and monitoring of such risks, as well as communicating these risks. |
Appendix A:
Instructions to Employers and Persons Conducting Activity-based Risk Assessment

1) Before completing the Risk Assessment Form, you have to complete the Inventory of Work Activities Form. You may use one inventory form for each process.
2) Outline the process workflow and indicate the process location under the “Process / Location” column.
3) For each work process, list all activities (routine and non-routine) under the “Work Activities” column.

You may use one Activity-Based Risk Assessment Form for each process.

1) Record the names and designations of risk assessment team members in the Risk Assessment Form.
2) Start with the first activity listed in the Inventory of Work Activities Form. Record this in columns 1a and 1b of the Risk Assessment Form.
3) Identify the hazards associated with each activity and record these in column 1c.
4) For each hazard identified, determine the consequence (possible accident / ill health and persons-at-risk) and record this in column 1d.
5) If there is any existing hazard control measure for the hazard, record this in column 2a.
6) Determine the severity of the accident or ill effect based on the following criteria, and record this in column 2b.

<table>
<thead>
<tr>
<th>Severity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor</td>
<td>No injury, injury or ill health requiring first aid treatment only (includes minor cuts and bruises, irritation, ill health with temporary discomfort)</td>
</tr>
<tr>
<td>Moderate</td>
<td>Injury requiring medical treatment or ill health leading to disability (includes lacerations, burns, sprains, minor fractures, dermatitis, deafness, work-related upper limb disorders)</td>
</tr>
<tr>
<td>Major</td>
<td>Fatal, serious injury or life-threatening occupational disease (includes amputations, major fractures, multiple injuries, occupational cancer, acute poisoning and fatal diseases)</td>
</tr>
</tbody>
</table>

7) Taking into consideration the existing hazard control measure(s), estimate the likelihood of occurrence of each accident or ill effect based on the following criteria, and record this in column 2c.

<table>
<thead>
<tr>
<th>Severity</th>
<th>Likelihood</th>
<th>Remote</th>
<th>Occasional</th>
<th>Frequent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td>Medium Risk</td>
<td>High Risk</td>
<td>High Risk</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>Low Risk</td>
<td>Medium Risk</td>
<td>High Risk</td>
<td></td>
</tr>
<tr>
<td>Minor</td>
<td>Low Risk</td>
<td>Low Risk</td>
<td>Medium Risk</td>
<td></td>
</tr>
</tbody>
</table>

(Note: ASMI recommends the use of 5 x 5 matrix, as described in Annex C-3 of this Guideline, which should be used by the users in the marine industry.)

8) Based on the severity and likelihood, assign the risk level for each hazard using the risk matrix below, and record this in column 2d.

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote</td>
<td>Not likely to occur</td>
</tr>
<tr>
<td>Occasional</td>
<td>Possible or known to occur</td>
</tr>
<tr>
<td>Frequent</td>
<td>Common or repeating occurrence</td>
</tr>
</tbody>
</table>

(Note: ASMI recommends the use of 5 x 5 matrix, as described in Annex C-3 of this Guideline, which should be used by the users in the marine industry.)
9) Based on the risk level assigned, suggest appropriate risk control measures (see Table below) and record these in column 3a following the hierarchy: Elimination, Substitution, Engineering Controls, Administrative Measures and Personal Protective Equipment.

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Acceptability of Risk</th>
<th>Recommended Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Risk</td>
<td>Acceptable</td>
<td>No additional risk control measures may be needed. However, frequent review may be needed to ensure that the risk level assigned is accurate and does not increase over time.</td>
</tr>
<tr>
<td>Medium Risk</td>
<td>Moderately Acceptable</td>
<td>A careful evaluation of the hazards should be carried out to ensure that the risk level is reduced to as low as is practicable within a defined time period. Interim risk control measures, such as administrative controls, may be implemented. Management attention is required.</td>
</tr>
<tr>
<td>High Risk</td>
<td>Not Acceptable</td>
<td>High Risk level must be reduced to at least Medium Risk before work commences. There should not be any interim risk control measures and risk control measures should not be overly dependent on personal protective equipment or appliances. If need be, the hazard should be eliminated before work commences. Immediate management intervention is required before work commences.</td>
</tr>
</tbody>
</table>

10) With the consensus of management or employer, assign a suitable person to implement the recommended risk control, and indicate the follow-up date in column 3b.

11) Repeat the risk assessment for other activities and processes listed in the Inventory of Work Activities Form.

12) Management or employer must endorse and approve the risk assessment results. Employer must communicate all risk assessments to employees, monitor the follow-up actions, and keep the risk assessment records for at least three (3) years.

13) Conduct another round of risk assessment after the risk control measures have been implemented; use a new risk assessment form to indicate the reduction in risk levels.

14) Review the risk assessment records every three (3) years or whenever there are changes in processes or work activities, whichever is earlier.
<table>
<thead>
<tr>
<th>No.</th>
<th>Process / Location</th>
<th>Work Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Risk Assessment Form**

<table>
<thead>
<tr>
<th>Company:</th>
<th>Conducted by:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Names, designations)</td>
</tr>
<tr>
<td></td>
<td>(Date)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process / Location:</th>
<th>Approved by:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Name, designation)</td>
</tr>
<tr>
<td></td>
<td>(Date)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Last Review Date:</th>
<th>Next Review Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Work Activity</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### 2. Risk Evaluation

### 3. Risk Control
Appendix B: Worked Examples (Activity-based Risk Assessment Form)

The following worked examples illustrate the detailed steps in conducting a risk assessment. The activities associated with each process, type of hazards, and the risk control measures in these examples are generic and not exhaustive, and may not be applicable to similar work in your workplace.

Scenario 1 – Spray Painting

A factory employs a worker to carry out spray painting of 15 kg metal drums. The work activities of the spray paint worker involve moving the metal drums into the spray paint booth, preparing and mixing solvent-based paint, and carrying out spray painting. The worker is provided with safety shoes, organic vapour respirators, and rubber gloves for his work. He moves 30 drums manually into the spray booth in a typical working day. Material safety data sheets for the spray paint indicate the presence of toxic and flammable solvents such as toluene and xylene. Safe work procedures for spray painting are implemented.
## 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Work Activity</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Moving metal drums to spray booth</td>
<td>Falling object</td>
<td>Worker's feet can be crushed by metal drum causing injury</td>
<td>Safety shoes</td>
<td>Moderate</td>
<td>Frequent</td>
<td>High</td>
<td>Provide mechanical lifting devices e.g. forklift for moving metal drums to spray booth</td>
<td>Ho Beng Long, Plant Manager (15/12/2004)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unsafe work practice</td>
<td>Manual handling of 15kg drum can cause back injury</td>
<td>Training</td>
<td>Moderate</td>
<td>Occasional</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Preparing and mixing paint</td>
<td>Toxic solvent vapours</td>
<td>Exposure to spray paint solvents can cause ill health</td>
<td>Organic vapour respirators; Safe work procedures; Local exhaust ventilation system for spray booth</td>
<td>Moderate</td>
<td>Remote</td>
<td>Low</td>
<td>Substitute solvent-based paint with high-solids coatings or use airless spray method; Keep minimum quantity of flammable liquids in the vicinity of spraying operation; Provide adequate fire extinguishers.</td>
<td>Ho Beng Long, Plant Manager (02/01/2006); (16/02/2005); Tan Ah Lim, Operator; Ong Huat Teng, Supervisor (15/09/2004); Ho Beng Long, Plant Manager, (30/09/2004)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flammable solvents and ignition sources</td>
<td>Fire from solvents can result in serious injury or death of worker and nearby people</td>
<td>Safe work procedures</td>
<td>Major</td>
<td>Remote</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Work Activity</td>
<td>Hazard</td>
<td>Possible Accident / Ill Health &amp; Persons-at-Risk</td>
<td>Existing Risk Control (if any)</td>
<td>Severity</td>
<td>Likelihood</td>
<td>Risk Level</td>
<td>Additional Risk Control</td>
<td>Action Officer, Designation (Follow-up date)</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>----------</td>
<td>------------</td>
<td>------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>3</td>
<td>Carrying out spray painting</td>
<td>Toxic solvent vapours</td>
<td>Exposure to spray paint solvents can result in ill health</td>
<td>Organic vapour respirators; Safe work procedures; Local exhaust ventilation system</td>
<td>Moderate</td>
<td>Remote</td>
<td>Low</td>
<td>Regular maintenance of spray booth e.g. changing of filters and testing for airflow; Monitor worker’s exposure to solvent vapours; Use explosion proof type of lights and fixtures; Use a non-sparking exhaust fan; Bond and ground spraying equipment and conductive objects</td>
<td>Ho Beng Long, Plant Manager (15/01/2005)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flammable spray paint mists / vapours and ignition sources</td>
<td>Explosion from spray paint mists and vapours can result in serious injury or death of worker and nearby people</td>
<td>Safe work procedures; Emergency plan; PPE</td>
<td>Major</td>
<td>Remote</td>
<td>Medium</td>
<td></td>
<td>Tan Ah Lim, Operator; Ong Huat Teng, Supervisor (15/09/2004) Ho Beng Long, Plant Manager (30/09/2004)</td>
</tr>
</tbody>
</table>
### Scenario 2 – Paper Slitting Process

A worker operates a paper slitting machine. His work includes loading 10 kg of paper rolls onto the machine, cutting the paper and unloading the cut paper. He also needs to repair and maintain the machine regularly as well as to change the blades of the machine.

#### Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>XYP Co Pte Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process / Location:</td>
<td>Paper Slitting / Cutting Dept</td>
</tr>
<tr>
<td>Conducted by:</td>
<td>Ho Beng Long, Production Manager; Ong Huat Teng, Supervisor; Tan Ah Lim, Operator.</td>
</tr>
<tr>
<td>Approved by:</td>
<td>Song Heng Poh, General Manager 01 September 2005</td>
</tr>
<tr>
<td>Last Review Date:</td>
<td>01 Sep 2004</td>
</tr>
<tr>
<td>Next Review Date:</td>
<td>01 Sep 2007</td>
</tr>
</tbody>
</table>

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Work Activity</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Loading the machine with paper roll</td>
<td>Slitting knives or blades</td>
<td>Small cuts when contacting the knives during setting</td>
<td>Instructions on safe work practice</td>
<td>Minor</td>
<td>Occasional</td>
<td>Low</td>
<td>Use leather hand gloves</td>
<td>Ong Huat Teng, Supervisor; Tan Ah Lim, Operator (30/9/2004)</td>
</tr>
<tr>
<td>2</td>
<td>Operating the machine</td>
<td>Unguarded machine</td>
<td>Serious cuts and hands getting caught in the rotating parts of the machine</td>
<td>Audio and visual warning; delayed start-up after “ON-button” pressed</td>
<td>Major</td>
<td>Occasional</td>
<td>High</td>
<td>Introduce daily check on safety function; install machine guarding on rotating parts start-up</td>
<td>Ho Beng Long, Production Manager (10/10/2005); Ong Huat Teng, Supervisor (13/03/2005)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flying fragments</td>
<td>Serious cuts and eye injuries by flying fragments of blades that break during slitting</td>
<td>Warning signs; Training of new employees; Face shields; Safety goggles; PPE</td>
<td>Major</td>
<td>Remote</td>
<td>Medium</td>
<td>Use knife with stronger blades; Install machine guarding on rotating parts</td>
<td>Ho Beng Long, Production Manager (10/10/2005); Ong Huat Teng, Supervisor (01/02/2005)</td>
</tr>
<tr>
<td>3</td>
<td>Unloading slit papers</td>
<td>Heavy load</td>
<td>Muscular strain when lifting slit papers on pallets</td>
<td>Correct lifting posture</td>
<td>Minor</td>
<td>Occasional</td>
<td>Low</td>
<td>Consider mechanical devices e.g. “scissors” stacker</td>
<td>Ho Beng Long, Production Manager (01/11/2004)</td>
</tr>
<tr>
<td>4</td>
<td>Repair and maintenance of the machine</td>
<td>Unguarded machine; unsafe work practice</td>
<td>Serious cuts from knives and getting caught in rotating parts if machine is accidentally started</td>
<td>Delayed start-up after “ON-button” pressed</td>
<td>Major</td>
<td>Occasional</td>
<td>High</td>
<td>Install guarding on rotating parts; Lock-out and tag-out procedure for repair and maintenance</td>
<td>Ho Beng Long, Production Manager (01/02/2005); Ong Huat Teng, Supervisor (01/12/2004)</td>
</tr>
</tbody>
</table>
Appendix C:

Instructions to Employers and Persons Conducting Trade-based Risk Assessment

Before completing the risk assessment form, you have to complete the Inventory of Trades Form.

1) List all trades or jobs and the names of persons doing the job under the “Trade” column.
2) For each trade or job, list and describe the main activities under the “Main Activities” column. You may use one Trade-Based Risk Assessment Form for each trade.
3) Record the names and designations of risk assessment team members in the Risk Assessment Form.
4) Start with the first trade listed in the Inventory of Trade Form. Record this in the Risk Assessment Form.
5) Identify the hazards associated with the activity of the trade, categorise the hazards by type (e.g. chemical, physical, electrical and mechanical hazards) and briefly describe these in column 1.
6) For each hazard identified, indicate whether it can cause harm (i.e. whether the hazard poses a risk) by a tick in the “Yes” or “No” box drawn in column 2.
7) If the hazard can cause harm, list all possible risk control measures (including existing measures) in column 3a to eliminate the hazard or reduce the risk following the hierarchy of control measures: “Elimination, Substitution, Engineering Controls, Administrative Controls and PPE”. Leave some blank spaces for later additions.
8) Tick the boxes next to the listed actions that are existing hazard control measures.
9) For those items that are not ticked, indicate the names of persons who are responsible for implementing the control measures, and state the dates of implementation in column 3b.
10) For any existing hazard control measures to be removed, state the reasons in column 3b.
11) Repeat steps 2 to 8 for the other trades listed in the Inventory of Trades Form.
12) Management or employer must endorse and approve the risk assessment results. Employer must communicate all risk assessments to employees, monitor the follow-up actions, and keep the risk assessment records for at least three (3) years.
13) After the risk control measures have been implemented, conduct another round of risk assessment using a new risk assessment form.
14) Review the risk assessment records every three (3) years or whenever there are changes in trades or work activities, whichever is earlier.
### Trade-based Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Conducted by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job:</td>
<td>(Names, designations)</td>
</tr>
<tr>
<td></td>
<td>(Date)</td>
</tr>
<tr>
<td>Approved by:</td>
<td>Last Review Date:</td>
</tr>
<tr>
<td></td>
<td>Next Review Date:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazards associated with trade</td>
<td>Is hazard likely to harm someone?</td>
<td>List of risk control measures Tick if it is an existing measure</td>
</tr>
<tr>
<td>□ Yes □ No</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>□ Yes □ No</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>□ Yes □ No</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>□ Yes □ No</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>□ Yes □ No</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
Appendix D:

Worked Examples (Trade-based Risk Assessment Form)

The following worked examples illustrate the detailed steps in conducting a risk assessment. The activities associated with each process, type of hazards, and the risk control measures in these examples are generic and not exhaustive, and may not be applicable to similar work in your workplace.

Scenario 1 – Spray Painting

A factory employs a worker to carry out spray painting of 15 kg metal drums. The work activities of the spray paint worker involve moving the metal drums into the spray paint booth, preparing and mixing solvent-based paint, and carrying out spray painting. The worker is provided with safety shoes, organic vapour respirators, and rubber gloves for his work. He moves 30 drums manually into the spray booth in a typical working day. Material safety data sheets for the spray paint indicate the presence of toxic and flammable solvents such as toluene and xylene. Safe work procedures for spray painting are implemented.
### Trade-based Risk Assessment Form

**Company:** XYP Co Pte Ltd  
**Job:** Spray Painter  
**Conducted by:**  
Ho Beng Long, Plant Manager; Ong Huat Teng, Supervisor; Tan Ah Lim, Spray Painter  
**Last Review Date:** 01 Sep 2004  
**Next Review Date:** 01 Sep 2007

<table>
<thead>
<tr>
<th><strong>1. Hazard Identification</strong></th>
<th><strong>2. Risk Evaluation</strong></th>
<th><strong>3a. Risk Control Actions</strong></th>
</tr>
</thead>
</table>
| **Limbs crushed due to:**  
• Falling metal drum while moving the drum to spray booth | ☑ Yes ☐ No | ☑ Moving drums using mechanical devices 15/12/2004 - Ho Beng Long  
☐ Use safety shoes  
☐ Other suggestion for actions can be added here |

| **Unsafe work practice causing back injury due to:**  
• Manual handling of drum while moving the drum to spray booth | ☑ Yes ☐ No | ☑ Handle drums using mechanical devices 15/12/2004 – Ho Beng Long  
☑ Conduct training on the correct way of moving a metal drum  
☐ Other suggestion for actions can be added here |

| **Toxic solvent vapour due to:**  
• Exposure to spray paint solvent during preparation and mixing of paint  
• Exposure to spray paint solvent during spray painting | ☑ Yes ☐ No | ☑ Substitute solvent-based paint with high-solids coatings 02/01/2006 – Ho Beng Long  
☐ Use airless spray method 16/02/2005 – Ho Beng Long  
☑ Install a local exhaust ventilation system  
☑ Implement safe work procedures  
☐ Conduct regular maintenance of spray booth 15/01/2005 – Ho Beng Long |
### Trade-based Risk Assessment Form

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hazard</strong></td>
<td><strong>Is hazard</strong></td>
<td><strong>List of risk control measures</strong></td>
</tr>
<tr>
<td>associated with trade</td>
<td>likely to harm</td>
<td>Tick if it is an existing measure</td>
</tr>
<tr>
<td>someone?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Fire and explosion due to:**
  - Flammable solvents and ignition sources from the preparation and mixing of paints
  - Flammable solvents and ignition sources from spray painting

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Monitor worker’s exposure to solvent vapours 15/01/2005 – Ho Beng Long</td>
</tr>
<tr>
<td>- Use organic vapour respirators</td>
</tr>
<tr>
<td>- Other suggestion for actions can be added here</td>
</tr>
<tr>
<td>- Substitute solvent-based paint with high-solids coating 02/01/2006 – Ho Beng Long</td>
</tr>
<tr>
<td>- Use a non-sparking exhaust fan 15/09/2004 – Tan Ah Lim; Ong Huat Teng</td>
</tr>
<tr>
<td>- Use airless spray method 16/02/2005 – Ho Beng Long</td>
</tr>
<tr>
<td>- Bond and ground spraying equipment and conductive objects 15/09/2004 – Tan Ah Lim; Ong Huat Teng</td>
</tr>
<tr>
<td>- Use explosion proof type of light and fixtures 15/09/2004 – Tan Ah Lim; Ong Huat Teng</td>
</tr>
<tr>
<td>- Install a local exhaust ventilation system</td>
</tr>
<tr>
<td>- Implement safe work procedures</td>
</tr>
<tr>
<td>- Conduct regular emergency response exercise</td>
</tr>
<tr>
<td>- Keep minimum quantity of flammable liquids in spraying vicinity 15/09/2004 – Ong Huat Teng, Tan Ah Lim</td>
</tr>
<tr>
<td>- Provide adequate fire extinguishers 30/09/2004 – Ho Beng Long</td>
</tr>
<tr>
<td>- Use PPE</td>
</tr>
<tr>
<td>- Other suggestion for actions can be added here</td>
</tr>
</tbody>
</table>
A worker operates a paper slitting machine. His work includes loading 10 kg of paper rolls onto the machine, cutting the paper and unloading the cut paper. He also needs to repair and maintain the machine regularly as well as to change the blades of the machine.

### Trade-based Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>XYP Co Pte Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job:</td>
<td>Operator of Paper Slitting Machine</td>
</tr>
<tr>
<td>Conducted by: (Names, designations) (Date)</td>
<td>Ho Beng Long, Plant Manager; Ong Huat Teng, Supervisor; Tan Ah Lim, Spray Painter</td>
</tr>
<tr>
<td>Last Review Date:</td>
<td>01 Sep 2004</td>
</tr>
<tr>
<td>Next Review Date:</td>
<td>01 Sep 2007</td>
</tr>
</tbody>
</table>

#### 1. Hazard Identification

<table>
<thead>
<tr>
<th>Hazards associated with trade</th>
<th>Is hazard likely to harm someone?</th>
<th>List of risk control measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuts from slitting knives due to:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Contact with blades while loading the machine with paper roll</td>
<td>Yes ☑ No ☐</td>
<td>Implement safe work practice</td>
</tr>
<tr>
<td>Cuts from knives due to:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Accidental start-up of machine during the repair and maintenance</td>
<td>Yes ☑ No ☐</td>
<td>Delayed start-up after “ON-button” is pressed</td>
</tr>
<tr>
<td>Limbs / clothing / hair getting caught in rotating parts due to:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Unguarded machine during operation</td>
<td>Yes ☑ No ☐</td>
<td>Install machine guarding on rotating parts</td>
</tr>
<tr>
<td>• Unguarded machine during repair and maintenance</td>
<td>Yes ☑ No ☐</td>
<td>Delayed start-up after “ON-button” pressed</td>
</tr>
</tbody>
</table>

#### 2. Risk Evaluation

<table>
<thead>
<tr>
<th>Implementation date &amp; action officer / remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>30/09/2004 – Ong Huat Teng, Tan Ah Lim</td>
</tr>
<tr>
<td>01/02/2005 – Ho Beng Long</td>
</tr>
<tr>
<td>01/12/2004 – Ong Huat Teng</td>
</tr>
<tr>
<td>13/03/2005 – Ong Huat Teng</td>
</tr>
</tbody>
</table>
### Trade-based Risk Assessment Form

**Company:** XYP Co Pte Ltd  
**Job:** Operator of Paper Slitting Machine  
**Conducted by:** Ho Beng Long, Plant Manager; Ong Huat Teng, Supervisor; Tan Ah Lim, Spray Painter  
**Approved by:** Song Heng Poh, General Manager 01 September 2005  
**Last Review Date:** 01 Sep 2004  
**Next Review Date:** 01 Sep 2007

|--------------------------|-------------------|-------------------------|
| Cuts from slitting knives due to:  
- Contact with blades while loading the machine with paper roll  
| Yes □ No  
| Implement safe work practice  
| Use leather hand gloves  
| 30/09/2004 – Ong Huat Teng, Tan Ah Lim  
| Other suggestion for actions can be added here |
| Cuts from knives due to:  
- Accidental start-up of machine during the repair and maintenance  
| Yes □ No  
| Implement lock-out and tag-out procedures  
| 01/12/2004 – Ong Huat Teng  
| Other suggestion for actions can be added here |
| Limbs / clothing / hair getting caught in rotating parts due to:  
- Unguarded machine during operation  
- Unguarded machine during repair and maintenance  
| Yes □ No  
| Install machine guarding on rotating parts  
| 01/02/2005 – Ho Beng Long  
| Other suggestion for actions can be added here  
| Implement lock-out and tag-out procedures for repair and maintenance  
| 01/02/2005 – Ho Beng Long  
| Conduct daily start-up check on safety functions  
| 13/03/2005 – Ong Huat Teng  
| Implement lock-out and tag-out procedures for repair and maintenance  
| 01/02/2005 – Ho Beng Long  
| Other suggestion for actions can be added here |
|-------------------------|-------------------|------------------------|
| Hazards associated with trade | Is hazard likely to harm someone? | List of risk control measures |
| ☒ Install audio and visual warning alarms and LED | ☒ Replace manual lifting procedures with mechanical devices such as "scissors" stacker | Implementation date & action officer / remarks |
| ☒ Conduct training on safe work procedures | ☒ Handle smaller loads at a time | 01/11/2004 – Ho Beng Long |
| ☒ Tie up loose hair | ☒ Conduct training on correct lifting posture | |
| ☒ Tuck in any loose clothing | ☒ Observe regular rest intervals | |
| ☐ Other suggestion for actions can be added here | ☐ Other suggestion for actions can be added here | |

Muscular strain due to:
- Heavy load when lifting slit papers on pallets for unloading purpose

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

Serious cuts and eye injuries due to:
- Flying fragments of blades that break during operation of slitting machine

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>
Annex C-2:

Risk Management Flow Chart
Annex C-3:

Risk Assessment Matrix In the Marine Industry

5 by 5 Risk Matrix

Likelihood

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote</td>
<td>So unlikely it can be assumed occurrence may not be experienced</td>
</tr>
<tr>
<td>Probable</td>
<td>Not likely to occur in company, but possible</td>
</tr>
<tr>
<td>Occasional</td>
<td>Likely to occur sometimes in company (1-3 times a year)</td>
</tr>
<tr>
<td>Periodical</td>
<td>Likely to occur several times in company (4-10 times a year)</td>
</tr>
<tr>
<td>Frequent</td>
<td>Likely to occur repeatedly in company (more than 10 times a year)</td>
</tr>
</tbody>
</table>

Consequence

<table>
<thead>
<tr>
<th>Severity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slight injuries or health effect</td>
<td>Slight injury or health effect</td>
</tr>
<tr>
<td>Minor injuries or health effect</td>
<td>Injury or ill health requiring first aid treatment only (includes minor cuts and bruises, irritation, ill health with temporary discomfort)</td>
</tr>
<tr>
<td>Major injuries or health effect</td>
<td>Injury requiring medical treatment or ill health leading to disability (includes lacerations, burns, sprains, minor fractures, dermatitis, deafness, work-related upper limb disorders)</td>
</tr>
<tr>
<td>Permanent partial disability</td>
<td>Serious injury or life threatening occupational diseases (includes amputations, major fractures, multiple injuries, occupational cancer, acute poisoning and fatal diseases)</td>
</tr>
<tr>
<td>Fatal</td>
<td>Serious injuries resulting in fatality or irreversible health damage with death (e.g. chemical, asphyxiation, cancer)</td>
</tr>
</tbody>
</table>

Note: This risk matrix is meant for reference when developing risk assessment guidelines.
Risk Matrix

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Likelihood</th>
<th>Remote</th>
<th>Probable</th>
<th>Occasional</th>
<th>Periodical</th>
<th>Frequent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatality</td>
<td>1</td>
<td>M</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>Permanent Partial Disability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major Injuries or Health</td>
<td>2</td>
<td>M</td>
<td>M</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>Major Injuries or Health Effect</td>
<td>3</td>
<td>L</td>
<td>M</td>
<td>M</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>Minor Injuries or Health Effect</td>
<td>4</td>
<td>L</td>
<td>L</td>
<td>M</td>
<td>M</td>
<td>H</td>
</tr>
<tr>
<td>Slight Injuries or Health Effect</td>
<td>5</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>

**Acceptability of Risk**

- **Acceptable**
  - No additional control measures may be needed.
  - Regular review is required to ensure risk level assigned is accurate and does not increase over time.

- **Moderately Acceptable**
  - Ensure risk level is reduced to as low as is practicable.
  - Within a defined time period.
  - Implement interim risk control measures such as administrative controls.

- **Not Acceptable**
  - Reduce to at least medium risk before work commences.
  - There should not be any interim risk control measures and risk control measures should not be overly dependent on Personal Protective Equipment. If need be, the hazard should be eliminated before work commences.
  - Immediate management intervention is required before work commences.

Note: This risk matrix is meant for reference when developing risk assessment guidelines.
Annex C-4:
Sample of ASMI Templates on Risk Assessment

- RA Templates: Electrical
- RA Templates: Marine Transport
- RA Templates: Mechanical Work
- RA Templates: Painting and Blasting
- RA Templates: Mechanical Work
- RA Templates: Transport

Note: The RA templates were drawn up by participants from workshops conducted by ASMI and MOM. These templates derived (which may not be sufficient or comprehensive) are available for reference only as sample formats.
## 1. RA Templates: Electrical

### Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Conducted by:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group 1 (13/09/06)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task: Renew Main Mast Equipment: Navigation Light</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Approved by: (Date)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Next Review Date:</th>
</tr>
</thead>
</table>

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inspect faulty navigation light</td>
<td>Falling from height</td>
<td>Fatality</td>
<td>• VSCLC  • Staging / scaffold  • Use body harness and anchor at hard point</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Monitor workers to be equipped with proper PPE (body harness)</td>
<td>Supervisor and Safety Officer</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Remove existing navigation light</td>
<td>Live wire</td>
<td>• Electric shock  • Electrocuton  • Fatality</td>
<td>• Isolate power supply with lockout/tagout  • VSCLC</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Counter check by multi-meter</td>
<td>Supervisor and Safety Officer</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bring down existing navigation light and bring up new light</td>
<td>Falling hazard</td>
<td>Body injuries</td>
<td>• Qualified signaler / rigger  • Valid inspection tag for lifting appliances  • Barricade affected area</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Provide lifting containers / casing</td>
<td>Lifting Supervisor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Install new navigation light</td>
<td>• Falling hazard  • Slip, tripping hazard</td>
<td>• Body injuries  • Hand / finger injuries</td>
<td>• Staging  • PPE (hand gloves, body harness)</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Use line yard for tools</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Testing and commissioning</td>
<td>Live wire</td>
<td>• Electric shock  • Electrocuton  • Fatality</td>
<td>• Permit-to-work system and authorised person to conduct test  • VSCLC meeting</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Conduct toolbox meeting</td>
<td>Commissioning Engineer/Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

**Company:** Group 2  
**Task:** Load Test Generator with Load Bank  
**Conducted by:** Arasu, Joleen, Yen, Sheng, Thein, Manir Ram, Aye Min, Kelvin and Ramkumar  
**Approved by:**  

**Date:** 13/09/2006  
**Next Review Date:** 12/09/2009

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
</table>
| 1   | Work Area Assessment | Slip, trip and fall | • Slip and fall due to slippery surface or  
• Trip and fall due to wires and cables on floor  
• Minor injury | • Keep the area clear / dry  
• Use cable hanger to hang cable  
• Use of PPE | 2 | 2 | L | Nil | Supervisor |  
| 2   | Transport of load bank/cables to work site using forklift | • Moving vehicle  
• Falling object | • Collision, topple of forklift  
• Fatality  
• Overload of forklift | • Ensure only trained and licensed forklift driver operates  
• Ensure the path of forklift is free from obstruction  
• Ensure not to overload  
• Secure the load | 5 | 1 | M | • Warning siren  
• Nil | Supervisor | Operation of forklift or checklist  
| 3   | Laying of cable from load bank to switchboard using shore crane | • Hand / finger injuries  
• Falling object | • Cut injury while pulling cable (minor injury)  
• Cable falling while lifting (minor injury) | • Ensure using of hand gloves  
• Ensure area is barricaded  
• Ensure lifting belt is certified and fit for use  
• Ensure trained signalmen is present | 2 | 2 | L | Nil | Supervisor | Inspection record for lift gear  
| 4   | Isolation of power in switchboard | Live voltage | • Electric shock  
• Electrocution (fatal) | • Highlight in VSCC meeting  
• Ensure skilled electrician is used  
• Lockout / tagout at main switchboard | 5 | 1 | M | | Supervisor |  

---

**Note:** This document outlines the risk assessment for a load test generator with load bank, detailing potential hazards, existing and additional risk controls, and references.
<table>
<thead>
<tr>
<th>No.</th>
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<th>Hazard</th>
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<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
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</thead>
<tbody>
<tr>
<td>5</td>
<td>Termination of load bank cable in switchboard</td>
<td>• Live voltage • Hand / finger injuries • Electric shock • Electrocution (fatal) • Cut injury during connection (minor injury)</td>
<td>• Ensure that line test is carried out • Ensure using of hand gloves</td>
<td>5 2 1 2</td>
<td>M L</td>
<td></td>
<td></td>
<td>• Briefing by Supervisor • Ensure no presence of electricity</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Load test of generator</td>
<td>Live voltage</td>
<td>• Electric shock • Electrocution (fatal)</td>
<td>5 1 1 M</td>
<td></td>
<td></td>
<td></td>
<td>• Operation of warning light • Use walkie-talkie to communicate</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Disconnect of cable and removal of load bank after testing</td>
<td>Live voltage</td>
<td>• Electric shock • Electrocution (fatal)</td>
<td>5 1 1 M</td>
<td></td>
<td></td>
<td></td>
<td>• Ensure no presence of electricity • Use walkie-talkie to communicate</td>
<td>Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

**Company:** ABC - Group 3

**Task:** Remove Alternator from Vessel and Overhaul in WS

**Conducted by:**

<table>
<thead>
<tr>
<th>Date</th>
</tr>
</thead>
</table>

**Approved by:**

<table>
<thead>
<tr>
<th>Date</th>
</tr>
</thead>
</table>

| Date |

**Machinery HOD 13/09/06**

**Next Review Date:** 13/09/09

### 1. Hazard Identification

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Inspect alternator located in E/RM</td>
<td>• Unknown condition • Trip, slip and fall</td>
<td>• Lack of oxygen • Toxic fumes • Body injuries or fatal</td>
<td>• Entry permit for confine space • Gas check • Forced ventilation and general lighting • Housekeeping • Adequate PPE</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Portable gas monitor per working group</td>
<td>Supervisor HSE Officer</td>
</tr>
<tr>
<td>2</td>
<td>Dismantle the alternator cable</td>
<td>Live power supply terminals</td>
<td>• Electric shock and electrocution • Body injuries</td>
<td>• VSUCC Meeting • Isolate the circuit breaker • Lockout / tagout • Use correct tool</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Check to ensure there is no presence of electricity</td>
<td>Supervisor</td>
</tr>
<tr>
<td>3</td>
<td>Remove of corroded mounting bolts</td>
<td>Fire and explosion</td>
<td>• Spark or molten generated from gas cutting, may cause flame • Body injuries/ fatality</td>
<td>• Hot work permit • PPE • Fire watch</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Brief worker before work commences</td>
<td>Supervisor</td>
</tr>
<tr>
<td>4</td>
<td>Lifting the alternator</td>
<td>Falling object</td>
<td>• Hit by falling object • Body injuries/ fatality</td>
<td>• Trained rigger / signalmen • Check SWL and condition of wire sling or lifting belt • Use bucket container to lift from onboard to shore</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td>Supervisor</td>
</tr>
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<td>-----------------------------------------------</td>
</tr>
<tr>
<td>5</td>
<td>Transportation of alternator from dock to workshop and vice versa</td>
<td>Moving vehicle</td>
<td>• Collision, topple, over capacity • Body injuries/ fatality • Damage property</td>
<td>• Ensure proper lashing • Use low bed trailer for over site alternator • Keep road clear of obstruction</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td>Supervisor</td>
<td>Ensure checklist for forklift</td>
</tr>
<tr>
<td>6</td>
<td>Dismantle / assembly of alternator</td>
<td>• Hand caught in between • Strike by tool • Strike by hose • Hit by parts</td>
<td>• Finger injury • Noise (NID) • Body injuries</td>
<td>• PPE • Proper tools • Correct WPs • Avoid / minimise hand contact and over extension</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Chemical cleaning</td>
<td>• Toxicity • Fluid spill</td>
<td>• Burn • Allergic</td>
<td>• Appropriate PPE • MSDS • Permit for cleaning</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Baking</td>
<td>Caught by hot equipment</td>
<td>Burn</td>
<td>• Train personnel using the hot/ oven room</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Testing</td>
<td>Live power supply terminal</td>
<td>• Body injuries • Electric shock and electrocution</td>
<td>• Trained personnel • Test protocol</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Supervisor</td>
<td>Ensure no contact while testing in progress / display warning signboard</td>
</tr>
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<td>---------------------------------------------</td>
</tr>
</tbody>
</table>
| 1   | Main switchboard cleaning        | Chemical exposure to skin and body parts | • Skin itch  
• Eye irritation | • Highlight in VSCC  
• PPE (eye protection, hand gloves)  
• Continuous ventilation  
• Temporary light and ventilation  
• Display warning sign | 2        | 1          | L          |                        | Supervisor / Charge Hand                        | MSDS                    |
| 2   | MSB bus bar insulation test and check | Electric hazard        | Finger injuries                             | • PPE (hand gloves)  
• Calibrated and tested equipment  
• Skilled electrician  
• Rubber Mat | 2        | 1          | L          |                        | Supervisor / Charge Hand                        |                        |
| 3   | MSB control circuit check        | Electric hazard        | Finger injuries                             | • PPE  
• Calibrated and tested equipment  
• Skilled electrician | 2        | 1          | L          |                        | Supervisor / Charge Hand                        |                        |
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<tr>
<td>4</td>
<td>Bus bar torque and breaker termination check</td>
<td>• Slip • Sharp edges • Hand injuries • Body injuries • Cut hand and body injuries</td>
<td>• Use appropriate tools • PPE • Skilled electrician</td>
<td>2 2</td>
<td>L</td>
<td></td>
<td></td>
<td>Supervisors / Charge Hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Energize the main switch board</td>
<td>• Short circuit • Explosion • Death • Body injuries • Burn</td>
<td>• (Steps before this step) • Sign boards • Barricade • Insulation mat • Standby FFA • PPE • Skilled electrician</td>
<td>5 1</td>
<td>M</td>
<td></td>
<td></td>
<td>Commissioning Engineer / Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Function test main switchboard</td>
<td>Short circuit • Electrical shock • Body injuries</td>
<td>• SWP checklist • Skilled electrician</td>
<td>3 1</td>
<td>L</td>
<td></td>
<td></td>
<td>Commissioning Engineer / Supervisor / Charge Hand</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1</td>
<td>Inspection of echo sounder and speed log</td>
<td>• Lack of O₂</td>
<td>• Asphyxiation • Body injuries</td>
<td>• Entry permit • Force ventilation • General lighting • Lifeline rope • Body harness / safety belt</td>
<td>5 5</td>
<td>1 1</td>
<td>M M</td>
<td>• Portable gas meter • Torchlight • Tank cleaning</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Disconnect sounder and speed log</td>
<td>Electric shock</td>
<td>• Electrocution • Fatality</td>
<td>• Workers briefed during Take 5 • Work highlighted in VSCC • Isolate power supply • LOTO</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>• Discharge residual voltage • Test with meter</td>
<td>Supervisor and Individual Electrician</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hot work</td>
<td>Fire and explosion</td>
<td>• Burns • Fatality</td>
<td>• Workers briefed • Work highlighted in VSCC • Permit-to-work • Proper PPE • Proper tool • Fire watchman</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Pressurised fire line</td>
<td>Supervisor and Hot Worker</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Work at height</td>
<td>Falling hazard</td>
<td>• Fractures • Fatality</td>
<td>• Workers briefed • Work highlighted in VSCC • Permit-to-work • Safety harness</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Supervisor and Individual Electrician</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Risk Assessment Form

- **Company:** Group 6
- **Task:** Test Commission Main Distribution Board (DB)
- **Conducted by:** Group 6 (13/09/2006)
- **Approved by:** 13/09/2006
- **Next Review Date:** 13/09/2009

#### 1. Hazard Identification

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</thead>
</table>
| 1   | Identify the location of the whole loop according to the one-line diagram and P and ID layout drawing | | | • Live power supply  
• Falling from height  
• Unknown gas condition | • Lockout / tagout all the equipments that relate to this loop  
• PPE  
• Check the staging “OK”  
• Tag and use harness  
• Apply entry permit and use vent-fan | 5  
5  
5 | 1  
1  
1 | M  
M  
M | Use walkie-talkie or mobile talk to communicate | Supervisor Officer | |
| 2   | Visual check the grounding cable and cleaning for the panel | Live power supply | Electric shock | • Lockout/ tagout power supply unit for the panel  
• PPE  
• Use proper tool | 5  
5 | 1  
1 | M  
M | Use walkie-talkie or mobile talk to communicate | Supervisor Officer | |
| 3   | Disconnect all the cables to do the continuous check and merger test | Live power supply | Electric shock | • PPE  
• Lockout/ tagout power supply unit for the panel  
• Make sure use of proper tools and the tools all in good condition | 5  
5 | 1  
1 | M  
M | Use walkie-talkie or mobile talk to communicate | Supervisor Officer | |
## Risk Assessment Form

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<tbody>
<tr>
<td>4</td>
<td>Connect back all the cables and make sure its exactly following the connection diagram</td>
<td>Live power supply</td>
<td>Electric shock</td>
<td>• PPE</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Use walkie-talkie or mobile talk to communicate</td>
<td>Supervisor Officer</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Power on</td>
<td>Live power supply</td>
<td>Electric shock</td>
<td>• Put warning symbol of energised</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Barricade work area</td>
<td>Supervisor Officer</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

**Company:** Group 7  
**Task:** Test and Commissioning of High Tension Switchboard  
**Conducted by:** Group 7 (13/09/06)  
**Approved by:** (Date)  
**Next Review Date:** 13/09/09

### 1. Hazard Identification

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</thead>
</table>
| 1   | Cleaning of switchboard | • Fumes, vapor, chemical and dust  
• Present of live power | • Inhalation of harmful chemical  
• Electrocution | • VSCC meeting  
• Wear mask  
• Hand glove  
• LOTO | 3  
5 | 1 | L | M | • Respirator  
• Temporary earthing of bus bar | Supervisor  
| 2 | Line check from MSB to source of supply and internal wiring | Live terminal | Electrocution | • Isolate external source  
• LOTO external source  
• Use proper tool/measuring device  
• Rudder mat  
• Deploy skilled electrician | 5 | 1 | M | Barricade and display warning sign | Supervisor  
| 3 | High pot and megger test | Present of live power | Electrocution | • Deploy skilled electrician  
• Do it at night (silent hour)  
• Use proper tool/measuring device  
• Rubber mat | 5 | 1 | M | Discharge residue power | Supervisor  
| 4 | Torque wrench test | Present of live power | Electrocution | LOTO | 5 | 1 | M | Temporary earthing of bus bar | Supervisor  
| 5 | Power up | Present of live power | Electrocution | • VSCC meeting  
• Permit-to-work  
• Isolate all outgoing breaker  
• LOTO at breaker | 5 | 1 | M | • Communicate through walkie-talkie  
• Display warning sign | Supervisor  

### 2. Risk Evaluation

### 3. Risk Control

### Reference
## Risk Assessment Form

### Company:
Group 8

### Task:
Rewiring of Power System in Engine Room

### Conducted by:
(Date) 13/09/06

### Approved by:
(Date) 

### Next Review Date:
12/09/09

<table>
<thead>
<tr>
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</thead>
</table>
| 1   | Assessment of area of work | • Greasy / oily floor
• Lack of ventilation and lighting | • Tripping and Slipping
• Body injuries | • Housekeeping
• Proper lighting and ventilation | 2
2 | 3 | M | L | Clean and dry environment | Safety Assessor and Supervisor |

| 2   | Isolation of power | Live power supply | Electrocution | • VSCC meeting
• Isolate the circuit breaker
• Lockout/ tagout | 5 | 1 | M | Check and ensure no presence electricity | Supervisor |

| 3   | Disconnection and removal of existing wires | Ergonomics | Hand / body injuries | • PPE
• Use long sleeves overalls | 2 | 3 | M | Wear anti-slip gloves | Supervisor |

| 4   | Cable Pulling and Strapping | • Height
• Ergonomics | • Body injuries (back sprain/ strain)
• Falling (fatality) | • Harness to wear and anchor at strong point
• Ladder / staging to be provided with OK tags | 5 | 1 | M | Men evenly spaced out while working on staging | Staging Supervisor and Supervisor |

| 5   | Termination | Slippage of tools and over tightening | Hand, finger and eye injuries | • PPE
• Proper tools | 2 | 3 | M | Wear anti-slip gloves | Supervisor |
## Risk Assessment Form

**Company:** Group 9  
**Task:** Maintenance of Existing MSB  
**Conducted by:** Electrical Supervisor - Mr. Rama  
**Date:** 10/09/06  
**Approved by:** Mr. Lim - Manager  
**Date:** 13/09/06  
**Next Review Date:** 11/09/09

### 1. Hazard Identification

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</table>
| 1   | Disconnect the main supply | Live wire | • Electric shock  
• Electrocution | • VSCC and Production meeting  
• Isolate power  
• LOTO system  
• Supply of temp lighting  
• Ensure only skilled electrician operates at MSB  
• Warning sign boards  
• Rubber mat | 5 | 1 | M | Line check and communicate by walkie-talkie | Supervisor | |
| 2   | Cleaning breaker and tightening bolt and nut (air blow and hand cleaning) | • Slipping of tools  
• Dust | • Hand / finger injuries  
• Respiratory illness | • PPE esp; hand gloves  
• Dust mask  
• Proper tools | 2 | 1 | L | Supervior | |
| 3   | Check breakers | • Slipping of breakers  
• Limited space | • Damage to property  
• Hand / finger injuries | • Proper tools  
• PPE esp; hand gloves | 2 | 1 | L | Supervisor | |
<table>
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</thead>
</table>
| 4   | Megger the cables          | Live conductors | Electric shock                                   | • Gloves  
• Ensure megger discharge to earth  
• Use proper tool  
• Rubber mat  
• Deploy skilled electrician | 2        | 1          | L         |                                                                                                          | Supervisor                                  |                        |
| 5   | Turn on power to MSB       | Live wire       | Electric shock                                   | • Ensure main cable properly terminated  
• Make sure all the tools remove from MSB  
• Isolate all outgoing breaker  
• LOTO breaker | 5        | 1          | M         | Barricade work site and display warning sign                                                             | Supervisor                                  |                        |
### Risk Assessment Form

