

# **1 GENERAL PROVISIONS**

## **1.1 OBJECTIVE**

- 1.1.1 The objective of this code is to provide practical guidance on health and safety in shipboard work with a view to:
- (a) preventing accidents, diseases and other harmful effects on the health of seafarers arising from employment on board ships at sea and in port;
  - (b) ensuring that the responsibility for health and safety is understood and remains a priority for all concerned with maritime transport, including governments, shipowners and seafarers; and
  - (c) promoting consultation and cooperation among government agencies, shipowner organisations and maritime unions in the improvement of health and safety on board ships.
- 1.1.2 The code also provides guidance in the implementation of the provisions of the *Prevention of Occupational Accidents to Employees Convention, 1970* (No 134), and *Recommendation, 1970* (No 142), as well as other relevant ILO Conventions and Recommendations.

## **1.2 APPLICATION**

- 1.2.1 The code covers the health and safety of seafarers, contractors and other persons on board ships to which the *Occupational Health and Safety (Maritime Industry) Act* applies.
- 1.2.2 The provisions of this code should be considered as the basic minimum requirements for protecting seafarers' health and safety.

## **1.3 GENERAL DEFINITIONS**

- 1.3.1 For the purposes of this code the following terms have been defined as follows:

*accident*: an incident that causes the death, serious injury or incapacity of a person;

*AMSA*: Australian Maritime Safety Authority;

*approved health and safety representatives training course*: the Maritime Industry Health and Safety representative Distance Learning Course, as approved by the Seacare Authority, or any other such course as approved by that Authority;

*Bulk Cargoes Code: Code of Safe Practice for Solid Bulk Cargoes*, as amended (published by IMO);

*competent person*: a person having the relevant training and skills and, if appropriate, qualifications, to perform particular tasks, e.g. an industrial chemist or an electrician. A ship's officer having the relevant training and skills may be considered a competent person;

*crew members*: seafarers, other than the master, working on the ship;

*dangerous occurrence*: has the same meaning as in the *Occupational Health and Safety (Maritime Industry) Act*, i.e. an incident that could have caused the death, serious injury or incapacity of a person, but which did not have that outcome;

*health and safety representative*: a member of the crew so appointed in accordance with the *Occupational Health and Safety (Maritime Industry) Act*;

*health and safety committee*: a committee comprising the master and certain other crew members appointed in accordance with the *Occupational Health and Safety (Maritime Industry) Act*;

*ILO*: International Labour Organisation;

*IMDG Code*: International Maritime Dangerous Goods Code;

*IMO*: International Maritime Organisation;

*incident*: An incident is defined as an undesired event that causes or has the potential to cause:

- harm to people
- damage to property
- loss to an operation;

*MARPOL*: *International Convention for the Prevention of Pollution from Ships 1973*, as amended by the Protocol of 1978 and subsequent resolutions;

*Master*: commander of a merchant ship, responsible for the navigation and management on behalf of the shipowner;

*NOHSC*: National Occupational Health and Safety Commission

*personal protective equipment*: includes, but is not limited to, protective clothing, safety helmets, eye and face protection, hearing protection, gloves, safety footwear, lifelines, safety harnesses, breathing apparatus and respirators, as appropriate;

*safety policy*: a written document produced by a shipowner indicating in broad terms its commitment, aims and objectives in relation to shipboard safety;

*safety program*: a detailed plan designed to implement the ideals and intentions expressed in the safety policy;

*Seacare Authority*: The Seafarers Safety, Rehabilitation and Compensation Authority;

*seafarer*: any person employed in any capacity on board the ship or unit. The term “seafarer” has the same meaning as “employee” in the *Occupational Health and Safety (Maritime Industry) Act*;

*ship*: a ship engaged in trade or commerce, including an offshore industry vessel and an offshore industry mobile unit. For the purposes of this code, the term “ship” embraces the terms “prescribed ship” and “prescribed unit” in the *Occupational Health and Safety (Maritime Industry) Act*;

*shipboard management committee*: a committee established by the shipowner with management responsibilities on the ship;

*shipowner*: any person or organisation that has the management or control of the ship. The term “shipowner” has the same meaning as the term “operator” in the *Occupational Health and Safety (Maritime Industry) Act*;

*SOLAS Convention*: *International Convention on Safety of Life at Sea 1974*, as amended by the Protocol of 1978, and the subsequent amendments and associated resolutions;

*STCW Convention*: *International Convention on Standards of Training, Certification and Watchkeeping 1978*, as amended.

## **2 GENERAL DUTIES AND RESPONSIBILITIES**

### **2.1 GENERAL DUTIES AND RESPONSIBILITIES OF THE SHIPOWNER**

*Note: This section should be read in conjunction with section 11 of the Occupational Health and Safety (Maritime Industry) Act, which sets out the duties of shipowners in relation to their sea staff.*

- 2.1.1 The shipowner is primarily responsible for the health, safety and welfare of all seafarers on board the ship. However, the execution of the day-to-day responsibilities of the shipowner generally lies with the master.
- 2.1.2 The development of the necessary degree of safety consciousness and the achievement of high standards of safety depend on the wholehearted support of management, good organisation and foresight.
- 2.1.3 The shipowner should ensure that the design of new tonnage and any modifications to existing tonnage takes account of ergonomic principles and the relevant Australian and international standards and codes of practice.
- 2.1.4 Consistent with the requirements of the *Occupational Health and Safety (Maritime Industry) Act*, the shipowner must establish a suitable safety policy on the health and safety of seafarers in their employ. The safety policy must be developed in consultation with the maritime unions and such other persons as the shipowner considers appropriate and:
  - (a) enable the shipowner and seafarers to cooperate effectively in promoting and developing measures to improve seafarers' health, safety and welfare at work;
  - (b) provide adequate mechanisms for reviewing the effectiveness of the measures;
  - (c) provide appropriate mechanisms for continuing consultations between the shipowner, maritime unions and seafarers on occupational health and safety matters; provide for such other matters as are agreed between the shipowner and the unions.
- 2.1.5 The shipowner should also provide the necessary resources and organisation to implement a safety program based on the safety policy. The policy and program should set out the responsibilities of all relevant parties, including in relation to shore staff, contractors and any other persons on, or in the vicinity of, the ship.
- 2.1.6 The shipowner should maintain their ships, provide and maintain equipment, tools, operating manuals and other documentation and organise all planning and operations, in such a manner that, as far as is reasonably practicable, there is no risk of accident or injury to seafarers. In particular, activities should be planned, prepared and undertaken so that:
  - (a) dangers likely to arise on board ship are prevented;
  - (b) excessively or unnecessarily strenuous work positions and movements are avoided;

- (c) the organisation of all work takes into account the health and safety of seafarers;
- (d) materials and products are used safely and in a manner that poses no danger to seafarers' health; and
- (e) working methods are employed which protect seafarers against the harmful effects of chemical, physical and biological agents.

2.1.7 In this context, the shipowner must ensure that the systems of work aboard incorporate the need to conduct a risk assessment in accordance with Australian Standard AS 4360–1995 (*Risk management*), in the normal course of activities or duties.

2.1.8 The shipowners should take into account the necessary standards of fitness, experience and competence to ensure the health and safety of seafarers in the performance of their duties and responsibilities when operating on board. In doing so the shipowner should:

- (a) take account of the links between shipboard safety and acceptable working and living conditions, including working hours and rest periods;
- (b) verify that the seafarer holds appropriate medical and competency certificates and endeavour to confirm their validity;
- (c) recognise fatigue as a potential hazard to health and safety and plan shipboard operations to take into account the expected period of work and the prevailing conditions on board in order to minimise fatigue; and
- (d) take account of reports and recommendations made by the master, shipboard management committee or health and safety committee regarding matters of health and safety on the ship.

2.1.9 The shipowner should provide such supervision as will ensure that seafarers perform their work with due regard to their health and safety. The shipowner should direct the master, and the master should work closely with the health and safety committee and health and safety representatives, to ensure that the work of all on board is organised in such a way as to avoid unnecessary risks to health and safety. The shipowner should make the master and crew members fully aware of all activities on board that could affect their health and safety.

2.1.10 The shipowner should arrange for a designated person in the shore organisation, preferably a person having access to the possible level within the management structure, to:

- (a) consult closely with the master and crew on all matters concerning health and safety;
- (b) review the reports of shipboard health and safety committees and consider any suggested improvements and other feedback information received from the ship; and

- (c) monitor the performance of equipment and personnel.

2.1.11 As provided by the *Occupational Health and Safety (Maritime Industry) Act*, the shipowner must, if requested by a maritime union, enter into consultations with the union over the establishment or variation of designated work groups. The duties and responsibilities of a health and safety representative are described in the *Occupational Health and Safety (Maritime Industry) Act* and summarised below in section 2.5.

2.1.12 As provided by the *Occupational Health and Safety (Maritime Industry) Act*, the shipowner must, if requested by a health and safety representative or a maritime union, establish a health and safety committee on the ship. The Act also enables the shipowner, in consultation with the maritime unions or other persons, to establish such a committee covering health and safety matters across several ships. The duties and responsibilities of a health and safety committee are described in the *Occupational Health and Safety (Maritime Industry) Act* and summarised below in section 2.4.

2.1.13 The shipowner should ensure the master fulfils the obligations imposed by the *Occupational Health and Safety (Maritime Industry) Act* including, but not limited to:

- (a) complying with provisional improvement notices, to the extent that they relate to matters under the master's control;
- (b) consulting health and safety representatives on implementation of changes that affect safety in the workplace;
- (c) allowing health and safety representatives access to the workplace;
- (d) allowing health and safety representatives to be present at interviews relating to health and safety matters (if the person being interviewed agrees);
- (e) giving health and safety representatives access to health and safety related information, other than confidential medical information;
- (f) allowing health and safety representatives, who have not previously completed the approved health and safety representatives training course, time to complete the course during working hours as soon as is reasonably practicable;
- (g) allowing health and safety representatives such time off work as is reasonably necessary for them to exercise their powers;
- (h) making available to health and safety committees any information possessed by the shipowner, other than confidential medical information, relating to the health and safety of seafarers; and
- (i) allowing members of health and safety committees reasonable time during working hours, to ensure that the committee performs its functions.

2.1.14 The shipowner should arrange for regular safety inspections of all parts of their ships at suitable intervals. The inspection should also include tools, equipment and machinery on which the safety of the crew members may depend.

- 2.1.15 The shipowner should ensure that, as soon as practicable after joining the ship, crew members are suitably instructed in the hazards connected with their work and the shipboard environment and trained in the precautions which must be taken to avoid accidents and injury to health. The training should address day-to-day shipboard operations as well as contingency planning and emergency preparedness. A training manual containing information and instructions on life-saving appliances and survival methods should be kept in the mess room and recreation room or in each cabin. The manual should be written in easily understood terms and illustrated wherever possible.
- 2.1.16 In accordance with the relevant provisions of the *Occupational Health and Safety (Maritime Industry) Act* and the *Navigation Act 1912*, the shipowner must notify AMSA of any accidents, diseases and dangerous occurrences.
- 2.1.17 The shipowner should also investigate all accidents and dangerous occurrences, analyse their underlying causes and take appropriate action to prevent a re-occurrence.
- 2.1.18 The shipowner should encourage seafarers to report all unsafe and unhealthy conditions or operations.
- 2.1.19 The shipowner should provide each ship with the necessary equipment, manuals and other information to ensure that all operations are carried out in such a manner as to reduce to a minimum any adverse effects on seafarers' health and safety.
- 2.1.20 The shipowner should provide proper information to the seafarers regarding health and safety hazards and measures related to the work processes. This information should be presented in a form which crew members can easily understand.

## **2.2 GENERAL DUTIES AND RESPONSIBILITIES OF THE MASTER**

*Note: This section should be read in conjunction with the various sections of the Occupational Health and Safety (Maritime Industry) Act, which relate to the health and safety functions and responsibilities of the person in command.*

- 2.2.1 The master is responsible for the implementation of the shipowners' health and safety policy and program on board the ship. The policy and program, including safety rules and instructions, should be clearly communicated to all members of the crew. The master should ensure that work carried out on, or from, the ship is performed in such a way as to avoid the possibility of accidents and the exposure of crew members or other persons to conditions which may lead to injury or damage their health.
- 2.2.2 The master should ensure that any hazardous work requiring that crew members work together is properly supervised.
- 2.2.3 The master should ensure that seafarers are assigned only to tasks to which they are physically fit and suitably skilled.
- 2.2.4 The master should ensure that no person under the age of 18 is assigned to inappropriate duties.

- 2.2.5 The master should issue appropriate notices and instructions in a clear and easily understood manner and verify, as appropriate, that such instructions have been understood.
- 2.2.6 The master should ensure that all crew members have:
- (a) a reasonable workload;
  - (b) reasonable hours of work;
  - (c) reasonable rest periods during working hours, having special regard to work which is strenuous, hazardous or monotonous;
- 2.2.7 The master should investigate all accidents or dangerous occurrences and record and report them in compliance with the *Occupational Health and Safety (Maritime Industry) Act* and *Navigation Act 1912* and the shipowner's reporting procedures (see chapter 3).
- 2.2.8 The master should ensure the availability of operating manuals, vessel plans, national laws and regulations, safety procedures and other such information to those seafarers who need such information to conduct their work safely. In particular, the master should ensure:
- (a) any necessary instructions and notices concerning the health and safety of the crew are posted in prominent and suitable places or brought to the crews' attention by other effective means; and
  - (b) the industry occupational health and safety training material for seafarers and the distance learning course for health and safety representatives are readily accessible to all crew members.
- 2.2.9 Where health and safety committee has been established on a ship, the master should hold regular meetings of the committee, say at intervals of 4–6 weeks or as otherwise appropriate, and ensure that the reports of the committee are given due consideration.
- 2.2.10 The master should ensure that safety equipment, including all emergency and protective equipment, is maintained in good order and stowed properly.
- 2.2.11 The master should ensure that all statutory drills and musters are carried out with realism, effectively and conscientiously at the required intervals and in compliance with Marine Orders, Part 29 (Emergency Procedures and Safety of Navigation).
- 2.2.12 The master should ensure that crew members participate in practice and training in emergency procedures. The use of any special emergency equipment should be demonstrated to the crew at regular intervals.
- 2.2.13 The master should ensure the "permit-to-work" system on board the ship is properly implemented (see chapter 4).



## **2.3 GENERAL DUTIES AND RESPONSIBILITIES OF SEAFARERS**

- 2.3.1 Section 27 of the *Occupational Health and Safety (Maritime Industry) Act* sets out the duties of care of seafarers. In accordance with those requirements seafarers shall perform their work in a way that does not risk their own health and safety, or the health and safety of others. Seafarers are also required to help others, including the shipowner, to meet their responsibilities under the Act.
- 2.3.2 In addition to complying with the basic requirements of the *Occupational Health and Safety (Maritime Industry) Act*, seafarers should be prepared to take an active role in promoting safe working conditions generally. An effective way to do this is by participation in safety meetings and expressing views on the health and safety aspects of working procedures on the ship.
- 2.3.3 Seafarers have the right to remove themselves from dangerous situations or operations when they have good reason to believe that there is an imminent and serious danger to their health and safety. In such circumstances, the supervisor or responsible officer and the health and safety representative should be informed of the danger forthwith and, if safe and practicable to do so, the operation concerned should be stopped immediately in a safe manner.
- 2.3.4 Seafarers should:
- (a) cooperate as closely as possible with the shipowner in the application of the prescribed safety and health measures;
  - (b) take care of their own safety and health and of other persons who may be affected by their acts or omissions at work;
  - (c) use and take care of personal protective equipment and clothing at their disposal and not misuse any means provided for their protection or the protection of others;
  - (d) report forthwith to their immediate supervisor any situation which they believe could pose a hazard and which they cannot properly deal with themselves;
  - (e) comply with the prescribed safety and health measures; and
  - (f) participate in safety and health meetings.
- 2.3.5 Except in an emergency, seafarers should not interfere with, remove, or displace any safety device or other equipment and appliances furnished for their protection or the protection of others, or interfere with any method or process adopted with a view to preventing accidents or risks to health.
- 2.3.6 Seafarers should not operate or interfere with equipment which they have not been duly authorised to operate, maintain or use.
- 2.3.7 A supervisor who gives an order or otherwise instructs a crew member should be certain that the order or instruction is understood.

2.3.8 If a seafarer does not fully understand an order, instruction or any other communication, they should seek clarification from their supervisor.

2.3.9 Seafarers have a duty to be particularly diligent during fire, lifeboat and other drills and emergency training.

2.3.10 In summary, all crew members should implement the shipowner's health and safety policy and program as delegated to them by the master in a diligent and professional manner and should demonstrate their full support for shipboard safety. They should do everything in their power to maintain their own health and safety as well as the health and safety of other crew members and persons on board.

## **2.4 GENERAL DUTIES AND RESPONSIBILITIES OF THE HEALTH AND SAFETY COMMITTEE**

2.4.1 Section 74 of the *Occupational Health and Safety (Maritime Industry) Act* sets out the functions of a health and safety committee. The Act requires the health and safety committee to:

- (a) assist the shipowner in developing and implementing measures to protect the health and safety of seafarers;
- (b) assist the shipowner in the review and update of those measures;
- (c) facilitate cooperation between the shipowner and seafarers in relation to health and safety matters; and
- (d) assist in the dissemination of health and safety information.

2.4.2 In general terms, the health and safety committee should assist in the implementation of the shipowner's health and safety policy and program and provide seafarers with a forum to influence health and safety matters.

2.4.3 The typical duties and responsibilities undertaken by the health and safety committee would generally include but not be limited to:

- (a) ensuring that seafarers comply with the relevant requirements of Marine Orders, relevant Australian Standards, or relevant International Standards, relevant codes of safe practice and the shipowner's health and safety requirements;
- (b) making representations and recommendations to the shipowner on behalf of the crew;
- (c) discussing and taking appropriate action in respect of any health and safety matters affecting the crew, and the evaluation of adequate protective and safety equipment, including life-saving equipment; and
- (d) studying accident reports.

2.4.4 In accordance with the *Occupational Health and Safety (Maritime Industry) Act*, a record must be kept of all committee meetings and copies should be posted for

viewing by the entire crew. A copy should be sent to the person ashore designated by the shipowner as responsible for ship safety.

2.4.5 The health and safety committee should be consulted during the planning or alteration of any shipboard work processes that may affect health and safety.

2.4.6 The health and safety committee should have access to information on hazards or potential hazards on board which are known to the shipowner and master, including information on hazardous or dangerous cargoes. The committee members should have access to the *Navigation Act 1912*, Marine Orders, Australian or relevant International Standards and codes of practice, the IMDG Code, the *Occupational Health and Safety (Maritime Industry) Act* and other relevant IMO publications.

2.4.7 In accordance with the *Occupational Health and Safety (Maritime Industry) Act*, Committee members must be given reasonable time within working hours to exercise their safety functions, including attendance at health and safety committee meetings.

## **2.5 GENERAL DUTIES AND RESPONSIBILITIES OF HEALTH AND SAFETY REPRESENTATIVES**

2.5.1 Division 2 of Part 3 of the *Occupational Health and Safety (Maritime Industry) Act* sets out the workplace arrangements in relation to health and safety representatives, including the selection, training and powers of representatives. In summary, Health and Safety Representatives (HSRs) have the power to:

- (a) inspect the workplace;
- (b) ask an AMSA inspector to conduct an investigation of the workplace;
- (c) accompany an inspector during an investigation;
- (d) investigate complaints by members of the representative's designated work group;
- (e) be present at certain interviews; and
- (f) issue provisional improvement notices.

2.5.2 If at the time of selection as the health and safety representative of a designated work group, the person concerned has not previously completed the approved health and safety representatives training course, the representative should undertake that course as soon as is reasonably practicable.

2.5.3 To assist the health and safety representative to properly exercise their duties and responsibilities, access to information, assistance and advice should be provided, as appropriate, by the shipboard management committee, the health and safety committee, the shipowner and professional bodies, including the appropriate maritime unions.

2.5.4 The health and safety representative should:

- (a) participate in the investigation of accidents and dangerous occurrences relevant to the designated work group represented by the health and safety representative; and
- (b) have access to all the necessary documentation, including investigation reports, past minutes of health and safety committees etc.

### **3 REPORTING OF ACCIDENTS**

#### **3.1 GENERAL PROVISIONS**

- 3.1.1 The principal purpose of accident investigation, reporting and analysis is to minimise the potential for a recurrence of such accidents.
- 3.1.2 The cause or causes of any accident or dangerous occurrence should be investigated.
- 3.1.3 A full report of the investigation should be made to the health and safety committee and the shipowner. Accidents and dangerous occurrences must also be reported to AMSA in the prescribed format in accordance with the relevant provisions of the *Occupational Health and Safety (Maritime Industry) Act* and the *Navigation Act 1912*.
- 3.1.4 Reports of accidents and dangerous occurrences should be discussed at health and safety committee meetings on board ship and steps should be taken to minimise the possibility of recurrences. The shipowner's shore management should consider the reports and, if necessary, amend the company's health and safety policy to take account of the conclusions of the investigation.

## **4 PERMIT-TO-WORK SYSTEMS**

### **4.1 GENERAL PROVISIONS**

- 4.1.1 The permit-to-work system is a method whereby safety procedures are specified in a written form issued to crew members who are entrusted with a task which may involve work of a hazardous nature.
- 4.1.2 Permits should only be used for the more hazardous tasks and the system should not become over-complicated.
- 4.1.3 The permit to work system should describe the work to be carried out and the necessary safety precautions. All foreseeable hazards should be considered, a predetermined safe procedure should be adopted and the appropriate precautions should be written down in a correct sequence.
- 4.1.4 The permit should contain a carefully planned checklist to identify, control or eliminate hazards and should state the emergency procedure in the event of an accident.
- 4.1.5 Only an officer with experience in the work operation should issue a permit. The officer should ensure that the checks have been properly carried out and sign the permit only when satisfied that it is safe for the work to proceed. Where considered appropriate, or in accordance with the shipowner's safety policy, the master should countersign the permit.
- 4.1.6 Procedures for the cancellation of permits and "making live", and for signing and locking off at points of isolation should be covered.

## **5 GENERAL SHIPBOARD HEALTH AND SAFETY CONSIDERATIONS**

### **5.1 SHIPBOARD HOUSEKEEPING AND PERSONAL HEALTH AND HYGIENE**

- 5.1.1 The importance of good housekeeping in the prevention of accidents and conditions likely to be injurious to health should be given priority in the training of every member of the crew, until its acceptance becomes second nature.
- 5.1.2 Minor deficiencies in the ship structure, equipment or furnishings (for example, protruding nails and screws, loose fittings and handles, uneven and damaged flooring, rough and splintered edges to woodwork and jamming doors) may cause cuts, bruises, trips and falls. They should be repaired as soon as they are noticed.
- 5.1.3 Any spillage of oil or other substance likely to cause a hazard should be removed immediately.
- 5.1.4 Accumulations of ice, snow or slush should be removed from working areas and passages on deck.
- 5.1.5 Although all exposed asbestos and asbestos lagging was removed from Australian ships some years ago, some asbestos in sealed fittings or located behind bulkhead and deckhand linings could not be readily removed was left in place. Warning notices were affixed to the fittings concerned. Should any such fitting be damaged in the course of the voyage, a responsible officer must be informed immediately. Any exposed asbestos fibre or board should be covered and protected to prevent loose fibres escaping, pending proper repair or removal at the earliest opportunity by an authorised shore contractor (see also paragraph 17.5.5). These ships must maintain a register identifying the locations of asbestos.
- 5.1.6 Instruction plates, notices and operating indicators should be kept clean and legible.
- 5.1.7 Heavy objects, particularly if placed at a height above deck level, should be stowed securely against the movement of the ship. Similarly, furniture and other objects likely to fall or shift during heavy weather should be properly stowed or secured.
- 5.1.8 Doors, whether open or closed, should be properly secured.
- 5.1.9 Coils of rope and wires on deck should be located so as not to pose a tripping hazard.
- 5.1.10 Under no circumstances whatsoever should seafarers stand in a bight of a rope or wire which is lying on deck. Seafarers should never stand or move across a rope or wire that is under tension.
- 5.1.11 Ropes and wires are frequently under strain during mooring operations and seafarers should, as much as possible, always stand in a place of safety from whiplash should ropes or wires break.
- 5.1.12 The stowage and dispersal of deck or machinery equipment should be well planned and organised so that each item has its proper place.

