ILO Codes of Practice

Safety and health in the construction of fixed offshore installations in the petroleum industry

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Preface

In October 1977 a meeting convened by the ILO on safety problems in the offshore petroleum industry recommended the preparation of a code of practice setting out standards for safety and health during the construction of fixed offshore installations. Such a code, to be prepared by the ILO in co-operation with other bodies, including the Inter-Governmental Maritime Consultative Organisation (IMCO), was to take into consideration existing standards applicable to offshore construction activities and to supplement the ILO codes of practice on safety and health in building and civil engineering work, shipbuilding and ship repairing.

In accordance with a decision taken by the Governing Body of the ILO at its 211th (November 1979) Session, a meeting of experts from government, employers' and workers' circles, and including other interested international agencies, was convened in Geneva from 1 to 10 December 1980 in order to draw up the proposed code.[1]

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[1] The following experts took part in the meeting:

Mr. S. Bye, Deputy Director, Norwegian Petroleum Directorate, Stavanger (Norway).

Mr. V. Federenko, Secretary, Central Committee, Oil and Gas Workers' Trade Union, Moscow (USSR).

Mr. J. E. Howard, Group Safety Adviser, Shell International Petroleum, The Hague (Netherlands).

Mr. P. Kutsyn, Chief, Occupational Safety Division, Ministry for the Gas Industry, Moscow (USSR).

Mr. M. Marbun, Fire and Safety Co-ordinator, State Oil Company PERTAMINA, Jakarta (Indonesia).

Mr. T. McCalmont, Construction Industry Co-ordinating Officer, Transport and General Workers' Union, Glasgow (United Kingdom).

Mr. L. A. Myhre, Chairman, Norwegian Oil and Petrochemical Union, Stavanger (Norway).

(footnote continued overleaf)

The code, as approved by the meeting of experts and as reproduced in this volume, seeks to provide guidance on the standards of safety and health to be observed during the construction of fixed offshore installations. As such, it is a corpus of practical advice for the use of all persons, whether in the public or in the private sector, who have responsibility for safety and health during the construction of fixed offshore installations in the petroleum industry and who may be framing provisions on the subject.

Although couched in the language of a set of rules, this code has no binding force; it is not intended to supersede national laws or regulations or accepted standards but rather to provide guidance for governments, employers and workers.

In adopting the code of practice, the experts recognised that its provisions could not be applied as they stood to all countries or regions, and that some provisions would need to be adapted to local conditions. In part, the experts' attention was directed to the harsh environment and complex offshore installations to be found in isolated and deep-water situations. The application of the code's provisions should be determined by the scale of the operation, by local circumstances and by technical possibilities.

The text of the code was approved for publication by the Governing Body of the ILO at its 215th (March 1981) Session.

Mr. P. Odier, Chief, Department of Environmental Safety, Elf-Aquitaine, Paris (France).

Mr. Y. A. Slail, Chief Loss Prevention Engineer, ARAMCO, Dhahran (Saudi Arabia).

The following international governmental and non-governmental organisations were represented:

Inter-Governmental Maritime Consultative Organisation.

International Organisation of Employers.

International Federation of Chemical, Energy and General Workers' Unions.

Contents

1. Definitions and application

1.1. Definitions

1.1.1. For the purpose of this code, unless otherwise noted:

"Boatswain's chair" means a seat for a workman, constructed to an adequate recognised standard, which is suspended by a cable or rope.

"Competent authority" means a minister, government department or other public authority having the power to issue regulations, orders or other instructions having the force of law.

"Competent person" means a person who by reason of training or experience, or both, is competent to perform the task or function, or to assume the responsibility, in question and is designated to perform such task or function.

"Construction operation" means the following operations in relation to a fixed offshore installation:

(a) the operations of positioning or constructing an offshore installation, or intended offshore installation;

(b) the operations of repairing, maintaining, demolishing or dismantling the structure of an existing offshore installation in so far as this code does not conflict with national laws or regulations;

(c) operations in *(a)* and *(b)* where produced hydrocarbons are present, provided precautions additional to this code of practice are taken;

(d) the testing and inspecting of:

(i) the structure of an offshore installation;

(ii) any plant or equipment for the purpose of the construction operations;

(e) the loading, unloading, fuelling or provisioning of an offshore installation when carried out in conjunction with the construction operations;

(f) any fixed installation intended for use offshore which is undergoing the operations in *(a)* to *(e)*, in inshore waters where applicable.

"Diving supervisor" means a person, competent by training and experience, appointed to be in charge of the diving operations.

"First aider" means someone holding a current certificate of first aid issued by the competent authority or organisation approved by the competent authority.

"Hoist" means a lifting machine with a carriage, platform or cage, the movement of which is restricted by a guide or guides.

"Installation manager" means the competent person appointed in writing by the owner of the installation or main contractor to be in charge of and responsible for all operations and activities on or in connection with the installation.

"Lifting appliance" means any lifting machine or appliance including a crane used for the purpose of raising, suspending, supporting or lowering of persons, goods or materials.

"Lifting gear" includes chains, ropes and slings and all means of attaching such gear to a lifting appliance or load and includes rings, links, hooks, plates, clamps, tongues, bars, shackles, swivels and eye-bolts and magnetic or electro-magnetic devices; it also includes baskets, skips, buckets, cages or other containers for persons, goods or materials.[1]

"Medical attendant" means a person trained in or experienced in offshore first aid and medicine to the standard required by the competent authority.

"Offshore installation" means any fixed installation or part of a fixed installation which is maintained within the area for which the competent authority has responsibility or is intended to be

[1] These definitions of lifting appliances and lifting gear do not include life-saving appliances such as davits, winches, launching apparatus, rope falls, blocks, hooks, links and chains which are provided solely for the purpose of launching and recovering survival craft, lifeboats and liferafts.

established there in connection with the exploitation of mineral resources or with exploration with a view to such exploitation.

"On or near an offshore installation" means on an installation or within the distance specified by the competent authority of its working station.

"Permit to work" means a written permit not being a work order signed by the person in charge of certain work activities and countersigned by the installation manager or a person appointed by the installation manager to countersign on his behalf and to be responsible for the safety of work activities being carried out in the relevant part or area of the installation.

"Pressurised system" means plant and equipment containing gases or liquids at pressure greater than ambient pressure and includes steam-raising plant, hydraulic equipment, air and gas compressors and pipework, receivers, containers and cylinders associated with such plant and equipment.

"Radiographic personnel" means persons employed for any part of their time in connection with radiography or the use of radioactive substances.

"Required standard" in connection with respiratory protective equipment means that the equipment is manufactured to an adequate recognised standard or is approved by the competent authority.

"Scaffold" means any temporary structure supporting one or more platforms used for access or supporting workmen or materials in the course of the construction operations.

"Slung scaffold" means a scaffold suspended by means of ropes, chains or rigid members which is not capable of being raised or lowered.

"Sound material" means material of a quality conforming to any relevant standards issued by a national standards institution or other body recognised by the competent authority or to generally accepted international engineering practices or to other technical standards.

"Stand-by vessel" means a vessel of appropriate capability, size, equipment and crew to meet the requirements of the competent authority for such vessels.

"Sufficient" means suitable in quantity to secure safety, health and welfare.

"Suitable" in connection with respiratory protective equipment means that the equipment is capable of providing the necessary protection in the situation where it is to be used, is easily maintained in an efficient condition and is not uncomfortable to wear.

"Suspended scaffold" means a scaffold (not being a slung scaffold) suspended by means of ropes or chains and capable of being raised or lowered but does not include a boatswain's chair or similar device.

1.2. Application

1.2.1. When construction activities, as defined in this code, are to take place offshore, this code should apply to all activities within 500 metres (550 yards) of the working station.

1.2.2. Where an installation, intended for offshore operation, is being constructed in inshore waters, the code should be followed to the greatest extent practicable.

1.2.3. The code does not apply to an offshore installation during tow-out to the working station unless construction operations are being carried out; in which case the code should be applied to the greatest extent practicable.

2. General duties

2.1. General duties of employers

2.1.1. Employers should so provide and maintain plant, equipment and workplaces, and should so organise work, as to protect persons as far as reasonably practicable against risks of accidents and injuries to health.

2.1.2. Whenever two or more employers undertake activities simultaneously at one workplace, they should have the duty to collaborate in order to comply with the prescribed measures, without prejudice to the responsibility of each employer for the health and safety of his employees. In appropriate circumstances, the competent authority should prescribe general procedures for this collaboration.

2.1.3. When acquiring machines, appliances, plant or equipment, or toxic and hazardous substances, employers should ensure that they conform to any national laws or regulations applying to them or, if there are none, that they are so designed or protected that they can be operated or used safely. Users should be provided with adequate instructions for their safe use and the substances should be labelled to a recognised international standard.

2.1.4. Employers should ensure that:

(a) equipment such as machines, appliances and vehicles used in the construction operations comply with national laws or regulations, and standards applicable to its design and construction;

(b) equipment not covered by national laws or regulations or standards is so designed and constructed as to be as safe as practicable; and

(c) equipment is accompanied by printed matter giving the necessary instructions for its proper testing, use and maintenance and drawing attention to possible hazards.

2.1.5. Employers should provide such supervision as will ensure that as far as reasonably practicable all persons perform their work in the best conditions of safety and health.

2.1.6. Work that is done jointly by a number of persons and requires mutual understanding and co-operation for the avoidance of risks should be specially supervised by a competent person.

2.1.7. Employers should only assign persons to employment for which they are suited by their physique, state of health, skill and ability to communicate.

2.1.8. If necessary, a check should be made by which it can be ascertained whether all the members of a shift have left the installation at the end of the shift.

2.2. Permits to work

2.2.1. The following operations should be carried out only in accordance with a permit-to-work system:

(a) welding or flame-cutting or any other work giving rise to danger from a source of ignition;

(b) work on live electrical equipment, which could give rise to risk of injury to any person;

(c) work at a place where there is inadequate ventilation for diluting and dispelling injurious or flammable fumes, vapours or gases or where an oxygen deficiency may exist;

(d) work involving injurious exposure to dust;

(e) radiography;

(f) erection, modification or dismantling of scaffolds over the sea;

(g) pressure-testing of plant, equipment and pipelines;

(h) use of explosives; and

(i) work on a pressurised system.

2.2.2. The permit should contain written instructions on:

(a) the nature of the work;

(b) the place where the work may take place;

(c) the period during which the work may take place;

(d) any protective equipment to be used or worn; and

(e) any precautions to be taken to avoid endangering the health and safety of:

(i) workers engaged in the operations; and

(ii) other persons on or near the installation.

2.2.3. The permit should be:

(a) signed by the person in charge of that work; and

(b) countersigned by the offshore installation manager or a person appointed by the offshore installation manager for that purpose, who has experience of the operation and is aware of any likely dangerous interaction between the operations and other activities on the installation.

2.3. Training, including retraining

2.3.1. Training in safety and health and welfare should be provided for persons employed in the construction of fixed offshore installations.

2.3.2. Such training should in particular take account of the special hazards associated with working offshore and should be to a standard acceptable to or required by the competent authority.

2.3.3. All workers should be properly instructed in the hazards of their respective occupations and the precautions necessary to avoid accidents and injuries to health.

2.3.4. Employers should make available to workers copies, extracts or summaries of relevant national laws or regulations and internal requirements and, whenever appropriate, instructions and notices relating to protection against accidents and injuries to

health, including posting such texts in prominent positions at suitable places.

2.3.5. Information should be given on safety colour coding and signals.

2.4. General duties of workers

2.4.1. Within the limits of their responsibilities, workers should do everything in their power to maintain a safe working environment, including their own safety and health and that of their workmates.

2.4.2. Before beginning work workers should examine their workplaces and the equipment that they are to use, and should forthwith report of their foreman or other competent superior any dangerous defect that they may discover in them.

2.4.3. Workers should make proper use of all safeguards, safety devices, protective equipment and other appliances.

2.4.4. Workers should not interfere with equipment such as machines and appliances that they have not been duly authorised to operate, maintain or use.

2.5. Designation of installation manager

2.5.1. (1) The construction of an offshore installation should be under the charge of an installation manager.

(2) The owner or main contractor of the installation should appoint to be the installation manager a person who, to the best of the knowledge and belief of the owner or main contractor, has skills and competence suitable for the appointment.

(3) The competent authority should be informed of any such appointment in accordance with national laws or regulations.

(4) Two or more persons may be appointed to be installation managers in rotation and persons so appointed should act in place of any of them.

2.5.2. If at any time the owner or main contractor is satisfied that an offshore installation manager does not have the requisite skills or competence, he should terminate the appointment and notify the competent authority, in accordance with national laws or regulations.

2.5.3. The owner or main contractor should ensure that the offshore installation manager is present during the construction operations.

2.6. Duties of installation manager

2.6.1. The installation manager for the time being in charge of the installation should ensure that a notice of his appointment is posted on board the installation, as soon as possible during the operations in such a position that it can be easily and conveniently read.

2.6.2. The installation manager should not be absent from the construction operations except in case of sudden sickness or other cause beyond his control or for other adequate reason.

2.6.3. (1) During construction operations in connection with an offshore installation, the installation manager should have a general responsibility:

(a) for matters affecting safety, health and related welfare; and

(b) for the maintenance of order and discipline.

(2) For the discharge of that responsibility, he should exercise authority over all persons in or about the construction operations.

(3) The responsibility of the installation manager should not extend to matters of which another person has responsibility, such as the master, captain or person in charge of vessel, aircraft or hovercraft.

2.6.4. The installation manager should not permit the installation of any operation or anything connected with the con-

struction of the installation to be used or carried out on or from the installation, if the installation is likely to be endangered.

2.6.5. (1) Where during the construction of an offshore installation there is an emergency or apprehended emergency endangering the installation or otherwise involving risk of death or personal injury, the installation manager may take or require to be taken such measures as are necessary or expedient to avoid the emergency.

(2) No requirement in this code should be taken as prohibiting or restricting the taking of such measures.

2.7. Appointment of a safety and health supervisor

2.7.1. Where circumstances warrant it, the owner or main contractor should ensure that a suitably qualified person is appointed in writing to be employed full time on the duties:

(a) of advising the installation manager, any contractors or employers on occupational safety and health and on measures necessary to comply with internal requirements and national laws or regulations;

(b) of exercising general supervision and co-operation in the observance of this guidance and promoting the safe conduct of the work generally;

(c) of liaising with safety committees and safety representatives where appointed;

(d) of advising employers on the training and instruction of employed persons with particular reference to the hazards of offshore working; and

(e) of ensuring that regular safety inspections are carried out at suitable intervals of all plant, equipment, workplaces and operations.

2.7.2. The name of the person so appointed should be brought to the notice of persons working on the installation by appropriate means.

2.7.3. The safety and health supervisor should investigate and prepare a report on accidents and occurrences with a view to preventing injury and damage.

2.7.4. The report referred to in paragraph 2.7.3 should be sent to the installation manager, safety committee, safety representative (where they exist) and competent authority to satisfy both internal requirements and national laws or regulations.

2.8. Safety committees

2.8.1. Safety committees should be established in any project where the circumstances warrant it or in accordance with national laws or regulations.

2.8.2. Every safety committee should consist of representatives of the employers and representatives of the workers. This committee should include:

(a) the installation manager or his representative;

(b) the safety and health supervisor or his representative;

(c) suitably qualified and experienced workers;

(d) a representative of the medical service if any exists.

2.8.3. The workers' representatives on safety committees should be elected by the workers. This could be done in such a manner that all suitably qualified and experienced workers could serve on the committee in accordance with national laws or regulations.

2.8.4. Safety committees should meet at suitable intervals and keep adequate records of all meetings.

2.8.5. The safety and health supervisor or safety committee should:

(a) consider the circumstances and causes of all accidents occurring on a project and make recommendations to the installa-

tion manager for preventing the occurrence or recurrence of accidents;

(b) make periodical inspections of the worksite and all its equipment in the interests of safety and hygiene;

(c) monitor measures taken for the prevention of accidents;

(d) monitor compliance with national laws or regulations, instructions, etc., relating to safety and hygiene;

(e) endeavour to secure the co-operation of all persons in the promotion of safety and hygiene;

(f) participate in the drawing up of safety rules;

(g) advise on the safety training, instruction and guidance of new workers and those transferred to new work;

(h) advise the installation manager of other situations which they consider to be dangerous.

2.8.6. The installation manager should:

(a) give safety committees all reasonable encouragement and facilities in the performance of their duties;

(b) consult safety committees in all matters relating to safety and health on the project;

(c) take all practicable steps to give effect to recommendations of the safety committee;

(d) in cases where they do not adopt a recommendation of the safety committee, inform the committee of the reasons within a reasonable time;

(e) keep the safety supervisor informed of developments and changes in processes and operations likely to affect health and safety; and

(f) where appropriate, make arrangements whereby workers can submit suggestions relating to safety and health on the project.