**Company:** Group 10  
**Task:** Replacement of Batteries in Emergency Generator Room  
**Conducted by:** Group 10  
**Approved by:** 13/09/06 by Group 10  
**Next Review Date:** 15/09/09

<table>
<thead>
<tr>
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</table>
| 1   | Access the location of the emergency generator room (location identification) | Falling / tripping | Body injuries | • Housekeeping  
• Ventilation and lighting | 2 | 2 | L | Torchlight | Supervisor | |
| 2   | Switch off the battery charger and check the cable | • Live power supply terminals  
• Fire and explosion | • Electric shock  
• Electrocution  
• Body injuries | • PPE  
• Rubber glove  
• Correct tools  
• VSSC Meeting  
• Deploy skilled electrician  
• Prevent tool from falling onto the battery  
• Cover the battery with wooden plank | 2 | 3 | M | M | Supervisor | |
| 3   | Disconnect the link and cable with a correct size spanner (correct tools) | Improper tools | Hand injuries | • PPE  
• Insulation of the tools  
• Face mask  
• Proper tools | 1 | 1 | L | | Supervisor | |
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<th>Action Officer, Designation (Follow-up date)</th>
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</tr>
</thead>
</table>
| 4   | Take out the battery from the battery box manually and clean the box | Manual lifting | • Back injuries  
• Hand injuries | • Require two persons to lift  
• Correct posture  
• PPE  
• Manual lifting procedure | 2 | 2 | L | | Supervisor | |
| 5   | Replace new battery into the battery box | Manual lifting | Back injuries | • Require two persons to lift  
• Correct posture  
• PPE  
• Manual lifting procedure | 2 | 2 | L | | Supervisor | |
| 6   | Reconnect back the battery link and cable | Live terminal | Electric shock | • Use correct tool  
• PPE  
• Insulation of the tools | 3 | 1 | L | | Supervisor | |
## 2. RA Templates: Marine Transport

### Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Group 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task:</td>
<td>Heavy Lifting – 20 tons Hatch Cover</td>
</tr>
<tr>
<td>Conducted by:</td>
<td>(Date)</td>
</tr>
<tr>
<td>Approved by:</td>
<td>(Date)</td>
</tr>
<tr>
<td>Next Review Date:</td>
<td></td>
</tr>
</tbody>
</table>

### 1. Hazard Identification

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<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Lifting supervisor to assess the load and type of lifting method to be used</td>
<td>Wrong assessment</td>
<td></td>
<td>• Competent and experienced lifting supervisor (undergone MOM lifting training)</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td>Lifting Supervisor</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
</tbody>
</table>
| 2   | To arrange proper lifting gear and cranes | Wrong selection | • Body injuries  
• Property damage | • RA briefing for all workers.  
• Select proper lifting gear  
• Anchor point check | 4 | 1 | M | | Lifting Supervisor | Safe Work Procedure for lifting operation |
| 3   | Check the welding condition of lifting lug | Structure failure (Eye lug) | • Body injuries  
• Property damage | • Welding eye lug, must be checked by competent person (e.g. QA / QC) | 4 | 1 | M | | Verified NDT report prior to lifting operation. | Safe Work Procedure for lifting operation |
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</thead>
</table>
| 4   | Hook up lifting gear as co-ordinated with crane operator and signalman | • Falling from height (if rigging is required to be performed at height  
• Falling lifting gears  
• Improper handling | Hand / finger injuries                                              | • To be carried out be qualified rigger  
• Appropriate PPE used (hand glove etc.)  
• Select correct lifting gear for the task (size and capacity)  
• All loose items must be secured / removed  
• Safety harness / safety belt to be used above 2m and on hanging staging  
• Ensure crane operator, rigger and signalman have clear communication (walkie-talkie) | 4      | 1        | M         | Increase safety awareness through safety briefing/ training | Lifting Supervisor                       | Safe Work Procedure for lifting operation |
| 5   | Load lifting                                                   | • Falling and caught by suspended load  
• Crane failure  
• Foul weather  
• Toppling          | • Body injuries  
• Property damage                                              | • Use lifting signals  
• Barricade the area and use tag line  
• Ensure competent crane driver  
• Ensure proper lifting equipment used  
• Don't stand under suspended load  
• Ensure crane operator, rigger and signalman have clear communication (walkie-talkie) | 3      | 3        | M         | Put sign board and alert workers on the operation  
• Increase safety awareness through safety briefing/ training | Rigger and Signalmen on site                                   | Safe Work Procedure for lifting operation |
## Risk Assessment Form

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</table>
| 6   | Load positioning                              | • Falling from height  
• Restricted visibility  
• Foul weather  
• Inadequate lighting  
• Miscommunication       | Minor body injuries                                                | Use tag line and barricade the area  
Stop work during foul weather  
Ensure adequate lighting prior to lifting  
Ensure communicate to rigger via walkie-talkie  
Ensure adequate illumination | 3        | 2          | M          | Use additional lifting gear | Rigger and Signalmen on site | Safe Work Procedure for lifting operation |
| 7   | Swinging the load for proper positioning      | • Hit by object  
• Restricted visibility  
• Foul weather  
• Inadequate lighting  
• Miscommunication       | Body injuries                                                      | Ensure tag line is installed  
Ensure sufficient manpower to handle tag line  
Don’t stand under suspended load  
Ensure the immediate lifting area is cordoned off  
Stop crane movement if load swing is too extensive  
Stop work during foul weather  
Use experienced lifting crew for complicated lift  
Swing slowing – observe SWP | 2        | 2          | L          | • Use whistle for area clearance and place signboard  
• Crane siren             | Lifting Team on site                                               | Safe Work Procedure for lifting operation |
## Risk Assessment Form

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</table>
| 8   | Load in position, Removal of lifting gears | - Falling from height (if rigging is required to be performed at height)  
- Falling lifting gears  
- Improper handling | Hand / finger injuries | Use proper PPE | 1 | 4 | L |  
- Lifting  
- Supervisor to conduct safety briefing | Rigger and Signalmen on site | Safe Work Procedure for lifting operation |
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<tr>
<td>1</td>
<td>Assess the weight and CG of the load</td>
<td>Wrong assessment of weight</td>
<td>• Damage to crane and lifting gears due to overloading. • Injure other workers</td>
<td>• Ensure that the load is within the lorry crane capacity • Ensure that the lorry can contain the load</td>
<td>4</td>
<td>1</td>
<td>L</td>
<td>• Reconfirm the weight of load by second party • Keep clear from any unauthorised personnel</td>
<td>Foreman / Supervisor</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
<tr>
<td>2</td>
<td>Arrange proper lifting gear to be used</td>
<td>Wrong selection</td>
<td>• Body injuries • Property damage</td>
<td>• RA briefing for all workers. • Select proper lifting gear • Anchor point check</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td>Lifting can only be carried out with the recommended lifting gears and lifting machines</td>
<td>Foreman / Supervisor</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
<tr>
<td>3</td>
<td>Hook up lifting gear as co-ordinated with crane operator</td>
<td>• Falling from height (if rigging is required to be performed on the lorry) • Improper handling</td>
<td>Hand / finger injuries</td>
<td>• To be carried out by qualified rigger • Pipes must be strapped and secured • Appropriate PPE used (hand glove etc.) • Select correct lifting gear for the task (size and capacity) • All loose items on the lorry must be secured/removed</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td>Increase safety awareness through safety briefing/ training</td>
<td>Foreman / Supervisor / Rigger</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
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<td>------------------------</td>
</tr>
<tr>
<td>4</td>
<td>Lifting of pipe onto lorry</td>
<td>• Lorry crane toppled</td>
<td>• Fatality / body injuries</td>
<td>• Set up outrigger</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>• Conduct toolbox briefing</td>
<td>Lifting Supervisor / Lorry Crane Operator</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Faulty lifting gear</td>
<td>• Hand / finger injuries</td>
<td>• Fully qualified driver</td>
<td></td>
<td></td>
<td></td>
<td>• RA briefing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Struck by object</td>
<td></td>
<td>• Barricade lifting area</td>
<td></td>
<td></td>
<td></td>
<td>• Supplier to provide maintenance record</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Firm and solid ground</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Lifting equipment in good working condition (with valid cert), and within Safe Working Load</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Swing slowing – observe SWP</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Safe Work Practice for manual handling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Transport from point A to point B</td>
<td>• Collision</td>
<td>Fatality / road traffic accident</td>
<td>• Observe speed limit</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>• Conduct toolbox briefing</td>
<td>Driver / Helper</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Pipe toppled</td>
<td></td>
<td>• Qualified driver</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Pipe fell off the lorry</td>
<td></td>
<td>• Load must be properly secured, tied down</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• All lose items must be cleared from the lorry or tied down before transportation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Red cloth to be tied at the back of the long pipe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Firmly secure the pipe within the load capacity of the lorry crane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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### Risk Assessment Form

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<tbody>
<tr>
<td>6</td>
<td>Unloading the load (hook up lifting gear as coordinated with crane operator)</td>
<td>• Falling from height (if rigging is required to be performed on the lorry) • Improper handling</td>
<td>Hand / finger injuries</td>
<td>• To be carried out by qualified rigger • Appropriate PPE used (hand glove etc.) • Select correct lifting gear for the task (size and capacity) • All loose items on the lorry must be secured/removed</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td>Increase safety awareness through safety briefing / training</td>
<td>Foreman / Supervisor / Rigger</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
<tr>
<td>7</td>
<td>Lifting of pipe off the lorry</td>
<td>• Lorry crane toppled • Faulty lifting gear • Struck by object</td>
<td>• Fatality / body injuries • Hand / finger injuries</td>
<td>• Set up outrigger • Fully qualified driver • Barricade lifting area • Firm and solid ground • Lifting equipment in good working condition (with valid cert), and within Safe Working Load • Swing slowly – observe SWP • Safe Work Practice for manual handling</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>• Conduct toolbox briefing • RA briefing • Supplier to provide maintenance record</td>
<td>Lifting Supervisor / Lorry Crane Operator</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
<tr>
<td>8</td>
<td>Load in position, removal of lifting gears</td>
<td>• Falling from height (if rigging is required to be performed at height) • Falling lifting gears • Improper handling</td>
<td>Hand / finger injuries</td>
<td>Use proper PPE</td>
<td>1</td>
<td>4</td>
<td>L</td>
<td>Lifting supervisor to conduct safety briefing</td>
<td>Rigger and Signalmen on site</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
</tbody>
</table>
### Risk Assessment Form

**Company:** Group 3  
**Task:** Lifting of Steel Plates in Workshop using Overhead Crane  
**Conducted by:** (Date)  
**Approved by:** (Date)  
**Next Review Date:**

<table>
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<tr>
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</thead>
</table>
| 1   | Assess the weight and CG of the load | Wrong assessment of weight | • Damage to crane and lifting gears due to overloading  
• Injure other workers | • Calculate weight by competent person  
• Check from technical drawing for the correct weight | 5  
1  
M | | | • Reconfirm the weight of the load by a second party  
• Keep clear from any unauthorised personnel | Foreman / Supervisor | Safe Work Procedure for lifting operation |
| 2   | Arrange lifting gear to be used | • Hit by moving object  
• Wrong selection | Hand / finger injuries | • Keep clear the surrounding area from any unauthorised personnel  
• Wear appropriate PPEs  
• Identify strong anchor points | 3  
2  
M | | | Train and brief staff on SWP | Foreman / Supervisor | Safe Work Procedure for lifting operation |
| 3   | Hook up the steel plates | Caught in between objects | Hand / finger injuries | • To be carried out by a qualified rigger  
• Appropriate PPE used (hand glove etc.)  
• Select correct lifting gear for the task (size and capacity) | 4  
1  
M | | | Increase safety awareness through safety briefing/ training | Foreman / Supervisor/ Rigger | Safe Work Procedure for lifting operation |
<table>
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</table>
| 4   | Lifting operation    | • Hit by swinging load  
• Falling and caught by suspended load  
• Crane failure  
• Falling load | • Body injuries  
• Property damage                                                                                       | • Center the crane prior to lifting  
• Use proper tug line  
• Deploy qualified riggers, signalmen and crane operators  
• Follow SWP  
• Wear appropriate PPEs  
• Check condition of lifting gears prior to lifting  
• Nobody must be under the suspended load | 5    | 1     | M          |            | • Keep clear the lifting zone from unauthorised personnel  
• Deploy additional watchman  
• Ensure load is suspended for a few minutes, make it stable before moving. | Supervisor  
Rigger / Signalman  
Watchman  
Crane Operator  
Supervisor | Safe Work Procedure for lifting operation |
| 5   | Unload the steel plates | Pinch points                                                          | Hand / finger injuries                                                                                       | • Use proper tug line  
• Wear appropriate PPEs | 4    | 2     | M          |            | Ensure proper co-ordination                                | Supervisor  
Rigger  
Signalman  
Crane Operator | Safe Work Procedure for lifting operation |
# Risk Assessment Form

**Company:** Group 4  
**Task:** Transportation of Scaffold Material from Berth Side to Vessel  
**Conducted by:** (Date)  
**Approved by:** (Date)  
**Next Review Date:**

<table>
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</table>
| 1   | Check the weight of the staging material and SWL of the crane used | • Toppling of crane due to overload  
• Falling objects  
• Wrong assessment | • Fatality  
• Body injuries | • Compliance to SWP  
• Competent and experienced person to perform assessment | 5  
1  
M | Mark the weight of the load | Lifting Supervisor | Safe Work Procedure for lifting operation |
| 2   | Secure staging material to lifting rack | Falling objects | • Fatality  
• Hand / finger injuries | • Qualified rigger  
• Check bar stability of load before lifting  
• Tug line must be secured to rack | 5  
1  
M | Barricade the surrounding | Lifting Supervisor  
Riggers  
Signalman | Safe Work Procedure for lifting operation |
| 3   | Barricade the surrounding (if necessary) | Falling objects | Fatality | Ensure no one is walking below the suspended load | 5  
1  
M | Put in sentry to inform other workers to prevent them from coming near the lifting | Riggers and Signalman | Safe Work Procedure for lifting operation |
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<tr>
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</table>
| 4   | Lifting operation | • Hit by swinging load  
• Fall and caught by suspended load  
• Crane failure  
• Falling load  
• Body injuries  
• Property damage | • Center the crane prior to lifting  
• Use proper tug line  
• Deploy qualified riggers, signalmen and crane operator  
• Follow SWP  
• Wear appropriate PPEs  
• Check condition of lifting gears prior to lifting  
• Nobody must be under the suspended load | 5  
1 | M | • Keep clear the lifting zone from unauthorised personnel  
• Deploy additional watchman  
• Ensure load is suspended for a few minutes to make it stable before moving | Supervisor  
Rigger / Signalman  
Crane Operator  
Rigger / Signalman  
Supervisor  
Watchman | Safe Work Procedure for lifting operation |
| 5   | Load in position, removal of lifting gears | • Falling from height (if rigging is required to be performed at height)  
• Falling lifting gears  
• Improper handling | Hand / finger injuries | Use proper PPE | 1 | 4 | L | Lifting supervisor to conduct safety briefing | Rigger and Signalmen on site | Safe Work Procedure for lifting operation |
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</thead>
</table>
| 1   | Engineering to produce drawings for lift that includes weight of installation and C.G, Padeye/ reinforcements | • Wrong weight assessment  
• Wrong lifting method proposed |                                                                                                                                | • Ensure qualified lifting supervisor (undergone MOM lifting supervisor course) for the task  
• Ensure engineering provide lifting supervisor with the necessary lifting info  
• Ensure safety factor are build in to all calculations  
• Check with production the availability of lifting gears and lifting machines | 3        | 1          | L          |                                                      |                                               | Safe Work Procedure for lifting operation |
| 2   | Arrival of floating crane by tugboat and setup mooring lines               | • Anchoring points not available  
• Anchoring points not strong  
• Damage mooring line | Hand / finger injuries                                                                                                             | • Personnel to be cleared from mooring line limit  
• Physical check on bollard and anchoring points by crane section                                                                 | 4        | 1          | L          | Ensure proper communication with supervisor |                                               | Safe Work Procedure for lifting operation |
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</table>
| 3   | Floating crane crew hook up lifting gear | • Falling from height (if rigging is required to be performed at height)  
• Falling lifting gears  
• Improper handling  
• Hand / finger injuries  
• Body injuries |                                                                                 | • Appropriate PPE used (hand glove etc.)  
• Select correct lifting gear for the task (size and capacity)  
• Training programme for rigger to enhance safety awareness  
• All loose items must be secured / removed  
• Safety harness / safety belt to be used above 2m and on hanging staging  
• Ensure crane operator, rigger and signalman have clear communication via walkie-talkie | 3 | 2 | L | Ensure rigging is done as per lifting plan provided by engineering | | Safe Work Procedure for lifting operation |
| 4   | Load lifting by floating crane crew | • Falling and caught by suspended load  
• Crane failure  
• Foul weather  
• Toppling  
• Body injuries  
• Property damage |                                                                                 | • Use lifting signals.  
• Barricade the area and use tag line  
• Ensure competent crane driver  
• Ensure proper lifting equipment used  
• Don't stand under suspended load  
• Ensure crane operator, rigger and signalman have clear communication via walkie-talkie | 3 | 3 | M | • Put sign board and alert workers on the operation  
• Increase safety awareness through safety briefing / training  
• Lifting done as per lifting plan provided by engineering | Rigger and Signalmen on site | Safe Work Procedure for lifting operation |
<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
</table>
| 5   | Load positioning           | • Falling from height  
• Restricted visibility  
• Foul weather  
• Inadequate lighting  
• Miscommunication | Minor body injury                                                      | • Use tag line and barricade the area  
• Stop work during foul weather  
• Ensure adequate lighting prior to lifting  
• Ensure communicate to rigger via walkie-talkie  
• Ensure adequate illumination | 3        | 2          | M         | Use additional lifting gear  
Rigger and Signalmen on site | Safe Work Procedure for lifting operation |
| 6   | Swinging the load for proper positioning | • Hit by object  
• Restricted visibility  
• Foul weather  
• Inadequate lighting  
• Miscommunication | Body injuries                                                      | • Ensure tag line is installed  
• Ensure sufficient manpower to handle tag line  
• Don’t stand under suspended load  
• Ensure the immediate lifting area is cordoned off  
• Stop crane movement if load swing is too extensive  
• Stop work during foul weather  
• Use experienced-lifting crew for complicated lift  
• Swing slowing – observe SWP | 2        | 2          | L         | Use whistle for area clearance and place signboard  
Lifting Team on site | Safe Work Procedure for lifting operation |
<table>
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<th>No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Load positioning</td>
<td>• Falling from height (if rigging is required to be performed at height) • Falling lifting gears • Improper handling</td>
<td>Hand / finger injuries</td>
<td>Use proper PPE</td>
<td>1</td>
<td>4</td>
<td>L</td>
<td>Lifting supervisor to conduct safety briefing</td>
<td>Rigger and Signalmen on site</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
</tbody>
</table>
## Risk Assessment Form

**Company:** Group 6  
**Task:** Lifting Scaffold Material Using Forklift  
**Conducted by:** (Date)  
**Approved by:** (Date)  
**Next Review Date:**

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
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</thead>
</table>
| 1   | Visually inspect forklift and function test before operation commences | Faulty mechanism can lead to accidents      | Body injuries                                   | • Use daily inspection checklist and inform immediate superior of defects found  
• Only trained forklift operator  
• Ensure all visual and audio signals are functioning  
• Pre-plan maintenance schedule to ensure forklift is in good condition | 1        | 1          | L          |                                           | Trained Forklift Driver | Safe Work Procedure for forklift operation |
| 2   | Operating the forklift                      | • Speeding  
• Faulty brake  
• Knock by forklift                                   | • Fatality  
• Body injuries                                      | • Forklift well-maintained  
• Checklist for forklift operator  
• Drive slowly, observe speed limit, reduce speed if necessaryKeep fork about 1 foot above ground  
• Only trained forklift operators are allowed to operate  
• Qualify operator | 5        | 1          | M          | • Make sure nobody is on the driveway  
• Keep a good lookout when approaching corners or blind spots  
• Assist co-worker | Scaffolding Supervisor / Foreman  
Trained Forklift Driver | Safe Work Procedure for forklift operation |
## Risk Assessment Form

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</thead>
<tbody>
<tr>
<td>3</td>
<td>Lifting the load</td>
<td>• Toppling scaffold materials&lt;br&gt;• Congested surroundings&lt;br&gt;• Heavy human traffic overload&lt;br&gt;• Body injuries to somebody&lt;br&gt;• Property damage</td>
<td>• Ensure no overloading&lt;br&gt;• Secure the load&lt;br&gt;• Barricade the area if necessary&lt;br&gt;• Check surrounding</td>
<td>3 3</td>
<td>M</td>
<td>• Safe working load&lt;br&gt;• Operator to check</td>
<td>Foreman&lt;br&gt;Trained Forklift Driver&lt;br&gt;Scaffolding Supervisor</td>
<td>Safe Work Procedure for forklift operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Transporting to designated area</td>
<td>• Obstruction on driveway&lt;br&gt;• Speeding&lt;br&gt;• Uneven surface&lt;br&gt;• Uneven distribution of load&lt;br&gt;• Body injuries to somebody&lt;br&gt;• Property damage</td>
<td>• To drive at low speed and right direction&lt;br&gt;• Passage to be kept clear&lt;br&gt;• House keeping well maintained&lt;br&gt;• Plan the route&lt;br&gt;• Keep a good lookout for even surface during transportation and avoid going over any debris&lt;br&gt;• If item transported obstruct the forklift operator’s view, move in the reverse direction</td>
<td>4 2</td>
<td>M</td>
<td>Keep a good lookout when approaching corners or blind spots</td>
<td>Trained forklift driver</td>
<td>Safe Work Procedure for forklift operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Unloading</td>
<td>Property damage (or) body injury to somebody</td>
<td>• Barricade the area&lt;br&gt;• No unauthorised person nearby&lt;br&gt;• Barricade the area if necessary&lt;br&gt;• Check surrounding</td>
<td>3 2</td>
<td>L</td>
<td></td>
<td></td>
<td>Safe Work Procedure for forklift operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Backing out and park the forklift</td>
<td>Vision block</td>
<td>Property damage (or) body injuries</td>
<td>• Warning buzzer activated&lt;br&gt;• Back view mirror&lt;br&gt;• Ensure the operator has clear back view</td>
<td>5 1</td>
<td>M</td>
<td>Assist co-worker to make sure nobody is on the driveway</td>
<td>Scaffolding Supervisor</td>
<td>Safe Work Procedure for forklift operation</td>
<td></td>
</tr>
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<td>No.</td>
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</tr>
<tr>
<td>1</td>
<td>Conduct meeting for the related section</td>
<td>Wrong calculation / info</td>
<td>The lifting info reviewed by the assigned person</td>
<td>1 1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
<tr>
<td>2</td>
<td>Assess the weight and CG of irregular shapes structure</td>
<td>Wrong assessment of weight</td>
<td>• Damage to crane and lifting gears due to overloading  • Injure other workers  • Ensure that the load is within the mobile crane capacity  • Ensure lifting path is cleared from obstruction</td>
<td>4 1</td>
<td>L</td>
<td>• Reconfirm the weight of the load by a second party  • Keep clear from any unauthorised personnel</td>
<td>Foreman/ Supervisor</td>
<td>Safe Work Procedure for lifting operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Arrange proper lifting gear to be used</td>
<td>Wrong selection</td>
<td>RA briefing for all workers  • Select proper lifting gear  • Anchor point check</td>
<td>4 1</td>
<td>M</td>
<td>Lifting can only be carried out with the recommended lifting gears and lifting machines</td>
<td>Foreman/ Supervisor</td>
<td>Safe Work Procedure for lifting operation</td>
<td></td>
<td></td>
</tr>
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</thead>
</table>
| 4   | Actual load lifting | • Fall and caught by suspended load  
• Crane failure  
• Foul weather  
• Toppling | • Body injuries  
• Property damage | • Use lifting signals. Barricade the area and use tag line  
• Ensure competent crane driver  
• Ensure proper lifting equipment used  
• Don’t stand under suspended load  
• Ensure crane operator, rigger and signalman have clear communication via walkie-talkie  
• Check ground movement | 3  
3 | M |  |  | • Put sign board and alert workers on the operation  
• Increase safety awareness through safety briefing/training | Rigger and Signalmen on site | Safe Work Procedure for lifting operation |
| 5   | Operation test lift | Crane collapse | Strike by falling object | • Barricade. Nobody nearby the suspended load  
• Ensure the load is stable and within the lifting capacity of the crane  
• Check C.G of load  
• Ensure crane on stable ground | 5 | 2 | M | Pre-briefing before test lift | Lifting Supervisor (Foreman, Supervisor) |  |
<table>
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</thead>
</table>
| 6   | Hook up lifting gear as coordinated with crane operator and signalman | Hand / finger injuries | • Falling from height (if rigging is required to be performed at height)  
• Falling lifting gears  
• Improper handling | • To be carried out by a qualified rigger  
• Appropriate PPE used (hand glove etc.)  
• Select correct lifting gear for the task (size and capacity)  
• All loose items must be secured/removed  
• Safety harness/safety belt to be used above 2m and on hanging staging  
• Ensure crane operator, rigger and signalman have clear communication (walkie-talkie) | 3 | 3 | M | Increase safety awareness through safety briefing / training | Lifting Supervisor | Safe Work Procedure for lifting operation |
| 7   | Load positioning | Minor body injuries | • Hit by object  
• Restricted visibility  
• Foul weather  
• Inadequate lighting  
• Miscommunication | • Use tag line and barricade the area  
• Stop work during foul weather  
• Ensure adequate lighting prior to lifting (maintenance)  
• Ensure communication with rigger via walkie-talkie  
• Ensure adequate illumination | 3 | 2 | M | Use additional lifting gear | Rigger and Signalmen on site | Safe Work Procedure for lifting operation |
<table>
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<tbody>
<tr>
<td>8</td>
<td>Swinging the load for proper positioning</td>
<td>• Hit by object • Restricted visibility • Foul weather • Inadequate lighting • Miscommunication</td>
<td>Body injuries</td>
<td>• Ensure tag line is installed • Ensure sufficient manpower to handle tag line • Don’t stand under suspended load • Ensure the immediate lifting area is cordoned off • Stop crane movement if load swing is too extensive • Stop work during foul weather • Use experience-lifting crew for complicated lift. • Swing slowing – observe SWP</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Use whistle for area clearance and place signboard</td>
<td>Lifting team on site</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
<tr>
<td>9</td>
<td>Load in position, removal of lifting gears</td>
<td>• Falling from height (if rigging is required to be performed at height) • Falling lifting gears • Improper handling</td>
<td>Hand / finger injuries</td>
<td>Use proper PPE</td>
<td>1</td>
<td>4</td>
<td>L</td>
<td>Lifting supervisor to conduct safety briefing</td>
<td>Rigger and signalmen on site</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
<tr>
<td>No.</td>
<td>Task Step</td>
<td>Hazard</td>
<td>Possible Accident / Ill Health &amp; Persons-at-Risk</td>
<td>Existing Risk Control (if any)</td>
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</tr>
<tr>
<td>1</td>
<td>Assess the weight and CG of the steel plates</td>
<td>Wrong assessment of weight</td>
<td>• Damage to crane and lifting gears due to overloading • Injure other workers</td>
<td>• Ensure that the load is within the crane capacity • Ensure lifting path is cleared from obstruction</td>
<td>4</td>
<td>1</td>
<td>L</td>
<td>• Reconfirm the weight of load by second party • Keep clear from any unauthorised personnel</td>
<td>Foreman/Supervisor</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
<tr>
<td>2</td>
<td>Arrange proper lifting gear to be used (plate cramp or long hook)</td>
<td>Wrong selection</td>
<td>• Body injuries • Property damage</td>
<td>• RA briefing for all workers. • Select proper lifting gear • Anchor point check</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td>Lifting can only be carried out with the recommended lifting gears and lifting machines</td>
<td>Foreman/Supervisor</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
<tr>
<td>3</td>
<td>Hook up lifting gear as co-ordinated with crane operator</td>
<td>• Falling from height (if rigging is required to be performed on the height) • Improper handling</td>
<td>Hand / finger injuries</td>
<td>• To be carried out by a qualified rigger • Appropriate PPE used (hand glove etc.) • Select correct lifting gear for the task (size and capacity) - inspected • All loose items on the lorry must be secured / removed</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td>Increase safety awareness through safety briefing/ training</td>
<td>Foreman/Supervisor/Rigger</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
</tbody>
</table>
## Risk Assessment Form

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
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<th>Hazard</th>
</tr>
</thead>
</table>
| 4   | Load lifting| • Falling and caught by suspended load  
• Crane failure  
• Foul weather  
• Toppling |
|     |             | • Body injury  
• Property damage |

### 2. Risk Evaluation

<table>
<thead>
<tr>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
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</table>
|                                                  | • Use lifting signals  
• Barricade the area and use tag line  
• Ensure competent crane driver  
• Ensure proper lifting equipment used  
• Don’t stand under suspended load  
• Ensure crane operator, rigger and signalman have clear communication (walkie-talkie)  
• Check ground movement | 3         | 3          | M          | • Put sign board and alert workers on the operation  
• Increase safety awareness through safety briefing/training | Rigger and Signalmen on site | Safe Work Procedure for lifting operation |
|                                                  | Minor body injury | 3         | 2          | M          | Use additional lifting gear | Rigger and Signalmen on site | Safe Work Procedure for lifting operation |

### 3. Risk Control

| Rigger and Signalmen on site | Safe Work Procedure for lifting operation |

**Note:** For all tasks, ensure the use of lifting signals, barricade the area, use tag line, and ensure competent crane drivers and proper lifting equipment. Always don’t stand under suspended loads. Ensure clear communication and check ground movement.
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>6</td>
<td>Swinging the load for proper positioning</td>
<td>• Hit by object • Restricted visibility • Foul weather • Inadequate lighting • Miscommunication</td>
<td>Body injury</td>
<td>• Ensure tag line is installed • Ensure sufficient manpower to handle tag line • Don’t stand under suspended load • Ensure the immediate lifting area is cordoned off • Stop crane movement if load swing is too extensive • Stop work during foul weather • Use experience-lifting crew for complicated lift • Swing slowing – observe SWP</td>
<td>3 3</td>
<td>M</td>
<td>Use whistle for area clearance and place signboard</td>
</tr>
<tr>
<td>7</td>
<td>Load in position, Removal of lifting gears Unload the steel plate</td>
<td>• Falling from height (if rigging is required to be performed at height) • Falling lifting gears • Improper handling</td>
<td>Hand / finger injuries</td>
<td>Use proper PPE</td>
<td>3 2</td>
<td>M</td>
<td>Lifting supervisor to conduct safety briefing</td>
</tr>
</tbody>
</table>
## Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Group 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task:</td>
<td>Lifting of Pipes Using Tower Crane</td>
</tr>
<tr>
<td>Conducted by:</td>
<td>(Date)</td>
</tr>
<tr>
<td>Approved by:</td>
<td>(Date)</td>
</tr>
<tr>
<td>Next Review Date:</td>
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<tr>
<td>No.</td>
<td>Task Step</td>
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<td>4</td>
<td>Load lifting</td>
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<td>Load positioning</td>
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<tbody>
<tr>
<td>6</td>
<td>Swinging the load for proper positioning</td>
<td>Body injuries</td>
<td>• Hit by object • Restricted visibility • Foul weather • Inadequate lighting • Miscommunication</td>
<td>• Ensure tag line is installed • Ensure sufficient manpower to handle tag line • Don’t stand under suspended load • Ensure the immediate lifting area is cordoned off • Stop crane movement if load swing is too extensive • Stop work during foul weather • Use experienced lifting crew for complicated lift • Swing slowing – observe SWP</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Use whistle for area clearance and place signboard crane siren</td>
<td>Lifting Team on site</td>
<td>Safe Work Procedure for lifting operation</td>
</tr>
<tr>
<td>7</td>
<td>Load in position, removal of lifting gears</td>
<td>Hand / finger injuries</td>
<td>• Falling from height (if rigging is required to be performed at height) • Falling lifting gears • Improper handling</td>
<td>Use proper PPE</td>
<td>1</td>
<td>4</td>
<td>L</td>
<td>Lifting supervisor to conduct safety briefing</td>
<td>Rigger and Signalmen on site</td>
<td>Safe Work Procedure for lifting operation</td>
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</thead>
</table>
| 1   | Visually inspect forklift and function test before operation commences | Faulty mechanism can lead to accidents | Body injuries | • Use daily inspection checklist and inform immediate superior of defects found  
• Only trained forklift operator  
• Ensure all visual and audio signals are functioning  
• Pre-planned maintenance schedule  
• Ensure forklift in good condition | 1 | 1 | L |  | Trained Forklift Driver | Safe Work Procedure for forklift operation |
| 2   | Operating the forklift | • Knock by forklift • Speeding faulty brake | Body injuries or fatality | • Qualified operator  
• Forklift well-maintained  
• Checklist for forklift operator  
• Drive slowly. Observe speed limit  
• Reduce speed if necessary  
• Keep fork about 1 foot above ground  
• Only trained forklift operators are allowed to operate | 5 | 1 | M |  | Scaffolding Supervisor/ Foreman Trained Forklift Driver | Safe Work Procedure for forklift operation |
<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Lifting the load</td>
<td>- Overload • Toppling of scaffold materials • Congested surroundings • Heavy human traffic</td>
<td>- Property damage • Body injuries to somebody</td>
<td>- Ensure no overloading • Secure the load • Barricade the area if necessary • Check surrounding • Secure steel ladder with strapping belt</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Operator to check safe working load</td>
<td>Scaffolding Supervisor/ Foreman Trained Forklift Driver</td>
<td>Safe Work Procedure for forklift operation</td>
</tr>
<tr>
<td>4</td>
<td>Transporting to designated area</td>
<td>- Obstruction on driveway • Speeding • Uneven surface • Uneven distribution of load</td>
<td>- Body injuries to somebody • Property damage</td>
<td>- To drive at low speed and right direction • Passage to be kept clear • House keeping well maintained • Plan the route • Keep a good lookout for even surface during transportation and avoid going over any debris • If item transported obstructs the forklift operator’s view, move in the reverse direction</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Keep a good lookout when approaching corners or blind spots</td>
<td>Trained Forklift Driver</td>
<td>Safe Work Procedure for forklift operation</td>
</tr>
<tr>
<td>5</td>
<td>Unloading</td>
<td>- The load may slip out from fork • Toppling of scaffold materials • Congested surroundings</td>
<td>Property damage (or) body injuries to somebody</td>
<td>- Barricade the area • No unauthorised person near by • Barricade the area if necessary • Check surrounding</td>
<td>3</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Safe Work Procedure for forklift operation</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Backing out and park the forklift</td>
<td>Vision block</td>
<td>Property damage (or) body injuries</td>
<td>- Warning buzzer activated • Back view mirror • Ensure the operator has clear back view</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Assist co-worker to make sure nobody is on the driveway</td>
<td>Scaffolding Supervisor</td>
<td>Safe Work Procedure for forklift operation</td>
</tr>
</tbody>
</table>
## 3. RA Templates: Mechanical Work

### Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Group 1</th>
<th>Conducted by: (Date)</th>
<th>Table 1</th>
</tr>
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<tbody>
<tr>
<td>Task:</td>
<td>Bow Thruster Overhaul</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approved by: (Date)</td>
<td>31/10/06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Preparation of tools</td>
<td>Struck by tools</td>
<td>Injury</td>
<td>Proper tools</td>
<td>1</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>Isolate hydraulic system and power supply</td>
<td>Oil spill</td>
<td>Slip and fall</td>
<td>Housekeeping</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Safety briefing and co-ordination</td>
<td>Trade Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrocution</td>
<td>Fatality</td>
<td>Lockout / tagout system</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Dismantle bow thruster at working platform</td>
<td>Falling from height</td>
<td>Permanent total disablement</td>
<td>Proper staging and hook safety harness</td>
<td>2</td>
<td>4</td>
<td>M</td>
<td>Safety briefing</td>
<td>Staging Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling of object</td>
<td>Major injuries</td>
<td>Ensure certified equipments and lifting gears</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Barricade the area</td>
<td>Trade Supervisor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Lifting and shifting of bow thruster</td>
<td>Falling of objects</td>
<td>Body injuries</td>
<td>Ensure certified lifting equipments and lifting gears</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Use qualified riggers and signalman</td>
<td>Lifting Supervisor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Repair and replace worn of material</td>
<td>Caught in between objects</td>
<td>Hand injuries</td>
<td>Proper job communication and proper PP</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Safety toolbox meeting</td>
<td>Trade Supervisor</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Inspection and assembling bow thruster</td>
<td>Caught in between objects</td>
<td>Hand injuries</td>
<td>Proper job communication and proper PP</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Safety toolbox meeting</td>
<td>Trade Supervisor</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Testing and completion</td>
<td>High pressure hydraulic leakage</td>
<td>Major injuries</td>
<td>Barricade testing area and coordinate the job in VSCC meeting</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td>Ensure no incompatible work in the area, and barricade the area</td>
<td>Ship Representative / Testing Engineer</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

### Company:
Group 2

### Task:
Cargo Pump Overhaul

### Conducted by:
Table 2

### Approved by:
(Date) 31/10/06

### Next Review Date:
30/10/09

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inspection of pump room</td>
<td>Lack of oxygen, lack of light and toxic gas</td>
<td>Brain damage, falling and fatality</td>
<td>Perform gas check, apply permit, provide adequate lighting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Isolate the system</td>
<td>Struck by spanner</td>
<td>Hand / finger injuries</td>
<td>Use of PPE, use of proper tools</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Ship Staff</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Dismantling pipe lines</td>
<td>Struck by objects</td>
<td>Hand / finger injuries</td>
<td>Proper PPE and proper tools</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Remove dismantle pump casing impeller</td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Clean spilled oil using saw dust</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Safety briefing and collect the oil in container</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Clear access for pump to shift</td>
<td>Falling hazard</td>
<td>Body injuries</td>
<td>Barricade</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Safety briefing</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Dismantle pump equipment in workshop</td>
<td>Struck by object/pressurised liquids</td>
<td>Hand / finger and eye injuries</td>
<td>Use proper PPE, barricade and display sign boards</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Foreman</td>
<td></td>
</tr>
<tr>
<td>No.</td>
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<td>Hazard</td>
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<tr>
<td>7</td>
<td>Clean inspect and measure</td>
<td>Fall of equipment</td>
<td>Hand / finger injuries</td>
<td>Use proper PPE / proper tools</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Safety briefing</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Struck by object</td>
<td>Hand / finger injuries</td>
<td>Use proper PPE / proper tools</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Replace bearing / mechanical seal</td>
<td>Struck by object / equipment</td>
<td>Hand / finger injuries</td>
<td>Use proper PPE / proper tools</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Install back shaft, impeller, couplings</td>
<td>Falling / struck by tools</td>
<td>Hand / finger injuries</td>
<td>Use proper PPE / proper tools</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Reinstall on board</td>
<td>Struck by object</td>
<td>Hand / finger injuries</td>
<td>Use proper PPE / proper tools</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Alignment and commissioning</td>
<td>Struck by object / pressurized liquid</td>
<td>Hand / finger and eye injuries</td>
<td>Use safety goggles, barricade the area</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Safety briefing</td>
<td>Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
## 1. Hazard Identification

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<tr>
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<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inspection of rudder</td>
<td>Falling from height</td>
<td>Fatality</td>
<td>Use safety harness and hook up</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Safety toolbox briefing</td>
<td>Mechanical Supervisor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Remove rudder bottom plug</td>
<td>Oil spillages, slip and fall</td>
<td>Body injuries</td>
<td>Prepare container for collecting drain oil, clean oil and apply permit</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Mechanical Supervisor</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Remove access cover (bolted type)</td>
<td>Struck by dropped object</td>
<td>Fatality</td>
<td>Coordinate and wear proper PPE</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Barricade the fall zone area</td>
<td>All trade supervisors</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Check clearance</td>
<td>Struck and cut finer by hand tools</td>
<td>Finger injuries</td>
<td>Wear hand gloves, adequate lighting</td>
<td>2</td>
<td>4</td>
<td>M</td>
<td>Toolbox meetings</td>
<td>Mechanical Supervisor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Final inspection</td>
<td>Falling from height</td>
<td>Fatality</td>
<td>Use proper PPE, hook up body harness</td>
<td>5</td>
<td>5</td>
<td>M</td>
<td>Check all hooking point and to staging “OK” tag</td>
<td>Mechanical Supervisor</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Close rudder access</td>
<td>Struck by dropped object</td>
<td>Major injuries</td>
<td>Wear proper PPE, proper barricade</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td></td>
<td>All Trade Supervisors</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Refit the rudder bottom plug</td>
<td>Struck by hand tool</td>
<td>Hand / finger injuries</td>
<td>Wear hand gloves</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Mechanical Supervisor</td>
<td></td>
</tr>
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<td>No.</td>
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</tr>
<tr>
<td>1</td>
<td>Erect staging</td>
<td>Falling hazard</td>
<td>Fatality</td>
<td>Use safety harness</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Safety briefing and proper scaffold inspection</td>
<td>Scaffold Supervisor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Weld eye piece on ship hull</td>
<td>Falling hazard</td>
<td>Fatality</td>
<td>Use safety harness</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Safety briefing</td>
<td>Welding Supervisor</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Electrocaution</td>
<td></td>
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<td></td>
<td></td>
<td>Fire hazard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Set up chain blocks and slings to support propeller, rope guard and cone</td>
<td>Falling hazard and falling of object</td>
<td>Body injuries</td>
<td>Use safety harness, check all lifting equipments</td>
<td>1</td>
<td>3</td>
<td>L</td>
<td>Immediate Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Remove rope guard using gas cutter</td>
<td>Fire hazard</td>
<td>Body burn</td>
<td>Supervision and follow permit-to-work systems</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Immediate Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Remove cement and cone's bolts</td>
<td>Falling hazard, hit by hand tool</td>
<td>Body injuries</td>
<td>Use safety harness, use proper PPE, cordon off the area</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Safety briefing</td>
<td>Supervisor</td>
<td></td>
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<tr>
<td>No.</td>
<td>Task Step</td>
<td>Hazard</td>
<td>Possible Accident / Ill Health &amp; Persons-at-Risk</td>
<td>Existing Risk Control (if any)</td>
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<td>Likelihood</td>
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</tr>
<tr>
<td>6</td>
<td>Modify staging for cone removal</td>
<td>Falling hazard</td>
<td>Body injuries</td>
<td>Use safety harness and inspect the scaffolding</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Staging Supervisor</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Remove cone</td>
<td>Falling of object</td>
<td>Body injuries</td>
<td>Supervision</td>
<td>2</td>
<td>1</td>
<td>L</td>
<td>Immediate Supervisor</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Remove propeller nut</td>
<td>Falling hazard and falling of object</td>
<td>Body injuries</td>
<td>Use safety harness, use proper PPE, cordon off the area</td>
<td>1</td>
<td>3</td>
<td>L</td>
<td>Immediate Supervisor</td>
<td>Supervisor</td>
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</tr>
<tr>
<td>9</td>
<td>Modify staging to facilitate propeller removal</td>
<td>Falling hazard</td>
<td>Body injuries</td>
<td>Use safety harness and inspect the scaffolding</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Scaffold Supervisor</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Swing out propeller using crane and chain blocks</td>
<td>Hit by propeller and propeller drop</td>
<td>Fatality</td>
<td>Proper supervision and proper lifting</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Pre-lifting briefing and certified lifter</td>
<td>Lifting Supervisor</td>
<td></td>
</tr>
</tbody>
</table>

**Risk Assessment Form**

1. **Hazard Identification**
2. **Risk Evaluation**
3. **Risk Control**
   - **Severity**: 1 (Low), 2 (Medium), 3 (High)
   - **Likelihood**: 1 (Low), 2 (Medium), 3 (High)
   - **Risk Level**: L (Low), M (Medium), H (High)

