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WORKPLACE SAFETY AND HEALTH ACT  
(CHAPTER 354A)

WORKPLACE SAFETY AND HEALTH (CONSTRUCTION)  
REGULATIONS 2007

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In exercise of the powers conferred by sections 28, 30 and 65 of the Workplace Safety and Health Act, the Minister for Manpower hereby makes the following Regulations:

PART I

PRELIMINARY

**Citation and commencement**

1. These Regulations may be cited as the Workplace Safety and Health (Construction) Regulations 2007 and shall come into operation on 1st January 2008.

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## Definitions

2. In these Regulations, unless the context otherwise requires —
- “blaster” means a person responsible for detonating explosives;
  - “brace” or “bracing” means a member incorporated in a formwork structure for stability;
  - “bulkhead” means an air-tight structure separating a working chamber from free air or from another chamber under a lower pressure than the working pressure in the working chamber;
  - “caisson” means a structure that is sunk through ground or water for the purpose of excavating and placing work at the prescribed depth and which subsequently becomes an integral part of the permanent work;
  - “competent person”, in relation to any work to be carried out, means a person who has sufficient experience and training to perform the work;
  - “compressed air” means air that is mechanically raised to a pressure higher than atmospheric pressure at sea level;
  - “contract sum”, in relation to any building operation or works of engineering construction, means the value specified in a contract of the works to be carried out by the contractor undertaking the building operation or works of engineering construction, which value includes the goods and services tax payable in relation to the supply of the work;
  - “contractor” means a person (whether or not he is also a main contractor or sub-contractor) who has entered into a contract for the purpose of carrying out any building operation or works of engineering construction;
  - “demolition work” means the work incidental to or connected with the total or partial dismantling or razing of a building or any other structure, and includes the removing or dismantling of any machinery or other equipment;
  - “designated person” means a competent person appointed in writing by —

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- (a) an occupier of a worksite;
  - (b) an employer of persons carrying out work in a worksite; or
  - (c) a principal who gives direction to persons on the work carried out by those persons in the worksite, to perform any task or duty prescribed under these Regulations in connection with the worksite;
- “employee’s lift” means a powered car operating in guides and used primarily to carry persons in a substantially vertical direction;
- “excavation” means a man-made cut, cavity or depression in an earth surface, formed after the removal of earth, rock or other material;
- “excavation work” means the removal of earth, rock or other materials in connection with any building operation or works of engineering construction;
- “falsework” means the structural supports and bracing for formworks or forms;
- “flashpoint” means the minimum liquid temperature at which a spark or flame causes an instantaneous flash in the vapour space above the liquid;
- “formwork” means any mould, surface, support or framing used to define the shape of concrete until the concrete is self-supporting;
- “formwork structure” includes formwork, falseworks, shores and any other support;
- “guard-rail” means a horizontal rail secured to uprights and erected along the open or exposed sides of scaffolds, floor openings, runways, gangways and other places in a worksite to prevent persons from falling;
- “lock attendant” means the person in charge of a man-lock or medical lock and who is responsible for controlling the



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compression, recompression or decompression of any person in such lock;

“low pressure air” means air supplied to pressurise working chambers, man-locks or medical locks;

“magazine” means a place in which explosives are stored or kept, whether above or below ground;

“man-lock” means any lock, other than a medical lock, used for the compression or decompression of persons entering or leaving a working chamber;

“materials lock” means a chamber through which materials and equipment pass from one air pressure environment into another;

“medical lock” means a double compartment lock used for the therapeutic recompression and decompression of persons suffering from the ill-effects of decompression;

“medical practitioner” means a person registered as a medical practitioner and who has in force a practising certificate issued under the Medical Registration Act (Cap. 174);

“pressure” means air pressure in bars above atmospheric pressure;

“professional engineer” means a person registered as a professional engineer and who has in force a practising certificate issued under the Professional Engineers Act (Cap. 253);

“project manager” means the person who is stationed at a worksite and who has overall control of all the works carried out in the worksite, and includes any competent person appointed by the occupier of the worksite in the event that the project manager is unable to perform his duties under these Regulations;

“rock bolt” means —

(a) a mechanical expansion bolt; or

(b) a bolt used with a cementitious or resin anchoring system,

which is set in a drilled hole in the arch or wall of a tunnel to improve rock competency;

“safety assessor” means a safety assessor appointed under regulation 11(1)(b);

“scaffold” means any temporary structure —

(a) on or from which persons perform work in any worksite; or

(b) which enables persons to obtain access to or which enables materials to be taken to any place at which such work is performed,

and includes any work platform, gangway, run, ladder or step-ladder (other than an independent ladder or step-ladder which does not form part of such a structure) together with any guard-rail, toe-board or other safeguards and all fixings, but does not include a lifting appliance, a lifting machine or a structure used merely to support the lifting appliance or lifting machine or to support other plant, equipment, gear, machinery, apparatus or appliance, or any part thereof;

“segment” includes a cast iron or precast concrete segmented structure formed to the curvature of the cross-section of a tunnel and used to support the ground surrounding the tunnel;

“shaft” means an excavation having a longitudinal axis at an angle greater than 45° from the horizontal —

(a) for the passage of persons or materials to or from a tunnel; or

(b) leading to an existing tunnel;

“sole plate” means a member used to distribute the load from a standard to the supporting surface;

“temporary electrical installation” means any electrical installation used for the purpose of supplying electricity for any building operation or work of engineering construction,

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and includes an extension socket-outlet or an extension cable, comprising either a connector or a socket-outlet which is joined to a cable;

“tunnel” means a subterranean passage made by excavating beneath the over-burden and into which a person enters or is required to enter in order to work;

“vehicle” means a vehicle propelled or driven by mechanical or electrical power and includes a trailer, traction engine, tractor and road-building machine;

“work platform” means a platform which is used to support workmen or materials;

“working chamber” means the part of the worksite where work in a compressed air environment is carried out, but does not include a man-lock or medical lock;

“working pressure” means pressure to which persons in a working chamber are exposed;

“worksite” means any premises where any building operation or works of engineering construction is or are being carried out, whether or not by or on behalf of the Government or a statutory body, and includes any line or siding (not forming part of a railway) which is used in connection with the building operation or works of engineering construction.

*[S 224/2013 wef 01/05/2013]*

### **Application**

3. These Regulations shall apply in relation to all worksites in Singapore.

## **PART II**

### **SAFETY AND HEALTH MANAGEMENT ARRANGEMENT**

4. *[Deleted by S 608/2009 wef 01/03/2010]*

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**Site coordination meeting**

5. It shall be the duty of the occupier of a worksite to —
- (a) convene such site coordination meetings as are necessary with due regard to the progress of the works which are, or are to be, carried out in the worksite for the purpose of coordinating such works so as to ensure the safety, health and welfare of persons at work in the worksite; and
  - (b) ensure that every meeting is —
    - (i) presided by the project manager of the worksite; and
    - (ii) attended by every person (being a supervisor, an engineer, a workplace safety and health co-ordinator or a workplace safety and health officer) who is involved in any work or process being co-ordinated in the worksite and any other person who oversees any such work or process.

**Workplace safety and health co-ordinator**

6.—(1) For the purposes of section 28(1) of the Act, a workplace safety and health co-ordinator shall be appointed in respect of every worksite where the contract sum of the building operation or works of engineering construction carried out therein is less than \$10 million.

(2) Every workplace safety and health co-ordinator shall be appointed by the occupier of every worksite referred to in paragraph (1).

(3) The occupier of the worksite shall not appoint any person as a workplace safety and health co-ordinator unless the person is one —

- (a) who has successfully completed a training course to equip him to be a workplace safety and health co-ordinator;
- (b) whom the occupier reasonably believes is competent to perform the functions and duties of a workplace safety and health co-ordinator; and
- (c) whom the occupier reasonably believes has at least 2 years' practical experience relevant to the work to be performed by a workplace safety and health co-ordinator.