2.8.7. Records should be kept of accidents and occurrences in accordance with national laws or regulations.

2.8.8. Records should be kept which enable accident experience on each operation and for each occupation to be identified along with accident causation and trends.

2.9. Employment of young persons under 18

2.9.1. No person under 18 years of age should be employed in the construction of an offshore installation except as permitted by the competent authority and in accordance with conditions prescribed by that authority.

2.10. Intoxicants

2.10.1. Persons under the influence of alcoholic beverages or other intoxicants should not be allowed to work in the operations.

2.10.2 No alcoholic beverages or other intoxicants are to be taken to or consumed at the site of the operations.

3. General recommendations on safety and health

3.1. General

3.1.1. Employers should take all necessary steps to satisfy the requirements of national laws or regulations and to ensure the safety and health of all workers and other persons who may be on or near the offshore installation during construction and demolition.

3.1.2. Employers should provide and maintain at all times, so far as is reasonably practicable, a safe place of work.

3.2. Access and egress

3.2.1. Employers should ensure the provision and maintenance of suitable and sufficient safe means of access to or egress from all places where any person has at any time to be whilst on or near the installation.

3.2.2. Where special safe means of access to or egress from workplaces are provided, workers should always use them for going to and from the the workplaces.

3.2.3. Means of access and egress should be clearly indicated.

3.3. Lighting

3.3.1. Sufficient and suitable lighting should be provided on or near an installation at:

(a) any place of work;

(b) any means of escape, including all points of assembly and embarkation;

(c) any means of access or egress; and

(d) any accommodation or other place on or near an installation where a person may have to be.

3.3.2. The means of artificial lighting should be such as to maintain a reasonable uniformity and constancy of illumination; so far as is reasonably practicable they should be such, or be so arranged, as to reduce glare and dazzle to a minimum and prevent the formation of shadows that might conceal a danger.

3.3.3. To ensure safety in an emergency, adequate and suitable emergency lighting should be provided.

3.4. Housekeeping

3.4.1. Loose materials should not be placed or left so as to obstruct dangerously workplaces and passageways.

3.4.2. All projecting nails should be removed or bent over to prevent injury.

3.4.3. Equipment, tools and small objects should not be left lying about.

3.4.4. Scrap, waste and rubbish should not be allowed to accumulate in workplaces or access.

3.4.5. Workplaces and passageways that are slippery owing to ice, snow, oil or other causes should be cleaned up or strewn with sand, ash or the like.

3.4.6. Portable equipment should be returned after use to its designated storage place.

3.5. Manual lifting and carrying

3.5.1. To reduce manual handling to a minimum, mechanical appliances should be provided and used where practicable for lifting and carrying loads.

3.5.2. Workers required to handle loads should be instructed how to lift and carry safely.

3.5.3. No person should lift, carry or move any load which, by reason of its weight, size or shape, is likely to endanger his safety or health.

3.6. Construction, maintenance and inspection of plant and equipment

3.6.1. All plant and equipment used in the operations should be:

(a) of good construction;

(b) of sound material;

(c) of adequate strength; and

(d) suitable for the purpose for which it is intended to be used.

3.6.2. To minimise potential danger to workers and other persons who may be on or near the installation, all plant and equipment and any structure used for and during the construction operations should be:

(a) suitably and safely installed and disposed; and

(b) the subject of suitable procedures providing for systematic maintenance, examination and, where appropriate, testing. Particular attention should be given to the condition of plant and equipment likely to have been affected by adverse climatic conditions.

3.6.3. All maintenance, examination and testing under any such scheme recommended in 3.6.2 should only be carried out by or under the supervision of a competent person.

3.6.4. No plant, equipment or structures should be used if any examination or test shows it to be unsafe, until the defect has been remedied.

3.6.5. The person carrying out the examination or test should immediately report any defect in writing to the person in charge of that work and to the installation manager.

3.7. Keeping of records

3.7.1. Reports and records of examinations and/or tests of plant, equipment and structures should be kept in a safe place and

made readily available at the request of a person authorised by the competent authority.

3.8. Placement or removal of the installation

3.8.1. (1) Only those persons whose presence is essential to the operation should be permitted to remain on an installation while it is being placed on or attached to or removed or detached from the sea bed.

(2) At all times while such persons are on the installation, effective means of communication should be maintained with the towing vessel or vessels.

4. Diving

4.1. General

4.1.1. Diving in connection with construction operations at an installation should be carried out only with the prior approval of the installation manager.

4.1.2. No construction operations or vessel movements should be permitted during or at the same time as diving which might affect the safety of divers, their equipment or attendant personnel and vessels.

4.1.3. Plant, equipment and materials including debris or scrap should not be so positioned or disposed of in a manner likely to endanger diving.

4.1.4. The diving supervisor should liaise with the installation manager, or person appointed by him for the purpose, to ensure that at all times there is effective co-ordination between the activities of the diving contractor and other contractors engaged in the construction operations, including the operations of supply boats.

4.1.5. Divers should not be employed in the operations, unless:

(a) they are controlled by a competent diving supervisor;

(b) they form part of a suitable diving team;

(c) they are adequately equipped with appropriate decompression and first-aid facilities;

(d) they are trained and have certificates of medical fitness to satisfy national laws or regulations; and

(e) they have appropriate log books.

5. Safety of workplaces and means of access and egress

5.1. General

5.1.1. Measures should be taken in compliance with national laws or regulations and internal requirements to ensure the provision of a safe workplace and of safe means of access and egress.

5.2. Scaffolding and staging – general

5.2.1. Where necessary to ensure safety, suitable and sufficient scaffolds, ladders or other appropriate elevated working surface should be provided and maintained.

5.2.2. (1) Scaffolds and other elevated working surface should be of good construction, suitable and sound material and of adequate strength for the purpose for which they are used.

(2) Timber and metal parts should be of suitable quality and free from corrosion and other patent defects likely to affect their strength materially.

(3) Where necessary, appropriate fittings should be used to prevent boards and planks used for scaffolds from splitting.

(4) Materials used in the construction of scaffolds should be stored under good conditions and apart from any material unsuitable for scaffolds.

(5) Scaffolds should have a design factor of at least four times their maximum load.

5.2.3. Precautions should be taken to prevent the accidental displacement of scaffolds and parts of scaffolds.

5.2.4. In the case of partially erected or dismantled scaffolds capable of being used, access to the scaffold or part of the scaffold should be effectively blocked and prominent warning notices in appropriate languages or signs should be posted.

5.2.5. (1) Scaffolds should be securely supported or suspended and, unless, designed and constructed to ensure stability without connection, should be rigidly connected to the installation.

(2) A scaffold should never extend above the highest anchorage to an extent which might endanger its stability and strength.

(3) All structures and appliances used as supports for working platforms should be of sound construction, have a firm footing, and be adequately strutted and braced to make them stable.

5.2.6. In addition, all parts of the scaffold, including boards, plates and other parts of the working platform, should be secured or lashed to prevent their displacement by wind or wave action.

5.2.7. Grating and plating, whether on a scaffold or other workplace or access, should be securely clamped, clipped, bolted or welded, so as to prevent displacement. "Displacement" includes unintentional tipping, sliding or movement by wind or wave or by any other cause.

5.2.8. Tubular metal scaffolds should:

(a) be made of suitable material such as galvanised steel tubing; and

(b) be of adequate strength to hold the anticipated load with a design factor of at least four times the maximum load.

5.2.9. All vertical and horizontal members of tubular metal scaffolds should be securely fastened together.

5.2.10. Where necessary to prevent danger, tubular metal scaffolds should be adequately braced.

5.2.11. Tubing should be of adequate size and strength for the load it will have to carry, and should in no case be less than 5 cm (2 in) (or other closely similar standard size) in outside diameter.

5.2.12. Every working platform on a scaffold should be of sufficient width to provide a clear passageway, and the minimum width of working platform should not be less than 65 cm (2 ft 2 in).

5.2.13. When a lifting appliance is to be used on a scaffold, the parts of the scaffold should be carefully inspected and, if need be, adequately strengthened to prevent any movement of scaffold members.

5.3. Use of scaffolds and staging

5.3.1. In transferring heavy loads on or to a scaffold, no sudden shock should be transmitted to the scaffold.

5.3.2. When necessary to prevent danger, loads being hoisted on to scaffolds should be controlled by a hand rope (tag line), so that they cannot strike against the scaffold.

5.3.3. The load on the scaffold should be evenly distributed as far as is practicable, and in any case should be so distributed as to avoid any dangerous disturbance of the equilibrium.

5.3.4. During the use of a scaffold, care should constantly be taken that it is not overloaded.

5.3.5. Scaffolds should not be used for the storage of material, except that required for immediate use.

5.4. Slung scaffolds

5.4.1. The means of suspension—including wire ropes or rigid members—of slung scaffolds should be:

(a) suitable and of adequate strength for the purpose for which the slung scaffold is used; and

(b) properly and securely fastened to safe anchorage points on the structure of the installation.

5.4.2. No rope other than wire rope should be used for the suspension of a slung scaffold.

5.4.3. Steps should be taken to prevent chafing of ropes, chains or other means of suspension.

5.4.4. Slung scaffolds should be secured to prevent undue horizontal movement while used as working platforms.

5.4.5. The platforms of slung scaffolds should be provided with guard rails and toe-boards on all sides.

5.5. Suspended scaffolds

5.5.1. (1) Guidance concerning slung scaffolds (see section 5.4) should be followed in the case of suspended scaffolds.

(2) The following additional measures should be taken:

(a) adequate and suitable chains, ropes and winches or other lifting appliances should be provided and should be suspended from suitable safe anchorage points;

(b) suspension ropes should be of such length that at the lowest position of the platform there are at least two turns of rope on each drum;

(c) suspension ropes should be fastened to the outriggers vertically above the drum centres of the winches on the movable platform;

(d) the lower ends of suspension ropes should be securely fastened to the hoisting machines by clips or other effective means; and

(e) devices for raising and lowering suspended scaffolds, including winches and lifting appliances, should be provided with a brake or similar device which comes into use when the operating handle or lever is released, and be adequately protected against the effects of weather, dust or material likely to cause damage.

5.5.2. If the power for raising and lowering is supplied from a motor, the motor should stop and automatically lock and securely hold the platform when the manual pressure on the starting switch or lever is released.

5.5.3. While persons are working on a suspended scaffold, the suspension ropes should be secured by locking the winches or by other effective means.

5.5.4. Suspended scaffolds with machine-operated platform should be prevented from swinging or knocking against the building by means of ties, spacing bars, etc.

5.5.5. When not in use, suspended scaffolds with machine-operated platform should:

(a) be cleared of all tools and other movable objects; and

(b) be securely lashed in position or lowered to the ground.

5.5.6. (1) Suspended scaffolds should be so secured or restrained as to prevent undue horizontal movement.

(2) This may be achieved by guides or suspension or safety wire restraint systems.

5.5.7. Where a wire restraint system is employed, it should be adequate for wind loads imposed upon the scaffold platform in any position.

5.6. Edge protection of working platforms

5.6.1. Suitable edge protection should be provided to prevent persons falling from the open side of a scaffold or other working platform.

5.6.2. Similar protection should also be provided at any opening in a working platform through which a person might fall, unless:

(a) it is part of a platform to which access is prevented; or

(b) the opening is protected with a covering, securely fixed in place and clearly marked to show its purpose.

5.6.3. When a working platform is above any place where a person may have to pass or work, precautions should be taken to prevent the fall of materials. (See also section 5.17.)

5.6.4. Edge protection should consist of an upper rail not less than 1 m (3 ft 3 in) in height above the floor or walkway, and at least one intermediate rail.

5.6.5. The vertical opening between any guard rails, and guard rails and toe-boards, should not exceed 40 cm (1 ft 4 in).

5.6.6. Toe-boards or barriers should be provided up to a sufficient height to prevent articles falling from the working platform. Consideration should be given to fitting suitable mesh between guard rails in areas where persons are liable to fall from a height.

5.7. Scaffold fastenings

5.7.1. Fastenings for connecting members of tubular metal scaffolds should:

(a) be made of drop-forged steel or equivalent material; and

(b) accurately embrace, over the whole area of their bearing surfaces, the members on which they are used.

5.7.2. Fastenings should not:

(a) cause deformation in the tube; or

(b) themselves undergo deformation.

5.7.3. Where the efficacy of fastenings depends on frictional grip, they should not be used to transmit primary tensile forces.

5.7.4. Fittings having screw threads and nuts should not be used unless each nut is fully engaged on the corresponding thread.

5.8. Mobile scaffolds

5.8.1. Scaffolds supported on wheels should be adequately braced and stiffened to prevent dangerous distortion in use.

5.8.2. Mobile scaffolds should be used only on a firm, level surface.

5.8.3. The height of mobile scaffolds should not exceed four times the lesser base dimension.

5.8.4. Ladders giving access to mobile scaffolds should be secured to the scaffold, and be so positioned as not to endanger the stability of the mobile scaffold.

5.8.5. When a mobile scaffold is in use, the castors or wheels should be adequately blocked.

5.8.6. No person should ride on a scaffold that is being moved.

5.8.7. All material and equipment which may fall should be removed from the platform before moving the mobile scaffold.

5.9. Boatswain's chairs, cages, skips or similar plant or equipment

5.9.1. Boatswain's chairs, cages, skips or similar plant or equipment should not be used as a working place in circumstances in which a suspended or hanging scaffold could be used, unless:

(a) the work is of short duration; and

(b) the use of a suspended or hanging scaffold would not be practicable.

5.9.2. Boatswain's chairs, cages, skips, etc., should be:

(a) of good construction;

(b) of suitable and sound material;

(c) free from patent defect;

(d) properly maintained; and

(e) constructed to an appropriate recognised national or international standard.

5.9.3. Outriggers or other supports should be of adequate strength, properly installed and supported.

5.9.4. When a skip, basket, boatswain's chair or similar equipment is used, it should be supported by ropes having a safety factor of at least 10, based on the total load including the self weight of the skip, basket or boatswain's chair.

5.9.5. Chains, ropes, lifting gear or other means of suspension should be securely attached to the outriggers or other supports, and to the boatswain's chairs, cages, skips, etc.

5.9.6. If not constructed of adequate metal, a skip or basket used as a suspended scaffold should be carried by two strong iron bands continued round the sides and bottom, with eyes in the bands to receive the ropes.

5.9.7. The total live load on a boatswain's chair raised and lowered by hand should not exceed 110 kg (250 lb).

5.9.8. Boatswain's chairs should have a back rail or rope and a front rail, rope or post not less than 25 cm (10 in) above the seat.

5.9.9. A boatswain's chair which is entirely supported by fibre ropes without metal straps underneath should have ropes of not less than 1.2 cm (½ in) in diameter and crossed underneath the chair and securely spliced together.

5.9.10. The seat of a boatswain's chair should:

(a) possess adequate strength and be firmly secured; and

(b) measure at least 45 × 25 cm (18 × 10 in).

5.9.11. The suspension ropes of boatswain's chairs should be made of high-grade manila fibre or steel wire or equivalent material.

5.9.12. If ropes are used, they should be secured in a suitable manner, so as not to become untied or unlashed.

5.9.13. Fibre ropes should not be used on boatswain's chairs when workers in them are using a blow torch or any open flame.

5.9.14. Measures should be taken to prevent spinning or tipping and the occupant falling out.

5.9.15. Boatswain's chairs should be used only if a safety belt is worn and so fastened that the workers will be safely held if they fall out of the chair.

5.9.16. The boatswain's chair, cage, skip, etc., should be free from materials or articles liable to interfere with the occupant's hand or foot hold.

5.9.17. A skip or other receptacle should be not less than 1 m (3 ft 3 in) in depth.

5.9.18. The installation of a boatswain's chair, cage, skip, etc., should be supervised by a competent person.

5.9.19. Before a boatswain's chair is taken into use, the overhead supports and the tackle should be inspected by a competent person.

5.10. Counterweights and outriggers

5.10.1. Where counterweights are used with outriggers, the counterweights should be securely attached to the outriggers.

5.10.2. They should be not less than:

(a) three times the weight which would counterbalance the weight suspended from the outrigger in the case of suspended scaffolds; and

(b) four times such weight in the case of boatswain's chairs.

5.10.3. The suspended weight includes the weight of:

(a) the runway, joist or rail track;

(b) the suspended scaffold or chair; together with

(c) the maximum number of persons who may be carried; and

(d) any other load.

5.11. Inspection of scaffolds

5.11.1. A scaffold should not be used unless thoroughly inspected by a competent person:

(a) before it is first taken into use;

(b) after erection or substantial alteration; and

(c) every seven days thereafter.