**Document for Reference**

- Staging Supervisor
- Immediate Supervisor
- scaffold Supervisor
- Lifting Supervisor
## Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Group 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task:</td>
<td>Turbo Generator Overhaul</td>
</tr>
<tr>
<td>Conducted by:</td>
<td>Table 5</td>
</tr>
<tr>
<td>Approved by:</td>
<td>31/10/06</td>
</tr>
<tr>
<td>Next Review Date:</td>
<td>30/10/09</td>
</tr>
</tbody>
</table>

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
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<th>Action Officer</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Isolate the system</td>
<td>Steam</td>
<td>Scald by steam</td>
<td>Proper PPE</td>
<td>1</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrocution</td>
<td>Fatality</td>
<td>Lockout / tagout procedure and isolation</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Safety briefing</td>
<td>Supervisors</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>To drain the steam and oil</td>
<td>Slip and fall</td>
<td>Body, head and finger injuries</td>
<td>House keeping and cleaning the spilled oil by sawdust</td>
<td>1</td>
<td>1</td>
<td>L</td>
<td></td>
<td>Supervisors</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Use chain block to lift up the cover and remove the motor</td>
<td>Chain block and load</td>
<td>Finger injuries</td>
<td>Use tested lifting equipment and wear proper PPE</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Safety briefing</td>
<td>Supervisors</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

**Company:** Group 6  
**Task:** Hydraulic Mooring Winch Overhaul  
**Conducted by:** Table 6  
**Approved by:** 31/10/06  
**Next Review Date:** 30/10/09

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Opening of foundation bolts and bearings</td>
<td>Struck by tools, trip and fall, flying objects</td>
<td>Eye injuries, hand injuries, leg injuries</td>
<td>Use proper PPE</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Toolbox briefing, Prepare for saw dust and rags</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Remove hydraulic hoses</td>
<td>Struck by hydraulic oil pressure, slip / fall</td>
<td>Eye injuries, hand injuries, leg injuries</td>
<td>Lockout/tagout procedures, drain the oil properly</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Toolbox briefing, check hose</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Remove brake band</td>
<td>Crush by heavy object</td>
<td>Body injuries</td>
<td>PTW system, proper PPE</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Toolbox briefing, check hose</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Lifting the complete assembly to trailer and then to workshop</td>
<td>Struck in between objects</td>
<td>Body injuries</td>
<td>Certified lifting gears, tag lines and good communication</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Barricade the lifting area, qualified signalman</td>
<td>Supervisor, Signalman and Rigger</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

**Company:** Group 7  
**Task:** Crank Shaft Deflection  
**Conducted by:** Table 7  
**Approved by:** 31/10/06  
**Next Review Date:** 30/10/09

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer (Follow-up date)</th>
<th>Document for Reference</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Isolate the L.O system</td>
<td>Oil spill</td>
<td>Body injuries</td>
<td>Confirm C/E to L.O. Pump shut position (lockout / tagout)</td>
<td>2</td>
<td>1</td>
<td>L</td>
<td>Supervisor to confirm. C/E highlight in VSCC</td>
<td>Supervisor</td>
<td></td>
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<tr>
<td>2</td>
<td>Open crank case door</td>
<td>Hit by heavy object</td>
<td>Body injuries</td>
<td>Secure the door</td>
<td>2</td>
<td>1</td>
<td>L</td>
<td>Supervisor to confirm with C/E before opening</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Explosion</td>
<td>Burn on body</td>
<td>Make sure engine is cooled sufficiently</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>In the VSCC meeting ensure the condition of electric motor connections and use proper PPE</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Check the turning gear - engage condition to fly wheel. Switch On / Off turning motor</td>
<td>Electric shock</td>
<td>Fatality</td>
<td>Trained person to operate</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>In the VSCC meeting ensure the condition of electric motor connections and use proper PPE</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hit by rotating propeller</td>
<td>Fatality</td>
<td>Make sure nobody works near propeller</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>In the VSCC meeting ensure the condition of electric motor connections and use proper PPE</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Set the deflection gauge on web. Turn crank engine to record reading</td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Make sure work place must be clean and free from oil</td>
<td>2</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Reinstall crank case door</td>
<td>Hit by heavy object</td>
<td>Body injuries</td>
<td>Make sure no person inside crank case</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>No.</td>
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</tr>
<tr>
<td>1</td>
<td>Dismantle cylinder head and lift out using special tools</td>
<td>Struck and cut fingers</td>
<td>Hand / finger injuries</td>
<td>Use proper tools, certified lifting equipment</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Use proper PPE</td>
<td>Supervisor</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Falling</td>
<td>Major injuries</td>
<td>Barricade the area</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Tool box briefing</td>
<td>Supervisor</td>
<td></td>
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<tr>
<td>2</td>
<td>Dismantle piston rod and stuffing box</td>
<td>Slips and fall</td>
<td>Body injuries</td>
<td>Use proper platform and tools</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>De-carbon combustion area of liner by grinding</td>
<td>Cut finger</td>
<td>Finger injuries</td>
<td>Use proper PPE</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Safety briefing</td>
<td>Supervisor</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Fire and explosion</td>
<td>Fatality</td>
<td>PTW system</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Safety briefing and supervision</td>
<td>Supervisor</td>
<td></td>
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<tr>
<td>4</td>
<td>Tighten lifting tools on piston crown</td>
<td>Cut finger</td>
<td>Finger injuries</td>
<td>Use proper tools</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Foreman</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Lift up piston using shore crane for vessel to shore</td>
<td>Falling</td>
<td>Major injuries</td>
<td>Use certified lifting equipments</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Safety briefing</td>
<td>Foreman</td>
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<tr>
<td>No.</td>
<td>Task Step</td>
<td>Hazard</td>
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<tr>
<td>6</td>
<td>Transfer piston to workshop by 10 T lorry</td>
<td>Falling</td>
<td>Major injuries</td>
<td>Proper lashing of piston to lorry</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td>Dismantle stuffing box piston rod at horizontal position</td>
<td>Struck and finger cut</td>
<td>Hand / finger injuries</td>
<td>Use proper tools</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td>Dismantle piston crown at vertical position using overhead crane in workshop</td>
<td>Struck finger</td>
<td>Finger injuries</td>
<td>Use proper tools</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling</td>
<td>Major injuries</td>
<td>Use certified lifting equipments</td>
<td>4</td>
<td>2</td>
<td>M Safety briefing before lifting</td>
<td>Foreman</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Chemical cleaning of piston rod crown and stuffing box</td>
<td>Chemicals</td>
<td>Health and skin irritation</td>
<td>Proper PPE and safety briefing</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Take clearance and measurements</td>
<td>Measuring tape</td>
<td>Finger injuries</td>
<td>Proper PPE</td>
<td>1</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Dye check piston crown</td>
<td>Chemicals</td>
<td>Health problems</td>
<td>Proper PPE</td>
<td>1</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
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<th>Additional Risk Control</th>
<th>Action Officer (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Open up the oil lines</td>
<td>Oil spill</td>
<td>Pollution, slipping hazard</td>
<td>PTW systems</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Proper co-ordination, immediate supervision, toolbox briefing</td>
<td>Foreman</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hand / finger injuries</td>
<td>Body injuries</td>
<td>Proper house keeping, Proper tools</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Foreman</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Remove the mounting bolts</td>
<td>Hand / finger injuries</td>
<td>Hand / finger injuries</td>
<td>Proper tools and PPE</td>
<td>2</td>
<td>4</td>
<td>M</td>
<td>Proper safety briefings, follow SWP</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Shifting by chain blocks</td>
<td>Falling hazard</td>
<td>Serious injuries</td>
<td>Tested lifting gear, proper co-ordination and communication. Trained riggers</td>
<td>4</td>
<td>3</td>
<td>H</td>
<td>Visual inspection before lifting</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Fit back and connect back oil lines</td>
<td>Hand / finger injuries</td>
<td>Hand / finger injuries</td>
<td>Proper tools and PPE</td>
<td>2</td>
<td>4</td>
<td></td>
<td>Proper safety briefings, follow SWP</td>
<td>Foreman</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Testing</td>
<td>Pressurized system</td>
<td>Bursting</td>
<td>Use proper PPE and proper co-ordination among ship crew</td>
<td></td>
<td></td>
<td></td>
<td>Double check and barricade the area</td>
<td>Supervisor</td>
<td></td>
</tr>
</tbody>
</table>

### 2. Risk Evaluation

- **Severity**
- **Likelihood**
- **Risk Level**

### 3. Risk Control

- **Action Officer (Follow-up date)**
- **Document for Reference**
## Risk Assessment Form

**Company:** Group 10  
**Task:** Steering Gear Pump Overhaul  
**Conducted by:** Table 10

**Approved by:**  
(Date) 31/10/06  
**Next Review Date:** 30/10/09

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
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<th>Additional Risk Control</th>
<th>Action Officer (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lock up the system and remove the power supply</td>
<td>Electrocution</td>
<td>Fatality</td>
<td>Tagout system</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Barricade the surrounding area</td>
<td>Trade Leader</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Isolate the hydraulic system valves and drain oil</td>
<td>Oil spillages</td>
<td>Fire, slip and fall</td>
<td>Open flanges to be blanked off and no hot work</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td>Saw dust and skip</td>
<td>Trade Leader</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Preparation of lifting equipment and access removal</td>
<td>Crushed by heavy objects</td>
<td>Loss of body parts</td>
<td>Lifting supervisors on site, certified lifting gears</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td>Brief in safety tool box meeting</td>
<td>Trade Leader</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Removal of pump, overhauling and testing after completion</td>
<td>Crushed by heavy objects</td>
<td>Finger injuries</td>
<td>Proper tools</td>
<td>2</td>
<td>4</td>
<td>M</td>
<td>Safety briefings</td>
<td>Trade Leader</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Reinstall after overhauling and system testing</td>
<td>Oil leakages</td>
<td>Fire, slip and fall</td>
<td>Proper container</td>
<td>2</td>
<td>4</td>
<td>M</td>
<td>Certified mechanical fitters, saw dust and plastic bags</td>
<td>Trade Leader</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crushed by objects</td>
<td>Finger injuries</td>
<td></td>
<td>Certified lifting equipment</td>
<td>2</td>
<td>4</td>
<td>M</td>
<td></td>
<td></td>
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<tr>
<td>6</td>
<td>Housekeeping</td>
<td>Trip and fall</td>
<td>Minor injuries</td>
<td>Safety briefing</td>
<td>1</td>
<td>3</td>
<td>L</td>
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</table>

### Reference
# Risk Assessment Form

**Company:** Group 11  
**Task:** Air Compressor Overhaul  
**Conducted by:** Table 11

**Approved by:** 31/10/06  
**Next Review Date:** 30/10/09

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
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<th>Likelihood</th>
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<th>Additional Risk Control</th>
<th>Action Officer</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dismantling of pipe and valves</td>
<td>Struck by ejected materials</td>
<td>Hand / finger injuries</td>
<td>Use of proper hand tools, proper housekeeping, wear PPE</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Proper supervision</td>
<td>Supervisors</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Dismantling of compressor casing and motor</td>
<td>Electrocution</td>
<td>Fatality</td>
<td>Isolation of the system</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Using lockout / tagout system and highlight in VSCC meeting</td>
<td>Supervisors</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Removal of cylinder head cover, connecting rod, bearings, and pistons springs and valve plates</td>
<td>Falling of materials</td>
<td>Hand / finger injuries</td>
<td>Use certified lifting gears, barricade the area</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td>Supervisors</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Calibrate and replace with new parts</td>
<td>Flying particles</td>
<td>Eye injuries</td>
<td>Use proper PPE</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td>Wear face shield and highlight in safety briefing</td>
<td>Supervisors</td>
<td></td>
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<tr>
<td>5</td>
<td>Re-assemble all dismantle parts</td>
<td>Struck by materials</td>
<td>Hand injuries</td>
<td>Use proper PPE</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Safety briefing</td>
<td>Supervisors</td>
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<tr>
<td>6</td>
<td>Testing and running of compressors</td>
<td>Electrocution</td>
<td>Fatality</td>
<td>Lockout/tagout</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Highlight in VSCC and conduct safety briefing</td>
<td>Supervisors</td>
<td></td>
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## Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Group 12</th>
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<tbody>
<tr>
<td>Task:</td>
<td>Engine Room Crane Overhaul</td>
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<td>Conducted by:</td>
<td>Table 12</td>
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<td>Approved by:</td>
<td>(Date) 31/10/06</td>
</tr>
<tr>
<td>Next Review Date:</td>
<td>30/10/09</td>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shut off the system</td>
<td>Electrocution</td>
<td>Fatality</td>
<td>Follow lockout / tagout procedures</td>
<td>5 1</td>
<td>M</td>
<td>Highlight in VSCC meeting. Tool box briefing Disconnect the power supply</td>
<td>Electrical Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Erect hanging staging</td>
<td>Falling</td>
<td>Fatality and body injuries</td>
<td>Qualified stagger, approved staging with “OK” tag. Display and use body hardness</td>
<td>5 1</td>
<td>M</td>
<td>Highlight in VSCC meeting Barricade the work place</td>
<td>Staging Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Removal of overhead crane from the position</td>
<td>Minor injury</td>
<td>Hand / finger injuries</td>
<td>Use proper tools and wear hand gloves</td>
<td>2 1</td>
<td>L</td>
<td>Tool box meeting highlight in VSCC and no standing under suspended load</td>
<td>Mechanical Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Lifting and shifting the crane out from the vessel</td>
<td>Falling and struck by object</td>
<td>Fatality and body injuries</td>
<td>Qualified rigger / signalman, certified lifting gears, use guide rope and qualified crane operator</td>
<td>5 1</td>
<td>M</td>
<td>Tool box meeting highlight in VSCC and no standing under suspended load</td>
<td>Lifting Supervisor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Risk Assessment Form

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<tbody>
<tr>
<td>5</td>
<td>Transporting the crane to workshop by forklift</td>
<td>Struck by forklift</td>
<td>Fatality and body injuries</td>
<td>Qualified forklift operators. Forklift daily checklist</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Follow yards speed limit. Do not overload and block the driver’s view. Use beacon lights</td>
<td>Forklift Driver</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Install back the overhead crane as original (refit)</td>
<td>Falling and struck by object</td>
<td>Fatality and body injuries</td>
<td>Qualified rigger / signalman, certified lifting gears, use guide rope and qualified crane operator</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Tool box meeting highlight in VSCC and no standing under suspended load</td>
<td>Lifting Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minor injury</td>
<td>Hand / finger injuries</td>
<td></td>
<td>Use proper tools and wear hand gloves</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Mechanical Supervisor</td>
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</table>
# 4. RA Templates: Painting & Blasting

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<tbody>
<tr>
<td>1</td>
<td>Entry into C.S</td>
<td>• Oxygen deficiency • Oxygen enrichment • Overcome by toxic gas • Corrosive substance • Trip and slip</td>
<td>• Fatality • Asphyxiation • Body injuries</td>
<td>• Entry permit (PTW) • Continuous atmospheric monitoring • Adequate lighting • Adequate ventilation</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mobilisation of equipment</td>
<td>• Falling hazard • Vehicle incident</td>
<td>• Minor hand / finger injuries • Collision • Fatality</td>
<td>• Trained vehicle / forklift operator • Qualified signalman / rigger • Provide appropriate PPE</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Setting up and testing of equipment</td>
<td>Struck by compressed air/ hose/ faulty A.R</td>
<td>Body injuries</td>
<td>• Equipment checklist • Adequate safety features • Provide PPE • Checking validity of AR (Air Receiver)</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Task Step</td>
<td>Hazard</td>
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<td>2. Risk Evaluation</td>
<td>3. Risk Control</td>
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<tr>
<td>4</td>
<td>Top up blasting grit</td>
<td>Falling hazard</td>
<td>Body injuries</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Barricade top area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Qualified signalman / rigger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Inspection of scaffold</td>
<td>Falling of persons / object</td>
<td>• Fatal • Body injuries</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Scaffold certificate validity</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Commencement of grit blasting</td>
<td>• Strike by compressed air / grit / hose • Trip and fall • Dust inhalation • Overcome by CO when using diesel operated air compressor for breathing air supply • Body injuries • Lung disease • Fatal</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>• Maintenance required to verify equipment • Safety after job completion</td>
<td>Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• PTW • Provide appropriate PPE • Equipment checklist • Provide adequate lighting • No obstruction • PPE • Co-modification at supply compressed air (visual or audible alarm) • Checking of air filter</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Grit removal and emptying the grit</td>
<td>• Ergonomic • Dust inhalation</td>
<td>• Back pain • Hand / finger injuries • Lung disease</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Provide appropriate PPE</td>
<td>Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

### Company:
Group 2

### Task:
Grit Blasting at shipside with Cherry Picker (Dry Dock)

### Conducted by:
(Date)

### Approved by:
(Date)

### Next Review Date:

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step Description</th>
<th>Hazard</th>
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</table>
| 1   | Transporting of blasting equipment and material by forklift / lorry truck from store to worksite | Moving vehicle | Collision of forklift / lorry truck | • Qualified operator  
• Working condition of vehicle  
• Ensure the load is within the safe working load and the C.G. of vehicle  
• Observe yard’s speed limit  
• Ensure clear passageway before operating vehicle  
• Maintain a clear vision of the operator | 5 | 1 | M | • Supervision  
• Brief to workers | Immediate Supervisor | |
|     |          | Falling object | Strike by falling object | • Secure load  
• Ensure clear passageway from surrounding area  
• Lifting equipment is valid and in safe working condition  
• Safe working load of lifting equipment | 2 | 2 | L | • Supervision  
• Brief to workers | Immediate Supervisor | |
## 1. Hazard Identification

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<tr>
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<tbody>
<tr>
<td>2</td>
<td>Setting up of grit-blasting equipment</td>
<td>• Falling of object &lt;br&gt; • Hand / finger injuries &lt;br&gt; • Body injury &lt;br&gt; • Slip, trip and fall</td>
<td>• Same as above &lt;br&gt; • Pinch point areas &lt;br&gt; • Slip and fall on slippery work surface or trip and fall over hoses placed at passageway</td>
<td>• Same as above &lt;br&gt; • Hand gloves &lt;br&gt; • Maintain two-way communication practice &lt;br&gt; • Using trained personnel &lt;br&gt; • Safe manual handling practice &lt;br&gt; • Maintain clean and dry work place at all times &lt;br&gt; • Do not place blasting hoses at passageway &lt;br&gt; • Hang up of blasting hoses using cable hanger</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>• Supervision &lt;br&gt; • Brief to workers</td>
<td>Immediate Supervisor &lt;br&gt; Immediate Supervisor &lt;br&gt; Immediate Supervisor</td>
<td>Immediate Supervisor &lt;br&gt; Immediate Supervisor &lt;br&gt; Immediate Supervisor</td>
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<tr>
<td>3</td>
<td>Blasting operation</td>
<td>• High pressure &lt;br&gt; • Noise &lt;br&gt; • Exposure to dust &lt;br&gt; • Body injuries (during blasting)</td>
<td>• Body injuries &lt;br&gt; • Noise-induced deafness (NID) &lt;br&gt; • Inhalation (respiratory problems) &lt;br&gt; • Overcome by CO &lt;br&gt; • Poor communication between pot man and blaster result in wrong pressurised hose &lt;br&gt; • Surrounding people hit by spent grit</td>
<td>• Physical check on hose condition &lt;br&gt; • Trained personnel &lt;br&gt; • Functional test (gradually turn on) &lt;br&gt; • Protective clothing &lt;br&gt; • Blasting hood (Air-fed) &lt;br&gt; • CO monitoring device installed &lt;br&gt; • Proper marking of hoses and valves &lt;br&gt; • Railings covered with canvas &lt;br&gt; • Highlight in VSCC meeting &lt;br&gt; • Display warning signboard</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>• Supervision &lt;br&gt; • Brief to workers &lt;br&gt; • Electrical generated compressed air &lt;br&gt; • Dead Man Switch recommended &lt;br&gt; • Blaster to look out prior to blasting</td>
<td>Immediate Supervisor &lt;br&gt; Immediate Supervisor &lt;br&gt; Immediate Supervisor &lt;br&gt; Immediate Supervisor &lt;br&gt; Immediate Supervisor</td>
<td>Immediate Supervisor &lt;br&gt; Immediate Supervisor &lt;br&gt; Immediate Supervisor &lt;br&gt; Immediate Supervisor &lt;br&gt; Immediate Supervisor</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cherry picker in safe working condition</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Supervision</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>trained operator: Certification of Cherry Picker to be valid</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Supervision</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>travelling path to be cleaned of obstruction and on even ground</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Supervision</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>anchor of safety belt</td>
<td></td>
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<td></td>
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<td></td>
<td>max. 2 persons operating</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>ensure no contact between cherry picker and electrical cable.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3.1</td>
<td>Operating of cherry picker</td>
<td>• Moving cherry Picker  • Falling of person  • Electrocution</td>
<td>• Collision / toppling  • Fell from basket  • Contact with electrical cables</td>
<td></td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Supervision</td>
<td>Immediate Supervisor</td>
<td></td>
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<tr>
<td></td>
<td>Demob</td>
<td>High pressure</td>
<td>Residual pressure in hoses result in body injuries (Strike by) Refer to No.2</td>
<td>• Off main valve  • Release existing pressure in the hose</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Supervision</td>
<td>Immediate Supervisor</td>
<td></td>
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</table>
| 1   | Accessing area to be grit blasted | Trips, slips and falls | • Trips due to uneven surface  
• Slips due to oily surface  
• Minor injuries | • Safety shoes  
• Use cable harness to hang up hoses  
• Keep surface clean and dry | 1 | 2 | L | Nil | Immediate Supervisor | |
| 2   | Equipment mobilization using fork lift and lorry crane | Hit by moving vehicle | Collision / forklift topple (fatality) | • Trained forklift operator assign  
• Check condition / capacity  
• Keep persons clear from operation | 5 | 1 | M | Nil | Immediate Supervisor | |
|     |          | Falling objects | Strike by falling equipment (minor) | • Secure load using proper pallet  
• Keep persons clear from operation | 2 | 2 | L | Nil | Immediate Supervisor | |
| 3   | Setting up of equipment | Trips, slips and falls | Trips due to uneven surface slip due to oily surface (minor) | • Safety shoes  
• Use cable harness to hang up hoses  
• Keep surface clean and dry | 1 | 2 | L | Nil | Immediate Supervisor | |
|     |          | Falling objects | Strike by falling equipment (minor) | • Do not lift heavy load manually  
• Use forklift or crane to lift equipment | 2 | 2 | L | | | |

## 2. Risk Evaluation

<p>| Severity | Likelihood | Risk Level | Additional Risk Control | Action Officer, Designation (Follow-up date) | Document for Reference |</p>
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<tr>
<td>4</td>
<td>Grit blasting</td>
<td>• High pressure injection • Injury</td>
<td>• Hit by flying grits • Hose burst • Slips / trips and falls • Blasting pot burst</td>
<td>• Check and use correct rating and gravel condition hose • Use dead men switch • Visual inspection of blasting pots for defects • Ensure blasting pot is tested and valid • Use of safety relief valve</td>
<td>3 3 5</td>
<td>3 3 1</td>
<td>M M M</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Asphyxiation</td>
<td>CO poisoning</td>
<td>Use electrical driven compressor</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
</tr>
<tr>
<td>5</td>
<td>Demob of blasting equipment</td>
<td>• High pressure injection • Injuries</td>
<td>• Hit by flying grits • Remaining pressure in the hose</td>
<td>Release pressure before disconnecting hose</td>
<td>3 3</td>
<td>M</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Task Step</td>
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<tr>
<td>1</td>
<td>Transporting of hydro-jetting equipment by forklift from store to worksite</td>
<td>• Moving vehicle / crane • Falling object</td>
<td>• Collision / forklift topple crane: fatality • Strike by a falling spray gun/hose from forklift: minor injury</td>
<td>• Assigned appointed and trained forklift operator • Check forklift condition before operating it • Ensure that load is within and e.g. load • Keep the people clear from forklift</td>
<td>5</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Setting up of hydro-jetting equipment at worksite and checklist for all the equipment</td>
<td>Pinch point</td>
<td>Finger injuries</td>
<td>Wear safety gloves</td>
<td>1</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>High pressure</td>
<td>Leg injuries • Possible falling down</td>
<td>Supervisor authorised the test of hydro-jetting equipment</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Falling object • Finger injury</td>
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<td></td>
<td></td>
<td></td>
<td>Falling from height</td>
<td>Housekeeping</td>
<td>2</td>
<td>1</td>
<td>L</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Entering a confined space</td>
<td>• Asphyxiation hazards • Lack of air • Falling objects • Person falling</td>
<td>• Fatality • Lost plank and small material fall down • Fatality</td>
<td>• Entry permit • OK tag for staging • Ventilation, lighting, body harness and gas checklist • Tank watchman • Permit display on a tank</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
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<td>Hazard</td>
<td>Possible Accident / Ill Health &amp; Persons-at-Risk</td>
<td>Existing Risk Control (if any)</td>
<td>Severity</td>
<td>Likelihood</td>
<td>Risk Level</td>
<td>Additional Risk Control</td>
<td>Action Officer, Designation (Follow-up date)</td>
<td>Document for Reference</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------</td>
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<td>------------</td>
<td>------------</td>
<td>-------------------------</td>
<td>-----------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>4</td>
<td>Hydro-jetting with rotor gun</td>
<td>• High pressure • People falling</td>
<td>• Leg injuries • Fatality</td>
<td>• Safety boots • Body harness</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Demobilise hydro-jetting equipment after hydro-jetting</td>
<td>• Pinch point • High pressure • Falling objects</td>
<td>• Hand injuries • Leg injuries and possible to fall down • Falling from height</td>
<td>• Released the pressure before disconnect / make sure • Supervisor is authorised • the demobilised the settons • Housekeeping</td>
<td>1</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Transporting of hydro-jetting equipment by forklift back to the store</td>
<td>• Moving vehicle crane • Falling objects</td>
<td>• Collision forklift/ crane • Struck by falling object hose, gun from forklift and crane</td>
<td>• Trained forklift operator • Check forklift condition • Keep the people clear from forklift • Ensure that load is within the e.g. load</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

**Company:** Group 5  
**Task:** Hydro-jetting on Main Deck Rotor Gun  
**Conducted by:** Yard Supervisor/Foreman  
**Approved by:** Section Head (12/07/2006)  
**Next Review Date:** 12/07/2009

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Reference</th>
</tr>
</thead>
</table>
| 1   | Preparation on mobilisation of equipment | Moving of vehicle and shifting and lifting | • Collision  
• Damage equipment  
• Hand injuries: fatality | • Certified operator  
• Qualified signalmen | 5  
1 | M | Premark location and check list | Supervisor and Foreman | Safe Work Procedure Equipment Catalog |
| 2   | Hydro-jetting in progress | • Over pressure  
• Flaying object | • Leg and hand injuries  
• Body injuries  
• Deafness | • PPE, boots guard and face shield  
• Barricade in this area and signboard highlighted VSCC | 2  
3 | M | Built in interlock | Supervisor and Foreman |
| 3   | Demob mobilisation of equipment | Pressure | Eyes and body injuries | Release pressure and PPE | 1  
1 | L | Premark location | Supervisor |

### 1. Hazard Identification

- **No. 1:** Preparation on mobilisation of equipment  
  - **Hazard:** Moving of vehicle and shifting and lifting  
  - **Possible Accident:** Collision, Damage equipment, Hand injuries: fatality  
  - **Risk Control:** Certified operator, Qualified signalmen  
  - **Severity:** 5  
  - **Likelihood:** 1

### 2. Risk Evaluation

- **No. 2:** Hydro-jetting in progress  
  - **Hazard:** Over pressure, Flaying object  
  - **Possible Accident:** Leg and hand injuries, Body injuries, Deafness  
  - **Risk Control:** PPE, boots guard and face shield, Barricade in this area and signboard highlighted VSCC  
  - **Severity:** 2  
  - **Likelihood:** 3

### 3. Risk Control

- **No. 3:** Demob mobilisation of equipment  
  - **Hazard:** Pressure  
  - **Possible Accident:** Eyes and body injuries  
  - **Risk Control:** Release pressure and PPE  
  - **Severity:** 1  
  - **Likelihood:** 1

- **Reference:** Safe Work Procedure Equipment Catalog
## Risk Assessment Form

**Company:** Group 6  
**Task:** Hydro-Jetting with Rotor Gun at Shipside using Cherry Picker  
**Conducted by:** Group 6 (12/07/2006)  
**Approved by:**  
**Date:**  
**Next Review Date:** 12/07/2009

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
</table>
| 1   | Transporting of hydro-jetting M/C from store to worksite using forklift | Moving vehicle | Collision / forklift topple fatality | • Assigned trained forklift operator  
• Check forklift condition before operating it  
• Ensure that load is within the forklift capacity and the C.G. is within the forks  
• Keep persons clear from operating forklift and location | 5 | 1 | M | • Ensure clear location  
• Ensure audio visual alarms operative during forklift operation  
• Ensure clear passageway | Immediate Supervisor | |
| 1A  | Transportation of cherry picker | Moving vehicle | • Collision/ topple Fatality | • Assigned trained cherry picker operator  
• Check cherry picker before operating it  
• Ensure rest position of boom  
• Clear passageway | 5 | 1 | M | • Ensure audio visual alarms operative during operation  
• Maintenance and inspection checks as need | Immediate Supervisor | |
|     | Falling objects | Strike by a falling hydro-jetting pump / gun/ hose from forklift | • Secure load to transport them  
• Keep persons clear from operating forklift | 1 | 1 | M | • Ensure clear location  
• Ensure audio visual alarms operative during forklift operation | Immediate Supervisor | |
<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
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<th>Severity</th>
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<th>Risk Level</th>
<th>Additional Risk Control</th>
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<th>Reference</th>
</tr>
</thead>
</table>
| 2   | Setting of hydro-jetting equipment at worksite | Slips, trips, falls at worksite | • Hands and finger caught while setting | • Keep work place clean and neat  
• Do not place hoses at passageway  
• Use hose arrestor with correct capacity  
• Assigned trained operator  
• Using adequate PPE  
• Use proper and correct capacity hoses, fittings and rotor guns  
• Using proper warning signs / barricade | 2 | 2 | L | Nil | Immediate Operator and Foreman |         |
| 3   | Hydro-jetting with rotor gun using cherry picker | • High pressure injection • Injury | • High pressure water injected on fingers / parts of body due to improper handing of hydro-jetting gun/ hoses  
• Use of substandard hose, fittings, parts | • Assigned trained operator / blaster  
• Use of hose / parts / fittings of correct rating (SWP) without damage kinks  
• Release trigger of the gun, release pressure in M/C and stop the M/C before adjusting nozzle  
• Keep hands away from nozzle during operation  
• Secure all hoses, fittings adequately | 4 | 2 | M | • Ensure proper trained / authorised person at worksite  
• Checklist for maintenance inspections of equipments / accessories | Immediate Supervisor and Foreman |         |
|     | Noise  
• Falling hazards | • Deafness  
• Falling from height, fatality | • Ensure no leaking  
• (PPE) Ear plug to be used  
• Assigned trained operator/ blaster  
• Adequate use of PPE | 3 | 1 | L | Refresher training and documentation | Immediate Supervisor and Foreman |         |
<table>
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<tr>
<th>No.</th>
<th>Task Step</th>
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<th>Risk Level</th>
<th>Additional Risk Control</th>
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</tr>
</thead>
</table>
| 4   | De-setting of hydro-jetting equipment at worksite | Slips, trips and falls at worksite | • Hands / fingers injuries | • Keep work place clean and neat  
• Do not place hoses at passageway, roll them properly and pack  
• Disconnect fittings carefully and store in M/C’s  
• Disconnect guns and store properly  
• Finally pack all accessories / secure it / lock the M/C  
• Clear passageway | 2 | 2 | L | Nil | Immediate Supervisor and Foreman | |
| 5   | De-mobilize hydro-jetting equipment | Moving vehicle  
• Collision / forklift topple  
• Fatality | • Assign trained forklift operator  
• Check forklift condition before operating it  
• Ensure that load is within the forklift capacity and the CG is within the forks  
• Ensure clear location  
• Ensure audio visual alarms operative during forklift operation | 5 | 1 | M | | Immediate Foreman | |
|      |          | Falling objects  
• Strike by a falling hydro-jetting pump / gun hose forklift | • Keep persons clear from operating forklift location  
• Secure load to transport them  
• Keep persons clear from operating forklift  
• Ensure clear location  
• Ensure audio visual alarms operative during forklift operation | 4 | 1 | M | | Immediate Foreman | |
<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
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<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
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</tr>
</thead>
</table>
| 5A  | Transportation of cherry picker | Moving vehicle | • Collision / topple • Fatality | • Assigned trained cherry picker operator  
• Check cherry picker before operating it  
• Ensure that the boon should be in rest position  
• Ensure audio visual alarms operative during operation  
• Maintenance and inspection checks as needed | 5 | 1 | 6 | Immediate Foreman | |
# Risk Assessment Form

**Company:** Black and White International Marine Pte Ltd  
**Task:** Spray Painting with Airless Spray Gun in a Confined Space  
**Conducted by:**  
**Approved by:** 12/07/2006  
**Next Review Date:** 11/07/2009

## 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
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<th>Severity</th>
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<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
</table>
| 1   | Transporting painting equipment by forklift to worksite | Moving vehicle | Collision • Topple • Fatality | • Assign trained forklift operator  
• Check and ensure green tag, proper maintenance, check list, follow speed limit  
• Do not overload  
• Ensure adequate lighting | 5  
1 | M | Immediate Supervisor | |
|     |                                     | Falling object | Strike by falling spray pump, hose and paint drum | Secure equipments properly | 2  
1 | M | Immediate Supervisor | |
| 2   | Lifting up equipment on board vessel by crane | Falling object | Strike by falling object • Struck by moving object | • Assign trained signaler and rigger  
• Assign trained crane operator  
• Check and inspect all lifting devices before use  
• Materials secured properly  
• No obstruction | 2  
1 | M | Immediate Supervisor | |

## 2. Risk Evaluation

<table>
<thead>
<tr>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1</td>
<td>M</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>M</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>M</td>
</tr>
</tbody>
</table>

## 3. Risk Control

- Immediate Supervisor
<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
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</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Setting and connection all equipments</td>
<td>Slips, trips and falls</td>
<td>• Oily surface • Poor housekeeping • Obstruction on • passageway</td>
<td>• Proper housekeeping • All hoses and cable must be laid out properly</td>
<td></td>
<td></td>
<td></td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sharp edges</td>
<td>Contact with sharp edges</td>
<td>Use proper hand gloves</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Testing of equipment</td>
<td>• High noise level • Leakage and splash</td>
<td>• NID • Eye injuries</td>
<td>Use proper PPE</td>
<td></td>
<td></td>
<td></td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Mixing paints</td>
<td>• Fire hazard • Explosion • Splashing</td>
<td>• Fire hazard due to hot work • Smoking</td>
<td>Check and ensure no hot work at the vicinity • Ban smoking • Barricade and display signboard</td>
<td></td>
<td></td>
<td></td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Spray painting in confined spaces with airless gun</td>
<td>• Fire hazard • Explosion • Falling from height • Inhalation • Skin irritation • Electrocuton • Asphyxiation • High pressure injuries</td>
<td>• Fire and explosion due to hot work • Smoking • Inhalation of harmful vapour • Defective ladder</td>
<td>Check and ensure no incompatible hot work • Coordinate painting work in VSCC meeting • Must use proper PPE • Proper lighting (explosion proof light) • Entry permit • Keep finger or body away from spray gun tip</td>
<td></td>
<td></td>
<td></td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Demobilise</td>
<td>High pressure injuries; paint inject</td>
<td>Paint injects into hand and body</td>
<td>Release pressure from equipment and hoses • Use proper PPE • Clear all empty paint drums and do housekeeping upon completion of work</td>
<td></td>
<td></td>
<td></td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

**Company:** Group 8  
**Task:** Spray Painting Using Airless Spray Gun at Shipside with Cherry Picker  
**Conducted by:** (Date) 12/07/2006  
**Approved by:** (Date) Group 8  
**Next Review Date:** 11/07/2006

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
</table>
| 1   | Identify the working area | Slips, trips and falls | • Slips, trips and falls due to wet and slippery ground  
• Passageway obstructed (minor injuries) | • Keep working area clean and dry at all times  
• Housekeeping to be done before commencement of any work  
• VSOC  
• PTW | 2 | 2 | L | More attention to monitor by supervisor | Supervisor | Nil |
| 2   | Mobilisation of equipment and materials | Moving vehicle | • Collision  
• Struck by moving vehicle  
• Forklift topple | Assign trained / qualified forklift operator | 3 | 2 | M | Nil | Foreman | Nil |
|     |          | Moving vehicle/equipment | Cherry picker topple due to outrigger not extended or / and uneven ground (major injuries) | • Ensure qualified SPP operator only operate  
• Ensure ground is not obstructed by any foreign materials | 3 | 2 | M | Nil | Supervisor | Nil |
|     |          |          | Person falling from height | Ensure safety belt / harness is being used (PPE) | 3 | 2 | M | Nil | Supervisor | Nil |
|     |          | Falling objects | • Struck by falling painting equipment and paint drums  
• Minor injuries | Ensure equipments and materials are properly secured and no overloading | 2 | 2 | L | Nil | Supervisor | Nil |
<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
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<th>Additional Risk Control</th>
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</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Setting up of spray painting equipments</td>
<td>Falling objects</td>
<td>Struck by falling equipments (minor injuries)</td>
<td>Ensure that manual lifting within the capability (not more than 25 kg per person)</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Supervisor</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td>Slips, trips and falls</td>
<td>Slips, trips and falls due to bad housekeeping (major injuries)</td>
<td>Ensure good housekeeping at all times</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Foreman/Supervisor</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mixing of paint</td>
<td>Fire and explosion</td>
<td>Fire and explosion due to hot work and / other heat sources</td>
<td>Ensure no hot work and / or other heat sources within the vicinity</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Foreman/Supervisor</td>
<td>Nil</td>
</tr>
</tbody>
</table>
|     | • Eye and body injuries  
  • Skin irritation | Paint splash to eyes and / or other body parts due to improper handling Equipment / hose break | • Ensure trained / qualified painter are being deployed  
  • Use proper paint equipments / hoses  
  • Use proper PPE | 3        | 2          | M         | Nil                    | Foreman/Supervisor | Nil                    |
<table>
<thead>
<tr>
<th>No.</th>
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<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
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</thead>
<tbody>
<tr>
<td>5</td>
<td>Spray painting using airless spray gun with cherry picker</td>
<td>Fire and explosion</td>
<td>• Fire and explosion due to hot work and/or other heat sources • Fatality</td>
<td>• Ensure no hot work and/or other heat sources in the vicinity • Coordinate in VSCC meeting</td>
<td>5</td>
<td>2</td>
<td>H</td>
<td>Proper co-ordination in VSCC meeting</td>
<td>Foreman / Supervisor</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• High pressure injection injuries</td>
<td>• Pressurised paint injected due to improper handling • Equipment failure • Major injuries</td>
<td>• Ensure trained painters are assigned • SSIC • Ensure equipment are being checked prior to use • Proper PPE</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Foreman / Supervisor</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Expose to toxic vapour</td>
<td>Chronic illnesses due to inhalation</td>
<td>Ensure proper PPE are being used</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td>Nil</td>
<td>Foreman / Supervisor</td>
<td>Nil</td>
</tr>
<tr>
<td>6</td>
<td>Demobilisation of pointing equipments</td>
<td>Falling objects</td>
<td>Hit / struck by falling object due to improper handling</td>
<td>Manual lifting to be within the person's capacity (not more than 25kg)</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td>Nil</td>
<td>Foreman / Supervisor</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slips and trips and falls</td>
<td>Slip and trip, fall due to bad housekeeping</td>
<td>Ensure proper housekeeping at the end of any work</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Foreman / Supervisor</td>
<td>Nil</td>
</tr>
</tbody>
</table>
### Risk Assessment Form

**Company:** Group 9  
**Task:** Spray Painting with Airless Spray Gun at Main Deck  
**Conducted by:**  
**Date:** 12/07/2006  
**Approved by:**  
**Date:**  
**Next Review Date:** 12/07/2009

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
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<th>Likelihood</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Preparation of equipment such as spray pump, spray gun, paints compressor, canvas, gaskets, and transport it using forklift to Wharf side</td>
<td>Pinch point</td>
<td>Hand caught in between equipment</td>
<td>Keep hand away from pinch point during preparation</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Immediate Supervisor or Foreman</td>
<td></td>
</tr>
</tbody>
</table>
| 2   | Blanking-up all pipelines by rubber gaskets, wooden plugs, covering protection on electrical equipment and etc. | Moving vehicle | • Collision  
• Forklift topple  
• Fatality | • Assign trained forklift driver  
• Check forklift condition  
• Ensure forklift capacity  
• Follow in-house rules  
• Keep forklift clear from pedestrian and others during operation | 5 | 1 | M | | Immediate Supervisor or Foreman | Refer to SOPM Chapter 25 on forklift driving |
| 3   | Barricade the site that are under operation | Falling object | • Strike by a falling spray pump, hose, gun, paint drums  
• Minor injuries | • Do not lift load more than you can carry  
• Ask for assistance if possible | 2 | 2 | L | | Immediate Supervisor or Foreman | |
| 4   | Barricade the site that are under operation | Hand injury | Hand cut by wire | Use hand glove | 1 | 2 | L | | Immediate Supervisor | |
| 5   | Barricade the site that are under operation | Slip, trips and falls | • Due to improper housekeeping  
• Slippery surface | • Maintain good housekeeping and keep tidy at all times  
• Hang up all cables | 2 | 3 | M | | Immediate Supervisor | |
| 6   | Barricade the site that are under operation | Slips, trips and falls | As above | As above | 2 | 3 | M | | Immediate Supervisor | |
## Risk Assessment Form

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Arrangement of equipment such as compressor, spray pumps, spray guns, paint, paints, rubbish bins</td>
<td>Falling objects</td>
<td>Strike by a falling paint drums, hose (wharf arranging)</td>
<td>Keep others clear away from the operation area</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
|     |           | Slips, trips and falls | Due to poor housekeeping and equipment | • Maintain good housekeeping  
• Maintain at all times | 2        | 3          | M         |                         | Immediate Supervisor                           |                      |
| 5   | Paint mixing |   | • Fire  
• Pollution | • Close all paint containers when not in use  
• Display signboard  
• Highlight at VSCC meeting  
• No smoking | 3        | 1          | L         |                         |                                                    |                      |
|     |           | Eye injuries | Paint splashes to eyes | • Wear eye protector | 2        | 2          | L         |                         |                                                    |                      |
| 6   | Start spray painting with airless spray gun | Fire | Flash fire due to smoking, hot works | • Apply permit  
• Blank off all openings  
• No hot works within the area  
• Co-ordinate at VSCC meeting  
• Display signboard “Painting in Progress” | 4        | 1          | M         |                         |                                                    |                      |
|     |           | • High pressure injection injuries | Due to finger and body injuries | • Trained spray painter or qualified personnel.  
• Buddy system applied to look during operation  
• Keep hand away from nozzle tip | 3        | 2          | M         |                         |                                                    |                      |
| 7   | Demobilising and housekeeping | Refer to hazards on setting-up | As above |                         |          |            |           |                         | Refer to SOPM Chapter 18 on good housekeeping |                      |
## Risk Assessment Form

**Company:** Group 10  
**Task:** Power Tooling at Open Space / Decks  
**Conducted by:**  
(Date) 12/07/2006  
**Approved by:**  
(Date) 12/07/2005  
**Next Review Date:** 11/07/2009

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
</table>
| 1   | Transporting of power tooling equipments by forklift and crane | • Moving vehicle (forklift)  
• Falling hazards (equipment)  
• Collision / Forklift topple  
• Fatality | • Assign appointed and trained forklift and crane operator  
• Check forklift/crane condition before operating it  
• Ensure that load is within the CG, is within the forks / lifting  
• Follow 3 steps of lifting procedure  
• Assign appointed riggers | 5 | 1 | M | Nil | Immediate Supervisor and Lifting Supervisor |  
| 2   | Setting up of power tooling equipments to work site | Falling objects | • Hit by falling air manifolds and air hoses  
• Minor injuries  
• Secure load and use proper lifting equipment like skip  
• Keep persons clear from operating area  
• Make sure the hose is shut before connecting | 3 | 2 | M | Nil | Immediate Supervisor |  