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(4) Any occupier of a worksite who contravenes paragraph (2) or (3) shall be guilty of an offence and shall be liable on conviction to a fine not exceeding \$10,000 and, in the case of a continuing offence, to a further fine not exceeding \$1,000 for every day or part thereof during which the offence continues after conviction.

### **Duties of workplace safety and health co-ordinator**

7.—(1) It shall be the duty of a workplace safety and health co-ordinator appointed under regulation 6(1) in respect of a worksite to —

- (a) assist the occupier of the worksite to identify any unsafe condition in the worksite or unsafe work practice which is carried out in the worksite;
- (b) recommend to the occupier of the worksite to implement such reasonably practicable measures to remedy the unsafe condition or unsafe work practice; and
- (c) assist the occupier of the worksite to implement such reasonably practicable measures referred to in sub-paragraph (b).

(2) Any workplace safety and health co-ordinator who, without reasonable excuse, contravenes paragraph (1) shall be guilty of an offence and shall be liable on conviction to a fine not exceeding \$1,000 and, in the case of a second or subsequent offence, to a further fine not exceeding \$5,000.

### **Powers of workplace safety and health co-ordinator**

8. A workplace safety and health co-ordinator shall, for the purposes of discharging his duties under regulation 7, have the power to do all or any of the following:

- (a) to enter, inspect and examine at any reasonable time the worksite;
- (b) to inspect and examine any machinery, equipment, plant, installation or article in the worksite;
- (c) to require the production of worksite records, certificates, notices and documents kept or required to be kept under

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the Act, including any other relevant document, and to inspect and examine any of them;

- (d) to make such examination and inquiry of the worksite and of any person at work at that worksite as may be necessary to execute his duties;
- (e) to assess the level of noise, illumination, heat or harmful or hazardous substances in the worksite and the exposure levels of persons at work therein; and
- (f) to investigate any accident, dangerous occurrence or occupational disease that occurred within the worksite.

### **Safety and health training**

9.—(1) It shall be the duty of —

- (a) the employer of any person who carries out manual work in a worksite; or
- (b) the principal under whose direction a person carries out manual work in a worksite,

to ensure that the person does not carry out any manual work in the worksite unless the person has received adequate safety and health training for the purpose of familiarising the person with the hazards associated with such work and the precautions to be observed.

(2) It shall be the duty of —

- (a) the employer of any person who carries out oversight or supervisory work in a worksite; or
- (b) the principal under whose direction any person carries out oversight or supervisory work in a worksite,

to ensure that the person does not oversee or supervise any work (including any process) in the worksite unless the person has received adequate safety and health training to ensure that the work which the person oversees or supervises can be carried out safely.

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PART III  
PERMIT-TO-WORK SYSTEM

**Application of this Part**

**10.** This Part shall apply only to the following types of work that form part of any building operation or works of engineering construction (referred to in these Regulations as high-risk construction work):

- (a) demolition work;
- (b) excavation and trenching work in a tunnel or hole in the ground exceeding 1.5 metres depth;
- (c) lifting operations involving tower, mobile or crawler crane;
- (d) piling work; and  
*[S 278/2014 wef 01/05/2014]*
- (e) tunnelling work.  
*[S 278/2014 wef 01/05/2014]*
- (f) *[Deleted by S 278/2014 wef 01/05/2014]*
- (g) *[Deleted by S 224/2013 wef 01/05/2013]*

**Implementation of permit-to-work**

**11.—(1)** It shall be the duty of the occupier of a worksite at which any high-risk construction work is or is to be carried out to —

- (a) appoint a project manager for the worksite;
- (b) appoint a safety assessor (who shall be either a workplace health and safety officer for the worksite or a competent person); and
- (c) take, so far as is reasonably practicable, such measures as are necessary to ensure that a permit-to-work system in accordance with this Part is implemented for that worksite.

(2) The permit-to-work system referred to in paragraph (1) shall provide that —

- (a) any high-risk construction work at the worksite must be carried out with due regard to the safety and health of

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persons carrying out the high-risk construction work in the worksite;

- (b) such persons are informed of the hazards associated with the high-risk construction work and the precautions they have to take; and
- (c) the necessary safety precautions are taken and enforced when the high-risk construction work is being carried out in the worksite.

(3) It shall be the duty of the occupier of a worksite to ensure that no person is appointed as a safety assessor unless the person is one whom the occupier reasonably believes is competent to perform the functions and duties of a safety assessor.

### **No high-risk construction work without permit-to-work**

**12.**—(1) Subject to paragraph (2), any person who carries out any high-risk construction work in a worksite without a permit-to-work first issued by the project manager of the worksite in respect of that high-risk construction work shall be guilty of an offence and shall be liable on conviction to a fine not exceeding \$20,000.

(2) Nothing in paragraph (1) shall operate to interfere with or render unlawful any rescue work or other work necessary for the general safety of life or property.

### **Application for permit-to-work**

**13.** An application for a permit-to-work shall —

- (a) be made by the supervisor of a person who is to carry out any high-risk construction work in a worksite;
- (b) be made in such form and manner as may be required by the project manager of the worksite;
- (c) state the measures which will be taken to ensure the safety and health of persons who carry out the high-risk construction work in the worksite; and



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- (d) be addressed to the project manager and submitted to the safety assessor for the worksite where the high-risk construction work is to be carried out.

### **Evaluation of permit-to-work**

**14.—**(1) On receipt of the application for a permit-to-work, the safety assessor shall —

- (a) assess whether all reasonably practicable measures have been taken to ensure the safety and health of the persons who will be carrying out the high-risk construction work in the worksite; and
- (b) inspect the site (including its surroundings) where the high-risk construction work is to be carried out together with the supervisor of the person who is to carry out the work to ensure that the high-risk construction work can be carried out with due regard to the safety and health of the person or any other person at work in the worksite who may be affected.

(2) If the safety assessor is satisfied that the high-risk construction work can be carried out in the worksite with due regard to the safety and health of workers and other persons at work in the worksite who may be affected, he shall endorse the application for the permit-to-work and forward the endorsed application to the project manager of the worksite.

(3) It shall be the duty of the safety assessor to exercise all due diligence when performing his functions in relation to the evaluation and endorsement of an application for a permit-to-work under paragraphs (1) and (2).

### **Issue of permit-to-work**

**15.—**(1) The project manager of a worksite may issue a permit-to-work in relation to any high-risk construction work which is to be carried out in the worksite if the project manager is satisfied that —

- (a) there has been a proper evaluation of the risks and hazards involved in the carrying out of the work based on the available information;

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- (b) no incompatible work which may pose a risk to the safety and health of other persons at work in the worksite will be carried out at the same time in the same vicinity as the high-risk construction work;
  - (c) all reasonably practicable measures will or have been taken to ensure the safety and health of the persons who carry out or are to carry out the high-risk construction work; and
  - (d) all persons who are to carry out the high-risk construction work are informed of the hazards associated with it.
- (2) The project manager of a worksite who issues a permit-to-work in respect of any high-risk construction work shall retain a copy of the permit-to-work.
- (3) It shall be the duty of the project manager of a worksite to exercise all due diligence when performing his function in relation to the issuance of a permit-to-work under paragraph (1).
- (4) Subject to regulation 19, a permit-to-work shall be valid for the period stated therein, and if the high-risk construction work for which the permit-to-work is issued is not completed within the validity period, a fresh application shall be made in accordance with regulation 13.

### **Posting of permit-to-work and supervisor's duty**

**16.** It shall be the duty of the supervisor of any person who carries out any high-risk construction work in a worksite to —

- (a) clearly post a copy of the permit-to-work issued in respect of that high-risk construction work, including where reasonably practicable, a sketch of any area where the high-risk construction work is permitted, at the work area where the work is carried out; and
- (b) ensure that the copy is not removed until the date of expiry or date of revocation of the permit-to-work or on completion of the high-risk construction work, whichever is the earlier.

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**Monitoring of work**

17.—(1) It shall be the duty of the project manager of a worksite to continually review the progress of all high-risk construction work being carried out in the worksite to ensure that the high-risk construction work is carried out with due regard to the safety, health and welfare of the persons carrying out the high-risk construction work in the worksite.