5.11.2. A scaffold which has been exposed to weather conditions or wave action likely to affect its strength or stability or to have displaced any part should not be used unless it has been thoroughly inspected by a competent person before use.

5.11.3. A record should be kept containing appropriate particulars of the inspection carried out in accordance with paragraphs 5.11.1 and 5.11.2.

5.12. Portable ladders

5.12.1. In general, the use of ladders at a workplace should be restricted to light work of short duration where the ladder may be used with safety.

5.12.2. Ladders should not be seen as an alternative to scaffolding, and they should be used only:

(a) as a means of access and support where their use is appropriate; and

(b) where they are both sufficient in numbers and suitable in size and sound material.

5.12.3. No wooden ladder having any rung which depends for its support solely on nails, spikes, screws or other similar fixing should be used.

5.12.4 Wooden ladders should be constructed with:

(a) uprights of adequate strength made of wood free from visible defects and having the grain of the wood running lengthwise; and

(b) rungs made of wood free from visible defects and mortised or rabbeted into the uprights.

5.12.5. Uprights and rungs of metal ladders should have a cross-section adequate to prevent dangerous deflection.

5.12.6. The intervals between rungs should be:

(a) equal; and

(b) not less than 25 cm (10 in) or more than 35 cm (14 in).

5.12.7. Rungs of metal ladders should be corrugated or treated to prevent slipping.

5.12.8. Rungs of metal ladders should be kept clean, so as to prevent them from becoming slippery.

5.12.9. Ladders should be provided with non-slip shoes or other devices to prevent slipping.

5.12.10. Wooden ladders should be provided with a sufficient number of steel cross-ties to ensure rigidity.

5.12.11. Ladders should be securely fixed or tied so that they cannot move from their top and bottom points of rest.

5.12.12. Ladders should extend at least 1 m (3 ft 3 in) above the place of landing or the highest rung to be reached by the person using the ladder. Where this is impracticable, adequate handholds should be provided and ladders should extend to the greatest extent practicable.

5.12.13. In any ladder or run of ladders, resting or landing places should be provided at vertical intervals of not more than 9 m (30 ft).

5.13. Extension ladders

5.13.1. An extension ladder should be used only where there is sufficient overlap of the sections of the ladder to ensure that it has adequate strength and stability.

5.13.2. Extension ladders should not exceed 9 m (30 ft) in length.

5.13.3. Extension ladders should be equipped with effective lock and guide brackets by which the ladder can be extended, retracted or locked in any position.

5.13.4. The rungs of overlapping sections should coincide so as to form double treads.

5.13.5. Extension ladders should be equipped with one or more extension ropes.

5.13.6. Extension ropes should be securely anchored and run over suitable pulleys.

5.13.7. Extension ladders should have not more than two sliding extensions in addition to the base unit.

5.14. Portable step-ladders

5.14.1. Portable step-ladders should not exceed 6 m (20 ft) in length.

5.14.2. Back legs of step-ladders should be adequately braced.

5.14.3. Step-ladders exceeding 1.5 m (5 ft) in length should be equipped with two or more cross-ties.

5.14.4. The spread between the front and back legs should be restrained by means of self-locking rigid hinged metal bars or other effective means.

5.14.5. When in the open position, treads of step-ladders should be horizontal.

5.14.6. Portable step-ladders should be inspected in accordance with section 5.11.

5.15. Inspection and maintenance of ladders and step-ladders

5.15.1. Defective ladders that cannot be satisfactorily repaired should be destroyed.

5.15.2. Portable wooden ladders should be stored in a dry, well ventilated place.

5.15.3. Wooden ladders should not be painted but should be oiled or covered with clear varnish or transparent preservatives.

5.15.4. Metal ladders should be protected against corrosion by being coated with rust-proof paint or by other adequate means, unless they are corrosion-resistant.

5.16. Fixed ladders

5.16.1. Any fixed ladder over 6 m (20 ft) in height not intended for use solely in emergencies should be protected by safety cages or hoops or other suitable means effective in preventing a person from falling.

5.16.2. Rest platforms, including safety harness attachment devices, should be provided at intervals of not more than 9 m (30 ft).

5.16.3. Rails or handholds should be provided to a height of at least 1 m (3 ft 3 in) above the place of landing of fixed ladders (as in paragraph 5.12.12).

5.17. Protection from falling and displaced materials

5.17.1. Where necessary, steps should be taken to prevent any person from being struck by any falling or displaced material or article.

5.17.2. Where access is not effectively prevented to any place at which a person may be struck, overhead protection should be provided, in the form of boarding, sheeting, nets or other equally effective measure. (See paragraph 5.6.3.)

5.17.3 (1) When the construction operation is being planned, account should be taken of the need to move parts of scaffolds, tools, equipment and materials from one level to another, particularly during demolition of the installation or striking of a scaffold.

(2) Where necessary, means should be provided to chute or lower such articles.

(3) No article or materials should be dropped, thrown or tipped, and chuting should be done in a safe manner.

5.17.4. (1) Tools, equipment and materials should be stacked and stored in a safe manner.

(2) Where necessary, they should be secured to prevent accidental displacement, including displacement by wind and wave action.

5.17.5. Materials and objects should be so stacked and unstacked that no person can be injured by materials or objects falling, rolling, overturning, falling apart or breaking.

5.17.6. Persons not directly concerned with the operations should keep out of areas where stacking and unstacking operations are in progress.

5.17.7. Persons should not climb on to stacks while stacking and unstacking operations are in progress.

5.17.8. Safe means of climbing stacks, such as ladders, should be provided for persons who have to climb them.

5.17.9. Material should not be placed or stacked near the edge of any deck, platform, floor or opening so as to cause danger to any person.

5.17.10. Stacks should be taken down only from the top, and no object should be pulled out from under another.

5.17.11. Stacks that lean heavily, become unstable or threaten to collapse should be taken down only under competent supervision.

5.17.12. (1) The provision of safety helmets alone should not be regarded as providing satisfactory protection against falling materials and articles.

(2) Safety helmets should be provided and worn as additional protection whenever there is risk of being struck. (See section 6.18.)

5.18. Use and erection of scaffolds and ladders

5.18.1. Suitable brackets, hangers and/or other devices should be incorporated into the structure of the installation, to facilitate the erection of scaffolds and other working platforms.

5.18.2. In assessing the suitability of scaffolds, ladders and other means of access and support, account should be taken of damage which may be caused by:

(a) vessels;

(b) loads being transferred between vessels and the installation; and

(c) crane and helicopter movements.

5.18.3. Scaffolding over the sea should be erected, dismantled or modified only in accordance with a permit-to-work system. (See section 2.2.)

5.18.4. Scaffolds should be erected, substantially modified or dismantled only by persons adequately trained and experienced for the work.

5.19. Safety harnesses and lifelines

5.19.1. (1) Appropriate safety harnesses constructed to a suitable recognised national or international standard should be provided, together with such ropes and fittings as are required to attach them to suitable anchorage points.

(2) Safety harnesses should be used by scaffolders and other persons who may be exposed to the risk of falling, particularly during the initial phase of construction before scaffolds and working platforms have been completed to a stage when they provide a safe workplace.

5.19.2. Workers who cannot be protected against falls from heights by other means should be protected by safety harnesses and lifelines.

5.19.3. Safety harnesses should be attached by a line of high-grade manila or equivalent material to a fixed anchor point at a level above the working platform.

5.19.4. Where necessary, when working with a safety harness, there should be in addition an independently secured lifeline.

5.19.5. The lifeline should be anchored above the work to a secure object and the free end should extend to a safe position.

5.19.6. Lifelines should be independent of blocks and tackles from which workers may be suspended.

5.19.7. All metal parts of safety harnesses and lifelines should be made of forged steel or equivalent material.

5.19.8. Suitable anchorage points should also be incorporated into the structure of the installation, to permit the safe use of safety harnesses, ropes and attachments.

5.19.9. Such brackets, hangers, anchorage points and similar devices (see paragraphs 5.18.1 and 5.19.8) should be installed in a manner acceptable to the competent authority.

5.19.10. Safety harnesses, safety straps, lifelines, anchorage points and connections should, both separately and when assembled:

(a) be capable of supporting safely a suspended load of at least 450 kg (1,000 lb); and

(b) have a breaking strength of at least 1,150 kg (2,500 lb).

5.19.11. If hooks are used for attaching safety harnesses to fixed anchors, they should be safety hooks.

5.19.12. When a lifeline or safety strap is liable to be severed, cut, abraded or burned, it should consist of a wire rope or a wire-cored fibre rope.

5.19.13. Safety straps should be so fastened to safety harnesses that they cannot pass through the harness fittings if either end comes loose from its anchorage.

5.19.14. Metal thimbles should be used for connecting ropes or straps to eyes, rings and snaps.

5.19.15. Safety harnesses, safety straps and lifelines should be so fitted as to limit the free fall of the wearer to 1 m (3 ft 3 in). Suitable restraint systems should be incorporated so as to limit the effects of restraint during free fall.

5.19.16. Not more than one worker should be attached to the same lifeline.

5.19.17. Before every occasion on which safety harnesses, safety straps and lifelines are used, they should be inspected.

5.19.18. When a worker's safety depends on a safety harness, he should not work alone.

5.20. Safety nets

5.20.1. When the erection or dismantling of scaffolds is being planned, consideration should be given to the use of safety nets or sheets.

5.20.2. Safety nets should be made of good-quality fibre cordage, wire or woven fabric or material of equivalent strength and durability.

5.20.3. The perimeter of safety nets should be reinforced with cloth-covered wire rope, manila rope or equivalent material.

5.20.4. Safety nets should be provided with adequate means of attachment to anchorages.

5.21. Work over the sea

5.21.1. (1) In remote or dangerous locations and during work over the sea, a person should be designated to watch the scaffolders or other persons particularly at risk.

(2) He should be equipped with a transmitter-receiver hand-set able to communicate with attending vessels and the installation.

(3) Radio communication with the person watching the scaffolders should be checked before the work begins.

5.21.2. Before work is begun on the erection, modification or dismantling of scaffolding over the sea, the attending vessel should be informed and asked to come in close to the installation and to ensure that a suitable rescue boat is ready for launching.

5.21.3. (1) When work is done over the sea, suitable life-jackets or buoyancy aids should be worn.

(2) In cold climates, consideration should also be given to the wearing of a suitable working-type survival suit.

6. Toxic and hazardous substances and agents and personal protective equipment

6.1. General

6.1.1. Harmful atmospheric contaminants, such as dusts, fibres, fumes, gases and vapours should be prevented or controlled at source.

6.1.2. When harmful atmospheric contaminants cannot be reduced to acceptable standards, persons exposed should be provided with appropriate respiratory protective equipment.

6.1.3. Where necessary to prevent danger, the atmosphere of workplaces should be tested for harmful contaminants at suitable intervals by a competent person.

6.1.4. Before a person is required to enter any potentially hazardous space, steps should be taken to ensure that the atmosphere is safe and remains safe.

6.1.5. No person should enter or remain in any space if there is any reason to consider:

(1) that the oxygen content in the air in that space is insufficient; or

(2) that there may be present any fume, gas or vapour to such an extent as to be likely to involve a risk to a person; unless a permit to work has been issued (see section 2.2), and either:

(a) (i) he is wearing respiratory protective equipment;
(ii) he is wearing a belt with ropes securely attached;
(iii) a person holding the free end of the rope is keeping watch outside and is capable of rendering and obtaining assistance in removing the person from the space;
(iv) a second person equipped with rope and who is also trained in the use of respiratory protective equipment is always available in the vicinity; or

(b) the space had been and remained adequately ventilated.

6.1.6. Persons must be properly trained in the use of respiratory protective equipment.

6.1.7 No internal combustion engine should be used in any enclosed space unless specific provision is made for conducting the exhaust gases from the engine into the open air and the space is adequately ventilated.

6.2. Precautions against oxygen enrichment

6.2.1. Oxygen should not be used to ventilate (or "sweeten") any space.

6.2.2. Oxygen should not be used to power pneumatic machinery or portable tools.

6.2.3. Steps should be taken to prevent the accidental leakage of oxygen from lines, pipes and cylinders, manifolds and other equipment.

6.2.4. Lines, pipes and cylinders, manifolds and other equipment containing oxygen should be removed from any space when not required for further use for any substantial period of time.

6.2.5. When not in continuous use, all cylinders, torches and manifolds should be turned off.

6.3. Toxic and hazardous substances–storage

6.3.1. Highly flammable, corrosive, toxic or explosive substances which are likely to be injurious, or any substance which is stored or used at pressure greater than atmospheric pressure, should be kept:

(a) in a safe and, where necessary, separate place;

(b) in suitable receptacles clearly marked in accordance with international classifications and labelling codes of hazardous substances to indicate the contents; and

(c) as far away as possible from any area where there is a risk of ignition or explosion or other chemical reactions, or from any living accommodation.

6.3.2. Containers in which there are toxic or hazardous substances should carry or be accompanied by instructions for the safe handling of the contents and first-aid measures in case of contamination.

6.3.3. (1) The precautions in paragraph 6.3.1 should also be taken in the case of empty containers which have held highly flammable, corrosive, toxic or explosive substances.

(2) Arrangements should also be made to ensure that empty containers are kept separately from full ones.

6.3.4. Highly flammable liquids, including liquefied petroleum gas, should be stored in suitable, closed vessels, either in a safe position in the open air or, if the quantity is small, in a fire-resisting bin or cupboard.

6.3.5. Storage should be clearly marked "highly flammable".

6.3.6. Storerooms should be ventilated to a safe area and constructed of fire-resisting material.

6.3.7. When not stored in bulk, flammable liquids should be kept in containers that are:

(a) tightly closed;

(b) fireproof and unbreakable; and

(c) labelled to indicate their contents.

6.3.8. When flammable liquids are transferred from one bulk container to another, the two containers should be electrically bonded and earthed, so as to prevent the risk of ignition from static electricity.

6.3.9. During long periods of disuse, or before storage, all containers that have held flammable liquids should be rendered free from any residual flammable contents by suitable means.

6.3.10. Proper precautions should be taken, including the thorough cleansing of flammable materials from containers, before any heat is applied to these containers, and any repairs should be carried out in the open.

6.3.11. Storerooms containing charged cylinders should be conspicuously marked on the outside with suitable danger signs.

6.3.12. Cylinders should be segregated for storage by type of gas.

6.4. Toxic and hazardous substances—supervision of use

6.4.1. Toxic and hazardous substances should not be kept, used or disposed of:

(a) except by or under the immediate control of a competent person;

(b) until all necessary precautions have been taken; and

(c) unless the quantities stored are kept to a minimum.

6.4.2. The installation manager should be advised of the arrival, location and storage of all radioactive and explosive substances.

6.5. Gas cylinders

6.5.1. Only cylinders that are properly constructed and of sound materials should be used, in accordance with national or international standards or laws.

6.5.2. Cylinders for compressed, dissolved or liquefied gases should be distinctively identified as to their contents.

6.5.3. No gas cylinder or battery of gas cylinders should be used unless it is fitted with:

(a) a high-pressure gauge;

(b) a reducing valve with pressure regulator and safety relief device; and

(c) a low-pressure gauge.

6.5.4. Gas cylinders should be inspected and tested by a competent person:

(a) before being taken into use for the first time;

(b) before being taken into use after repairs; and

(c) at recognised suitable intervals.

6.5.5. Acetylene cylinders (whether loaded or empty) should be maintained in an upright position, secured to prevent their being knocked over and stored in a safe place.

6.5.6. Cylinders should not be knocked, dropped or rolled in handling, or otherwise subjected to violent shocks.

6.5.7. The valves of cylinders should not be opened by hammering or other violent means and should always be opened slowly.

6.5.8. Acetylene cylinders should be opened slowly with a special tool which should be left on the stem so that the valve can be closed quickly in an emergency.

6.5.9. When acetylene cylinders are coupled, flash arrestors should be inserted between the cylinder and the coupler block, or between the coupler block and the regulator.

6.5.10. Only acetylene cylinders of approximately equal pressure should be coupled.

6.5.11. Gas should not be taken from a cylinder unless a pressure-reducing regulator has been attached to the valve.

6.5.12. If cylinders charged with liquefied gases are heated for emptying, this should be done with a water jacket and not with an open flame.

6.5.13. The valves of cylinders should be closed immediately after emptying.

6.5.14. Oxygen cylinders should not be allowed to come into contact with oil or grease.

6.5.15. Oxygen under pressure should not be allowed to come into contact with oily or greasy surfaces such as clothes or containers.

6.5.16. Steps should be taken to prevent the accidental leakage of liquefied petroleum gas and other gases from lines, pipes and cylinders, manifolds and other equipment.

6.5.17. Lines, pipes and cylinders, manifolds and other equipment containing liquefied petroleum gas and other gases should be removed from any space when not required for further use for any substantial period of time.