- 5.1.13 Seafarers should always stand clear of any load being lifted and should not walk close or underneath any load being lifted, or while it is suspended.
- 5.1.14 Litter presents a fire risk and may cause slips, falls or conceal other hazards. It should be disposed of in compliance with the appropriate MARPOL legislation.
- 5.1.15 Tasks should be carried out with account being taken of possible risks to other persons; for example, water from hosing down the deck may enter other spaces and result in slips and falls.
- 5.1.16 Aerosols having volatile and inflammable content should never be used or placed near naked flames or other heat sources or disposed of in the ship's incinerator, even when empty.
- 5.1.17 Seafarers should ensure their own protection by ensuring:
- (a) they have appropriate and up-to-date vaccinations and inoculations;
  - (b) small cuts and abrasions are treated immediately;
  - (c) precautions are taken to avoid insect bites. In particular, anti-malaria precautions should be taken before, during and after the ship visits ports where malaria is known to exist.
- 5.1.18 High standards of personal cleanliness and hygiene should be maintained at all times. Hands should always be thoroughly washed after using paints or after possible exposure to toxic substances.
- 5.1.19 Working in conditions of high humidity and heat may cause heat exhaustion or heat stroke. Sensible precautions should be taken, including the drinking of sufficient water. Caution should be exercised when taking electrolyte replacements as internal organ damage may result.

## **5.2 USE OF CHEMICALS**

- 5.2.1 Toxic and other hazardous substances and products should be used and stored in such a way that users and others are safeguarded against accidents, injuries or particular discomfort. The ship should keep a register of hazardous substances on board.
- 5.2.2 There should be readily accessible to all users a Material Safety Data Sheet (MSDS), containing sufficient information to determine the degree of the danger posed by the substances. Seafarers should be familiar with the content of the MSDS before using the chemical and ensure that all appropriate precautions are taken.
- 5.2.3 If possible, the substance should be stored in the original packaging or in another correspondingly labelled packaging that cannot give rise to confusion. Such substances must be stored in a locked, well ventilated room.
- 5.2.4 Chemicals should always be handled with extreme care, protection should be worn and the manufacturer's instructions closely followed. Particular attention should be paid to protecting eyes.



- 5.2.5 Some cleaning agents, such as caustic soda and bleach, are chemicals and may burn the skin.
- 5.2.6 A chemical from an unlabelled container should never be used.
- 5.2.7 Exposure to certain substances such as mineral oils, natural solvents and chemicals, including domestic cleaning agents and detergents, may cause dermatitis. Suitable gloves should be worn when using such substances and the owner should provide suitable barrier creams that may help to protect the skin.

The Material Safety Data Sheet should be consulted for accidents involving chemicals. All persons required to use hazardous substances need to be trained in safe use, including the use and maintenance of P.P.E.

### **5.3 FIRE PREVENTION**

#### **5.3.1 SMOKING**

*Note: This section must be read in conjunction with the shipowner's policy and instructions in relation to smoking on board ship. See also chapter 24 for special provisions on tankers.*

- 5.3.1.1 Smoking on board a ship should not be permitted except in authorised areas. Instructions and prohibition notices should be prominently displayed.
- 5.3.1.2 Careless disposal of burning matches and cigarette ends is dangerous. Ashtrays, or other suitable containers, should be provided and used in locations where smoking is permitted.
- 5.3.1.3 In no circumstances should a seafarer smoke in bed.

#### **5.3.2 ELECTRICAL AND OTHER FITTINGS**

- 5.3.2.1 Unauthorised persons should not interfere with electrical equipment and fittings.
- 5.3.2.2 All electrical faults in equipment, fittings or wiring, including flickering lights should be reported immediately to the responsible engineer officer.
- 5.3.2.3 Failed light globes should be replaced as soon as possible. Failed light globes in sealed waterproof or gas tight fittings must only be changed by or under supervision of the engineer officer.
- 5.3.2.4 The overloading of a circuit must not be permitted as it can cause fires.
- 5.3.2.5 Portable heaters carried as ship's equipment should not be used except in exceptional circumstances and with due warning of their accompanying dangers.
- 5.3.2.6 Personal heating appliances should not be used under any circumstances.
- 5.3.2.7 All portable electrical appliances should be isolated from the mains when not in use.
- 5.3.2.8 All personal electrical equipment in accommodation areas should be connected only by standard plugs fitting into the sockets provided.

- 5.3.2.9 Extension leads and multi-socket plugs should not be used in accommodation areas for connecting several items of electrical equipment to one plug or socket.
- 5.3.2.10 When seafarers use portable equipment or portable lamps, they should ensure that any flexible cables passing through doors, hatches, manholes etc., are protected and that their insulation is not damaged by the closing of doors, covers or lids.
- 5.3.2.11 Seafarers should not site private aerials in the vicinity of the vessel's aerials.
- 5.3.2.12 Seafarers should not attempt to work on or repair their personal mains-powered radios, compact disc players or other equipment without removing the mains plug, and should have the equipment checked by a qualified electrical technician before plugging it in again. Frayed or damaged leads must be replaced immediately. When cleaning, ensure that electrical appliances and equipment are separated from water.
- 5.3.2.13 Wall charts giving instructions on emergency first aid treatment to seafarers who have suffered electric shock should be displayed in appropriate places about the ship. All seafarers should ensure they understand and are able to follow the procedures shown on the notices.

### **5.3.3 LAUNDRY AND WET CLOTHING**

- 5.3.3.1 Care should be taken when drying items of clothing. Clothing should not be hung directly on or close to heaters and should never be dried in the engine-room.

### **5.3.4 SPONTANEOUS COMBUSTION**

- 5.3.4.1 Waste, rags, and other rubbish as well as clothes soaked with paint, oil, thinners etc. are dangerous if left lying around as they may spontaneously combust. All waste should be stored in designated bins until it can safely be disposed of in accordance with MARPOL requirements.

### **5.3.5 GALLEYS**

- 5.3.5.1 Galleys present particular fire hazards. A means to smother fat or cooking oil fires, such as a fire blanket and appropriate fire extinguisher, must be readily available (see also chapter 22). Water must never be used in attempts to fight fires involving hot oil in cooking areas (see Marine Orders, Part 15 (Ship Fire Protection, Fire detection and Fire Extinction)).

## **5.4 WORKING CLOTHES AND PERSONAL PROTECTIVE EQUIPMENT**

### **5.4.1 GENERAL**

**Note:** *Section 27 of the Occupational Health and Safety (Maritime Industry) Act provides that if the shipowner supplies safety or protective equipment then the seafarer must use that equipment in accordance with any instructions given by the shipowner, or Master, consistent with the safe and proper use of the equipment.*

- 5.4.1.1 Working clothes should be close fitting with no loose flaps and should be appropriate for the work being carried out.

- 5.4.1.2 Suitable safety footwear should be worn at all times when on duty. Seafarers should not wear thongs or open type sandals.
- 5.4.1.3 The master should ensure that seafarers are supplied with suitable personal protective equipment, particularly when engaged in work involving a particular hazard that can be reduced by the provision of personal protective equipment.
- 5.4.1.4 Seafarers should be reminded that the provision of personal protective equipment does not mean that they can lower their own safety standards and that such equipment does not eliminate hazards but gives only limited protection in the case of accidents.
- 5.4.1.5 Personal protective equipment should be of a type and standard as approved by the Australian Standards Association or its equivalent. A wide variety of equipment is available and it is essential that no items are ordered, or received on board, unless they are suitable for the task for which they are required.
- 5.4.1.6 The manufacturer's instructions should be kept with the relevant equipment and consulted for use and maintenance purposes.
- 5.4.1.7 The effectiveness of personal protective equipment depends not only on its design but on its maintenance in good condition. Such items should be inspected at regular intervals.
- 5.4.1.8 All seafarers should be trained in the use of personal protective equipment and advised of its limitations. Persons using such items should check them each time before use.
- 5.4.1.9 Special personal protective equipment should be provided and worn by seafarers who may be exposed to particular corrosive or contaminating substances.
- 5.4.1.10 Clothing worn in galleys and machinery spaces where there is a risk of burning or scalding should adequately cover the body to minimise the hazard and should be made from a material of low flammability, such as cotton.

#### **5.4.2 HEAD PROTECTION**

- 5.4.2.1 Helmets may be designed for different purposes. A helmet designed to provide protection from objects falling from above may not be suitable for protecting seafarers from chemical splashes. The ship should be supplied with helmet types appropriate to the range of operations carried out on the ship. Australian Standard AS 1800–1998 (*Occupational protective helmets*), provides guidance on the selection, care and use of industrial safety helmets. Helmets supplied to the ship should comply with AS 1800–1998 or its equivalent.
- 5.4.2.2 In general, the shell of a helmet should be of one-piece construction, with an adjustable cradle inside to support the helmet on the wearer's head and a chinstrap to prevent the helmet from falling off.
- 5.4.2.3 The cradle and chinstrap should be properly adjusted as soon as the helmet is put on to ensure a snug fit.

- 5.4.2.4 A helmet that is visibly damaged should not be used and should be disposed of for scrap. A helmet which has been subjected to a knock or blow should also be scrapped.

### **5.4.3 HEARING PROTECTION**

- 5.4.3.1 Seafarers who by the nature of their duties are exposed to high levels of noise, such as those working in machinery spaces, should be provided with and should wear ear protectors.
- 5.4.3.2 Various types of hearing protectors are available for shipboard use, including ear plugs and earmuffs, each of which may be of different design standards. Protectors should be of a type recommended as suitable for the particular circumstances and climatic conditions.
- 5.4.3.3 In general, earmuffs give the most effective protection and should be used in preference to ear plugs except in situations where the use of ear muffs is impracticable. Hearing protectors should comply with AS 1270–1998 (*Acoustics—Hearing protectors*), or its equivalent.

### **5.4.4 FACE AND EYE PROTECTION**

- 5.4.4.1 Face and eye protectors are available in a wide variety of designs. Careful consideration should be given to the characteristics of the respective hazard to ensure the selection of the appropriate protector. Eye protectors should comply with AS 1337–1992 (*Eye protectors for industrial applications*) or its equivalent.
- 5.4.4.2 Ordinary prescription (corrective) spectacles, unless manufactured to a safety standard, do not afford protection. Certain box-type goggles are designed so that they can be worn over ordinary spectacles.

### **5.4.5 SUN PROTECTION**

- 5.4.5.1 Strong sunlight can severely damage the eyes and sunglasses should be worn whenever appropriate. Sunglasses should comply with AS 1067.1–1990 (*Sunglasses and fashion spectacles—Safety requirements*) and AS 1067.2–1990 (*Sunglasses and fashion spectacles—Performance requirements*).
- 5.4.5.2 A wide-brimmed hat should be worn and a sunscreen of SF 15+ used on exposed parts of the body when working in the sun.

### **5.4.6 RESPIRATORY PROTECTIVE EQUIPMENT**

- 5.4.6.1 Appropriate respiratory protective equipment should be provided for work in conditions where there is a risk of oxygen deficiency or exposure to poisonous, dangerous or irritating fumes, dust, or gases. Respiratory devices should comply with AS 1716–1994 (*Respiratory protective devices*), or its equivalent.
- 5.4.6.2 The selection of correct equipment is essential. Since there is a wide variety of equipment available for shipboard use, advice should be sought on the appropriate equipment for use on particular ships and for particular purposes. Seafarers should be trained in the use and care of equipment. AS 1715–1994 (*Selection, use and*

*maintenance of respiratory protective devices*), provides guidance on the selection, use and maintenance of respiratory protective devices.

- 5.4.6.3 The face-piece incorporated in respirators and breathing apparatus must be fitted correctly to prevent leakage. The wearing of spectacles unless adequately designed for the purpose, or beards and whiskers is likely to interfere with the face seal.

#### **5.4.7 HAND AND FOOT PROTECTION**

- 5.4.7.1 Gloves should give protection from the particular hazard of the work being carried out and must be appropriate to that type of work. For example, leather gloves are generally better for handling rough or sharp objects, heat resistant gloves for handling hot objects, and rubber, synthetic or PVC gloves for handling acids, alkalis, various types of oils, solvents and chemicals.
- 5.4.7.2 All seafarers at work should wear safety footwear that complies with AS 2210.1–1994 (*Occupational Protective Footwear, Guide to Selection and Use*). Sandals and similar footwear must not be worn when working.

#### **5.4.8 PROTECTION FROM FALLS**

- 5.4.8.1 Seafarers working aloft, outboard, or where there is a risk of falling, should wear an approved safety harness attached to a lifeline (see also chapter 15).

### **5.5 SIGNS, NOTICES AND COLOUR CODES**

- 5.5.1 Signs and symbols are a very effective method for warning against hazards and for presenting information in a non-linguistic form. Safety signs and notices should conform in shape and colour to the requirements of SOLAS and IMO Resolution A.760 (18).
- 5.5.2 Fire extinguishers must be coloured and marked in accordance with the relevant IMO Standards applicable to the fire extinguisher type. Each fire extinguisher should have a label affixed to it providing instructions for its use. Seafarers should familiarise themselves with the colour coding and markings on fire extinguishers to enable the appropriate extinguisher to be immediately selected in an emergency.
- 5.5.3 International Standards include requirements for the colour coding of electrical wiring cores. Care should always be taken to ensure that personnel are aware of the meaning of the core colours on board the ship. If a replacement is required, it should be in accordance with the coding system on board, see AS 3000–1991 (*SAA Wiring Rules*).
- 5.5.4 Gas cylinders should be clearly marked with the name of the gas, its chemical formula or symbol and the body should be coloured according to its contents. AS 4484–1997 (*Industrial, medical and refrigerant gas cylinder identification*), or its equivalent, sets out the requirements for the labelling of gas cylinders. A colour-coding card should be provided.
- 5.5.5 Pipelines should be marked with a colour coding system which indicates their contents. Replacement lengths of pipe should be immediately marked consistent with the colour coding system. A colour coding card should be provided, see AS 1345–1995 (*Identification of the contents of piping, conduits and ducts*).

- 5.5.6 Packages containing dangerous goods should be appropriately marked in accordance with IMDG Code classifications (see also chapter 7).

## **6 SHIPBOARD EMERGENCIES AND EMERGENCY EQUIPMENT**

*Note: This chapter provides general guidance on shipboard emergency procedures and emergency equipment. For information about specific requirements, the reader should also study the relevant provisions in Marine Orders, Part 29 (Emergency Procedures and Safety of Navigation).*

### **6.1 GENERAL PROVISIONS**

- 6.1.1 The provisions of Marine Orders, Part 29 governing equipment, musters, drills and training must be strictly complied with.
- 6.1.2 Shipboard emergency training plans should take account of the IMO/ILO *Document for Guidance* (an international maritime training guide).
- 6.1.3 On first joining a ship, crew members must be informed of the location of the muster stations and the survival craft to which they have been assigned and of their duties in emergency situations in accordance with STCW95 Regulation VI/I.
- 6.1.4 The master must ensure that a muster list is compiled and kept up to date in accordance with Marine Orders, Part 29.
- 6.1.5 All crew members concerned should muster at a drill wearing the appropriate clothing and wearing life-jackets, properly secured
- 6.1.6 Arrangements for drills should take account of prevailing weather conditions.
- 6.1.7 Each crew member must participate in drills in accordance with the requirements of the master and Marine Orders, Part 29, Appendix 4, and the ship's safety management system, which sets out the procedure to be followed for an emergency stations practice muster.
- 6.1.8 The timing of drills should be varied to ensure that seafarers (who because of their duties) have not taken part in a particular drill may participate in the next drill. Crew members should receive drill training as soon as possible. Crew may require specific training before joining the ship, to ensure that crew members are not incapable of carrying out safety related responsibilities.
- 6.1.9 Drills should involve the whole crew but, in some circumstances, it might be preferable to confine certain drills to crew members with specific tasks.
- 6.1.10 Although drills are an essential part of emergency training, a training scheme should consist of more than just drills. Information should be given to the entire crew on subjects such as hypothermia and instruction provided to certain crew members on the use of particular items of equipment.

### **6.2 FIRE-FIGHTING EQUIPMENT, DRILLS AND TRAINING**

- 6.2.1 In accordance with Marine Orders, Part 15 (Ship Fire Protection, Fire detection and Fire Extinction), a fire control plan must be permanently exhibited on the ship. The

plan must show the control stations for each deck and particulars of fire detection and fire alarm systems, sprinkler installation, fire-extinguishing appliances, means of access, details of the ventilation system and other relevant information for fire control.

6.2.2 The fire fighting equipment must be maintained in good order in accordance with the manufacturer's instructions and kept available for use at all times.

6.2.3 Crew members should not interfere with or discharge any fire extinguisher without due cause, and should report any faults or cases of accidental discharge to a responsible officer.

6.2.4 Immediately after joining a ship, seafarers should familiarise themselves with the location of the fire-fighting appliances on board, the operation of such appliances and their effectiveness on different types of fires. In accordance with STCW95 Regulation VI/I section A VI/I of the Code, a responsible officer should verify this knowledge (for guidance with respect to passenger vessels, see chapter 24 of this code).

6.2.5 Crew members should be trained in the use of the following fire-fighting appliances:

- (a) all types of portable fire extinguishers carried on board;
- (b) self-contained breathing apparatus;
- (c) hoses with jet and spray nozzles;
- (d) any fixed fire-fighting system such as foam or carbon dioxide;
- (e) fire blankets; and
- (f) firemen's outfits.

6.2.6 When practicable, fire drills should be held in port as well as at sea.

6.2.7 Although many fires occur in port it may prove difficult to arrange a drill with the local fire authorities. This problem can be partly resolved by instructing the crew on the nature of shore requirements using the contents of the fire wallet (the fire wallet should be positioned by the access arrangements and should outline information required by shore fire authorities who are required to fight a fire on board ship).

6.2.8 Efficient fire-fighting requires the full cooperation of personnel in all departments of the vessel.

6.2.9 For the purpose of a fire drill, an outbreak of fire should be assumed to have occurred in some part of the ship, the alarm should be activated and the requisite actions taken should be in accordance with the ship's health and safety policy.

6.2.10 The type and position of the fire scenario should be varied in a well-conceived sequence that covers most parts of the ship and all types of fire-fighting. Locations could include:

- (a) holds, tanks and other spaces such as forepeak stores and paint lockers;
- (b) engine or boiler rooms;



- (c) accommodation spaces such as cabins and laundry rooms; and
- (d) galleys.

- 6.2.11 Fire drills should be as realistic as circumstances permit. When possible, local fire-fighting equipment, such as extinguishers, should be activated and the visibility of self-contained breathing apparatus masks should be reduced to give the impression of operating within a smoke-filled atmosphere. Caution must be exercised with such drills to avoid trip and slip hazards.
- 6.2.12 The fixed water fire-fighting system should be used and engine room staff should ensure that the fire pumps are operated and that full water pressure is on the fire mains. The emergency fire pump should also be used for fire drills. Personnel should be trained in the operation of other fixed systems such as foam and carbon dioxide.
- 6.2.13 All equipment activated during fire drills should be immediately replaced with fully loaded appliances.
- 6.2.14 Seafarers should be exercised in the closing of openings and the closing down of ventilation systems.
- 6.2.15 A fire drill can be held as the first stage of an abandon ship drill.

### **6.3 ABANDON SHIP DRILLS AND TRAINING**

- 6.3.1 Each abandon ship drill should include:
- (a) summoning personnel to muster stations by the general alarm and ensuring that they are made aware of the order to abandon ship. A check should be carried out to ensure that all personnel are at muster stations;
  - (b) reporting to stations and preparing for the duties described in the muster list;
  - (c) checking that personnel are suitably dressed to minimise cold shock if direct entry into the sea is necessary;
  - (d) checking that life-jackets are correctly donned;
  - (e) where possible, lowering of at least one lifeboat after any necessary preparation for launching;
  - (f) starting and operating the lifeboat engine;
  - (g) where fitted, operating of davits for launching life-rafts;

*Note:* Seafarers should refer to the manual, *Survival at Sea*, for further guidance.

- 6.3.2 If possible, abandon ship drills should be held when a life-raft is due to be sent for servicing. Invaluable experience can be obtained by actually inflating a life-raft in the water and exercising the crew in life-raft boarding techniques.
- 6.3.3 Lowering or hoisting a boat should only be done with minimum crew on board.

- 6.3.4 When turning out davits or bringing boats or rafts inboard under power, seafarers should always keep clear of any moving parts.
- 6.3.5 The crank handle of a lifeboat winch is designed not to rotate except for manual hoisting action. Nevertheless, such handles should be removed from the winch as soon as manual hoisting is stopped. If, however, for some reason the handle cannot be removed and there is a chance of the handle rotating under the action of gravity or electricity, crew members should keep well away from the handle although it may seem stationary.
- 6.3.6 Personnel in an open lifeboat being lowered should remain seated, holding their lines and should have their hands inside the gunwale to avoid them being crushed against the ship's side.
- 6.3.7 Fingers should be kept clear of the long-link when unhooking or securing blocks on to lifting hooks while the boat is in the water.
- 6.3.8 Before craft in gravity davits are recovered by power, the operation of the limit switches and similar devices should be checked.

Free fall lifeboats should at all times be boarded in an orderly manner. Personnel should immediately secure themselves into the seat with the restraining harness and carry out the instructions of the responsible officer. Refer to Marine Notice 10/1998 (Lifeboat Accidents).

- 6.3.9 In accordance with Marine Orders, Part 57 (Helicopter Operations), the shipowner must provide such arrangements, equipment, instructions and training in the safe transfer of persons and goods between helicopter and ship as are
- (a) necessary and reasonable for emergency evacuations; and
  - (b) appropriate and reasonable for the normal operation of the ship.
  - (c) refer to Marine Notice 5/1998 (Ship–Helicopter Marine Personnel Transfers).

## **6.4 MAN OVERBOARD AND RESCUE AT SEA**

- 6.4.1 Each ship should have a contingency plan in the event that someone falls overboard. The plan should take into account the particular characteristics of the ship, the life-saving equipment available and the size of the crew. For example, a typical drill could test the action taken if the bridge watchkeeping officer observes someone falling from the main deck into the sea. This would include:
- (a) executing a Williamson turn or other ship's turn as appropriate;
  - (b) dropping the bridge wing quick-release lifebuoy;
  - (c) sounding the general or emergency squad alarm;
  - (d) announcing the type of emergency over the public address system so that the rescue boat can be prepared;

- (e) assigning a person to the wheel and posting lookouts;
- (f) radar "marking" of the man overboard position;
- (g) initiating any communication such as a "Pan Pan Pan" message; and
- (h) positioning the ship to make a lee and launching the rescue boat.

6.4.2 It should be remembered that it may take the master a few minutes to reach the bridge before he or she can take over the operation and that some decisions need to be taken before he or she reaches the bridge.

6.4.3 The procedure for pulling a person from the sea into a boat should, when possible, be practised during periods when a ship is at anchor.

6.4.4 Should a search be necessary the procedures described in the *Merchant ship search and rescue manual* (MERSAR), published by the IMO, should be adopted, especially if the search is carried out with other ships.

## **6.5 OTHER DRILLS**

6.5.1 Emergency training should not be limited to abandoning ship, fire-fighting and man-overboard drills. Crew members should undergo continuous and refresher training in any emergency situations likely to occur aboard the ship.

6.5.2 Drills in the rescue of seafarers in confined spaces are essential. Seafarers should be thoroughly trained in the procedures described in chapter 10 of this document.

6.5.3 Special training in first aid should be provided as appropriate for particular types of cargoes and operations. Refresher training should be given on a regular basis. Posters, pamphlets and other means of reminding seafarers of first aid procedures should be posted or otherwise made available throughout the ship.