(2) It shall be the duty of the supervisor of any person who carries out any high-risk construction work in a worksite —

- (a) to ensure that the measures necessary to ensure the safety and health of the person at work are taken and are in place at all times during the validity period of the permit-to-work; and
- (b) to inform the project manager of the worksite upon completion of the high-risk construction work.

**Duty to report incompatible work**

18.—(1) It shall be the duty of any person who is aware of any work being carried out in a worksite which is incompatible with any high-risk construction work being carried out in the worksite to immediately report the incompatible work to his supervisor, the workplace safety and health officer, the workplace safety and health co-ordinator or the project manager of the worksite.

(2) In this regulation, any work in a worksite which is carried out at or in the vicinity of any high-risk construction work and which is likely to pose a risk to the safety or health of persons at work in the worksite shall be treated as incompatible work.

**Revocation of permit-to-work**

19. If the project manager of a worksite who, after issuing a permit-to-work in respect of any high-risk construction work, is of the view that the carrying out of the high-risk construction work poses or is likely to pose a risk to the safety, health and welfare of persons at work in the worksite, he may order the high-risk construction work to cease immediately and revoke the permit-to-work.

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PART IV  
GENERAL PROVISIONS

**Structures and supports**

**20.**—(1) It shall be the duty of the occupier of a worksite with a supporting structure to take, so far as is reasonably practicable, such measures as are necessary to ensure that the supporting structure complies with paragraphs (2) and (3) and to obtain an endorsement in respect of the supporting structure under paragraph (4).

(2) Every supporting structure in a worksite, including its foundation, shall be —

- (a) of sound design, good construction in accordance with the design, and of adequate strength for its intended purpose; and
- (b) properly maintained and checked periodically for excessive corrosion, erosion, physical deterioration or alteration so that its stability is not affected and that it is suitable and adequate to perform the function for which it is intended.

(3) Every partially constructed or fully constructed supporting structure in a worksite, including its foundation, shall be able to safely withstand any foreseeable load likely to be imposed on it during the construction or dismantling of the structure which the supporting structure supports.

(4) Where a supporting structure in a worksite or its foundation will eventually form an integral part of the permanent structure designed by a professional engineer, it shall be the duty of the professional engineer who designed the permanent structure —

- (a) to take, so far as is reasonably practicable, such measures as are necessary to ensure that the design of the supporting structure or its foundation is safe for its intended use; and
- (b) to endorse the design of the supporting structure or its foundation as safe for its intended use.

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**Stability of structures**

**21.** It shall be the duty of the occupier of a worksite to ensure that no wall, chimney or other structure or part of a structure in the worksite shall be left unsecured or unshored in such condition that it may fall, collapse or weaken due to wind pressure, vibration or any work being carried out in the worksite or in the vicinity of the worksite.

**22.** [*Deleted by S 224/2013 wef 01/05/2013*]

**23.** [*Deleted by S 224/2013 wef 01/05/2013*]

**Storage and placement of materials and equipment**

**24.** It shall be the duty of —

- (a) the employer of any person who carries out the work of storing, stacking or placing materials or equipment in a worksite; or
- (b) the principal under whose direction any person carries out the work of storing, stacking or placing materials or equipment in a worksite,

to ensure that the material or equipment is not stored, stacked or placed so close to any opening or edge of a floor, scaffold, platform or structure as to endanger persons below the opening or edge.

**Protection against falling objects**

**25.** It shall be the duty of the occupier of a worksite to ensure that adequate overhead protection is provided in the worksite against objects that could fall on or otherwise hit persons.

**Slipping hazards**

**26.** It shall be the duty of —

- (a) the employer of any person who carries out any work in any passageway, or on any scaffold, platform or other elevated working surface in a worksite; or
- (b) the principal under whose direction any person carries out any work in any passageway, or on any scaffold, platform or other elevated working surface in a worksite,

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to ensure that the passageway, scaffold, platform or other elevated working surface to be used by the person is kept free from slipping hazards.

### **Hazards arising from protruding objects**

27. It shall be the duty of the occupier of a worksite to ensure that at the worksite —

- (a) all passageways, stairs, platforms and other means of access or places of work in the worksite are kept free from debris or protruding objects or any other obstruction that could cause tripping; and
- (b) any sharp projection which is present in any passageway, stair, platform and other means of access or place of work in the worksite and which may injure any person is removed or otherwise made safe.

### **Vehicular hazards**

28.—(1) Where in a worksite, any work is performed over, on or in close proximity to a street, public road or any other place where public vehicular traffic may cause danger to any person who carries out the work, it shall be the duty of —

- (a) the employer of any person who carries out the work in the worksite; or
- (b) the principal under whose direction any person carries out the work in the worksite,

to ensure that —

- (i) the worksite is barricaded;
- (ii) suitable warning signs and warning lights are set up to direct traffic away from the worksite; and
- (iii) where necessary, the traffic is specially controlled by designated persons.

(2) It shall be the duty of the owner of any vehicle used in a worksite to ensure that the vehicle is of good construction and roadworthy.

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(3) No person shall drive a vehicle of any class or description in a worksite unless he has obtained the authorisation of the occupier of the worksite to do so.

(4) It shall be the duty of the occupier of a worksite to ensure that no person shall drive a vehicle of any class or description in the worksite, except a person who has obtained the authorisation to do so referred to in paragraph (3).

(5) It shall be the duty of —

- (a) the employer of any person who drives any vehicle in a worksite; or
- (b) the principal under whose direction any person drives any vehicle in a worksite,

to ensure that the person does not drive the vehicle unless the person —

- (i) has been fully instructed as to the dangers likely to arise in connection therewith and the precautions to be observed; and
- (ii) has received sufficient training to operate or drive the vehicle.

(6) Nothing in this regulation shall derogate from the effect of the Road Traffic Act (Cap. 276).

(7) Any person who contravenes paragraph (3) shall be guilty of an offence and shall be liable on conviction to a fine not exceeding \$1,000 and, in the case of a second or subsequent conviction, to a fine not exceeding \$2,000.

### **Runways and ramps**

**29.—**(1) It shall be the duty of the occupier of a worksite to ensure that —

- (a) every runway and ramp in the worksite is adequately constructed and securely braced and supported in relation to the span;

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- (b) every runway and ramp for motor vehicles in the worksite is constructed in accordance with the design and drawings of a professional engineer; and
- (c) no person in the worksite shall use any such runway or ramp for motor vehicles in the worksite unless a certificate under paragraph (3)(ii) has been issued in respect of that runway or ramp.
- (2) It shall be the duty of the professional engineer who designs a runway or ramp for motor vehicles in a worksite to —
- (a) take, so far as is reasonably practicable, such measures as are necessary to ensure that his design can be executed safely by any person who constructs or uses the runway or ramp according to his design; and
- (b) provide to any person who is constructing or is to construct the runway or ramp all design documentation (including all relevant calculations, drawings and construction procedures) as is necessary to facilitate the proper construction of the runway or ramp according to his design.
- (3) It shall be the duty of —
- (a) the professional engineer who designs a runway or ramp for motor vehicles in a worksite; or
- (b) any other professional engineer who is appointed by the occupier of a worksite to oversee the construction of a runway or ramp for motor vehicles in the worksite,
- to take, so far as is reasonably practicable, such measures as are necessary to ensure that the runway or ramp —
- (i) is constructed in accordance with the design of the professional engineer who designed it; and
- (ii) is safe for its intended use when completely constructed and if so, issue a certificate stating that the runway or ramp is safe for its intended use.



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**Entry into building under construction**

- 30.** It shall be the duty of the occupier of a worksite —
- (a) where a building under construction in the worksite is more than 2 storeys high, to provide designated entry and access at the ground floor with adequate overhead protective cover for persons entering or leaving the building; and
  - (b) to take all reasonably practicable measures to prevent any person from entering or leaving the worksite by or through other means of entry and access.
- 31.** [*Deleted by S 224/2013 wef 01/05/2013*]

**Lighting**

- 32.** It shall be the duty of the occupier of a worksite to —
- (a) provide and maintain in the worksite —
    - (i) sufficient and suitable lighting, whether natural or artificial, in every part of the worksite in which persons are at work or passing; and
    - (ii) emergency lighting for use in the event of a power failure affecting the general lighting; and
  - (b) ensure that the level of illumination provided by the emergency lighting shall be sufficient in intensity and distribution to allow for the safe evacuation or rescue of persons in the worksite.