6.5.18. When not in continuous use, all cylinders and torches and manifolds and other equipment should be turned off.

6.5.19. Steps should also be taken to prevent damage to liquefied petroleum gas and other gas cylinders when they are moved or transferred from ship to installation.

6.6. Explosives—storage and use

6.6.1. Only competent persons specially authorised by the installation manager for the purpose should handle or use explosives.

6.6.2. Explosives should be stored in a safe manner in the charge of a competent person and should be checked for deterioration at regular intervals by a competent person.

6.6.3. Explosives should not be stored together with detonators or any primed explosives.

6.6.4. Particular attention should be given to the storage, issue for use and return to store of unused cartridges for cartridge-operated tools.

6.6.5. Deteriorating explosives should not be used.

6.6.6. All explosives issued from a magazine should be accounted for, and unused explosives should be returned to the

same magazine on the completion of the operation for which they were drawn.

6.6.7. Persons storing, transporting or otherwise handling explosives should not smoke or carry open lights.

6.6.8. Measures should be taken to protect workers from the special problems of using explosives under water.

6.7. Lasers

6.7.1. Laser beams should be used in a safe manner in accordance with manufacturers' instructions.

6.8. Precautions against fume, dust, gas and vapour, etc.

6.8.1. Precautions should be taken to prevent the inhalation of any injurious fume, dust, gas, vapour or any substantial quantity of dust of any kind.

6.8.2. The emission of such fume, dust, gas or vapour should be prevented or controlled at source and steps taken to prevent the spread of such fume, etc., into other areas.

6.8.3. (1) A permit-to-work system should be operated (see section 2.2) and effective steps taken to control the fume, etc., by ventilation.

(2) If ventilation is not practicable, respiratory protective equipment of a type appropriate to the nature and concentration of the fume, etc., should be provided and used.

6.8.4. Persons not directly engaged in the work giving off fumes, etc., should be excluded from the area. If this is not possible, they should be protected again by control and also separation, segregation and, finally, respiratory protective equipment.

6.9. Air-cleaning equipment

6.9.1. Air-cleaning equipment should be so placed that:

(a) collected contaminants can be removed from it without causing danger; and

(b) it can be serviced and repaired without causing danger by recontamination of the atmosphere.

6.9.2. Atmospheric contaminants removed by exhaust systems should not be discharged so that they can recontaminate the atmosphere of any workplace or places where persons are likely to be.

6.10. Toxic and irritant substances–personal protection

6.10.1. Workers likely to be exposed to toxic or irritant substances should be provided with personal protective equipment (including clothing and respiratory protective equipment) if necessary to prevent danger.

6.10.2. Where necessary, personal protective equipment and coverings should be removed before the wearer partakes of any food.

6.10.3. All workers exposed to toxic substances should thoroughly wash before partaking of any food or before leaving the worksite.

6.10.4. Workers exposed to toxic or irritant substances should promptly report any physical complaints to the medical service, first-aid post or a supervisor.

6.10.5. Persons with open wounds should not handle toxic or corrosive substances.

6.10.6. Appropriately located emergency showers and eye-wash stations should be provided.

6.10.7. For drawing off acids from containers, siphons, tipping appliances or other suitable devices should be used.

6.11. Risk of explosion from fume, dust, gas and vapour

6.11.1. (1) Where any explosive or flammable fume, dust, gas or vapour is given off, adequate measures should be taken to prevent the danger of fire or explosion.

(2) These measures should include:

(a) the provision of adequate ventilation;

(b) the provision of suitable safe equipment; and

(c) the removal of unprotected ignition sources from the area.

6.12. Asbestos

6.12.1. Wherever possible, the use of asbestos, in particular blue asbestos, should be avoided. Non-hazardous substitutes should be used if technically possible. Where, however, it is found that asbestos must be used, then, as far as possible, prefabricated asbestos products should be utilised in order to avoid cutting or other dust-producing operations.

6.12.2. Asbestos should be handled in such a way as to prevent the production of dust.

6.12.3. Where this is not reasonably practicable, steps should be taken to contain the dust by:

(a) sealing off the working area; and

(b) preventing fibres from migrating to other areas on, for example, clothing or equipment.

6.12.4. Exhaust ventilation should be used at the point where dust is produced, to prevent it from entering the air of the workplace.

6.12.5. When insulating blocks, slabs, cloth, tapes, cords, etc., containing asbestos are used, respiratory protective equipment should be worn and cloth, tapes, cords and the like should be kept wet.

6.12.6. Suitable effective protective clothing, including head covering and respiratory protective equipment, should be provided and used.

6.12.7. (1) Adequate clothing, accommodation, changing and washing facilities should be provided for asbestos workers.

(2) Arrangements should be such as to prevent the offsite clothing of persons from becoming contaminated with asbestos fibres.

6.12.8. Areas provided for the storage of offsite clothing should be completely separated from the accommodation for protective clothing and respiratory protective equipment.

6.12.9. Loose asbestos should not be allowed to accumulate in working areas. Waste asbestos should be collected in impervious bags subsequently sealed for safe disposal.

6.12.10. Steps should be taken to ensure that these areas and the changing and clothing accommodation are cleaned frequently.

6.13. Offensive and nuisance substances

6.13.1. Measures including suppression, control by local exhaust ventilation and provision of respiratory protective equipment should be taken to prevent the inhalation of any substance which is likely to be offensive to any person.

6.14. Environmental monitoring

6.14.1. The need for adequate and suitable precautions to provide protection against asphyxiating atmospheres and toxic and hazardous substances implies a need to monitor the atmosphere, for which appropriate monitoring equipment should be used. Monitoring should be carried out before persons enter potentially dangerous atmospheres and at appropriate intervals in the course of the work.

6.14.2. A person competent both by training and by experience should carry out that monitoring.

6.15. Disposal of flammable, corrosive, toxic or explosive substances

6.15.1. Flammable, corrosive, toxic or explosive substances which are not required for further use should be returned to the store and removed from the installation as soon as possible. (See sections 6.3 and 6.4.)

6.16. Ionising radiations[1]

6.16.1 When not in active use, radioactive sources should be housed in specially designed and clearly marked storage container(s) to:

(a) provide maximum shielding to limit exposure to acceptable national standards;

(b) prevent unauthorised use; and

(c) protect from the risk of fire and explosion.

6.16.2. Radioactive sources should not be handled, used or disposed of,[2] nor X-ray machines activated, except by or under the direct supervision and control of a competent person.

6.16.3. Except when not practical, radiographic work should be carried out in a suitably designated area and away from living accommodation and construction activities.

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[1] The principal source of exposure to ionising radiations is through industrial radiography using sealed radioactive isotopes, mainly Iridium 192 and to a lesser extent Cobalt 60. Occasionally X-ray machines are used. X-ray machines are electrically energised and hence pose no radiation hazard except when in use.

[2] Under no circumstances should radioactive sources be disposed of in the oilfield. Weak (unusable) sources should be returned to a burial site approved by the competent authority.

6.16.4. When the conditions in 6.16.3 cannot be achieved, the work area should be roped off and clearly marked, and all except authorised persons should be excluded from the area during radiography.

6.16.5. Radiographic personnel should be equipped with instruments to monitor radiation levels of storage compartment(s) and aid in setting up work areas.

6.16.6. Radiographic personnel should be provided with and should wear appropriate personal radiation monitoring devices.

6.16.7. If a radioactive source is suspected of being lost or mislaid, a competent person or persons should be notified, and steps should be immediately taken to locate the source.

6.16.8. A log of all the sources, including their movement into and out of the storage containers, should be maintained by a competent person.

6.17. Personal protective equipment – general

6.17.1. Personal protective equipment should be issued on an individual basis and not passed to another person without first being cleaned, serviced and maintained.

6.17.2. The space provided for personal safety equipment should be such as not to contaminate accommodation or other storage.

6.17.3. (1) Personal protective equipment should be suitable for the purpose and to the required standard, having regard to the nature of the work.

(2) Where there is a relevant certificate of approval or a national standard or there is an equivalent international standard, personal protective equipment should be to that standard.

6.17.4. Every person engaged in the operations and every other person who may be exposed to the risk of injury, poisoning

or disease arising from the operations should, where necessary, be provided with and should wear:

(a) a suitable safety helmet constructed to an appropriate standard;

(b) overalls;

(c) safety boots;

(d) depending upon the risk, sufficient and suitable protective clothing and equipment, including: respiratory protective equipment; eye protectors; hearing protection; gloves; welding aprons; safety harnesses, ropes and attachments; and buoyancy aids; and

(e) sufficient and suitable protective outer clothing for use by any person who, by reason of the nature of his work, is required to continue working in the open air during cold or hot weather, rain, snow, sleet, hail, spray, high winds or hot, humid conditions.

6.18. Head protection

6.18.1. Safety helmets or hard hats should be worn by persons employed at any place where they might be exposed to head injury from:

(a) falling;

(b) falling or flying objects; or

(c) striking against objects or structures.

6.18.2. Where necessary to prevent danger from electricity, hard hats should be made of insulating material.

6.18.3. Persons working in the sun in hot weather should wear suitable head covering.

6.19. Respiratory protective equipment

6.19.1. Persons who cannot be protected against airborne dust, fumes, vapours and gases by ventilation or other means should be protected by suitable protective respiratory equipment.

6.19.2. Persons employed at places where they might be exposed to injury from lack of oxygen should wear a suitable self-contained airline or respirator.

6.19.3. All persons required to use respiratory protective equipment should be adequately instructed in its care and use.

6.19.4. When not in use, respirators should be kept in closed containers.

6.19.5. Air supplied to airline respirators should be free from harmful contaminants and obnoxious odours.

6.19.6. When compressed air is used to supply airline respirators:

(a) the compressor should be so placed as to avoid contamination of the air supply and steps should be taken to ensure that the air supplied is of adequate purity;

(b) the air should be supplied at a suitable temperature; and

(c) the compressor should be provided with a safety device to prevent excessive heating, so as to eliminate the possibility of generating toxic gases.

6.19.7. Air supplied to a respirator should not be at an excessive pressure.

6.19.8. In the supply line from a compressor or from a cylinder for compressed air there should be:

(a) a pressure-reducing valve;

(b) a relief valve pre-set to function at a pressure slightly above the setting of the reducing valve if the latter fails; and

(c) a filter that effectively retains pipe scale, oil, water and harmful vapours.

6.20. Hand and arm protection

6.20.1. Where necessary, persons should wear suitable gloves or gauntlets when employed at places where they might be exposed to hand or arm injuries from:

(a) hot, corrosive or toxic substances;

(b) sharp or rough points, edges or surfaces of objects; or

(c) cold weather.

7. Welding and flame cutting[1]

7.1. General

7.1.1. Welding should be carried out only in accordance with section 2.2.

7.1.2. Welders should wear fire-resistant protective clothing and equipment such as fire-resistant gauntlets and aprons, helmets and goggles with suitable filter lenses.

7.1.3. Welders should wear clothing that is free from grease, oil and other flammable material.

7.1.4. Workers removing excess metal, slag, etc., should:

(a) wear gloves and goggles or a face screen;

(b) ensure that other persons are not struck by chips.

7.1.5. Adequate precautions should be taken to protect persons working or passing near welding operations from dangerous sparks and radiation.

7.1.6. When welding or cutting is being done on materials containing toxic or harmful substances or liable to produce toxic or harmful fumes, adequate precautions should be taken to protect workers from the fumes, if possible by exhaust ventilation.

7.1.7. At places where welding machines are operated by internal combustion engines, adequate ventilation should be provided.

7.1.8. A suitable fire extinguisher should be kept ready for immediate use at places where welding is done.

7.1.9. To prevent acetylene backflow, check valves should be used in addition to maintaining adequate oxygen pressure.

7.1.10. Acetylene should not be used for welding at a pressure exceeding 1 atm. gauge.

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[1] See also chapter 9.

7.1.11. Adequate precautions should be taken to prevent:

(a) fires from being started by sparks, slag or hot metal; and

(b) damage to fibre ropes from heat, sparks, slag or hot metal.

7.1.12. Precautions should be taken to prevent flammable vapours and substances from entering the working area.

7.2. Work under water and in confined spaces

7.2.1. Procedures should be adopted to protect workers from the special problems of welding and flame cutting under water.

7.2.2. When welding and cutting operations are being carried out in a confined space:

(a) adequate ventilation, by means of exhaust fans or forced draught as the conditions require, should be constantly provided; oxygen should not be use for this purpose;

(b) no blowpipe should be left unattended inside a tank or vessel or other confined space during meals or other interruptions of the work;

(c) the workers should take all necessary precautions to prevent unburned combustible gas or oxygen from escaping inside a tank or vessel or other confined space;

(d) when necessary to prevent danger, an attendant should watch the welder or welders from outside;

(e) if the tank has contained flammable products, it should be cleaned by steam or detergents, and the necessary safety measures should be taken accordingly;

(f) no material which may produce sparks or flames should be introduced until the atmosphere has been tested and found to be safe; and

(g) acetylene and oxygen cylinders should not be placed inside confined spaces.

7.3. Work on containers for explosive or flammable substances

7.3.1. Welding or cutting operations on containers in which there are explosive or flammable substances should not be allowed.

7.3.2. Only the right pressure-reducing regulator should be used for the gas in the cylinder.

7.3.3. Cylinder valves should be kept free from grease, oil, dust and dirt.

7.4. Gas hoses and torches

7.4.1. Only hose specially designed for welding and cutting operations should be used to connect an oxy-acetylene torch to gas outlets.

7.4.2. Hose lines for oxygen and for acetylene should be of different colours.

7.4.3. Hose connections should be sufficiently tight to withstand without leakage a pressure twice the maximum delivery pressure of the pressure regulators in the system.

7.4.4. Care should be taken that hose does not become kinked or tangled, stepped on, run over or otherwise damaged.

7.4.5. Any length of hose in which a flashback has burned should be discarded.

7.4.6. No hose with more than one gas passage should be used.

7.4.7. Only soapy water should be used for testing for leaks in hose and connections.

7.4.8. When torches are being changed, the gases should be shut off by closing the head valves on cylinders and not by crimping the hose.

7.4.9. Torches should be lit with friction lighters, stationary pilot flames or other safe source, but not with matches.

7.5. Electric arc welding–equipment

7.5.1. (1) A welding machine other than one driven by an internal combustion engine should be controlled by a switch mounted on or near the machine framework.

(2) When opened, the switch should immediately cut off the power from all conductors supplying the machine.

(3) Portable welding machines should be securely immobilised when in use.

7.5.2. Welding circuits should be supplied only through generating or converting equipment or a double-wound transformer.

7.5.3. The maximum open-circuit no-load voltage should be in accordance with national or international codes or standards.

7.5.4. Return conductors should be taken directly to the work and securely connected mechanically and electrically to it.

7.5.5. Cables should be so insulated, positioned and supported as to prevent danger.

7.5.6. In arc-welding or cutting machines the motor generators, rectifiers, transformers and all current-carrying parts should be protected against accidental contact with uninsulated live parts.

7.5.7. Ventilating slots in transformer enclosures should be so designed that no live part is accessible through any slot.

7.5.8. Metal frames of arc-welding machines should be effectively earthed.

7.5.9. Only heavy-duty cable with unbroken insulation should be used.

7.5.10. Circuit connections should be waterproof.

7.5.11. When lengths of cable have to be joined, only insulated connectors should be used, on both the earth line and the electrode holder line.

7.5.12. Connections to welding terminals should be made at distribution boxes, socket outlets, etc., by bolted joints.

7.5.13. Welding terminals should be adequately protected against accidental contact by enclosures, covers or other effective means.

7.5.14. Electrode holders should:

(a) have adequate current capacity; and

(b) be adequately insulated to prevent shock, short-circuiting or flashovers.

7.6. Electric arc welding— protective clothing and equipment

7.6.1. (1) Where persons other than the welders are likely to be exposed to harmful radiations or sparks from electric arc welding, they should be protected by screens or other effective means.

(2) Workers such as crane drivers who cannot be protected from radiations by screens should wear suitable tinted goggles.

7.6.2. Walls and screens of both permanent and temporary protective enclosures should be so painted or otherwise treated as to absorb harmful radiations from the welding equipment and prevent reflection.

7.6.3. Welders should be protected by gloves, sleeves, aprons, leggings and spats against burns from metal splashes and electrode stubs.

7.6.4. When sheathed electrodes are used, the welders should be protected by goggles against eye injuries from flying fragments of sheaths and should also have ear protectors at their disposal.

7.6.5. Workers using pneumatic hammers or chisels to remove slag from welds should wear appropriate personal protective equipment.