## 7 CARRIAGE OF DANGEROUS GOODS

**Note:** *This chapter provides only general guidance on the safe handling and carriage of dangerous goods. For information about specific requirements, the reader should also study Marine Orders, Part 34 (Cargo and Cargo Handling—Solid Bulk Cargoes; Marine Orders, Part 41 (Cargo and Cargo Handling—Dangerous Cargoes); the IMDG Code; and the Bulk Cargoes Code.*

*NOHSC Exposure standards for Atmospheric Contaminants in the Occupational Environment should be consulted.*

### 7.1 GENERAL PROVISIONS

**Note:** *The International Maritime Dangerous Goods Code (IMDG Code) should be consulted by the responsible officer before any known or suspected dangerous goods are loaded.*

- 7.1.1 The provisions of the IMDG Code, Marine Orders, Part 41 and any port rules and regulations must be observed.
- 7.1.2 No dangerous goods should be loaded if not accompanied by appropriate documentation. The documentation should state the correct technical name of the goods (the manufacturer's trade name alone is not sufficient) and the United Nations number so that the relevant information can be found in the IMO codes. The goods are to be correctly described using the IMDG classification system.
- 7.1.3 Dangerous substances should be loaded or unloaded only under the supervision of a responsible officer.
- 7.1.4 Goods should not be loaded if the packaging does not comply with IMDG Code standards and any special packaging requirements specified in Marine Orders, Part 41.
- 7.1.5 Packages are to be durably marked with the correct technical name and the contents are to be identified by the IMDG classification and labelling system.
- 7.1.6 No containers or road vehicles containing dangerous goods should be loaded without the provision of a container packing certificate or vehicle packing certificate where required.
- 7.1.7 Crew members should be advised beforehand of the dangerous nature of the goods and of any necessary precautions to be observed. Seafarers handling consignments containing dangerous substances are to be given adequate information about the nature of the substances and any special precautions that are to be taken. If accidental exposure to dangerous substances occurs, the IMO's *Medical First Aid Guide for Use in Accidents Involving Dangerous Goods* should be consulted.

**Note:** *The ILO code of practice, Safety and Health in Dock Work, also provides that port workers should be advised on the handling of dangerous goods.*

- 7.1.8 The shipper is responsible for informing the shipowner of any special hazard, and is required to forward instructions on the dangers and the medical treatment of

accidental spillage or poisoning and, if necessary, should supply any special drugs required for medical treatment.

**Note:** *For information on any special drug requirements, the IMDG Code and the IMO's Medical First Aid Guide for Use in Accidents Involving Dangerous Goods should be consulted.*

- 7.1.9 Dangerous goods that are liable to interact dangerously are to be effectively segregated from one another in accordance with the IMDG Code and Marine Orders, Part 41 requirements.
- 7.1.10 Explosives and other hazardous goods should be carried only in strict accordance with the IMDG Code and Marine Orders, Part 41 requirements.
- 7.1.11 Each ship carrying hazardous goods should have a detailed stowage plan which shows the location of all hazardous goods on board and which identifies the goods by class. A copy shall be available before departure for the respective shore authorities and another copy shall be kept on the vessel's bridge. The stowage plan, or at least the location of dangerous cargoes, should be made available to the health and safety committee before the ship is loaded.
- 7.1.12 Substances that are liable to spontaneous heating or combustion should only be carried in accordance with the provisions of the relevant Marine Orders or IMO codes. See Marine Orders, Part 34 or Marine Orders, Part 41; IMDG Code; *Bulk Cargoes Code* and any applicable additional precautions for specific cargo types as set out in IMO codes or resolutions.
- 7.1.13 Correct measures should be taken promptly to render harmless any spillage of dangerous substances. Particular attention may be necessary if such substances are transported in refrigerated compartments where the spillage may be absorbed by insulating material.
- 7.1.14 On the discovery of leakage of dangerous goods or of damaged packing, work must cease immediately and may be resumed only after advice and instruction on the necessary safety precautions to be taken. Otherwise, work shall be resumed (depending on the degree of danger) only after workers have put on protective clothing appropriate to the nature of the goods to be handled.
- 7.1.15 In the event of leakage or spillage involving dangerous gas or fumes, the use of a gas detector is advised before a space is declared to be safe (see chapter 10). Gas masks should only be used for purposes of escape. The place where the leakage has occurred should be treated immediately with an appropriate neutralising substance.

## **7.2 SPECIAL PRECAUTIONS**

- 7.2.1 The IMDG Code contains many provisions for ensuring the safe handling and carriage of dangerous goods, including requirements for electrical equipment and wiring, fire-fighting equipment, ventilation, smoking, repair work, provision and availability of special equipment etc., and should be referred to before handling dangerous goods.

- 7.2.2 Before the loading of particular consignments, officers should check the individual entries in the codes to ensure that the vessel has the appropriate fire-fighting equipment and extinguishing agent should a fire occur.
- 7.2.3 Since some substances that catch fire may emit poisonous fumes, protective clothing and sets of self-contained breathing apparatus should be readily available.
- 7.2.4 Packages should be stowed in a location that ensures protection from accidental damage or heating.
- 7.2.5 Dangerous goods are to be segregated from substances that are liable to start or to spread fires.
- 7.2.6 Dangerous goods should be stowed away from living quarters.
- 7.2.7 It may be necessary to ensure accessibility of dangerous goods so that packages in the vicinity of a fire may be protected or moved to safety.
- 7.2.8 Before loading commences all fire detection systems should be tested.
- 7.2.9 During loading, suitable fire-fighting appliances should be ready for use and all unauthorised personnel should be removed /relocated from the area.
- 7.2.10 A responsible person should be present when dangerous goods are being loaded. All packages should be tallied.
- 7.2.11 Vessels that transport dangerous substances where conditions of operation have not allowed advance notice of the nature of the dangerous substances being transported, shall carry medical supplies including at least the antidotes listed in the IMDG Code. However, on a regular trade, the antidotes might be limited to those that have to be administered in cases of extreme emergency within a period of time not exceeding the normal duration of the crossing.

### **7.3 ADDITIONAL SOURCES OF INFORMATION**

- 7.3.1 Marine Orders, Part 34 and the *Bulk Cargoes Code* provides guidance in the safe stowage and shipment of solid bulk cargoes, excluding grain. They include general advice on the procedures to be followed whenever bulk cargoes are to be shipped, a description of the hazards associated with certain materials and lists of typical material currently shipped in bulk.
- 7.3.2 Appendix B (List of bulk materials possessing chemical hazards) of the Bulk Cargoes Code is to be followed where certain solid dangerous substances are shipped in bulk. Additional advice can be found in chapter 24.
- 7.3.3 The IMO's *Emergency procedures for ships carrying dangerous goods* (EmS) gives information on the action to be taken in the event of an incident involving certain dangerous goods. The goods included in the EmS are classified according to the IMDG Code and are grouped so that goods with the same or similar emergency action appear on one emergency schedule. Each emergency schedule is divided into five sections:

- (a) group title with the emergency schedule number;
- (b) special equipment required;
- (c) emergency procedures;
- (d) emergency action;
- (e) first aid.

- 7.3.4 The appropriate schedules should be consulted before goods are loaded to ascertain that the vessel has the correct equipment to deal with any incidents that might occur.
- 7.3.5 Pesticides used on board ship may be classed as dangerous goods; information on various aspects of pest control can be found in *IMO Recommendations on the safe use of pesticides in ships*.
- 7.3.6 Personal Protective Equipment (PPE) used in an incident involving dangerous goods may become contaminated. PPE contaminated in such a way may need to be disposed of in secure containers or thoroughly decontaminated on board. Specialist advice should be sought following an incident.

## 8 SAFE ACCESS TO SHIP

**Note:** *This chapter provides only general guidance on safe access to the ship. For information about specific requirements, the reader should also consult Marine Orders, Part 23 (Equipment—Miscellaneous and Safety Measures). Further information on safe access to ships may also be found in the ILO code of practice on Safety and Health in Dock Work (revised, 1984) and the ILO Guide to Health and Safety in Dock Work (revised, 1988).*

### 8.1 MEANS OF ACCESS TO SHIP

8.1.1 There should be a safe means of access between any ship and any quay, pontoon or similar structure or another ship alongside which the ship is secured.

8.1.2 Crew members should be provided with adequate information on how to make their way safely to and from the ship through the marine terminal or shore side cargo handling area.

8.1.3 In some modern ports access equipment such as mobile gangways and information on safe means of access are provided by the port authorities. However, the master should ensure, as far as possible, that the equipment meets the required safety standards.

8.1.4 Crew members shall not use a means of access which is unsafe. They should also use means of access with care, e.g. they should not carry so much at once but should instead make several trips or use a stores crane when carrying personal gear, stores or ship's equipment.

8.1.5 Access arrangements should be supervised at all times, either by crew members or by shore personnel, particularly in ports which have large tidal ranges.

**Note:** *Besides contributing to the protection of seafarers against accidents, such surveillance also enhances security against unauthorised persons, including criminals, from boarding the ship.*

8.1.6 Access should generally be by an accommodation ladder or gangway which is appropriate to the deck layout, size, shape and maximum freeboard of the ship.

8.1.7 Access equipment should be of good construction, sound material, adequate strength, free from obvious defect, properly maintained and inspected at frequent intervals. It should not be painted or treated to conceal cracks or defects.

8.1.8 Access equipment should be placed in position promptly after the ship has been secured and should remain in position while the ship is secured.

8.1.9 A lifebuoy with a self-activating light and a separate safety line or some similar device should be provided at the point of access aboard the ship.

8.1.10 Access equipment and approaches to such equipment should be properly illuminated.

8.1.11 Crew members should use only the means of access provided to embark or disembark the ship.



- 8.1.12 The means of access should be kept free of any snow, ice, grease or other substance likely to cause a slip or fall.
- 8.1.13 All gaps between the dockside and the ship, should be protected by a safety net (meeting the requirements of Appendix 6 of Marine Orders, Part 23). This should prevent persons on the ship's accommodation ladder or gangway from falling into the water.
- 8.1.14 The means of access and immediate approaches should be kept free from obstruction and, as far as practicable, kept clear of any substance likely to cause a slip or fall.
- 8.1.15 The means of access should be sited so that no suspended load passes over it.
- 8.1.16 Accommodation ladders and gangways should be clearly marked with maximum designed angle of use and maximum safe loading in both number of persons and total weight. Under no circumstances should this limit be exceeded.
- 8.1.17 Further guidance concerning access to vehicle ferries or roll-on/roll-off vessels may be found in chapter 24.

## **8.2 SHIP'S ACCOMMODATION LADDERS AND GANGWAYS**

- 8.2.1 The specifications for accommodation ladders and gangways are contained in Appendices 4 and 5 of Marine Orders, Part 23.
- 8.2.2 If the gangway rests on rollers or wheels, it should be fitted or protected in such a way as to prevent the user's feet from being caught and it should be placed in a position that does not restrict the free movement of the rollers or wheels. Where the wharf surface is irregular or gaps or ledges exist that may cause the rollers or wheels to jamb or catch, a suitably sized plate should be placed on the surface on which the rollers or wheels rest.
- 8.2.3 A gangway should never be permitted to drop between the shore and the ship in such a way that it may be crushed or damaged.
- 8.2.4 Special care should be taken during maintenance to detect any cracking, rusting or corrosion in gangways, ladders and metal fittings. Any defects posing a hazard should be rectified before further use.

## **8.3 PILOT EMBARKATION AND DISEMBARKATION**

- 8.3.1 The requirements for pilot transfer arrangements are contained in Marine Orders, Part 23. Pilot ladders are not to be used for crew access to a ship except in an emergency. Marine Orders, Part 23 provides that the master of a ship at anchor or at a mooring may provide a pilot ladder as a means of access if he or she considers the use of an accommodation ladder is impracticable. The use of such ladder, except in an emergency, must be limited to pilots and other persons engaged in or in relation to the business of the ship.

## **8.4 TRANSPORT OF PERSONS BY WATER**

- 8.4.1 When persons have to be transported to or from a ship by water, suitable and proper measures should be taken to provide for their safe passage. The boats used should be of suitable construction, properly equipped and maintained and suitably crewed. Embarkation and disembarkation should take place only at suitable and safe landing places.

## **9 SAFE MOVEMENT ABOUT THE SHIP**

### **9.1 GENERAL PROVISIONS**

- 9.1.1 When moving about the ship at sea, seafarers should always bear in mind the possibility of an unusual lurch or heavy roll by the ship.
- 9.1.2 Permanent fittings which cause obstruction and which may be dangerous to vehicles, lifting appliances or persons should be made conspicuous by means of colouring, marking or lighting.
- 9.1.3 Any deck obstructions and head-height obstructions that are a hazard should be painted a bright, conspicuous colour. Where necessary, warning notices utilising graphic symbols should be posted. Head-height obstructions should be padded.
- 9.1.4 The stowage of deck cargoes should take account of the requirements for safe access to crew quarters, for crew working the ship, for boarding of pilots, and access to safety equipment.

### **9.2 PASSAGEWAYS AND WALKWAYS**

- 9.2.1 All passageways, walkways, stairs and deck surfaces used for transit should be properly maintained and kept free from materials or substances that might cause slips or falls.
- 9.2.2 Transit areas and stair treads should, where practicable, be provided with a surface that is slip-resistant in dry as well as in wet conditions.
- 9.2.3 Walkways on deck should be delineated by painted lines or otherwise and indicated by signs.
- 9.2.4 Any gear or equipment stowed to the side of a passageway or walkway should be securely fixed or lashed against the movement of the ship when at sea.
- 9.2.5 When heavy weather is expected, lifelines should be rigged securely across open decks (see chapter 10).

### **9.3 WATERTIGHT DOORS**

- 9.3.1 All seafarers who might use watertight doors should be instructed in their safe use.
- 9.3.2 Power-operated watertight doors can be closed from the bridge and particular care should be taken when using such doors. If opened locally under these circumstances, a door will re-close automatically and crush anyone in its path as soon as local control has been released. Both hands are usually required to operate the local controls, and for this reason no person alone should attempt to carry any load through such doors. The bridge should be notified whenever such doors are opened and immediately after they are closed.
- 9.3.3 Notices clearly stating the method of operating the local controls of watertight doors should be prominently displayed on both sides of the doors.

9.3.4 No attempt should be made to pass through a watertight door when it is closing or when the warning alarm is sounding.

9.3.5 Whenever a watertight door is energised, and under remote control, transit is not allowed. If it is necessary to leave the area confined by such doors, emergency exits shall be used. A warning to that effect shall be displayed at the local operating point.

## **9.4 LIGHTING**

9.4.1 Areas of the ship used for loading or unloading, other work processes or transit should be adequately and appropriately illuminated. See Marine Orders, Part 32 (Cargo and Cargo Handling—Safety Measures). Lighting should be reasonably constant and arranged to minimise glare, dazzle and the formation of deep shadows and sharp contrasts between one area and another.

9.4.2 Broken or defective lights should be reported immediately and repaired as soon as practicable. Failed light globes or faults in sealed waterproof or gas tight fittings must only be changed by the responsible engineer officer.

It is prohibited to enter unlit or inadequately lit places on the ship without safe portable lights. Lighting appliances and cabling should be of a type appropriate to the space being entered, e.g. if the space does or may contain explosive fumes special electrical safety standards need to be applied.

9.4.3 Both fixed and portable lighting should be checked to ensure proper operation and safe rigging prior to use. No operation should be permitted to commence or continue if lighting is insufficient.

## **9.5 PROTECTION AROUND CARGO HATCHES AND OTHER DECK OPENINGS**

9.5.1 Marine Orders, Part 32 sets out the requirements for protection around cargo hatches and other deck openings

9.5.2 Hatch covers, pontoons and beams that have been removed should be placed so as to leave a safe walkway from rail to hatch coaming and fore and aft.

9.5.3 Access within cargo spaces and holds should be kept clear.

9.5.4 Mechanically, hydraulically and electrically powered hatch covers should be opened and closed only by designated members of the ship's crew or other authorised persons. The hatches should only be operated after ensuring it is clear to do so.

9.5.5 Any openings through which a person might fall should be fitted with secure guards or fencing of adequate design and construction.

9.5.6 As required by Marine Orders, Part 32 fencing across an opening must comprise at least two parallel rails, ropes or chains, the top rail, rope or chain being at a height of at least one (1) metre above the walkway. If constructed of rope or chain, the fence should be fitted with tensioning devices to keep the rope or chain as taut as practicable.

## **9.6 ACCESS TO HOLDS AND OTHER DECK SPACES**

- 9.6.1 Safe access should be provided into each hold or space below deck, in accordance with requirements of Marine Orders, Part 32 .
- 9.6.2 Rope ladders should not be used to access holds.
- 9.6.3 All ladders and access arrangements should be inspected at frequent intervals by a responsible officer, but particularly before and after working cargo in the space in question. If any ladders, handgrips, footholds or cleats are found to be unsafe, access should be locked or blocked off and warning notices prohibiting access should be posted at every approach until repairs have been carried out.
- 9.6.4 The responsible officer should ensure that any defects are corrected as soon as practicable. Any welding or replacement of rungs, ladders or cleats should be inspected and tested by a responsible officer before use to ensure that the work has been properly carried out.

## **9.7 DRAINAGE**

- 9.7.1 Drains and scuppers should be regularly inspected and properly maintained to ensure that they do not become blocked.

## **10 ENTERING AND WORKING IN ENCLOSED OR CONFINED SPACES**

**Note:** *This chapter provides only a general guide to entering and working in enclosed or confined spaces. For more detailed information about the precautions to be taken before entering enclosed or confined spaces the reader should consult AMSA Marine Notice 9/1986 (Precautions to be taken before entering tanks or other enclosed spaces and safety measures in port). AS 2865–1997 (Safe Working in a Confined Space), must be used for enclosed space entry. Reference should also be made to the ship's safety management system.*

*For additional guidance in relation to entry into spaces on oil, chemical and gas tankers and ships carrying solid bulk cargoes, the reader should consult the following publications:*

*International Safety Guide for Oil Tankers and Terminals (ISGOTT)*

*Liquefied Gas Handling Principles on Ships and in Terminals (SIGTTO)*

*Code of Safe Practice for Solid Bulk Cargoes (Bulk Cargoes Code)*

*NOHSC 3008 Guidance Note on Exposure standards for atmospheric contaminants in the occupational environment*

### **10.1 GENERAL**

- 10.1.1 All confined spaces should be considered unsafe for entry until proven otherwise.
- 10.1.2 If there is an unexpected reduction in, or loss of, ventilation, in spaces which are usually ventilated by whatever means, then those spaces should also be considered as dangerous and should be vacated immediately.
- 10.1.3 Any confined space may be deficient in oxygen, and/or contain flammable or toxic fumes, gases or vapours, thus presenting a major risk to health or life for anyone entering it. Areas in which an unsafe atmosphere is present, or can arise, include: cargo holds, double bottoms, cargo tanks, pump rooms, compressor rooms, fuel tanks, ballast tanks, cofferdams, void spaces, duct keels, inter-barrier spaces, sewage tanks, cable trunks, pipe trunks, pressure vessels, battery lockers, chain lockers, inert gas plant scrubber and blower spaces and the storage rooms for carbon dioxide (CO<sub>2</sub>), halons and other media used for fire extinguishing or inerting.
- 10.1.4 Such confined spaces should not be entered except upon the explicit instruction of the master or the responsible officer. If a deficiency of oxygen or the presence of toxic gases, vapours or fumes is suspected in any space, then that space should be considered dangerous.
- 10.1.5 The crew shall be drilled periodically in confined spaces rescue and medical first aid.

## **10.2 PRECAUTIONS ON ENTERING CONFINED SPACES**

- 10.2.1 Before a space is entered, the following precautions should be taken, as appropriate, to make it safe for entry without the need for breathing apparatus, and to ensure that it remains safe whilst persons are inside:
- (a) a competent person should make an assessment of the space and the risks involved and a responsible officer should be appointed to take charge of the operation;
  - (b) the potential hazards should be identified;
  - (c) the space should be prepared and secured for entry;
  - (d) the atmosphere should be tested;
  - (e) a "permit-to-work" system should be used;
  - (f) entry procedures should be established and followed;
  - (g) continuous ventilation should be maintained throughout.
- 10.2.2 Additional precautions, including the use of breathing apparatus, should be taken where the procedures listed in paragraph 10.2.1 have been followed and an unsafe atmosphere has been established (see section 10.9.).
- 10.2.3 No person should enter a dangerous space to attempt a rescue without first having called for assistance and then having donned a breathing apparatus. Even then, entry should not be made until assistance arrives (see sections 10.9 and 10.10).

## **10.3 DUTIES AND RESPONSIBILITIES OF A COMPETENT PERSON AND OF A RESPONSIBLE OFFICER**

- 10.3.1 The designated competent person should be capable of making an informed assessment of the likelihood of a dangerous atmosphere being present or arising subsequently in a space. The competent person should have sufficient theoretical knowledge and practical experience of the hazards that might be met and whether precautions are necessary. The assessment of potential hazards should take into account any dangers from neighbouring or unconnected spaces, as well as the work needing to be done in the space itself.
- 10.3.2 A responsible officer should be designated to take charge of every operation where entry into a potentially dangerous space is necessary. This officer may be the same person as the competent person.
- 10.3.3 The responsible officer must, on the basis of the competent person's assessment, determine the procedures to be followed for entry into the space. These will depend on whether the assessment shows:
- (a) no immediate risk to life or health but that a risk could arise during the course of work in the space (the precautions in section 10.5 should then be followed);

- (b) an immediate risk to life or health (the precautions in section 10.9 should then be followed).

10.3.4 The space should be continuously monitored as long as anyone is inside.

#### **10.4 PREPARING AND SECURING THE SPACE FOR ENTRY**

10.4.1 Care should be taken to avoid the effects of a possible release of pressure or vapour when opening the entrance to the space.

10.4.2 The space should be isolated and secured against the escape of dangerous substances by blanking off pipelines or other openings, or by closing valves. Valves should then be tied, or some other method employed to show that they must not be opened.

10.4.3 The space should be cleaned or washed, if necessary, to remove as much as possible of the sludge or other deposit liable to give off dangerous fumes. Special precautions may be necessary (see section 10.9).

10.4.4 The space should be thoroughly ventilated by natural or mechanical means, to ensure that all harmful gases are removed and no pockets of oxygen-deficient atmosphere remain. Compressed oxygen should not be used to ventilate any space.

10.4.5 Officers on watch, or persons in charge, on the bridge, on the deck, in the engine-room, or the cargo control room should be informed as necessary that a space is to be entered so that, for example, fans are not stopped, equipment not started or valves not opened by remote control.

10.4.6 Appropriate warning notices should be placed on the relevant controls or equipment.

10.4.7 Where necessary, pumping operations or cargo movements should be suspended when entry is being made into a dangerous space.

#### **10.5 TESTING THE ATMOSPHERE OF CONFINED AND ENCLOSED SPACES**

10.5.1 Only persons trained in the use of the equipment should test the atmosphere of a space.

10.5.2 Equipment should be properly calibrated before use.

10.5.3 Testing of the atmosphere should be carried out before entry and at regular intervals thereafter.

10.5.4 Testing of the atmosphere before entry should be made by remote means. If not possible, the competent person should ensure that all attempts have been made to reduce the danger posed by the atmosphere and only then should entry be made with the additional precautions set out in section 10.9.

10.5.5 Testing of the atmosphere should be carried out on different levels, where appropriate.



- 10.5.6 Personal monitoring equipment designed purely to provide a warning against oxygen deficiency and hydrocarbon concentrations should not be used as a means of determining whether a dangerous space is safe to enter.

## **10.6 USE OF A PERMIT-TO-WORK SYSTEM**

- 10.6.1 A "permit-to-work" system should be used. Entry into a space should be planned in advance and if unforeseen problems or hazards arise during the operation, then work should be stopped and the space evacuated immediately. Permits to work should then be withdrawn and the situation reassessed. Permits to work should be revised as appropriate after the reassessment.
- 10.6.2 Everyone should leave the space on expiry of a "permit to work", and the entrance should be closed or otherwise secured to prevent re-entry until declared safe for normal entry.