**Personal protective equipment**

- 33.—(1)** It shall be the duty of —
- (a) the employer of any person who carries out any work in a worksite which requires any protection referred to in paragraph (2); or
  - (b) the principal under whose direction any person carries out any work referred to in sub-paragraph (a) in a worksite,
- to provide and maintain, as far as is reasonably practicable, the appropriate personal protective equipment to the person.

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(2) The protection referred to in paragraph (1) is as follows:

- (a) eye protection;
- (b) fall protection;
- (c) foot protection;
- (d) hand protection;
- (e) head protection;
- (f) hearing protection; and
- (g) respiratory protection.

## PART V

### ELECTRICAL SAFETY

#### **Electrical power circuits**

**34.—**(1) It shall be the duty of —

- (a) the employer of any person who carries out any work in the course of which the person may come into contact with any part of an electrical power circuit in a worksite; or
- (b) the principal under whose direction any person carries out any work in the course of which the person may come into contact with any part of an electrical power circuit in a worksite,

to comply with paragraphs (2), (3) and (4).

(2) Before any work is carried out at a worksite, the worksite shall be inspected to ascertain whether there is —

- (a) any electrical power circuit which any person may come into contact with in the course of his work in the worksite; and
- (b) any tool or machine which is connected to any electrical power circuit and which any person may come into contact with in the course of his work in the worksite.

(3) Where there is any such electrical power circuit, tool or machine referred to in paragraph (2), appropriate warning signs understood by

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the persons carrying out the work in the worksite shall be clearly posted and maintained at the place where the circuit, tool or machine is located.

(4) No person shall be permitted to work in a worksite where he may come into contact with any part of an electrical power circuit unless —

- (a) he has been advised of the location of the electrical power circuit, the hazards involved and the protective measures to be taken; and
- (b) he is protected against electric shock —
  - (i) by de-energizing the circuit and earthing it; or
  - (ii) by guarding it with effective insulation or other means.

### **Installation of electric wiring and power lines**

**35.—**(1) It shall be the duty of —

- (a) the employer of the person who carries out any work in the course of which the person may come into contact with any electric wiring or cable in a worksite; or
- (b) the principal under whose direction any person carries out any work in the course of which the person may come into contact with any electric wiring or cable in a worksite,

to comply with paragraphs (2) and (3).

(2) All electric wiring in a worksite shall —

- (a) be supported on proper insulators; and
- (b) not be looped over nails or brackets.

(3) Subject to paragraph (4), no electric wiring or cable shall be left or laid on the ground or the floor of a worksite unless it is —

- (a) of the weather-proof type;
- (b) provided with adequate protection to withstand the wear and tear to which it may be subjected; and
- (c) maintained in good and safe working order.

(4) Paragraph (3) shall not apply to a flexible cable which —

- (a) does not exceed 3 metres in length; and
- (b) is used to connect an electrical equipment to a plug.

(5) It shall be the duty of the occupier of a worksite to ensure that all elevated power lines shall —

- (a) have a sufficient vertical clearance where they cross highways, access roads or areas travelled by trucks, cranes, shovels or other similar equipment; and
- (b) be at least 5 metres above the ground level.

### **Bare wires and exposed live conductors**

**36.—**(1) It shall be the duty of the occupier of a worksite where any electrical installation is used in the worksite to ensure —

- (a) that the electrical installation is effectively earthed where these have provisions made for earthing;
- (b) that any exposed metal part of the electrical installation, other than the current carrying part, which is liable to become energised in the event of a failure in the insulation is effectively earthed; and
- (c) where the electrical installation is connected to any bare wire or other uninsulated live conductor, that no bare wires or other uninsulated live conductors are located at any place in a worksite where a person may work or pass, unless —
  - (i) such wires or conductors are effectively insulated or guarded by a fence or other barrier; or
  - (ii) the person working or passing is an electrical worker licensed under the Electricity Act (Cap. 89A) to carry out such electrical works on the wires or conductors.

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(2) It shall be the duty of —

- (a) the employer of the person who uses any electrical appliance or other current carrying equipment in a worksite; or
- (b) the principal under whose direction any person uses any electrical appliance or other current carrying equipment in a worksite,

to ensure —

- (i) that the electrical appliance or current carrying equipment is effectively earthed where these have provisions made for earthing; and
- (ii) that any exposed metal part of the electrical appliance or current carrying equipment, other than the current carrying part, which is liable to become energised in the event of a failure in the insulation is effectively earthed.

### **Residual current circuit breakers and overcurrent protective devices**

**37.** It shall be the duty of the occupier of a worksite where any electrical installation is used in the worksite to ensure that —

- (a) effective residual current circuit breakers are installed for all temporary electrical installations to provide earth leakage protection; and
- (b) overcurrent protective devices with the appropriate ratings are installed in the distribution board to provide overcurrent or short-circuit protection.

### **Prohibition on use of fuse**

**38.** It shall be the duty of the occupier of a worksite where any electrical installation is used in the worksite to ensure that no fuse is used in the final circuit of any electrical installation.

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**Welding sets**

**39.** It shall be the duty of —

- (a) the employer of the person who uses any welding set in a worksite; or
- (b) the principal under whose direction any person uses any welding set in a worksite,

to ensure that all alternating current welding sets are fitted with an effective voltage limiting device or shock preventor.

**Industrial plug and socket-outlet**

**40.** It shall be the duty of the occupier of a worksite where any industrial plug and socket-outlet is used in the worksite to ensure that the plug and socket-outlet used for connecting any electrical equipment to a temporary electrical installation is of heavy duty industrial type.

**Distribution board and socket-outlet assembly**

**41.** It shall be the duty of the occupier of a worksite to ensure that —

- (a) circuit breakers used for the final circuits of any distribution board and socket-outlet assembly in the worksite are housed in an enclosure; and
- (b) the enclosure is constructed so as —
  - (i) to fully enclose all live electrical parts within the enclosure;
  - (ii) to allow any of the circuit breakers to be switched on or off without having to open the enclosure; and
  - (iii) to be of weather-proof construction.

**Electrical installations and equipment used underground or in confined space**

**42.** It shall be the duty of the occupier of a worksite where any lighting, electric hand-held tools and inspection lamps and lights are used underground or in a confined space to ensure that —

- (a) the electricity supply for lighting and electric hand-held tools is provided by means of a step-down transformer having a secondary voltage not exceeding 110 volts centre point earthed; and
- (b) the electric hand-held tools and inspection lamps and lights are operated at a voltage not exceeding 55 volts between the conductor and earth.

## PART VI

*[Deleted by S 224/2013 wef 01/05/2013]*

## PART VII

### CANTILEVERED AND MATERIAL PLATFORMS

#### **Cantilevered and material platform**

**46.**—(1) The requirements on cantilevered platforms or material platforms mentioned in this Part shall apply to —

- (a) any cantilevered platform erected for the purposes of loading and unloading of any material or equipment; and
  - (b) any material platform which —
    - (i) is used for the purposes of loading and unloading of any material or equipment; and
    - (ii) is subjected to a load weighing 1,000 kilogrammes or more.
- (2) It shall be the duty of the occupier of a worksite to ensure that —
- (a) any cantilevered platform or material platform used in the worksite is —
    - (i) designed such that it is capable of bearing a load of at least twice its safe working load; and
    - (ii) constructed, installed or repositioned in accordance with the design and drawings of a professional engineer who designed the platform;

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- (b) no person shall use any such cantilevered platform or material platform in the worksite unless a certificate under paragraph (4)(ii) has been issued in respect of it; and
- (c) sign boards showing the safe working load of a cantilevered platform or material platform used in the worksite is prominently displayed at suitable locations at the platform.
- (3) It shall be the duty of the professional engineer who designs a cantilevered platform or material platform for use in a worksite to —
- (a) take, so far as is reasonably practicable, such measures as are necessary to ensure that his design can be executed safely by any person who constructs or uses the platform according to his design; and
- (b) provide to any person who is constructing or is to construct the platform all design documentation (including all relevant calculations, drawings and construction procedures) as is necessary to facilitate the proper construction of the platform according to his design.
- (4) It shall be the duty of —
- (a) the professional engineer who designed the cantilevered platform or material platform for use in a worksite; or
- (b) any other professional engineer who is appointed by the occupier of a worksite to oversee the construction of a cantilevered platform or material platform,
- to take, so far as is reasonably practicable, such measures as are necessary to ensure that the platform —
- (i) is constructed in accordance with the design of the professional engineer who designed it; and
- (ii) is safe for its intended use when completely constructed and if so, to issue a certificate stating that the platform is safe for its intended use.
- (5) The cantilevered platform or material platform used in a worksite shall not be loaded beyond its safe working load except by an inspector or a professional engineer when testing the platform.