7.7. Electric arc welding—operations

7.7.1. When arc welding is done in damp or otherwise conductive confined spaces:

(a) the electrode holders should be completely insulated; and

(b) the welding machine should be either:

(i) outside the confined space; or

(ii) equipped with a voltage-reducing device in the case of arc welding with alternating current.

7.7.2. Adequate precautions should be taken to prevent:

(a) damage to fibre ropes from heat, sparks, slag or hot metal;

(b) fires started by sparks, slag or hot metal; and

(c) flammable vapours and substances from entering the working area.

7.7.3. Welders should take adequate precautions to prevent:

(a) any part of their body from completing an electric circuit;

(b) any part of their body from coming into contact with the exposed part of the electrode or electrode holder when they are in contact with metal; and

(c) wet or damaged clothing, gloves and boots from touching any live part.

7.7.4. Electrodes should be inserted in the holder only with a means of insulation such as insulating gloves.

7.7.5. Electrode and return leads should be adequately protected against damage.

7.7.6. Live parts of electrode holders should be inaccessible when they are not in use.

7.7.7. Live parts of electrode holders should not be allowed to come into contact with metallic objects when not in use.

7.7.8. Whenever necessary, electrode stubs should be deposited in a fire-resistant container.

7.7.9. Electric arc-welding equipment should not be left unattended with the current switched on.

8. Machinery, pressure plant and tools

8.1. Dangerous machinery

8.1.1. Every dangerous part of any machine should be effectively guarded.

8.1.2. (1) All guards and safety devices provided for moving and dangerous parts of machinery should be properly maintained.

(2) They should be kept in position while the parts for which they are provided are moving except when such parts are necessarily exposed for examination, adjustment or lubrication which it is necessary to carry out while they are moving; provided that:

(a) arrangements are made to reduce to a minimum the risk of injury to all persons;

(b) no person, other than a competent person, performs the operations of examination, adjustment and lubrication.

8.1.3. Every power-driven machine should be provided with adequate means, immediately accessible and readily identifiable to the operator, of stopping it quickly, and preventing it from being started again.

8.2. Woodworking machines

8.2.1. Operators of woodworking machines should not be disturbed while the machine is working.

8.2.2. Non-automatic woodworking machines should not be left in motion when unattended.

8.2.3. Woodworking machines should not be adjusted or cleared of jammed wood while they are operating.

8.2.4. Shavings, sawdust, etc., should not be removed by hand from woodworking machines or in their vicinity while the machines are working.

8.2.5. Woodworking machines that use tools of widely differing diameters should have a device for altering the speed of rotation.

8.2.6. Workpieces should be firmly supported, or be securely guided or clamped.

8.2.7. Free ends of long workpieces should be supported on trestles, table extensions, etc.

8.2.8. Small or short workpieces should be guided, clamped or pushed with a push stick.

8.3. Abrasive wheels

8.3.1. Floor stands for abrasive wheels should be:

(a) rigidly constructed;

(b) sufficiently heavy for the wheels, discs, etc., used; and

(c) securely mounted on substantial foundations so as to withstand vibration.

8.3.2. Abrasive wheels, except wheels used for internal grinding and wheels less than 5 cm (2 in) in diameter, should be equipped with protection hoods or other suitable devices to prevent injury to persons if the wheel breaks.

8.3.3. (1) Protection hoods should:

(a) so far as is reasonably practicable, be of such a design and so constructed as to contain every part of the abrasive wheel in the event of any fracture of the abrasive wheel or any part thereof occurring while the wheel is in motion;

(b) be properly maintained and so secured as to prevent their displacement in the event of any such fracture as aforesaid; and

(c) enclose the whole of the abrasive wheel except such part thereof as is necessarily exposed for the purpose of any work being done.

(2) Every hood for an abrasive wheel used for grinding on the periphery and mounted on a fixed machine should be kept adjusted to the decreasing diameter of the wheel.

8.3.4. Stationary abrasive wheels, and portable abrasive wheels whenever practicable, should be equipped with exhaust systems that will effectively remove the dust and dirt particles produced in grinding.

8.3.5. Work rests on abrasive wheels should be:

(a) substantially constructed;

(b) shaped to fit the contour of the wheel; and

(c) securely fixed in position as close as practicable to the wheel.

8.3.6. Workers using abrasive wheels should be provided with protection for the head and eyes against flying particles or splashes.

8.3.7. Abrasive wheels should be inspected before they are mounted to ascertain whether they are cracked or otherwise damaged.

8.3.8. Every abrasive wheel should be properly mounted on its spindle.

8.3.9. Work rests should not be adjusted while wheels are in motion.

8.3.10. A notice specifying the maximum working speed or speeds of the spindle should be affixed to every grinding machine.

8.3.11. Every governor or other device used for controlling the speed of any air-driven grinding machine should be properly maintained.

8.3.12. The maximum safe speed of operation should be marked on every abrasive wheel.

8.3.13. Abrasive wheels should not be run at a speed exceeding the maximum safe speed indicated on them.

8.3.14. Work should not be forced against cold abrasive wheels but applied gradually.

8.3.15. Abrasive wheels should be run at the maximum safe speed for at least one minute before any work is applied and while all workers are in a place that is safe if the wheel bursts.

8.3.16. Abrasive wheels should be tested for balance at least once a week and trued if necessary. Wheels found to be damaged should be clearly marked or tagged to prevent further use.

8.3.17. Abrasive wheels used in wet grinding should not be left standing in water.

8.3.18. Dry grinding or brushing should not be done on surfaces coated with harmful paint unless local exhaust ventilation is provided or respiratory protective equipment is used.

8.4. Pressurised systems, including pressure vessels and air receivers

8.4.1. (1) Pressurised systems together with their appropriate fitting should:

(a) be suitable for their purpose;

(b) be properly maintained;

(c) be regularly inspected and, where necessary, examined by a competent person in accordance with a written scheme prepared by the user; and

(d) be so installed and operated as not to endanger personnel through the venting of relief valves.

(2) The intervals between thorough examinations for particular pressure vessels should not be greater than those specified by the competent national authority.

8.4.2. Steps should be taken to see that pressurised systems are not endangered by the construction operations, by vessels, by loads being lifted between vessels in the operations, by the operation of the cranes themselves and by helicopter operations; or by

the actual handling of the pressurised system itself if it is transshipped from an attendant vessel on to the installation.

8.4.3. (1) Repairs or modifications to a pressurised system should be properly designed and the final standard of plant integrity should be adequate for the duty to which the plant will be returned.

(2) Where any repair or modification may affect the integrity of a pressurised system, suitable examinations and tests should be carried out by a competent person before the pressurised system is brought back into use.

(3) Steps should be taken to prevent accidents in connection with repair, assembling or dismantling of components involved in high-pressure liquid or gas systems.

8.4.4. Records should be kept of all repairs and modifications which may affect the plant's integrity as a pressurised system.

8.4.5. Pressurised systems should be operated in accordance with instructions for the safe working of the plant.

8.4.6. Pressure testing of plant, equipment and pipelines should be carried out by hydraulic means. In exceptional circumstances pneumatic testing is permitted, provided that the appropriate precautions are taken.

8.4.7. Any unusual loss of pressure, particularly in compressed air systems, should be investigated immediately.

8.4.8. Air receivers should be equipped with:

(a) a safety valve;

(b) a pressure gauge; and

(c) a drain cock.

8.4.9. Air receivers should be provided with suitable openings for inspection and cleaning.

8.4.10. Air receivers should be so installed as to be:

(a) where practicable, protected from the weather; and

(b) accessible for thorough inspection.

8.4.11. Air receivers should be examined and tested at appropriate intervals by a competent person.

8.4.12. The maximum permissible working pressure of each receiver should be marked in a distinctive colour on the pressure gauge and/or on the vessel.

8.4.13. A pressure-reducing valve of adequate capacity should be inserted in the piping between the air receiver and the compressor.

8.4.14. Between the receiver and each consuming appliance there should be a stop valve.

8.4.15. Air receivers should be cleaned of oil, carbon and other foreign substances at suitable intervals.

8.5. Emission of steam, smoke and vapour

8.5.1. Effective steps should be taken to prevent danger arising from the emission of steam, smoke or vapour on or near the construction operation.

8.6. Hand tools

8.6.1. In order to reduce the hazards from sparking, adequate precautions should be taken when hand tools are used:

(a) on vessels that carry oil, liquefied combustible gases or other flammable liquids;

(b) near flammable or explosive material; and

(c) in the presence of explosive dusts or vapours.

8.7. Pneumatic tools

8.7.1. Operating triggers on portable pneumatic tools should be:

(a) so placed as to minimise the risk of accidental starting of the machine; and

(b) arranged to close the air inlet valve automatically when the pressure of the operator's hand is removed.

8.7.2. Hose and hose connections for the supply of compressed air to portable pneumatic tools should be:

(a) designed for the pressure and service for which they are intended;

(b) fastened securely to the permanent pipe outlet and to the tool; and

(c) designed so that they cannot be released while the hose is under pressure except where specially designed connections are used.

8.7.3. Pneumatic shock tools should be equipped with safety clips or retainers to prevent dies and tools from being accidentally expelled from the barrel.

8.7.4. Tools should not be shot out of pneumatic hammers, but be removed by hand.

8.7.5. Pneumatic tools should be disconnected from the source of power and the pressure in the hose lines released before any adjustments or repairs are made.

8.7.6. (1) Air supply lines should be adequately protected from damage by traffic or other movement.

(2) Over such surfaces as those of ladders, steps, scaffolds and walkways, hose should not be laid in such a manner as to create a tripping hazard.

8.7.7. Portable pneumatic tools should not be hoisted or lowered by the airline.

8.7.8. Reciprocating pneumatic equipment should have the plungers, dies and tools removed when they are not in use.

8.7.9. Compressed air should not be used for cleaning clothing or parts of the body, or be directed to the body.

8.7.10. Hose should be inspected visually before each use and removed if damaged.

8.8. Cartridge-operated tools–construction

8.8.1. Cartridge-operated tools should have:

(a) a guard or protective shield that cannot be removed without rendering the tool inoperative;

(b) a device that prevents the tool from firing inadvertently, as for example if it is dropped or while it is being loaded;

(c) a device that prevents the tool from firing if it is not approximately perpendicular to the working surface; and

(d) a device that prevents the tool from firing if the muzzle is not pressed against the working surface.

8.9. Cartridge-operated tools–inspection and maintenance

8.9.1. (1) Every time it is used, a cartridge-operated tool should be inspected beforehand to ensure that it is safe to use.

(2) In particular, action should be taken to ensure that:

(a) the safety devices are in proper working order;

(b) the tool is clean;

(c) all moving parts work easily; and

(d) the barrel is unobstructed.

8.9.2. Cartridge-operated tools should be repaired only by the manufacturer or by competent persons.

8.10. Cartridge-operated tools—use

8.10.1. Cartridge-operated tools should be accompanied by instructions for their maintenance and use.

8.10.2. Operators of cartridge-operated tools should wear adequate personal protective equipment.

8.10.3. Cartridge-operated tools should:

(a) not be loaded until they are to be used;

(b) never be pointed at any person, even when they are unloaded;

(c) not be stored or used in an explosive or flammable atmosphere.

8.10.4. Cartridge-operated tools should not be fired:

(a) into existing holes;

(b) into objects or structures through which the projectile could pass;

(c) into concrete or masonry near the edge;

(d) into any brittle material or material that is likely to shatter on impact.

8.10.5. When it is being fired, a cartridge-operated tool should:

(a) be held perpendicular to the working surface; and

(b) have the muzzle pressed firmly against the working surface.

8.10.6. An obstructed bore should not be cleared by firing another stud or cartridge into it.

8.10.7. (1) Cartridge-operated tools and cartridges should not be left unattended.

(2) Cartridge-operated tools should not be transported loaded.

8.10.8. When not required for use, inspection or other purpose, cartridge-operated tools should be kept in a suitable container.

8.10.9. Only cartridges conforming to the maker's specifications should be fired in a cartridge-operated tool.

8.10.10. Cartridges should be kept in a metal container that:

(a) is clearly marked to indicate its contents;

(b) is kept locked when not in use;

(c) is used only for this purpose; and

(d) is stored in a cool, dry place.

8.10.11. If a cartridge-operated tool misfires:

(a) it should be left in the operating position against the material for at least 15 seconds; and

(b) the cartridge should be removed before the guard is lifted from the surface.

8.10.12. Misfired cartridges should be safely destroyed by competent persons.

8.10.13. Areas in which cartridge-operated tools are being used should be fenced off or indicated by warning signs or notices.

9. Electricity

9.1. General

9.1.1. All electrical equipment and circuits should be so designed, constructed, installed, protected, operated and maintained as to prevent danger in accordance with the requirements of national laws or regulations and of the competent authority.

9.1.2. All electrical conductors and equipment should be sufficient in size and power for the work for which they are used.

9.1.3. All parts of the electrical installation during construction operations should:

(a) be of a standard of construction not lower from the safety point of view than national or international standard specifications approved or accepted by the competent authority;

(b) be so constructed, installed and maintained as to prevent fire, external explosions and electric shock;

(c) not be apt to be damaged by water, dust or electrical, thermal or chemical action to which they may be subjected; and

(d) be effectively insulated or have all bare live parts enclosed or otherwise protected.

9.1.4. (1) All electrical appliances and conductors should be clearly marked to indicate their purpose and voltage.

(2) When the layout of an installation cannot be clearly distinguished, the circuits and appliances should be identified by labels or other effective means.

(3) Circuits and appliances at different voltages in the same installation should be clearly distinguished by coloured markings or other conspicuous means.

9.1.5. Adequate precautions should be taken to prevent installations from receiving current at a higher voltage from other installations.

9.1.6. Installations should be protected against lightning.

9.1.7. Lines of signalling and telecommunication systems should not be laid on the same supports as lines carrying current of medium or high voltage.

9.1.8. If the electrical system on the offshore installation is supplied with electricity from a vessel alongside:

(a) all the circuits to be energised should be equipped with suitable over-current protection;

(b) all the circuits to be energised should have been inspected and found to be in a safe condition.

9.1.9. When electrical equipment ceases to be used, it should be disconnected from the source of electric supply by removing the fuses, by disconnecting the conductors or by other effective means.

9.2. Protection of electrical conductors and apparatus

9.2.1. Steps should be taken to prevent damage to electrical conductors or apparatus not only from the construction operations, but also from the movement of cranes and their loads and vessels.

9.2.2. Conductors passing through bulkheads, partitions, etc., should be adequately protected.

9.2.3. Conductors passing through door frames, hatches, manholes or the like should be protected so that the insulation is not damaged by the closing of doors, covers or lids.

9.2.4. Where appropriate, consideration should be given to the installation of earth-leakage protection.

9.2.5. All electrical conductors and apparatus should be subject to a suitable scheme of systematic examination, maintenance and testing.

9.3. Protection against excessive contact voltage

9.3.1. Protection against excessive contact voltage should be provided in all installations where the operating voltage exceeds 50 V AC to earth (rms).

9.3.2. Protection against excessive contact voltage should be afforded by one or more of the following:

(a) placing live parts out of reach;

(b) protective barriers;

(c) enclosure;

(d) insulation;

(e) earthing of neutral;

(f) automatic circuit breakers;

(g) reduction to safety extra-low voltage;

(h) earthing of non-current carrying metal parts.

9.3.3. Bare conductors should be so positioned and protected as necessary to prevent danger.

9.3.4. If an installation has an earthed neutral it should be equipped with an appliance that automatically cuts off the electrical supply from the defective part of the installation.

9.4. Earthing

9.4.1. In installations where the voltage exceeds 50 V AC (or 65 V AC for telephone) the following should be earthed:

(a) armouring and metallic coverings of cables;

(b) external metallic parts of electrical equipment that are not normally live; and

(c) metallic parts in the immediate vicinity of live conductors.

9.4.2. Earthing systems should be so installed that no dangerous voltage can arise between earthed parts and the earth.

9.4.3. Earthing should be ensured by one or more of the following:

(a) conductive sheaths or armourings of cables;

(b) special conductors forming part of cables;

(c) visible outside conductors.

9.4.4. All parts of earthing systems should:

(a) have sufficient electrical continuity;

(b) be efficiently connected to earth by means of suitable earth electrodes or by other equivalent means;

(c) have adequate mechanical strength; and

(d) be properly maintained and periodically examined.

9.4.5. (1) The metal parts of electrical installations that require to be earthed should be provided with clearly visible earthing terminals that permit reliable connection with the earthing conductor.

(2) Whenever equipment is provided with more than one earthing terminal, perfect electrical continuity should be ensured between these terminals.

9.4.6. Earthing conductors, particularly their attachments and connections to earthing terminals, should be protected against corrosion.

9.4.7. Except for testing purposes, no switch, fuse, circuit breaker or other circuit-opening device should be placed in any earthing conductor.