## **10.7 PROCEDURES AND ARRANGEMENTS BEFORE ENTRY**

- 10.7.1 Access to, and lighting, within the space should be adequate.
- 10.7.2 No sources of ignition should be taken or put into the space unless the master or responsible officer is satisfied that it is safe to do so.
- 10.7.3 A rescue team and resuscitation equipment should be available for immediate action. The resuscitation equipment should be positioned ready for use at the entrance.
- 10.7.4 Only trained personnel should be assigned duties at entry, functioning as attendants or as members of rescue teams.
- 10.7.5 The number of persons entering the space should be limited to those persons who need to work and to the number that could be rescued in the event of an emergency.
- 10.7.6 At least one person, trained in entry procedures and the action to be taken in the event of an emergency, should be detailed to stay by the entrance whilst the space is occupied. The attendant should not enter the space leaving the entrance unattended, even in cases where a person inside the space is believed to be at risk, and certainly not before the responsible officer is advised and arrangements made for another person to act as the attendant.
- 10.7.7 A communication system should be agreed and tested by all involved, to ensure that persons entering the space can keep in touch with the person stationed at the entrance.
- 10.7.8 A communication system should be set up between the officer on watch and the person stationed at the entrance.
- 10.7.9 It should be checked that entry with breathing apparatus is possible before entry is allowed. The extent by which movement could be restricted or the removal of a casualty could be hampered, by the use of breathing apparatus, lifelines or harnesses should be ascertained by a competent person.

- 10.7.10 Rescue harness lifelines should be long enough for the purpose and easily detachable by the wearer, but should not otherwise come away from the harness.

## **10.8 PROCEDURES AND ARRANGEMENTS DURING ENTRY**

- 10.8.1 The space should be continuously ventilated whilst occupied and during temporary breaks. All persons in the space should leave immediately if the ventilation system fails.
- 10.8.2 Whilst the space is occupied the atmosphere should be tested periodically. Should there be any deterioration in the conditions all persons should leave immediately.
- 10.8.3 Work should stop and all persons should leave the space if unforeseen difficulties or hazards occur. The situation should then be reassessed (see paragraph 10.6.1).
- 10.8.4 If any person working in a space feels in any way adversely affected he or she should give a pre-arranged signal to the person standing by the entrance and immediately leave the space.
- 10.8.5 A rescue harness should be worn to facilitate recovery in the event of an accident.
- 10.8.6 The general (or crew) alarm should be sounded in the event of an emergency, so that immediate back-up can be given to the rescue team.

## **10.9 ADDITIONAL REQUIREMENTS FOR ENTRY INTO A SPACE WHERE THE ATMOSPHERE IS SUSPECT OR KNOWN TO BE UNSAFE**

- 10.9.1 Where the atmosphere is considered suspect or unsafe to enter without breathing apparatus, and provided all reasonable attempts at gas-freeing have been carried out, entry may be made if this is essential for testing purposes, the working of the ship, the safety of life or the safety of the ship. The number of persons entering should be limited to the minimum number necessary to undertake the work.
- 10.9.2 Breathing apparatus should always be worn. Respirators must not be used because they do not provide a supply of clean air from a source independent of the atmosphere in the space.
- 10.9.3 Two air supplies, as described in section 10.10, should be available to the wearer of breathing apparatus, except in the case of emergency, or where this is impractical because movement in the space would be seriously impeded. A continuous supply provided from outside the space should be used. Should it prove necessary to change over to the self-contained supply, the person should immediately vacate the space.
- 10.9.4 Precautions should be taken to safeguard the continuity of the outside source of air during occupation of the space by the wearer of breathing apparatus. Special attention should be given to supplies originating from the engine-room.
- 10.9.5 A single air supply may be acceptable, where remote testing of the space is not reasonably practicable, provided prolonged presence in the space is not required and the person is situated so that he or she can be hauled out immediately in case of emergency.

- 10.9.6 A rescue harness should be worn. Lifelines should be used where practicable, and should be attended by a person stationed at the entrance who has received training in removing an unconscious person from a dangerous space. If hoisting equipment is needed to effect a rescue, the availability of persons to operate the equipment in the event of an emergency should be ensured.
- 10.9.7 Portable lights and other electrical equipment should be of a type approved for use in a flammable atmosphere.
- 10.9.8 Personal protective equipment should be worn where there is a hazard due to chemicals, in liquid, gaseous or vapour form
- 10.9.9 A pre-arranged plan should be drawn up to deal with the rescue of collapsed persons within a dangerous space. The plan should take into account the design of the individual ship and of the equipment and manpower on board. The need to allocate personnel to relieve or back-up those first into the space should be considered.
- 10.9.10 If a person working in the space indicates that he or she is being affected by the atmosphere, the person stationed by the entrance, using the agreed communication system should immediately raise the alarm. On no account should the person stationed at the entrance to the space attempt to enter it before additional help has arrived and the responsible person has been alerted to the situation. No one should attempt a rescue without wearing breathing apparatus, a rescue harness and, whenever possible, a lifeline.
- 10.9.11 If air is being supplied through an air line to the person who has become unwell, an immediate check should be made that the air supply is being maintained at the correct pressure.
- 10.9.12 An incapacitated person should be removed from the space as quickly as possible, unless he or she is gravely injured, and essential first aid treatment should be administered first (e.g. the restoration of the casualty's air supply at the earliest possible moment must be the first priority).

## **10.10 BREATHING APPARATUS AND RESUSCITATION EQUIPMENT**

- 10.10.1 Every crew member should be instructed in the use of breathing apparatus by a responsible officer.
- 10.10.2 The responsible officer and the person about to enter the space should undertake the full pre-wearing check and donning procedures recommended by the manufacturer. In particular the following should be checked:
- (a) that there will be sufficient clean air at the correct pressure;
  - (b) that low pressure alarms are working properly;
  - (c) that the face mask fits correctly against the wearer's face, so that, combined with pressure of the air coming into the mask, there will not be an ingress of oxygen-deficient air or toxic vapours when the user inhales. It should be noted that facial hair or spectacles will prevent the formation of an airtight seal between a person's face and the face mask;

- (d) that the wearer of the breathing apparatus understands whether or not the air supply may be shared with another person and if so is also aware that such procedures should only be used in an extreme emergency;
- (e) that when work is being undertaken in the space, the wearer should keep the self-contained supply ready for use in case there is a failure of the continuous supply from outside the space.

10.10.3 When in a dangerous space:

- (a) no one should remove their own breathing apparatus;
- (b) breathing apparatus should not be removed from a person unless it is necessary to save his or her life.

10.10.4 Where any person may be required to enter a dangerous space, appropriate resuscitators should be provided, and if entry is expected to occur at sea the ship should be provided with the appropriate equipment. If the appropriate equipment has not been provided entry should not take place.

**10.11 MAINTENANCE OF EQUIPMENT AND TRAINING**

10.11.1 A responsible officer should maintain and periodically inspect and check for correct operation all breathing apparatus, rescue harnesses, lifelines, resuscitation equipment and any other equipment provided for use in, or in connection with, entry into dangerous spaces or during emergencies. A record should be kept of the inspections and checks. All items of breathing apparatus should be inspected and checked for correct operation before and after use.

10.11.2 Equipment for testing the atmosphere of dangerous spaces should be kept in good working order and, where applicable, regularly serviced and calibrated. The manufacturer's recommendations should be kept with the equipment and should be followed.

10.11.3 Shipowners should provide seafarers with the necessary training, instructions and information on entry into dangerous spaces, which should include:

- (a) recognition of the circumstances and activities likely to lead to the presence of a dangerous atmosphere;
- (b) recognition of the hazards associated with entry into dangerous spaces, and the precautions to be taken;
- (c) the use and proper care of equipment and clothing required for entry into dangerous spaces;
- (d) instruction and drill in rescue from dangerous spaces.

## 11 MANUAL LIFTING AND CARRYING

***Note:** This chapter provides only a general guide to safe manual handling practice. For more detailed information about the principles and practices of safe manual handling, the reader should also study the Worksafe Australia Standard on Manual Handling (which incorporates both the National Standard (NOHSC:1001(1990)) and the National Code of Practice (NOHSC:2005(1990)).*

### 11.1 GENERAL PROVISIONS

- 11.1.1 Lifting and carrying objects may seem to be simple operations but many persons on board ship have sustained serious back and other injuries by lifting in an incorrect manner.
- 11.1.2 Every person who is required to handle loads manually should be properly trained.
- 11.1.3 Before lifting and carrying weights, seafarers should first inspect the load as regards its weight, size and shape. Attention should be given to sharp edges, protruding nails or splinters, greasy surfaces or any other features which might lead to an accident.
- 11.1.4 The size and shape of the load are not a reliable indication of its actual weight.
- 11.1.5 The area over which the load is to be moved should not be slippery and should be free from obstructions.
- 11.1.6 To ensure that the lift will be as straight as possible, a firm and balanced stance should be taken close to the load, with the feet being kept slightly apart.
- 11.1.7 Seafarers lifting a load from below knee level should adopt a crouching position with the knees bent but the back should be kept straight to ensure that the legs take the strain.
- 11.1.8 The load should be gripped with the whole of the hand.
- 11.1.9 The load should be kept close to the body and lifted by straightening the legs.
- 11.1.10 Where possible or when lifting to a high level, the seafarer should:
  - (a) use a bench or support to make the lift in two stages;
  - (b) adjust the grip as necessary for carrying or lifting to a second level.
- 11.1.11 The load should be carried in such a manner as to ensure that vision is not obscured. If vision is obscured another method of moving the load should be adopted.
- 11.1.12 To put the load down the lifting procedure should be reversed, with the legs doing the work of lowering, with the knees bent, back straight and the load kept close to the body.
- 11.1.13 Safety shoes or boots should be worn.
- 11.1.14 Personal protective equipment such as back supports are not recommended.

- 11.1.15 Mechanical aids or devices such as a block and tackle should be used where ever possible.
- 11.1.16 Seafarers should take note of the working environment including the weather and the ship's movement when loads are being carried on board ship, particularly if the ship is at sea.
- 11.1.17 Particular care should be taken to coordinate action when two or more people are carrying a load.

## **12 TOOLS AND MATERIALS**

### **12.1 GENERAL PROVISIONS**

- 12.1.1 Users should ensure that all machines, tools and other equipment are suitable for the work in hand and the conditions in which they are to be used.
- 12.1.2 Personal protective equipment should be worn when appropriate (e.g. eye, face and hearing protectors and hair nets for long hair, should be worn when appropriate).

### **12.2 HAND TOOLS**

- 12.2.1 Tools should be treated with due care and should be used only for the purpose for which each tool is designed.
- 12.2.2 Damaged or unsafe tools should not be used.
- 12.2.3 Tools that are not being used should be placed in a carrier, box or tool rack located in a safe position against movement at sea.
- 12.2.4 All tools should be stowed on shadow boards, in lockers or other appropriate places at the end of a work period or operation.
- 12.2.5 When working aloft with hand tools, tools should be secured in such a manner as to prevent them falling.

### **12.3 PORTABLE ELECTRIC, PNEUMATIC AND HYDRAULIC TOOLS**

- 12.3.1 Power-operated tools are dangerous if they are not maintained and operated correctly.
- 12.3.2 Special care should be taken when seafarers work in damp conditions since the risk of electric shock is greatly increased in the presence of moisture or high humidity.
- 12.3.3 Since ships are largely made of metal, which conducts electricity, great care should be taken in the use of electrical tools.
- 12.3.4 All electrical hand tools purchased must have double insulation. Electrical tools designed to be earthed should be properly connected.
- 12.3.5 Electrical tools should be inspected before use and particular attention should be paid to power supply leads. Damaged, frayed or suspect leads must never be used.
- 12.3.6 Refer to AS 3160–1996 (*Approval and test specification*), on electrical appliances.
- 12.3.7 Electrical leads and hydraulic/pneumatic tool hoses should be kept clear of anything that might damage them.
- 12.3.8 Tool pieces, such as drills or bits, must be secure in the tool and must not be fixed or replaced while the tool is connected to a power source.
- 12.3.9 Power tools should be switched off and disconnected from the power source when not in use.

## **12.4 WORKSHOP AND BENCH MACHINES (FIXED INSTALLATIONS)**

- 12.4.1 Permanent signs should be fitted above workshop and bench machines alerting users to any necessary precautions appropriate to the machine, such as the wearing of eye protection.
- 12.4.2 No person should operate a machine unless authorised and trained to do so.
- 12.4.3 Machine operators should be competent in the use of the machine and familiar with its controls.
- 12.4.4 All dangerous parts of machines must be securely guarded. Refer to AS 4024.1–1996 (*Safeguarding of machinery Part 1—General principles*), on machine guarding. Examples of "dangerous parts" are reciprocating components, revolving shafts, gearing, belt drives etc.
- 12.4.5 A machine should be checked each time before use. Guards and safety devices should be inspected before the machine is started.
- 12.4.6 No control or light switch should be in such a position that an operator is required to lean over a machine to reach it.
- 12.4.7 Loose fitting and unsuitable clothing should not be worn when operating machines.
- 12.4.8 If a machine is found to be defective, it should be isolated from its source, tagged and or locked out until repaired by a competent person.
- 12.4.9 Working areas should be kept clean and uncluttered and debris such as metal turnings and swarf should not be allowed to build up around a machine.
- 12.4.10 A machine in use should never be left unattended, even for a few minutes, and should always be stopped when it is not in use.
- 12.4.11 Before a drill or lathe is started, the chuck key should be removed and the operator should ensure that other people are clear of the machine.
- 12.4.12 Work pieces for drilling and milling should be securely held at all times by a machine vice or clamp.
- 12.4.13 There must be adequate lighting around all fixed machines.

## **12.5 ABRASIVE WHEELS**

- 12.5.1 Abrasive wheels should be selected, mounted and used only in accordance with the manufacturer's instructions.
- 12.5.2 A wheel should be closely inspected for damage and brushed clean before it is mounted.
- 12.5.3 The clamping nut should be tightened only enough to hold the wheel firmly.



- 12.5.4 A strong guard should be provided and kept in position at every abrasive wheel both to contain the parts in the event of the wheel bursting and to prevent the user from coming into contact with the wheel.
- 12.5.5 The speed of the spindle should not exceed the stated maximum speed of the wheel and should be periodically checked.
- 12.5.6 When dry grind operations are being carried out or an abrasive wheel is being trued or dressed, suitable transparent screens should be fitted in front of the exposed part of the wheel and users must wear properly fitting suitable eye protection. Note that it is necessary to use both forms of protection.

## **12.6 SPIRIT LAMPS**

- 12.6.1 Care should be taken in filling lamps. If a lamp has been in use it should be completely cool before it is refilled.

## **12.7 COMPRESSED AIR**

- 12.7.1 Compressed air should never be directed at any part of a person's body as air puncturing a person's skin could have serious consequences.
- 12.7.2 Compressed air should not be used to clean a working area.
- 12.7.3 Seafarers should be particularly aware of the dangers of using high pressure pneumatic equipment, such as cleaning and scaling devices, as their misuse can lead to fatal consequences.

## **12.8 COMPRESSED GAS CYLINDERS**

- 12.8.1 The labelling, stowage and carriage of compressed gas cylinders are governed by the IMDG code to which reference should be made.
- 12.8.2 Reference should also be made to Australian Standards 2030.1–1989, 2030.2–1996, 2030.3–1982, 2030.4–1985 and 2030 Supplement 1–1986 on the approval, filling, inspection, testing and maintenance of cylinders for the storage and transport of compressed gas.
- 12.8.3 Cylinders should always be handled with care, whether full or empty.
- 12.8.4 Cylinders should be properly secured and kept upright but must be capable of quick release. Oxygen and fuel gas cylinders (such as acetylene) should be kept in suitable, separate, well ventilated compartments that are not subject to extremes of temperature. The space should have no electrical fittings or other sources of ignition. "No smoking" signs should be displayed at the entrance and within the space.
- 12.8.5 Protective caps over the valve should be screwed in place when cylinders are not in use or are being moved. Valves should be closed when the cylinder is empty.
- 12.8.6 Cylinder valves controls and associated fittings should be kept free from oil, grease and paint. Controls should not be operated with oily hands. Delivery pipework must

be marked in accordance with AS 1345–1995 (*Identification of the contents of pipes, conduits and ducts*).

## **13 WELDING FLAME-CUTTING AND OTHER HOT WORK**

### **13.1 GENERAL PROVISIONS**

- 13.1.1 Welding, flame-cutting and other hot work operations must be conducted within the "permit-to-work" system and procedures as described in the ship's safety management system documentation (see chapter 4), whenever carried out in a non-workshop location.
- 13.1.2 Equipment operators should be competent and familiar with the equipment to be used and should inspect it before use.
- 13.1.3 Equipment operators should be given careful instructions if special precautions need to be taken.
- 13.1.4 Harmful fumes may be produced and oxygen depleted during operations. Special care should be taken during operations in enclosed places and enclosed space procedures (see chapter 10) should be used where necessary to ensure safe operations. Compressed gas cylinders must not be introduced into confined spaces.
- 13.1.5 The precautions provided in chapter 24 should be followed for hot work aboard tankers.

### **13.2 PERSONAL PROTECTIVE EQUIPMENT**

- 13.2.1 The equipment operator and other persons involved in the work process should wear clean and approved personal protective equipment.
- 13.2.2 The operator should normally wear:
  - (a) a welding helmet and suitable eye shield;
  - (b) leather working gloves;
  - (c) a leather apron when appropriate; and
  - (d) any other appropriate personal protective clothing and equipment, e.g. safety boots.

### **13.3 PRECAUTIONS AGAINST FIRE, EXPLOSIONS AND NON-LIFE SUPPORTING ENVIRONMENTS**

- 13.3.1 Before any operation begins, inspections and tests should be carried out to ensure that there are no combustible solids, liquids or gases at or in any compartments adjacent to the work area which might be ignited by heat or sparks from the work. An assessment of the task in the context of other work being done on board must be completed. The assessment to be undertaken by a responsible officer.
- 13.3.2 All surfaces to be welded, or upon which hot work is to be conducted, should be free of oil, grease or any flammable or combustible material

- 13.3.3 All openings through which sparks might fall in should be closed where practicable. Where closure is not possible special care is to be taken to ensure no flammable materials below can be ignited and that the area below is cordoned off to prevent access to passage of persons below while work is occurring.
- 13.3.4 Cargo tanks, fuel tanks, cargo holds or other tanks or spaces (including cargo pumps and pipelines) that have contained flammable substances should be certified by a competent person as being free of flammable gases before any work commences (see chapter 10).
- 13.3.5 All operations should be properly supervised and a fire watch maintained, both in the operational area and all adjacent areas, including spaces on the other side of affected bulkheads. Because of the possibility of delayed fires the fire watch should be maintained for a suitable period of time after the work has been completed.
- 13.3.6 Suitable fire extinguishers should be kept at hand.

#### **13.4 ELECTRIC WELDING EQUIPMENT**

- 13.4.1 The power supply should be direct current (DC), which minimises the risk from electric shock.
- 13.4.2 The "go and return" system in which the welding set has two cables should be used, with the "return" cable separately earthed to the ship's structure. The lead and return cables should be of the shortest length possible (and of an appropriate cross-section) to avoid voltage drop.
- 13.4.3 Cables should be inspected before use, and connectors should be fully insulated.
- 13.4.4 Suitable means should be provided for rapidly cutting off current from the electrode should the operator encounter difficulties.

#### **13.5 PRECAUTIONS TO BE TAKEN DURING ELECTRIC-ARC WELDING**

- 13.5.1 Non-conducting safety footwear should be worn in addition to the personal protective equipment specified in section 13.2. Clothing should be kept as dry as possible.
- 13.5.2 If the operator is in close contact with the ship's structure, protection should be provided by dry insulating mats or boards.
- 13.5.3 Where possible, welding should not be carried out in hot/humid conditions that might cause sweat or damp clothing. If it is not possible to avoid such conditions, appropriate precautions should be taken such as changing damp clothing.
- 13.5.4 Under no circumstances whatsoever should a welder work in wet conditions.
- 13.5.5 The electrode holder should be isolated from the current supply before a used electrode is removed and before a new electrode is inserted. This precaution is necessary because some electrode coatings have extremely low resistance.

## **13.6 FLAME-CUTTING AND BRAZING**

- 13.6.1 Equipment should have backpressure valves fitted adjacent to the torch in the oxygen and acetylene lines and flame arresters fitted at the low pressure side of the regulators. A competent person must check all tools and equipment before use.
- 13.6.2 Oxygen pressure should always be sufficient to prevent acetylene from entering the oxygen line.
- 13.6.3 Acetylene may explode under excessive pressure. It should not be used at a pressure exceeding one (1) atmosphere gauge.
- 13.6.4 If a backfire occurs, the valves on the oxygen and acetylene cylinders should be closed immediately. Personnel should be trained in the appropriate methods for cooling and/or jettisoning cylinders which become hot. An acetylene cylinder that becomes overheated is very dangerous as an impact could cause internal ignition and subsequent explosion.
- 13.6.5 Only hoses which have been specially designed for flame cutting and brazing operations should be used. Hoses in which a flashback has occurred, or which are in any other way damaged, should be discarded.
- 13.6.6 Blowpipes should be lit by safe means such as a stationary pilot flame or a special friction igniter.
- 13.6.7 Gases should be shut off at the pressure reducing regulators before a blowpipe is changed.

## **14 PAINTING**

### **14.1 GENERAL PROVISIONS**

- 14.1.1 Paints may contain toxic or irritant substances. A paint for which no manufacturer's information or Material Safety Data Sheet (MSDS) is available should not be used. Information must also be provided on thinners and cleaning solvents.
- 14.1.2 Some paints dry by evaporation of the paint's solvent and the process may release flammable or toxic vapours. All interior and enclosed spaces should be well ventilated while painting is in progress and until the paint has dried.
- 14.1.3 Smoking should not be permitted during painting. Naked lights, such as matches, should not be used in spaces until paint has fully dried.
- 14.1.4 Great care should be taken when mixing two-pack (two component) paint, as a chemical reaction takes place during the mixing which might create heat and fumes.
- 14.1.5 Chemical rust removers are corrosive and precautions should be taken to protect eyes and skin.
- 14.1.6 Spaces where paint and painting equipment are stored should be well ventilated (see section 10.9 for guidance concerning entering into such spaces when the ventilation system is inoperative).

### **14.2 SPRAY PAINTING**

- 14.2.1 Operators should closely follow the manufacturer's instructions on the operation of spray equipment.
- 14.2.2 A "paint mist" may form during spraying operations and personnel should wear suitable personal protective equipment such as a combination suit, hood, gloves and eye protectors. A respirator may also be necessary.
- 14.2.3 Paints containing tin, mercury, lead or any toxic compounds should not be sprayed in interior spaces.
- 14.2.4 Airless spray equipment ejects paint at a very high pressure. The operation is hazardous as the paint can penetrate the skin or cause eye injuries. Great care should be taken in the use of such equipment.
- 14.2.5 Operators of spray equipment should be trained in the correct methods of unblocking nozzles according to the manufacturer's instructions.

### **14.3 PAINTING ALOFT AND WORKING OVER THE SIDE**

- 14.3.1 Chapter 15 should be read for the precautions to be taken when working aloft and over the side.

## **15 WORKING ALOFT AND OVER THE SIDE**

### **15.1 GENERAL PROVISIONS**

- 15.1.1 Consideration should be given to a permit to work system for work aloft or over the side, depending on the nature of the work (see chapter 4). A form for working aloft should take account of the particular nature of the operation.
- 15.1.2 Particular attention should be paid to sea and weather conditions and the possibility of squalls before working aloft or over the side is commenced. In general, working aloft or over the side should not be permitted if the movement of a ship in a seaway makes such work hazardous.
- 15.1.3 In coastal waters strong tidal or current rips could cause sudden, unexpected ship movements, which might be hazardous to seafarers working aloft.
- 15.1.4 Special consideration should be given to the problems of working near the ship's whistle, funnel, radio aerials and radar scanners. All relevant officers should be informed before work commences and all relevant equipment should be isolated, shut down or appropriate procedures adopted. Warning notices should be posted as appropriate. Officers should be informed when the work is completed.
- 15.1.5 Inexperienced persons should not be required to work aloft, outboard or over the side, unless accompanied by an experienced crew member or are under adequate supervision.
- 15.1.6 All seafarers should wear safety harnesses and restraints appropriate to the conditions. Safety nets should be rigged where necessary. Persons working over the side should wear life-jackets or other suitable flotation devices. Someone should be in attendance on deck. A lifebuoy with a line attached should be readily available.
- 15.1.7 Warning notices that persons are working aloft should be posted on deck, and elsewhere as appropriate. Tools should not be carried in pockets but secured in belt tool carriers, and they should be kept secured to the belt with a lanyard or string during the work. Tools and stores should be sent up and lowered by line in suitable containers.
- 15.1.8 All equipment, such as ladders, blocks and gantlines, should be carefully examined before use. If there is any doubt of the standard, quality and condition of any item, it should not be used.
- 15.1.9 Where possible, only permanent fixtures to the ship's structure, such as welded eye pads, should be used as securing points for ladders, blocks and gantlines. Securing points should be inspected to ensure that they are capable of carrying the weight.
- 15.1.10 Ladders and gantlines should be kept away from, or protected from, sharp edges.
- 15.1.11 Cargo handling operations should not take place in the vicinity where seafarers are working aloft.
- 15.1.12 A competent person should continuously supervise seafarers working aloft or over the side.