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(6) Materials or equipment shall not remain on a cantilevered platform or material platform used in a worksite for a period longer than is necessary for loading or unloading.

(7) It shall be the duty of —

- (a) the employer of any person who carries out any work on a cantilevered platform or material platform in a worksite; or
- (b) the principal under whose direction any person carries out any work on a cantilevered platform or material platform in a worksite,

to comply with paragraphs (5) and (6).

### **Guard-rails and toe-boards**

**47.—**(1) It shall be the duty of the occupier of a worksite where any cantilevered platform or material platform is used therein to comply with paragraphs (2) and (3).

(2) Every open side of a cantilevered platform or material platform used in a worksite from which any person could fall more than 2 metres shall be provided with guard-rails and toe-boards.

(3) Where any gate is provided in place of guard-rails at the outer edge of a cantilevered platform or material platform used in a worksite, it shall be constructed to open inwards to the platform.

### **Use of wire rope**

**48.** It shall be the duty of the occupier of a worksite where any cantilevered platform is used therein to ensure that —

- (a) no wire rope shall be used as a load bearing element in a cantilevered platform used in the worksite unless it is terminated with eyes that have been fitted with thimbles; and
- (b) wire rope clips shall not be used for terminating such rope.

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**Inspection by designated person**

**49.**—(1) It shall be the duty of the occupier of a worksite to —

- (a) ensure that every cantilevered platform or material platform in the worksite is inspected by a designated person at least once every 7 days;
- (b) rectify immediately any unsafe condition discovered during the inspection;
- (c) ensure that the result of the inspection is entered by the designated person into a register; and
- (d) keep the register at the worksite and produce it for inspection upon request by an inspector.

(2) It shall be the duty of the designated person making any inspection under paragraph (1) to take, so far as is reasonably practicable, such measures as are necessary to ensure that the inspection was properly conducted.

**PART VIII****DISPOSAL OF MATERIALS****Accumulation of debris**

**50.** It shall be the duty of the occupier of a worksite to ensure that debris shall not be allowed to accumulate so as to constitute a hazard in the worksite.

**Method of removal of debris, etc.**

**51.** It shall be the duty of —

- (a) the employer of any person who carries out work in a worksite; or
- (b) the principal under whose direction any person carries out work in a worksite,

to ensure that any debris, brick or other materials in the worksite shall be removed by means of chutes, buckets, hoists or any other method which will not endanger any person in the worksite.

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**Floor openings for debris removal**

**52.**—(1) It shall be the duty of the occupier of a worksite to ensure that every opening used for the removal of debris on every floor in the worksite which is not closed to access, except the top or working floor, is provided with an enclosure from floor to ceiling.

(2) Where it is impracticable to provide an enclosure under paragraph (1), it shall be the duty of the occupier of the worksite to ensure that the opening is so barricaded that no person has access to within a horizontal distance of 6 metres from any opening above through which debris is being dropped.

**Chutes**

**53.** It shall be the duty of the occupier of a worksite to ensure that —

- (a) any chute provided for the removal of materials in a worksite is entirely enclosed on all sides, except at openings used for the receiving or discharging of material; and
- (b) any opening of any chute (except the top opening) in the worksite is closed when not in use.

**Construction of chutes**

**54.** It shall be the duty of the occupier of a worksite to ensure that every chute in the worksite is of good construction, sound material, adequate strength and rigidly supported throughout its length.

**Debris collection area**

**55.**—(1) It shall be the duty of the occupier of the worksite to comply with paragraphs (2) to (7).

(2) In a worksite, the discharge end of every chute shall be directed to a designated debris collection area.

(3) The debris collection area shall be within an enclosure fitted with a gate to effectively protect persons from the hazard of falling debris.

(4) The enclosure for the debris collection area shall be constructed of materials of adequate strength up to a height of at least 2 metres.

(5) The gate provided under paragraph (3) shall be kept closed unless removal of debris is taking place at the area.

(6) The distance between the discharge end of the chute and the floor of the designated debris collection area shall not be more than 3 metres.

(7) A warning notice indicating the hazard of falling debris shall be placed in a conspicuous position at the debris collection area.

(8) Paragraphs (2) to (5) shall not apply where a skip or container with sides extending to height of at least 2 metres is placed directly below the chute as a debris collection area to collect the debris being discharged.

### **Design of chute by professional engineer**

**56.—**(1) It shall be the duty of the occupier of a worksite to ensure that —

- (a) any chute exceeding 12 metres in height for use in the worksite is constructed, installed or repositioned in accordance with the design and drawings of the professional engineer who designed the chute; and
- (b) no person shall use any such chute unless a certificate under paragraph (3)(ii) has been issued in respect of it.

(2) It shall be the duty of the professional engineer who designs a chute exceeding 12 metres in height for use in a worksite to —

- (a) take, so far as is reasonably practicable, such measures as are necessary to ensure that his design can be executed safely by any person who constructs, installs, repositions or uses the chute according to his design; and
- (b) provide to any person who is constructing, installing or repositioning or who is to construct, install or reposition the chute all design documentation (including all relevant calculations, drawings and construction procedures) as is necessary to facilitate the proper construction, installation or repositioning of the chute according to his design.

(3) It shall be the duty of —

- (a) the professional engineer who designed the chute exceeding 12 metres in height for use in a worksite; or
- (b) any other professional engineer who is appointed by the occupier of a worksite to oversee the construction, installation or repositioning of a chute exceeding 12 metres in height for use in the worksite,

to take, so far as is reasonably practicable, such measures as are necessary to ensure that the chute —

- (i) is constructed in accordance with the design of the professional engineer who designed it; and
- (ii) is safe for its intended use when completely constructed and if so, issue a certificate stating that the chute is safe for its intended use.

## PART IX

### FORMWORK STRUCTURES

#### **General duty on occupier**

**57.** It shall be the duty of the occupier of a worksite with formwork structures to comply with regulations 58 and 59.

#### **General requirement**

**58.—(1)** In a worksite, every formwork structure shall —

- (a) be of sound material, good construction and adequate strength;
- (b) be free from patent defect;
- (c) be suitable and safe for the purpose for which it is intended; and
- (d) be properly braced or tied together so as to maintain position and shape.

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(2) In a worksite, every formwork structure shall be capable of sustaining the total dead, live and impact loads imposed on the structure with a minimum safety factor of 2.

(3) Where a formwork structure in a worksite is of 2 or more tiers, frames or shores —

- (a) the tiers, frames or shores shall be securely and effectively connected vertically;
- (b) safe means of access to and around the formwork structure shall be provided for the purpose of inspection; and
- (c) every designated access point shall —
  - (i) be clearly marked with a sign or label; and
  - (ii) be made safe for use by any person using the access point.

(4) All reasonably practicable measures shall be taken to ensure that any new or existing formwork structure or any part of such a structure which may become unstable or is in temporary state of weakness or instability due to the carrying out of construction or erection work, does not collapse.

(5) No load is to be applied to unsecured structures in a worksite except as permitted by the design documentation, and no part of the formwork structure shall be loaded as to render it unsafe to any person.