---

**210**
<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Power tooling in progress</td>
<td>Fire</td>
<td>Sparks flying around during power tooling</td>
<td>• Check and ensure no flammable liquids surrounding areas • Co-ordinate in VSCC meeting • Assign experienced workers • Close all air hoses when not in use</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eye and body injuries</td>
<td>Particles and hoses may affect eyes and body</td>
<td>• Use proper eyewear • To use whip arrestor for connections</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Demobilise power tooling equipments after power tooling</td>
<td>Falling objects</td>
<td>Hit by falling air manifolds and hoses</td>
<td>• Assign appointed rigger • Secure load and use proper lifting equipment like skip • Keep persons clear from operating area • Do not place air gases at passageway</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slip, trips and falls</td>
<td>Minor injuries</td>
<td>• Keep persons clear from operating area • Do not place air gases at passageway</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Transporting of power tooling equipment by forklift back to workshop</td>
<td>Moving vehicle</td>
<td>Collision/ forklift topple</td>
<td>• Assign appointed and trained forklift operator • Check forklift condition before operating it • Ensure that load is within the forklift capacity • Keep persons clear from operating forklift</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Nil</td>
<td>Immediate Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
**Risk Assessment Form**

<table>
<thead>
<tr>
<th>Company: Group 11</th>
<th>Conducted by: (Date)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task: Power Tooling Pneumatic Confine Space</td>
<td></td>
</tr>
<tr>
<td>Approved by: (Date) 12/07/2006</td>
<td>Next Review Date: 12/07/2009</td>
</tr>
</tbody>
</table>

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Apply entry permit</td>
<td>Nil</td>
<td>Nil</td>
<td>Highlight in the VSCC meeting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yard Foreman</td>
</tr>
<tr>
<td>2</td>
<td>Check location</td>
<td>• Slips, trips and falls • Insufficient light • Lack oxygen • CO₂</td>
<td>• Slippery work place • Poor visibility • Fatality</td>
<td>• Clear and dry all times • Arrange more lights • More ventilation • Gas meter</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Arrange manpower distribution</td>
<td>• Unskilled worker • Language barrier</td>
<td>• Prone to injuries • Miscommunication</td>
<td>• Proper tool handling • Buddy system • Proper PPE issue, inspect</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Equipment distribution</td>
<td>• Pinch point • Falling objects • Faulty equipment • Poor housekeeping</td>
<td>• Hand / finger injuries • Strike by falling objects • Body injuries • Slips, tips and falls</td>
<td>• Use proper PPE • Proper rigging • Secure loose item • Keep clear lifting area • Check before issue • Keep clear and clean</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Starting work</td>
<td>• Dust • Hit by falling objects</td>
<td>• Respiratory disease • Body injuries</td>
<td>Use proper respirator, proper PPE</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>General cleaning (vacuum)</td>
<td>Dust</td>
<td>Respiratory disease</td>
<td>Use proper respirator</td>
<td>1</td>
<td>1</td>
<td>L</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Demobilising</td>
<td>• Pinch point • Falling objects • Faulty equipment • Poor housekeeping</td>
<td>• Hand / finger injuries • Strike by falling objects • Body injuries • Slips, trips and falls</td>
<td>• Use proper PPE • Proper rigger • Keep area clear / clean</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
## 5. RA Templates: Piping

### Risk Assessment Form

<table>
<thead>
<tr>
<th>Company</th>
<th>Group 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task</td>
<td>Fabrication of Pipes in a Workshop</td>
</tr>
<tr>
<td>Conducted by:</td>
<td>(Date) 31/08/06</td>
</tr>
<tr>
<td>Approved by:</td>
<td>(Date) 31/08/06</td>
</tr>
<tr>
<td>Next Review Date</td>
<td>30/08/09</td>
</tr>
</tbody>
</table>

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arrange material to workshop “trailer”</td>
<td>Pipe falling</td>
<td>Fatal</td>
<td>Wedges and side stopper</td>
<td>5</td>
<td>2</td>
<td>H</td>
<td>Extra chain/ belt to secure</td>
<td>Lifting Supervisor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Pinch point</td>
<td>• Facture</td>
<td>PPE</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>• Crowbar to be used</td>
<td>Lifting Supervisor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Finger injuries</td>
<td>• Crush injuries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Tag line</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cutting of pipe</td>
<td>Fire hazards</td>
<td>• Body injuries</td>
<td>• Clearing of combustible material</td>
<td>2</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Damage property</td>
<td>• H/W tools check</td>
<td>• PTW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Falling objects</td>
<td>Fracture / crush</td>
<td>Tool box meeting</td>
<td></td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>• Deny entry to unauthorised person</td>
<td>Workshop Engineer</td>
</tr>
<tr>
<td></td>
<td>Physical injuries</td>
<td>• Eye injuries</td>
<td>PPE</td>
<td></td>
<td>2</td>
<td>3</td>
<td>M</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Burnt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2. Risk Evaluation

<table>
<thead>
<tr>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2</td>
<td>H</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>M</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>L</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>M</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>M</td>
</tr>
</tbody>
</table>

### 3. Risk Control

<table>
<thead>
<tr>
<th>Action Officer, Designation (Follow-up date)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifting Supervisor</td>
</tr>
<tr>
<td>Lifting Supervisor</td>
</tr>
<tr>
<td>Workshop Engineer</td>
</tr>
<tr>
<td>No.</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
# Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task:</td>
<td>Installation of Sounding Pipe Inside Tank</td>
</tr>
<tr>
<td>Conducted by:</td>
<td>Table 2 Members</td>
</tr>
<tr>
<td>(Date):</td>
<td>31/08/06</td>
</tr>
<tr>
<td>Approved by:</td>
<td>31/08/06</td>
</tr>
<tr>
<td>Next Review Date:</td>
<td>30/08/09</td>
</tr>
</tbody>
</table>

## 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
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<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pre-inspection / marking</td>
<td>Asphyxiation</td>
<td>Faint, lack of oxygen, overcome by gas</td>
<td>• Valid entry permit • Portable gas detector (working condition, calibrated, competent user) • Buddy system • Dual Badge system • Highlighted in VSCC meeting</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>• Pre-inspection before entry by supervisor • Ensure badges displayed properly at entrance</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling / tripping hazards</td>
<td>Fatality due to falling</td>
<td>• Adapt 3 point contact while climbing ladder • Wear rubber boots</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>• Daily briefing • Ensure lighting installed properly (adequate)</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fire explosion</td>
<td>Fatal</td>
<td>Ony explosion proof lighting can be used</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Briefing to workers</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hit by objects</td>
<td>Injuries caused by falling objects, hit by structure</td>
<td>Proper PPE (safety helmet)</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Task Step</td>
<td>Hazard</td>
<td>Possible Accident / Ill Health &amp; Persons-at-Risk</td>
<td>Existing Risk Control (if any)</td>
<td>Severity</td>
<td>Likelihood</td>
<td>Risk Level</td>
<td>Additional Risk Control</td>
<td>Action Officer, Designation (Follow-up date)</td>
<td>Document for Reference</td>
</tr>
<tr>
<td>-----</td>
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<td>------------</td>
<td>-------------------------</td>
<td>---------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>2</td>
<td>Fabrication of pipe spool on deck</td>
<td>Fire explosion</td>
<td>Fatal accident</td>
<td>• Valid hot work permit • Qualified fire watch with working fire extinguisher / hose</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Pre-check by supervisor</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Pinch points</td>
<td>Hand / finger injuries</td>
<td>• Maintain communication among co-workers</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td>Pre-check</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sharp edge</td>
<td>Hand / finger injuries</td>
<td>• Leather gloves</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flying objects</td>
<td>Eye injuries</td>
<td>Eye protection (safety)</td>
<td>4</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Burns</td>
<td>Burnt injuries on hand</td>
<td>Long sleeve with leather glove/ foot protection</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tripping hazards</td>
<td>Sprain or bruises</td>
<td>Housekeeping, clear passageway</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>To cut pipe penetration on main deck</td>
<td>Fire explosion</td>
<td>Fatal accident</td>
<td>• Valid hot work permit • Qualified fire watch with working fire extinguisher / hose • Valid inspection tag</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Pre-check by supervisor</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling</td>
<td>Injury caused by falling</td>
<td>Standby watchman at tank bottom</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tripping hazards</td>
<td>Sprained ankle</td>
<td>Cover up the hole</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>-----------</td>
<td>--------</td>
<td>-----------------------------------------------</td>
<td>--------------------------</td>
<td>-------------------</td>
<td>----------------</td>
<td>-----------</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 4   | To weld double plate on tank bottom | Fire explosion | Fatal accident | • Valid hot work permit  
• Qualified fire watch with working fire extinguisher/hose  
• Valid inspection tag | Severity 5  
Likelihood 1  
Risk Level M | Pre-check by supervisor  
Additional Risk Control | Supervisor  
Action Officer, Designation (Follow-up date) |
| 4   | Asphyxiation | Faint, lack of oxygen, overcome by gas | • Valid entry permit  
• Portable gas detector (working condition, calibrated, competent user)  
• Buddy system  
• Dual badge system  
• Highlight in VSCC meeting | Severity 5  
Likelihood 1  
Risk Level M | • Pre-inspection before entry by supervisor  
• Ensure badges displayed properly at entrance | Pre-inspection  
additional risk control | Supervisor  
Action Officer, Designation (Follow-up date) |
| 4   | Electrical | Electrocution from exposed cables, damaged cable, wet clothes, condition | • Valid inspection tag  
• No damaged cable  
• Wear leather glove and boots  
• Condition dry (clothes dry) | Severity 5  
Likelihood 1  
Risk Level M | • Pre-check by holder  
• Supervisor conduct tool box meeting | Pre-check by holder  
additional risk control | Holder  
Action Officer, Designation (Follow-up date) |
| 5   | To lower pipe to tank | Struck by falling objects | Fatal injuries from falling objects | Maintain communication | Severity 5  
Likelihood 1  
Risk Level M | • Briefing to workers  
• Ensure co-workers can talk common language | Briefing to workers  
additional risk control | Supervisor  
Action Officer, Designation (Follow-up date) |
| 5   | Cuts | Finger injuries | • Leather gloves  
• Remove sharp edge | | | | |
| 6   | Install pipe (bottom to top) | Falling | Scaffold defect | • Valid OK Tag  
• No modification to scaffold | Severity 5  
Likelihood 1  
Risk Level M | Check on scaffold before use | Check on scaffold before use  
additional risk control | Supervisor  
Action Officer, Designation (Follow-up date) |
| 7   | Housekeeping | Falling | Injuries caused by falling objects | • Contain rubbish in rubbish bag  
• Secure all tools | | | |
## Risk Assessment Form

**Company:** Group 3

**Task:** Installation of drain line below helipad

**Conducted by:** Superintendent (31/08/06)

**Next Review Date:** 31/08/09

### 1. Hazard Identification

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<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
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</table>
| 1   | Scaffold erection | Falling from heights | Fatal injuries | • Erection only done by trained scaffold  
• Use of fall protection devices (harness, etc.) | 5 | 2 | H | Check thoroughly the scaffolding before assigning to workers | Supervisor of piping and Scaffolding Supervisor | Company’s SMS and work procedures |
| 2   | Collection and mobilisation of material’s from workshop include tools | Hand injuries and falling objects | Hand hit by falling materials | • Wearing hand glove and beware of pinch point  
• Ensure no over-loading and appropriate lifting gears | 2 | 4 | M | Pre-job briefing in morning | Piping Supervisor and Lifting Supervisor | Company’s SMS and work procedures |
| 3   | Lifting of spools using yard cranes | Caught in between | Hand injuries | • Wear hand gloves  
• Secure bundle of pipes properly  
• Beware of pinch point  
• Use proper lifting gears | 2 | 4 | M | • Competent and trained person to do rigging  
• Check and inspect belt condition (keep clear of lifting area) | Lifting Supervisor | Company’s SMS and work procedures |
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| 4   | Transfer the tools and spool to install. Location by chain blocks         | Falling                    | Injury from falling                               | • Selection of appropriate belts and chain blocks  
• Proper secure points of chain block  
• Ensure to wear body harness and hang on secure place | 4        | 3          | H          | Barricade the area and display no entry sign | Piping Supervisor                           | Company’s SMS and work procedures |
| 5   | Installation of pipe and pipe’s supports followed by welding             | Caught in between          | Finger injuries                                   | • Beware of pinch point  
• Wear gloves  
• Proper tools box to be used  
• Provide fire cloth  
• Ensure fire watch man | 3        | 2          | M          |                                                     | Piping Supervisor                           | Company’s SMS and work procedures |
| 6   | Removal of tools and left over materials and housekeeping               | Falling objects from height| Injuries caused by falling objects                | Immediately remove excess materials, tools and proper housekeeping | 2        | 2          | L          |                                                     | Piping Supervisor                           | Company’s SMS and work procedures |
### Risk Assessment Form

**Company:** Group 4  
**Task:** Installation of PVC Pipes in Accommodation Quarters  
**Conducted by:** Babu (Supervisor)  
(Date): 31/08/06  
**Approved by:** Leo (Section Manager)  
(Date): Piping 31/08/06  
**Next Review Date:** 31/08/09

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<tbody>
<tr>
<td>1</td>
<td>Identify the PVC pipe spool to be installed at the location</td>
<td>Slips, trips and falls</td>
<td>Sprain injury and bruises</td>
<td>Maintain good housekeeping</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Selection of proper tools and equipment</td>
<td>Flying objects</td>
<td>Finger and eye injuries</td>
<td>Tool inspected and in good condition</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
</tbody>
</table>
| 3   | Installation of pipe support | Fire | Burn injuries | • Firewatch man present  
• Fire protection  
• Fire cloth  
• Fire extinguisher | 3 | 2 | M | More frequent inspection | Supervisor Safety | |
| 4   | Laying of pipe | Falling objects | Hit by falling object | Follow safe work procedure | 2 | 2 | L | | | |
| 5   | Bonding of pipe | Chemical hazard | Skin irritation | • Proper PPE  
• MSDS | 2 | 2 | L | | | |
| 6   | Clamping of PVC pipe | Caught in between | Finger injuries | Use the correct tool | 2 | 1 | L | | | |
## Risk Assessment Form

**Company:** Group 6  
**Conducted by:**  
(31/08/2006)

**Task:** Removal and Replacement of Portable Hot Water Pipes in Accommodation Quarters

**Approved by:**  
(31/08/2006)

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</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove ceiling panel for access</td>
<td>Falling objects</td>
<td>Hit by objects</td>
<td>Cordon off</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Working at height</td>
<td>Body injuries</td>
<td>Proper platform</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contact with insulation</td>
<td>Skin irritation</td>
<td>Protective clothing</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Remove pipe insulation</td>
<td>Falling objects</td>
<td>Hit by object</td>
<td>Cordon off</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Working at height</td>
<td>Body injury</td>
<td>Proper platform</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contact with insulation</td>
<td>Skin irritation</td>
<td>Protective clothing</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 3   | Dismantle bolt – nut and clamp | Contact with hot water | Burns | • Shut off system  
• Drain the system | 3 | 1 | L | Close supervision | Immediate Supervisor |  |
|     |          | Strike by hammer | Finger injuries | • Use proper tools  
• Use chisel with cap  
• Hand gloves  
• Adequate lighting | 3 | 3 | M |  |  |  |
| 4   | Shift out pipe | Caught in between | Finger injuries | • Use hand gloves  
• Use mechanical handling of pipe | 2 | 2 | L |  |  |  |
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<tr>
<td>5</td>
<td>Transport to workshop</td>
<td>Forklift operation</td>
<td>Struck by moving vehicle</td>
<td>• Qualified operator • Forklift checklist • Observe speed limit</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Periodic safety induction by forklift supervisor</td>
<td>Safety Section</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loose material</td>
<td>Object falling from forklift</td>
<td>Secure object by web sling</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Fabricate pipe in workshop</td>
<td>Hot work</td>
<td>Fire</td>
<td>• PTW System • Valid hot work tools</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrocution</td>
<td>Burns</td>
<td>• Proper insulation of electrical tools • Ensure body not wet</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flying particles</td>
<td>Eye injuries</td>
<td>Wear proper eye protection</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Radiation</td>
<td>Arc eye</td>
<td>Wear proper eye protection</td>
<td>2</td>
<td>2</td>
<td>L</td>
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<tr>
<td></td>
<td></td>
<td>Struck by objects</td>
<td>Finger injuries</td>
<td>• Proper tools • Hand gloves</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>7</td>
<td>Transport back the pipe to ship</td>
<td>Forklift operation</td>
<td>Struck by moving vehicle</td>
<td>• Qualified operator • Forklift checklist • Observe speed limit</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Loose material</td>
<td>Object falling from forklift</td>
<td>Secure object by web sling</td>
<td>4</td>
<td>2</td>
<td>M</td>
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</tr>
<tr>
<td>8</td>
<td>Box up pipe</td>
<td>Contact with hot water</td>
<td>Burn</td>
<td>• Shut off system • Drain the system</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Struck by hammer</td>
<td>Finger injuries</td>
<td>• Use proper tools • Use chisel with cap • Hand gloves • Adequate lighting</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>System test</td>
<td>Slips, trips and falls</td>
<td>Body injuries</td>
<td>• Cordon off • House keeping • Warning sign</td>
<td>2</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Box up insulation</td>
<td>Falling objects</td>
<td>Hit by object</td>
<td>Cordon off</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling from height</td>
<td>Body injuries</td>
<td>Proper platform</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contact with insulation</td>
<td>Skin irritation</td>
<td>Protective clothing</td>
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</tr>
<tr>
<td>1</td>
<td>Removal of insulation from existing pipes</td>
<td>Falling</td>
<td>• Falling from height&lt;br&gt;• Falling objects</td>
<td>• Highlighted in VSCC meeting&lt;br&gt;• Certified working platform (OK tag)&lt;br&gt;• Do no keep any loose materials on scaffolds</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td>Proper supervision and monitoring of workers throughout</td>
<td>Piping Supervisor - Contracts Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health</td>
<td>Inhalation of fibre particles</td>
<td>• Proper briefing to employees on the activity&lt;br&gt;• Provision of PPE</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td>Proper supervision and monitoring of workers throughout</td>
<td>Piping Supervisor - Contracts Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Proper securing of pipe</td>
<td>Falling</td>
<td>Falling from heights</td>
<td>• Using of certified lifting gears&lt;br&gt;• Liaise with vessel's C/E to ensure the strength of securing point</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td>Close monitoring and supervision of work force</td>
<td>Piping Supervisor - Contracts Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Caught in between</td>
<td>Hand / finger injuries</td>
<td>PPE</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td>Close monitoring and supervision of work force</td>
<td>Piping Supervisor - Contracts Supervisor</td>
<td></td>
<td></td>
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| 3   | Removal of bolt and nuts (cold works) | Falling | Falling from height | • Using proper tools  
• and equipments  
• Safe work platform  
• Highlighted in VSCE | 4  
1 | M | Close monitoring and supervision of workforce | | | |
|     | Struck against objects | Hand / finger injuries | • PPE  
• Proper tools | 4  
1 | M | Close monitoring and supervision of workforce | | | |
| 4   | Shifting and lifting of pipes from engine room | Falling Injuries | • Falling from height  
• Falling objects | • Certified lifting gears  
• Deployment of qualified riggers and signalmen | 4  
1 | M | Close monitoring and supervision of workforce | Piping Supervisor, Contracts Supervisor | | |
|     | Caught in between | Hand / finger injuries | • Proper briefing to workers on the activity  
• Provision of PPE | 4  
1 | M | Close monitoring and supervision of workforce | Piping Supervisor, Contracts Supervisor | | |
## Risk Assessment Form

**Company:** Group 9 Marine Piping Specialists

**Task:** Repair of Pipe Joint that Failed Radiography Test (Workshop – 4” XS)

**Conducted by:** KM Chua

**Approved by:** 31/08/06

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| 1   | Gouge out weldment | Fire | Fire                                            | • Permit-to-work system  
• Provision of fire extinguishing tools / fire | 3   | 3          | M          | Clear work area of combustible material | Supervisor                                      |                        |
|     |           | Electrical | Electrical eye (worker) | PPE                                      | 2   | 3          | M          | Morning pre-job briefing | Supervisor                                      |                        |
|     |           | Radiation | Radiation                                       | Permit-to-work system            | 3   | 3          | M          | Constant reminder and enforcement of safety | Supervisor                                      |                        |
| 2   | Edge preparation - levelling | Flying sparks | Flying sparks                                    | Permit-to-work system | 3   | 3          | M          | Constant reminder and enforcement of safety | Supervisor                                      |                        |
|     |           | Struck by objects | Struck by objects                               | PPE, such as face shield, hand glove glass | 3   | 2          | M          | Constant reminder and enforcement of safety | Supervisor                                      |                        |
| 4   | Fit and joint realignment | Caught in | Finger injuries                                 | • Use the correct tools  
• Use of PPE (safety gloves) | 2   | 3          | M          | Morning pre-job briefing | Supervisor                                      |                        |
|     |           | Strike by flying particles | Strike by flying particles                       | • Permit-to-work  
• Provision of fire extinguisher/prefrenton system | 3   | 3          | M          | Clear work area of combustible material | Supervisor                                      |                        |
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<tbody>
<tr>
<td>5</td>
<td>Pre-heating using heating torch</td>
<td>Fire</td>
<td>Burnt injuries on hand</td>
<td>• Use of PPE • Provision of ample space for heating</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>• Barricade • Signboard informing passers-by</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
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</table>
| 6   | Welding                    | Struck by flying particles | Fire                                               | • Use of proper PPE  
  a) Welding masks  
  b) Welding gloves  
  c) Proper ventilation  
  d) Permit-to-work system | 3        | 3          | M          | • Signboard informing passers-by  
  • Barricade covered with firecloth | Supervisor                   |                        |
|     |                            |                   |                                                   |                                |          |            |            |                                       |                              |                        |
|     | Electrical                 | Electrocution     | Periodic checking of electrical tools              | 5                                | 1        |            | M          |                                       | Supervisor                   |                        |
|     | Radiation                  | Arc Eye           | Use of proper PPE  
  - Welding shield                                      | 2                                | 3        |            | M          | Remind in the morning pre-job briefing | Supervisor                   |                        |
|     | Metal fume                 | Metal fever       | Use of proper PPE  
  - Welding                                             | 3                                | 2        |            | M          | Use forced ventilation                 | Supervisor                   |                        |
| 7   | Surface - Power Brushing   | Struck by flying particles | Fire (worker)                                      | Use of proper PPE  
  - Dust mask  
  - Face shield  
  - Supervisor                                    | 3                                | 3        |            | M          | • Signboard informing passers-by  
  • Barricade covered with firecloth             | Supervisor                   |                        |
<p>|     | Dust                       | Dust inhalation   | Use of proper PPE                                 | 3                                | 3        |            | M          | Remind in the morning pre-job briefing | Supervisor                   |                        |</p>
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<tbody>
<tr>
<td>2</td>
<td>Dismantling of pipes in sequence</td>
<td>Struck by objects</td>
<td>Finger injuries</td>
<td>Correct tools and work procedure</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Morning pre-job briefing</td>
<td>Supervisor / Foreman</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling hazards</td>
<td>Body injuries</td>
<td>Proper work platform</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Morning pre-job briefing</td>
<td>Supervisor / Foreman</td>
<td>Nil</td>
</tr>
<tr>
<td>3</td>
<td>Transportation of pipes from main deck to the quay side by the shore crane</td>
<td>Struck by falling objects</td>
<td>Injuries caused by falling objects</td>
<td>• Use tag line</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Inform worker to clear off from the suspended load</td>
<td>Lifting Supervisor / Foreman</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Qualified signalmen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Proper lashing / rigging</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Validity of lifting belts, SWL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Transport pipes from quay side to workshop</td>
<td>Toppling of pipes from forklift</td>
<td>Injuries caused by toppling pipes</td>
<td>• Proper lashing of the pipes</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td>Pre-check by supervisor</td>
<td>Forklift Driver / Supervisor / Foreman</td>
<td>Checklist for the forklift</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Qualified forklift driver</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Collect back the newly fabricated pipe from workshop</td>
<td>Falling objects hazards</td>
<td>Injuries caused by falling objects</td>
<td>• Use tag line</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Inform worker to clear off from the suspended load</td>
<td>Lifting Supervisor / Foreman</td>
<td>Nil</td>
</tr>
<tr>
<td>No.</td>
<td>Task Step</td>
<td>Hazard</td>
<td>Possible Accident / Ill Health &amp; Persons-at-Risk</td>
<td>Existing Risk Control (if any)</td>
<td>Severity</td>
<td>Likelihood</td>
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<td>Additional Risk Control</td>
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<td>-----------------------------------------------</td>
<td>------------------------</td>
</tr>
</tbody>
</table>
| 6   | Transport the pipes from quayside to on board | Falling objects | Injuries caused by falling objects | • Use tag line  
• Qualified signalmen  
• Proper lashing  
• Validity of lifting belts, SWL | 3 | 2 | M | Inform worker to clear off from the suspended load | Lifting Supervisor / Foreman | Nil |
| 7   | To install back the pipe in position | Caught in between | Finger injuries | Use correct tools | 2 | 3 | M | Morning briefing | Supervisor / Foreman | Nil |
|     |           | Falling hazard | Body bruises |                       |       |           |            |                        |                                | Nil |
| 8   | Line check by visual inspection | • Chemical  
• Physical  
• Tripping | Leg sprains, falls | Conduct check tightening of bolt and rink | 2 | 1 | L | Nil | Supervisor / Foreman | Nil |
| 9   | Return the permit to safety | Remove permit before completing the job | Nil | Ensure permit expiry | 3 | 1 | L | Nil | Supervisor / Foreman | Nil |
## Risk Assessment Form

### Company:
Group 11

### Task:
Hydrotest of Hydraulic Lines at 3000psi Pipe Renewal Main deck

### Conducted by:
(Date) 31/08/06

### Approved by:
(Date)

### Next Review Date:

---

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equipment preparation</td>
<td>Caught between</td>
<td>Finger injuries</td>
<td>• LOTO system info c/e VSCC meeting (permit-to-work)</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Store the equipment near the work site</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• PPE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Certified testing equipment</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Briefing of hydroblasting to worker</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>Transport from store to berth by lorry</td>
<td>Falling objects</td>
<td>Injuries caused by falling objects</td>
<td>• Use pallet or container</td>
<td>5</td>
<td>2</td>
<td>H</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Secure properly</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Qualified driver</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>Road accident</td>
<td>Hit by forklift</td>
<td>Follow speed limit</td>
<td>5</td>
<td>2</td>
<td>H</td>
<td>Designate walkways in the yard</td>
<td>Yard Manager</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lifting by shore crane</td>
<td>Caught in between</td>
<td>Hand / finger injuries</td>
<td>• Follow lifting procedure</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Pre-lifting briefing and checks</td>
<td>Lifting Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Use proper tools</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling objects</td>
<td>Injuries caused by falling objects</td>
<td>• Qualified crane operator / lifters</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Pre-lifting briefing and checks</td>
<td>Lifting Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Barricade the area affected</td>
<td></td>
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</tr>
<tr>
<td>No.</td>
<td>Task Step</td>
<td>Hazard</td>
<td>Possible Accident / Ill Health &amp; Persons-at-Risk</td>
<td>Existing Risk Control (if any)</td>
<td>Severity</td>
<td>Likelihood</td>
<td>Risk Level</td>
<td>Additional Risk Control</td>
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<td>Document for Reference</td>
</tr>
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</tr>
<tr>
<td>4</td>
<td>Set up the testing equipment</td>
<td>Caught in between Finger injuries</td>
<td>Proper tools and PPE</td>
<td>2</td>
<td>1</td>
<td>L</td>
<td></td>
<td>Pre-lifting briefing and checks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical hazard Electrocution</td>
<td>• Lockout/tagout • Safety signboards (&quot;High Pressure Testing in progress&quot;)</td>
<td>1</td>
<td>5</td>
<td>M</td>
<td></td>
<td>Pre-job briefing and checks</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dismantling of existing hydraulic pipe</td>
<td>Oil spillage Injury due to fall on slippery grounds</td>
<td>• To follow safe work procedure • Oil collect container • Oil absorbent sheet</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td>• Firewatch man • Immediate</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fire hazard Fire</td>
<td>Permit-to-work</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Strike by objects Finger injuries</td>
<td>Proper tools</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Blanking of pipe ends and hook up to pump</td>
<td>Caught in between Finger injuries</td>
<td>To follow safe work procedure in blanking of pipes</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oil spill Injury from slipping</td>
<td>• Oil collect container • Oil absorbent sheet</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Task Step</td>
<td>Hazard</td>
<td>Possible Accident / Ill Health &amp; Persons-at-Risk</td>
<td>Existing Risk Control (if any)</td>
<td>Severity</td>
<td>Likelihood</td>
<td>Risk Level</td>
<td>Additional Risk Control</td>
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</tr>
<tr>
<td>7</td>
<td>Filing the water of hydro test pipe line (150psi)</td>
<td>Overfill</td>
<td>Eye injuries during leak</td>
<td>• Signboard</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Check pressure in the pipe</td>
<td></td>
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</tr>
<tr>
<td>8</td>
<td>Checking of increasing of hydrotest (750psi)</td>
<td>Leakage at the joint pipe</td>
<td>Eye injuries during leak</td>
<td>• Signboard</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Check joints for leakage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Increasing pressure slowly from 750 to 3000psi</td>
<td>• Pipe burst • Flooding</td>
<td>Body injuries</td>
<td>Checking on 2500psi</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>• Check pressure in the pipe • Check joints</td>
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<tr>
<td>10</td>
<td>Release pressure slowly</td>
<td>High pressure water</td>
<td>Body injuries</td>
<td>Follow safe working procedure</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Dismantling of the testing connections</td>
<td>Strike by objects</td>
<td>Hand / finger injuries</td>
<td>• Follow safe working procedure • PPE</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Housekeeping of the testing area</td>
<td>Strike by objects</td>
<td>Finger injuries</td>
<td>PPE</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 6. RA Templates: Steelwork

### Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Group 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task:</td>
<td>Renewal of Pump Room Bulkhead</td>
</tr>
<tr>
<td>Conducted by:</td>
<td>Group 1</td>
</tr>
<tr>
<td>Approved by:</td>
<td>21/06/2006</td>
</tr>
<tr>
<td>Next Review Date:</td>
<td>21/06/2009</td>
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</tbody>
</table>

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
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<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
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</tr>
</thead>
</table>
| 1 | Entry into confined space (pump room and cargo tank) | Lack of oxygen | Asphyxiation | • Entry permit approval  
• Gas check  
• Portable gas detector | 5 | 1 | M |  |  |  |
| | | Lack of lighting | Body injuries | • Provide lighting at tank entry and along passageway | 3 | 1 | L |  |  |  |
| | | Gas leak | Unconscious | Portable gas detector | 5 | 1 | M |  |  |  |
| | | Tripping and falling | Body injuries | • Barricade of opening  
• Ensure passageway clear of obstruction | 3 | 1 | L |  |  |  |
| 2 | Cut deck access opening | Fire and explosion | Body injuries | • Valid hot work permit  
• Barricade of opening (hard barricade) | 5 | 2 | H | Double check hot work area before start work | Supervisor in-charge / Safety Officer |  |
| | | Falling | Body injuries | • Barricade in cargo tank  
• Weld support on 4 side | 3 | 1 | L |  |  |  |
| 3 | Lifting of plate | Falling object | Body injuries | • Qualify rigger  
• Inspection of valid and good condition of lifting gear | 5 | 1 | M | To check lifting gear before lifting | Supervisor in-charge |  |
| | | Caught in between | Body injuries | • Wear leather gloves  
• Maintain communication | 4 | 2 | M |  |  |  |
## Risk Assessment Form

### 1. Hazard Identification

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<thead>
<tr>
<th>No.</th>
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</thead>
<tbody>
<tr>
<td>4</td>
<td>Cutting of damage bulkhead</td>
<td>Fire explosion</td>
<td>Body injuries</td>
<td>• Valid hot work permit • Barricade of hot work area</td>
<td>5</td>
<td>2</td>
<td>H</td>
<td>To check combustible matter around hot work area</td>
<td>Supervisor in-charge</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling</td>
<td>Body injuries</td>
<td>• OK tag for staging • Weld eye piece to bulkhead • Lifting gear to be tested and in working condition</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Dye check on dye tag before lifting operation</td>
<td>Supervisor in-charge</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Removal of cut steel plate to shore</td>
<td>Falling</td>
<td>Body injuries</td>
<td>• Qualified rigger • Lifting Supervisor • Valid lifting gear and in good working condition</td>
<td>3</td>
<td>1</td>
<td>M</td>
<td>Barricade affected lifting area</td>
<td>Supervisor in-charge</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Caught in between</td>
<td>Body injuries</td>
<td>• Wear glove • Used tag line • Keep people away from lifting area</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Lifting of new plate from shore to cargo hold</td>
<td>Falling</td>
<td>Body injuries</td>
<td>• Qualified rigger • Lifting supervisor • Valid lifting gear and in good working condition</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Barricade affected lifting area</td>
<td>Supervisor in-charge</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Caught in between</td>
<td>Body injuries</td>
<td>• Wear glove • Used tag line • Keep people away from lifting area</td>
<td>4</td>
<td>1</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fitting and welding of bulkhead</td>
<td>Fire and explosion</td>
<td>Body injuries</td>
<td>• Valid hot work permit • Barricade of opening (hard barricade)</td>
<td>5</td>
<td>2</td>
<td>H</td>
<td>Double check hot work area before starting work</td>
<td>Supervisor in-charge / Safety Officer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling</td>
<td>Body injuries</td>
<td>• Barricade in cargo tank • Weld support on 4 side</td>
<td>3</td>
<td>1</td>
<td>L</td>
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### Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Marine Pacific</th>
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</thead>
<tbody>
<tr>
<td>Task:</td>
<td>Shellplate Renewal in No. 6 C.O.T</td>
</tr>
<tr>
<td>Conducted by:</td>
<td>Foreman/ Supervisor (19/06/2006)</td>
</tr>
<tr>
<td>Approved by:</td>
<td>Hull Section Manager (21/06/2006)</td>
</tr>
<tr>
<td>Next Review Date:</td>
<td>20/06/2009</td>
</tr>
</tbody>
</table>

#### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Steelwork • Marking • Cutting • Fitting • Welding • Grinding • Lifting</td>
<td>Fire explosion</td>
<td>Body injuries</td>
<td>• Qualified personnel to do work • Hot work tools must be checked and tested</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Barricade the area (both in and out of tank)</td>
<td>Hull Supervisor / Lifting Supervisor / Safety Officer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling object</td>
<td>Body injuries</td>
<td>Lifting gears must be checked and tested</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>Testing/ NDT (Vacuum test, X-ray visual)</td>
<td>Falling</td>
<td>Body injuries</td>
<td>• Apply permit • Barricade the area</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Hose burst</td>
<td>Body injuries</td>
<td>Use whip arrester</td>
<td>4</td>
<td>2</td>
<td>M</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>Radiation</td>
<td>Body injuries</td>
<td>• Barricade affected areas • Install blinkers and prominent signs</td>
<td>5</td>
<td>1</td>
<td>M</td>
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## Risk Assessment Form

**Company:** Group 3

**Task:** Renewal of Tank Top Plates

**Conducted by:** (Date)

**Approved by:** (Date)

**Next Review Date:**

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
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</tr>
</thead>
</table>
| 1   | Crop out damaged plate | Fire / explosion | Asphyxiation | • Fire watch  
• Valid hot work tools  
• Good ventilation  
• General lighting | 5  | 1  | M | Additional access to be provided | Production Supervisor / Hull Supervisor / Contractor Supervisor | |
|     |           | Smoke and fumes | Burns (sparks) | Remove combustible materials | 3  | 2  | M |  |
| 2   | Lift out old plate to lift in new plate | Falling object | Body injuries | • Trained signal and rigging man  
• Presence of lifting supervisor  
• Cordon off affected area  
• Tag line | 5  | 1  | M | Additional marshals to clear off the area | Lifting Supervisor / Contractor Supervisor | |
| 3   | Fit new plate | Struck by object | Body injuries | • Trained rigging and signalman  
• Lifting gear in good condition  
• Presence of lifting supervisor  
• Cordon off affected area | 4  | 2  | M | Provide the right fitters, do not crowd around work area | Production Supervisor / Hull Supervisor / Contractor Supervisor | |
<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
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<th>Severity</th>
<th>Likelihood</th>
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</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Welding of new plate</td>
<td>Fire / fumes</td>
<td>• Asphyxiation • Burns</td>
<td>• Strong ventilation • Good condition of tool • Fire watch • Eyes protection</td>
<td>1</td>
<td>2</td>
<td>L</td>
<td>• Visual checks on welding tools before commencement • Good ventilation in tank • Ensure good housekeeping / cleaning</td>
<td>Site Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electric shock</td>
<td>• Hand gloves • Good earthing for welding set</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Visual checks on welding tools before commencement</td>
<td>Site Supervisor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Gouging</td>
<td>Fire / fumes</td>
<td>• Asphyxiation • Burns</td>
<td>• Ventilation • Filter mask to wear • Hand gloves</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>• Good ventilation in tank • Ensure good housekeeping / cleaning</td>
<td>Site Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excessive noise</td>
<td>Noise induced deafness</td>
<td>Ear plugs</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>• Check on workers • PPE (ear plugs)</td>
<td>Site Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Noise</td>
<td>Noise induced deafness</td>
<td>Ear plugs</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>• Check on workers • PPE (ear plugs)</td>
<td>Site Supervisor</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Grinding</td>
<td>Flying sparks</td>
<td>Body injuries</td>
<td>• Safety glasses • Dust masks • Face shield • Grinder protective</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>• Good ventilation in tank • Ensure good housekeeping / cleaning</td>
<td>Site Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
# Risk Assessment Form

**Company:** Group 5  
**Conducted by:** XYZ  
**Approved by:** ABC  
**Next Review Date:** 21/06/2009

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove platform (portable)</td>
<td>Material handling</td>
<td>Body injuries</td>
<td>Barricade</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Install signboard</td>
<td>Hull Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tripping</td>
<td>Body injuries</td>
<td>Barricade</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Friction floor mat</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 2   | Cleaning E/R bottom | Fire and explosion | Body injuries | • PPE  
• No hot work at surrounding vicinity | 2 | 2 | L | |
|     | Falling / tripping | Body injuries | • Barricade  
• Good safety shoe (sole) | 2 | 2 | L | |
| 3   | Cutting, fitting and welding of platform support | Fire and explosion / fumes | Body injuries | • Valid hot work permit  
• Firewatch  
• Fire clothes / lines  
• Ventilation / lighting | 5 | 1 | M | |
|     | Material handling | Body injuries | • Tag lines  
• Hand gloves | 4 | 2 | M | |
|     | Falling / tripping | Body injuries | • Barricade  
• Signboard | 4 | 2 | M | |
| 4   | Lifting and cut off support and platform and lifting new platform | Falling object | Body injuries | • Qualified signalman  
• Lifting gears checked  
• Use guide ropes  
• Keep clear from path | 5 | 1 | M | Cordon off affected area | Supervisor | |
| 5   | Install new platform (change plate) | Material handling | Body injuries | • Tag line  
• Barricade | 2 | 3 | M | |
|     | Tripping / falling | Body injuries | Barricade | 4 | 2 | M | |
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Pre-job inspection and marking</td>
<td>Lack of oxygen</td>
<td>Asphyxiation</td>
<td>Ventilation and lighting</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Toxic gas</td>
<td>Overcome by gas</td>
<td>Gas meter</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gas checking periodically</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>Preparation for hot work</td>
<td>Defective tools</td>
<td>Fire exposure by gas leak and oxygen enrichment explosion</td>
<td>Periodical checking of cutting tools (2 weeks) and welding tools (30 days)</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Elevation of gas hoses and separation of hoses / cables</td>
<td>Trade Supervisor</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Lifting tools</td>
<td>Body injuries</td>
<td>Use valid lifting tools</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fitting, welding and grinding off new plate</td>
<td>Fire and explosion</td>
<td>Burn to person</td>
<td>PTW system</td>
<td>5</td>
<td>2</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Finger and hand caught in between</td>
<td>Hand / finger injuries</td>
<td>Hand glove</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling from height</td>
<td>Multiple injuries</td>
<td>Body harness</td>
<td>5</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Valid scaffold tag (OK tag)</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Proper accessing to location</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4</td>
<td>Vacuum test</td>
<td>Falling from height</td>
<td>Multiple injuries</td>
<td>PPE (ear plug)</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ensure tools in good working condition</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
### Risk Assessment Form

- **Company:** Group 7
- **Task:** Renew BHD IWO Pump Room
- **Conducted by:** Group 7
- **Approved by:** Section Manager (21/6/2006)
- **Next Review Date:** 21/6/2009

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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove insulation</td>
<td>Contact with hazardous substance</td>
<td>• Skin irritation • Asbestosis</td>
<td>• Sample test for asbestos • If asbestos, engage approved contractors • Respiratory protection</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Cordon - off area</td>
<td>Hull supervisor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cutting of existing BHD</td>
<td>Fire</td>
<td>• Damaging of equipments • Injury caused by fire</td>
<td>• Permit-to-work • Provide firecloth to protect equipment • Fire watch men</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Additional fire watch men with radio</td>
<td>Hull Supervisor</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Removal of scraps</td>
<td>Falling materials</td>
<td>Body injuries</td>
<td>PPE (handgloves)</td>
<td>2</td>
<td>2</td>
<td>M</td>
<td>Refer to SWP</td>
<td>Hull Supervisor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Transportation of new BHD to site</td>
<td>Falling materials</td>
<td>Body injuries • Property damage</td>
<td>• Certified lifting equipment (color coded) • Trained lifting supervisor / signalmen</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>• Cordon off area when lifting in progress • Alert men working nearby</td>
<td>Lifting Supervisor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Installation</td>
<td>Falling materials</td>
<td>Body injuries</td>
<td>Certified lifting equipment</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Cordon off area</td>
<td>Hull Supervisor</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Welding / grinding</td>
<td>Fire</td>
<td>• Eye injuries • Body injuries • Property damage</td>
<td>• PPE (head shield, goggles) • Hot work permit • Fire watchmen</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td>Housekeeping</td>
<td>Hull Supervisor</td>
</tr>
</tbody>
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<tbody>
<tr>
<td>1</td>
<td>Check or mark hot work area</td>
<td>Falling</td>
<td>Minor injuries / sprain</td>
<td>• Safe staging with checklist • Wear safety belt • Provide ventilation</td>
<td>2</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overcome by CO₂</td>
<td>May become unconscious</td>
<td>Gas check</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contact with hot surface</td>
<td>Burn injuries</td>
<td>Wear hand gloves</td>
<td>2</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Prepare - hot work / lifting / hand tools</td>
<td>Trip or fall</td>
<td>Body injuries / sprain</td>
<td>• Good housekeeping • Safe staging with checklist</td>
<td>2</td>
<td>1</td>
<td>L</td>
<td></td>
<td>Tool box briefing</td>
<td>Supervisor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Caught in between</td>
<td>Finger injuries</td>
<td>• Safe manual handling • Wear leather gloves</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cut and remove the plate as marked</td>
<td>Fire</td>
<td>Body injuries</td>
<td>Hot work permit</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td>Cordon off area</td>
<td>Supervisor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fall</td>
<td>Body injuries</td>
<td>Safe staging</td>
<td>2</td>
<td>1</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hit by</td>
<td>Body injuries</td>
<td>Use hand gloves</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
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</tr>
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<tbody>
<tr>
<td>4</td>
<td>Install / fit the plate</td>
<td>Handling hazard</td>
<td>Major injuries</td>
<td>• Safe lifting equipment • PPE (gloves)</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Cordon off area</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Falling object</td>
<td>Body injuries</td>
<td></td>
<td>Put all tools in toolbox</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>Clear the area or ensure good housekeeping</td>
<td>Caught in between</td>
<td>Body injuries</td>
<td>• Correct manual lifting • PPE (gloves)</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flying particles</td>
<td>Minor injuries</td>
<td></td>
<td>PPE (safety goggles)</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
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</tr>
<tr>
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</tr>
<tr>
<td>1</td>
<td>Inspection and marking</td>
<td>Falling from height</td>
<td>Body injuries</td>
<td>Body harness</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Strong and proper anchoring points</td>
<td>Steelwork Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling objects</td>
<td>Body injuries</td>
<td>Tool container</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Gas cutting</td>
<td>Fire and explosion</td>
<td>Body injuries</td>
<td>Permit-to-work system</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Fibre-cloth to contain straying sparks</td>
<td>Steelwork Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Property damage</td>
<td>Check tools required</td>
<td></td>
<td></td>
<td></td>
<td>Fire extinguisher</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td>Tool container</td>
<td>Tool container</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Firewatchman</td>
<td>Firewatchman</td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>Removal of existing plate and lifting of new plate</td>
<td>Falling from height</td>
<td>Body injuries</td>
<td>Anchor to a secure point</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Cordon off area and signboards</td>
<td>Steelwork Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling objects</td>
<td>Body injuries</td>
<td>Qualified signalman</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Steelwork Supervisor / Lifting Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Check lifting appliances</td>
<td>Check lifting appliances</td>
<td></td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>4</td>
<td>Fit-up of new plate</td>
<td>Falling from height</td>
<td>Body injuries</td>
<td>Body harness</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Cordon off area and signboards</td>
<td>Steelwork Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling objects</td>
<td>Body injuries</td>
<td>Contain small items e.g. weges, dog piece</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>No.</td>
<td>Task Step</td>
<td>Hazard</td>
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</tr>
<tr>
<td>5</td>
<td>Welding, gouging and grinding</td>
<td>Toxic fumes</td>
<td>Long term sickness</td>
<td>Good ventilation</td>
<td>3</td>
<td>4</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Noise</td>
<td>Deafness</td>
<td>Use of ear plugs / muffins</td>
<td>3</td>
<td>4</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eye injury</td>
<td>Loss of eyesight</td>
<td>Use of eye protection (goggles)</td>
<td>3</td>
<td>4</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|     |                         | Electrocution           | Death                                             | • Proper insulation of welding, gouging, grinding tools  
• Use 110V of electrical tools  
• Check on ELCB and LVSP for electrical box and welding set (AC) | 5        | 1          | M          |                          |                                 |                        |
| 8   | Close back access       | Fire explosion          | Refer to task Step 02                             |                                | 5        | 2          | H          | Double check hot work area before work starts | Supervisor in-charge                  |                        |
|     |                         | Falling                 |                                                  |                                | 3        | 1          | L          |                          |                                 |                        |
# Risk Assessment Form