## **15.2 CRADLES AND STAGES**

- 15.2.1 Cradles and stages must comply with AS 1576.1–1995 (*Scaffolding—General Requirements*). Cradles should be at least 45 cm wide and fitted with guard-rails to a height of one (1) metre.
- 15.2.2 Plank stages should be made from sound wood and materials and should be free from defect.
- 15.2.3 As far as possible, stages should be secured against movement.
- 15.2.4 Gantlines should be long enough to allow stages to be lowered to a level which enables seafarers to step off the stage easily.
- 15.2.5 When seafarers working on a stage are required to lower the stage themselves, all movements of the stage should be small and carefully controlled.

## **15.3 BOSUN'S CHAIRS (SWING CHAIR)**

Work aloft using bosun's chairs must be done in accordance with the provisions of AS/NZ 4488.1–1997 (*Industrial rope access systems—Part 1: Specifications*) and AS/NZ 4488.2–1997 (*Industrial rope access systems—Part 2: Selection, use and maintenance*).

## **15.4 ROPES**

- 15.4.1 The safety of seafarers working aloft depends to a large extent on the condition of the ropes used in the operations. Such ropes must be given considerable care and attention (see also chapter 18).
- 15.4.2 Ropes should be stowed in a special locker and used for no other purpose than for working aloft. Nothing else should be stowed in the locker as stores such as detergents and paints may damage ropes. The locker should be dry and not subject to excessive heat.
- 15.4.3 All ropes should be thoroughly inspected each time before use and daily when in use. It should be remembered that although the surface of a rope may indicate that it is in good condition, it may have deteriorated inside.
- 15.4.4 All ropes (e.g. gantlines, lifelines and lizards) should be load tested before use to four or five times the weight that they will be expected to carry.

## **15.5 PORTABLE LADDERS AND SCAFFOLDING**

- 15.5.1 Portable ladders should be manufactured to AS 1892.1–1996 (*Portable ladders—metal*) or AS 1892.2–1992 (*Portable ladders—timber*). Portable scaffolding should be manufactured to AS 1576.1–1995 (*Scaffolding—General Requirements*).
- 15.5.2 Working from ladders, where there is a risk of over-stretching and falling, should be discouraged.
- 15.5.3 A safety harness secured above the person should be used when working aloft.



- 15.5.4 The ladder should extend to a height of at least one (1) m above the top landing place.
- 15.5.5 A ladder should be effectively secured so that it cannot move.
- 15.5.6 Seafarers using a ladder should:
- (a) have both hands free for climbing up and down;
  - (b) face a rigid ladder when climbing up and down;
  - (c) not carry tools or equipment.
- 15.5.7 Rigid portable ladders should be placed at an angle between 65 and 70 degrees to the horizontal and there should be a clearance of at least 15 cm behind all the rungs. Portable ladders are to be regularly inspected for defects.
- 15.5.8 Metal ladders should never be used where there is any risk of the ladder or user coming into contact with an electrical source
- 15.5.9 Scaffolding over three (3) metres in height should be erected by professional scaffolders with due regard to the stability and securing of the structure.

## **15.6 ROPE LADDERS**

- 15.6.1.1 Rope ladders should be of good construction, adequate strength and properly maintained.
- 15.6.2 The rope ladder should be properly secured but never secured to railings, or to any other means of support, unless the railings or support will safely take the weight of a person and the ladder.
- 15.6.3 The rope ladder should either hang fully extended or be pulled up completely. It should never be left so that slack may suddenly pay out when the ladder is used.
- 15.6.4 The ladder should be rigged and used under proper supervision.

## **15.7 WORKING OVER THE SIDE FROM PUNTS**

- 15.7.1 Punts should be stable and have suitable fencing.
- 15.7.2 The person in charge should consider the potential hazards of working at the stern and near side discharges and the hazards of strong tides and wash from passing vessels etc. All relevant persons should be informed that the work is taking place.
- 15.7.3 A person working from a punt should wear a lifeline and a buoyancy garment. Someone should be in attendance on deck and a lifebuoy with a line attached should be readily available.

## **16 WORKING WITH ELECTRICITY AND ELECTRICAL EQUIPMENT**

### **16.1 GENERAL PROVISIONS**

16.1.1 All relevant national and international regulations governing the design and construction of electrical installations should be observed, with account being taken of unusual conditions which may be encountered in service such as exposure to:

- (a) moisture, steam and oil vapour, salt-laden atmosphere, sea spray, high winds and ice formation;
- (b) abnormal vibrations, deformation and mechanical shock;
- (c) unusually high or low temperatures; and
- (d) explosive mixtures when used in certain areas.

**Note:**     *The Australian Standard Handbook SAA HB94 1997—Electrical safety in the workplace contains information and advice which augments the provisions of this code.*

16.1.2 Seafarers should receive adequate training before being permitted to work on electrical installations.

16.1.3 The installation should be maintained and protected to minimise the possibility of fire, external explosion, electrical shocks and danger to seafarers.

16.1.4 All live parts should be effectively insulated and enclosed in conduits or otherwise protected and should be maintained in that condition.

16.1.5 All electrical equipment should be regularly inspected to ensure that it is suitable for its intended use. Any electrical faults or other defects should be immediately reported to the appropriate person and repaired by a competent person.

16.1.6 Attention should be paid to the maintenance of the emergency source of electrical power and alarm systems supply and backup.

16.1.7 All electrical appliances should be clearly marked to indicate their safe operating voltage.

16.1.8 Flickering lights should be investigated and repaired by an engineer officer.

16.1.9 Circuits and appliances carrying different voltages in the same installation should be clearly distinguishable by notices, markings on distribution boxes and other conspicuous means.

16.1.10 Seafarers should not interfere with a design and installation intended to prevent circuits and apparatus from being subjected to voltages which exceed those for which they were designed.

- 16.1.11 Only an engineer officer or other competent person should carry out repairs to electrical installations. When appropriate a "permit-to-work" should be issued (see chapter 4).
- 16.1.12 Effective means of ensuring safe isolation of every circuit, sub-circuit and apparatus, such as facilities to lock off isolators, key control or signing, should be provided to minimise or eliminate danger to seafarers.
- 16.1.13 Every circuit should be protected against overload currents, so as to reduce damage to the system and keep the danger of fire to a minimum.
- 16.1.14 Redundant circuits or apparatus should be disconnected or dismantled.
- 16.1.15 Personal protective equipment, such as rubber gloves and rubber boots, should be used whenever there is a risk of electric shock, but should not be regarded as providing full protection against such a risk.
- 16.1.16 Protection against contact with live equipment should be afforded by:
  - (a) placing live parts out of reach;
  - (b) effective enclosure of live parts;
  - (c) adequate insulation; and
  - (d) where ever possible do not work on live equipment or plant.
- 16.1.17 The enclosures of live circuits, such as terminal boxes, should be designed so that only authorised persons can remove them.
- 16.1.18 Suitable fuses or contact-breakers should be placed in each circuit to limit the current to the safe rating for the cable or equipment.
- 16.1.19 Where fuses are used, they should bear clear markings indicating their rated current and, as far as practicable, their rated capacity. Replacement fuses should be of the correct rating.
- 16.1.20 Only authorised persons should replace fuses.
- 16.1.21 All fuses should be protected to prevent accidental contact.
- 16.1.22 Effective means (such as a fuse replacement tool) should be employed to ensure that persons removing or inserting fuses will not be endangered, in particular, by any adjacent live parts.
- 16.1.23 In general, it should not be possible to remove or insert fuses in a circuit unless it has been made dead by means of an isolating device on the incoming side.
- 16.1.24 The following notices should be exhibited at suitable places:
  - (a) a warning notice prohibiting unauthorised persons from entering electrical equipment rooms, interfering with switchboards, and handling or interfering with electrical apparatus;

- (b) a warning notice specifying the person to be notified in the event of an electrical accident or some other dangerous occurrence, and indicating how to communicate with that person;
  - (c) a notice specifying the voltage present in equipment or conductors; and
  - (d) a notice prohibiting the use of naked flames in the vicinity of the battery room.
- 16.1.25 Only authorised persons should have access to and enter equipment rooms containing live electrical equipment or have access to the rear of live switchboards.
- 16.1.26 No work should be done in dangerous proximity to a conductor or installation until it has been made dead and signs have been suitably posted.
- 16.1.27 If a conductor or an installation is in the immediate vicinity of a work location and cannot be made dead, special precautions should be taken. An engineer officer should supervise any such operation.
- 16.1.28 All conductors and equipment should be considered to be live unless there is definite proof to the contrary.
- 16.1.29 Before the current is restored, an engineer officer should ensure that no seafarer is in a dangerous position.
- 16.1.30 After work has been done on electrical equipment, the current should be switched on again only by, or on the orders of, a competent person.
- 16.1.31 Distribution apparatus and switch gear should be protected in all circumstances, particularly:
  - (a) against dripping or splashing of water; and
  - (b) in switchboard rooms and machinery spaces.
- 16.1.32 If temporary connections have to be made while repairs are being carried out, the connections should be made with cables having an adequate margin of current and voltage rating and by an engineer officer. They should be disconnected and removed as soon as they are no longer required.
- 16.1.33 Seafarers not authorised to carry out electrical work should never install new equipment or alter existing equipment.
- 16.1.34 Accurate up-to-date drawings, including cabling diagrams and electrical equipment arrangement diagrams, covering the whole installation should be on hand.
- 16.1.35 Distribution panels should include a list identifying the lighting fixtures, socket outlets and fixed appliances supplied by each of the panel's circuit breakers or fuses.
- 16.1.36 Distribution panels and local group starter panels should be clearly labelled to show their identity as depicted on the drawings.

## **16.2 WANDERING LEADS, PORTABLE LIGHTS, ELECTRIC TOOLS AND OTHER MOVABLE EQUIPMENT**

16.2.1 All flexible cables should be:

- (a) of sufficient size and current rating for the purposes for which they are to be used;
- (b) so constructed, insulated, secured and protected as to ensure that danger to seafarers will be reduced to a minimum.

16.2.2 Every electrical connection should be of suitable construction with regard to conductivity, insulation, mechanical strength and protection, with account being taken of the need to use such equipment in exposed locations.

16.2.3 Cables and conductors should be mechanically protected and properly and durably insulated at points where they are joined, branched or led into any apparatus. For these purposes junction boxes, sleeves, bushings, glands or equivalent connecting devices should be employed.

16.2.4 Where practicable, flexible cables should be joined by junction boxes or plug and socket couplings, and the attachment should be made by screwing, clamping, soldering, riveting, brazing and crimping or equivalent means.

16.2.5 Where armoured cables are joined, care should be taken to continue the conductive bond between the armouring of the cables by the bridging and the junction boxes.

16.2.6 All conductors and apparatus liable to be exposed to a flammable or explosive atmosphere should be so constructed as to negate the possibility of ignition of the vapour or explosive dust. Reference should be made to Australian Standards 2380.1–1989, 2380.2–1991, 2380.4–1994, 2380.6–1988, 2380.7–1987 and 2380.9–1991 on Electrical equipment for explosive atmospheres—Explosion protection techniques. Refer additionally to AS 2381.1–1991, AS 2381.2–1993, AS 2381.6–1993, AS 2381.7–1989, AS 2381.10–1995 on electrical equipment for explosive atmospheres—selection, installation and maintenance.

16.2.7 The supply voltage to portable tools and appliances should generally not exceed 240 volts.

16.2.8 Hand-held electrical tools should be provided with a spring-loaded switch that will break the circuit automatically when the tool is released from the hand.

16.2.9 Portable electrical tools and appliances should not be used in a potentially flammable or explosive atmosphere, unless they are of a type certificated for use in such an atmosphere and the action is authorised by a responsible officer.

16.2.10 A hand lamp or other portable lamp should be of an approved type with effective protection for the bulb and with a suitable cover of glass or other transparent material. Such equipment should be dust and water proof and, where necessary, gas proof.

16.2.11 Flexible cables should:

- (a) not be laid on surfaces that are oily or wet with corrosive liquids;
- (b) be kept clear of moving loads, running gear and moving equipment;
- (c) not be used to lift the portable lamp or portable tools to which they are connected, unless specifically designed for that purpose;
- (d) have additional protection where they are likely to be subjected to rough usage or moisture.

16.2.12 When seafarers use portable equipment or portable lamps they should ensure that any flexible cables passing through doors, hatches, manholes etc., are protected and that their insulation is not damaged by the closing of doors, covers or lids.

16.2.13 A sufficient number of well placed socket outlets should be provided so that no permanent extension leads are required. Permanent extension leads are to be avoided.

### **16.3 HIGH-VOLTAGE SYSTEMS**

16.3.1 As high-voltage systems present considerable danger only competent persons should work upon them.

16.3.2 Manufacturer's instruction manuals should be provided for all high-voltage equipment and be closely followed.

16.3.3 Care should be taken to observe the requirement that all high-voltage equipment should be enclosed or protected. Access should be only obtained by authorised persons using a special tool or key that is retained by the responsible engineer officer, unless the equipment is designed in a way to ensure that any attempt at access will automatically isolate and render it safe.

### **16.4 RECTIFIERS AND ELECTRONIC EQUIPMENT**

16.4.1 No maintenance or repair work should be attempted until the equipment has been effectively isolated and any stored energy dissipated.

16.4.2 Special attention should be paid to the hazard of working near charged capacitors associated with rectification circuits.

16.4.3 Only competent persons should be authorised to repair electronic equipment.

### **16.5 RADIO COMMUNICATION EQUIPMENT**

16.5.1 Aerials and open wire feeders should be placed and guarded in a way to make them inaccessible to unauthorised persons.

16.5.2 Conductors that pass through areas of high electro-magnetic flux should be insulated or otherwise protected in areas to which seafarers have access.

16.5.3 Any work in the vicinity of transmitting aerials should be carried out only within the "permit-to-work" system (see chapter 4). Warning notices should be posted at appropriate places until the work has been completed.

- 16.5.4 No seafarers should be allowed to work in the vicinity of transmitting aerials whilst there is a possibility that they may be energised.
- 16.5.5 Suitable means should be provided and maintained to exclude any persons from the vicinity of equipment where there is a danger from shock, radio frequency burns and injury from X-rays or other radiation.

## **16.6 BATTERIES AND BATTERY ROOMS**

- 16.6.1 Battery rooms should be adequately ventilated to avoid accumulation of explosive gases.
- 16.6.2 Lighting fittings and any electrical equipment in the battery room should be of a type certified as being suitable for a hydrogen atmosphere.
- 16.6.3 Particular hazards when charging batteries are hydrogen explosion and short circuits. During charging, a battery gives off hydrogen and oxygen and the subsequent mixture can be easily ignited. Short circuits may cause arcing which could lead to an explosion or burn seafarers.
- 16.6.4 Only authorised persons should enter battery rooms and, when doing so, they should ensure that they do not introduce any source of ignition. Smoking or welding is prohibited in and near battery rooms.
- 16.6.5 Care should be taken when using metal tools or implements to avoid making contact with the metal battery case or terminals.
- 16.6.6 Battery rooms should be kept clear of any equipment, including any other electrical equipment, likely to act as a source of ignition, and should not be used as storerooms.
- 16.6.7 Lead-acid batteries and alkaline batteries should not be stored in the same room because of the possible interaction of the electrolytes.
- 16.6.8 Safe and effective means of inspecting and servicing the batteries should be provided by adequate lighting and access to each cell. Personal protective clothing, gloves and face shield suitable for use with acid should be supplied and worn by seafarers engaged in topping up the batteries.

**Open flames and naked lights should not be used to inspect battery cells.**

## **16.7 WORK WITH VISUAL DISPLAY UNITS (VDUS) INCLUDING MICROCOMPUTERS**

- 16.7.1 Seafarers should be given adequate training in the use and capabilities of VDUs and microcomputers, where applicable, for the execution of their duties.
- 16.7.2 Work with VDUs can be mentally tiring and measures should be taken to minimise the risk of eyestrain. Lighting should be adequate for the task, with glare and reflection cut to a minimum, and the display screen should be clear and easy to read. Rest periods should be provided.

- 16.7.3 Symptoms such as neck and arm pains may arise as the result of bad posture. VDU operators should avoid sitting in a slumped or cramped position and should be provided with an adjustable chair. Screens and keyboards should be adjustable to the correct height and the correct distance from the operator.



## **17 WORKING WITH DANGEROUS AND IRRITATING SUBSTANCES AND RADIATIONS**

### **17.1 GENERAL PROVISIONS**

- 17.1.1 This chapter should be read in conjunction with chapter 7 which refers to publications and codes containing essential information on the handling of dangerous goods.
- 17.1.2 Dangerous and irritating substances should be handled only under the supervision of a responsible officer.
- 17.1.3 Seafarers should wear appropriate personal protective equipment (see chapter 5).
- 17.1.4 Seafarers should be aware that materials such as residual fuel oil and used or spent engine oil contain substances known to be carcinogenic. In addition to any carcinogenic effects, contact between oil and human skin may lead to a range of skin complaints ranging from mild irritation to severe oil acne. Contact must be avoided by taking suitable precautions, e.g. the owner should provide barrier creams and personal protective equipment.
- 17.1.5 Masters should ensure that the Material Safety Data Sheet (MSDS) provided by the manufacturers with their products is made available to all seafarers who may come into contact with these products.

### **17.2 WORK WITH UNSATURATED POLYESTERS**

- 17.2.1 Composite bonding material can contain unsaturated polyesters that may cause skin irritation or sensitisation that can be difficult to control. Appropriate personal protective clothing should be worn when using substances that contain unsaturated polyesters.

### **17.3 WORK WITH ADHESIVES**

- 17.3.1 Many adhesives emit fumes that are detrimental to health. Appropriate respiratory equipment should be worn and work spaces should be well ventilated.
- 17.3.2 Fire precautions should be observed when working with adhesives.
- 17.3.3 Some adhesives, such as "super-glues", can bond skin upon contact. Such adhesives should be used with great caution and the manufacturer's instructions should be closely followed if skin becomes bonded to objects or to other parts of the body. Force should never be used to separate skin or to detach skin from objects.

### **17.4 REMOVING INSULATION, PAINT AND OTHER COATINGS**

- 17.4.1 When possible, information on the nature of the material should be obtained and any particular hazards identified and suitable precautions taken.
- 17.4.2 Even seemingly innocuous material may contain harmful substances. Appropriate personal protective equipment should always be worn when insulation, paint and other coatings are removed.

## **17.5 WORK WITH ASBESTOS**

- 17.5.1 All types of asbestos have a fibrous structure that can produce dust harmful to health if the surface integrity is damaged or disturbed. The danger is from minute fibres that can become lodged in the lungs and may cause cancer at a later period (see also paragraph 5.1.5).
- 17.5.2 Seafarers should be supplied with information if asbestos is on board ship. Such information should indicate the specific location.
- 17.5.3 Asbestos that is sealed is unlikely to release dust; old asbestos may be in poor condition and consideration should be given to its removal.
- 17.5.4 In general asbestos must only be dealt a specialist contractor.
- 17.5.5 If it is necessary to carry out emergency repairs involving the removal of asbestos, full personal protective equipment, including respirators, should be worn and asbestos-handling safety procedures should be followed. If necessary expert advice should be sought.

**Refer to NOHSC Asbestos Guide**

## **17.6 WORK WITH MAN-MADE MINERAL FIBRES**

- 17.6.1 Man-made mineral fibres, such as those found within insulation material, can cause skin, nose and eye irritation. Appropriate personal protective equipment, such as goggles, masks and coveralls should be worn when handling such material.

**Refer NOHSC Guide on Synthetic Mineral Fibres**

## **17.7 RADIO AND RADAR INSTALLATIONS**

- 17.7.1 Warning notices of the danger of high voltages should be located near radio transmitter aerials and lead-through insulators.
- 17.7.2 When seafarers are working near aerials and scanners, equipment should be isolated, tagged and locked out from the mains supply and radio transmitters earthed. Warning notices should be displayed on the relevant equipment.
- 17.7.3 Fuses should be removed from any equipment upon which work is to be carried out before that work commences.

## **17.8 IONISING RADIATION**

- 17.8.1 Seafarers should not be exposed to dangerous levels of microwave radiation. Instructions contained in manufacturers' manuals should be strictly followed.
- 17.8.2 Eyes are particularly sensitive to microwave and ultrawave radiation. Care should be taken not to look into a radar scanner or waveguide when a radar is operating.
- 17.8.3 No work should be carried out within the marked safety radius of a satellite terminal antenna unless its transmitter has been switched off and isolated.

## **18 UPKEEP OF WIRE AND FIBRE ROPES**

### **18.1 GENERAL PROVISIONS**

- 18.1.1 All ropes should be of sound material, good construction and adequate strength for the service required. Refer to AS 3569–1989 (*Steel Wire Ropes*) and AS 4142–1993 (*Fibre ropes—Care and safe usage*).
- 18.1.2 Before use, all ropes should be inspected and confirmed adequate for the intended working load.
- 18.1.3 A competent person should periodically inspect all ropes used for load bearing purposes.
- 18.1.4 When any rope has been lengthened, altered or repaired, it should be examined and tested before it is used again.
- 18.1.5 All ropes should be maintained in good order:
- (a) when not in use they should be stowed under cover in clean, dry and well ventilated places;
  - (b) ropes should not be exposed to excessive heat or harmful chemicals.
- 18.1.6 Care should be taken to avoid damaging or weakening a rope through:
- (a) excessive stress and strain;
  - (b) rubbing or chafing against sharp objects; or
  - (c) passing it through too small a sheave or block.
- 18.1.7 Care should be taken to avoid the formation of a kink in any rope under strain.
- 18.1.8 Care should be taken in withdrawing rope from a new coil:
- (a) for stranded rope this should be done from the inside of a coil, taking it counter-clockwise for a rope for right-hand lay in order to retain the twist.
  - (b) kinks should always be taken out by correct coiling (a right-hand coiling for a right-hand rope).
- 18.1.9 Any rope, whether natural, synthetic or wire, and of any construction, should not be put under a load suddenly or taken up with a jerk, since such action may overload it.
- 18.1.10 Where thimbles are required for eye splices on ropes, they should be of suitable size.
- 18.1.11 Rope ends and splices should be properly seized with yarn or other suitable means.

### **18.2 WIRE ROPES**

- 18.2.1 No wire rope should be accepted on board unless it is accompanied by a certificate stating that it has been made to a recognised national or international standard and

which gives details of its construction, safe working load and minimum breaking strain.

- 18.2.2 Wire rope should always be handled with great care. Gloves should be used to protect hands against injury from wire ropes except when the rope is under stress or is being paid out. In such cases care should be taken to avoid hand injuries from broken or frayed strands.
- 18.2.3 All wire ropes should be treated at regular intervals with suitable lubricants free from acid or alkali and, if possible, of a type recommended by the manufacturer. Wire ropes should be regularly inspected for loose or broken strands or internal damage. Special attention should be paid to the condition of eye splices.
- 18.2.4 Wire ropes should be stored on reels of suitable diameter. When a wire rope normally stored on a reel is required for use it should be taken from the reel and flaked on the deck in a safe manner. It should be inspected thoroughly for corrosion, damage, and for the expiry of shelf life that the manufacturer may have recommended.
- 18.2.5 A wire rope should not be used if:
- (a) it shows signs of corrosion;
  - (b) there is a tendency towards separation of the strands or wires;
  - (c) excessive wear is indicated by flats appearing on the individual wires;
  - (d) there is excessive reduction in the measured diameter;
  - (e) the number of broken wires in any length of 10 diameters exceeds five percent of the total number of wires in the rope;
  - (f) its statutory life or service life as recommended by the manufacturer has expired, although the wire may look outwardly good; or
  - (g) after failing to meet requirements of a test.