### **Supports and shores**

**59.**—(1) In a worksite, horizontal and diagonal bracing shall be provided in both longitudinal and transverse directions, as may be necessary to provide stability and rigidity to any formwork structure unless the formwork structure has been designed to be stable and rigid without the bracing.

(2) Shores in a worksite shall be properly seated top and bottom and shall be secured in place to prevent displacement.

(3) Where the shores rest upon the ground, sole plates shall be provided.

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(4) All shores for the formwork structure in a worksite shall be of adequate size and spacing.

### **Appointment of formwork supervisor**

**60.**—(1) It shall be the duty of —

- (a) the employer of any person who carries out any work involving the construction, erection, alteration or dismantling of a formwork structure in a worksite; or
- (b) the principal under whose direction any person carries out any work involving the construction, erection, alteration or dismantling of a formwork structure in a worksite,

to comply with paragraphs (2), (3) and (4).

(2) A formwork supervisor shall be appointed to supervise the construction, erection, alteration or dismantling of any formwork structure in a worksite.

(3) No person shall be appointed as a formwork supervisor in a worksite unless he has received adequate safety and health training to familiarise him with the hazards associated with the construction, erection, alteration or dismantling of the formwork structure and the precautions to be observed.

(4) No formwork structure shall be constructed, erected, altered or dismantled in a worksite except under the immediate supervision of a formwork supervisor.

### **Duties of formwork supervisor**

**61.** It shall be the duty of a formwork supervisor —

- (a) to take, so far as is reasonably practicable, such measures as are necessary to ensure that during the erection of a formwork structure in a worksite, all the components of the formwork structure are properly erected, seated, connected, braced and tied so as to maintain its position and shape;
- (b) to make an inspection of the formwork structure upon the completion of the formwork structure to ensure that the

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formwork structure is in accordance with the design and drawings for that formwork structure; and

- (c) to immediately notify the occupier of the worksite upon discovering any unsafe condition during any inspection made under paragraph (b).

### **Register**

**62.** It shall be the duty of the formwork supervisor to —

- (a) enter the results of every inspection referred to in regulation 61(b) into a register;
- (b) keep the register of such inspections of the formwork structure at the worksite; and
- (c) produce the register for inspection upon request by an inspector.

### **Design and construction of formwork structure**

**63.—**(1) It shall be the duty of the occupier of a worksite where there is situated a formwork structure that —

- (a) exceeds 9 metres in height;
- (b) consists of any formwork which is supported by shores constructed in 2 or more tiers; or
- (c) consists of any formwork where the thickness of the slab or beam to be cast in the formwork exceeds 300 millimetres,

to comply with paragraphs (2) to (5).

(2) Any formwork structure referred to in paragraph (1) that is in a worksite shall be designed by a professional engineer and no other.

(3) No alteration shall be made or allowed to be made to a formwork structure referred to in paragraph (1) unless its design and drawings have been reviewed and endorsed by a professional engineer.

(4) The design and drawings of a formwork structure referred to in paragraph (1) shall be kept at the worksite and shall be produced for inspection upon request by an inspector.



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(5) No formwork structure referred to in paragraph (1) shall be used in a worksite unless the certificate referred to in regulation 64(2)(ii) has been issued in respect of it.

### **Duties of professional engineer on formwork structure**

**64.—**(1) It shall be the duty of a professional engineer who designs a formwork structure referred to in regulation 63(1) for use in a worksite to —

- (a) take, so far as is reasonably practicable, such measures to ensure that his design can be executed safely by any person who constructs or uses the formwork structure according to his design; and
- (b) provide to any person who is constructing or who is to construct the formwork structure all design documentation (including all relevant calculations, drawings and construction procedures) as is necessary to facilitate the proper construction of the formwork structure according to his design.

(2) It shall be the duty of —

- (a) the professional engineer who designs a formwork structure referred to in regulation 63(1) for use in a worksite; or
- (b) any other professional engineer who is appointed by the occupier of a worksite to oversee the construction of a formwork structure referred to in regulation 63(1) for use in the worksite,

to take, so far as is reasonably practicable, such measures as are necessary to ensure that the formwork structure —

- (i) is constructed in accordance with the design of the professional engineer who designed it; and
- (ii) is safe for its intended use when completely constructed and if so, issue a certificate stating that the formwork structure is safe for its intended use.

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**Concrete work**

**65.**—(1) It shall be the duty of the occupier of a worksite where any formwork structure is situated to comply with paragraphs (2) to (5).

(2) Placement of concrete shall not be carried out in such manner as to affect the stability of the formwork structure in a worksite.

(3) Where a formwork structure in a worksite is designed by a professional engineer, placement of concrete shall not commence unless the formwork structure, including any alteration thereto, has been inspected and certified by the professional engineer.

(4) No person shall be in the vicinity of a formwork structure in a worksite during the placement of concrete unless his presence is incidental to the concrete work in progress.

(5) The formwork supervisor shall regularly inspect a formwork structure in a worksite during the placement of concrete to monitor the stability and soundness of the formwork structure.

(6) It shall be the duty of a formwork supervisor to take, so far as is reasonably practicable, such measures as are necessary to ensure that any inspection carried out under paragraph (5) is conducted properly.

**Dismantling**

**66.**—(1) It shall be the duty of the occupier of a worksite where any formwork structure situated therein is to be dismantled to comply with paragraphs (2), (3) and (4).

(2) Dismantling of a formwork structure in a worksite shall not commence until the concrete is set.

(3) Materials dismantled from the formwork structure shall be removed promptly or stock-piled in areas where persons are not required to work or pass.

(4) Protruding nails, wire ties and other form of accessories not necessary to subsequent work shall be pulled, cut or otherwise made safe.

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**Steel reinforcement**

**67.** It shall be the duty of the occupier of a worksite to ensure that steel reinforcement for any column, wall, floor or any other structure in the worksite is adequately supported to prevent collapse.

**Reshoring**

**68.—(1)** It shall be the duty of the occupier of a worksite where reshoring is carried out to comply with paragraphs (2) to (5).

(2) Reshoring shall be provided when necessary to safely support slabs and beams after a formwork structure in a worksite is dismantled, or where such slabs or beams are subjected to any superimposed load due to any construction work above.

(3) The reshoring shall be properly seated top and bottom and shall be secured in place to prevent displacement.

(4) Where the reshores rest upon the ground, sole plates shall be provided.

(5) The reshoring shall be inspected by the formwork supervisor and the results of the inspection shall be entered by the formwork supervisor into a register.

(6) It shall be the duty of a formwork supervisor to take, so far as is reasonably practicable, such measures as are necessary to ensure that any inspection carried out under paragraph (5) is conducted properly.

PART X  
DEMOLITION

**General duty on occupier**

**69.** It shall be the duty of the occupier of a worksite where demolition works are carried out to comply with regulations 70 to 76.

**Preparation of demolition work**

**70.—(1)** Before commencing any demolition work in a worksite —

- (a) all glass and claddings on the exterior of the building to be demolished shall be removed; and

(b) all gas, electric, water, steam and other supply lines shall be shut off and capped.

(2) Where it is necessary to maintain any power, water, gas or electric lines during demolition in a worksite, such lines shall be so re-located or protected with substantial coverings so as to protect them from damage and to afford safety to every person.

### **Protection of adjacent structures**

**71.**—(1) Before and during the demolition of any structure in a worksite, the stability of the walls, ceilings, slabs, beams and all other structures adjacent to the structure which are to be demolished shall be determined.

(2) Where there is a possibility that an adjacent structure is unsafe or will become unsafe because of demolition operations in a worksite, no demolition shall be performed unless sheet piling, shoring, bracing or such other means as may be necessary to ensure the stability of the adjacent structure and to prevent the structure or other property from collapsing is provided.

### **Removal of load bearing structures**

**72.** Where any demolition work in a worksite involves the removal of any column, beam, floor or other load bearing structure, it shall be the duty of the occupier of the worksite to ensure that the work is carried out —

(a) with due regard to the integrity of the remaining structure; and

(b) in accordance with the method statement prepared by a professional engineer.