**Company:** Group 10  
**Task:** Partial Renewal of Aft Bulkhead at Fr. 174  
**Conducted by:** Group 10  
**Approved by:** 21/06/2006  
**Next Review Date:** 20/06/2009

## 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inspection of work and mark out with owner</td>
<td>Lack of oxygen</td>
<td>Suffocation</td>
<td>Permit-to-work system, Entry permit, Gas check, Ventilation, Lighting, Personal gas meter</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Buddy system</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling hazard</td>
<td>Body injuries</td>
<td>Good lighting, Good housekeeping</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Individual torchlight</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cutting / welding upper deck plate</td>
<td>Fire</td>
<td>Body injuries</td>
<td>Valid hot work permit, Fire watch</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Cordon off area</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lifting of upper deck plates</td>
<td>Object falling from height</td>
<td>Body injuries</td>
<td>Only trained signalman / rigger are allowed to do lifting, No one should be under the load, Check lifting equipment (expiry)</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Barricade area (cordoned off)</td>
<td>Lifting Supervisor</td>
<td></td>
</tr>
<tr>
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<td>-----------------------</td>
</tr>
<tr>
<td>4</td>
<td>Grinding of work pieces</td>
<td>Flying object</td>
<td>Finger and eye injuries</td>
<td>• Wear shield</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Good lighting</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Grinder disc guard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Welding of new plate</td>
<td>Fire</td>
<td>Body injuries</td>
<td>• Valid hot work permit</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Place of work free from combustible materials</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Good and valid welding equipment (cables, holder)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrocution</td>
<td>Body injuries</td>
<td>Good and valid welding equipment (cables, holder)</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Place of work is dry</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Housekeeping</td>
<td>Tripping and falling</td>
<td>Hand / finger injuries</td>
<td>Use proper equipment</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Group 11</th>
</tr>
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<tbody>
<tr>
<td>Task:</td>
<td>Renewal of Bosun Store and Chain Locker Plating</td>
</tr>
<tr>
<td>Conducted by:</td>
<td>Lim Teck Song (21/06/2006)</td>
</tr>
<tr>
<td>Approved by:</td>
<td>ASMI</td>
</tr>
<tr>
<td>(Date)</td>
<td>Next Review Date: 21/06/2009</td>
</tr>
</tbody>
</table>

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</thead>
<tbody>
<tr>
<td>1</td>
<td>Cut and install access openings (main deck and bosun store deck)</td>
<td>Fire / explosion</td>
<td>Body injuries</td>
<td>• Validity of entry permit and hot work permit • Firewatch and firelines • VSSC meeting</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td>Hull Supervisor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Removal of plating and installation of new plating</td>
<td>Falling objects</td>
<td>Body injuries</td>
<td>• No loose object on scaffolding • Provide barricade (scaffold)</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Hull Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling objects</td>
<td>Injury, death and damaged vessel property</td>
<td>• Qualify signalman and riggers • Validity of lifting gears • Tagline to secure • PPE</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td>Hull Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
## 7. RA Templates: Tank Cleaning

### Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Group 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task:</td>
<td>Pump Room Cleaning (Bottom) in Dry Dock</td>
</tr>
<tr>
<td>Conducted by:</td>
<td>(Date) 10/5/2006</td>
</tr>
<tr>
<td>Approved by:</td>
<td>(Date)</td>
</tr>
<tr>
<td>Next Review Date:</td>
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</thead>
</table>
| 1   | Pre-inspection by supervisor | Miscommunication | Invalid permit application | • Highlight in VSCC meeting  
• Ensure valid PTW tank entry | 1 | 1 | L | | | |
|     | Lack of oxygen | Asphyxiation | Sufficient ventilation  
• Equip with portable gas detector (working condition) | 5 | 1 | M | • 3 point contact  
• Buddy system | Immediate Supervisor | |
|     | Slip and fall | Body injuries | Sufficient lighting  
• Ensure carrying torchlight  
• Barricading  
• PPE (safety boot) and hand glove | 3 | 2 | M | | | |
|     | Falling of person | Body injuries | | | | | | | | |
|     | Lack of illumination | Body injuries | | | | | | | | |
| 2   | Preparation of material for cleaning and manpower | Falling object | Body injuries | Valid / tested lifting equipment  
• Qualified rigger and signaler  
• Barricade falling zone | 4 | 2 | M | Nil | Nil | |
|     | Electroctution | Fatality | Ensure electrical equipment in good condition | 5 | 1 | M | Nil | Nil | |
|     | Ergonomic manual handling | Back injuries | Adequate people for jobs | 3 | 2 | M | Correct lifting technique | Supervisor | |
|     | Falling of person | Body injuries | Barricades  
• Fall protector must be anchored to rigid point | 3 | 2 | M | Nil | Nil | |
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Commence cleaning</td>
<td>Lack of oxygen</td>
<td>Asphyxiation</td>
<td>Sufficient ventilation</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling hazards</td>
<td>Body injuries</td>
<td>Barricade all opening</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>• Sufficient lighting</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Fall arrestor must be anchored to a rigid point</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Proper co-ordination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skin allergy</td>
<td>Skin dermatitis</td>
<td>Wear rubber boots and gloves</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>MSDS from ship</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oil leak</td>
<td>Pollution</td>
<td>Ensure highlight to VSCC meeting/ valid cleaning permit LOTO</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>All connection to be secured with safety tag</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Housekeeping</td>
<td>Falling object</td>
<td>Body injuries</td>
<td>Lifting equipment valid and tested</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Correct lifting technique</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manual handling</td>
<td>Body injuries</td>
<td>Use proper PPE</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Struck by object</td>
<td>Body injuries</td>
<td>Proper coordination and PPE</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oil spill</td>
<td>Environmental pollution</td>
<td>Ensure bags have no leak and dispose in designated rubbish box</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>5</td>
<td>Completion of work</td>
<td>Work completion not signed off</td>
<td>Poor co-ordination</td>
<td>Ensure proper endorsement</td>
<td>1</td>
<td>1</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
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</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Inspection by supervisor</td>
<td>Lack of oxygen</td>
<td>Asphyxiation</td>
<td>• Permit-to-work system • Carry gas meter</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Nil</td>
<td>Supervisor</td>
<td>SMS PTW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling from height</td>
<td>Fatality</td>
<td>• Provide a ladder • Provide adequate lighting</td>
<td>5</td>
<td>2</td>
<td>H</td>
<td>• Secure the ladder • Ladder must be provided by scaffold</td>
<td>Project Manager</td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>Slip, trip and fall</td>
<td>Slip, trip and fall</td>
<td>Body injuries</td>
<td>• Maintain good housekeeping • Provide adequate lighting</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Nil</td>
<td>Supervisor</td>
<td>SMS Work instruction</td>
</tr>
<tr>
<td>2.1</td>
<td>Transport equipment to on board vessel</td>
<td>Struck by industrial vehicle</td>
<td>Fatality</td>
<td>Only trained forklift operator to operate the forklift</td>
<td>5</td>
<td>2</td>
<td>H</td>
<td>Only appointed forklift operator to operate forklift</td>
<td>Supervisor</td>
<td>SMS Work instruction</td>
</tr>
<tr>
<td>2.2</td>
<td>Falling object during lifting</td>
<td>Falling object during lifting</td>
<td>Fatality</td>
<td>• Assign trained rigger to do lifting work • Follow lifting procedure</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Lifting supervisor must be present on site</td>
<td>Lifting Supervisor</td>
<td>SMS Lifting procedure</td>
</tr>
<tr>
<td>3</td>
<td>Set up equipment</td>
<td>Struck by moving equipment</td>
<td>Body injuries</td>
<td>• Provide handhold for air winch and pump • Wear hand gloves</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
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<tbody>
<tr>
<td>4</td>
<td>Work Commencement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>Pump out water</td>
<td>Struck by whipping hose from pump</td>
<td>Body injuries</td>
<td>• Ensure that all hose connections are tightened properly</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>4.2</td>
<td>Clean the mud</td>
<td>Slippery surface due to flooding</td>
<td>Body injuries</td>
<td>Wear rubber boot</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>4.3</td>
<td>Scrape the loose scale (rust)</td>
<td>Struck by object</td>
<td>Foreign particles in eyes</td>
<td>• Down hand (hard) scrapping</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>4.4</td>
<td>Removed mud and scale bag from chain locker</td>
<td>Struck by falling objects</td>
<td>PPD - Permanent partial disability</td>
<td>• Wear goggles and PPE</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>4.4</td>
<td></td>
<td>Caught by moving winch wire rope</td>
<td>PPD - Permanent partial disability</td>
<td>• Provide hand hold for winch wire rope</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>4.4</td>
<td></td>
<td>Manual handling</td>
<td>Back injuries</td>
<td>Adopt correct lifting method</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>4.5</td>
<td>Hose down the chain locker</td>
<td>Electrocution</td>
<td>Fatality</td>
<td>• All hand lamp and portable electrical equipment must be tested by electrician</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• User must check to ensure that equipment is free from defect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>-----------------------------------------------</td>
<td>-----------------------</td>
</tr>
</tbody>
</table>
| 4.6 | Re-pump out water | Struck by whipping hose from pump | Body injuries | • Ensure that all hose connections are tightened properly  
• Provide hose arrestor  
• Discharge water to drain | 2 | 3 | M | Nil | Nil | |
| 5 | Inspection done by owner | Asphyxiation | Fatality | • Permit-to-work system  
• Carry gas meter | 5 | 1 | M | Nil | Nil | SMS PTW |
| 5 | Falling from height | Fatality | • Provide a ladder  
• Provide adequate lighting | 5 | 2 | H | • Secure the ladder  
• Ladder must be provided by scaffolder | Project Manager | |
| 5 | Slip, trip and fall | Body injuries | • Maintain good housekeeping  
• Provide adequate lighting | 3 | 3 | M | Nil | Nil | SMS work instruction |
| 6 | Transport all equipment back to workshop | Struck by industrial vehicle | Fatality | • Only trained forklift operator to operate the forklift | 5 | 2 | H | Only appointed forklift operator to operate forklift | Supervisor | SMS work instruction |
| 6 | | Falling object during lifting | Fatality | • Assign trained rigger to do lifting work  
• Follow lifting procedure | 5 | 1 | M | Nil | Nil | SMS lifting procedure |
## Risk Assessment Form

**Company:** Group 3  
**Task:** Sewage Tank Cleaning  
**Conducted by:** (Date) 10/05/2006  

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<th>Task Step</th>
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<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Highlight during VSCC and raise PTW</td>
<td>Apply for wrong location or permit</td>
<td>Nil</td>
<td>Daily work plan checklist</td>
<td>1</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Arrange ventilation and lighting</td>
<td>Lack of oxygen</td>
<td>Suffocation or asphyxiation</td>
<td>Conduct gas check</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Minimum one gas meter carrier per work group</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fire and explosion</td>
<td>Fatality</td>
<td></td>
<td>Explosion proof lighting</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Check location to be cleaned</td>
<td>Lack of oxygen</td>
<td>Suffocation or asphyxiation</td>
<td>Conduct gas check</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Minimum one gas meter carrier per work group</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Disinfect the tank with chemical</td>
<td>Overcome by chemical fumes</td>
<td>Disorientation and unconscious</td>
<td>Use supplied airline mask and refer to MSDS</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td>Use water based chemical</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Demuck and dispose</td>
<td>Overcome by toxic gas build up</td>
<td>Unconscious</td>
<td>Use supplied airline mask</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Extractor fan and gas meter</td>
<td>Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

**Company:** Group 4  
**Task:** Tank Cleaning of Cargo Oil Tank (bottom) for Hot Work  
**Conducted by:**  
**Date:** 10th May 2006  
**Approved by:**  
**Date:**  
**Next Review Date:**

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Before highlight in VSCC Meeting</td>
<td>Communication breakdown date / time</td>
<td>May carry out incompatible work</td>
<td>All trade supervisor to attend meeting</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Make sure all trade supervisors attend meeting</td>
<td>SRM</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Gas free certificate to be obtained</td>
<td>Fire and explosion</td>
<td>Fatality</td>
<td>Gas monitoring</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Conduct regular gas monitoring</td>
<td>Safety Personnel</td>
<td></td>
</tr>
</tbody>
</table>
| 3   | Permit-to-work for tank entry | Lack of oxygen | Asphyxiation | • Continuous ventilation  
• Explosion proof lighting | 5        | 1          | M          | • Work group bring along portable gas detector / torchlight | Supervisor |                          |
<p>| 4   | Mobilise equipment and manpower | Struck by object | Body injuries | Trained rigger and signaler | 3        | 3          | M          | Conduct toolbox briefing | Supervisor |                          |
|     | Rash act | Body injuries | Familiarise inexperienced worker with work environment | 3        | 3          | M          | Buddy system for new workers | Supervisor |                          |
| 5   | Work-in-progress | Fumes and gas | Dizziness | Permit-to-work for tank cleaning | 3        | 3          | M          | Regular gas monitoring | Safety Personnel |                          |
|     | Identify exact location for cleaning | Lack of oxygen | Asphyxiation | Provide adequate forced ventilation | 5        | 1          | M          | Carry portable gas detector | Supervisor |                          |
|     | Slip and fall | Body injuries | Provide adequate lighting | 3        | 3          | M          | Nil | Nil |                          |
|-----|----------------------------|-------------------------------|-------------------------------------------------|--------------------------|-------------------|-----------------|------------------|
| 6   | Residual oil to be pumped out | Slip and fall Body injuries   | Provide adequate lighting                        | 3                        | 2                 | M               | Standby sawdust, oil dispenser | Supervisor |
|     |                             | Gas and fumes Dizziness       | Provide adequate forced ventilation              | 3                        | 3                 | M               | Regular gas monitoring          | Safety Personnel |
|     |                             | Excessive noise Noise-induced deafness | PPE                                           | 4                        | 3                 | H               | Conduct noise monitoring        | Safety Officer   |
| 7   | Cleaning of sludge manually | Slip and fall Body injuries   | Provide adequate lighting                        | 3                        | 2                 | M               | Standby sawdust, oil dispenser | Supervisor |
|     |                             | Gas and fumes Dizziness       | Provide adequate forced ventilation              | 3                        | 3                 | M               | Regular gas monitoring          | Safety Personnel |
|     |                             | Skin irritation Skin dermatitis | Wear rubber gloves and barrier cream             | 2                        | 2                 | L               | Nil                            | |
| 8   | Wiping down the surface manually | Slip and fall Body injuries   | Provide adequate lighting                        | 3                        | 2                 | M               | Standby sawdust, oil dispenser | Supervisor |
|     |                             | Gas and fumes Dizziness       | Provide adequate forced ventilation              | 3                        | 3                 | M               | Regular gas monitoring          | Safety Personnel |
|     |                             | Skin irritation Skin dermatitis | Wear rubber gloves and barrier cream             | 2                        | 2                 | L               | Nil                            | |
| 9   | Pack the sludge bags        | Gas and fumes Dizziness       | Provide adequate forced ventilation              | 3                        | 3                 | M               | Regular gas monitoring          | Safety Personnel |
|     |                             | Slip and fall Body injuries   | Provide adequate lighting                        | 3                        | 2                 | M               | Standby sawdust, oil dispenser | Supervisor |</p>
<table>
<thead>
<tr>
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<th>Task Step</th>
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</thead>
<tbody>
<tr>
<td>10</td>
<td>Dispose sludge bags on deck to sludge bin</td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Provide adequate lighting</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Standby sawdust, oil dispenser</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Struck by falling object</td>
<td>Body injuries</td>
<td>Proper material handling to be adopted</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Conduct toolbox briefing</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Remove sludge to shore</td>
<td>Struck by falling object</td>
<td>Body injuries</td>
<td>Proper material handling to be adopted</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Conduct toolbox briefing</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Struck by moving object</td>
<td>Body injuries</td>
<td>Using of tag line to control the swinging load</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Final inspection by safety assessor / production supervisor</td>
<td>Gas and fumes</td>
<td>Dizziness</td>
<td>Provide adequate forced ventilation</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Monitor gas from bell mouth drop line (change of condition)</td>
<td>Safety Officer and Trade Foreman</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

**Company:** Group 5  
**Task:** Cargo Oil Tank Cleaning  
**Conducted by:** (Date) 10/05/06

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mobilisation of ventilation and lighting</td>
<td>Struck by object</td>
<td>Body injuries</td>
<td>Trained rigger and signalman</td>
<td>1</td>
<td>1</td>
<td>L</td>
<td>Nil</td>
<td>Maintenance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrocution</td>
<td>Fatality</td>
<td>Qualified electrician</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Inspected electrical equipment to be tagged</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cargo oil tank cleaning</td>
<td>Oxygen deficiency</td>
<td>Asphyxiation</td>
<td>Sufficient forced ventilation</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>–</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fumes and gases</td>
<td>Prolong exposure may cause dizziness</td>
<td>Sufficient forced ventilation</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>–</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fall from height</td>
<td>Fatality</td>
<td>Hooked on secured structure</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>–</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Ensure that safety shoe is oil resistance</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>–</td>
<td>Supervisor</td>
<td></td>
</tr>
</tbody>
</table>

### 2. Risk Evaluation

- **Severity**
- **Likelihood**
- **Risk Level**

### 3. Risk Control

- **Action Officer, Designation (Follow-up date)**
- **Document for Reference**
<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
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<th>Action Officer, Designation (Follow-up date)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Explosion inside tank</td>
<td>Hand lamp might break and cause spark</td>
<td>Use explosion proof light</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Explosion proof light is a must when cleaning fuel oil tank</td>
<td>Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skin irritation</td>
<td>Itchiness and dryness</td>
<td>Hand protection is required</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Educate the workforce on personal hygiene</td>
<td>Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Remove sludge bags from the tank</td>
<td>Struck by falling objects</td>
<td>Body injuries</td>
<td>Proper manual handling of material</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Conduct toolbox briefing</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Inspection</td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Arrange more lighting and ventilation</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
</tbody>
</table>
### Risk Assessment Form

**Company:** Group 6  
**Task:** Slop Tank Cleaning  
**Conducted by:**  
**Date:** 10/05/06  
**Approved by:**  
**Date:**  
**Next Review Date:**

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gas free certificate to be obtained</td>
<td>Fire and explosion</td>
<td>Fatality</td>
<td>Gas monitoring</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Conduct regular gas monitoring</td>
<td>Safety Personnel</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Permit-to-work for tank entry</td>
<td>Lack of oxygen</td>
<td>Asphyxiation</td>
<td>Continuous ventilation • Explosion proof lighting</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Work group should bring along portable gas detector</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Mobilise equipment and manpower</td>
<td>Struck by object</td>
<td>Body injuries</td>
<td>Trained rigger and signaler</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Conduct toolbox briefing</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rash act</td>
<td>Body injuries</td>
<td>Trained rigger and signaler</td>
<td>Familiarise inexperienced worker with work environment</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Buddy system for new workers</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Identify exact location for cleaning</td>
<td>Fumes and gas</td>
<td>Dizziness</td>
<td>Permit-to-work for tank cleaning</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Regular gas monitoring</td>
<td>Safety Personnel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lack of oxygen</td>
<td>Asphyxiation</td>
<td>Provide adequate forced ventilation</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Carry portable gas detector</td>
<td>Supervisor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Provide adequate lighting</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Residual oil to be pumped out</td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Provide adequate lighting</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Standby sawdust, oil dispenser</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gas and fumes</td>
<td>Dizziness</td>
<td>Provide adequate forced ventilation</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Regular gas monitoring</td>
<td>Safety Personnel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Excessive noise</td>
<td>Noise-induced deafness</td>
<td>PPE</td>
<td>4</td>
<td>3</td>
<td>H</td>
<td>Conduct noise monitoring</td>
<td>Safety Officer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Task Step</td>
<td>Hazard</td>
<td>Possible Accident / Ill Health &amp; Persons-at-Risk</td>
<td>Existing Risk Control (if any)</td>
<td>Severity</td>
<td>Likelihood</td>
<td>Risk Level</td>
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<tr>
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<td>-----------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>6</td>
<td>Cleaning of sludge manually</td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Provide adequate lighting</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Standby sawdust, oil dispenser</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gas and fumes</td>
<td>Dizziness</td>
<td>Provide adequate forced ventilation</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Regular gas monitoring</td>
<td>Safety Personnel</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skin irritation</td>
<td>Skin irritation</td>
<td>Wear rubber gloves and barrier cream</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Wiping down the surface manually</td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Provide adequate lighting</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Standby sawdust, oil dispenser</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gas and fumes</td>
<td>Dizziness</td>
<td>Provide adequate forced ventilation</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Regular gas monitoring</td>
<td>Safety Personnel</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skin irritation</td>
<td>Skin dermatitis</td>
<td>Wear rubber gloves and barrier cream</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Pack the sludge bags</td>
<td>Gas and fumes</td>
<td>Dizziness</td>
<td>Provide adequate forced ventilation</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Regular gas monitoring</td>
<td>Safety Personnel</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Provide adequate lighting</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Standby sawdust, oil dispenser</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Dispose sludge bags on deck to sludge bin</td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Provide adequate lighting</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Standby sawdust, oil dispenser</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Struck by falling object</td>
<td>Body injuries</td>
<td>Proper material handling to be adopted</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Conduct toolbox briefing</td>
<td>Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

### Company:
Group 7

### Task:
Water Ballast Tank Cleaning

### Conducted by:
(Date)
10/05/06

### Approved by:
(Date)

### Next Review Date:

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Highlight VSCC meeting</td>
<td>Language barrier competency problem</td>
<td>Miscommunication leading to incompatible works</td>
<td>Minimum supervisory level must attend VSCC</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Supervisor trained in SSSC should attend</td>
<td>PJM</td>
<td>nil</td>
</tr>
<tr>
<td>2</td>
<td>Provide ventilation and lighting</td>
<td>Lack of oxygen</td>
<td>Asphyxiation</td>
<td>Provide portable gas detector</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Regular gas monitoring</td>
<td>Safety Personnel</td>
<td>nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Use butterworth opening to lay out lighting instead of manhole</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Designate safe access</td>
<td>Supervisor</td>
<td>nil</td>
</tr>
<tr>
<td>3</td>
<td>Display entry permit at location</td>
<td>• Display at wrong location</td>
<td>Incompatible work</td>
<td>Chargehand and supervisor level to display permit</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Must hang at strategic location near work site</td>
<td>Supervisor</td>
<td>nil</td>
</tr>
<tr>
<td>4</td>
<td>Display entry tag correctly</td>
<td>Fail to display tag</td>
<td>Missing person unaccounted</td>
<td>• Ensure all person deposit tag upon entry</td>
<td>2</td>
<td>3</td>
<td>M</td>
<td>Closely monitor compliance</td>
<td>Supervisor</td>
<td>nil</td>
</tr>
<tr>
<td>5</td>
<td>Check access ladder</td>
<td>Falling hazard</td>
<td>Body injuries</td>
<td>• Use torchlight and clipping hammer</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td>nil</td>
</tr>
<tr>
<td>6</td>
<td>Carry gas meter</td>
<td>• Do not know how to use</td>
<td></td>
<td>Group leader to ensure gas meter is working</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Supervisor</td>
<td>nil</td>
</tr>
<tr>
<td>No.</td>
<td>Task Step</td>
<td>Hazard</td>
<td>Possible Accident / Ill Health &amp; Persons-at-Risk</td>
<td>Existing Risk Control (if any)</td>
<td>Severity</td>
<td>Likelihood</td>
<td>Risk Level</td>
<td>Additional Risk Control</td>
<td>Action Officer, Designation (Follow-up date)</td>
<td>Document for Reference</td>
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<td>------------------------</td>
</tr>
<tr>
<td>7</td>
<td>Bringing of tools and equipment</td>
<td>Lack of oxygen</td>
<td>Asphyxiation</td>
<td>Provide portable gas detector</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Use butterworth opening to lay out lighting instead of manhole</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>8</td>
<td>Cleaning operation</td>
<td>Lack of oxygen</td>
<td>Asphyxiation</td>
<td>• Sufficient ventilation • Portable gas detector</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Provided gas meter training</td>
<td>Safety</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tripping hazard</td>
<td>Body injuries</td>
<td>Sufficient lighting</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Maintain proper housekeeping</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Falling from height</td>
<td>Fatality</td>
<td>Anchor safety belt</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Inspection</td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Clear all left over material</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
</table>
## Risk Assessment Form

**Company:** Group 8  
**Task:** Fuel Oil Bunker Tank Cleaning  
**Conducted by:**  
(Date) 10/05/06  
**Approved by:**  
(Date)  

**Next Review Date:**

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
</table>
| 1   | Open manhole in the way of fuel oil bunker tank | Falling from height | Fatality | Barricade the opening  
- ‘U’ stand  
- Erect barricade staging | 5 | 1 | M | Nil | Nil |
| 2   | Arrange ventilation | Fumes and gases | Asphyxiation | Follow the safe work procedure | 5 | 1 | M | Nil | Nil |
| 3   | Highlight in the VSCC meeting and apply entry permit | Permit application not correct (Location / date) | NA | • Gas free  
• Permit-to-work system | 1 | 1 | L | Nil | Nil |
| 4   | Identify the job location | Falling from height | Body injuries | • Arrange adequate lighting  
• Proper access | 4 | 2 | M | Conduct toolbox briefing | Supervisor |
|     | Lack of oxygen fumes / gas | Fumes and gases | Asphyxiation | Adequate ventilation | 5 | 1 | M | Arrange additional gas meter | Supervisor |

### 2. Risk Evaluation

### 3. Risk Control

### Reference
<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
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<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Start cleaning step by step</td>
<td>Falling from height</td>
<td>Body injuries</td>
<td>• Adequate lighting • Barricade the opening</td>
<td>4</td>
<td>3</td>
<td>H</td>
<td>Closer supervision</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Fumes and gases • Lack of oxygen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Remove sludge bags from the tank</td>
<td>Struck by falling objects</td>
<td>Body injuries</td>
<td>Proper manual of handling of material</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Conduct toolbox briefing</td>
<td>Supervisor</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Inspection</td>
<td>Slip and fall</td>
<td>Body injuries</td>
<td>Arrange more lighting and ventilation</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

**Company:** Group 9

**Task:** Procedure to Clean the Wing Ballast Tank for Tankers

**Conducted by:**

**Date:** 10/05/06

**Approved by:**

**Date:**

**Next Review Date:**

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
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<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Check proper ventilations, lighting and required gas check in tanks</td>
<td>Falling, tripping hazard from main deck to tank bottom</td>
<td>Body injuries</td>
<td>• Barricades around manhole • Cable stands, or cable hangers on deck • Supervisors ensure proper housekeeping</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>2</td>
<td>Permit-to-work application of tank entry (only documentation)</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>3</td>
<td>Entry into wing ballast tanks</td>
<td>Falling and tripping hazard</td>
<td>Body injuries</td>
<td>Maintain steady descend of ladder</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Proper supervision of work and movement</td>
<td>Supervisor and Group Leader</td>
<td>Supervisor and Group Leader</td>
</tr>
<tr>
<td></td>
<td>Lack of oxygen</td>
<td>Fatality</td>
<td>Maintain adequate ventilation and provide portable gas detector</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Prolong ventilation in tank</td>
<td>Supervisors</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Falling objects, such as rusty scales</td>
<td>Body injuries</td>
<td>Avoid standing directly below loose scales</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Toolbox briefing for workers</td>
<td>Supervisor and Group Leader</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Task Step</td>
<td>Hazard</td>
<td>Possible Accident / Ill Health &amp; Persons-at-Risk</td>
<td>Existing Risk Control (if any)</td>
<td>Severity</td>
<td>Likelihood</td>
<td>Risk Level</td>
<td>Additional Risk Control</td>
<td>Action Officer, Designation (Follow-up date)</td>
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<td>-----------------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>4</td>
<td>Commencement of cleaning</td>
<td>Tripping and slipping hazard</td>
<td>Body injuries</td>
<td>PPE</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dropping of rusty scales</td>
<td>Body injuries</td>
<td>Proper job co-ordination for locations</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Toolbox briefing for workers</td>
<td>Supervisor and Group Leader</td>
<td>Nil</td>
</tr>
<tr>
<td>5</td>
<td>QC and owner representatives inspection</td>
<td>Tripping hazard</td>
<td>Body injuries</td>
<td>Final housekeeping prior inspection</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dropping of rusty scales</td>
<td>Body injuries</td>
<td>Proper job co-ordination for locations</td>
<td>3</td>
<td>3</td>
<td>M</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>6</td>
<td>Return of entry and cleaning permit (only documentation)</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
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</tbody>
</table>
## Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Group 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task:</td>
<td>Fuel Oil Tank Cleaning (Bottom Area)</td>
</tr>
<tr>
<td>Conducted by:</td>
<td>(Date) 10/05/06</td>
</tr>
<tr>
<td>Approved by:</td>
<td>(Date)</td>
</tr>
</tbody>
</table>

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Preparation of equipment • Winch • Pumps • Chemicals • Rags • Bum bags • Scrapper • Scoop</td>
<td>Pinch point</td>
<td>Hand, leg injuries (caught in between)</td>
<td>Keep hands away from pinch points</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chemical splash into eye</td>
<td>Eye irritation</td>
<td>Safety goggles (PPE) must be worn while handling</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Handling of chemicals</td>
<td>Skin dermatitis</td>
<td>Rubber glove to be used only</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Transport equipment to worksite using forklift</td>
<td>Speeding</td>
<td>Collision with structure or hit passerby</td>
<td>Driver must be trained and observe speed limit in the yard</td>
<td>5</td>
<td>2</td>
<td>H</td>
<td>Send operator for defensive driving</td>
<td>Head of Dept</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Toppling of unsecured equipment/uneven ground</td>
<td>Damage of equipment</td>
<td>All equipment are secure in a metal cage</td>
<td>2</td>
<td>1</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lifting of equipment to ship by crane</td>
<td>Struck by moving object</td>
<td>Body injuries</td>
<td>Using of tag line to control the swinging load</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Struck by dropped object</td>
<td>Fatality</td>
<td>• Trained rigger and signalman to carry out operations only • Use valid lifting equipment</td>
<td>5</td>
<td>2</td>
<td>H</td>
<td>Deploy additional men to guide and control traffic movement</td>
<td>Head of Dept and Lifting Supervisor</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Task Step</td>
<td>Hazard</td>
<td>Possible Accident / Ill Health &amp; Persons-at-Risk</td>
<td>Existing Risk Control (if any)</td>
<td>Severity</td>
<td>Likelihood</td>
<td>Risk Level</td>
<td>Additional Risk Control</td>
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<td>-----------------------------------------------</td>
<td>------------------------</td>
</tr>
</tbody>
</table>
| 4   | Setting up equipment                          | Electric shock                  | Shock to worker and numbness                   | • Inspection of electrical equipment at store  
• 110V supply to be used                                                                             | 3        | 2          | M         | Tag electrical equipment after inspection                                                  | Maintenance Personnel                          |                        |
|     | Ventilation                                   |                                 |                                               |                                                                                                |          |            |           |                                                                                         |                                |                        |
|     | Lighting                                      |                                 |                                               |                                                                                                |          |            |           |                                                                                         |                                |                        |
|     | Compress air hose connection                   |                                 |                                               |                                                                                                |          |            |           |                                                                                         |                                |                        |
| 4   |                                               | Struck by compressed air hoses when connecting | Body injuries | • Use whip arrester to be used to prevent back lash  
• Shut off air manifold before disconnecting                                                         | 3        | 2          | M         | Use correct rating of whip arrester                                                        | Immediate Supervisor                          |                        |
|     |                                               | Trip and fall due to slippery floor | Body injuries | Rubber boot to be worn                                                                           | 3        | 3          | M         | Nil                                                        |                                | Nil                    |
| 5   | Start cleaning                                | Lack of oxygen                  | Asphyxiation                                   | • Provide adequate ventilation  
• Provide portable gas detector                                                                       | 5        | 1          | M         | Conduct regular gas monitoring of confined space                                           | Safety Personnel                              |                        |
|     | Pump out Scooping                              | Fire hazard due to substandard lighting | Fatal                                           | Use of only explosion proof lightings                                                           | 5        | 1          | M         | Nil                                                        |                                | Nil                    |
| 5   |                                               | Slip and fall                   | Body injuries                                  | Provide adequate lighting and barricade openings                                                | 3        | 3          | M         | Nil                                                        |                                | Nil                    |
|     |                                               | Fumes and gases                 | Asphyxiation                                   | Provide adequate ventilation                                                                  | 5        | 1          | M         | Conduct regular gas monitoring of confined space                                           | Safety Personnel                              |                        |
| 6   | Remove sludge bags from the tank               | Failing object                  | Body injuries                                  | Proper manual handling of material                                                             | 3        | 3          | M         | Conduct toolbox briefing                                                              | Supervisor                                    |                        |
| 7   | Inspection                                    | Slip and fall                   | Body injuries                                  | Provide sufficient lighting and ventilation                                                      | 3        | 3          | M         | Nil                                                        |                                | Nil                    |
# 8. RA Templates: Scaffold

## Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task:</td>
<td>Erection of Tower Scaffold at Open Space</td>
</tr>
<tr>
<td>Conducted by:</td>
<td>(Date)</td>
</tr>
<tr>
<td>Approved by:</td>
<td>(Date)</td>
</tr>
<tr>
<td>Next Review Date:</td>
<td></td>
</tr>
</tbody>
</table>

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<th>No.</th>
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<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
<th>Action Officer, Designation (Follow-up date)</th>
<th>Document for Reference</th>
</tr>
</thead>
</table>
| 1   | Material handling | • Pinch by planks  
• Struck by planks and pipe | • Major injuries on hands and fingers  
• Major injuries on hand and fingers | • Briefing of tasks prior to work  
• Barricade working area  
• Use hand glove | 3  
3 | 3  
3 | M  
M | | Scaffold Supervisor | |
| 2   | Erecting main members of a scaffold (i.e. base plate; standards; ledger; transom; bracing, etc.) | • Falling from height  
• Falling object  
• Slip / trip  
• Eye injury | • Fatal  
• Major injuries  
• Major injuries  
• Major injuries | | 5  
3  
3  
3 | 1  
3  
3  
3 | M  
M  
M  
M | Scaffold Supervisor | |
| 3   | Install  
• Ladder  
• Planks  
• Handrail  
• Toe board | • Falling object  
• Fall from height  
• Eye injury | • Major injuries  
• Major injuries  
• Major injuries | | 3  
3  
3 | 3  
3  
3 | M  
M  
M | Scaffold Supervisor | |
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Install</td>
<td>Collapse of staging</td>
<td>Fatality</td>
<td>• Securing of tie back every 2 lift, 3 boy • Install outrigger in accordance with height of scaffold • If tower scaffold exceeds 15m, installation must be done accordance to PE drawing</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Scaffold Supervisor</td>
<td>Scaffold Supervisor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Inspection of Scaffold</td>
<td>• Fall from Height • Loose Accessories • Major injuries</td>
<td>• Major injuries • Usage of safety harness • Follow checklist</td>
<td>3 2 1</td>
<td>3 1</td>
<td>M L</td>
<td>Scaffold Supervisor</td>
<td>Scaffold Supervisor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Risk Assessment Form

<table>
<thead>
<tr>
<th>Company:</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task:</td>
<td>Erecting of Multi Tier Scaffold in Confined Space</td>
</tr>
<tr>
<td>Conducted by:</td>
<td>(Date)</td>
</tr>
<tr>
<td>Approved by:</td>
<td>(Date)</td>
</tr>
<tr>
<td>Next Review Date:</td>
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</tr>
</tbody>
</table>

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<th>Hazard</th>
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<th>Existing Risk Control (if any)</th>
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<th>Additional Risk Control</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lifting into confined space</td>
<td>Asphyxiation</td>
<td>• Loss of consciousness • Death</td>
<td>• P.T.W • Ventilation / lighting provided • Portable gas detector</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>• Briefing • Check physical condition of workers</td>
<td>Scaffold Supervisor</td>
<td>Scaffold Supervisor</td>
</tr>
<tr>
<td>2</td>
<td>Installation of lifelines</td>
<td>• Falling from height • Hand / finger injuries • Falling of objects</td>
<td>• If not properly secured, erectors may fall • Hand / fingers cut by wire • Injuring of other workers working below</td>
<td>• Using of body harness with double lanyard secured • Wearing of hand gloves • Erection area to be cordoned off • Tools to be secured • Couplers to be secured on pipes before passing down</td>
<td>5 2 3</td>
<td>1 2 3</td>
<td>M L M</td>
<td>Maintenance of body harness • Erectors / supervisors must be qualified</td>
<td>Scaffold Supervisor (12/04/06)</td>
<td>Scaffold Supervisor (12/04/06)</td>
</tr>
<tr>
<td>3</td>
<td>Front base frame from ship's ladder platform</td>
<td>• Falling from height • Hand / finger injuries</td>
<td>• If not properly secured, erectors may fall • Hand / fingers cut by wire</td>
<td>• Using of body harness with double lanyard secured • Wearing of hand gloves</td>
<td>5 2</td>
<td>1 2</td>
<td>M L</td>
<td></td>
<td>Scaffold Supervisor (12/04/06)</td>
<td>Scaffold Supervisor (12/04/06)</td>
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<tr>
<td>4</td>
<td>Routing of staging wires</td>
<td>• Hand / finger injuries • Falling of objects</td>
<td>• Hand / fingers cut by wire • Injuring of other workers working below</td>
<td>• Wearing of hand gloves • Erection area to be cordoned off • Tools to be secured</td>
<td>2 3</td>
<td>2 3</td>
<td>L M</td>
<td>Erectors / supervisors must be qualified</td>
<td>Scaffold Supervisor (12/04/06)</td>
<td>Scaffold Supervisor (12/04/06)</td>
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<tr>
<td>No.</td>
<td>Task Step Description</td>
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</tr>
<tr>
<td>5</td>
<td>Install and secure wooden planks provided with standards, guardrails and toeboards</td>
<td>• Falling from height • Hand / finger injuries • Falling of objects</td>
<td>• Erectors fall from height • Hand / fingers got cut • Injury of other workers below</td>
<td>• Use of body harness • Lifeline provided • Wearing of hand gloves • Area to be cordoned off</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Erectors / supervisors must be qualified</td>
<td>Scaffold Supervisor (12/04/06)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Erect 2nd tier scaffold platform with transom, ledger and putlog</td>
<td>• Falling from height • Hand / finger injuries • Falling of objects</td>
<td>• Erectors fall from height • Hand / fingers got cut • Injury of other workers below</td>
<td>• Using of body harness • Lifeline provided • Wearing of hand gloves • Area to be cordoned off</td>
<td>5</td>
<td>2</td>
<td>M</td>
<td>Erectors / supervisors must be qualified</td>
<td>Scaffold Supervisor (12/04/06)</td>
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</tr>
<tr>
<td>7</td>
<td>Install vertical ladder</td>
<td>• Falling from height • Hand / finger injuries • Falling of objects</td>
<td>• Erectors fall from height • Hand / fingers got cut • Injury of other workers below</td>
<td>• Using of body harness • Lifeline provided • Wearing of hand gloves • Area to be cordoned off</td>
<td>5</td>
<td>2</td>
<td>L</td>
<td>Erectors / supervisors must be qualified</td>
<td>Scaffold Supervisor (12/04/06)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Secure wooden planks and install guardrails and toeboards</td>
<td>• Falling from height • Hand / finger injuries • Falling of objects</td>
<td>• Erectors fall from height • Hand / fingers got cut • Injury of other workers below</td>
<td>• Using of body harness • Lifeline provided • Wearing of hand gloves • Area to be cordoned off</td>
<td>5</td>
<td>2</td>
<td>M</td>
<td>Erectors / supervisors must be qualified</td>
<td>Scaffold Supervisor (12/04/06)</td>
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</table>
## Risk Assessment Form

**Company:** Group 8  
**Task:** Erect Cantilever Scaffolding  
**Conducted by:** (Date) 12/04/06

### 1. Hazard Identification

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
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<th>Additional Risk Control</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Entry for inspection</td>
<td>Lack of oxygen, flammable, toxic gas</td>
<td>• Suffocate • Falling</td>
<td>• Entry permit, staging permit  • PGM</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Monitor air flow</td>
<td>HSE Officer, Staging Supervisor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Inspect the erect area, location, possible hazard, cleanliness</td>
<td>Sludge, mud</td>
<td>• Slip • Falling hazard</td>
<td>• Lighting • Torchlight. PPE, buddy system</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Staging Supervisor Fellow Worker</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Arrange material manpower</td>
<td>• Poor material, PPE • Un-train personnel</td>
<td>• Staging collapse • Falling hazard</td>
<td>• Checked by store • Inspect PPE regularly • Training</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td>Staging Supervisor Storekeeper Worker</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Transport material</td>
<td>Falling object (Not properly secured)</td>
<td>People hit by object</td>
<td>• Use rack • Secure material • Stack to 2 levels</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Staging Supervisor Forklift Driver Lorry Driver</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Lift up the material</td>
<td>Follow hand out</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Lower material to confined space</td>
<td>Falling object</td>
<td>• Poorly secured • Expired gear • Wrong method of lowering</td>
<td>• Inspection of lifting equipment • Qualified scaffold</td>
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## 2. Risk Evaluation