### **18.3 FIBRE ROPES**

- 18.3.1 At regular intervals and always after any cutting or splicing, fibre ropes used for hoisting purposes should be examined for abrasions, broken fibres, cuts, fraying, displacement of the yarns, discolouration and other defects. Contact with grit or sand or dragging over rough surfaces may damage rope and should be avoided.
- 18.3.2 An eye or rope splice in a rope of natural fibre should have not less than three tucks and the tail of each tuck should be whipped in a suitable manner.
- 18.3.3 Ropes used in connection with safety equipment should preferably be of natural fibre.
- 18.3.4 If ropes of man-made fibre are used for life-saving purposes, they should:
- (a) be approved for the purpose; and
  - (b) carry a means of identification that they are of the approved quality.

- 18.3.5 In using ropes of man-made fibres, seafarers should:
- (a) avoid practices under which the special characteristics of such ropes could pose a hazard;
  - (b) be aware of the whiplash effects of a breakage in ropes of man-made fibre resulting from their added elasticity and lack of warning signs prior to breakage;
  - (c) avoid operations by which friction can heat the strands of the rope and produce a partial melting or stickiness in operation, as for example during surging or slacking away on a drum end or winch barrel, excessive angle around or movement over bollards or fairleads, or rubbing against or across a wire rope or hatch coaming;
  - (d) ensure that the manufacturer's recommendations concerning man-made fibre ropes are used when surging operations are carried out using winch drums to avoid excessive slippage;
  - (e) ensure that when taking in or paying out rope, slippage between the rope and the drum or barrel is reduced to a minimum;
  - (f) avoid gripping any rope that has become heated by friction;
  - (g) not allow ropes to run freely through their hands; and
  - (h) ensure that such ropes are not unduly exposed to sunlight or harmful chemicals.
- 18.3.6 Man-made fibre ropes should be replaced when worn or damaged and in any case as required by the competent authority.
- 18.3.7 The method of making eye or loop splices in ropes of man-made fibre should accord strictly with the manufacturer's instructions for the particular material of which the rope is made.
- 18.3.8 Any part of a rope composed of man-made fibres, which has come into contact with such organic solvents as paint stripper or paint, should be discarded.
- 18.3.9 If a man-made rope has been subjected to a severe shock, it should be carefully examined.
- 18.3.10 A natural fibre rope that has become wet should be allowed to dry naturally.
- 18.3.11 A natural fibre rope that has been, or is suspected of having been, in contact with any acid, alkali or any other substance known to be detrimental to rope fibre should be taken out of service and destroyed.
- 18.3.12 Fibre ropes of diameter less than 12 millimetres shall not be used to lift materials.

## **19 ANCHORING, DOCKING AND MOORING**

### **19.1 GENERAL PROVISIONS**

- 19.1.1 All anchoring, docking and mooring work must be supervised by an officer, who is in constant communication with the bridge.
- 19.1.2 The windlass, anchors, chains, mooring lines and wires should be carefully maintained and regularly inspected for damage and defects.
- 19.1.3 Appropriate personal protective equipment should be provided to all seafarers involved in these operations.
- 19.1.4 Seafarers should be aware that it is usual for capstans, winches, or windlasses to be designed so as to stall or walk back before exceeding the safe working load of the weakest part of the system. Seafarers should not tamper with such arrangements or settings.

### **19.2 ANCHORING**

- 19.2.1 Any anchor or chain showing defects should be withdrawn from service and repaired and tested by a suitable shore workshop.
- 19.2.2 Except on cases of an emergency the anchor should not be dropped from the hawse pipe but should be walked back to a suitable position and let go from that position.
- 19.2.3 Anchors may be let go at inappropriate moments due to the wrong message being received on a portable transceiver. All instructions should be “identified” by some means, e.g. by including the name of the vessel in the instruction.
- 19.2.4 Seafarers engaged in operating the brake, and others in the vicinity should wear goggles (or a full-face shield) and safety helmets for protection from dust and debris thrown from the chain.
- 19.2.5 Seafarers engaged in stowing an anchor chain into the locker should stand in a protected position and should keep in constant communication with the windlass operator.
- 19.2.6 Anchors housed and not required should be properly secured to guard against accidents or damage should the windlass brake be released inadvertently.

### **19.3 CHARACTERISTICS OF MAN-MADE FIBRE ROPES USED FOR MOORING OR TOWING**

- 19.3.1 Man-made fibre ropes have advantages over natural fibre ropes in terms of strength, durability and resistance to rot etc. However, wear, damage and excessive exposure to sunlight can greatly diminish the strength of man-made ropes which should therefore be handled with care.
- 19.3.2 The following features should be taken into account when man-made ropes are used in port operations:

- (a) owing to the ability of the ropes to stretch there may be considerable whiplash effect if the rope breaks;
- (b) there is generally no audible warning prior to a rope breaking;
- (c) some ropes have a low melting point and have a tendency to melt or fuse on a drum end.

#### **19.4 MOORING AND UNMOORING**

- 19.4.1 All seafarers involved in mooring and unmooring operations of any kind should be informed of the hazards of engaging in such operations.
- 19.4.2 A competent person should be in charge of mooring operations and ascertain that there are no persons in a dangerous position before any heaving or letting go operation is commenced.
- 19.4.3 On each occasion that a vessel berths, all relevant circumstances such as weather, tides, passing vessels etc., should be considered in determining a safe securing pattern of ropes and wires.
- 19.4.4 Mixed moorings of wires and ropes in the same direction should not be used because wires and ropes stretch differently.
- 19.4.5 There should be sufficient seafarers available to ensure the safe conduct of operations.
- 19.4.6 Only competent persons should operate windlasses and winches.
- 19.4.7 Under no circumstances whatsoever should seafarers stand in a bight of a rope or wire which is lying on deck. Seafarers should never stand or move across a rope or wire that is under strain.
- 19.4.8 Ropes and wires are frequently under strain during mooring operations and seafarers should always stand in a place of safety from whiplash should ropes or wires break.
- 19.4.9 Due to the types of man-made ropes that may be on board ship, seafarers should be trained in the techniques of "stopping off" wires and ropes. Chain securing devices should be used for stopping off wire mooring ropes but never for fibre ropes.
- 19.4.10 A watchman should regularly inspect the moorings when a vessel is alongside and the moorings should be kept tight at all times to prevent the ship's movement.

#### **19.5 MOORING TO BUOYS**

- 19.5.1 Where mooring to buoys by the ship's crew is permitted by the local authority, the following additional precautions should be followed:
  - (a) lifebuoys, with and without attached lines, should be readily available;
  - (b) seafarers engaged in mooring to buoys from a ship's boat should wear personal protective equipment and a life-jacket;

- (c) means should be provided to enable anyone who falls into the water to climb on board the boat;
- (d) the eye of a slip wire used for mooring to buoys should never be put over the bitts;
- (e) mooring strong points, such as chain securing devices and quick-release mechanisms, should be maintained in a serviceable condition.



## **20 WORKING ON DECK OR IN CARGO SPACES**

### **20.1 GENERAL PROVISIONS**

- 20.1.1 All statutory requirements, standards and codes relating to the equipment used should be observed. However, when a ship is not subject to such requirements, these may nevertheless serve as useful guidance.
- 20.1.2 Reference should also be made to the chapters concerning special types of ships, where relevant.
- 20.1.3 All operations should be under the control of a responsible officer or supervisor who should provide instruction and draw attention to any possible hazards associated with the operation.
- 20.1.4 Work should be planned to take account of the prevailing weather conditions.
- 20.1.5 The planning process above must include risk assessment and control strategies.
- 20.1.6 When seafarers are to work on deck while a ship is at sea, a responsible person should authorise such work.

### **20.2 CARGO OPERATIONS**

- 20.2.1 The following section applies to seafarers only to the extent that they are permitted to perform such cargo operations under applicable local regulations and/or practice.
- 20.2.2 This section outlines general considerations for cargo operations. For additional information on cargo operations on specific types of ships, reference should be made to chapter 24.
- 20.2.3 The requirements of Marine Orders, Part 32 must be complied with. The requirements of the port where cargo operations take place should also be complied with and should be made known to seafarers, as appropriate. The ship's garbage management plan should also be consulted.
- 20.2.4 Only trained and experienced persons should operate cargo handling equipment. Manufacturer's instructions regarding operation and maintenance as contained in the ship's cargo handling manual should be followed at all times.
- 20.2.5 A responsible officer should inspect equipment prior to and after use. No equipment should be used or operated unless the prescribed certificates of tests and examinations are on the ship and are current and valid.
- 20.2.6 The officer with primary responsibility for cargo operations should check that all safety features are in place and that any possible hazards are clearly marked and otherwise dealt with to prevent injury to any persons who may be working on board the vessel.
- 20.2.7 The master and ship's officers should ensure that the other crew members are aware of any hazardous cargoes or operations. Appropriate protective equipment should be provided to seafarers before commencement of cargo operations.

- 20.2.8 Prior to commencement of cargo operations, clear means and lines of communication should be established between the ship's crew and terminal personnel or waterside workers. This is particularly important in the case of hazardous cargoes or hazardous operations. If hand signals are to be used, they must be in accordance with Appendix 18 of Marine Orders, Part 32 and their meaning must be clear in advance to all those concerned in the operation.
- 20.2.9 All seafarers must take particular care to not exceed the safe working load of any equipment. The master and officers should take particular care, especially in older vessels, not to overstress any part of the ship's structure.
- 20.2.10 When work is interrupted or has temporarily ceased, hatches should be left in a safe condition, with either guardrails or the hatch covers in position.
- 20.2.11 No other work should be carried out in a space in which cargo is being worked.
- 20.2.12 Seafarers should immediately report the damage of cargo handling equipment to a responsible ship's officer. Damaged equipment should be immediately taken out of service. Seafarers should never attempt to conceal damage to equipment from the responsible ship's officer or from waterside workers and others who may use the equipment.
- 20.2.13 When dangerous goods are carried, the guidance provided in chapter 7 should be strictly followed.
- 20.2.14 Cargo gear should be properly stowed to prevent it from breaking loose and posing a hazard when the vessel is at sea.
- 20.2.15 Cargo should be stowed and secured assuming the worst weather conditions that may be expected.
- 20.2.16 When deck cargoes are carried, particularly timber, attention should be paid to ensuring the ship's stability throughout the voyage, especially in consideration of the possibility of added weight due to absorption of water or accumulation of ice or snow.

### **20.3 LIFTING GEAR**

- 20.3.1 All lifting equipment used on board ship should be of good design, sound construction and material, adequate strength for the purpose for which it is used, free from defect, properly installed or assembled and properly maintained.
- 20.3.2 Lifting gear must be tested, examined and certificated in accordance with Marine Orders, Part 32 .
- 20.3.3 Lifting gear must not be used unless clearly and legibly marked with its safe working load, including the safe working load at various operating positions.
- 20.3.4 The register of a ship's lifting appliances and items of loose gear should be kept in an accessible place on the ship. All lifting gear and loose gear should be included in the register.

- 20.3.5 All equipment should be thoroughly examined by a responsible officer before use and regularly examined during use. The frequency of examination should depend on the operation, e.g. derrick wires subjected to hard usage should be inspected several times a day.
- 20.3.6 Seafarers using cranes, derricks or special lifting gear should preferably be trained and certified for the particular equipment; if this is not possible, they should be thoroughly instructed by a competent ship's officer prior to any cargo operations.
- 20.3.7 Loads being lowered or hoisted should not pass or remain over any person engaged in loading or unloading or performing any other work in the vicinity.
- 20.3.8 Cargo handling equipment should always be manned when controls are in the "on" position. When not in operation it should be turned "off" and safety locks or devices should be put in place.
- 20.3.9 Persons operating equipment should have a clear view. If this is not possible, a signaller should be placed at a point clearly visible to the equipment operator and from the area of work.

#### **20.4 USE OF SLINGS**

- 20.4.1 Straps and slings should be of sufficient size and length to enable them to be used safely and be applied and pulled sufficiently tight to prevent the load or any part of the load from slipping and falling.
- 20.4.2 Before heavy loads such as lengths of steel sections, tubes and lumber are swung, the load should be given a trial lift to test the effectiveness of the slinging.
- 20.4.3 Except for the purpose of breaking out or making up slings, lifting hooks should not be attached to:
- (a) the bands, straps or other fastenings of packages of cargo;
  - (b) the rims of barrels or drums.
- 20.4.4 Slings or chains being returned to the loading position should be securely hooked on the cargo hook before the signaller gives the signal to hoist. Hooks or claws should be attached to the egg link or shackle of the cargo hook, not allowed to hang loose. The cargo hook should be kept high enough to keep slings or chains clear of persons and obstructions.
- 20.4.5 Loads (setts) should be properly put together and properly slung before they are hoisted or lowered.
- 20.4.6 Loads should be raised and lowered smoothly, avoiding sudden jerks or "snatching" loads.
- 20.4.7 Suitable precautions, such as the use of packing or chafing pieces, should be taken to prevent chains, wire and fibre ropes from being damaged by the sharp edges of loads.

- 20.4.8 When slings are used with barrel hooks or similar holding devices where the weight of the load holds the hooks in place, the sling should be led down through the egg or eye link and through the eye of each hook in turn so that the horizontal part of the sling draws the hooks together.
- 20.4.9 The angle between the legs of slings should not normally exceed 90 degrees. Where this is not reasonably practicable, the angle may be exceeded up to 120 degrees provided that the slings have been designed to work at the greater angles.
- 20.4.10 Trays and pallets should be hoisted with four-legged slings and, where necessary, nets or other means should be used to prevent any part of the load falling. Cages should be used wherever possible for loose items.
- 20.4.11 When bundles of long metal goods such as tubes, pipes and rails are being hoisted, two slings should be used and, where necessary, a spreader. A suitable lanyard should also be attached, where necessary.
- 20.4.12 Cargo buckets, tubs and similar appliances should be carefully filled so that there is no risk of the contents falling out. They should be securely attached to the hoist (for example, by a shackle) to prevent tipping and displacement during hoisting and lowering.
- 20.4.13 Shackles should be used for slinging thick sheet metal if there are suitable holes in the material; otherwise, suitable clamps on an endless sling should be used.
- 20.4.14 Bricks and other loose goods of similar shape, carboys, small drums, canisters etc., should be loaded or discharged in suitable boxes or pallets with sufficiently high sides, lifted by four-legged slings.

## **20.5 PULLEY BLOCKS**

- 20.5.1 All blocks should be inspected before use and no block should be used unless it has identification marks and its safe working load marked on it in tonnes.
- 20.5.2 When a block is inspected it should be ascertained that no sheave is cracked, that it turns freely and the groove is not excessively worn, that the head swivel fitting is securely fastened and the block shank freely turns, that the site straps are sound and that all sheave clearances are satisfactory.
- 20.5.3 All grease nipples and/or lubrication holes should be kept clear and each block should be regularly greased.

## **20.6 HOOKS**

- 20.6.1 Every hook should be provided with an efficient device to prevent displacement of the sling or load or be of such construction as to prevent displacement.
- 20.6.2 No hook should be used unless its safe working load is clearly marked.

## **20.7 SHACKLES**

- 20.7.1 No shackle should be used unless its safe working load is clearly marked.

20.7.2 A shackle should be of the correct type, size and safe working load for its intended use.

20.7.3 All shackles should have their pins effectively secured or seized with wire.

20.7.4 The running part of any rigging should not come into contact with the pin of a shackle.

20.7.5 All shackle pins should be kept lubricated.

## **20.8 WORKING ON DECK WHILE SHIP IS AT SEA**

20.8.1 The responsible officer should ensure that seafarers working on deck are properly instructed in the tasks that they are required to perform.

20.8.2 Seafarers should be prohibited at all times from sitting upon the vessel's bulwark or rail.

20.8.3 Bridge watchkeeping officers should be informed of all work being performed on deck or in deck spaces.

## **20.9 HEAVY WEATHER**

20.9.1 If heavy weather is expected, lifelines should be rigged in appropriate locations on deck.

20.9.2 Attention should be given to the dangers of allowing any person out on deck during heavy weather.

20.9.3 No seafarers should be on deck during heavy weather unless it is absolutely necessary for the safety of the ship or crew.

20.9.4 The lashings of all deck cargo should be inspected and tightened, as necessary, when heavy weather is expected. Work on deck during heavy weather should be authorised by the master and the bridge watch should be informed.

20.9.5 Any person required to go on deck during heavy weather should wear a life-jacket and be equipped with a portable transceiver. If possible, the person should remain in communication with a back-up person and be visible at all times.

20.9.6 Seafarers on deck should wear reflective clothing.

20.9.7 Seafarers should work in pairs or in teams. All seafarers should be under the command of an experienced senior officer.

## **20.10 WORKING IN HATCHES AND HOLDS**

20.10.1 Reference should be made to chapters 8, 9 and 10.

20.10.2 Before any work in any hatches or holds where the atmosphere may contain toxic or flammable gases or be deficient in oxygen, the enclosed space procedures outlined in chapter 10 should be observed.

- 20.10.3 If work is to be performed on or near a tall stack of cargo, an officer should ensure that it is safe to do so. Fall protection measures should be implemented where there is a risk of falling and being injured.
- 20.10.4 When possible, loosely stowed dunnage should not be walked upon. If this is unavoidable, care should be taken not to walk on any protruding nails.
- 20.10.5 Work should not be carried out in holds where cargo operations are taking place.

## **21 WORKING IN MACHINERY SPACES**

### **21.1 GENERAL PROVISIONS**

- 21.1.1 All operations in machinery spaces should be performed under the supervision of a responsible officer.
- 21.1.2 Reference should be made to chapter 13 concerning welding, flame cutting and other hot work.
- 21.1.3 Reference should be made to chapter 5 concerning personal protective equipment. Particular attention should be paid to protecting seafarers from the effects of noise. Warning signs should indicate spaces in which hearing protection needs to be worn.
- 21.1.4 No work other than routine duties should be undertaken except on the orders of a responsible engineering officer. Maintenance work should be carried out in compliance with manufacturer's instruction manuals. When necessary, specific work should be carried out within the "permit-to work" system (see chapter 4).
- 21.1.5 Moving parts of machinery should be protected with permanent guards or other safety devices such as railings or fencing. Refer to the AS 4024.1–1996 (*Safeguarding of machinery—General principles*).
- 21.1.6 If the use of any piece of machinery or equipment is considered to be temporarily unsafe, it should be immobilised or put in a safe place or condition immediately and, if necessary, a warning notice should be posted adjacent to it or at the control position. The ships lock out or tag out system should be used where applicable.
- 21.1.7 No guard, fencing or shielding should be removed for repair or maintenance except when the machinery to which it relates has been stopped and isolated. The machinery should not be restarted until the fencing or shielding has been replaced and secured.
- 21.1.8 All valves, pipes and fittings should be adequately supported and fixed or clamped to avoid vibration and possible fracture. All such fixtures and supports should be properly maintained and replaced after maintenance.
- 21.1.9 All items such as steam pipes, exhaust pipes and fittings which, because of their location and operating temperature present a hazard, should be adequately lagged or shielded.
- 21.1.10 The source of any oil leak should be located as soon as possible and the leak stopped.
- 21.1.11 Waste oil should not be allowed to accumulate in the bilges or on tank tops. Any accumulation should be removed as soon as possible in compliance with MARPOL. Tank top and bilge spaces should be washed down at regular intervals or as necessary for safety.
- 21.1.12 A procedure should be in place to ensure that, whenever a fuel oil tank is being filled, or the contents of one tank are being transferred to another, it does not overflow. Such a procedure may be in writing and may include permanently displayed line diagrams and particulars. Whenever fuel oil is being loaded or transferred, the operation should be supervised by the responsible officer.

- 21.1.13 Bilges and mud-boxes should be kept clear of rubbish and substances so that the bilges can be easily pumped.
- 21.1.14 Special attention should be given to preventing leakages into machinery spaces of exhaust gases from boilers, inert gas plants, uptakes etc.
- 21.1.15 All areas should be suitably illuminated:
- (a) areas under floor plates where oil pipes are located should be painted a light colour.
  - (b) any light that fails should be replaced as soon as possible;
  - (c) temporary or portable lighting should be used to provide additional illumination as required, and should be removed immediately after use.
- 21.1.16 Care should be taken to keep the noise level as low as practicable and to maintain or, where necessary, improve sound-absorbing arrangements.
- 21.1.17 Seafarers should be informed of the danger of removing hearing protection in areas where the noise level is high, even for short periods. When work has to be carried out in such areas, a suitable system of communication should be agreed upon before the work begins.
- 21.1.18 If there is a control room, doors should be kept closed and hearing protection should be worn when access is required to any area where the noise level is high.
- 21.1.19 Ventilation should be maintained to ensure a comfortable atmosphere so far as is reasonably practicable in all areas, with special attention being given to working areas and control rooms. If necessary, ventilation should be increased where maintenance and repair work have to be carried out in areas of high temperature or high humidity.
- 21.1.20 Unless properly equipped and authorised to be operated without persons in attendance, the boiler room and machinery space should be under the direct supervision of an engineer officer at all times and should be manned at all times by persons adequate for the duties required.
- 21.1.21 All work on piping systems should be performed under the supervision of an engineer officer and the following precautions should be taken:
- (a) all drains on such equipment as pipes and filters should be kept clear;
  - (b) care should be taken to ensure that any pressure has been relieved in all relevant piping, system or container before it is opened or any flange or joint is broken;
  - (c) as a precaution, bolts should be only slackened back and not removed until the flange or joint is broken;
  - (d) if the flange or joint does not part easily, separation should be made with a wedge and not by allowing pressure into the line. The pipe should be secured temporarily if necessary before the flange or joint is broken;



- (e) it should be remembered that valves may not be completely tight nor lines fully drained and that pressure, or accumulation of oil and scalding water, may build up in a pipe even after the pressure has been relieved;
  - (f) any valve controlling flow should be effectively locked or secured as long as the line remains open and, if necessary, a warning notice should be posted.
- 21.1.22 All stores and tools should be properly stowed and adequate arrangements should be made, particularly with heavy stores, to secure each item in heavy weather.
- 21.1.23 When lifting weights, seafarers should avoid strains by using chain blocks or the engine room crane, as appropriate. When turning valves or hand wheels, seafarers should avoid strains by using lever or wheel spanners.
- 21.1.24 Where heavy items are lifted by chain blocks or by an engine room crane:
  - (a) the lifting device and lifting arrangements should be examined by the responsible engineer officer, who should ensure that the safe working load is not exceeded;
  - (b) slings should be examined for broken or ragged strands, and padded as required to avoid damage on sharp edges.
- 21.1.25 Where lifting or eye bolts are to be used, the thread on the bolt and in the part to be lifted should be seen to be clean and in good condition, and the threaded part fully screwed home and locked as appropriate before any lifting effort is applied. This is particularly important when lifting heavy machinery parts, when care should be taken that carbon is removed from the threaded recess, if necessary by running down the appropriate tap before screwing home the bolt.
- 21.1.26 Hoisting or lowering, whether by crane or by chain blocks, should be performed only after all persons involved have been informed of the intended action.
- 21.1.27 Any friction fit, tightness or adhesion of the part of any load being lifted should be broken by wedges or tapping, and not by increasing the load on the lifting appliance, as there is potential to overload the lifting appliance.
- 21.1.28 Seafarers should always stand clear of any load being lifted and should not walk close to or underneath any load being lifted or while it is suspended. It is particularly important not to be located between the load and a fixed object.
- 21.1.29 Any tools used at heights above platform level should be kept in a suitable bag or box, or secured so as to prevent them from falling. After any repair or maintenance work, all tools and any spares or replaced parts should be checked, accounted for and properly stowed away in a safe and secure place.
- 21.1.30 When working alone, a person should arrange to communicate at regular and frequent intervals with other persons in the machinery spaces or on the bridge.
- 21.2 BOILERS, UNFIRED PRESSURE VESSELS AND STEAM PIPES**
- 21.2.1 No person should perform any operation on a boiler, unfired pressure vessel or steam pipe that could result in the release of steam, air, or oil except:

- (a) under the supervision of an engineer officer; and
- (b) with the knowledge and approval of the chief engineer.

21.2.2 All boilers and unfired pressure vessels and steam piping should be inspected internally and externally at regular intervals by a competent person as required under Marine Orders, Part 31 (Ship Surveys and Certification) and classification society rules.