9.4.8. Earthing conductors should have a total conductance equal to at least half that of the largest current-carrying conductor in the circuit.

9.5. Connections

9.5.1. Electrical conductors should be connected to the supply by efficient, properly constructed connectors.

9.5.2. If electrical conductors have to be joined, the connection should be of proper construction as regards conductivity, insulation, mechanical strength and protection.

9.5.3. At points where cables and conductors are joined, branched or led into apparatus, they should be:

(a) mechanically protected; and

(b) properly and durably insulated.

9.5.4. (1) Conductors and cables should be joined, branched or led into apparatus through junction boxes, sleeves, bushings, glands or equivalent connecting devices.

(2) Whenever practicable, cables should be joined by junction boxes or plug-and-socket couplings.

(3) When parts of cables or conductors are joined together, or cables or conductors are joined to one another or to apparatus, the attachment should be made by screwing, clamping, soldering, riveting, brazing, crimping or equivalent means.

9.5.5. Junction boxes and connectors should be protected as far as possible against water and other sources of damage.

9.5.6. Whenever armoured cables are joined, the junction boxes should be bridged by a suitable conductive bond between the armouring of the cables.

9.5.7. Makeshift plugs, sockets and connectors should not be used.

9.6. Flexible cables

9.6.1. Particular attention should be paid to the elimination of trailing electrical conductors of excessive length.

9.6.2. Flexible cables for hand-held or portable apparatus where the voltage exceeds 50 V AC and where all circuits are not intrinsically safe should:

(a) contain an earthing conductor with a conductance of at least half that of the largest current-carrying conductor, unless the cable is supplying portable apparatus of an approved double-insulation or all-insulated type;

(b) unless otherwise specified by the competent authority, be protected by at least one continuous metal screen that will ensure that the supply of electricity is cut off automatically if serious damage occurs to the cable;

(c) be protected against kinking by a rubber tube or other suitable device at the motor end; and

(d) be relieved from mechanical strain at connections to terminals.

9.6.3. Hand-held apparatus and, where practical, portable apparatus should be supplied by a single flexible cable.

9.6.4. All flexible cables where the voltage exceeds 50 V AC, other than those forming part of intrinsically safe circuits, should have external sheathing that is resistant to fire and mechanical damage.

9.6.5. Automatic devices should be provided for the purpose of making or maintaining dead any hand-held or portable apparatus supplied by a flexible cable in the event of a break in the earthing conductor included in the cable.

9.6.6. The flexible cable should not be used to lift a portable tool.

9.6.7. Flexible cables should not be laid on surfaces that are oily or wet with corrosive liquids.

9.6.8. Flexible cables should be kept clear of loads, running gear and moving equipment.

9.6.9. Heavy rubber-insulated flexible cables should be used for extension lights inside plant, tanks and other places where conductors may be subjected to rough handling or moisture.

9.7. Mobile and portable equipment

9.7.1. (1) The frames of mobile and portable electric tools and appliances, except double-insulated tools, should be properly connected to earth.

(2) Whenever practicable, portable tools and appliances supplied should be double-insulated.

9.8. Portable apparatus

9.8.1. The supply of electricity to portable tools and hand-held appliances should be at a declared voltage not exceeding 230 V AC ± 10 per cent.

9.8.2. Portable machines should be equipped with a built-in switch.

9.8.3. Hand-held electrical tools should be provided with a built-in switch that will break the circuit automatically when the tool is released by the hands.

9.8.4. Portable electric tools and appliances should not be used in flammable or explosive atmospheres unless special precautions are observed.

9.9. Hand lamps and portable lamp holders

9.9.1. The use of hand lamps and portable lamp holders exceeding 130 V AC should not be permitted.

9.9.2. Hand lamps should be:

(a) equipped with a strong cover of glass or other transparent material;

(b) proofed against dust and water; and

(c) equipped with a strong guard over the cover.

9.9.3. Portable lamp holders should, in addition to the requirements of paragraph 9.9.2, have:

(a) all current-carrying parts enclosed; and

(b) an insulated handle.

9.10. Circuit controls

9.10.1. Efficient means, suitably located, should be provided to cut off the power supply to prevent danger.

9.10.2. In all circuits supplying appliances, it should be possible to cut off the current from all active conductors by means of a readily accessible device.

9.10.3. Stop or "off" buttons should be readily distinguishable from start or "on" buttons.

9.10.4. Every fuse and circuit breaker should be so constructed and arranged as to:

(a) effectively interrupt the current before it so exceeds the working rate as to involve danger; and

(b) prevent danger.

9.11. Circuit breakers

9.11.1. Circuit breakers should:

(a) be of adequate breaking and making capacities to perform their normal function; and

(b) have their essential characteristics clearly marked on them.

9.11.2. In circuits where the voltage exceeds 50 V AC, the isolating device should act on all poles.

9.11.3. It should not be possible for circuit breakers to be opened or closed inadvertently by gravity or by mechanical impact.

9.12. Fuses

9.12.1. Fuses should bear clear markings indicating their rated current, whether they are of the fast or slow breaking type and, as far as practicable, their rated breaking capacity.

9.12.2. (1) It should not be possible to remove or insert fuses in a circuit (other than an intrinsically safe circuit) where the

voltage exceeds 50 V AC unless the circuit has been made dead by means of an isolating device on the incoming side.

(2) The fuses of such circuits should be accessible only to authorised persons.

9.12.3. Effective protective measures should be taken to ensure that persons removing or inserting fuses will not be endangered, in particular by any adjacent live parts.

9.13. Hazardous atmospheres

9.13.1. Electrical conductors and apparatus exposed to the weather, wet, corrosion and flammable or explosive surroundings or atmospheres should be so constructed and protected, or such other special precautions should be taken, as to prevent danger and where necessary satisfy the requirements of the competent authority as to certification.

9.13.2. (1) In confined spaces with conductive elements or where conditions are otherwise dangerous, portable non-double insulated electrical appliances should be supplied only with a safe voltage, i.e. not exceeding 50 V AC or 120 V DC.

(2) Sources of supply at a higher voltage should be outside the confined spaces.

9.13.3. Only intrinsically safe or flameproof equipment and suitably protected conductors should be installed or used:

(a) at storeplaces for explosives or flammable liquids; and

(b) in other flammable or explosive atmospheres.

9.14. Notices

9.14.1. The following notices in appropriate languages should be kept exhibited at suitable and prominent places:

(a) a notice prohibiting unauthorised persons from entering electrical equipment rooms;

(b) a notice prohibiting unauthorised persons from handling or interfering with electrical apparatus;

(c) a notice containing directions concerning procedure in case of fire; and

(d) a notice specifying the person to be notified in case of an electrical accident or some other dangerous occurrence, and indicating how to communicate with that person.

9.14.2. Instructions as to the rescue and treatment of persons suffering from electric shock should be displayed at suitable positions in appropriate languages.

9.14.3. At all places where contact with or proximity to electrical equipment can cause danger, suitable warnings should be placed.

9.15. Inspection and maintenance

9.15.1. All electrical equipment should be inspected before use to ensure that it is suitable for the use proposed.

9.15.2. Earthing circuits in all installations should be tested before being put into use and periodically thereafter.

9.15.3. At the beginning of every shift every person using electrical equipment should make a careful external examination of the equipment and conductors for which he is responsible, especially flexible cables.

9.15.4. Electrical conductors and equipment should be repaired only by electricians.

9.15.5. As far as is necessary to ensure safety, no work should be done on live conductors or equipment.

9.15.6. Before any work is begun on conductors and equipment that does not have to remain live:

(a) the electric supply should be switched off;

(b) adequate precautions (such as padlocking and tagging) should be taken to prevent the current from being switched on again;

(c) the conductors and equipment should be tested for current;

(d) the conductors and equipment should be earthed and short-circuited; and

(e) neighbouring live parts should be adequately protected against accidental contact.

9.15.7. After work has been done on conductors and equipment, the current should be switched on again only on the orders of a competent person.

9.15.8. Electricians should be supplied with sufficient adequate tools and personal protective equipment such as rubber gloves, mats and blankets.

9.15.9. All conductors and equipment should be considered to be live unless there is certain proof of the contrary.

9.16. Temporary installations

9.16.1. Temporary lighting installations should have heavy-duty cables.

9.16.2. Temporary lights should not be suspended by the cables unless the latter are designed for the purpose.

9.16.3. As soon as practicable, the permanent electrical system of the installation should be brought into use to reduce the need for temporary power and lighting equipment.

10. Noise and vibration

10.1. General

10.1.1. The installation manager should be responsible for action to reduce by all appropriate means the exposure of workers to harmful noise and vibration.

10.1.2. The installation manager should be responsible for the organisational arrangements required to prevent the risks due to noise and vibration.

10.1.3. The installation manager should establish and publicise (preferably in writing) a general policy emphasising the importance of noise prevention, and should take the decisions and the practical steps required to give effect to national laws or regulations and to this code of practice.

10.1.4. Measures should be taken at source to prevent damage to health due to the generation, transmission, amplification and reverberation of noise and vibration during the construction processes.

10.2. Noise limit levels

10.2.1. Noise limits should be laid down in particular:

(a) to prevent a risk of hearing impairment;

(b) to minimise interference with communications essential for safety purposes; and

(c) to minimise fatigue, with due regard to the work to be done and the proximity of accommodation.

10.2.2. Noise and vibration levels should be taken into account when planning the system of work and sequence of operations and also when machinery, plant and equipment is obtained for use.

10.2.3. (1) Such measures should be taken as will reduce noise levels to those permissible in national laws or regulations.

(2) For continuous eight hours exposure to a reasonably steady noise in one day, the limit should not exceed 90 dB(A).

(3) For ease of reference the table below gives, to the nearest decibel, values equivalent to this level for continuous exposure for longer periods to a reasonably steady noise.

Period of continuous exposure to a reasonably steady noise (hours)	Limit dB(A)
8	90
12	88
16	86

10.2.4. If the noise level is fluctuating, an equivalent continuous noise level (Leq) may be calculated and its value should not exceed 90 dB(A).

10.2.5. Where it is difficult to measure and control exposure to non-continuous noise (for example, where persons move from one area to another), any exposure at a general level of 90 dB(A) or more should be regarded as exceeding the accepted limit and requiring the use of hearing protection.

10.2.6. No matter for how short a time, a person should not, without appropriate ear protection, enter an area in which the noise level is 115 dB(A) or more.

10.2.7. If there are single isolated bursts of noise which can go above 130 dB(A) "Impulse" or 120 dB(A) "Fast", personal protective equipment should be worn.

10.2.8. No person should enter an area where the noise level exceeds 140 dB(A).

10.2.9. The monitoring of the working environment should be systematic and repeated as often as needed to ensure that noise and vibration risks are kept under control.

10.2.10. When it is not possible to control noise and vibration to below permissible levels, other measures should be taken to provide protection, including:

(a) the reorganisation of the work; or

(b) the provision of appropriate hearing protection.

10.2.11. (1) The guidance in paragraphs 10.2.3 to 10.2.5 on noise levels relates to levels of noise likely to cause hearing damage and not to lower noise levels that may be required for other purposes such as sleeping and recreation.

(2) Particular attention should be given to the control of noise, or protection from noise produced by continuous operations such as piling, that may affect persons in off-duty hours.

10.2.12. (1) Persons on the installation or vessels and accommodation alongside should abide by instructions given and recommendations made to them concerning the prevention of noise and vibration.

(2) In particular, they should:

(a) make use of noise and vibration control devices and techniques;

(b) indicate whenever such devices are faulty or are in need of maintenance;

(c) be willing to undergo the prescribed medical surveillance; and

(d) use the personal protective equipment provided.

11. Lifting appliances and lifting gear

11.1 Construction and maintenance of lifting appliances

11.1.1. Every lifting appliance and all parts of it, and any part of an installation or vessel which is used to support any part of lifting appliance, should be:

(a) of good construction;

(b) of sound material;

(c) of adequate strength;

(d) free from patent defect; and

(e) suitable for any purpose for which it is used.

11.1.2. Every lifting appliance should be adequately and securely supported.

11.1.3. Where the stability of a lifting appliance is achieved by weights or ballast, they should be:

(a) adequate and suitable;

(b) placed in accordance with a ballast diagram; and

(c) placed and secured to prevent accidental displacement.

11.1.4. Where a ship, barge or pontoon fitted with lifting appliances is engaged in lifting heavy loads and is counter-ballasted to reduce heel or trim such that with the load suspended at the required outreach the vessel is upright or nearly upright, the vessel's stability should be sufficient to absorb the full counter-heeling moment which would be imposed in the event of the loss of the load and to provide an additional reasonable margin of stability. The ballasting arrangements should be under the control of a competent person who should be provided with all appropriate data.

11.1.5. (1) Where a lifting appliance with a travelling or slewing motion is in use, an unobstructed passageway not less than 60 cm (2 ft) wide should be maintained between any part of the appliance and any guard rails, fencing, nearby fixture or materials.

(2) Effective steps should be taken to prevent access to such a place where it is impracticable to maintain this clearance.

11.1.6. Every dangerous moving part of a lifting appliance should be adequately guarded.

11.1.7. Drivers of lifting appliances should, where appropriate, be provided with suitable cabs which should:

(a) provide adequate protection from the weather;

(b) be ventilated and, when required, adequately heated or cooled; and

(c) provide as clear and unrestricted a view for the driver as possible for the safe operation of the lifting appliance.

11.1.8. Safe means of access and egress should be provided to:

(a) the cab or driving position; and

(b) those parts of the lifting appliance requiring inspection and maintenance.

11.1.9. (1) Every lifting appliance should be properly maintained.

(2) All maintenance should be carried out by or under the supervision of a competent person.

(3) Records of maintenance and daily and weekly checks should be kept on board the installation.

11.1.10. (1) Where a mobile crane is to be used to lift over the side of the installation, the crane should be securely attached to the installation.

(2) The crane should be de-rated from its "land rating" and further de-rated according to wind and sea state or so designed as to be suitable for offshore use.

11.1.11. (1) All air-operated and lifting appliances (air winches and air hoists) should be adequately and securely attached to the installation.

(2) In most cases it will be insufficient simply to weld to deck plating unless this is sufficiently strong and supported locally by a framework.

(3) Following installation, all air-operated and lifting appliances should be load-tested before use.

11.1.12. (1) Air-operated winches should be fitted with suitable brakes which are applied:

(a) if the controls are in a neutral position; or

(b) if the air supply should fail.

(2) An isolating valve should be provided which will enable the air supply to be shut off at the winch quickly if required.

11.2. Erection of lifting appliances

11.2.1. A lifting appliance should not be erected under weather or sea conditions likely to endanger the operation, personnel or the stability of the lifting appliance.

11.2.2. Particular attention should be given to wind velocity and sea conditions.

11.2.3. Care should be taken where a crane is erected or dismantled using another crane located on a vessel, owing to the hazards caused by relative movement.

11.2.4. Every temporary attachment of ropes, chains or other plant or equipment used during the erection or dismantling of any lifting appliance should be adequate and secure.

11.2.5. Every lifting appliance should be erected, modified or dismantled by or under the supervision of a competent person.

11.3. Operation of lifting appliances

11.3.1. A lifting appliance should not be used under wind, weather and sea conditions likely to endanger its stability or to

endanger any person, vessel or offshore installation, including an incomplete offshore installation.

11.3.2. Instructions issued by the manufacturer, specifying wind, weather and sea conditions in which the lifting appliance should either not be used or used subject to limitations, should be followed.

11.3.3. Before a lifting appliance is used in circumstances where the wind, weather and sea conditions would be likely to affect the safety of the operation, effective steps should be taken to obtain information on wind, weather and sea conditions for the period during which the lifting operation will be carried out.

11.4. Multiple lifts

11.4.1. The simultaneous use of more than one lifting appliance during construction operations offshore to raise, suspend, support or lower a single load should be avoided.

11.4.2. Where the simultaneous use of more than one lifting appliance is unavoidable:

(a) the operation should be designed and planned and such information as may be necessary obtained from the manufacturers of the lifting appliances so as to ensure that no lifting appliance is loaded beyond its safe working load or rendered unstable;

(b) the operation should be so conducted that no lifting appliance exceeds its safe working load or is rendered unstable; and

(c) the operations should be supervised by a competent person.

11.5. Operators of lifting appliances

11.5.1. (1) A lifting appliance should be operated only by a person trained and competent to operate the appliance.

(2) However, a person who is under the direct supervision of a competent person may operate a lifting appliance for the purpose of training.