- **Severity:** 1-5  
- **Likelihood:** 1-5  
- **Risk Level:** M

## 3. Risk Control
<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
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</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Set up the base</td>
<td>Uneven ground</td>
<td>Scaffold collapse</td>
<td>• Use level gauge</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td>Supervisor Stager</td>
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<tr>
<td></td>
<td></td>
<td>Improper securing</td>
<td></td>
<td>• Use base / sole plate</td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td>Build up the levels</td>
<td>Falling objects</td>
<td>Hit by falling object</td>
<td>• Use safety harness</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td>Supervisor Stager</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Work at height</td>
<td></td>
<td>• PE drawing</td>
<td></td>
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<td></td>
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<td></td>
<td>• Follow scaffold rules</td>
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<td>9</td>
<td>Extend the tubes from main tower</td>
<td>Falling objects</td>
<td>Hit by falling object</td>
<td>• Use safety harness</td>
<td>5</td>
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<td>M</td>
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<td>Supervisor Stager</td>
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<tr>
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<td></td>
<td>Work at height</td>
<td></td>
<td>• PE drawing</td>
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<td>• Follow scaffold rules</td>
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<tr>
<td>10</td>
<td>Put up planks and secure them</td>
<td>Falling objects</td>
<td>Hit by falling object</td>
<td>• Use safety harness</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td>Supervisor Stager</td>
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<tr>
<td></td>
<td></td>
<td>Work at height</td>
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<td>• PE drawing</td>
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<td>• Follow scaffold rules</td>
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<td>• Barricade around</td>
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<tr>
<td>11</td>
<td>Put up tie backs, toeboard, guard rail etc.</td>
<td>Falling objects</td>
<td>Work at height</td>
<td>Hit by falling object</td>
<td>5</td>
<td>1</td>
<td>M</td>
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<td>Supervisor Stager</td>
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<td></td>
<td>• Use safety harness</td>
<td></td>
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<td>• PE drawing</td>
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<td>• Follow scaffold rules</td>
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<tr>
<td>12</td>
<td>Inspection, put up signboard</td>
<td>Work at height</td>
<td>Falling from height</td>
<td>• PPE compliance</td>
<td>5</td>
<td>1</td>
<td>M</td>
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<td>Supervisor Stager</td>
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</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>• Qualified supervisor</td>
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<td>• Checklist</td>
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</table>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Make frame</td>
<td>Hand / finger injuries</td>
<td>Sandwich by staging materials</td>
<td>• PPE (gloves) • Communication • Visual inspection of staging materials</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Supervisor Group Leader Stager</td>
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<tr>
<td>2</td>
<td>Lower to location</td>
<td>• Hand / finger injuries • Falling hazard • Frame and stager might fall overboard</td>
<td>Crash over ship structure (railing)</td>
<td>• PPE (glove) • Communication • Staging wire going round the railing</td>
<td>2</td>
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<td>L</td>
<td>• Proper communication • Prepare lifebuoy and life jackets • Anchor safety belt to ship railing</td>
<td>Supervisor Group Leader Stager</td>
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<tr>
<td>3</td>
<td>Secure the staging wires</td>
<td>• Hand / finger injuries • Eye injury</td>
<td>• Wires whipped • Wire end poke eye</td>
<td>• PPE (goggle) • Method of tying • Qualify stager</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td></td>
<td>Supervisor Group Leader Stager</td>
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</tr>
<tr>
<td>4</td>
<td>Erect frame for landing platform</td>
<td>• Hand / finger injuries • Falling hazard</td>
<td>• Sandwich by staging material • Crash by staging material and ship structure • Stager fall over board</td>
<td>• PPE (hand glove) • Lifeline • Sala-block • Anchor of safety belt • Life-jacket</td>
<td>2</td>
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<td>L</td>
<td>• Lifebuoy • Add pipe to prevent tilt</td>
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<td>Ladder to install</td>
<td>Hand / finger injuries</td>
<td>Hand sandwich by ladder</td>
<td>PPE (glove)</td>
<td>2</td>
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<td></td>
<td>Group Leader Stager</td>
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<td>6</td>
<td>Erect working platform</td>
<td>• Falling from height • Falling of object</td>
<td>Hit by objects</td>
<td>• PPE (helmet) • Communication • Refer to lifting and lowering risk assessment</td>
<td>3</td>
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<td>Supervisor Group Leader Stager</td>
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<tr>
<td>1</td>
<td>Inspection of ground by supervisor</td>
<td>• Falling from height • Tripping hazards</td>
<td>Drowning and body injuries</td>
<td>• Body harness (anchor on strong point) • Housekeeping</td>
<td>4</td>
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<td>M</td>
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<td>Supervisor and Scaffolders</td>
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<td>2</td>
<td>Selection and sorting out of material</td>
<td>Pinch point</td>
<td>Hand injuries</td>
<td>Wear hand gloves</td>
<td>1</td>
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<td>L</td>
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<td>3</td>
<td>Transportation to wharf</td>
<td>Overloading of cradle</td>
<td>Load topple</td>
<td>Keep within S.W.L or forklift</td>
<td>3</td>
<td>2</td>
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<td>Banksman</td>
<td>Forklift Driver</td>
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<td>4</td>
<td>Lifting of material</td>
<td>• Falling object • Defective lifting • Improper rigging • Load stability</td>
<td>• Fatality • Property damage • Workers around lifting area</td>
<td>• Barricade with signboard • Qualified rigger and signaler • Valid lifting gear</td>
<td>5</td>
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<td>H</td>
<td>Safety checklist</td>
<td>Rigger and Signalers</td>
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<tr>
<td>5</td>
<td>Choosing of anchor pocket (hanging wire and lifeline)</td>
<td>Wire damage</td>
<td>Hand injuries</td>
<td>Wear gloves</td>
<td>3</td>
<td>2</td>
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<td>Supervisor conducts thorough inspection</td>
<td>Supervisor</td>
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<td>6</td>
<td>Base erection</td>
<td>Pinch point</td>
<td>Hand injuries</td>
<td>Wear gloves</td>
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<td>1</td>
<td>L</td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
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<tr>
<td>7</td>
<td>Secure the frame with wires</td>
<td>Pinch point</td>
<td>Hand injuries</td>
<td>Wear gloves</td>
<td>1</td>
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<td>Qualified scaffolder</td>
<td>Scaffold</td>
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<tr>
<td>8</td>
<td>Secure planks on the frame</td>
<td>Pinch point</td>
<td>Hand injuries</td>
<td>Wear gloves</td>
<td>1</td>
<td>1</td>
<td>L</td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
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<tr>
<td>9</td>
<td>Lower the frame to exact location</td>
<td>Mishandling of wires structural collapse</td>
<td>Hand injuries</td>
<td>• Qualified scaffolder • Proper tying method</td>
<td>2</td>
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<td>Scaffold</td>
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<td>10</td>
<td>Provide a lifeline</td>
<td>Pinch point</td>
<td>Hand injuries</td>
<td>Wear gloves</td>
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<td>Qualified scaffolder</td>
<td>Scaffold</td>
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</tr>
<tr>
<td>11</td>
<td>Install resting platform</td>
<td>Falling from height</td>
<td>• Drowning • Fatality</td>
<td>• Life jacket • Full body harness • Anchored to industrial lifeline</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Install ladder for access</td>
<td>• Pinch point • Falling from height • Hand injuries • Drowning</td>
<td></td>
<td></td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Erector climbs onto scaffold (Max 02 pax)</td>
<td>Swing and overturn of platform</td>
<td>• Max 02 pax • Supervision to provide proper coordination to maintain CG</td>
<td></td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Secure the platform to the hull</td>
<td>• Falling from height • Falling object Drowning</td>
<td></td>
<td>Ensure tieback 1.5 rigid</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
<td></td>
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<tr>
<td>15</td>
<td>Lower planks manually by ropes</td>
<td>Falling object</td>
<td>Provide watchman to clear area</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Secure the planks</td>
<td>Falling object</td>
<td>Drowning</td>
<td>4</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Lower pipes</td>
<td>Pinch point</td>
<td>Hand injuries</td>
<td>Wear gloves</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Install guardrails</td>
<td>Pinch point</td>
<td>Hand injuries</td>
<td>Wear gloves</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Tie backs</td>
<td>Pinch point</td>
<td>Hand injuries</td>
<td>Wear gloves</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Install toeboards</td>
<td>Falling object</td>
<td>Hand injuries</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Install resting platform every SM</td>
<td>Pinch point</td>
<td>Hand injuries</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td></td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Inspection by scaffold supervisor and follow up OK tag</td>
<td>Falling from height</td>
<td>Drowning</td>
<td>• Body harness</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td>Qualified scaffolder</td>
<td>Scaffold</td>
<td></td>
</tr>
</tbody>
</table>

- **1. Hazard Identification**
- **2. Risk Evaluation**
- **3. Risk Control**
- **Reference**
## Risk Assessment Form

**Company:** [Company Name]

**Task:** Modify Tower Stage

**Conducted by:** Group 1

**Approved by:** [Date] 12/04/06

**Next Review Date:** 18/04/09

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
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<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
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</thead>
</table>
| 1   | Entering of confined space | • Asphyxiation  
• Falling from height  
• Slipping and tripping  
• Fire and explosion | • Death  
• Death  
• Physical injury  
• Death | • PTW  
• Use double hook harness  
• Anchor at strong point  
• Housekeeping  
• PTE  
• Valid gas check tag | 5  
5  
2  
1 | 1  
1  
2  
1 | M  
M  
L  
M | • Sufficient ventilation  
• Barricade and signboard  
• Sufficient lighting  
• Slip resistant shoes  
• Clear walkway  
• Portable gas detector | Foreman, Supervisor  
Foreman, Supervisor, Group Leader  
Foreman, Supervisor, Group Leader  
Certified Gas Meter Carried | |
| 2   | Prior to commencement of modification (lowering) | Scaffold material falling from height | Death | • Proper equipment and method  
• No overloading  
• Sufficient manpower | 5  
1 | 1  
M | M | • Barricade  
• Tag line  
• Signboard | Foreman, Supervisor, Scaffold Rigger | |
| 3   | Modification | Falling from height | Death | • Double hook harness  
• Strong anchor point | 5  
1 | 1  
M | M | Lifeline | Foreman, Supervisor, Group Leader, Scaffold | |
| 4   | Inspection | • Tripping  
• Fall from height | • Fracture  
• Death | • Housekeeping  
• Double hook harness  
• Strong anchor point | 2  
5  
1 | 2  
1  
M | L  
M | • Sufficient lighting  
• Carry torchlight  
• Lifeline  
• Buddy system | Foreman, Supervisor  
Foreman, Supervisor | |

- **Severity**
- **Likelihood**
- **Risk Level** M: Major, L: Low

### Additional Information:
- **Date of Modification:** [Date] 12/04/06
- **Follow-up Date:** 18/04/09
- **Action Officer:** Foreman, Supervisor, Group Leader
- **Designation:** Foreman, Supervisor, Scaffold Rigger
- **Sufficient:**
  - **Ventilation**
  - **Lighting**
  - **Slip-Resistant Shoes**
  - **Clear Walkway**
  - **Portable Gas Detector**
  - **Barricade**
  - **Tag Line**
  - **Signboard**
  - **Lifeline**
  - **Buddy System**

### References:
- Company's Safety Manual
- Local Health and Safety Regulations
- Industry Standards

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27
## Risk Assessment Form

| Company: | | Conducted by: | Group 4 |
|———|———|———|———|
| Task: | Dismantling of Multi-tier Hanging Scaffold in Confined Space | | |
| Approved by: | (Date) | 12/04/06 | |
| Next Review Date: | 3 years later | | |

### 1. Hazard Identification

| No. | Task Step | Hazard | Possible Accident / Ill Health & Persons-at-Risk | Existing Risk Control (if any) | Severity | Likelihood | Risk Level | Additional Risk Control | Action Officer, Designation (Follow-up date) | Document for Reference |
|———|———|———|———|———|———|———|———|———|———|———|
| 1 | Confined space entry | • Suffocation • Poor visibility | • Suffocation • Collapse • Tripping • Falling from height | • Gas check • Portable gas detector • Proper lighting and ventilation • Coordination • SWP (P.T.W) | 5 | 2 | H | • Proper supervision • Workers briefed / toolbox | Supervisor In-Charge |
| 2 | Inspect the scaffold before dismantling | • Damage scaffold • Unwanted materials / loose materials | • Falling or tripping • Struck by objects | • Rectification of damage parts before dismantling • Housekeeping • Barricade the work area (signboard) SWP | 4 | 2 | M | • Torchlight • Anchor to lifeline (ensure) | Supervisor In-Charge |
| 3 | Dismantle of multi-tier hanging scaffold | • Falling items • Loose materials • Improper material handling • Scaffold overload • Poor quality workers (shortcuts) | • Falling / tripping • Struck by objects • Confusion • Laceration | • Communication, co-ordination and supervision (proper) • Proper usage of full body harness and lifeline • Proper material handling • Continuous training for workers | 5 | 2 | H | Strict supervision (more than 1 supervisor) | Supervisors In-Charge |
| 4 | Lifting of material form vessel to wharf | • Falling objects • Caught in between • Struck by load • Damage lifting equipments | • Struck by objects • Finger injuries | • Certified riggers and signalers • Check the lifting equipments • Ensure that nobody below suspended load and its path | 5 | 1 | M | Proper barricade | Supervisors In-Charge |
## Risk Assessment Form

Company:  

Task: Dismantling of Tower Scaffold in Open Space  

Conducted by:  

Group 5  

Approved by:  

(Date)  

Next Review Date: 12/04/09

<table>
<thead>
<tr>
<th>No.</th>
<th>Task Step</th>
<th>Hazard</th>
<th>Possible Accident / Ill Health &amp; Persons-at-Risk</th>
<th>Existing Risk Control (if any)</th>
<th>Severity</th>
<th>Likelihood</th>
<th>Risk Level</th>
<th>Additional Risk Control</th>
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</thead>
</table>
| 1   | Fabricate and provide signage board at the work place to notify workers that scaffold work is in progress | Falling from height due to no warning | Fall of materials from height | • Clear the work area  
  • Do not to allow people to enter work area | 2        | 2          | L          |                                        | Supervisor  
  Group Leader                          |                                      |                                      |
| 2   | Provide a lifeline to anchor safety hook                                 | • Falling from height  
  • Weak anchoring point  
  • To notify workers that scaffold work is in progress | Serious injury | • Provide strong and safe lifeline  
  • Use sala block  
  • Wear full body harness with double hooks | 5        | 1          | M          | Make sure all PPE and equipment inspection are carried out daily | Supervisor  
  Group Leader                          |                                      |                                      |
| 3   | Open scaffold handrail’s at the top of last step                         | Materials and man falling from height | Serious injury | • Secure materials properly  
  • Provides lifeline and safety harness for workers | 5        | 1          | M          | Make sure materials and lifeline used are inspected and certified | Supervisor  
  Group Leader                          |                                      |                                      |
<table>
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<tr>
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<tbody>
<tr>
<td>4</td>
<td>Open platform at the top step for access</td>
<td>• Persons falling from height • Hand / finger injuries</td>
<td>Serious injury</td>
<td>• Make sure person anchor safety hook at strong anchoring point • Secure materials properly • Wear hand gloves</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Provide certified PPE, lifeline and sala-block</td>
<td>Supervisor, Group Leader</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Lowering of materials to and stack properly</td>
<td>Hand / finger injuries</td>
<td>Minor injuries</td>
<td>Wear approved PPE and pass materials carefully</td>
<td>1</td>
<td>2</td>
<td>L</td>
<td>• No horse play • Be alert • Clear communication when lowering material</td>
<td>Supervisor, Group Leader</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Opening of bracing</td>
<td>• Scaffold collapsing • Pinch point</td>
<td>Major injuries</td>
<td>Dismantle scaffold according to processor</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>• No horse play • Be alert</td>
<td>Supervisor, Group Leader</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Remove all ledger’s and pot tie’s and lastly standards</td>
<td>Hand / finger injuries</td>
<td>Slight injuries</td>
<td>• Use proper PPE i.e. hand gloves, harness, and helmet. • Good communication during dismantling</td>
<td>1</td>
<td>3</td>
<td>L</td>
<td>• Use certified PPE • Be alert</td>
<td>Supervisor, Group Leader</td>
<td></td>
</tr>
</tbody>
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### 1. Hazard Identification

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</table>
| 1   | Access work area Develop work plan | Falling of person and object | Opening and insecure material                     | • Using sala block and live line to hook-up at independent rigid point  
• Area barricaded below                                               | 5        | 1          | M          | Nil                      | Supervisor                                  | Document for Reference |
| 2   | Apply permit to work system      | Poor co-ordination       |                                                   | Informed in the VSCC                                                                      |          |            |            | Nil                      | Supervisor                                  | Document for Reference |
| 3   | Appoint the work group           | Falling                  | • Not a qualified erector  
• Fatigue / physical state of erector | • Qualified erector  
• Physically fit                                               | 2        | 1          | L          | Nil                      | Supervisor                                  | Document for Reference |
| 4   | Brief work-scope to group and SF issue | Language barrier | No understanding                                   | Select group that understands common language                                           | 2        | 1          | L          | Nil                      | Supervisor and Worker                         | Document for Reference |
| 5   | Remove OK Tag                    |                          |                                                   |                                                                                           | 5        | 1          | M          | Nil                      | Supervisor                                  | Document for Reference |
| 6   | Top tier of removal / lowering:  
• Ladder  
• Toeboard  
• Handrail  
• Plank  
• Transom  
• Ledger | Falling person and object | • Fall protection not worn  
• Poor anchor point  
• Overload of person  
• Fall protector snap | • Independent / rigid anchor point  
• Wear fall protector in working condition  
• Supervisor immediate supervision  
• Supervisor allocate erector for task (in number) | 5        | 1          | M          | Nil                      | Supervisor and Worker                         | Document for Reference |
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<tr>
<td>7</td>
<td>Dismantle and lower down materials</td>
<td></td>
<td>• Fall of object • Hand / finger injuries • Falling object</td>
<td>• Mishandling during transfer • Improper loading • Sharp edges • Pinch point during handling • Overload during manual lowering</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Nil</td>
<td>Supervisor and Workers</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Remaining tier dismantling (except base frame)</td>
<td></td>
<td>• Fall of object • Hand / finger injuries • Falling object</td>
<td>• Mishandling during transfer • Improper loading • Sharp edges • Pinch point during handling • Overload during manual lowering</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Nil</td>
<td>Supervisor and Workers</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Base frame by pulling up – leave 2 planks</td>
<td>Falling object</td>
<td>Lost control of pulling</td>
<td>• Adequate man and job • Ensure no loose item on base frame</td>
<td>3</td>
<td>1</td>
<td>L</td>
<td>Nil</td>
<td>Supervisor and Workers</td>
<td></td>
</tr>
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</tr>
<tr>
<td>1</td>
<td>Fix frame work and secure hanging wire ropes (PE design)</td>
<td>• Tripping</td>
<td>• Tag, arm injury</td>
<td>• Assign qualified erectors (MMSE) • Use hand gloves • Ensure area is free from oil • Wear safety shoe • Wear safety helmet</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Scaffold Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Slip</td>
<td>• Pinch point during handling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Moving object caught in between</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Secure two planks on the frame before lowering</td>
<td>• Caught in between objects</td>
<td>• Finger injuries</td>
<td>• Use hand gloves • Preheated wires trimmed</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Scaffold Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sharp objects</td>
<td>• Arm injuries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Put two inner vertical standard down from the frame 500mm – 1m</td>
<td>• Caught in between objects</td>
<td>• Finger injuries</td>
<td>• Use hand gloves • Wear safety shoes</td>
<td>2</td>
<td>2</td>
<td>L</td>
<td>Nil</td>
<td>Scaffold Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sharp edges</td>
<td>• Arm injuries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Material falling</td>
<td>• Leg injuries</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Centre of the frame fix one lowering rope before lowering</td>
<td>Falling objects</td>
<td>Person hit by falling objects</td>
<td>• Barricade • Display warning sign board around the location</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Assign 1 scaffold to monitor affected area</td>
<td>Scaffold Supervisor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Lowering the complete frame work on exact location</td>
<td>• Falling from height</td>
<td>• Fatality</td>
<td>• Hook up their lanyard at strong anchoring point • Barricade / display sign board • Wear hand gloves and safety shoes</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td>Scaffold Supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Falling object caught in between objects</td>
<td>• Hit person</td>
<td></td>
<td>5</td>
<td>1</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Arm, leg injuries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>---------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>6</td>
<td>Securing of hanging wires</td>
<td>• Anchoring point gives way • Wrong method of securing rope</td>
<td>Frame hits the person</td>
<td>• Do correct MPI check on anchoring point • User two and half clove hitch</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Visual inspection by scaffold supervisor</td>
<td>Scaffold Supervisor</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fix ladder (if more than 3m level from the hatch loaming erect one resting platform)</td>
<td>Falling objects</td>
<td>Person hit by falling object</td>
<td>• Barricade • Display warning signboard around the location</td>
<td>3</td>
<td>2</td>
<td>M</td>
<td>Nil</td>
<td>Scaffold Supervisor</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>One man down to the frame to complete the platform</td>
<td>Falling from height</td>
<td>Fatality</td>
<td>• Wear lifeline (or) fall arrestor • Secure the lifeline (or) fall arrestor on strong anchoring point</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Double check on anchoring point</td>
<td>Scaffold Supervisor</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Fix safety railing and toe boards</td>
<td>Men / materials falling from height</td>
<td>• Fatality • Person hit by falling object</td>
<td>• Safety railing must be 1.1m height / always hook up • Toe boards minimum 90mm</td>
<td>5</td>
<td>1</td>
<td>M</td>
<td>Double check on anchoring point</td>
<td>Scaffold Supervisor</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Inspection of completed hanging scaffold</td>
<td>• Slip • Trip</td>
<td>Body injuries</td>
<td>• Balance preheated wires to be trimmed • House keeping to be done once erection is completed</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>Nil</td>
<td>Scaffold Supervisor</td>
<td></td>
</tr>
</tbody>
</table>
## Annex D-1:

Matrix on Mandatory Safety Training and Trade-related Training Required for Shipbuilding and Ship-repairing

<table>
<thead>
<tr>
<th>Trade</th>
<th>Mandatory Safety Training Course</th>
<th>Mandatory Trade-Related Training Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot Work*</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Painting</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Rigging</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Signaling</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Scaffolding</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Crane Operating</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Other Production Workers</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Scaffolding Supervisors</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Lifting Supervisor</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Other Production Supervisors</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Safety Supervisor</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Safety Assistant</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Safety Assessor</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Safety Officer</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Ship Repair Manager</td>
<td>•</td>
<td></td>
</tr>
</tbody>
</table>

* Hot Work - includes riveting, welding, flame cutting or burning and any other work involving the use or generation of heat or the production of sparks
## Annex D-2:

### Safety Training Courses for Management Personnel, Supervisory Personnel and Workers (Shall Include, but not Be Limited to the Following)

<table>
<thead>
<tr>
<th>Level</th>
<th>Safety Training Programmes</th>
</tr>
</thead>
</table>
| Management Personnel         | Safety Management System  
Training for Ship-repair Manager  
Training for Noise Monitoring Officer  
Training for Noise Control Officer  
Training for Workplace Safety and Health Officer (WSHO)  
Training for Fire Safety Manager  
Training for Safety Committee Member  
Accident/Incident Investigation  
Group Communication  
Personnel Communication  
Emergency Preparedness  
Planned Inspection  
Behavioural-based Safety |
| Supervisory Personnel        | Safety Instruction Course for Supervisors  
Safety Management System  
Training for Scaffold Supervisor  
Training for Lifting Supervisor  
Training for Safety Assessor for Hot Work Certification  
Training for Confined Space Assessor  
Training for Safety Committee Member  
Emergency Response  
Safe Work Practices  
Group Communication  
Accident/Incident Investigation  
Hazard Analysis Technique  
Behavioural-based Safety |
| Marine Worker / Tradesman    | Shipyard Safety Instruction Courses  
Safety Orientation for New Employees/Contractors  
Training for Safety Committee Members  
Training for Hot Work Tradesmen  
Training for Painters  
Training for Crane Operators  
Training for Forklift Operators  
Training for Scaffold Erectors  
Training for Self-Propelled Platform Operators  
Training for Respirator Users  
Training for Riggers and Signalers  
Training for Fire Watchman  
Training for High Pressure Equipment Users  
Training for First Aiders  
Training for Powered Tools Users  
Hazard Identification  
Safe Work Practices  
Emergency Response  
Housekeeping Training  
Behavioural-based Safety |
Annex E-1:

In-House Safety Rules and Regulations (Shall Include, but not Be Limited to the Following)

- Compliance with safe work practices and permit-to-work system;
- Provision and use of personal protective equipment;
- Removal or making safety devices or provisions inoperative;
- Operation and maintenance of machinery and equipment and tools;
- Handling, storage and use of substances and materials;
- Reporting of accidents, incidents and hazards;
- Removal of hazards at the workplace;
- Maintenance of housekeeping and cleanliness at the workplace;
- Prohibition of horseplay;
- Operation of equipment without authority;
- Prohibition and misuse of equipment;
- Ensuring competency at work;
- Prohibition of smoking except at designated areas; and
- Prohibition of speeding of motorised vehicles and equipment.
Annex E-2:

List of High-Risk Work as Defined by the WSH (Shipbuilding and Ship-repairing) Regulations

The following types of work that are carried out in relation to a ship (including a ship under construction) in a shipyard or on board a ship in a harbour are referred to in the Regulations as “high-risk works”. Carrying of out these works requires the application of permit-to-work as stipulated in the Regulations:

- Work which involves the use of any hazardous, volatile, corrosive or flammable chemical, material or solvent in significant quantities;
- Work involving entry into any confined space;
- Spray painting work;
- Grit-blasting work carried out in a confined space;
- Testing or dismantling of any pipe or equipment that
  - Contains, or had contained, oil or substances that are flammable, toxic or corrosive; or
  - Contains steam;
- Ballasting and deballasting of a ship;
- Repair or maintenance work carried out on the hydraulic system of a ship;
- Bunkering and transferring of fuel oil;
- Radiography work; and
- Such other work as the Commissioner may specify in writing to the occupier of the shipyard or the master, owner or agent of the ship or the employer or principal of the person carrying out the work.
Annex E-3:

Permit-to-Work Flow Chart

**Step 1: Implementation of System**
Implementation of Permit-to-Work System by responsible person.

**Step 2: Application of Permit**
Application for Permit-to-Work by supervisor or foreman of person carrying out hot work, using form and in manner required by ship repair manager; state safety measures, and address the application to ship repair manager and submit to safety assessor.

**Step 3: Evaluation of Application**
Safety assessor inspects and makes assessment of work area with the supervisor or foreman to ensure that workplace is safe for the work to be carried out.

**Step 4: Issue of Permit**
Ship repair manager issues Permit-to-Work if he is satisfied that work is safe to be carried out.

**Step 5: Posting of Permit / Carry out Work**
Supervisor / foreman clearly posts the Permit-to-Work and ensures it is not removed throughout the work. Where practicable, provide a sketch of area where the work is to be carried out.

**Step 6: Monitoring**
Supervisor / foreman ensures safety measures are in place all the time. Ship repair manager continually reviews progress of work.

**Step 7: Completion**
Supervisor / foreman informs the ship repair manager upon completion of job.
Annex E-4:

Permit-To-Work Formats (sample)

1) Permit for Hot Work
2) Permit for Painting
3) Permit for Grit Blasting in Confined Spaces
4) Permit for Ballasting / Deballasting
5) Permit for Dismantling / Testing of Pipes Valves and Heating Coils
6) Permit for Radiography Work
7) Permit for Repair / Maintenance Work of Hydraulic System
8) Permit for Bunkering by Barge
9) Permit for Transferring Oil
10) Permit for Chemical Cleaning of Generators/Motors
11) Permit for Chemical Cleaning / Flushing / Pickling Boiler / Heat Exchanger / Pipe System
12) Permit for Entry into Confined Spaces
**1. Permit for Hot Work**

Hot Work shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel.

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Hull</th>
</tr>
</thead>
</table>

Vessel's Name:  
Commencement: Date: / /  
Time: Hrs  
Location of Work:  
Completion: Date: / /  
Time: Hrs  
Types of Hot Work: Gouging / Burning / Welding / Pre-heating / Grinding / Others: (specify)*

Details of the Hot Work to be carried out:

**Stage I: Application by Trade Foreman / Supervisor**

1. Special hazards and risks (if any):

2. Measures taken:

I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been coordinated. Further, I shall ensure compliance with the under-mentioned requirements prior to the commencement and during the hot work:

Please tick the applicable requirements in the appropriate boxes.

- Presence of fire-watch with fire extinguishers/ fire hoses
- Prominent display of hot work signboard
- Supply of sufficient forced ventilation and provision of adequate lighting
- Prominent display of the Hot Work Permit with sketch
- Display of revolving lights

Name:  
Designation:  
Signature:  
Date: / /  
Time: Hrs

**Stage II: Endorsement by Safety Assessor**

I have inspected and confirm that:

1. The hot work area and its surroundings are free from combustible / flammable substances; and
2. The necessary safety requirements have been complied with.

Additional safety precautions to be taken:

I hereby endorse the permit

Name:  
Signature:  
Date: / /  
Time: Hrs

**Stage IIIA: Approval by Ship Repair Manager**

1. I have evaluated the hazards and risks associated with the work.
2. I have ensured that there are no incompatible work processes being carried out in the same vicinity at the same time.
3. All reasonably practicable measures will or have been taken to ensure safety and health of person carrying out the work.
4. All persons carrying out the hot work are informed of the hazards associated with it.
5. I confirm that I have co-ordinated the work at the VSCC meeting.
6. I am satisfied that a thorough inspection and proper assessment of the hot work area and its surroundings have been made so that the work can be carried out safely.

I hereby endorse the permit

Name:  
Signature:  
Date: / /  
Time: Hrs

**Stage IIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)**

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

Name:  
Signature:  
Date: / /  
Time: Hrs

**Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor**

The above-mentioned work was completed on / / at hours.

Name:  
Signature:  
Date: / /  
Time: Hrs

*Delete where not applicable  
See overleaf for explanatory notes
Procedure for Obtaining Approval of Permit for Hot Work

1) The Trade Foreman / Supervisor shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.

2) The Trade Foreman / Supervisor shall be familiar with the work schedule, the nature of the work to be carried out and the risks and hazards involved in respect of the work to be done before submitting his permit-to-work application.

3) The Trade Foreman / Supervisor shall take the relevant safety measures such as ensuring the hot work area and its surroundings are free from combustible and flammable substances.

4) He shall raise 5 copies of the permit-to-work application.

5) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel’s name, location of hot work, commencement / completion date and time, type of hot work and details of the hot work to be carried out. He shall also include a sketch of the hot work area.

6) He shall fill up and sign Stage I in all 5 copies of the permit-to-work application and personally submit all 5 copies to the Safety Assessor.

7) On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, the nature of the work to be done. and risks and hazards involved in respect of the work to be done; and
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.

8) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.

9) If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.

10) On receipt of the endorsed application from the Safety Assessor, the SRM shall
   a) Evaluate the information given to him relating to the work to be carried out and the risks and hazards involved;
   b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
   c) Ensure that all reasonably practicable measures will or have been taken for the safety and health of persons carrying out the work;
   d) All persons carrying out the high-risk work are informed of the hazards associated with it;
   e) Confirm that co-ordination have been made about the work at the VSCC meeting.
   f) Be satisfied that a thorough inspection and proper assessment of the hot work area and its surroundings have been made so that the work can be carried out safely. The SRM shall retain a copy of the permit-to-work.

11) For tender jobs, the Trade Foreman / Supervisor shall brief the Sub-contractor Foreman / Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman / Supervisor acknowledges the briefing by signing Stage III B of the application for the, permit-to-work in the ‘Display’ and ‘Trade Foreman / Supervisor’ copies.

12) The Trade Foreman / Supervisor shall display the copy of the permit-to-work marked ‘Display’ at the vicinity of the work area together with the sketch. He retains the copy marked ‘Trade Foreman / Supervisor’ and hands over two copies marked ‘Safety’ to the Safety Assessor and the other copy marked ‘SRM’ to the SRM.

13) He could then commence the hot work.

14) Upon completion of the hot work, the Trade Foreman / Supervisor shall sign Stage IV in the copy marked ‘Trade Foreman / Supervisor’ and hand over the copy to the Safety Personnel.

Note:

a) Validity of Permit:

<table>
<thead>
<tr>
<th>Location</th>
<th>Maximum Validity Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>E/Rms, P/Rms, Cargo Oil Tanks, F.O. Tanks</td>
<td>Maximum up to 7 days</td>
</tr>
<tr>
<td>Main Deck, Stores Cargo Holds, Accommodation Area</td>
<td>Maximum up to 14 days</td>
</tr>
<tr>
<td>DB Tanks, Cofferdams, Duct Keels, Ballast Tanks and Other Similar Compartments</td>
<td>Case by Case Basis (Maximum up to 14 days)</td>
</tr>
<tr>
<td>Designated Hot Work Areas</td>
<td>Maximum up to 30 days</td>
</tr>
</tbody>
</table>
b) The permit is invalidated should combustible substances be introduced in the hot work area or should any of the following incompatible works be carried out in the same area:

   (i) Dismantling of valves and pipelines  
   (ii) Ballasting and deballastion  
   (iii) Testing of valves / pipes / heating coils  
   (iv) Painting  
   (v) Chemical cleaning  
   (vi) Sludge cleaning  
   (vii) Transferring of oil  
   (viii) Bunkering by barge

In these cases, all hot work shall cease and safety personnel informed.

**General Requirements**

a) The work shall not commence until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman / Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permit-to-work shall be highlighted at the VSCC meeting.

e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked ‘Trade Foreman / Supervisor’ of the permit shall be handed over to the Safety Personnel.

g) The Trade Foreman / Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked ‘Trade Foreman / Supervisor’ is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman / Supervisor to remove the display copy once the job has been completed or when the permit has expired.
2. Permit for Painting

<table>
<thead>
<tr>
<th>S/No</th>
<th>Confined</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>Others</td>
<td>The process shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel</td>
<td></td>
</tr>
</tbody>
</table>

Vessel’s Name: 
Location of Work: 
Commencement: Date: / / Completion Date: / / Time: Hrs Time 
Types of Paint: *Brush / Roller / Spray 

Stage I: Application by Trade Foreman / Supervisor

1. Special hazards and risks (if any):

2. Measures taken:

I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been coordinated. Further, I shall take the undermentioned safety measures prior to the commencement of the work process and shall be responsible for maintaining them during the entire process.

<table>
<thead>
<tr>
<th>Confined Space</th>
<th>Open Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prominent display of appropriate signboards at the paint storage area and the space to be painted</td>
<td>Prominent display of appropriate signboards at the paint storage area</td>
</tr>
<tr>
<td>Co-ordination of painting and storage areas</td>
<td>Co-ordination of painting and storage areas</td>
</tr>
<tr>
<td>Supply of sufficient forced ventilation</td>
<td>Use of cartridge type respirator</td>
</tr>
<tr>
<td>No hot work in the space to be painted</td>
<td></td>
</tr>
<tr>
<td>No hot work within 3 meters of the common bulkheads in the adjacent tanks</td>
<td></td>
</tr>
<tr>
<td>Provision of adequate flame proof lights with cables in good condition</td>
<td></td>
</tr>
<tr>
<td>Use of cartridge type respirator/ air fed mask</td>
<td></td>
</tr>
<tr>
<td>Proper blanking/ isolation of pipelines leading to other compartments</td>
<td></td>
</tr>
</tbody>
</table>

Name: ____________ Designation: ____________ Signature: ____________ Date: ____________ / ____________ / Time: ____________ Hrs 

Note: The necessary safety measures must be completed before the application is handed over to the safety Assessor/ Safety Assistant for endorsement.

Stage II: Endorsement by Safety Assessor

I have inspected the work area and its surroundings and confirm that the necessary safety requirements have been complied with. I hereby endorse the permit.

Name: ____________ Signature: ____________ Date: ____________ / ____________ / Time: ____________ Hrs

Stage IIIA: Approval by Ship Repair Manager

1. I have evaluated the hazards and risks associated with the work.
2. I have ensured that there are no incompatible work processes being carried out in the same vicinity at the same time.
3. All reasonably practicable measures will or have been taken to ensure safety and health of person carrying out the work.
4. All persons carrying out the hot work are informed of the hazards associated with it.
5. I confirm that I have co-ordinated the work at the VSCC meeting.
6. I am satisfied that a thorough inspection and proper assessment of the hot work area and its surroundings have been made so that the work can be carried out safely. I hereby approve the permit.

Name: ____________ Signature: ____________ Date: ____________ / ____________ / Time: ____________ Hrs

Stage IIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

Name: ____________ Signature: ____________ Date: ____________ / ____________ / Time: ____________ Hrs

Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor

The above-mentioned work was completed on ____________ / ____________ / at ____________ hours. I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

Name: ____________ Designation: ____________ Signature: ____________ Date: ____________ / ____________ / Time: ____________ Hrs

Stage V: Notification of Completion of Work by Trade Foreman / Supervisor

I confirm that the space ____________ is certified gas free.

Name: ____________ Designation: ____________ Signature: ____________ Date: ____________ / ____________ / Time: ____________ Hrs

*Delete where not applicable
See overleaf for explanatory notes
Procedure for Obtaining Approval of Permit for Painting

1) The Trade Foreman / Supervisor shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.

2) The Trade Foreman / Supervisor shall be familiar with the work schedule, the nature of the work to be carried out and the risks and hazards involved in respect of the work to be done before submitting his permit-to-work application.

3) He shall raise 5 copies of the permit-to-work application.

4) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, commencement / completion date and time, type of paint and method of application. He shall indicate ☑ in the box provided at the top of the permit whether the application is for open or confined space painting.

5) He shall fill up and sign Stage I in all 5 copies of the permit-to-work application and personally submit all 5 copies to the Safety Assessor / Safety Assistant.

6) On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, the nature of the work to be done and risks and hazards involved in respect of the work to be done; and
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.

7) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.

8) If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.

9) On receipt of the endorsed application from the Safety Assessor, the SRM shall
   a) Evaluate the information given to him relating to the work to be carried out and the risks and hazards involved;
   b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
   c) Ensure that all possible safety precautions and measures have been implemented and enforced; and.
   d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.

10) With the approved hazardous substances storage checklist, the Trade Foreman / Supervisor can arrange to bring up the paint drums to the vessel.

11) For tender jobs, the Trade Foreman / Supervisor shall brief the Sub-contractor Foreman / Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman / Supervisor acknowledges the briefing by signing Stage IIIB of the application for the, permit-to-work in the ‘Display’ and ‘Trade Foreman / Supervisor’ copies.

12) The Trade Foreman / Supervisor shall display the copy of the permit-to-work marked ‘Display’ at the vicinity of the work area together with the sketch. He retains the copy marked ‘Trade Foreman / Supervisor’ and hands over two copies marked ‘Safety’ to the Safety Assessor and the other copy marked ‘SRM’ to the SRM.

13) He could then commence the painting work.

14) Upon completion of the hot work, the Trade Foreman / Supervisor shall sign Stage IV in the copy marked ‘Trade Foreman / Supervisor” and hand over the copy to the Safety Personnel. For confined spaces painting, ventilation shall be maintained during the curing period.

15) The Safety Assessor / Safety Assistant shall notify the SRM once the area has been certified gas free.

Note:
   i) This permit shall also apply for spray painting of open spaces. Open spaces include the hull, main deck and superstructure of vessels.
   ii) For spray painting of open spaces, Hot Work shall not be allowed within 3 metres if the area is to be painted.
General Requirements

a) The work shall not commence until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman / Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.

e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked ‘Trade Foreman / Supervisor’ of the permit shall be handed over to the Safety Personnel.

g) The Trade Foreman / Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked ‘Trade Foreman / Supervisor’ is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman / Supervisor to remove the display copy once the job has been completed or when the permit has expired.
3. Permit for Grit Blasting in Confined Spaces

<table>
<thead>
<tr>
<th>S/No</th>
<th>Confined</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>Others</td>
<td>The process shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vessel's Name:</th>
<th>Location of Work:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Commencement:</th>
<th>Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date: / /</td>
<td>Date: / /</td>
</tr>
<tr>
<td>Time: Hrs</td>
<td>Time</td>
</tr>
</tbody>
</table>

| Types of Paint: | *Brush / Roller / Spray |

**Stage I: Application by Trade Foreman / Supervisor**

1. Special hazards and risks (if any):

2. Measures taken:

I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been coordinated. Further, I shall take the undermentioned safety measures prior to the commencement of the work process and shall be responsible for maintaining them during the entire process.

- Provision of adequate lighting
- Blasters equipped with air fed protective hoods

Name: ___________ Designation: ___________ Signature: ___________ Date: ___ / ___ / ___ Time: ______ Hrs

Note: The necessary safety measures must be completed before the application is handed over to the Safety Assessor / Safety Assistant for endorsement.

**Stage II: Endorsement by Safety Assessor**

I have inspected the work area and its surroundings and confirm that the necessary safety requirements have been complied with. I hereby endorse the permit.

Name: ___________ Signature: ___________ Date: ___ / ___ / ___ Time: ______ Hrs

**Stage IIIA: Approval by Ship Repair Manager**

1. I have evaluated the hazards and risks associated with the work.
2. I confirm that I have co-ordinated the work at the VSCC meeting.
3. I have instructed the Safety Assessor / Safety Assistant to ensure that the hazards and risks are eliminated or critically reduced to a contemporary objective standard and all recommended safety measures are complied with.
4. I am satisfied that a thorough inspection and proper assessment of the work area and its surroundings have been made so that the work can be carried out safely.

I hereby approve the permit.

Name: ___________ Signature: ___________ Date: ___ / ___ / ___ Time: ______ Hrs

**Stage IIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)**

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

Name: ___________ Signature: ___________ Date: ___ / ___ / ___ Time: ______ Hrs

**Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor**

The above-mentioned work was completed on ___ / ___ / ___ at ______ hours.

I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

Name: ___________ Designation: ___________ Signature: ___________ Date: ___ / ___ / ___ Time: ______ Hrs
Procedure for Obtaining Approval of Permit for Grit Blasting in Confined Spaces

1) The Trade Foreman / Supervisor shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.

2) The Trade Foreman / Supervisor shall be familiar with the work schedule, the nature of the work to be carried out and the risks and hazards involved in respect of the work to be done before submitting his permit-to-work application.

3) The Trade Foreman / Supervisor shall take the relevant safety measures.

4) He shall raise 5 copies of the permit-to-work application.

5) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel’s name, location of work, commencement / completion date and time.

6) He shall fill up and sign Stage I in all 5 copies of the permit-to-work application and personally submit all 5 copies to the Safety Assessor / Safety Assistant.

7) On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, the nature of the work to be done and risks and hazards Involved in respect of the work to be done; and
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.

8) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.

9) If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.

10) On receipt of the endorsed application from the Safety Assessor, the SRM shall
    a) Evaluate the information given to him relating to the work to be carried out and the risks and hazards involved;
    b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
    c) Ensure that all possible safety precautions and measures have been implemented and enforced; and
    d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.

11) For tender jobs, the Trade Foreman / Supervisor shall brief the Sub-contractor Foreman / Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman / Supervisor acknowledges the briefing by signing Stage IIIB of the application for the, permit-to-work in the ‘Display’ and ‘Trade Foreman / Supervisor’ copies.

12) The Trade Foreman / Supervisor shall display the copy of the permit-to-work marked ‘Display’ at the vicinity of the work area together with the sketch. He retains the copy marked ‘Trade Foreman / Supervisor’ and hands over two copies marked ‘Safety’ to the Safety Assessor and the other copy marked ‘SRM’ to the SRM.

13) He could then commence the painting work.

14) Upon completion of the hot work, the Trade Foreman / Supervisor shall sign Stage IV in the copy marked ‘Trade Foreman / Supervisor’ and hand over the copy to the Safety Personnel.

Special Requirements

a) The work shall not commence until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman / Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.

e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked ‘Trade Foreman / Supervisor’ of the permit shall be handed over to the Safety Personnel.

g) The Trade Foreman / Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked ‘Trade Foreman / Supervisor’ is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman / Supervisor to remove the display copy once the job has been completed or when the permit has expired.
4. Permit for Ballasting / Deballasting

**S/No**

<table>
<thead>
<tr>
<th>Confined</th>
<th>Open</th>
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<tbody>
<tr>
<td>Others</td>
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The process shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel.

**Vessel's Name:**

**Location of Work:**

**Commencement:**

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<tr>
<th>Date:</th>
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<tr>
<td>Time:</td>
<td>Hrs</td>
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</table>

**Completion:**

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<th>Date:</th>
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</thead>
<tbody>
<tr>
<td>Time:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Types of Paint:**

*Brush / Roller / Spray*

---

**Stage I: Application by Trade Foreman / Supervisor**

1. Special hazards and risks (if any):

2. Measures taken:

   **1. By Master / Chief Officer**

   I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been coordinated. Further, I shall take the undermentioned safety measures prior to the commencement of the work process and shall be responsible for maintaining them during the entire process.

   - Clear all persons from the tanks involved
   - Isolate pipelines / valves leading to the other tanks
   - Ensure no hot work in all confined spaces within the ballast system during ballasting / deballasting
   - Ensure the mooring system is attended to

   **2. By Trade Foreman / Supervisor**

   I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been co-ordinated. Further, I agree to take the following safety precautions:

   - Clear all persons from the tanks involved
   - Ensure from Master / Chief Officer the pipelines/valves leading to the other tanks are isolated

   Please tick the applicable requirements in the appropriate boxes.

   **Name:**
   **Designation:**
   **Signature:**
   **Date:** / /  
   **Time:** Hrs

**Note 1:** Master / Chief shall raise the permit if the ship's system are to be used. Trade Foreman / Supervisor shall raise the permit if the shore lines are to be used.

**Note 2:** The necessary safety measures shall be compiled with before the applications is handed over to the Safety Assessor / Safety Assistant for his endorsement.

---

**Stage II: Endorsement by Safety Assessor**

I have inspected the work area and its surroundings and confirm that the necessary safety requirements have been complied with. I hereby endorse the permit.