21.2.3 No boiler or unfired pressure vessel should be operated or kept at working pressure if unsafe for use or if not provided with the properly maintained fittings necessary for safe operation.

21.2.4 In addition to normal confined space entry procedures, AS 2865–1997 (*The Australian Standard on Safe Working in a Confined Space*), the following precautions apply when a boiler or unfired pressure vessel is to be inspected internally:

- (a) before any boiler or unfired pressure vessel is opened for inspection, any pressure therein should be released, the contents cooled down to atmospheric temperature and the system effectively drained off;
- (b) no boiler or unfired pressure vessel should be opened or entered for inspection until adequate arrangements have been made to prevent any back flow of steam or working fluid by blanking off, or locking shut, any lines or valves that might allow such back flow of steam, hot water or exhaust gases to enter the boilers, combustion chamber or pressure vessel;
- (c) the top manhole door should be knocked in first with the dogs slacked back but not removed;
- (d) the manhole door should be held by a rope or other means when the dogs are removed;
- (e) when the top manhole has been removed, the bottom manhole door may be knocked in;
- (f) at all times while a person is in the boiler, another person should be standing by at the manhole entrance and should communicate at frequent intervals with the person inside;
- (g) work should not be undertaken while a second boiler is in operation, or when this is not possible, there are at least two valves providing isolation between the fired boiler and the boiler being inspected.

21.2.5 Spaces at the top and sides of boilers should not be used for storage.

21.2.6 Safety valves should be properly sealed and maintained in good operational condition at all times.

- 21.2.7 Special care should be taken to maintain water gauges in proper order. They should be checked and blown through in a proper manner by a competent person at frequent intervals. Only a competent person should replace gauges.
- 21.2.8 The water level should be checked at all times when fires are alight. Should the water level fall below the glass, the boiler should be immediately secured as required.
- 21.2.9 When bringing a boiler back into service care should be taken to:
- (a) ensure when lighting up, the combustion chambers have been properly purged free of gas and that no loose oil has accumulated on the furnace floor;
  - (b) ascertain that all burners are clean and properly assembled.
  - (c) ensure the fuel oil has been recirculated until all parts of the system have reached a suitable temperature before admission to the furnace.
  - (d) ensure when lighting up a boiler, all persons are standing clear of any openings in order to avoid injury from a possible blowback.
- 21.2.10 Should a furnace fail to light for any reason when the oil valve is opened:
- (a) the valve should be closed;
  - (b) the combustion chamber should be properly purged.
- 21.2.11 Operating instructions should be clearly displayed at each boiler.

### **21.3 PROPULSION MACHINERY**

- 21.3.1 The propulsion machinery must be provided and maintained in accordance with the requirements of Marine Orders, Part 20 (Ship Machinery), and classification society rules and the manufacturer's operating manuals.
- 21.3.2 Maintenance should be carried out under the supervision of an engineer officer and the officer informed immediately if any actual, or latent, fault or defect is observed with remedial action being taken as appropriate.
- 21.3.3 The machinery should be stopped before any work is done on, or using, machinery items which would constitute a hazard:
- (a) the throttle or starting system should be closed;
  - (b) the turning gear or a suitable brake should be engaged; and
  - (c) a warning notice should be posted.

### **21.4 TURBINES**

- 21.4.1 The governor, low lubricating oil pressure alarm and shutdown devices, and other speed limiting devices should be made ready to operate should abnormal operations occur.

- 21.4.2 Steam joints, valve gland and gland sealing arrangements should be maintained in good order to avoid excessively high humidity in the surrounding area.

## **21.5 INTERNAL COMBUSTION ENGINES**

- 21.5.1 Internal combustion machinery should be maintained in safe condition and be regularly inspected as required by the manufacturer.
- 21.5.2 Scavenge trunks should be kept clean and free from loose oil and turbo-blowers should be kept free of accumulations of oil and dirt.
- 21.5.3 A source of ignition, e.g. a portable electric light or naked flame, should not be brought near an open engine crank case until it has been cooled and well ventilated and until all explosive gases have been expelled.

## **21.6 AIR COMPRESSORS AND RESERVOIRS**

- 21.6.1 Air compressors should be properly maintained and inspected by an engineer officer.

## **21.7 REFRIGERATION SYSTEMS**

- 21.7.1 Adequate information stating the operating and maintenance safeguards of the refrigeration plant should be displayed on each vessel.
- 21.7.2 Refrigeration compressors and systems should be properly maintained to avoid leakage of refrigerant, either in the compressor room or in the refrigerated compartments. Where refrigerating equipment is isolated, the responsible engineer officer should be notified before entering the machinery room or compartment.
- 21.7.3 When leakage is suspected the proper detection method should be used.
- 21.7.4 No person should enter a refrigerated compartment without wearing protective clothing and informing the responsible officer.

## **21.8 OIL-BASED SYSTEMS**

- 21.8.1 Special precautions should be taken when working on systems containing oil and, in particular, hot oil.
- 21.8.2 All protective covers on oil lines should be drained before removing same. Protective covers should be promptly replaced after completion of any work and after verification that no leaks are evident in the system.
- 21.8.3 Attention is drawn to the potential fire hazard associated with the rupture of unprotected oil lines and joints.
- 21.8.4 Safety devices of oil pumps, oil heaters and coolers should be maintained in good and operative condition.

## **21.9 STEERING GEAR**

- 21.9.1 The operation of the steering gear should be checked or inspected at frequent intervals by the responsible officer and safety devices should be ready to operate at all times.
- 21.9.2 The steering gear should be tested within 12 hours before proceeding to sea in accordance with IMO requirements.

## **21.10 CONTROL-ROOM OPERATION AND UNATTENDED MACHINERY SPACES**

- 21.10.1 Only authorised persons should enter a control room or an unattended machinery space.
- 21.10.2 Seafarers should never enter, or remain in, an unattended machinery space unless permission has been received from, or instructions given by, the engineer officer in charge at the time.
- 21.10.3 When watchkeeping is carried out from a control room, the engineer officer should ensure that a person sufficiently knowledgeable to detect any unusual conditions patrols the machinery space at regular intervals.
- 21.10.4 The instrumentation and alarms, on which the safety of an unattended installation depends, should be maintained in good operational order in accordance with the manufacturer's instructions.
- 21.10.5 Unmanned machinery spaces should be adequately lit at all times.
- 21.10.6 Any alarms that have operated should be reset before the machinery space is left. No alarm system should be isolated without the permission of the chief engineer.
- 21.10.7 At any time when the machinery spaces are to be left unattended, a responsible officer should ensure that all alarm systems are set to operate and that all persons have been accounted for and have left the space.
- 21.10.8 Should the responsible officer enter the space alone for any reason, he or she should notify the bridge duty officer who should arrange to check on their well-being frequently and at specific times as long as he or she remains therein.
- 21.10.9 Notices of safety precautions to be observed by seafarers working in control-rooms and unattended machinery spaces should be clearly displayed at entrances.

## **21.11 HYDRAULIC SYSTEMS**

- 21.11.1 Hydraulic systems should be frequently inspected by a responsible officer, and be properly maintained and kept free of leaks.
- 21.11.2 Care should be taken to avoid skin penetration from high-pressure fluid during inspections and repair of hydraulic systems.

- 21.11.3 The system should be purged as necessary to avoid erratic operations that could be dangerous to seafarers.

## **22 WORKING IN GALLEYS, PANTRIES AND OTHER FOOD HANDLING AREAS**

### **22.1 LOADING AND STORING PROVISIONS**

- 22.1.1 All seafarers working in the galley, pantry and other food handling areas should be trained in related safety measures before assuming their responsibilities.
- 22.1.2 Whenever possible, stores and provisions should be taken aboard, preferably by a crane or derrick, onto a deck area where no cargo is being worked. There should be a short and convenient route to the storerooms and, as far as practicable, this route should not pass across areas where cargo is being worked.
- 22.1.3 Care should be taken to ensure that any obstructions between the loading area and the storerooms are marked or properly protected. Where possible, wooden ramps should be installed so as to provide unimpeded passage over steps or obstructions.
- 22.1.4 When crates are handled or opened, any protruding nails or staples should be removed and crates or chests should be made safe and any metal strips or projections removed before handling.
- 22.1.5 Any hooks or sharp equipment used for handling stores should be stowed in a safe place.
- 22.1.6 Refrigerator chamber doors should be fitted with:
- (a) a device of adequate strength to hold them open in a seaway; and
  - (b) a means of opening them from the inside.
- 22.1.7 Refrigerator rooms should have a means of sounding the alarm both from inside and outside.
- 22.1.8 The area immediately outside a refrigerator room should have a slip-resistant surface.
- 22.1.9 If a leakage of refrigerant in a refrigerated storage space is suspected:
- (a) a warning notice to that effect should be posted on the door or access; and
  - (b) seafarers should not enter.
- 22.1.10 When seafarers enter refrigerated chambers that are usually padlocked they should take the padlocks in with them.
- 22.1.11 Seafarers should make themselves familiar with the operation of the inside release for the door and the location of the alarm button so they may be easily found in the dark.
- 22.1.12 The proper functioning of alarm bells, door clasps and the inside release should be checked at regular intervals.

## **22.2 PREPARATION OF FOOD**

- 22.2.1 Extra caution should be taken in all catering operations when the vessel is moving in a seaway.
- 22.2.2 When meat is being chopped, special care should be taken to ensure that:
- (a) the chopping block is firm;
  - (b) the cutting area of the meat is well on the block;
  - (c) fingers, arms and legs are clear of the line of strike; and
  - (d) protective gloves are worn.
- 22.2.3 Chopping blocks should be placed in a clear unobstructed area so as to reduce any danger to the seafarer concerned to a minimum and to eliminate dangers to others nearby.
- 22.2.4 When foodstuffs are being chopped or cut with a knife, fingers should be bent inwards towards the palm of the hand with the thumb overlapped by the forefinger. The knife should be angled away from the work so that the blade is sloped away from the fingers as the work is fed to the knife.
- 22.2.5 When meat is being sawed or boned, care should be taken to ensure that the saw or knife does not slip off the bone. A protective apron should be worn. Cutting should be done with smooth, firm strokes, care being taken to keep the fingers clear of the cutting edge.
- 22.2.6 All cuts, however small, should be reported immediately and treated for infection. Cuts should always be covered by a waterproof dressing when food is being handled.
- 22.2.7 Adequate lighting should be provided where catering operations are carried out, with additional lighting as necessary in areas where cutting or chopping is done.
- 22.2.8 All areas where catering operations are carried out should be adequately ventilated. Cooking areas should be provided with exhaust ventilation. The uptakes and any filters in such a system should be cleaned at frequent intervals to remove oily deposits.
- 22.2.9 Hot pots and pans should not be full, since they may overflow in seaway.
- 22.2.10 Care should be taken never to leave pans or fat unattended in an oven or on a heating stove, or to allow water to come into contact with hot fat.
- 22.2.11 All seafarers working in the galley should be trained in the use of appropriate fire-fighting equipment, including the use of a smothering blanket and the appropriate type of fire extinguisher. Water should never be used to extinguish burning fat.
- 22.2.12 Broken glass or crockery should be cleaned up immediately using a brush and pan.
- 22.2.13 Seafarers working in catering operations should wear clean clothing, particularly when handling food and preparing meals. They should wash hands and clean finger



nails before handling food and after using the toilet. A supply of hot running water, soap and clean towels should be available in food preparation areas.

- 22.2.14 Sea water should never be used in the preparation of food.
- 22.2.15 Particularly when purchased in a hot climate, vegetables to be used in salads should always be thoroughly washed in clean running fresh water before being served. Fruit should preferably be washed and peeled before being eaten.
- 22.2.16 Seafarers should not be permitted to handle food or cooking utensils etc., when suffering from dysentery, diarrhoea or stomach disorders of an infectious nature. They should report any such complaints, spots or rashes to the responsible officer at the earliest opportunity.
- 22.2.17 All accommodation areas and particularly places where food is stored or prepared should be inspected regularly to ensure cleanliness and freedom from insects, mice and rats.
- 22.2.18 Absolute cleanliness should be maintained in respect of food, crockery, cutlery, cooking utensils and stores.
- 22.2.19 Clean clothes should always be used in pantries, saloons and mess rooms.
- 22.2.20 Cracked or chipped crockery and glassware should be discarded and any food that has been in contact with broken glass or crockery should be thrown out.
- 22.2.21 Smoking is prohibited in kitchens, galleys, pantries, storerooms or other places where food is stored, handled or prepared and notices to this effect should be displayed.
- 22.2.22 Cleaning and washing substances should be only for the purpose intended and never in excess of the quantities recommended in the manufacturer's instructions. Protective gloves should be worn, particularly when handling concentrated liquids.
- 22.2.23 Care should be taken to prevent concentrated liquid and powders from coming in contact with exposed areas of the skin or eyes. In the event of exposure, the affected area should be immediately washed with copious amounts of fresh water. An eye flushing device should be used where necessary. Any such incident should be reported immediately to the responsible officer.

### **22.3 WORK IN GALLEYS, PANTRIES AND SERVING FOOD**

- 22.3.1 Care should be taken to avoid tripping and slipping when moving around galleys or carrying or serving food. Decks should be kept free of grease or rubbish. If any oil or grease is spilt, the person responsible should clean it up immediately or see that others are warned of the risk until the cleaning up is completed.
- 22.3.2 Seafarers should be particularly careful when carrying food and up and down stairs and companionways, which should be kept clear and unobstructed. In particular, one hand should be kept free to hold handrails or supports. Loads should be carried in such a manner as not to obstruct the line of view, and movements should not be hurried.

- 22.3.3 Suitable protective footwear of a type that fully covers the foot, with slip-resistant soles, should be worn at all times.
- 22.3.4 Seafarers should be careful to avoid burns and scalding when handling hot pans and dishes, removing lids off boilers, opening steamers and pressure cookers, immersing the hands in hot water in the sinks or opening oven doors. Clean, dry cloths should be used for picking up utensils too hot to handle.
- 22.3.5 Before washing down the galley, electrical appliances should be unplugged or otherwise isolated from the power source and stoves should be switched off. Care must be taken to prevent the ingress of water into electrical appliances, regardless of whether or not the power is off. There should be no form of hot oil on stove tops and other similarly exposed locations where they may be subject to splashing. Decks should be mopped clear and surplus water removed after washing.
- 22.3.6 Any defects in equipment or utensils should be reported to the responsible officer, who should arrange for their repair or replacement as soon as possible. In the meantime, the defective item should be taken out of service.
- 22.3.7 Repairs to oil-fired or electrical ranges or equipment must only be made by, or under the supervision of an engineer officer.
- 22.3.8 The potentially dangerous heated or moving parts of any machinery or equipment used in the catering department should have suitable guards which should always be in position when being used or operated.
- 22.3.9 Catering staff should be trained and properly instructed:
- (a) in the use of any mechanical or electrical equipment which they may be required to use or operate; and
  - (b) in the dangers of cutting instruments and bacon slicing, mincing and chopping machines.
- 22.3.10 Inexperienced persons should not use mechanical or electrical equipment, cutting, mincing or slicing machines, unless they have been properly instructed and are supervised.
- 22.3.11 Catering staff should ensure that all safety devices are in place before operating slicing, mincing or chopping machines and should use them in a proper manner. Cleaning should never be carried out when any part is in motion, and power should be disconnected from any electrical equipment, using lock out/tag out procedures, before cleaning any part or removing any blockage.
- 22.3.12 When a user is in doubt as to the operation of any electrically driven machine, the machine should be switched off and the responsible engineer officer informed.
- 22.3.13 Sharp knives, saws and choppers should be safely stowed in a proper rack and should never be left lying around or in washing-up water. Tins should be opened only with proper tin openers, which should preferably be securely mounted on a bench or bulkhead.

22.3.14 Catering staff should always observe the manufacturer's printed instructions when lighting up oil-fired ovens or stoves. The following general precautions should be taken:

- (a) the interior should be inspected to ensure that no oil is lying in the bottom;
- (b) air should be blown through to clear any gas;
- (c) the special torch provided should be lit and inserted before the oil is turned on;
- (d) no other means of lighting should ever be used; and
- (e) the face and body should be kept well clear of the burner aperture during the lighting operation.

22.3.15 Should the burner fail to light:

- (a) the oil should be turned off;
- (b) air should be blown through the furnace for two or three minutes to clear any oil vapour before an attempt is made to relight the burner;
- (c) relighting a burner from the hot brickwork of the furnace should never be attempted; and
- (d) any printed instructions should be followed.

## **23 SAFETY IN LIVING ACCOMMODATION**

### **23.1 GENERAL PROVISIONS**

- 23.1.1 Cabins and accommodation should be kept in a clean and tidy condition. Shipowners should provide the necessary cleaning equipment for this purpose.
- 23.1.2 The emergency stations and duties of the occupants of each cabin should be clearly displayed in that cabin or immediately adjacent to the door of the cabin. Seafarers should read and memorise this information immediately upon being allocated the cabin. A careful note should be made of emergency escape routes from the cabin.
- 23.1.3 Towels and clothing should be put away in their proper place when not in use. Wet clothing should be hung in drying room and be kept clear of light bulbs, radiators and other sources of heat.
- 23.1.4 Where the shipowner's smoking policy permits smoking in the accommodation, seafarers should take care to ensure that all butts and ashes are properly extinguished. Seafarers must never smoke in bed. Check company policy.
- 23.1.5 When electrical equipment, including personal electrical equipment, is used in the accommodation, the following precautions should be taken:
- (a) any mains-operated electrical equipment purchased outside Australia should be checked to ensure it is compatible with the ship's power supply;
  - (b) any mains-operated electrical equipment which develops a fault should be immediately unplugged and not operated again before being checked by an engineer officer or a qualified shore service agent;
  - (c) double adaptors should not be used;
  - (d) disposable fuses should never be rewired or replaced by others of a higher rating;
  - (e) portable lamps, radios and other electrical equipment should be switched off at the main switch when not in use or when the user leaves the room;
  - (f) electrical equipment should be properly secured against movement in a seaway;
  - (g) faulty cabin wiring should be immediately reported to an engineer officer.
- 23.1.6 Slip-resistant bath mats and proper handholds should be provided in bathrooms and showers.
- 23.1.7 Seafarers should recognise that the safety of individuals and of the entire ship and crew depends upon off-duty crew members being able to get adequate rest and sleep. Noise and other behaviour that may disturb others should be kept to a minimum.
- 23.1.8 Before leaving a common space, seafarers should always check that chairs and other loose objects are appropriately secured against movement.

- 23.1.9 Accommodation areas should be inspected as part of a fire patrol when most seafarers are asleep.

## **23.2 LAUNDERING APPLIANCES**

- 23.2.1 The manufacturer's operating instructions for washing, cleaning or drying machines should be followed.
- 23.2.2 Clothes washing and drying machines should be installed according to the manufacturer's instructions concerning ventilation and operation.
- 23.2.3 When hand or industrial irons are used, precautions should be taken to avoid burns and scalds and such equipment should be switched off and returned to the stowed position whenever the user leaves the laundry room.
- 23.2.4 Any malfunction or damage to the equipment should be reported to an engineer officer.
- 23.2.5 Dry-cleaning chemicals should not be used.

## **23.3 ROOMS FURNISHED WITH EQUIPMENT TO IMPROVE OR MAINTAIN PHYSICAL FITNESS**

- 23.3.1 All equipment should be installed, secured and used in accordance with the manufacturer's instruction. Free weights are dangerous and should not be used at sea.
- 23.3.2 Seafarers should be encouraged to maintain health and fitness.

*Note: It may not be safe to use certain apparatus when the ship is moving in a seaway. Regular inspection and maintenance of gym equipment is essential.*

## **23.4 SWIMMING POOLS**

- 23.4.1 When a swimming pool is available, seafarers should take precautions against the ordinary risks of swimming and diving. Warning signs should be placed around the pool to discourage dangerous activities such as swimming alone or diving.
- 23.4.2 The swimming pool should be emptied when heavy weather is expected.
- 23.4.3 A substantial net should be stretched across the pool and properly secured whenever the pool is empty.
- 23.4.4 The water in the swimming pool should be changed at regular intervals and the pool should not be filled with water that might be injurious to health.

## **23.5 SEWAGE SYSTEMS**

- 23.5.1 The dangers of gases from sewage systems being generated and finding their way into working and living spaces, and the significance of the hazards presented, should be brought to the attention of all seafarers. An operational procedure should be introduced for reporting and recording inspections and maintenance of the sewage

system and the action taken to deal with complaints of foul or musty smells which may be due to toxic or oxygen-depleted gases.

- 23.5.2 The use of toilet cleaning products that kill germs and bacteria should be avoided as they may destroy the bacteria which are essential to the aerobic operation of sewage treatment plants. The manufacturer of the treatment plant should be consulted for details of appropriate non-harmful cleaning products.
- 23.5.3 If entry into the sewage tanks or work on the system is necessary, all personnel engaged on this work should be informed of the hazards of encountering oxygen-depleted, toxic and flammable gases (see chapter 10).
- 23.5.4 When inspecting a sewage system, the following should be checked:
- (a) that all drainpipes have satisfactory water/gas tightness and adequate water seals and traps to prevent the back flow of gases into the respective compartments;
  - (b) that all sanitary fittings are securely fastened to prevent relative movements at pipe joints;
  - (c) that where toilet pans are fitted with vacuum-breaking arrangements at the back of the water trap, such as individual air pipes or patented back flow prevention valves, these are in a satisfactory condition and operation;
  - (d) that there is an adequate supply of flush water to clear toilet pans and to replenish water seals.
- 23.5.5 It should be made certain that drains and air vents are clear of obstruction and are in sound water/gas tight condition throughout their length. Adequate air vents should be fitted to the piping network, paying special attention to the extremities of the system. These should ensure an adequate supply of air and prevent plugs of water from breaking the water seal during violent rolling or pitching.
- 23.5.6 Ventilation systems to all compartments of a ship should be designed, installed and balanced to ensure satisfactory distribution of air. They should be maintained in a clean and efficient condition to achieve the designed air changes throughout the service life of the vessel. Particular attention should be paid to the exhaust or extraction systems in toilet or washing areas. In general, attention should be paid to the examination of extraction grilles, louvres, ducts etc. to ensure that they are clear and free of accumulated dirt, fluff etc.

## **24 SPECIFIC VESSEL TYPES**

### **24.1 GENERAL PROVISIONS**

24.1.1 The appropriate national and international requirements should be observed.

24.1.2 In all operations, maintaining a high level of safety should be the first priority. The operations and the hazards should be thoroughly explained to seafarers carrying out their respective tasks and the safety precautions for each task should be fully understood. In particular:

- (a) where there is a high risk from fire and explosion rules restricting smoking and the carriage of matches and cigarette lighters must be observed. Smoking should not be permitted on board except in places and at times in accordance with the shipowner's smoking policy or, if there is no specific smoking policy set down, as permitted by the master;
- (b) a warning of the risks present, not only from smoking and naked flames, but also to the risks in an explosive atmosphere from the use of unsuitable electrical equipment or arising from a discharge of static electricity.
- (c) spillages and leaks of hazardous substances, such as petroleum and some mineral oils, should be attended to immediately. The shipowner should provide seafarers with information and personal protective equipment for the safe handling of such spillages;
- (d) oil soaked rags and other materials present a fire hazard and may spontaneously ignite. They must be disposed of in compliance with MARPOL. Other combustible rubbish should not be allowed to accumulate;
- (e) cargo handling equipment, testing instruments, automatic and other alarm systems should be well maintained;
- (f) work which could cause sparking or which involves the use of heat should not be undertaken unless authorised, after the work area has been tested and found gas free, or otherwise declared safe. Similar caution is required where there is a possibility of the formation of explosive dusts, such as sugar, grains or sulphur;
- (g) where work in an enclosed space is necessary, the guidance in chapter 10 should be strictly followed;
- (h) "permit to work" procedures should be adopted unless the work presents no hazard (see chapter 4);
- (i) appropriate personal protective equipment should be worn.

24.1.3 Shipowners should ensure seafarers on first joining the ship receive appropriate training and instruction relevant to the operations they will perform on the ship. Training in emergency procedures and the use of any special emergency equipment should be undertaken at regular intervals. This should include medical first aid measures, in the event of accidental contact with harmful substances and inhalation of dangerous gases or fumes.