11.5.2. A person should not be regarded as trained and competent to operate a lifting appliance unless he is certified in accordance with national laws or regulations or national requirements, or:

(a) he is adequately trained and experienced in the operation of lifting appliances offshore, including the type he is required to operate;

(b) he has sufficient knowledge of the working of the lifting appliance to carry out such inspections as instructed in accordance with paragraph 11.12.1 *(c)*;

(c) he is familiar with safe working practices which apply to offshore lifting appliance operations and to the particular type of lifting appliance he is required to operate;

(d) he has read and understood the operating instructions and procedures for the particular type of lifting appliance he is required to operate;

(e) he has adequate knowledge of safe slinging practices;

(f) he is familiar with and competent to operate radio or other communications systems used to control the operations of the lifting appliance; and

(g) he is over 18 years of age and is medically fit for the work.

11.6. Control of loads and operations

11.6.1. No lift should take place unless the crane driver is aware of the weight of the load.

11.6.2. No crane movements in the vicinity of the helicopter landing area should be permitted during helicopter landing and take-off. (See Chapter 16.)

11.6.3. Efficient arrangements for signalling or communicating—including use of radios if appropriate—between the operator of the lifting appliance and persons at the loading or unloading points should be provided and maintained.

11.6.4. If the person operating a lifting appliance does not have a clear and unrestricted view of the load or, where there is no load, the point of attachment of the load and its vicinity throughout the operation, there should be appointed and suitably stationed one or more competent persons as may be necessary to give signals or otherwise communicate with the operator.

11.6.5. Every signal for the movement or stopping of a lifting appliance should be distinctive in character and such that the person to whom it is given should be able to see or hear it easily. Only standardised signals should be used.

11.6.6. Devices or apparatus for signalling or communicating as required in paragraphs 11.6.3 to 11.6.5 should be protected from accidential operation, interference or damage.

11.6.7. A person should not be regarded as competent for the purposes of paragraph 11.6.4 unless he is adequately trained and experienced in an appropriate signalling system with which the operator of the lifting appliance is also familiar or is capable of giving clear and distinctive instructions over the communications system.

11.7. Construction and maintenance of lifting gear

11.7.1. Every piece of lifting gear and all parts of it should be:

(a) of good construction to national laws or regulations or recognised international standards;

(b) of sound material;

(c) of adequate strength with an appropriate factor of safety;

(d) free from patent defect; and

(e) suitable for any purpose for which it is used.

11.7.2. The use of fibre rope slings should be discouraged.

11.7.3. All cables or ropes used on hoisting appliances for raising or lowering materials should be long enough to leave at

least two turns on the drum at every operating position of the appliance.

11.7.4. No rope should be used over a grooved drum or pulley if its diameter exceeds the pitch of the drum grooves or the width of the pulley groove.

11.7.5. Every hoisting or derricking rope or chain should be securely fastened to the drum of the crane, crab or winch with which it is used.

11.7.6. When not in use, lifting gear should be stored under cover in clean, dry, well ventilated places where they are protected against corrosion or other damage.

11.7.7. Every hook used for raising or lowering or as a means of suspension should be provided with an efficient device, where possible a safety catch, and where this is not possible, be of such shape as to reduce so far as is practicable the accidental displacement of the load.

11.7.8. If necessary to prevent danger, hooks should be provided with a hand rope (tag line) long enough to enable persons engaged in loading or unloading operations to keep clear.

11.7.9. Every sling used on a lifting appliance should be securely attached to the appliance by a method not likely to damage any part of the sling or lifting gear supporting it.

11.7.10. Double or multiple leg slings should be used only if the upper ends of the legs are connected by means of shackles, rings or links of adequate size and strength.

11.7.11. Suitable packing or other effective steps should be taken to prevent the edges of the load from coming into contact with any sling, rope or chain where this would cause danger.

11.7.12. When multiple slings are used, the load should be distributed equally among the ropes as far as practicable.

11.7.13. When bulky objects are being raised or lowered, the proper number of slings should be selected to ensure stability and also to support the weight of the load.

11.7.14. A load should not be raised, suspended, supported or lowered on:

(a) a chain or wire rope which has a knot in any part of the chain or rope under direct tension; or

(b) a chain which is shortened or joined by temporary or inadequate means.

11.8. Wire ropes

11.8.1. Wire ropes for lifting appliances should:

(a) be made of sound steel wire;

(b) have a safety factor related to the method of use but which is at least 3.5 times the maximum load; and

(c) consist of one length.

11.8.2. Ends of wire rope should be seized or otherwise secured to prevent the strands from coming loose.

11.8.3. Splices and fastenings of wire rope should be carefully examined at regular intervals, and clips or clamps tightened if they show signs of loosening.

11.8.4. In order to keep wire ropes pliable and prevent rust, the ropes should, if practicable, be treated at regular intervals with suitable lubricants free from acids or alkalis.

11.8.5. Reverse bends in wire rope should be avoided as far as practicable.

11.8.6. Wire ropes should be regularly inspected and should be replaced in the case of extensive wear, corrosion, breakage of wires or other dangerous defects.

11.8.7. Wire ropes should be fastened to hooks, tongs, etc., by secure means.

11.8.8. Eye splices and loops of wire ropes should be provided with thimbles.

11.8.9. If wire ropes other than ropes for lifting appliances and inclined transport are joined by splicing, the strength of the splice should at least be equal to that of the wire ropes.

11.8.10. Wire ropes should be cut with a suitable tool and a soft hammer, not a hard hammer or an axe.

11.8.11. The diameter of pulleys and drums should be such as not to damage wire ropes or should be in accordance with a national standard.

11.9. Hoists

11.9.1. The guidance given in sections 11.1 to 11.7 applies, as appropriate, to hoists.

11.9.2. The hoistway of every hoist should be efficiently protected by a substantial enclosure to prevent any person from being struck by any moving part of the hoist or load and to prevent any person from falling down the hoistway.

11.9.3. The enclosure and gates, where access is required to the hoists, should be not less than 2 m (6 ft 6 in) in height.

11.9.4. Gates should be kept closed except when the cage or platform is at rest at the landing place and access is required to it for loading or unloading of the hoist.

11.9.5. Every hoist should be maintained and provided with:

(a) efficient devices which will support the platform or cage together with its safe working load in the event:

(i) of failure of the hoist rope or ropes or any part of the hoisting gear; or

(ii) of failure of the driving pinion in the case of a rack-and-pinion hoist;

(b) efficient automatic devices which will ensure that the platform or cage does not overrun the highest point to which it is, for the time being, constructed to travel.

11.9.6. Particular attention should be paid to the proper installation, operation and maintenance of safety devices required in connection with hoists and hoistways in view of their exposure to corrosive, wet and freezing conditions.

11.9.7. No person should be carried by a hoist unless it is provided with a cage so constructed as to prevent a person:

(a) from falling out;

(b) from being trapped between any part of the cage and the fixed structure or any moving part of the hoist; or

(c) from being struck by articles falling down the hoistway.

11.9.8. The cage and hoistway enclosure at each landing of every hoist for carrying persons should be fitted on each side from which access is provided with gates which should have interlocking or other devices to ensure:

(a) that a gate cannot be opened except when the cage is at a landing place; and

(b) that the cage cannot be moved from the landing until every gate is closed.

11.9.9. Every hoist for carrying persons should be fitted with efficient automatic devices which will ensure that the cage comes to rest at a point above the lowest point to which the cage can travel.

11.9.10. A hoist should be capable of being operated either:

(a) from the cage, in which case it should satisfy the recommendations in paragraphs 11.9.1 to 11.9.9; or

(b) from one position only, in which case, if it is a passenger hoist, it should satisfy the recommendations of paragraphs 11.9.1 to 11.9.9; or, if it is a goods hoist only, paragraphs 11.9.1 to 11.9.6.

11.9.11. Where a hoist is operated in a manner described in paragraph 11.10.2 and the person operating the hoist does not have a clear and unrestricted view of the platform or cage throughout its travel except where such view is not necessary for its safe working, effective arrangements should be made:

(a) for signals for operating the hoist to be given to him from each landing from which the hoist is used; and

(b) to enable him to stop the platform or cage at the appropriate level.

11.10. Winches

11.10.1. The guidance given in paragraphs 11.9.1 to 11.9.9, as appropriate, applies to winches. Reference should be made to paragraph 11.1.11 on air-operated winches.

11.10.2. Where a hoist is operated by means of a winch or where a person is carried in accordance with sections 5.9 and 11.13, the winch should be so constructed that the brake is automatically applied at all times except when the controls are in the operating position.

11.10.3. No winch should be fitted with a pawl and ratchet gear on which the pawl has to be disengaged before the platform or cage can be lowered.

11.11. Safe working loads of lifting appliances and lifting gear

11.11.1. (1) Every lifting appliance and piece of lifting gear should:

(a) be clearly marked with its safe working load or loads as shown on the latest record of thorough examination; and

(b) be clearly marked with an identifying number or mark.

(2) No lifting appliance or piece of lifting gear should be used for any load exceeding its safe working load marked upon it, other than when undergoing a test by a competent person.

11.11.2. Cranes with fixed or derricking jibs should be fitted with effective automatic safe load indicators which should be:

(a) provided with appropriate visual and audible signals;

(b) properly maintained; and

(c) tested by a competent person after the erection or installation of the crane.

11.11.3. Cranes used in construction and which are part of the permanent equipment of the installation should conform to the requirements of the competent national authority for cranes on offshore installations.

11.11.4. (1) Lifting appliance automatic safe load indicators, in addition to their inclusion in thorough examination and inspection under section 11.12, should also be both inspected and tested for correct functioning at intervals not exceeding seven days.

(2) When such lifting appliances are infrequently used, automatic safe load indicators should be inspected and tested before each occasion on which they are used.

11.12. Examination and inspection of lifting appliances and lifting gear

11.12.1. Every lifting appliance and every piece of lifting gear should be:

(a) thoroughly examined by a competent person immediately before being taken into use, after installation, re-installation, alteration or repair and periodically in accordance with national laws or regulations;

(b) thoroughly examined by a competent person at intervals not exceeding six months since the previous thorough examination; and

(c) inspected at intervals not exceeding seven days.

11.12.2. For the purpose of paragraph 11.12.1 a thorough examination means a detailed visual examination by a competent

person, supplemented if necessary by other suitable means or measures in order to arrive at a reliable conclusion as to the safety of the appliance or item of loose gear examined.

11.12.3. For the purpose of paragraph 11.12.1 an inspection means a visual inspection by a responsible person carried out to decide whether, so far as can be ascertained in such manner, the lifting appliance or lifting gear is safe for continued use.

11.12.4. As regards attending vessels, due attention should be paid to the provisions of the ILO Occupational Safety and Health (Dock Work) Convention, 1979 (No. 152).

11.13. Carrying of persons by means of power-operated lifting appliances

11.13.1. No person should be raised, suspended, supported or lowered by a power-driven lifting appliance except:

(a) on the driver's platform in the case of a crane;

(b) on a hoist;

(c) on a suspended scaffold;

(d) if the use of a hoist or suspended scaffold is not reasonably practicable, in a skip, bucket, cage or other receptable that meets the recommendations of paragraphs 11.13.2 to 11.13.6; or

(e) in a basket that meets the recommendations of paragraphs 11.13.2 to 11.13.4, 11.13.6 and 11.13.7.

11.13.2. The lifting appliance should be capable of being operated from one position only.

11.13.3. Any winch used with the appliance should comply with the recommendations of section 11.10.

11.13.4. The lowering of a person should be carried out only under power and not simply against a brake mechanism.

11.13.5. The skip, bucket, cage or other receptacle should meet the recommendations of paragraphs 5.9.2 to 5.9.12 and, if appropriate, section 5.10.

11.13.6. The operation of raising, suspending, supporting or lowering should be supervised by a competent person who should at all times have a clear unrestricted view of the operation and be in effective communication with persons in the skip, bucket, cage or other receptacle.

11.13.7. (1) Personnel baskets should be:

(a) of good construction;

(b) of sound material;

(c) of adequate strength; and

(d) free from patent defect.

(2) They should:

(a) in adverse weather conditions, be used only in an emergency or other exceptional circumstances where the use of other appropriate means of transferring personnel is either impractical or unsafe;

(b) be inspected before each occasion on which they are used;

(c) be evenly loaded;

(d) be used only when lift-off and landing points are available which are even and with safe means of access and egress to those points;

(e) not to be used in weather and sea conditions likely to endanger persons using the personnel basket; and

(f) be moved by a crane the engine of which has been warmed up and the brakes and controls of which have been checked before such movement commences.

(3) When personnel baskets are used between the installation and boat, all workers should use suitable life jackets.

(4) Where practicable, the hoisting and lowering of the basket should be done over the sea and the basket should then be moved towards the ship or installation.

11.14. Secureness of loads

11.14.1. Every part of any load should be securely suspended, supported or enclosed whilst being raised, lowered or carried and should be secured to prevent danger from slipping or displacement.

11.14.2. Effective steps should be taken to prevent the load on a lifting appliance, lifting gear or crane rope from approaching or coming into contact with any person, vessel, structure, offshore installation or electrical apparatus in a manner likely to cause danger.

11.14.3. No load should be left suspended from a lifting appliance unless a competent person is actually in charge of the lifting appliance.

11.14.4. Loose materials or articles that could move or roll should not be placed on a hoist platform without effective steps being taken to prevent the movement or fall of such objects.

11.15. Containers

11.15.1. Every container for raising, suspending, supporting or lowering articles, tools, equipment and other materials should be:

(a) of good construction;

(b) of sound material;

(c) of adequate strength;

(d) free from patent defect; and

(e) suitable for the purpose for which it is required.

11.15.2. Every such container should be:

(a) provided with adequate and suitable arrangements for securing the container to the lifting appliance or to lifting gear, as appropriate;

(b) marked with its tare weight and the weight of the load that it may carry with safety; and

(c) so constructed as to prevent the accidental displacement of its load.

11.15.3. Loose materials or articles that could be displaced should be secured or covered to prevent such displacement.

11.15.4. Containers which are freight containers should comply with relevant national and international standards.

12. Living accommodation

12.1. General

12.1.1. (1) Suitable accommodation should be provided where persons are required:

(a) to live on an installation during construction operations; or

(b) to live other than on an installation during such operations.

(2) Details of a suitable standard of accommodation are given in the Appendix.

12.2. Emergency shelter accommodation

12.2.1. In the absence of suitable living accommodation provided in accordance with paragraph 12.1.1, adequate emergency shelter accommodation should be provided for all persons on the installation.

12.2.2. Emergency shelter accommodation should:

(a) safely and adequately house all persons who may be on the installation at any time, with due regard to their health and welfare; and

(b) be provided with sufficient food and water together with suitable means of temperature control and lighting.

12.3. Drinking water[1]

12.3.1. A clean and wholesome supply of drinking water should be provided and maintained for all persons, which should be conveniently accessible and clearly identified as drinking water.

12.3.2. If stored, drinking water for common use should be stored only in closed containers from which the water should be dispensed through taps or cocks.

[1] See World Health Organization: *International standards of drinking water* (Geneva, 3rd ed., 1971).

12.3.3. If drinking water from an approved public supply has to be transported to the site of the offshore construction operations, the transport arrangements should be approved by the competent health authority.

12.4. Food

12.4.1. All food provided for human consumption should be fit for this purpose, palatable and of good quality.

12.4.2. Separate refrigerated store-rooms should be provided for the storage of food products. The quantity stored should be determined by the number of persons accommodated and the supply arrangements.

12.5. Smoking

12.5.1. Smoking should be confined to the accommodation and other areas specified by the installation manager. If any smoking areas exist outside the accommodation, they should be clearly indicated.

13. Medical supervision

13.1. General

13.1.1. (1) All persons should undergo a medical examination:

(a) before or shortly after entering employment in offshore construction for the first time (pre-employment examination with special emphasis on physical fitness and personal hygiene); and

(b) periodically, at such intervals as the competent authority should prescribe, taking due account of the risks inherent in the work and the conditions under which the work is performed (periodical re-examination).

(2) All persons employed in work involving asbestos products should undergo an appropriate medical examination at least every 12 months.

(3) No persons should be employed in work involving a radiation hazard unless, within the period of three months preceeding his first employment in that work, he has undergone a medical examination. All persons employed in work involving a radiation hazard should undergo a medical examination at least every 12 months and, if possible, every six months. Additional medical examinations should be carried out as circumstances require, for example in the case of over-exposure or radioactive contamination.

(4) Persons involved in catering and the handling of food should be subject to close medical supervision, including regular medical examinations.

(5) Annual audiometric examination should be carried out on workers who have been exposed to noise levels exceeding limits mentioned in paragraph 10.2.3 (3).

13.1.2. All medical examinations should:

(a) be free of cost to the persons examined; and

(b) include, if necessary, X-ray and laboratory examinations.