### **Demolition of walls, partitions, etc.**

**73.**—(1) Demolition of walls and partitions in a worksite shall proceed in a systematic manner and all work above each tier of floor beams shall be completed before the safety of its supports is impaired.

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(2) Masonry shall neither be loosened nor permitted to fall in a worksite in such masses as to endanger the structural stability of any floor or structural support.

(3) No wall, chimney or other structure or part of a structure which is being demolished in a worksite shall be left in such a condition that it may —

- (a) fall or collapse inadvertently; or
- (b) be weakened due to wind pressure, vibration or other causes.

(4) Where any demolition work in a worksite is carried out with the use of hand-tools —

- (a) safe footing in the form of sound flooring or scaffolds shall be provided for persons working on an exterior wall; and
- (b) walls or partitions shall not be left standing more than one storey above the uppermost floor on which persons are working.

### **Access to floor**

**74.** There shall be provided at all times safe access to and egress from every building in the worksite in the course of demolition by means of entrances, hallways, stairways or ladder runs which shall be so protected as to safeguard the persons using them from falling material.

### **Barricades, catch platforms and warning signs**

**75.—(1)** Where demolition operations are being carried out in a worksite, a substantial barricade with signs to warn persons from unauthorised entry into the worksite shall be erected along every sidewalk or thoroughfare bordering the demolition operations.

(2) During the demolition of an exterior masonry wall or a roof in a worksite, catch platforms shall be provided and maintained except where an exterior built-up scaffold provides equivalent protection.

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**Mechanical method of demolition**

**76.**—(1) Where a swinging weight is used in demolition operations in a worksite —

- (a) the building or structure or remaining portion thereof shall be not more than 24 metres in height; and
- (b) a zone of demolition having a radius of at least one and a half times the height of the structure or portion thereof being so demolished shall be maintained around the points of impact.

(2) Where a clamshell bucket is being used for the demolition work in a worksite, a zone of demolition shall be maintained within 8 metres of the line of travel of the bucket.

(3) Where other mechanical contrivances are being used for the demolition work in a worksite, there shall be maintained in the area into which affected persons may fall an adequate zone of demolition to ensure the safety of the person.

(4) No person other than any person essential to the demolition work in a worksite shall be permitted to enter a zone of demolition which shall be provided with substantial barricades.

## PART XI

### EXCAVATION AND TUNNELLING WORKS

#### **General requirements on excavation work**

**77.**—(1) It shall be the duty of the occupier of a worksite where excavation works are carried out to comply with paragraphs (2) to (11).

(2) Subject to paragraph (3), where the depth of any excavation in a worksite exceeds 1.5 metres or where the banks are undercut, adequate shoring by underpinning, sheet piling, bracing or other means of shoring shall be provided to prevent collapse of the excavation, or any structures adjoining or over areas to be excavated.

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(3) No shoring shall be required under paragraph (2) if the excavation in the worksite has been examined and certified by a professional engineer to be safe without any shoring.

(4) Where the depth of any excavation in a worksite exceeds 4 metres, adequate shoring by underpinning, sheet piling, bracing or other means of shoring shall be made or erected in accordance with the design of a professional engineer to prevent collapse of the excavation, or any structures adjoining or over areas to be excavated.

(5) Where the depth of any excavation in a worksite exceeds 4 metres, no work (other than excavation or shoring operations) shall be carried out inside the excavation until after a certificate under regulation 78(2)(ii) has been issued in respect of the underpinning, sheet piling, bracing or other means of shoring for that excavation.

(6) During any excavation work in a worksite, all reasonably practicable measures shall be taken —

- (a) to prevent any person being trapped by the collapse of the excavation;
- (b) to prevent any person being struck by an object, such as an excavating machine or by any material dislodged by the machine;
- (c) to prevent any person falling into the excavation; and
- (d) to prevent any person inhaling, or otherwise being exposed to, carbon monoxide or another impurity of the air in the excavation.

(7) Excavated material or other superimposed loads shall be so placed away from the edge of the excavation in a worksite to prevent the materials or other loads from falling into the excavation, or cause the banks to slip or cause the upheaval of the excavation bed.

(8) The open side of any excavation in a worksite which exceeds 2 metres in depth shall be provided with adequate guard-rails to prevent persons from falling into the excavation.

(9) Notices shall be put up at appropriate and conspicuous positions to warn persons about the excavation in a worksite.

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(10) The excavation in a worksite and its vicinity shall be inspected by a designated person after every rain storm or other hazard-increasing occurrence.

(11) Where any inspection made under paragraph (10) reveals that the excavation in the worksite is not safe for entry, the designated person shall immediately inform the project manager of the worksite of the unsafe condition.

(12) Upon being informed, the project manager of the worksite may order that all works within the excavation cease immediately and revoke any permit-to-work issued for such work.

(13) It shall be the duty of the designated person to take, so far as is reasonably practicable, such measures as are necessary to ensure that any inspection carried out under paragraph (10) is conducted properly.

(14) Any designated person who contravenes paragraph (13) shall be guilty of an offence and shall be liable on conviction to a fine not exceeding \$2,000 and, in the case of a second or subsequent conviction, to a fine not exceeding \$5,000.

### **Duties of professional engineers on excavation**

**78.**—(1) It shall be the duty of a professional engineer who designs the underpinning, sheet piling, bracing or other means of shoring as required under regulation 77(4) for an excavation to —

- (a) take, so far as is reasonably practicable, such measures as are necessary to ensure that his design can be executed safely by any person constructing the underpinning, sheet piling, bracing or other means of shoring according to his design;
- (b) provide to any person who is constructing or who is to construct the underpinning, sheet piling, bracing or other means of shoring all design documentation (including all relevant calculations, drawings and construction procedures) as is necessary to ensure that the underpinning, sheet piling, bracing or other means of shoring is constructed according to his design; and



- (c) ensure that the structures adjoining or over areas to be excavated are safe to any person working on or near the structure by reason of such underpinning, sheet piling, bracing or other means of shoring.

(2) It shall be the duty of —

- (a) the professional engineer who designs the underpinning, sheet piling, bracing or other means of shoring for an excavation; or
- (b) any other professional engineer who is appointed by the occupier of a worksite to oversee the construction of the underpinning, sheet piling, bracing or other means of shoring in the worksite,

to take, so far as is reasonably practicable, such measures as are necessary to ensure that the underpinning, sheet piling, bracing or other means of shoring —

- (i) is constructed in accordance with the design of the professional engineer who designed it; and
- (ii) is safe for its intended use when completely constructed and if so, issue a certificate stating that the underpinning, sheet piling, bracing or other means of shoring is safe for its intended use.

### **Access and egress from excavation**

**79.** It shall be the duty of the occupier of a worksite where any excavation work is carried out to ensure that —

- (a) safe access to and egress from the excavation in the worksite is provided where persons are required to work in the excavation; and
- (b) the access or egress referred to in paragraph (a) is sufficient in numbers and installed in such locations so as to be readily accessible.

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**General duty on occupier**

**80.** It shall be the duty of the occupier of the worksite where tunnelling works are carried out to comply with regulations 81 to 87.

**Stability of tunnelling work**

**81.—**(1) Where tunnelling works are being carried out in a worksite, all reasonably practicable measures such as shoring, shot-creting, supports by means of rock bolts, segments or steel sets, or other measures, shall be taken —

- (a) to ensure the stability of the tunnel; and
- (b) to prevent any person being trapped by the collapse of the tunnel or being struck by an object falling into the tunnel.

(2) The roof, face and walls of the work area in the tunnel shall be examined and tested before the start of the tunnelling works and thereafter at regular intervals to ensure that it is safe for persons at work in the tunnel.

(3) Adequate clearance or refuge area shall be provided and maintained to prevent workers from being caught in between or struck by any part of any vehicle, fixture or equipment within the tunnel.

(4) All tunnels or shafts in a worksite shall be properly designed and constructed —

- (a) to prevent the collapse of the shaft or surrounding earth; and
- (b) to prevent flooding.