**Name:**
**Signature:**
**Date:** / /  
**Time:** Hrs

---

**Stage IIIA: Approval by Ship Repair Manager**

1. I have evaluated the hazards and risks associated with the work.
2. I have ensured that there are no incompatible work processes being carried out in the same vicinity at the same time.
3. All reasonably practicable measures will or have been taken to ensure safety and health of person carrying out the work.
4. All persons carrying out the hot work are informed of the hazards associated with it.
5. I confirm that I have co-ordinated the work at the VSCC meeting.
6. I am satisfied that a thorough inspection and proper assessment of the hot work area and its surroundings have been made so that the work can be carried out safely.

I hereby approve the permit.

**Name:**
**Signature:**
**Date:** / /  
**Time:** Hrs

---

**Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor**

The above-mentioned work was completed on / /  at  hours.

I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

**Name:**
**Designation:**
**Signature:**
**Date:** / /  
**Time:** Hrs

**Note:** For ballasting / deballasting using ship's system, no hot work shall be carried out in all confined spaces within the ballast system during ballasting / deballasting operation.

---

**Stage V: Notification of Completion of Work by Trade Foreman / Supervisor**

I confirm that the space is certified gas free.

**Name:**
**Designation:**
**Signature:**
**Date:** / /  
**Time:** Hrs

*Delete where not applicable

See overleaf for explanatory notes.
Procedure for Obtaining Approval of Permit for Ballasting / Deballasting

1) The Trade Foreman / Supervisor shall highlight at the Vessel Safety Co-Ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.

2) The person in charge shall be familiar with the work schedule, the nature of the work to be carried out and the risks and hazards involved in respect of the work to be done before submitting his permit-to-work application.

3) He shall take the relevant safety measures.

4) He shall raise 5 copies of the permit-to-work application.

5) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, tanks involved, commencement / completion date and time and method of filling / transfer.

6) He shall fill up and sign Stage I in all 5 copies of the permit-to-work application and personally submit all 5 copies to the Safety Assessor / Safety Assistant.

7) On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, the nature of the work to be done and risks and hazards involved in respect of the work to be done; and
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.

8) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.

9) If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.

10) On receipt of the endorsed application from the Safety Assessor, the SRM shall
   a) Evaluate the information given to him relating to the work to be carried out and the risks and hazards involved;
   b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
   c) Ensure that all possible safety precautions and measures have been implemented and enforced; and
   d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage III of the application for the permit-to-work.

11) The applicant shall display the copy of the permit-to-work marked 'Display' at the vicinity of the work area together with the sketch. He retains the copy marked 'Trade Foreman / Supervisor' and hands over two copies marked 'Safety' to the Safety Assessor and the other copy marked 'SRM' to the SRM.

12) He could then commence the painting work.

13) Upon completion of the hot work, the Trade Foreman / Supervisor shall sign Stage IV in the copy marked 'Trade Foreman / Supervisor' and hand over the copy to the Safety Personnel.

Special Requirements

a) The work shall not commence until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman / Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.

e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked 'Master / Chief Officer; Trade Foreman / Supervisor' of the permit shall be handed over to the Safety Personnel.

g) The Trade Foreman / Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked 'Master / Chief Officer; Trade Foreman / Supervisor' is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman / Supervisor to remove the display copy once the job has been completed or when the permit has expired.
### 5. Permit for Dismantling / Testing of Pipes / Valves and Heating Coils

<table>
<thead>
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<th>S/No</th>
<th>Confined</th>
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<tbody>
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<td>Others</td>
<td>The process shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Vessel’s Name:</th>
<th>Location of Work:</th>
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<table>
<thead>
<tr>
<th>Commencement: Date:</th>
<th>/ /</th>
<th>Completion Date:</th>
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<tr>
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<td>Hrs</td>
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</table>

<table>
<thead>
<tr>
<th>Types of Paint:</th>
<th>*Brush / Roller / Spray</th>
</tr>
</thead>
</table>

#### Stage I: Application by Trade Foreman / Supervisor

1. Special hazards and risks (if any):

2. Measures taken:

   - I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been coordinated. Further, I shall take the undermentioned safety measures prior to the commencement of the work process and shall be responsible for maintaining them during the entire process.

   - **Confined Space (All Pipes and Valves)**

     - Prominent display of appropriate signboards at the paint storage area and the space to be painted
     - Supply of sufficient forced ventilation
     - Provision of adequate flame proof lights with cables in good condition
     - No hot work in the above location / all confined spaces
     - Valves of confined spaces in ballast or containing oil isolated / rendered inoperative
     - Use of containers / plastic bags for collecting oily water / oil
     - Proper blanking / isolation of pipelines leading to other compartments

   - **Open Space (Oil, Gas, Chemical Pipes & Valves)**

     - Prominent display of appropriate signboards at the vicinity of work
     - No hot work within a radius of 3 metres of the area and condoning off the area with red and white tape
     - Use of containers / plastic bags for collecting oily water / oil

   - Please tick the applicable requirements in the appropriate boxes

   Name: ____________ Designation: ____________ Signature: ____________ Date: ____________ / ____________ / ____________ Time: ____________ Hrs

   Note: The necessary safety measures must be completed before the application is handed over to the Safety Assessor / Safety Assistant for endorsement.

#### Stage II: Endorsement by Safety Assessor

   I have inspected the work area and its surroundings and confirm that the necessary safety requirements have been complied with. I hereby endorse the permit

   Name: ____________ Signature: ____________ Date: ____________ / ____________ / ____________ Time: ____________ Hrs

#### Stage IIIA: Approval by Ship Repair Manager

1. I have evaluated the hazards and risks associated with the work.
2. I have ensured that there are no incompatible work processes being carried out in the same vicinity at the same time.
3. All reasonably practicable measures will or have been taken to ensure safety and health of person carrying out the work.
4. All persons carrying out the hot work are informed of the hazards associated with it.
5. I confirm that I have co-ordinated the work at the VSCC meeting.
6. I am satisfied that a thorough inspection and proper assessment of the hot work area and its surroundings have been made so that the work can be carried out safely.

   I hereby approve the permit

   Name: ____________ Signature: ____________ Date: ____________ / ____________ / ____________ Time: ____________ Hrs

#### Stage IIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)

   I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

   Name: ____________ Signature: ____________ Date: ____________ / ____________ / ____________ Time: ____________ Hrs

#### Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor

   The above-mentioned work was completed on ____________ / ____________ / ____________ at ____________ hours. I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

   Name: ____________ Designation: ____________ Signature: ____________ Date: ____________ / ____________ / ____________ Time: ____________ Hrs

#### Stage V: Notification of Completion of Work by Trade Foreman / Supervisor

   I confirm that the space ____________ is certified gas free.

   Name: ____________ Designation: ____________ Signature: ____________ Date: ____________ / ____________ / ____________ Time: ____________ Hrs

*Delete where not applicable

See overleaf for explanatory notes
Procedure for Obtaining Approval of Permit for Dismantling / Testing Pipes / Valves and Heating Coils

1) The Trade Foreman/Supervisor shall highlight at the Vessel Safety Co-Ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.

2) The person in charge shall be familiar with the work schedule, the nature of the work to be carried out and the risks and hazards involved in respect of the work to be done before submitting his permit-to-work application.

3) The Trade Foreman / Supervisor shall take the relevant safety measures.

4) He shall raise 5 copies of the permit-to-work application.

5) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, commencement / completion date and time, type of work. He shall indicate in the box provided at the top of the permit whether the dismantling / testing is for oil / gas / chemical pipes / valves or system containing steam. In addition, the applicant has to indicate ☑ in the box provided at the top of the permit whether the work is going to be carried out in the open or confined space.

6) He shall fill up and sign Stage I in all 5 copies of the permit-to-work application and personally submit all 5 copies to the Safety Assessor / Safety Assistant.

7) On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, the nature of the work to be done, and the risks and hazards involved in respect of the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.

8) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.

9) If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.

10) On receipt of the endorsed application from the Safety Assessor, the SRM shall
   a) Evaluate the information given to him relating to the work to be carried out and the risks and hazards involved;
   b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
   c) Ensure that all possible safety precautions and measures have been implemented and enforced; and
   d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.

11) For tender jobs, the Trade Foreman / Supervisor shall brief the Sub-contractor Foreman / Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman / Supervisor acknowledges the briefing by signing Stage IIIB of the application for the, permit-to-work in the 'Display' and 'Trade Foreman / Supervisor' copies.

12) The Trade Foreman / Supervisor shall display the copy of the permit-to-work marked 'Display' at the vicinity of the work area together with the sketch. He retains the copy marked 'Trade Foreman / Supervisor' and hands over two copies marked 'Safety' to the Safety Assessor and the other copy marked 'SRM' to the SRM.

13) He can then commence the painting work.

14) Upon completion of the hot work, the Trade Foreman / Supervisor shall sign Stage IV in the copy marked 'Trade Foreman / Supervisor' and hand over the copy to the Safety Personnel.

15) The Safety Assessor / Safety Assistant shall notify the SRM when the location is certified gas free.

Note:
   a) This permit is required for the following:
      i) All pipelines and valves in confined spaces;
      ii) Oil gas and chemical pipelines and valves in open spaces;
      iii) Dismantling of pipelines / valves in the fuel oil purifier room and main fuel oil system connected to the main engine generator and boiler;
      iv) System that contains steam.
   b) This permit is not required for dismantling sea valves.
   c) Dismantled pipelines leading to other compartments must be blanked off with metal blanks before 'Hot Work' can be permitted in a compartment.
   d) In open spaces, hot work should not be allowed within a radius of 3 metres of the area where dismantling is in progress.
Special Requirements

a) The work shall not commence until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman / Supervisor to maintain the safety requirements throughout the job performance; if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.

e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked ‘Master / Chief Officer; Trade Foreman / Supervisor’ of the permit shall be handed over to the Safety Personnel.

g) The Trade Foreman / Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked ‘Master / Chief Officer; Trade Foremen / Supervisor’ is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman / Supervisor to remove the display copy once the job has been completed or when the permit has expired.
6. Permit for Radiography Work

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<th>S/No</th>
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The process shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel.

Vessel's Name:  
Location of Work:  
Commencement: Date: / /  
Time: Hrs  
Completion: Date: / /  
Time:  
Types of Paint: *Brush / Roller / Spray

**Stage I: Application by Trade Foreman / Supervisor**

1. Special hazards and risks (it any):

2. Measures taken:

I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been coordinated. Further, I shall take the under-mentioned safety measures prior to the commencement of the work process and shall be responsible for maintaining them during the entire process:

- Clear all persons from the tanks involved
- Prominent display of warning signboards at all possible accesses to the radiography area
- Installation of blinking lights (applicable for night work only)
- Standby of radiography
- Barricading of affected area

Name: ______________  
Designation: ______________  
Signature: ______________  
Date: __/__/  
Time: _______ Hrs

Note: The necessary safety measures must be completed before the application is handed over to the Safety Assessor / Safety Assistant for endorsement.

**Stage II: Endorsement by Safety Assessor**

I have inspected the work area and its surroundings and confirm that the necessary safety requirements have been complied with. I hereby endorse the permit.

Name: ______________  
Signature: ______________  
Date: __/__/  
Time: _______ Hrs

**Stage IIIA: Approval by Ship Repair Manager**

1. I have evaluated the hazards and risks associated with the work.
2. I have ensured that there are no incompatible work processes being carried out in the same vicinity at the same time.
3. All reasonably practicable measures will or have been taken to ensure safety and health of person carrying out the work.
4. All persons carrying out the hot work are informed of the hazards associated with it.
5. I confirm that I have co-ordinated the work at the VSCC meeting.
6. I am satisfied that a thorough inspection and proper assessment of the hot work area and its surroundings have been made so that the work can be carried out safely.

I hereby approve the permit.

Name: ______________  
Signature: ______________  
Date: __/__/  
Time: _______ Hrs

**Stage IIIB: Endorsement by Sub-contractor Foreman/ Supervisor (for tender job only)**

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

Name: ______________  
Signature: ______________  
Date: __/__/  
Time: _______ Hrs

**Stage IV: Notification of Completion of Work by Trade Foreman/ Supervisor**

The above-mentioned work was completed on __/__/ at _______ hours.
I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

Name: ______________  
Designation: ______________  
Signature: ______________  
Date: __/__/  
Time: _______ Hrs
Procedure for Obtaining Approval of Permit for Radiography Work

1) The Trade Foreman / Supervisor shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.

2) The person in charge shall be familiar with the work schedule, the nature of the work to be carried out and the risks and hazards involved in respect of the work to be done before submitting his permit-to-work application.

3) The Trade Foreman / Supervisor shall take the relevant safety measures.

4) He shall raise 5 copies of the permit-to-work application.

5) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, commencement / completion date and time, type of work. He shall indicate ☑ in the box provided at the top of the permit whether the work is going to be carried out in the open or confined space.

6) He shall fill up and sign Stage I in all 5 copies of the permit-to-work application and personally submit all 5 copies to the Safety Assessor / Safety Assistant.

7) On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, the nature of the work to be done and the risks and hazards involved in respect of the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present

8) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.

9) If the Safety Assessor is satisfied with the results of the Inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.

10) On receipt of the endorsed application from the Safety Assessor, the SRM shall
   a) Evaluate the information given to him relating to the work to be carried out and the risks and hazards involved;
   b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
   c) Ensure that all possible safety precautions and measures have been implemented and enforced; and.
   d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.

11) For tender jobs, the Trade Foreman / Supervisor shall brief the Sub-contractor Foreman / Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman / Supervisor acknowledges the briefing by signing Stage IIIB of the application for the, permit-to-work in the 'Display' and 'Trade Foreman / Supervisor' copies.

12) The Trade Foreman / Supervisor shall display the copy of the permit-to-work marked 'Display' at the vicinity of the work area together with the sketch. He retains the copy marked 'Trade Foreman / Supervisor' and hands over two copies marked 'Safety' to the Safety Assessor and the other copy marked 'SRM' to the SRM.

13) He could then commence the painting work.

14) Upon completion of the hot work, the Trade Foreman / Supervisor shall sign Stage IV in the copy marked 'Trade Foreman / Supervisor' and hand over the copy to the Safety Personnel.

Special Requirements

a) The work shall not commence until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman / Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any Incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.

e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked 'Master / Chief Officer; Trade Foreman / Supervisor' of the permit shall be handed over to the Safety Personnel.

g) The Trade Foreman / Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked 'Master / Chief Officer; Trade Foreman / Supervisor' is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman / Supervisor to remove the display copy once the job has been completed or when the permit has expired.
# 7. Permit for Repair / Maintenance Work of Hydraulic System

<table>
<thead>
<tr>
<th>S/No</th>
<th>Confined</th>
<th>Open</th>
</tr>
</thead>
</table>

**Others**

The process shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel.

### Vessel's Name:

<table>
<thead>
<tr>
<th>Commencement:</th>
<th>Location of Work:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td>Date:</td>
</tr>
<tr>
<td>Time:</td>
<td>Time:</td>
</tr>
</tbody>
</table>

### Types of Paint:

*Brush / Roller / Spray

### Stage I: Application by Trade Foreman / Supervisor

1. Special hazards and risks (if any):

2. Measures taken:

   - Power supply isolated and tagged
   - Valves for the system closed / lashed / tagged
   - No hot work in the affected area
   - Display of warning signboards

Name: __________ Designation: __________ Signature: __________ Date: __________ / __________ / __________ Time: __________ Hrs

Note: The necessary safety measures must be completed before the application is handed over to the Safety Assessor / Safety Assistant for endorsement.

### Stage II: Application by Trade Foreman / Supervisor

I agree to the following safety precautions:

- Power supply isolated and tagged
- Valves for the system closed / lashed / tagged
- No hot work in the affected area

Note: The necessary safety measures must be completed before the application is handed over to the Safety Assessor / Safety Assistant for endorsement.

### Stage II: Endorsement by Safety Assessor

I have inspected the work area and its surroundings and confirm that the necessary safety requirements have been complied with. I hereby endorse the permit.

Name: __________ Signature: __________ Date: __________ / __________ / __________ Time: __________ Hrs

### Stage IIIA: Approval by Ship Repair Manager

1. I have evaluated the hazards and risks associated with the work.
2. I confirm that I have co-ordinated the work at the VSCC meeting.
3. I have instructed the Safety Assessor / Safety Assistant to ensure that the hazards and risks are eliminated or critically reduced to a contemporary objective standard and all recommended safety measures are complied with.
4. I am satisfied that a thorough inspection and proper assessment of the work area and its surroundings have been made so that the work can be carried out safely.

I hereby approve the permit.

Name: __________ Signature: __________ Date: __________ / __________ / __________ Time: __________ Hrs

### Stage IIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

Name: __________ Signature: __________ Date: __________ / __________ / __________ Time: __________ Hrs

### Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor

The above-mentioned work was completed on __________ / __________ / __________ at __________ hours.

I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

Name: __________ Designation: __________ Signature: __________ Date: __________ / __________ / __________ Time: __________ Hrs
Procedure for Obtaining Approval of Permit for Repair / Maintenance Work of Hydraulic System

1) The Trade Foreman / Supervisor shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.

2) The person in charge shall be familiar with the work schedule, the nature of the work to be carried out and the risks and hazards involved in respect of the work to be done before submitting his permit-to-work application.

3) The Trade Foreman / Supervisor shall take the relevant safety measures.

4) He shall raise 5 copies of the permit-to-work application.

5) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel’s name, location of work, commencement / completion date and time, type of work. He shall indicate ☑️ in the box provided at the top of the permit whether the work is going to be carried out in the open or confined space.

6) He shall fill up and sign Stage I in all 5 copies of the permit-to-work application and personally submit all 5 copies to the Safety Assessor / Safety Assistant.

7) On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, the nature of the work to be done, and the risks and hazards involved in respect of the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.

8) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.

9) If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.

10) On receipt of the endorsed application from the Safety Assessor, the SRM shall
    a) Evaluate the information given to him relating to the work to be done and the risks and hazards involved; 
    b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied; 
    c) Ensure that all possible safety precautions and measures have been implemented and enforced; and. 
    d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.

11) For tender jobs, the Trade Foreman / Supervisor shall brief the Sub-contractor Foreman/Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman / Supervisor acknowledges the briefing by signing Stage IIIB of the application for the permit-to-work.

12) The Trade Foreman / Supervisor shall display the copy of the permit-to-work marked ‘Display’ at the vicinity of the work area together with the sketch. He retains the copy marked ‘Trade Foreman / Supervisor’ and hands over two copies marked ‘Safety’ to the Safety Assessor and the other copy marked ‘SRM’ to the SRM.

13) He could then commence the painting work.

14) Upon completion of the hot work, the Trade Foreman / Supervisor shall sign Stage IV in the copy marked ‘Trade Foreman / Supervisor’ and hand over the copy to the Safety Personnel.

Note:
This permit shall be obtained for the following works:

1) Any repair / maintenance of winches, windglass, cranes, derricks, steering gear, actuators, hatch covers, ramps, doors, hydraulic, pumps, motors or any other mechanism operated by using hydraulic system.

2) Any repair / maintenance on power pack / control panel.

This permit is not applicable for dismantling / testing of hydraulic pipelines / valves and testing / operation of the hydraulic system after repair of maintenance work.
**Special Requirements**

a) The work shall not commence until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman / Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.

e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked ‘Master / Chief Officer; Trade Foreman / Supervisor’ of the permit shall be handed over to the Safety Personnel.

g) The Trade Foreman / Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked ‘Master / Chief Officer; Trade Foremen / Supervisor’ is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman / Supervisor to remove the display copy once the job has been completed or when the permit has expired.
8. Permit for Bunkering by Barge

<table>
<thead>
<tr>
<th>S/No</th>
<th>Confined</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>Others</td>
<td>The process shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel</td>
<td></td>
</tr>
</tbody>
</table>

Vessel’s Name: Location of Work: 

Commencement: Date: / / Completion Date: / / 

Time: Hrs Time: 

Types of Paint: *Brush / Roller / Spray 

Stage I: Application by Trade Foreman / Supervisor

1. Special hazards and risks (if any):

2. Measures taken:

I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been coordinated. Further, I shall take the undermentioned safety measures prior to the commencement of the work process and shall be responsible for maintaining them during the entire process.

- Brief the bunker barge master on the safety rules and regulations
- Detail ship staff to standby during operation
- Clean any oil spills arising from the operation
- Stop all hot work on the vessel
- Isolate the fuel oil system from the other tanks

Name: ___________________ Designation: ___________________ Signature: ___________________ Date: / / Time: _____________ Hrs

Note: The necessary safety measures must be completed before the application is handed over to the Safety Assessor / Safety Assistant for endorsement.

Stage II: Endorsement by Safety Assessor

I have inspected the work area and its surroundings and confirm that the necessary safety requirements have been complied with. I hereby endorse the permit.

Name: ___________________ Signature: ___________________ Date: / / Time: _____________ Hrs

Stage IIIA: Approval by Ship Repair Manager

1. I have evaluated the hazards and risks associated with the work.
2. I confirm that I have co-ordinated the work at the VSCC meeting.
3. I have instructed the Safety Assessor / Safety Assistant to ensure that the hazards and risks are eliminated or critically reduced to a contemporary objective standard and all recommended safety measures are complied with.
4. I am satisfied that a thorough inspection and proper assessment of the work area and its surroundings have been made so that the work can be carried out safely.

I hereby approve the permit.

Name: ___________________ Signature: ___________________ Date: / / Time: _____________ Hrs

Stage IIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

Name: ___________________ Signature: ___________________ Date: / / Time: _____________ Hrs

Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor

The above-mentioned work was completed on / / at hours.

I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

Name: _______________ Designation: _______________ Signature: _______________ Date: / / Time: _____________ Hrs
Procedure for Obtaining Approval of Permit for Bunkering by Barge

1) The Master / Chief Engineer shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.

2) The Master / Chief Engineer shall be familiar with the work schedule, the nature of the work to be carried out and the risks and hazards involved in respect of the work to be done before submitting his permit-to-work application.

3) The Master / Chief Engineer shall take the relevant safety measures.

4) He shall raise 5 copies of the permit-to-work application.

5) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, tanks taking the fuel, commencement / completion date and time, type of fuel and quantity of fuel.

6) He shall fill up and sign Stage I in all 5 copies of the permit-to-work application and personally submit all 5 copies to the Safety Assessor / Safety Assistant.

7) On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, the nature of the work to be done, and the risks and hazards involved in respect of the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.

8) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.

9) If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.

10) On receipt of the endorsed application from the Safety Assessor, the SRM shall
   a) Evaluate the information given to him relating to the work to be carried out and the risks and hazards involved;
   b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
   c) Ensure that all possible safety precautions and measures have been implemented and enforced; and,
   d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.

11) The Trade Foreman / Supervisor shall display the copy of the permit-to-work marked ‘Display’ at the vicinity of the work area together with the sketch. He retains the copy marked ‘Master / Chief Engineer’ and hands over two copies marked ‘Safety’ to the Safety Assessor and the other copy marked ‘SRM’ to the SRM.

12) He could then commence the painting work.

13) Upon completion of the hot work, the Trade Foreman / Supervisor shall sign Stage IV in the copy marked Master / Chief Engineer“ and hand over the copy to the Safety Personnel.

Note:
Maritime and Port Authority of Singapore Regulation with regard to taking bunker, diesel, lube oil or any type of oil by barge shall strictly be adhered to.

Special Requirements

a) The work shall not commence until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman / Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.

e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked ‘Master / Chief Officer; Trade Foreman / Supervisor’ of the permit shall be handed over to the Safety Personnel.

g) The Trade Foreman / Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked ‘Master / Chief Officer; Trade Foreman / Supervisor’ is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman / Supervisor to remove the display copy once the job has been completed or when the permit has expired.
9. Permit for Transferring Oil

The process shall not commence until Stages I to IIIA- IIIB for tender jobs are duly completed and signed by the respective personnel.

Vessel’s Name: Location of Work:

Commencement: Date: / / Completion Date: / / Time: Hrs

Types of Paint: *Brush / Roller / Spray

Stage I: Application by Trade Foreman / Supervisor

1. Special hazards and risks (if any):

2. Measures taken:

☐ Ensure no hot work at the affected area
☐ Detail a person to standby during the operation
☐ Clean any oil spills, arising from the operation
☐ Ensure that all fittings are tightly secured

Name: ___________ Designation: ___________ Signature: ___________ Date: ___________ / / Time: ___________ Hrs

Note: The necessary safety measures must be completed before the application is handed over to the Safety Assessor/ Safety Assistant for endorsement.

Stage IB: Application by Master / Chief Engineer

I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been coordinated. Further, I shall take the under-mentioned safety measures prior to the commencement of the work process and shall be responsible for maintaining them during the entire process:

☐ Ensure no hot work at the affected area
☐ Detail a person to standby during the operation
☐ Clean any oil spills, arising from the operation
☐ Isolate the fuel system from the other tanks*

Name: ___________ Designation: ___________ Signature: ___________ Date: ___________ / / Time: ___________ Hrs

Note: The necessary safety measures must be completed before the application is handed over to the Safety Assessor/ Safety Assistant for endorsement.

Stage II: Endorsement by Safety Assessor

I have inspected the work area and its surroundings and confirm that the necessary safety requirements have been complied with. I hereby endorse the permit

Name: ___________ Signature: ___________ Date: ___________ / / Time: ___________ Hrs

Stage IIIA: Approval by Ship Repair Manager

1. I have evaluated the hazards and risks associated with the work.
2. I confirm that I have co-ordinated the work at the VSCC meeting.
3. I have instructed the Safety Assessor / Safety Assistant to ensure that the hazards and risks are eliminated or critically reduced to a contemporary objective standard and all recommended safety measures are complied with.
4. I am satisfied that a thorough inspection and proper assessment of the work area and its surroundings have been made so that the work can be carried out safely.

I hereby approve the permit

Name: ___________ Signature: ___________ Date: ___________ / / Time: ___________ Hrs

Stage IIIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

Name: ___________ Signature: ___________ Date: ___________ / / Time: ___________ Hrs

Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor

The above-mentioned work was completed on ___________ / / / at ___________ hours.

I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

Name: ___________ Designation: ___________ Signature: ___________ Date: ___________ / / Time: ___________ Hrs
Procedure for Obtaining Approval of Permit for Transferring Oil

1) The person in charge shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.

2) He shall be familiar with the work schedule, the nature of the work to be carried out and the risks and hazards involved in respect of the work to be done before submitting his permit-to-work application.

3) He shall take the relevant safety measures.

4) He shall raise 5 copies of the permit-to-work application.

5) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, commencement/completion date and time, quantity, method of transfer.

6) If the yard is performing the job, the Trade Foreman/Supervisor shall fill up and sign Stage IA in all 5 copies. He then has to get the confirmation from the Master/Chief Engineer who has to acknowledge that the valve is isolated as in Stage IB.

7) On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, the nature of the work to be done, and the risks and hazards involved in respect of the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.

8) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.

9) If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.

10) On receipt of the endorsed application from the Safety Assessor, the SRM shall
   a) Evaluate the information given to him relating to the work to be carried out and the risks and hazards involved;
   b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
   c) Ensure that all possible safety precautions and measures have been implemented and enforced; and,
   d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.

11) For tender jobs, the Trade Foreman / Supervisor shall brief the Sub-contractor Foreman / Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman / Supervisor acknowledges the briefing by signing Stage IIB of the application for the, permit-to-work in the ‘Display’ and ‘Master / Chief Engineer’ copies.

12) The Trade Foreman / Supervisor shall display the copy of the permit-to-work marked ‘Display’ at the vicinity of the work area together with the sketch. He retains the copy marked Master / Chief Engineer’ and hands over two copies marked ‘Safety’ to the Safety Assessor and the other copy marked ‘SRM’ to the SRM.

13) He could then commence the work.

14) Upon completion of the hot work, the Trade Foreman / Supervisor shall sign Stage IV in the copy marked Master / Chief Engineer’; ‘Trade Foreman / Supervisor’ and hand over the copy to the Safety Personnel.

Note:

i) This permit is required for transferring any type of oil on board of a vessel.

ii) The method of transfer could be:
   a) From one tank to another tank using ship's pumping system.
   b) From a road tanker to the vessel's tanks or vice versa.
   c) From a tank to a container / one tank to another tank using pneumatic pump.
**Special Requirements**

a) The work shall not commence until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman / Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.

e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked ‘Master / Chief Office; Trade Foremen / Supervisor’ of the permit shall be handed over to the Safety Personnel.

g) The Trade Foreman / Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked ‘Master / Chief Office; Trade Foremen / Supervisor’ is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman / Supervisor to remove the display copy once the job has been completed or when the permit has expired.
## 10. Permit for Entry into Confined Spaces

### (First Time Entry)

<table>
<thead>
<tr>
<th>S/No</th>
<th>Hull</th>
<th>(Do not enter the space until stages II are duly completed and signed by the respective personnel)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Confined</td>
<td>Open</td>
</tr>
</tbody>
</table>

| S/No | The process shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel |

<table>
<thead>
<tr>
<th>Vessel’s Name:</th>
<th>Location of Work:</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Commencement</th>
<th>Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td>Date:</td>
</tr>
<tr>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Time: Hrs</td>
<td>Time:</td>
</tr>
</tbody>
</table>

| Types of Paint: | *Brush / Roller / Spray |

### Stage I: Application by Trade Foreman / Supervisor

1. Special hazards and risks (if any):

2. Measures taken:

   - I have highlighted the work at the Vessel Safety Co-ordination Committee (VSCC) meeting and it has been coordinated. Further, I shall take the undermentioned safety measures prior to the entry into the space and during the course of work in the space:
     - [ ] Provision of adequate lighting and ventilation
     - [ ] Prominent display of the entry permit
     - [ ] Display of the number tags at the entrance to the space
     - [ ] Maintenance of escape routes free from obstruction

   Name: ___________  Designation: ___________  Signature: ___________  Date: ___________ / ___________ / ___________  Time: ___________ Hrs

   Note: The necessary safety measures must be completed before the application is handed over to the Safety Assessor / Safety Assistant for endorsement.

### Stage II: Endorsement by Safety Assessor

I have gas monitored the space and confirm that it is certified fit for entry.

Remarks (if any)

### Stage IIIA: Approval by Ship Repair Manager

1. I have evaluated the hazards and risks associated with the work.
2. I confirm that I have co-ordinated the work at the VSCC meeting.
3. I have instructed the Safety Assessor / Safety Assistant to ensure that the hazards and risks are eliminated or critically reduced to a contemporary objective standard and all recommended safety measures are complied with.
4. I am satisfied that a thorough inspection and proper assessment of the work area and its surroundings have been made so that the work can be carried out safely.

I hereby approve the permit

Name: ___________  Signature: ___________  Date: ___________ / ___________ / ___________  Time: ___________ Hrs

### Stage IIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

Name: ___________  Signature: ___________  Date: ___________ / ___________ / ___________  Time: ___________ Hrs

### Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor

The above-mentioned work was completed on ___________ / ___________ / ___________ at ___________ hours.

I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

Name: ___________  Designation: ___________  Signature: ___________  Date: ___________ / ___________ / ___________  Time: ___________ Hrs

Note:

i) This permit is strictly for entry into the space only

ii) It does not entitle the applicant to carry out hot work or any other hazardous work. Separate permits must be obtained to carry out hot work or any other hazardous work.
Procedure for Obtaining Approval of Entry into Confined Spaces

1) The person in charge shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.

2) The Trade Foreman / Supervisor shall be familiar with the work schedule, the nature of the work to be carried out and the risks and hazards involved in respect of the work to be done before submitting his permit-to-work application.

3) The Trade Foreman / Supervisor shall take the relevant safety measures.

4) He shall raise 5 copies of the permit-to-work application.

5) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel’s name, location of work, commencement/ completion date and time, quantity, method of transfer.

6) If the yard is performing the job, the Trade Foreman/ Supervisor shall fill up and sign Stage IA in all 5 copies. He then has to get the confirmation from the Master / Chief Engineer who has to acknowledge that the valve is isolated as in Stage IB.

7) On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, the nature of the work to be done, and the risks and hazards involved in respect of the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.

8) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.

9) If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.

10) On receipt of the endorsed application from the Safety Assessor, the SRM shall
   a) Evaluate the information given to him relating to the work to be carried out and the risks and hazards involved;
   b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
   c) Ensure that all possible safety precautions and measures have been implemented and enforced; and
   d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before her approves Stage IIIA of the application for the permit-to-work.

11) The Trade Foreman / Supervisor shall display the copy of the permit-to-work marked ‘Display’ at the vicinity of the work area together with the sketch. He retains the copy marked Trade Foreman / Supervisor and hands over two copies marked ‘Safety’ to the Safety Assessor and the other copy marked ‘SRM’ to the SRM.

12) He could then commence the work.

13) Upon completion of the hot work, the Trade Foreman / Supervisor shall sign Stage IV in the copy marked Master / Chief Engineer’; ‘Trade Foreman / Supervisor’ and hand over the copy to the Safety Personnel.

Note:

i) The first person who intends to enter the space shall be required to raise the permit. No permits are required for subsequent entry.

ii) In the event the first applicant has completed his work in the space and decides to return the permit, he shall highlight his intention at the VSCC Meeting, the SRM shall decide on who should be the next applicant for entry permit.

iii) The following areas do not require the entry permit:
   a) Engine rooms
   b) Open cargo holds

Special Requirements

a) The work shall not commence until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman / Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.

e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked ‘Master / Chief Officer; Trade Foreman / Supervisor’ of the permit shall be handed over to the Safety Personnel.

g) The Trade Foreman / Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked ‘Master / Chief Officer; Trade Foreman / Supervisor’ is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman / Supervisor to remove the display copy once the job has been completed or when the permit has expired.
11. Permit for Chemical Cleaning / Flushing / Pickling Boiler / Heat Exchanger / Pipe System

<table>
<thead>
<tr>
<th>S/No</th>
<th>Confined</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>Others</td>
<td>The process shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel</td>
<td></td>
</tr>
<tr>
<td>Vessel’s Name:</td>
<td>Location of Work:</td>
<td></td>
</tr>
<tr>
<td>Commencement:</td>
<td>Date: / / Completion Date: / /</td>
<td></td>
</tr>
<tr>
<td>Time:</td>
<td>Time</td>
<td></td>
</tr>
<tr>
<td>Types of Paint:</td>
<td>*Brush / Roller / Spray</td>
<td></td>
</tr>
</tbody>
</table>

**Stage I: Application by Trade Foreman/ Supervisor**

1. Special hazards and risks (if any):

2. Measures taken:

- Prominent display of appropriate signboards at all accesses to the work area
- No hot work in the *engine room / boiler room / ______________________ (specify)
- Use of adequate flame proof lights
- Use of appropriate personal protective equipment by all men engaged in the chemical work
- Leak proof circulation system
- Presence of chemical cleaners during the process
- Use of receptacles to contain trade effluents (discharge of effluents into sea is prohibited)
- Workers involved in the chemical cleaning have been briefed on the hazards and preventive measures

Name: ___________ Designation: ___________ Signature: ___________ Date: __ / __ / Time: ___________ Hrs

**Stage II: Endorsement by Safety Assessor**

I have inspected the work area and its surroundings and confirm that the necessary safety requirements have been complied with.

I hereby endorse the permit

Name: ___________ Signature: ___________ Date: __ / __ / Time: ___________ Hrs

**Stage IIIA: Approval by Ship Repair Manager**

1. I have evaluated the hazards and risks associated with the work.
2. I confirm that I have co-ordinated the work at the VSCC meeting.
3. I have instructed the Safety Assessor / Safety Assistant to ensure that the hazards and risks are eliminated or critically reduced to a contemporary objective standard and all recommended safety measures are complied with.
4. I am satisfied that a thorough inspection and proper assessment of the work area and its surroundings have been made so that the work can be carried out safely.

I hereby approve the permit

Name: ___________ Signature: ___________ Date: __ / __ / Time: ___________ Hrs

**Stage IIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)**

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

Name: ___________ Signature: ___________ Date: __ / __ / Time: ___________ Hrs

**Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor**

The above-mentioned work was completed on __ / __ / at ___________ hours.
I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

Name: ___________ Designation: ___________ Signature: ___________ Date: __ / __ / Time: ___________ Hrs

**Stage V: Verification by Safety Assessor / Safety Assistant**

I confirm that the *engine room / boiler room / ______________________ (specify) is / are certified gas free.

Name: ___________ Designation: ___________ Signature: ___________ Date: __ / __ / Time: ___________ Hrs
**Procedure for Obtaining Approval of Permit for Chemical Cleaning / Flushing / Pickling Boiler / Heat Exchanger / Pipe System**

1) The Master / Chief Engineer shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.

2) Once highlighted at the meeting, the Trade Foreman / Supervisor can make arrangements to do the preparatory work by bringing up on board the vessel the necessary equipment. Subsequently the unit code could be filled with water and leak tested.

3) Trade Foreman / Supervisor shall be familiar with the work schedule, the nature of the work to be carried out and the risks and hazards involved in respect of the work to be done before submitting his permit-to-work application.

4) Trade Foreman / Supervisor shall take the relevant safety measures.

5) He shall raise 5 copies of the permit-to-work application.

6) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel's name, location of work, commencement / completion date and time, type of work and characteristics of the chemicals to be used.

7) He shall fill up and sign Stage I in all 5 copies of the permit to work application and personally submit all 5 copies to the Safety Assessor / Safety Assistant.

8) On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, the nature of the work to be done, and the risks and hazards involved in respect of the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.

9) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.

10) If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.

11) On receipt of the endorsed application from the Safety Assessor, the SRM shall
   a) Evaluate the information given to him relating to the work to be carried out and the risks and hazards involved;
   b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
   c) Ensure that all possible safety precautions and measures have been implemented and enforced; and,
   d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.

12) For tender jobs, the Trade Foreman / Supervisor shall brief the Sub-contractor Foreman / Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman / Supervisor acknowledges the briefing by signing Stage IIIB of the application for the, permit-to-work in the ‘Display’ and ‘Trade Foreman / Supervisor’ copies.

13) With the approved permit, the Trade Foreman / Supervisor could arrange to lift up chemicals on board and keep it in an area approved by the SRM.

14) The Trade Foreman / Supervisor shall display the copy of the permit-to-work marked ‘Display’ at the vicinity of the work area together with the sketch. He retains the copy marked ‘Trade Foreman / Supervisor’ and hands over two copies marked ‘Safety’ to the Safety Assessor and the other copy marked ‘SRM’ to the SRM.

15) He could then commence the work.

16) Upon completion of the hot work, the Trade Foreman / Supervisor shall sign Stage IV in the copy marked Master / Chief Engineer; ‘Trade Foreman / Supervisor’ and hand over the copy to the Safety Personnel.

17) The Safety Assessor / Safety Assistant shall notify the SRM when the location is certified gas free.

**Note:**

Copies of the material safety data sheets (MSDS) of the chemicals to be used shall be submitted together with the permit-to-work application to the safety personnel and the SRM by the Trade Foreman / Supervisor. Any changes in chemicals other than those stated in the permit-to-work application shall render the permit as invalid. The Trade Foreman / Supervisor shall submit a fresh application if he intends using chemicals not mentioned in the permit.
Special Requirements

a) The work shall not commence until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman / Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.

e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked ‘Master / Chief Officer; Trade Foreman / Supervisor’ of the permit shall be handed over to the Safety Personnel.

g) The Trade Foreman / Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked ‘Master / Chief Officer; Trade Foreman / Supervisor’ is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman / Supervisor to remove the display copy once the job has been completed or when the permit has expired.
### 12. Permit for Chemical Cleaning of Generators / Motors

**Confined**

The process shall not commence until Stages I to IIIA - IIIB for tender jobs are duly completed and signed by the respective personnel.

<table>
<thead>
<tr>
<th>Vessel's Name:</th>
<th>Location of Work:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Others</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Commencement: Date:</th>
<th>/</th>
<th>/</th>
<th>Completion: Date:</th>
<th>/</th>
<th>/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time: Hrs</td>
<td></td>
<td></td>
<td>Time: Hrs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Types of Paint:** *Brush / Roller / Spray

### Stage I: Application by Trade Foreman / Supervisor

1. Special hazards and risks (if any):

2. Measures taken:

   - Prominent display of appropriate signboards at all entrances
   - Isolation of *generator / motor beaker and heater circuit in the switchboard
   - Supply sufficient exhaust ventilation
   - No hot work in the *engine room and boiler room / emergency generator room
   - Use of appropriate personal protective equipment by the chemical cleaners and assistants
   - Use of adequate flame proof lights
   - Workers involved in the chemical cleaning have been briefed on the hazards and preventive measures

**Name:** __________  **Designation:** __________  **Signature:** __________  **Date:** __________ / __________ / __________  **Time:** __________ Hrs

**Note:** The necessary safety measures must be completed before the application is handed over to the Safety Assessor / Safety Assistant for endorsement.

### Stage II: Endorsement by Safety Assessor

I have inspected the work area and its surroundings and confirm that the necessary safety requirements have been complied with. I hereby endorse the permit

**Name:** __________  **Signature:** __________  **Date:** __________ / __________ / __________  **Time:** __________ Hrs

### Stage IIIA: Approval by Ship Repair Manager

1. I have evaluated the hazards and risks associated with the work.
2. I confirm that I have co-ordinated the work at the VSCC meeting.
3. I have instructed the Safety Assessor / Safety Assistant to ensure that the hazards and risks are eliminated or critically reduced to a contemporary objective standard and all recommended safety measures are complied with.
4. I have ensured that there shall not be any hot work or any other incompatible work carried out in the *engine room and boiler / emergency generator rooms.
5. I am satisfied that a thorough inspection and proper assessment of the work area and its surroundings have been made so that the work can be carried out safely.

I hereby approve the permit

**Name:** __________  **Signature:** __________  **Date:** __________ / __________ / __________  **Time:** __________ Hrs

### Stage IIIB: Endorsement by Sub-Contractor Foreman / Supervisor (for tender job only)

I hereby acknowledge that I have understood the briefing conducted by the Trade Foreman / Supervisor on the safety measures to be taken for the work and shall ensure compliance with the same.

**Name:** __________  **Signature:** __________  **Date:** __________ / __________ / __________  **Time:** __________ Hrs

### Stage IV: Notification of Completion of Work by Trade Foreman / Supervisor

The above-mentioned work was completed on __________ / __________ / __________ at __________ hours.

I confirm that the ventilation was maintained in the tank during the curing period (for confined space painting only).

**Name:** __________  **Designation:** __________  **Signature:** __________  **Date:** __________ / __________ / __________  **Time:** __________ Hrs

### Stage V: Verification by Safety Assessor / Safety Assistant

I confirm that the *engine room / boiler room / (specify) is / are certified gas free.

**Name:** __________  **Designation:** __________  **Signature:** __________  **Date:** __________ / __________ / __________  **Time:** __________ Hrs
Procedure for Obtaining Approval of Permit for Chemical Cleaning of Generator / Motors

1) The Master / Chief Engineer shall highlight at the Vessel Safety Co-ordination Committee (VSCC) meeting the intended work before raising the permit-to-work application. In the event that the intention to carry out the work arises after the VSCC meeting, the Ship Repair Manager (SRM) shall convene another VSCC meeting before the permit-to-work application is made.

2) Once highlighted at the meeting, the Trade Foreman / Supervisor can make arrangements to do the preparatory work by bringing up on board the vessel the necessary equipment. Subsequently the unit code could be filled with water and leak tested.

3) Trade Foreman / Supervisor shall be familiar with the work schedule, the nature of the work to be carried out and the risks and hazards involved in respect of the work to be done before submitting his permit-to-work application.

4) Trade Foreman / Supervisor shall take the relevant safety measures.

5) He shall raise 5 copies of the permit-to-work application.

6) He shall fill up the particulars correctly and legibly in the appropriate boxes such as vessel’s name, location of work, commencement / completion date and time, type of work and characteristics of the chemicals to be used.

7) He shall fill up and sign Stage I in all 5 copies of the permit to work application and personally submit all 5 copies to the Safety Assessor / Safety Assistant.

8) On receipt of the application, the Safety Assessor shall:
   a) Familiarise himself with the work schedule, the nature of the work to be done, and the risks and hazards involved in respect of the work to be done;
   b) Make a physical inspection of the site of the intended work and its surrounding areas to ensure that there are no hazards or danger present.

9) The inspection shall be carried out together with the applicant for the permit unless the Safety Assessor is thoroughly familiar with the area in which the hot work is to be carried out.

10) If the Safety Assessor is satisfied with the results of the inspection, he shall then endorse Stage II of the application for the hot work permit and forward the endorsed application to the SRM.