13.1.3. The results and data obtained by medical examinations should be suitably recorded and kept for reference.

13.1.4. Workers who have been severely injured or ill should not return to work without permission from a doctor.

14. Health and first aid

14.1. General recommendations

14.1.1. Suitable provision should be made for the effective treatment of injured and ill persons.

14.1.2. Procedures in Chapter 18 should take account of the need for effective and prompt first-aid and medical treatment in the event of an emergency.

14.1.3. (1) Except where medical advice is to the contrary, all persons suffering from other than minor injuries and illness should be transferred onshore for treatment.

(2) Pending transfer onshore they should be placed in a sick bay or medical treatment room conforming to the guidance in paragraph 14.2.3 or to another appropriate place such as a suitably equipped vessel.

(3) Necessary equipment—such as suitable stretchers—should always be kept readily available to ensure that the transfer may safely be undertaken.

(4) Minor injuries and illnesses should be treated in the sick bay.

(5) Where diving operations are carried out, appropriate first-aid and rescue equipment should be provided.

14.2. Sick bays or medical treatment rooms

14.2.1. As soon as possible the sick bay for the installation should be brought into use; until this is done, alternative arrangements should be made for an equivalent sick bay to be provided.

14.2.2. In the case of installations in inland waters, the sick bay may be provided on an adjacent barge, vessel or pontoon.

14.2.3. The sick bay should be in the charge of a medical attendant and conform to the standards required by national law. It should contain at least the medical stores required to be provided for an operational installation.

14.2.4. Where it is not practicable to meet the standard referred to in paragraph 14.2.3, the sick bay should conform to the following minimum standards. The sick bay should:

(a) be in the charge of a medical attendant;

(b) be heated or cooled, lit and well ventilated;

(c) have surfaces which are impervious and easy to clean;

(d) have easy access to transport facilities, such as a helicopter pad;

(e) contain a first-aid box, bag or similar container; and

(f) contain the following equipment:

(i) one or more bed/couch with bedding;
(ii) occasional chair;
(iii) examination couch;
(iv) sink and toilet;
(v) writing platform;
(vi) accident book; and
(vii) telephone with ship-to-shore facility if possible, but otherwise with at least the facility for rapid communication with adjacent installations or vessels.

14.2.5. In the absence of a sick bay on the installation, there should at all times be readily available a secure, watertight box containing a manual resuscitator and a 20-minute supply of oxygen contained in a suitable apparatus for administration; and, subject to climatic conditions, two anti-hypothermia bags. Where emergency shelter accommodation only is provided on the installation, that box should be kept in that emergency shelter.

14.2.6. An adequate first-aid kit should be readily available for every first aider.

14.3. First-aid personnel

14.3.1. On every installation under construction and where not more than 200 persons are regularly at work, there should be at least one first aider for every 25 persons or part thereof regularly at work on the installation. Where more than 200 persons are regularly at work on the installation, this ratio should be applied for the first 200 persons but need not be applied for those in excess of 200 persons, provided that everyone has easy access to a first aider. Notwithstanding these requirements, at all times there should be at least one first aider readily available.

14.3.2. (1) Where there is a sick bay and where there are between 26 and 100 persons regularly at work on the installation, at least one medical attendant should be appointed.

(2) Where there are more than 100 persons regularly at work on an installation, at least two medical attendants should be appointed.

(3) Where one or more medical attendants are appointed, the number of first aiders may be correspondingly reduced.

14.4. Provision of information

14.4.1. All persons on the installation should be informed of, and notices should be posted in appropriate languages indicating the arrangements for obtaining, first-aid treatment, the means of identifying first-aid personnel and the locale of first-aid equipment and facilities.

14.5. Liaison with doctors

14.5.1. Written instructions setting out the arrangements for liaison with a qualified medical practitioner in the event of first-aid personnel or other persons on the installation requiring:

(a) general medical advice; and/or

(b) assistance with a sick or injured person should be displayed in the sick bay and radio operator's room and in prominent positions on the installation.

15. Life-saving appliances

15.1. Stand-by vessels

15.1.1. A suitable stand-by vessel, where required by national laws or regulations or climatic conditions, should be:

(a) stationed in the vicinity of the installation;

(b) ready to render assistance in the event of an emergency on or near the installation;

(c) capable of accommodating safely on board all persons who may need to be rescued from the installation;

(d) equipped if necessary to provide adequate first-aid treatment for all such persons; and

(e) equipped with a rescue or pick-up boat suitable for safely retrieving persons from the water by day and night.

15.1.2. Where the installation is in inland waters, paragraph 15.1.1 will not apply, providing that safe means are provided to transfer persons from the installation to the shore.

15.2. Rescue or pick-up boats

15.2.1. A rescue or pick-up boat should be provided either on the installation or on a vessel alongside where it is not necessary to provide a stand-by vessel. It should be constructed to a recognised national or international standard.

15.3. Access between vessels and the installation

15.3.1. Until such times as emergency shelter accommodation or the living accommodation has been installed and is suitable for use, no person should remain on the installation unless:

(a) safe means of access and egress are provided and maintained between the installation and a suitable vessel or vessels; and

(b) the said vessel or vessels are stationed immediately alongside the installation.

15.3.2. Where the means of access or egress to a vessel alongside the installation has to be removed, the number of persons left on the installation should not normally exceed the capacity of the available accommodation on the installation or the capacity of the survival craft and liferafts noted in paragraph 15.4.1.

15.4. Survival craft and liferafts

15.4.1. (1) At all times when persons are living on the installation, there should be provided and maintained on the installation motor-propelled survival craft which are capable of being safely launched fully loaded and of accommodating in aggregate at least one-and-a-half times the number of persons who are on the installation.

(2) Where sufficient liferafts are provided to accommodate the total number of persons on the installation, the number of motor-propelled survival craft should be sufficient to accommodate in aggregate the number of persons on the installation.

(3) Where climatic conditions so require, the motor-propelled survival craft mentioned in (1) and (2) should be totally enclosed.

15.4.2. For the purpose of paragraph 15.4.1 "persons" means either all persons working on the installation or, where there is accommodation alongside, such persons as remain on the installation when the means of access to or egress from the installation has been removed.

15.4.3. The painter or rope of every inflatable liferaft which is not davit-launched should have its external end secured to a strong point on the installation.

15.4.4. Survival craft and liferafts should be manufactured to a recognised international or national standard.

15.5. Lifejackets

15.5.1. Suitable lifejackets should be provided, to a total of at least one-and-a-half times the number of persons who are on the installation.

15.5.2. All such lifejackets should be properly maintained and kept readily available for use at a suitable place or places, which should be clearly marked.

15.5.3. Such lifejackets should be manufactured to a recognised international or national standard.

15.6. Lifebuoys

15.6.1. Sufficient and suitable lifebuoys manufactured, distributed and installed in accordance with international and national standards should be provided at all times.

15.7. Communications

15.7.1. Effective means of communication should be provided at all times between the installation and its stand-by vessel or vessels and helicopters.

15.7.2. Where possible, this should be by radio telephone; an alternative means of signalling should also be provided.

15.7.3. All such equipment should be used only by a suitably trained and competent operator.

15.7.4. Communications equipment should be efficient, properly installed, regularly tested and kept in good working order.

15.7.5. Radio-frequency communications equipment should have the frequency conspicuously marked on both the transmitter and the receiver.

15.7.6. Radio-frequency communications equipment should not affect or be affected by any other signalling equipment in the neighbourhood.

15.7.7. In case of electrical storms which could affect the transmission, no radio signals the misunderstanding of which might lead to an accident should be given.

16. Helicopters

16.1. Operations

16.1.1. No helicopter should land or take off from an installation until radio or visual communication has been established between the helicopter and the installation.

16.1.2. All practicable precautions should be taken to ensure the safety of persons on the installation during helicopter operations, including:

(a) the provision of any operational information concerning the installation or any vessel which may be alongside, as may be required by the person in charge of the helicopter; and

(b) the control of such activities in connection with the construction operations, including crane movements, as may endanger helicopter operations.

16.1.3. (1) As soon as practicable, suitable means should be provided for ascertaining at any time:

(a) wind speed and direction;

(b) air temperature; and

(c) barometric pressure.

(2) In addition, a scheme should at all times be in force, in respect of the installation, providing for the regular and systematic ascertainment and recording of the items listed in paragraph 16.1.3 (1) and also:

(a) visibility;

(b) cloud base; and

(c) cover.

16.1.4. Adequate and suitable equipment to the standard required by the competent national authority should be provided to ensure the safety of the helicopter operations.

16.2. Landing areas

16.2.1. Where a helicopter landing area is provided, it should be located and constructed to the standard required by the competent national authority.

16.3. Control of helicopter movements

16.3.1. Where by reason of the scale of helicopter movements it is necessary in order to avoid danger, an installation manager or, in inland waters, the main contractor should appoint a competent person as helicopter landing officer to be responsible for the control of helicopter operations in relation to the installation.

16.3.2. No person should be appointed as helicopter landing officer unless he has been adequately trained.

16.3.3. All persons engaged in the helicopter operations on the installation or who may be in or near the helicopter landing area should be subject to the immediate and effective control of the helicopter landing officer.

17. Alarms, means of escape and fire-fighting equipment

17.1. General alarm system

17.1.1. General alarm and public address systems should be provided and maintained on the installation, which are:

(a) suitable and effective; and

(b) capable of raising an alarm and giving warning throughout the installation.

17.1.2. The general alarm system should be perceptible by clearly audible signal and, where appropriate, by visual means. (See section 18.1.)

17.1.3. Where the general alarm and public address system for the installation has not yet been installed, alarms and address systems using manual sounding devices and loud hailers should be provided.

17.1.4. The installation manager should institute a system of signals and warning to be used in the event of an emergency and should take adequate steps to ensure that all persons are familiar with all signals.

17.1.5. Each signal should have only one meaning.

17.1.6. Signals and warnings should be given only by reliable, competent persons duly authorised to give signals.

17.2. Means of escape

17.2.1. For the purpose of this section "means of escape" means the method and the integrity of the route by which persons are safely to attain sea level and abandonment areas.

17.2.2. Sufficient and suitable safe means of escape to abandonment areas and to sea level should be provided and maintained on the installation, appropriate to:

(a) the survival craft launching areas;

(b) an attendant vessel; and

(c) the helicopter deck.

17.2.3. The escape route should be:

(a) properly maintained and free from obstruction;

(b) appropriately and effectively protected; and

(c) clearly indicated by suitable signs.

17.2.4. Any appliance provided as part of the means of escape and which does not form part of the installation should be stowed and clearly marked so as to be readily available for use.

17.3. Location of emergency equipment

17.3.1. The location of all equipment on the installation for use in emergencies should be clearly and conspicuously indicated.

17.3.2. The emergency equipment should be maintained in good order in accordance with the manufacturer's instructions and kept available for use at all times.

17.4. Fire appliances and precautions against fire

17.4.1. Fire protection devices, fire-extinguishing appliances, breathing apparatus and other safety equipment should be provided in accordance with national laws or regulations.

17.4.2. Places where workers are employed should be provided as far as practicable with:

(a) suitable and sufficient fire-extinguishing equipment; and

(b) an adequate water supply at ample pressure.

17.4.3. All supervisors and a sufficient number of workers should be trained in the use of fire-extinguishing equipment.

17.4.4. An adequate number of persons trained to use the fire-extinguishing equipment should be readily available during all working periods.

17.4.5. Fire-extinguishing equipment should be inspected at suitable intervals by a competent person and be properly maintained.

17.4.6. Access to fire-extinguishing equipment such as hydrants, portable extinguishers and connections for hoses should be kept clear at all times.

17.4.7. Fire-extinguishing equipment should be easily visible.

17.4.8. At least one adequate and suitable fire extinguisher should be provided:

(a) at each place where combustible materials are stored;

(b) at places where any welding and flame-cutting operations are carried out; and

(c) on each level of an installation that is being constructed or altered and where there is combustible material.

17.4.9. The necessary number of suitable dry chemical extinguishers should be provided:

(a) where flammable liquids are stored or handled;

(b) where oil- or gas-fired heating equipment is used; and

(c) where there is a danger of electrical fires.

17.4.10. Fire-extinguishing equipment should be adequately protected against mechanical damage and climatic conditions.

18. Emergency procedures and drills

18.1. Emergency procedures

18.1.1. The installation manager and, in inland waters, the main contractor should prepare written procedures specifying the action to be taken in the event of an emergency.

18.1.2. Each person on the installation should be provided with printed instructions indicating the action he should take in the event of an emergency. (See section 17.1.)

18.1.3. (1) When five or more persons are on the installation, a muster list should be provided showing the station to which each person should go in the event of an emergency and any duties to be carried out in an emergency which are assigned to particular individuals.

(2) Copies of the muster list should be displayed in appropriate languages in the accommodation and in other positions where they may easily be read, and relevant parts of the muster list should be similarly posted at each emergency station.

18.2. Rescue teams

18.2.1. Rescue teams, where set up, should be specifically trained in the following procedures:

(a) first aid;

(b) fire fighting;

(c) recovery of personnel;

(d) evacuation of the installation; and

(e) use of breathing apparatus.

18.2.2. Sufficient persons, trained and competent in the correct procedures to be followed in the event of a person receiving an electric shock, should be readily available.

18.3. Drills

18.3.1. Irrespective of their other duties, personnel should:

(a) take part in drills at regular intervals whereby persons on the installation are trained in the use of emergency equipment and in the procedures to be followed in the event of an emergency;

(b) participate actively in boat and emergency drills;

(c) learn their particular duties; and

(d) thus ensure that they will be prepared to play their allotted part in coping with any emergency which might arise.

18.3.2. In particular, drills should adequately cover the following:

(a) procedures in the event of fire, explosion or escape of gas;

(b) a person falling from the installation; and

(c) abandonment of the installation.

18.3.3. Every such drill should take place at least once every 12 days.

18.3.4. Care should be taken when swinging out or lowering lifeboats for practice purposes: when the boat is being lowered or raised, personnel should not remain between the blocks and the end of the boat; personnel in the boats should be seated.

18.3.5. Any lowering or raising of a boat should:

(a) be controlled by a competent person;

(b) be carried out at a steady speed; and

(c) keep the ends of the boat level when using rope falls.

Appendix — Living accommodation

General recommendations

1. The accommodation should provide adequate protection from the weather and be constructed of suitable fire-resisting material. Suitable and safe thermal and acoustic insulation should be incorporated as necessary. The accommodation should be located so as to minimise noise, and special attention should be given to noise reduction in sleeping quarters.

2. Adequate means of escape in the event of fire should be provided.

3. Suitable temperature control and ventilation should be provided to cover climatic conditions, as appropriate.

4. Suitable and sufficient lighting should be installed, together with independent emergency lighting.

5. Arrangements should be made for keeping the accommodation in a clean and hygienic condition.

6. Appropriate smoke-detection equipment and fire-extinguishing equipment should be provided.

Sleeping accommodation

7. (1) There should be sufficient beds or bunks for the number of persons expected on the installation without any sharing by persons on successive shifts.

(2) Any room designated as sleeping accommodation should be used by no more than two persons, except for short-stay personnel accommodation when four persons per room may be accepted, subject to the agreement of the competent authority. The minimum floor area provided for each person in a room designated as sleeping accommodation should be not less than 3 m^2 (32 sq. ft.).

(3) There should be adequate space for persons to hang up their personal clothing, and each person should be provided with one lockable drawer or locker.

(4) For every bunk there should be in each room at least one properly stowed lifejacket.

Working clothes

8. There should be separate facilities for the storage of working clothes outside the sleeping area.

Toilets and washroom

9. There should be at least one wash basin with hot and cold running water for every six persons. A water closet (not being a urinal) and a bath or shower together with a supply of running cold or hot and cold water, as appropriate, should be provided for every eight persons.

10. Toilets, including privies, should have a smooth and impervious floor.

11. A sufficient quantity of disinfectants and deodorisers should be provided for chemical closets.

12. Washing facilities should include:

(a) adequate means of removing waste water;

(b) suitable non-irritating soap in sufficient quantity; and

(c) adequate drying facilities.

13. Washing facilities should not be used for any other purpose.

14. Shower-bath equipment should be thoroughly cleaned at least once in every day of use and effectively disinfected.

Clothes-drying and laundry room

15. A seperate room should also be provided with adequate and suitable machines for the washing of clothing together with adequate drying facilities.

Cloakrooms and lockers

16. Suitable arrangements should be made for disinfecting cloakrooms and lockers in conformity with the requirements of the competent health authority.

Mess room and galley

17. There should be a mess room and galley to cater for at least half the number of persons likely to resort to the mess room in any period of two hours.

18. Suitable provision should be made to prevent the entry of insects and vermin.

Waste disposal

19. A sufficient number of receptacles should be provided at suitable places for the disposal of garbage and other waste.

20. The contents of waste receptacles should be incinerated, or otherwise harmlessly disposed of at suitable intervals.

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