- 24.1.4 Shipowners should provide the master and crew with adequate instructions and information on all operations. Those on board responsible for the safe loading and carriage of the cargo should also be provided with all the relevant information pertinent to the cargo before it is loaded and about the precautions to be taken during the voyage. The remainder of the crew should also be advised of any precautions they should take. At all loading and discharging ports, the master and an official from the marine terminal should review a safety checklist. Before starting cargo loading, the stowage and loading procedure should be discussed and agreed between the master and the terminal operator.
- 24.1.5 Shipowners should ensure that all ships are equipped with the correct operational and loading manuals.
- 24.1.6 To minimise the risk of exposure to cargo that could irritate the skin, seafarers should wear appropriate protective clothing and use barrier creams. They should wash themselves and their clothing to remove residual cargo dust so that it is not carried into the living spaces and ingested accidentally while eating. This is particularly relevant for those materials identified as toxic in the IMDG Code.
- 24.1.7 At sea, lashings on deck, in cargo holds, in engine rooms or in stores, should be checked regularly and tightened if necessary. During heavy weather, where appropriate, the heading of the ship should be changed in order to facilitate the tightening of the lashings to reduce potential hazards.

## **24.2 BULK CARRIERS AND CARRIAGE OF BULK CARGOES**

*Note: This section should be read in conjunction with study Marine Orders, Part 34 and the IMO Bulk Cargoes Code.*

- 24.2.1 The dust created by certain cargoes, particularly in loading, discharging or hold cleaning operations, may pose an explosion hazard and should be limited as far as possible to the minimum.
- 24.2.2 Many solid bulk cargoes, some seemingly innocuous, can cause health problems for seafarers in various ways. For example:
- (a) ammonium nitrate fertilisers produce toxic gases upon decomposition;
  - (b) antimony ore dust is toxic;
  - (c) barium nitrate dust on food is toxic if swallowed;
  - (d) pencil pitch when handled may cause severe irritation of the skin and eyes in sunlight.
- 24.2.3 Portholes, doors etc, should be kept closed in port if they permit cargo dust to enter the ship's accommodation area.
- 24.2.4 Spaces used for the carriage of bulk cargoes should be treated as confined or dangerous spaces. The procedures for entering such spaces, set out in chapter 10, should be strictly followed.



- 24.2.5 The properties of dry bulk cargoes should be carefully considered as certain bulk materials are liable to oxidation. This may result in oxygen reduction, emission of toxic fumes and self-heating. Other materials may emit toxic fumes, particularly when wet. Other materials, if they become wet, are corrosive to skin, eyes and mucous membranes, as well as to the ship's structure.
- 24.2.6 Ships which carry cargoes that may emit toxic gases, for whatever reason, should be provided with the appropriate gas detection equipment.
- 24.2.7 Many bulk cargoes, particularly ores, are loaded into holds from great heights and at very fast rates. This can create sufficient stress to damage the structure of the vessel. This could be avoided by reducing the loading rate.
- 24.2.8 The plans for the loading and discharging of ships should be properly adhered to, so that the vessel is not exposed to unacceptable stresses, shear forces and bending moments. There is a SOLAS requirement to develop and execute a formal loading plan. The Bulk Cargoes Code contains details. See also the IMO *Code of Practice for Safe Loading and Unloading of Bulk Carriers* (the BLU Code).
- 24.2.9 Some kinds of cargoes, including concentrates, certain coals and other materials with similar physical properties, may liquefy above the transportable moisture limit and cause a shift in cargo. The moisture content should therefore be carefully checked prior to loading and during the voyage, as moisture migration may occur due to vibration and/or ship motion.
- 24.2.10 Precautions to prevent liquids entering through pipelines into cargo holds in which bulk cargoes are stowed should be maintained throughout the voyage.
- 24.2.11 Precautions should be taken against seawater entering holds through hatch covers moving or flexing when the ship is working in a seaway.
- 24.2.12 Water should not be used to cool cargoes that may liquefy.
- 24.2.13 The appropriate national and international requirements with respect to ventilation should be observed. Certain cargoes, such as some coals, copra, swarf, charcoal and concentrates etc., are liable to self-heating and may catch fire if the temperature is high enough. Cooling such material should be carried out with extreme care since water used to cool the cargo may actually cause increased heating and lead to spontaneous ignition and/or explosion. The temperature of holds containing such cargo should be checked daily or in accordance with the shipowner's or shipper's instructions.
- 24.2.14 The dust from some bulk cargoes including grain and sugar dusts can be explosive. Particularly when cleaning holds after discharge, seafarers should be made aware of this hazard. Smoking should be prohibited or restricted and cleaning carried out so as to minimise dust formation, for example, by hosing down. Static electricity is a major source of hazard and care must be taken to ensure that equipment used is suitable for controlling static hazards.
- 24.2.15 Employees should not enter wing tanks when grain is being loaded.

## **24.3 CONTAINER SHIPS**

- 24.3.1 For general requirements with respect to these vessels, see paragraphs 24.1.1 to 24.1.7 of this section.
- 24.3.2 Shipowners should provide seafarers with special training as required and in particular in the operation and maintenance of on-board container cranes where utilised.
- 24.3.3 Shipowners should provide each ship with instruction manuals for the operation and maintenance of cargo handling equipment. A stowing and securing manual must also be provided.
- 24.3.4 Each container should be fitted with a safety approval plate specifying the country of approval, date of manufacture, identification number, maximum operating gross weights, allowable stacking weight, transverse racking and test load value.
- 24.3.5 The stack height of containers should take account of their design strength and also not impair visibility from the bridge. The number of tiers on deck or in the hold should not exceed the design limitation of both the vessel and the container.
- 24.3.6 When carrying containers on a hatch cover the strength of the hatch cover should not be exceeded. Covers should be restrained against sliding and tipping by approved type stoppers and locking devices.
- 24.3.7 Containers stowed on deck should be secured to the ship, for example, by stacking cones and twist locks. Twist locks can be used effectively when containers are stowed one or two high, especially if the container in the second tier is either light loaded or empty. Care should be taken that twist locks are placed in the correct way and locked. When the number of tiers on deck exceeds two, stacking cones and wire or steel rod lashings should be used.
- 24.3.8 All containers should be effectively secured, preferably at the bottom corners, in a way which will guard against sliding.
- 24.3.9 No restraint system should be imposed on containers, or any of their fittings, which create forces in excess of those for which they have been designed.
- 24.3.10 Employees should wear personal protective equipment when carrying out cargo operations, fitting or securing deck lashings and should use specially designed leverage bars to tighten cargo tensioning devices.
- 24.3.11 In the handling of containers, attention should be paid to the possibility of uneven or poorly distributed loading or incorrectly declared weight.
- 24.3.12 Heavy items of machinery or plant that are stored on flats may need to be further secured by additional lashings.
- 24.3.13 Safe means should be provided for access to containers stacked on deck to check lashings etc. Where practicable, seafarers should be protected from falling by the use of a safety harness properly secured or by other suitable arrangements.

- 24.3.14 Where the ship's electrical supply is used for refrigerated containers, the supply cables should be provided with proper connection for the power circuits and for earthing the container. Before the supply is used, cables and connections should be inspected and any defects repaired and tested by a competent person. Supply cables should be handled only if the power is switched off.
- 24.3.15 Employees should be aware that a container may drop as a result of failure of cargo handling equipment and that the structure of a container itself may fail due to overloading or damage during cargo operations. This may result in the contents of the container spilling out and raining down on deck. Employees transiting the deck during cargo operations should, if possible, use the outboard side of the vessel. Employees should not be located beneath overhead loads.
- 24.3.16 Employees should wear the appropriate protective equipment when on deck in the vicinity of containers. They should be aware that loose lashing gear, particularly twistlocks and lashing gear inadvertently dropped during cargo operations, pose a considerable danger.
- 24.3.17 All deck areas and the tops of containers should be checked for loose lashing gear after cargo operations have been completed.
- 24.3.18 If a container is leaking, the content of the cargo should at first be established from its placarding and from the documentation carried on board ship. The provisions of chapter 7 should be followed.
- 24.3.19 Intermodal freight containers should be hoisted only vertically and with the aid of the correct spreader.
- 24.3.20 Under no circumstances should containers be lifted with the aid of wire slings alone, as deformation of the container may occur which renders it unsuitable for replacing in cell guides and/or handling by specialised equipment.

#### **24.4 RO-ROS AND VEHICLE AND PASSENGER FERRIES**

- 24.4.1 Shipowners should provide seafarers with special training as required, especially in the operation and maintenance of ramps and vehicle access doors.
- 24.4.2 The cargo securing manual should be kept readily accessible.
- 24.4.3 Special attention should be paid to the possible ingress of water, for example, through defective door closures, scuppers, broken bilge pipes and faulty bilge non-return valves, which may affect the stability of the ship. Any water that does enter should be reported to the bridge immediately. The officer of the watch should arrange for the water to be pumped out as soon as possible and the cause of the inflow investigated and remedied.
- 24.4.4 The master should ensure that an effective system of supervision and reporting of the closing and opening of doors and ramps is in operation. Doors should never be open when the ship is under way. Openings in the deck must be suitably framed.
- 24.4.5 The appropriate gas detection instruments should be carried on board to check if ro-ro spaces are gas-free (see chapter 10).

- 24.4.6 The advice given in operating manuals should be followed when opening, working, closing, locking and maintaining cargo access equipment.
- 24.4.7 Vehicles should be provided with the requisite number of securing points to enable the cargo to be properly secured to withstand forces, particularly transverse forces, which may arise during the voyage.
- 24.4.8 Ships should be provided with fixed cargo securing arrangements and with portable securing gear, the correct application of which should be described in the ship's cargo handling manual.
- 24.4.9 Shippers' advice or guidelines on handling, loading, stowing and lashing individual cargo units should be observed.
- 24.4.10 Before being accepted for shipment, every freight vehicle should be inspected externally by a responsible person to check that it is in satisfactory condition for shipment. Cargo units or vehicles should not be accepted for shipment if there is reason to suspect that:
- (a) cargo has been packaged or stowed in an unsatisfactory way;
  - (b) a vehicle is in a bad state of repair or overloaded;
  - (c) the unit itself cannot be safely stowed or secured to the ship and may therefore pose a danger to ship, cargo and crew;
  - (d) the unit might contain dangerous goods;
  - (e) the unit is not properly marked.
- 24.4.11 The type and number of lashings per vehicle depends on the stowage space within the ship and the dimensions and the weight of the vehicle.
- 24.4.12 The movement, stowage and securing of vehicles should be well planned and carried out by at least two competent persons under the supervision of a responsible officer. Adequate means of communication (e.g. hand-held radios) should be used when possible.
- 24.4.13 Ships' ramps, car platforms, retractable car decks and similar equipment should be operated only under the supervision of the responsible officer. Safe systems of work should be provided to ensure that the health and safety of persons are not put at risk when the equipment is operated.
- 24.4.14 Passengers and drivers should not be permitted to remain on vehicle decks without the express authority of the responsible officer. Prominent notices should be displayed in vehicle spaces and passenger accommodation to bring this restriction to the attention of passengers and drivers. The period prior to disembarkation, when passengers and drivers are requested to return to their vehicles, should be kept to a minimum.
- 24.4.15 Ramps used by vehicles should not be used for pedestrian access unless there is suitable separation of vehicles and pedestrians.

- 24.4.16 Where permanent walkways are provided on vehicle decks, they should be adequate in extent, safe to use, and clearly marked and signposted.
- 24.4.17 Suitable notices or appropriate instructions should be made to inform persons on vehicle decks of the dangers from moving vehicles and of the need to exercise extreme caution to minimise the risk to health and safety.
- 24.4.18 Seafarers working on vehicle decks should wear suitable high visibility garments.
- 24.4.19 Seafarers should exercise great care when supervising the driving, marshalling, stowing and securing of vehicles to ensure that no person is put at risk.
- 24.4.20 No attempt should be made to secure a vehicle until it is parked, the brakes have been applied and the engine switched off.
- 24.4.21 Hand lamps and torches should be available wherever seafarers are working in poorly lit areas or have to go under vehicles to secure lashings.
- 24.4.22 Seafarers engaged in the securing of vehicles should take care to avoid injury from projections on the underside of vehicles.
- 24.4.23 Lashings and their points of attachment should be regularly checked during the voyage and re-tightened when necessary. Persons inspecting vehicle spaces during a voyage should exercise caution to avoid being injured by moving or swaying vehicles. If necessary, the ship's course should be altered to reduce movement when lashings are being adjusted. The officer of the watch should always be informed whenever an inspection of the vehicle deck is being carried out.
- 24.4.24 To reduce the build up of fumes, for example carbon monoxide, drivers should be instructed to stop their engines as soon as practicable after embarking and to avoid starting up prior to departure until instructed to do so. Warning notices to this effect should be posted at the entrances to and within vehicle spaces. The appropriate national and international requirements with respect to ventilation should be observed. Where there is doubt about the quality of the air, arrangements should be made for testing (see also chapter 10 and paragraph 24.4.5). The car deck should be ventilated in accordance with the ship's ventilation plan.
- 24.4.25 Noise levels on vehicle decks should be monitored and hearing protection with the appropriate attenuation made available.
- 24.4.26 Smoking is not to be permitted on the vehicle deck. Prominent "No smoking" signs should be permanently affixed within the space and at all entrances.
- 24.4.27 If the presence of flammable vapour is suspected or detected, all electrical circuits and items of equipment that are not intrinsically safe, or certified flame-proof, should be isolated from a position outside the space. Employees and passengers should not be allowed into the space until the vapour has been effectively dispersed.
- 24.4.28 All vehicle decks, ships' ramps and lifting appliances should be kept free of water, grease, oil, or any liquid which might cause a person to slip or fall.

- 24.4.29 Drums, canisters, fuel, gas and acetylene cylinders should not be stowed on the vehicle deck.
- 24.4.30 Retractable car decks and lifting appliances should be securely locked in the stowed position. Doors and ramps, when open, should be locked in position.
- 24.4.31 No vehicle movements should occur until the ferry has been made fast to the dock.
- 24.4.32 Particular attention should be paid to vehicles, unit load and trucks carrying dangerous goods. The goods carried and full safety information should be specified on the relevant transit document of the vehicle. Care should be taken to ensure that the proper separation from other vehicles, or from other substances carried in other vehicles, is maintained. The guidance of chapter 7 should be observed.

## **24.5 OIL TANKERS**

- 24.5.1 This section deals with both crude and product tankers.
- 24.5.2 Particular attention is drawn to the importance of the *International Safety Guide for Oil Tankers and Terminals* (ISGOTT) which provides comprehensive information on the safe operation of tankers.
- 24.5.3 Shipowners should provide seafarers employed on tankers with appropriate training and instructions in the relevant operational and safety requirements associated with their duties and emergency situations.
- 24.5.4 For each operation the master should designate a competent officer who is familiar with the safe operation of tankers. The master should ensure that the designated officer has available an adequate number of competent persons.
- 24.5.5 Particular attention is drawn to the following specific issues:
  - (a) the need for a well-structured on board safety policy backed up by the appropriate safety committee with designated responsibilities (see chapter 2);
  - (b) the need for strict smoking and hot work policies;
  - (c) the need for crew members to fully understand the hazardous nature of cargoes carried;
  - (d) the need for crew members to be aware of the inherent dangers of cargo pumprooms. Pumprooms, by virtue of their location, design and operation, constitute a particular hazard and therefore necessitate special precautions;
  - (e) the need for crew members to be made aware of the carcinogenic health hazards resulting from exposure to minor concentrations of benzene vapour in the air. This hazard can result from breathing vapours of benzene containing cargoes such as gasoline, JP-4 and some crude oils;
  - (f) the need to ensure that seafarers are made aware of the safety precautions and emergency action to be taken in the event of spillage.

## **24.6 BULK CHEMICAL TANKERS**

- 24.6.1 Aspects of section 24.5 may also apply to this section.
- 24.6.2 Additional information and guidance can be obtained from, Marine Orders, Part 17.
- 24.6.3 Ships intended for the carriage of chemicals should carry only those chemicals for which their construction and equipment are suitable, and which are specified on the certificate of fitness.
- 24.6.4 Particular attention is drawn to the importance of having comprehensive information on the safe operation of chemical tankers. Only approved documentation should be used. MSDS should be provided and be freely available for all chemical cargoes carried.
- 24.6.5 Shipowners should provide seafarers employed on chemical tankers with specialised training and instructions in the safe carriage of all chemicals which the ship may be required to carry and the relevant operational and safety requirements associated with their duties and emergency situations.
- 24.6.6 For each operation the master should designate a competent officer who is familiar with the safe operation of chemical tankers. The master should ensure that the designated officer has available an adequate number of experienced seafarers.
- 24.6.7 Particular attention is drawn to the need to:
- (a) ensure that any cargo offered is listed in the shipping documents by the correct technical name;
  - (b) ensure that where a cargo is a mixture, an analysis is provided indicating the dangerous components which contribute significantly to the hazard of the product. This information should be available on board, and freely accessible to all concerned;
  - (c) ensure that a full description of a cargo's physical and chemical properties is supplied with each cargo loaded;
  - (d) ensure that seafarers are made aware of the safety precautions and emergency action to be taken in the event of spillage or crew exposure to possible contamination by chemicals;
  - (e) ensure that cargoes requiring stabilisers or inhibitors, and which are not accompanied by the required certificates, are not accepted for shipment;
  - (f) carry out emergency drills using protective equipment and safety and rescue devices at regular intervals;
  - (g) plan effective first aid treatment in the event of accidental personal contact.
- 24.6.8 For each operation the master should designate a competent officer who is familiar with the safe operation of tankers. The master should ensure that the designated officer has available an adequate number of suitably trained and experienced seafarers.

## **24.7 LIQUEFIED NATURAL AND PETROLEUM GAS CARRIERS**

- 24.7.1 Aspects of section 24.5 may also apply to this section.
- 24.7.2 Additional information and guidance can be obtained from, Marine Orders, Part 17 (Liquefied Gas Carriers and Chemical Tankers).
- 24.7.3 Ships intended for the carriage of liquefied gas should carry only those liquids for which its construction and equipment are suitable, and which are specified on the certificate of fitness.
- 24.7.4 Particular attention is drawn to the importance of the ICS publication *Tanker Safety Guide (Liquefied Gas)* and the book *Liquefied Gas Handling Principles on Ships and in Terminals*, which provides comprehensive information on the safe operation of liquefied gas carriers.
- 24.7.5 Shipowners should provide seafarers employed on liquefied gas carriers with appropriate training and instructions in the relevant operational and safety requirements associated with their duties and emergency situations.
- 24.7.6 Comprehensive operating instructions should be provided concerning the particular ship and cargo.
- 24.7.7 For each operation, the master should designate a competent officer who is familiar with the safe operation of liquefied gas carriers. The master should ensure that the designated officer has available an adequate number of experienced seafarers.
- 24.7.8 Particular attention is drawn to the need to:
- (a) ensure that a full description of the cargo's physical and chemical properties is supplied with each cargo loaded;
  - (b) ensure that seafarers are made aware of the safety precautions and emergency action to be taken in the event of spillage;
  - (c) plan effective first aid treatment due to possible physical contact with liquefied gases or cold cryogenic pipelines, some of which can be at a temperature of minus 160 degrees Celsius;
  - (d) carry out emergency drills at regular intervals using personal protective equipment and safety and rescue devices.

## **24.8 PASSENGER VESSELS**

- 24.8.1 The IMO Convention for the Safety of Life at Sea (SOLAS) requires a sufficient number of trained persons to be on board for mustering and assisting untrained persons.
- 24.8.2 Personnel nominated on muster lists to assist passengers emergency situations should receive additional training to enable them to perform their duties properly. The number of trained persons should always be sufficient to assist the total number of



passengers who may be on board at any one time. The number of trained persons should be included on the ship's safe manning document.

- 24.8.3 Where training is given in a shore-based training course, it should be supplemented by shipboard training before assuming the duties referred to in paragraph 24.8.2. The training should be to the satisfaction of the flag State and some means should be established of ensuring that crew members maintain continued proficiency through periodic refresher training, drills or related work experience;
- 24.8.4 Communication skills of the nominated seafarers should be sufficient to assist passengers during an emergency, taking into account the following criteria:
- (a) the language or languages appropriate to the principal nationalities of passengers carried on a particular route;
  - (b) the likelihood that an ability to use elementary English vocabulary for basic instructions can provide a means of communicating with a passenger in need of assistance whether or not the passenger and crew member share a common language;
  - (c) the possible need to communicate during an emergency by some other means (e.g. by demonstration, or hand signals, or calling attention to the location of instructions, muster stations, life-saving devices or evacuation routes) when verbal communication is impractical;
  - (d) the extent to which complete safety instructions have been provided to passengers in their native language or languages; and
  - (e) the languages in which emergency announcements may be broadcast during an emergency or drill to convey critical guidance to passengers and to help crew members in assisting passengers.
- 24.8.5 The training provided under paragraph 24.8.2 should include but not necessarily be limited to the following theoretical and practical items:
- (a) awareness of life-saving appliance plans and fire-control plans, and knowledge of muster lists and emergency instructions including:
    - (i) general alarms and procedures for mustering of passengers;
    - (ii) areas of responsibility with emphasis on "own section";
  - (b) general layout of the ship with special emphasis on location of muster and embarkation stations, accesses and escape routes;
  - (c) location and use of emergency equipment relevant to the duties in paragraph 24.8.2 with emphasis on "own section" and escape routes therefrom;
  - (d) location of adult and infant life-jackets;
  - (e) location of other evacuation supplies, e.g. blankets, to be taken to survival craft;

- (f) elementary first aid and transportation of casualties;
- (g) communication:
  - (i) the use of internal communication systems;
  - (ii) raising the alarm;
  - (iii) alerting the passengers;
  - (iv) reporting and notification;
- (h) evacuation:
  - (i) the use of passenger lists or counts;
  - (ii) the alarm signals;
  - (iii) mustering; importance of keeping order and panic avoidance procedures;
  - (iv) emergency exits;
  - (v) evacuation equipment;
  - (vi) control of passengers in corridors, staircases and passageways;
  - (vii) maintenance of escape routes clear of obstructions;
  - (viii) assistance en route to muster and embarkation station;
  - (ix) methods available for evacuation of disabled persons and persons needing special assistance;
  - (x) restrictions on the use of elevators;
  - (xi) search of accommodation spaces;
  - (xii) ensuring that the passengers are suitably clothed and have donned their life-jackets correctly;
- (i) fire situations:
  - (i) fire detection and initial containment;
  - (ii) raising the alarm;
  - (iii) danger of smoke inhalation;
  - (iv) breathing protection;
- (j) abandon ship situations:

- (i) correct use of individual survival equipment, e.g. life-jackets, immersion suits, lifebuoys, light and smoke signals etc.;
    - (ii) need for assistance to special cases;
  - (k) familiarisation by means of repeated organised guided tours on board;
  - (l) repeated participation in fire drills and lifeboat drills including transportation of simulated casualties;
  - (m) repeated exercise in use of equipment such as donning of life-jackets and appropriate protective clothing;
  - (n) repeated exercise in use of internal communication systems;
  - (o) repeated exercises in evacuation.
- 24.8.6 Before the vessel leaves port, instructions should be issued to passengers on emergency and evacuation procedures.
- 24.8.7 Where possible a short safety video should be screened shortly after embarkation of passengers.
- 24.8.8 Unambiguous emergency signs to assist passengers should be placed at the appropriate level and should be in a language understood by a majority of passengers, indicating paths to muster stations and the location of life-jacket containers. The IMO international symbols should be used for this purpose.
- 24.8.9 Lifeboat drills should be carried out in compliance with SOLAS and other life-saving appliances and equipment should be examined regularly and kept in good order. The manufacturers' instructions with respect to maintenance and replacement should always be followed.
- 24.8.10 Klaxon and communications systems should be tested regularly and kept in good working order.
- 24.8.11 Man-overboard drills and procedures should be conducted regularly.

## **24.9 OFFSHORE SUPPORT VESSELS**

- 24.9.1 For information on safe working practices on offshore support vessels, see the *Australian Offshore Support Vessel Code of Safe Working Practice*. This code of practice has been adopted under Marine Orders, Part 59 (Offshore Support Vessel Operations).



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Marine Notices are available on the Internet:

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