11) On receipt of the endorsed application from the Safety Assessor, the SRM shall
   a) Evaluate the information given to him relating to the work to be carried out and the risks and hazards involved;
   b) Ensure that no incompatible work will be carried out at the same time in the same vicinity as the work for which the permit-to-work is being applied;
   c) Ensure that all possible safety precautions and measures have been implemented and enforced; and.
   d) Cause a thorough inspection and proper assessment of the work area and its surroundings to be made before he approves Stage IIIA of the application for the permit-to-work.

12) For tender jobs, the Trade Foreman / Supervisor shall brief the Sub-contractor Foreman / Supervisor on the safety measures to be taken by him for the work. He shall ensure that the Sub-contractor Foreman / Supervisor acknowledges the briefing by signing Stage IIIB of the application for the permit-to-work.

13) With the approved permit, the Trade Foreman / Supervisor could arrange to lift up chemicals on board and keep it in an area approved by the SRM.

14) The Trade Foreman / Supervisor shall display the copy of the permit-to-work marked ‘Display’ at the vicinity of the work area together with the sketch. He retains the copy marked ‘Trade Foreman / Supervisor’ and hands over two copies marked ‘Safety’ to the Safety Assessor and the other copy marked ‘SRM’ to the SRM.

15) He could then commence the work.

16) Upon completion of the hot work, the Trade Foreman / Supervisor shall sign Stage IV in the copy marked Master / Chief Engineer; ‘Trade Foreman / Supervisor’ and hand over the copy to the Safety Personnel.

17) The Safety Assessor / Safety Assistant shall notify the SRM when the location is certified gas free.

Note:
Copies of the material safety data sheets (MSDS) of the chemicals to be used shall be submitted together with the permit-to-work application to the safety personnel and the SRM by the Trade Foreman / Supervisor. Any changes in chemicals other than those stated in the permit-to-work application shall render the permit as invalid. The Trade Foreman / Supervisor shall submit a fresh application if he intends using chemicals not mentioned in the permit.
Special Requirements

a) The work shall not commence until the permit has been duly completed and signed by the respective personnel.

b) It shall be the duty of the Trade Foreman / Supervisor to maintain the safety requirements throughout the job performance, if the condition changes, he shall stop the job and notify the SRM and Safety Personnel.

c) The permit shall be invalidated if conditions change or if any incompatible work processes need to be carried out due to priority. During these situations, the permit shall be returned to the Safety Personnel.

d) All work processes that require permits-to-work shall be highlighted at the VSCC meeting.

e) Request from sub-contractors for the approval of a permit shall not be entertained by the SRM.

f) If the job is not completed within the stipulated time, a fresh permit shall have to be raised and the copy marked ‘Master / Chief Officer; Trade Foreman / Supervisor’ of the permit shall be handed over to the Safety Personnel.

g) The Trade Foreman / Supervisor shall inform the SRM and the Safety Personnel once the job has been completed. If the copy marked ‘Master / Chief Officer; Trade Foreman / Supervisor’ is not returned to the Safety Personnel, it shall be assumed that the job has not been completed and other incompatible work processes shall not be approved.

h) It is the responsibility of the Trade Foreman / Supervisor to remove the display copy once the Job has been completed or when the permit has expired.
Annex E-5:

ASMI Safety Checklists

Reference:
Safety Checklist for Rigger
(Slinging, Signaling and Lifting)

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

1. **Before Lifting the Load,**

1.1 Are you appointed as a rigger to carry out rigging and signaling activities in your yard? ☐ ☐

1.2 Have you successfully undergone the training in rigging? ☐ ☐

1.3 Have you checked that the lifting gears or appliances such as chain blocks, wire ropes, shockles, eyebits and others:
   - Visible defects ☐ ☐
   - Maximum safety working load ☐ ☐
   - Date of last test ☐ ☐
   - Current colour coding ☐ ☐

1.4 Have you checked to ensure that the welded eye piece or lifting lug of the load has no visible defects? ☐ ☐

1.5 Have you checked:
   - The weight of the load to be carried and confirmed that this is below the safe working load of your lifting gear or appliances? ☐ ☐
   - The load including all loose items and all lifting attachments are properly secured? ☐ ☐
   - The pads are placed in areas where the mire ropes are bent around the sharp edges? ☐ ☐
   - There is one trained person around to give the signal? ☐ ☐

1.6 Have you ensured that all the appropriate tag line is attached to the load? ☐ ☐

1.7 Have you ascertained the weight of the load which is to be lifted and informed the crane operator of the weight of the load? ☐ ☐

2. **During Lifting the Load,**

2.1 Have you ensured that the load is properly balanced? ☐ ☐

2.2 Has the load been prevented from swinging? ☐ ☐

2.3 Are the loose chain or wire rope slings properly secured? ☐ ☐

2.4 Are other workers in the vicinity warned of the potential danger? ☐ ☐

2.5 Have the workers standing or working below the suspended load being cleared away? ☐ ☐

3. **When Lowering the Load,**

3.1 Have you ensured that the resting place for the food is suitable, and upon resting, that the load is stable? ☐ ☐

3.2 Have you ensured that the chain or wire rope sling is slackened before attempting to remove it? ☐ ☐

3.3 After removing the chain or wire rope sling, have you ensured that the shackled pins are properly secured? ☐ ☐

Note:
Upon completion of work, please ensure that all lifting gears or appliances are kept properly
Do not start work unless the above questions are answered YES. If in doubt, please check with your supervisor.
## Safety Checklist for Fire Watchmen

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have you attended the fire watch personnel training?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Have you checked and ensured that the area is completely free from flammable substances?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Have you checked and ensured that all combustible materials in the way of the affected areas in the adjacent compartments have been removed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Have you been provided with suitable fire fighting equipment?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Are the fire extinguishers in serviceable condition?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. For areas provided with fire hoses, are they charged and ready for use?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Upon completion of the work, have you checked the work area and the affected areas in the adjacent compartments for any smothering smoke etc?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:
Do not start work unless the above questions are answered Yes.
If in doubt, please check with your supervisor.
# Safety Checklist for Pipe Fitters

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Personal Protective Equipment (PPE)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Are you fully equipped with the suitable PPE required for this job?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. Work Tools</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Are your work tools suitable for the job?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2 Are your work tools in good working condition?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3. Entry and Work in Confined Space</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1 Is there a valid entry permit displayed at the entrance to the confined space?</td>
<td></td>
<td></td>
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<tr>
<td><strong>4. Working at Height</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1 Are the working platforms (scaffoldings) certified safe for use?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.2 Are proper anchoring points for safety belts provided and used?</td>
<td></td>
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</tr>
<tr>
<td><strong>5. Hot Work (General)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1 Have you been instructed by your supervisor to do hot work?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2 If yes, has valid hot work permit been obtained to carry out the hot work?</td>
<td></td>
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</tr>
<tr>
<td><strong>6. Pipe / Valve Work (Engine / Room / Tanks / Deck)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.1 Before commencing work on the pipe, has the pressure in the pipe been released?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2 Has a valid permit been obtained for dismantling piping / valve containing or which has contained all or any other substances that are toxic, flammable or corrosive?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.3 When dismantling fuel oil pipes / valve in confined spaces,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Is adequate ventilation provided?</td>
<td></td>
<td></td>
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<tr>
<td>• Are flame-proof lights used?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.4 Are drip trays / containers used to contain oil spill when dismantling cargo pipes / valves?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.5 Are there any leaks / discharge from the pipelines / valves?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(If yes, stop the leaks immediately and report to your supervisors)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>7. Work on Boilers / Steam Pipes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.1 Has a valid permit been obtained for the work on the steam boiler or steam pipes?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.2 Are steam and exhaust lines / valves completely blown down?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.3 Are steam and exhaust lines / valves sufficiently cooled before work?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.4 Are adequate ventilation and lighting provided? (for work inside boilers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>8. Access Opening (E.g. Skylight)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.1 Are the openings barricaded before lifting lowering of items?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>9. Material Handling</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.1 Before any slinging or lifting, have you ensured that all chain block / sling wires are tested by an approved person?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.2 Have you checked with your supervisor to ensure that the engine room’s overhead crane has been tested by an approved person?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.3 Are you trained and authorised to operate the engine room’s overhead crane?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.4 Are you familiar with the lifting operation and procedures?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:
Do not start work unless the above questions are answered Yes.
If in doubt, please check with your supervisor.
### Safety Checklist for Welding, Burning and Cutting

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

#### 1. Before Work,

1.1 Have you put on the personal protective equipment?  
1.2 Safe set up for the operation:
   - Are the manifolds, gas regulators, hose and torches in good condition?  
   - Are the short-length/extension hose properly connected according to colour coding?  
   - Are the hosts, joints and valves free from leakage?  
   - Are the gas hoses properly arranged or suspended?  
   - Are the approved flash-back arrestor fitted to the gas outlet and inlet of the cutting torch?  
   - Are the gas torch and gas hoses provided with valid inspection tags?

#### 2. During Work,

2.1 Is a ‘spark-gun’ provided for the lighting of gas torch?  
2.2 Are the gas regulators set to correct pressure (for gas cylinders only)?  
2.3 Is the gas torch shut off before moving around?

#### 3. After Work,

3.1 Is the gas turned off?  
3.2 Is the supply valve securely closed?  
3.3 Are the torches and gas hoses disconnected from supply and removed out of the tanks?  
3.4 Have you checked the work area before leaving?

Note:  
Do not start work unless the above questions are answered “Yes”.  
If in doubt please check with your supervisor.
**Safety Checklist Arc Welding**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

| 1. **Before Work,** |
| --- | --- |
| 1.1 Have you put on the personal protective equipment? | ☐ | ☐ |
| 1.2 Safe set up for the operation: | ☐ | ☐ |
| • Are the welding set and work piece properly earthed? | ☐ | ☐ |
| • Are the cables and connections in good condition and firmly attached? | ☐ | ☐ |
| • Are the gas hoses properly arranged or suspended? | ☐ | ☐ |
| • Is the electrode holder fully insulated? | ☐ | ☐ |
| • Are the electrode holders and cables provided with valid inspection tags? | ☐ | ☐ |
| • Is the low voltage shock preventer functioning? | ☐ | ☐ |

| 2. **During Work,** |
| --- | --- |
| 2.1 Is the electrode disconnected from the cables when moving around? | ☐ | ☐ |

| 3. **After Work,** |
| --- | --- |
| 3.1 Is the electrode disconnected from the supply cables? | ☐ | ☐ |
| 3.2 Is the welding set switched off? | ☐ | ☐ |
| 3.3 Have you check work area before leaving? | ☐ | ☐ |

**Note:**
Do not start work unless the above questions are answered “Yes”.
If in doubt please check with your supervisor.
## Annex E-6:

### Safety Signs and Colour Coding

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Comments On Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning</td>
<td>Hand protection must be worn</td>
<td></td>
</tr>
</tbody>
</table>
| Mandatory | Head protection must be worn | • To indicate that safety helmet must be worn  
• Should be permanently fixed at all approaches to the operational areas  
• Permanent feature |
| Mandatory | Eye protection must be worn | |
| | Face shield must be worn | |
| Prohibition | Fire, open light and smoking prohibited | To be used in cases where smoking or open flame can cause danger or fire or explosion |
| Mandatory | Foot protection is a must | |
| Mandatory | Hearing protection must be worn | • To indicate noisy area  
• Should be placed in noisy areas  
• When the noise level exceeds 85dbA  
• To warn workers to wear ear plugs / ear muffs to prevent noise-induced deafness |
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Comments On Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Warning</strong></td>
<td>Safety harness / belt must be worn</td>
<td></td>
</tr>
<tr>
<td><strong>Prohibition</strong></td>
<td>Smoking prohibited</td>
<td>To be used in cases where smoking can cause danger of fire and harm to health</td>
</tr>
</tbody>
</table>
| **Mandatory** | • Thoroughfare prohibited for pedestrians  
• Entry prohibited or No Entry beyond this sign | Place at the access of tanks and confined spaces: means ‘No Entry’ |
| **Warning** | Caution, explosion risk | To be used to indicate the possible existence of an explosive atmosphere flammable gas or explosives |
| **Warning** | Caution, overhead load | • Should be installed at all approaches to cranage areas  
• Should be a permanent feature  
• A warning to all personnel approaching or working in the vicinity of possible falling hazard  
• Avoid working under suspended load |
| **Warning** | Caution, toxic hazard | • Should be installed at the electroplating areas and acid storage areas  
• Areas where chemicals are stored both on board ships and in workshops  
• Should be permanently fixed  
• Must obtain permission before entering area  
• A warning against toxic and poisonous fume  
• Adequate ventilation must be provided |
| **Warning** | Caution, risk of ionizing radiations | • To be used in area where there is a rush of radioactive exposure  
• In area where there is radiation hazard  
• Do not pass beyond the sign or go into the fenced off area  
• Entry prohibited |
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Comments On Use</th>
</tr>
</thead>
</table>
| **Warning** | Caution, risk of fire | • To indicate the presence of highly flammable materials and high temperature  
• Should be installed where paints, solvents and flammable liquids are stored / kept  
• Flash point of substance is below 150 °F or 66 °C  
• A warning against potential fire and explosion hazard |
| **Warning** | Caution, risk of electrical shock | • Should be installed at all high voltage substations, transformers, live wires  
• A warning against electrical hazards from high voltages  
• Only authorised persons of the Electrical Department are allowed to work on or near such hazards and with the expressed permission from an Electrical Engineer  
• This sign must be installed by the Electricians |
| **Warning** | Caution, risk of corrosion | Corrosive materials |
| **Warning** | Respiratory protection must be worn | • To indicate that appropriate respirators must be worn  
• Against specific work processes such as chemical cleanings, spray paintings, etc. |
| **Mandatory** | Fire fighting equipment | • Should be placed at fire extinguisher points  
• To indicate location of extinguisher  
• The extinguisher should be used in case of fire. It is recommended that chemical be used because of its speed and efficiency in extinguisher all types of fire |
| **Warning** | Emergency escape | • To be used to indicate the direction to an exit which can be used in the event of an emergency  
• Indicating the escape route  
• Should be placed in the boiler room, engine room, duct keel and on passenger vessels and complicated routes on board ships |
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
<th>Comments on Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Warning</strong></td>
<td><strong>Prohibition</strong></td>
<td>Fixed CO₂ fire fighting system</td>
</tr>
</tbody>
</table>
| ![Symbol](image) | ![Symbol](image) | • Be installed against the CO₂ cylinder  
• When vessels enter for repairs  
• A warning against tempering with any controls or work on any controls or entry into the cylinder room  
• The system must be isolated and rendered inoperative |
| **Fire, Openlight and Smoking Prohibited** | **Approved Entry Permit** | Safe for entry but not safe for hot work |
| ![Symbol](image) | ![Symbol](image) | • For entry into confined spaces for work other than hot work  
• Appropriate permits for the work/entry must be obtained  
• Appropriate permits for the work/entry must still be displayed with this sign  
• Indicate “Safe for Entry but not Safe for Hot Work” |
| **Approved Entry Permit** | **Approved Hot Work Permit** | For approved hot work, ensure that Valid Entry Permit and Valid Hot Work Permit are displayed at entrances of confined spaces |
| ![Symbol](image) | ![Symbol](image) | • For entry and hot work in confined space  
• Valid permits for hot work and entry |
Annex E-7:
Control Flow Chart for Outsource Service of Hazardous Activities
Annex E-8:
Contractor’s Machinery and Equipment Control Flow Chart

1. Start
2. Submit Declaration Form and Relevant Test Certificates
3. Confirm Declaration Form by the Security Department
4. Verify Certificates are Valid and Inspect the Item According to the Table
5. Sign the Declaration Form/Permit
6. Direct Contractor Back to Safety Department

Decision Point:
- If YES, go to Next
- If NO, return to the Start

Contractor → Security Department → Safety Department
# Annex E-9:
Control and Inspection of Contractors’ Plant and Equipment at Entry to Yard’s Premises

<table>
<thead>
<tr>
<th>SN</th>
<th>Type of Plant &amp; Equipment</th>
<th>Form/Permit to be Filled Up</th>
<th>Copy of Certificates to be Attached</th>
<th>Items to be Verified by Safety Department</th>
<th>Inspection/Service by User (While Using in Yard)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mobile Crane</td>
<td>Hydro-jetting Gun Entry</td>
<td>Declaration of:</td>
<td>- Copy of Certificate; Lift Test Certificate; Pressure Vessel; Endorsed by Approved Person</td>
<td>Monthly service must be done by service technician and service reports to be submitted to Safety Department once every 30 days</td>
</tr>
<tr>
<td>2</td>
<td>Hydro-jetting Gun</td>
<td></td>
<td>Declaration of: Hydro-jetting</td>
<td>- Copy of Certificate; Lift Test Certificate</td>
<td>Verify certificates; Inspect hydron-jetting gun to ensure that it is equipped with trigger mechanism</td>
</tr>
<tr>
<td>3</td>
<td>Lifting Equipment and Pressure Vessels</td>
<td></td>
<td>Declaration of: Lifting Equipment and Pressure Vessels</td>
<td>- Lift Test Certificate; Pressure Vessel; Endorsed by Approved Person</td>
<td>Verify certificates; Inspect equipment's satisfactory condition; Verify all equipment have Lift Test Certificate Registration Number, Date of Test, SWL, or SVP, clearly marked on equipment</td>
</tr>
<tr>
<td>4</td>
<td>Contractor's Forklift and Rental Forklift</td>
<td>Inspection of Forklift by Safety Department</td>
<td>Service Report for Forklift.</td>
<td>- Valid Forklift Operator Certificate</td>
<td>Verify forklift by completing Part 2 of checklist; To endorse Part 3 of checklist (refer to Appendix L)</td>
</tr>
</tbody>
</table>
Annex E-10:

List of Common Hazardous Materials

<table>
<thead>
<tr>
<th>Category of Chemicals</th>
<th>Purpose of Use</th>
<th>Nature of Hazards</th>
</tr>
</thead>
</table>
| Acids (Hydrochloric, Phosphoric, etc.) | For etching, cleaning, scaling, etc., of exotic steel materials such as aluminium, stainless steel, etc. | • Explosive  
• Corrosive  
• Severe skin dermatitis |
| Marine Paints/ Solvents        | For steel surface preservation and corrosion control                          | • Explosive  
• Skin irritation |
| Cleaning/ Degreasing Agents     | Cleaning of electrical contacts, machinery parts, etc.                        | • Explosive  
• Skin irritation / dermatitis |
| Radioactive Substances          | For purpose of industrial radiography work on weld joints / seams, etc.       | • Genetic mutation  
• Carcinogenic |

Note:
1. The purpose of this list is to provide an overview appreciation of the common chemicals or substances used in a shipyard operation.
2. Reference should be made to the Safety Data Sheet (SDS) to determine the hazardous nature of each chemical or substance.
Annex E-11:

Hazardous Materials Control Flow Chart

Production/ Facility Department or Owner → Start → Define Specification of Hazardous Materials → End

- Yard Procurement
- Owner Supply

Procurement Department
- Seek Substitute Material
- Evaluation & Selection of Qualified Supplier
- Proceed to Procure

Safety Department
- Review & Evaluate MSDS
- Approval
  - NO
  - YES

Supplier
- Prepare Delivery with Relevant MSDS & Apply Entry Permit

Security Department
- Verification of Delivery Order & Entry Permit
  - NO
  - YES

Legend
- SDS Safety Data Sheet
**Annex E-12:**

**Forklift Inspection Checklist**

**Part 1: Forklift Information (To be completed by the applicant)**

<table>
<thead>
<tr>
<th>Name of Company:</th>
<th>Forklift Serial No.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe Working Load:</td>
<td>Forklift ID No.:</td>
</tr>
<tr>
<td>Serviced by:</td>
<td>Date of service:</td>
</tr>
<tr>
<td>Submitted by:</td>
<td>Signature &amp; Date</td>
</tr>
</tbody>
</table>

**Part 2: Inspection by Safety Department**

Place a tick [✓] in the boxes provided if the checks are satisfactory and a cross [✗] if the checks are unsatisfactory.

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Yes</th>
<th>No</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Check hydraulic system is functioning properly.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Check brake system is working effectively.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Check steering system is working properly.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Check horn is working effectively.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Check reverse warning buzzer is working properly.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Check two revolving lights are functioning properly.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Check side signal lights are working properly.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Check side mirrors are provided and not broken.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Check rear view mirror is available and not broken.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Check service report is valid and signed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Check forklift operator certificate is valid.</td>
<td></td>
<td></td>
<td>Applicable to external contractor</td>
</tr>
</tbody>
</table>

Note: Reject forklift if a cross (✗) is indicated in any of the boxes in item 1 to 10.

**Part 3: Verification by Safety Department**

This is to confirm that the above forklift has been inspected and found satisfactory by the Safety Department, and is allowed to be used in the yard’s premises.

<table>
<thead>
<tr>
<th>Inspected by:</th>
<th>Signature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation:</td>
<td>Date &amp; Time:</td>
</tr>
</tbody>
</table>
Annex F-1:

Sample of SCDF Fire Emergency Plan

1. Objective
1.1 Purpose
1.2 Fire Safety Committee
1.3 Fire Alarm

2. Action to be taken in event of an outbreak of fire
2.1 Informant
2.2 All staff
2.3 FSM / Co-ordinator / Assistant Co-ordinator
2.4 Fire Warden / Assistant Fire Warden
2.5 Chief Security Officer / Assistant Chief Security Officer
2.6 Specialist Personnel
2.7 Fire Fighting Team
2.8 Telephone Operator

3. Fire Occurring Outside Office Hours

4. Duties and Responsibilities
4.1 FSM/ Co-ordinator / Assistant Co-ordinator
4.2 Fire Warden / Assistant Fire Warden
4.3 Chief Security Officer / Assistant Chief Security Officer
4.4 Fire Fighting Team / Security Personnel
4.5 Specialist Personnel
4.6 Telephone Operator
4.7 Persons Responsible for Isolation and Activation of Fire Alarm

5. External Emergency Support

6. Fire Evacuations Drills

7. Classifications of Emergencies (If any)

8. General

9. Appendices
Appendix I Name List and Contact Numbers of Fire Safety Committee
Appendix II Name List and Contact Numbers of Key Personnel
Appendix III Site Plan of Assembly Point
Appendix IV Typical Floor Plan (Include Location of Hose Reels, Extinguishers and First Aid Boxes)
Appendix V Evacuation Drill Record Sheet
Appendix VI Floor Register
Appendix VII List of Hazards Stored / Used in the Premises
Appendix VIII Emergency Response Facilities
Appendix IX Procedures to Mitigate Spillages of Hazardous Materials
Fire Emergency Plan Guidelines for Industrial Premises

1. Objective

1.1 The Purpose of the Fire Emergency Plan is:
   a) To ensure the safeguard of human lives in the event of fire.
   b) To establish a systematic and orderly evacuation plan.
   c) To ensure prompt raising of the fire alarm and marshalling of first aid fire fighting efforts.
   d) To establish responsibilities of individuals involved in handling emergencies.

1.2 Fire Safety Committee
   A Fire Safety Committee shall be formed in the building for achieving the above objective. It shall comprise the following persons:
   a) A Senior Executive
   b) Fire Safety Manager / Co-ordinator as Secretary
   c) Chief Security Officer
   d) Fire Wardens
   e) Specialist Personnel

1.3 Signal for Fire Alarm
   The alarm signal for fire is a continuous ringing note resounding from the electrically operated bells on every storey of the building.
   The fire alarm signal can be raised by:
   a) Break glass alarm system
   b) Automatic heat and smoke detector system
   c) Automatic sprinkler system

2. Action to be Taken in the Event of an Outbreak of Fire

2.1 Informant
   The person who discovers the fire shall immediately:
   a) Raise the alarm by activating the nearest fire alarm “Break Glass” call point.
   b) Attempt to extinguish any incipient fire with the available fire fighting equipment and without personal risk.

2.2 All Staff
   a) Upon hearing the fire alarm, all staff shall lock important files, cash, shut down machinery etc. and evacuate immediately guided by
      their respective Fire Wardens.
   b) When evacuating, do not panic but quickly walk down the staircase by the nearest exit and proceed to the assembly point. Do not
      use lifts.
   c) The assembly point is located at See Appendix II (Site Plan).
   d) All staff shall not re-enter the building unless instructed otherwise by the Civil Defence Officer in attendance.

2.3 FSM / Co-ordinator / Assistant Co-ordinator
   In the event of fire:
   a) Ensure that the Singapore Civil Defence Force (SCDF) has been notified of the fire.
   b) Proceed to the fire alarm main panel and ensure that the fire fighting team has been mobilised to respond to the alarm.
   c) Proceed to the assembly point and obtain the floor evacuation status reports from the fire wardens (As in the format recommended
      in Appendix V)
   d) Await the arrival of the responding crew from the Singapore Civil Defence Force at the main entrance of the building and report to
      the officer in charge the status of the evacuation.
   e) (Abatement of any hazards)

2.4 Fire Warden / Assistant Fire Warden
   On hearing the fire alarm:
   a) Alert everyone on his storey to evacuate in an orderly manner using the nearest exit.
   b) Check all offices, stores, toilets, etc. to ensure that no one is left behind.
   c) Ensure that the disabled, children, pregnant women, etc. if present in their storey, are given particular attention during evacuation.
   d) Leave the building after ascertaining that all the occupants of the floor have complied with his order.
   e) On reaching the assembly area, conduct a roll call of the staff present and report to the coordinator in person of the
      evacuation status.
   f) (Abatement of any hazards)
2.5 Chief Security Officer / Assistant Chief Security Officer
   a) The chief security officer shall ensure that security personnel are deployed at the ground floor staircase exits to guide guests /
      visitors to the designated assembly area when the fire alarm is activated.
   b) Ensure that all main entrances and exits to / from the building are adequately manned to prohibit unauthorised entry and also to
      intensify patrolling in the vicinity of the building.
   c) Ensure that a security personnel directs the Civil Defence officer on his arrival to the FCC.
   d) Ensure that security personnel are detailed to direct traffic to facilitate the movement of evacuees at points where they cross roads
      to reach assembly point.

2.6 Specialist Personnel
   a) Upon hearing the fire alarm, switch off necessary equipment, contain fire hazardous materials used in area of work.
   b) Report to FSM that his area is clear and potential hazards contained.
   c) Meet up with SCDF personnel to provide advice in areas related to his speciality.
   d) Render assistance to SCDF personnel in mitigating fire.

2.7 Fire Fighting Team
   a) Upon hearing the fire alarm, members of the fire fighting team shall ascertain the location of the fire from the main fire alarm panel
      and proceed to that location.
   b) The fire fighting team shall attempt to extinguish or control the fire without taking personal risk, before the arrival of the Singapore
      Civil Defence Force.
   c) The fire fighting team shall comprise one Team Leader / Assistant Team Leader and four team members.

2.8 Telephone Operator
   On hearing the fire alarm, the Telephone Operator shall immediately notify the Singapore Civil Defence Force (Tel no : 995) of the
   activation of the fire alarm and state the following:
   a) Location of the building
   b) Telephone number
   The caller shall not replace the telephone set until the address has been repeated by the operator of the Singapore Civil
   Defence Force.

3. Fire Occurring Outside Office Hours
   a) In the event of an outbreak of fire after normal working hours, confirm with the Singapore Civil Defence Force and notify the
      following persons:
      i) Co-ordinator
      ii) Assistant Co-ordinator
   b) The fire fighting team shall proceed to fight the fire from a safe distance with the available fire fighting equipment and attempt to
      extinguish or control the fire without taking personal risk.

4. Duties and Responsibilities
4.1 FSM / Co-ordinator / Assistant Co-ordinator
   a) Represent the management of the building in respect of all fire safety matters.
   b) Has the full responsibility for:
      i) Establishment of a Fire Safety Committee
      ii) Training of the employees
      iii) Preparation, drafting and putting into force the Fire Emergency Plan
   d) Ensures that the approved Fire Emergency Plan is abided by all staff of the building.
   d) Ensures that exits, fire prevention and fire fighting systems are in good order through regular inspections.
   e) Records the date and time of each Evacuation Drill conducted on a Form as per attached specimen Appendix IV. (This form must be
      kept in the office of the Coordinator for verification purposes by the Civil Defence Officer).
   f) Appoints one person as Co-ordinator during his absence from the building.
   g) Responsible for the formation and training of a fire fighting team within the building from among responsible employees who are
      physically fit to perform this function.
   h) Ensures that exit doors are kept closed and unlocked during business hours and that hallways, corridors, lobbies and staircases are
      kept free from obstruction at all times.
4.2 **Fire Warden / Assistant Fire Warden**
   a) Acquaint any new employees with the Fire Emergency Plans and means of escape of the building.
   b) Be familiar with the Fire Emergency Plan and means of escape of the building.
   c) Be familiar with the operation of the fire alarm system, the use of first aid and fire fighting equipment.
   d) Liaise and co-ordinate with each other.

4.3 **Chief Security Officer / Assistant Chief Security Officer**
   a) Be familiar with the Fire Emergency Plan and means of escape from the building.
   b) Ensures that the security personnel are well versed with their roles as described in the Fire Emergency Plan.

4.4 **Fire Fighting Team / Security Personnel**
   a) To know fully the location and operation of the Fire Alarm System.
   b) Be familiar with the Fire Emergency Plan, location of staircases, exits and emergency exits.
   c) Be familiar with the location and use of first aid and fire fighting equipment.
   d) Be familiar with basic fire fighting procedures.

4.5 **Specialist Personnel**
   a) To know how materials / machines used in his scope of work can be a source of fire.
   b) To know necessary steps to contain spread of fire if his work area is affected.
   c) To know the specialist department and companies to contact to provide information and advice on mitigating a fire.

4.6 **Telephone Operator**
   a) To know the fire emergency plan and telephone number of the Singapore Civil Defence Force and other essential emergency telephone numbers.

4.7 **Persons Responsible for Isolation and Activation of Fire Alarm**
   a) To know fully the Fire Emergency Plan, location and operation of the Fire Alarm System.

5. **External Emergency Support**

   Emergency support from nearby companies (If any).

6. **Fire Evacuations Drills**
   a) Fire evacuation drills shall be conducted twice a year.
   b) All personnel in the building shall participate in the drill.

7. **Classifications of Emergencies (If any)**
   a) Alert 1
   b) Alert 2
   c) Alert 3

8. **General**
   Remember, it is in your interest to know:
   1) How to report a fire – sound the alarm without delay.
   2) What to do in the event of a fire.
   3) Location of nearby fire extinguishers and hose reels – Learn the proper way to use them.
   4) Means of escape in case of fire and to keep staircases, landings and other escape routes clear of obstruction at all time.

9. **Appendices**
   Appendix I - Name List and Contact Numbers of Fire Safety Committee
   Appendix II* - Name List and Contact Numbers of Key Personnel
   Appendix III - Site Plan of Assembly Point
   Appendix IV - Typical Floor Plan (Include Location of Hose Reels, Extinguishers and First Aid Boxes)
   Appendix V* - Evacuation Drill Record Sheet
   Appendix VI* - Floor Register
   Appendix VII* - List of Hazards
   Appendix VIII* - Emergency Response Facilities
   Appendix IX* - Procedures to Mitigate Hazardous Spillages

*Specimen attached
## Appendix II:

Name of Key Personnel

<table>
<thead>
<tr>
<th>S/No</th>
<th>Name</th>
<th>Appointment</th>
<th>Contact No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</table>
Appendix V:

Evacuation Drill Record Sheet

I, the FSM / Co-ordinator of the Fire Drill conducted for __________________________

(Name of Premises/ Building), hereby certify that all facts shown herein below are true and correct and that the said Fire Drill was conducted in accordance to the Fire Emergency Plan as required by Fire Safety Bureau (FSB).

<table>
<thead>
<tr>
<th>Date of Drill</th>
<th>Activation Time</th>
<th>Unit No. or Floor Level</th>
<th>No. of Participants</th>
<th>Time Taken to Evacuate</th>
<th>Name &amp; Signature of FSM / Co-ordinator</th>
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</table>

‘Fire’ Floor (if applicable): ______________________________________
## Appendix VI:

### Floor Register

<table>
<thead>
<tr>
<th>Fire Warden:</th>
<th>Unit:</th>
<th>No. Floor Level:</th>
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<tbody>
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</table>

<table>
<thead>
<tr>
<th>Unit No.</th>
<th>Name of Occupants/ Visitors</th>
<th>Evacuation Status</th>
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<tbody>
<tr>
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<td>Present</td>
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# Appendix VII:

List of Hazards Stored / Used in the Premises

<table>
<thead>
<tr>
<th>S/ No</th>
<th>Hazardous Materials</th>
<th>Personnel-in-Charge</th>
<th>Method of Mitigation</th>
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</table>
Appendix VIII:
Emergency Response Facilities

<table>
<thead>
<tr>
<th>S/ No</th>
<th>Type</th>
<th>Location</th>
<th>Remarks</th>
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</table>
# Appendix IX:

Procedures to Mitigate Spillages of Hazardous Material

<table>
<thead>
<tr>
<th>Toxic / Hazardous Materials</th>
<th>Action to be Taken During Spillages</th>
<th>Personnel Responsible</th>
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</thead>
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Annex G-1:

Noise Monitoring Report

SECOND SCHEDULE

NOISE MONITORING REPORT

Regulations 6(2)

Part A. Noise Monitoring Officer

Name: ___________________________________________ NRIC: ___________________________

Part B. Factory Monitored

Name of Company / Business: ____________________________________________________________

Address: ____________________________________________________________________________

Tel: _____________________________________________________________________________ Fax: ____________________________________________________________________________

Date & Time of Monitoring: ____________________________________________________________

Part C. Instrumentation

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Brand</th>
<th>Model</th>
<th>Serial No.</th>
<th>Type</th>
</tr>
</thead>
</table>

Calibrator Used (Brand/ Model/ Serial No): ____________________________________________

Part D. Noise Map

Attach a copy of Factory Layout Plan with a noise map including areas with sound pressure levels above 85 dB(A). The sound pressure level must be measured at the maximum possible level, ie, reflecting the combined effect of all machines and processes in operation in the area.
## Second Schedule - Continued

Part E. Exposure Assessment

<table>
<thead>
<tr>
<th>Machine / Equipment</th>
<th>Process / Activity</th>
<th>No. of Persons Exposed</th>
<th>Job Description of persons exposed</th>
<th>LAeq. T dB(A)</th>
<th>Measurement Time (minutes)</th>
<th>Duration of Exposure per Day (Hours and Minutes)</th>
<th>LAeq.8hr dB(A)</th>
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Annex H-1:

Occupational Health Inspection Audit

Date: ___________________________  Auditors(s): ___________________________

Factory: ___________________________

Address: ___________________________

No. of workers: ___________________________

Contact person(s): ___________________________

Designation: ___________________________  Tel No: ___________________________

Checklist:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Chemical Hazard Control</td>
<td>A</td>
<td>NA</td>
</tr>
<tr>
<td>2. Industrial Ventilation</td>
<td>A</td>
<td>NA</td>
</tr>
<tr>
<td>3. Industrial Hygiene Monitoring</td>
<td>A</td>
<td>NA</td>
</tr>
<tr>
<td>4. Confined Space Work</td>
<td>A</td>
<td>NA</td>
</tr>
<tr>
<td>5. Contract Work</td>
<td>A</td>
<td>NA</td>
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<tr>
<td>6. Hearing Conservation</td>
<td>A</td>
<td>NA</td>
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<tr>
<td>7. Medical Surveillance</td>
<td>A</td>
<td>NA</td>
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<tr>
<td>8. Respiratory Protection</td>
<td>A</td>
<td>NA</td>
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<tr>
<td>9. First Aid Facilities</td>
<td>A</td>
<td>NA</td>
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</tbody>
</table>

A: Applicable
NA: Not Applicable

1. Chemical Hazard Control

A plant which uses chemicals must have elements in its control programme designated to ensure safety in the use of chemicals and that adequate safety and health information is available to chemical users.

Person I/C: ___________________________  Job Title: ___________________________

Remarks

a) Is there a chemical procedure approval procedure?  
   Remarks: Y* N
b) Is there an inventory of the chemicals used?  
   Remarks: Y* N
c) Number of chemicals used:
   Number of chemicals with material safety data sheets?  
   Remarks: Y* N
d) Is there a proper chemical storage and staging area?  
   Remarks: Y* N
e) Are all chemical containers labelled?  
   Remarks: Y* N
f) Are there any written procedures on the use of chemicals?  
   Remarks: Y* N
g) Are there any engineering control measure?  
   Remarks: Y* N
h) Are workers informed of the hazards involved and precautions to take?  
   Remarks: Y* N
i) Are suitable personal protective appliances provided and used? Y* N
j) Are there any emergency procedures? Y* N

*To check relevant records and documents.

Findings and Recommendations:

2. System and Occupational Health

Exhaust ventilation systems are installed to remove airborne contaminants from the workplace. In order for these engineering controls to be effective, they must be properly designed, installed and maintained.

Person I/C: ___________________________     Job Title: ___________________________

Remarks

a) Is there an inventory (engineering designs and specifications) of all exhaust systems? Y* N
b) Are designs for new or revised local exhaust ventilation systems vetted by technical staff? Y* N
c) Are local exhaust ventilation systems tested and maintained regularly? Y* N
d) Are the test results and maintenance records properly documented? Y* N
e) Has the person performing vetting, testing and maintenance received appropriate training? Y* N

*To check relevant records and documents.

Findings and Recommendations:

3. Industrial Hygiene Monitoring

Evaluation of workplace conditions to ensure that airborne contaminants are controlled to prevent potentially harmful chemical concentrations, and that actual exposure levels are documented, are essential parts of an industrial hygiene monitoring programme.

Person I/C: ___________________________     Job Title: ___________________________

Remarks

a) Is there a documented sampling or monitoring programme? Y* N
b) Are appropriate instruments and equipment used for hygiene monitoring? Y* N
c) Are these instruments and equipment calibrated before use? Y* N
d) Are the sampling strategies correct? Y* N
e) Is the person performing the monitoring suitably trained? Y* N
f) Are the monitoring results available for inspection and maintained for at least 5 years? Y* N

*To check relevant records and documents.

Findings and Recommendations:
## Annex H-2:

### Checklist for the Review of Shipyard Safety Management System

This checklist may be used for audit to the key requirement in the MOM's Safety and Health Management System Elements as listed in the Second Schedule to WSH (General Provisions) Regulations 2006.

(To be completed by Review Team Leader)

Please answer all questions by placing a tick (✓) in the relevant boxes. Put in the remarks if necessary.

<table>
<thead>
<tr>
<th>Item</th>
<th>General</th>
<th>Yes</th>
<th>No</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Has the shipyard implemented a safety management system for the purpose of ensuring the safety and protecting the health of all workers in the yard in accordance with Regulation 4 of the WSH (Shipbuilding and Ship-repairing) Regulations 2008?</td>
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<td>2.1</td>
<td>Has the shipyard included its commitment to the safety policy?</td>
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<td>2.2</td>
<td>Is the policy communicated to all of the organisations?</td>
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<td>2.3</td>
<td>Is the policy implemented and maintained at all levels of the organisation?</td>
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<tr>
<td>2.4</td>
<td>Are there provisions for the periodical review and amendment of the safety policy when necessary?</td>
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<tr>
<td>3.1</td>
<td>Have the procedures been established and maintained to ensure the safe work practices are followed?</td>
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<tr>
<td>3.2</td>
<td>Are the procedures documented as work procedures?</td>
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<td>3.3</td>
<td>Has a listing of all statutory requirements with regards to safe work been established and maintained?</td>
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<tr>
<td>3.4</td>
<td>Are there provisions for the updating of the list of Statutory Requirements?</td>
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<td>3.5</td>
<td>Do the work procedures or instructions conform to the Statutory Requirements in terms of contents, format and authorisation?</td>
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<td>3.6</td>
<td>Are there any mechanisms to effectively communicate decisions and actions proposed by the safety committees to those persons responsible for implementing them or monitoring their implementation?</td>
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<td>4.1</td>
<td>Are procedures established to ensure that safety incidents are identified, recorded, investigated, and analysed with the objective of recommending specific action to prevent recurrence?</td>
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<td>4.2</td>
<td>Are procedures established for implementing corrective action or recommendations arising from incident investigation and analysis?</td>
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<td>4.3</td>
<td>Has a mechanism been set up to ensure that all personnel, including contract workers, have the avenue to report safety incidents?</td>
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<tr>
<td>Item</td>
<td>In-House Safety Rules and Regulations</td>
<td>Yes</td>
<td>No</td>
<td>Remarks</td>
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<tr>
<td>5.1</td>
<td>Are there in-house safety rules and regulations to give clear instructions to personnel in the following (where applicable):</td>
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<tr>
<td></td>
<td>i) Safe operation of plant machinery and equipment</td>
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<td>ii) Maintenance of plant, machinery and equipment</td>
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<td>iii) The safe handling of material</td>
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<td>iv) The reporting of hazards and incidents</td>
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<td>v) The supply and use of personal protective equipment</td>
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<td>vi) The cleanliness of the workplace</td>
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<tr>
<td>5.2</td>
<td>Are the safety rules and regulations adequate in accounting for the provisions of the Statutory Requirements?</td>
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<tr>
<td>5.3</td>
<td>Are the safety rules and regulations adequately documented and communicated to all appropriate levels of the organisation?</td>
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<td>6</td>
<td>Safety Promotion</td>
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<tr>
<td>6.1</td>
<td>Are there promotional programmes that demonstrate the shipyard’s commitment in advancing the culture of safety in the workplace and reinforcing the concept that safety and production are inseparable?</td>
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<td>6.2</td>
<td>Are there procedures to evaluate safety performance of contractors?</td>
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<td>7</td>
<td>Safety Inspections</td>
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<tr>
<td>7.1</td>
<td>Are there procedures to carry out internal safety inspections?</td>
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<tr>
<td>7.2</td>
<td>Are the personnel carrying out the inspections competent and fully conversant with the statutory requirements, relevant procedures for safe work practices, rules and regulations?</td>
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<td>7.3</td>
<td>Are there provisions to ensure that the relevant findings of the inspections are brought to the attention of the Ship Repair Manager, WSH Officer and the personnel responsible for taking any corrective action?</td>
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<td>7.4</td>
<td>Has the corrective action been taken immediately?</td>
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<td>7.5</td>
<td>Are the inspections carried out so frequently as to ensure a high level of compliance with the provisions of the Safety Management System?</td>
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<td>7.6</td>
<td>Are the statutory inspections carried out in with the relevant regulations under the Factories Act and its subsidiaries?</td>
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<tr>
<td>Item</td>
<td>Yes</td>
<td>No</td>
<td>Remarks</td>
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<tr>
<td><strong>8 Maintenance Regime</strong></td>
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<tr>
<td>8.1 Are there procedures to ensure that plant machinery and equipment used in the shipyard are properly maintained and, where appropriate, fitted with personnel protection devices and equipment that are ‘in good order’?</td>
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<td>8.2 Is there a preventive maintenance programme for inspections to be conducted at appropriate intervals; defects and material deficiencies to be identified and reported; and appropriate corrective action to be taken?</td>
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<td>8.3 Are the maintenance and testing carried out as required by law and integrated into the shipyard’s preventive maintenance programme?</td>
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<td>8.4 Does the shipyard designate appropriate areas for storage of the chemical/material and are such areas secured against unauthorised access?</td>
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<td>8.5 Are there provisions to ensure that personnel involved with the storage, handling and use of hazardous chemical/material are competent and are fully aware of the relevant safeguards and measures?</td>
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<td>8.6 Are there provisions to ensure that hazardous chemical/material are returned to the designated storage areas when not in use?</td>
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<tr>
<td><strong>9 Emergency Preparedness</strong></td>
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<tr>
<td>9.1 Are there procedures to identify, describe and respond to emergency situations within the shipyard?</td>
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<tr>
<td>9.2 Are there emergency procedures documented and communicated to all level of personnel (including contract workers) so as to enable the shipyard to respond quickly to emergency situations?</td>
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<td><strong>10 Occupational Health Programmes</strong></td>
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<tr>
<td>10.1 Does the shipyard implement and maintain an effective Hearing Conservation Programme (HCP) and Respiratory Protection Programme (RPP) for workers experiencing excessive noise and air contaminants?</td>
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<td>10.2 Does your HCP include the following:</td>
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<td>i) Engineering and administrative control measures to reduce noise levels and regular monitoring of noise level?</td>
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<td>ii) Suitable hearing protectors are selected, provided, and maintained and their usage are under supervision?</td>
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<td>iii) All exposed workers are required to undergo pre-employment and annual audiometric examinations?</td>
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<td>iv) Sufficient and appropriate training and education are given to worker?</td>
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Occupational Health Inspection Audit