**Ventilation**

**82.** In a worksite where tunnelling works are carried out —

- (a) all work areas in a free air tunnel shall be provided with appropriate ventilation system to ensure adequate supply of fresh air;
- (b) all reasonably practicable measures shall be taken to ensure that the air in the tunnel where a person has to work is free from flammable gases and vapours and contains —

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- (i) at least 19.5% oxygen by volume; and
  - (ii) not more than 23.5% oxygen by volume; and
- (c) air that has passed through any underground oil or fuel storage areas shall not be used for ventilation in the tunnel.

### **Illumination level**

**83.** In a worksite where tunnelling works are carried out —

- (a) all areas in the tunnel shall be adequately illuminated; and
- (b) emergency generators are provided to ensure adequate illumination of the tunnels and work areas in the event of a failure in the power supply.

### **Access to and egress from tunnel or shafts**

**84.—**(1) Safe access to and egress from any tunnel in a worksite where tunnelling works are being carried out shall be provided where persons are required to work in the tunnel.

(2) Where persons have to descend in a shaft in a worksite, an alternate means of egress from the shaft shall be provided for emergency purposes.

(3) Where persons have to descend in a shaft in a worksite which exceeds 24 metres in depth, a lift shall be provided for the transport of men and materials.

(4) All combustible materials shall, as far as is reasonably practicable, be kept away from such lift and access way referred to in this regulation.

(5) In a worksite where tunnelling works are carried out —

- (a) proper control of ingress and egress of persons to and from any tunnel under construction in the worksite shall be exercised;
- (b) a chart listing the names of persons working in the tunnel and their location of work shall be displayed at the main entrance to the tunnel and be regularly updated; and

- (c) notices to warn persons against unauthorised entry shall be displayed at all points of entry to the tunnel.

### **Plant and ancillary equipment**

**85.**—(1) All plant and ancillary equipment necessary for the conduct of work in any excavation or within a tunnel in the worksite shall, so far as is reasonably practicable, be —

- (a) of appropriate design and construction;
  - (b) of sufficient capacity;
  - (c) safe and without risks to health; and
  - (d) adequately maintained.
- (2) Without prejudice to the generality of paragraph (1) —
- (a) all supply lines to pneumatic tools used within a tunnel in the worksite shall be fitted with water traps and where appropriate, safety chains or wires;
  - (b) hydraulic oils with flashpoints which are lower than the working temperatures in the tunnel shall not be used in the worksite;
  - (c) only high pressure hydraulic hoses and coupling shall be used in the tunnel and such hoses shall be properly protected;
  - (d) only fire resistant hydraulic hoses shall be used in hydraulically activated machinery and equipment used in the tunnel;
  - (e) all hydraulic lines shall be protected by insulation or other screening where there is a risk of burning through human contact;
  - (f) only flameproof equipment shall be used whenever there is danger of the presence of flammable or explosive gases;
  - (g) no petrol driven internal combustion engine shall be used in a tunnel;
  - (h) no diesel engine shall be used in a tunnel unless it is so constructed that no air enters the engine without first being

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cleaned, and no fumes or sparks shall be emitted by the engine;

- (i) oil, grease or fuel stored in the tunnel shall be kept in tightly sealed containers in fire resistant areas at safe distances from explosives, magazines, electrical installations and away from the bottom of shafts;
- (j) gasoline or liquefied petroleum gases or other highly flammable substances shall not be used in the tunnel without the approval of the project manager of the worksite; and
- (k) all gasoline or liquefied petroleum gases or highly flammable substances used in the tunnel shall be removed immediately after use.

### **Means of communications**

**86.**—(1) Effective and reliable means of communication, such as a telephone network, shall be provided at intervals of 100 metres along the tunnel in the worksite, including outside the portal or at the top of the shaft, and maintained at all times.

(2) Any code of audio and visual signals used shall be conspicuously displayed near the entrances to the worksite and such other locations as may be necessary to bring it to the attention of all persons concerned.

### **Tampering with fittings**

**87.** Appropriate control measures shall be implemented to prevent any unauthorised person from tampering with fittings, valves or other controls regulating air supply, lighting, electricity or any monitoring system used in connection with any work in the tunnels in the worksite.

### **Training**

**88.** It shall be the duty of —

- (a) the employer of any person who carries out any work in a tunnel in a worksite; or

- (b) the principal under whose direction any person carries out any work in a tunnel in a worksite,

to ensure that the person does not carry out the work unless the person has received adequate safety and health training to familiarise himself with the hazards associated with such work and the precautions to be observed.

### **Rescue team**

**89.**—(1) Where 25 or more persons have to work underground in a worksite at any one time, it shall be the duty of the occupier of the worksite to ensure that at least 5 such persons are persons who have been trained in rescue procedures, resuscitation, the use, care and limitations of breathing apparatus and the use and maintenance of fire fighting equipment.

(2) Where more than 4 but not more than 24 persons have to work underground in a worksite at any time, it shall be the duty of the occupier of the worksite to ensure that at least 2 such persons are persons who possess the training specified in paragraph (1).

(3) It shall be the duty of the occupier of a worksite where tunnelling works are carried out to provide and maintain sufficient suitable breathing apparatus for use by persons employed to work in a tunnel in the worksite.

### **Fire-fighting facilities and procedure**

**90.**—(1) It shall be the duty of the occupier of a worksite where tunnelling works are carried out —

- (a) to provide adequate and appropriate fire-fighting facilities in every tunnel in the worksite including a fire alarm system connected to the ground level; and
- (b) to conduct at least one joint exercise for fire and rescue purposes together with the Singapore Civil Defence Force in the course of the tunnelling works.

(2) Before conducting the joint exercise referred to in paragraph (1)(b), it shall be the duty of the occupier of the worksite to consult the Singapore Civil Defence Force.

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(3) It shall be the duty of the occupier of a worksite where tunnelling works are carried out to ensure that —

- (a) the procedure that is to be followed in the event of an outbreak of fire is displayed at prominent positions both inside and outside every tunnel in the worksite;
- (b) every person employed in the tunnel has received instruction on the procedure referred to in paragraph (a); and
- (c) a fire drill is held at least once in every 3 months in the worksite.

## PART XII

### COMPRESSED AIR ENVIRONMENT

#### **General duty on occupier**

**91.** Unless otherwise provided, it shall be the duty of the occupier of a worksite where work in a compressed air environment is carried out to comply with regulations 92 to 113.

#### **Safe system of work**

**92.** No person shall enter, work in or leave the compressed air environment in the worksite except in accordance with a safe system of work which, so far as is reasonably practicable, is safe and without risk to health.

#### **Warning notices**

**93.—(1)** A notice shall be displayed at the entrance to the compressed air environment warning persons against unauthorised entry into the compressed air environment.

(2) The notice shall also inform persons of —

- (a) the danger of not undergoing proper compression and decompression;
- (b) fire and explosion hazards; and
- (c) the evacuation procedure in case of an emergency.

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**Use of bulkhead**

**94.**—(1) No bulkhead for retaining compressed air within a tunnel shall be used unless it has been approved by the Commissioner.

(2) Paragraph (1) shall not apply to a bulkhead which forms an integral part of a tunnelling or boring machine.

**Plant and ancillary equipment**

**95.**—(1) Every plant and ancillary equipment in the worksite necessary for the conduct of work in the compressed air environment shall be —

- (a) of appropriate design and construction;
- (b) of sufficient capacity;
- (c) safe and without risk to health; and
- (d) adequately maintained.

(2) No oxy-acetylene shall be used in the compressed air environment in the worksite.

**Supply of air**

**96.**—(1) There shall be an adequate supply of compressed air to a working chamber in a worksite.

(2) A reserve supply of compressed air shall be made available at all times for every man-lock and medical lock located in a worksite.

(3) The air intake for all air compressors of the air supply shall be located, as far as is reasonably practicable, at a place in the worksite where there are no fumes, exhaust gases or other air contaminants.

(4) Instrumentation or gauges indicating the pressure in a working chamber in a worksite shall be provided near the air compressor and at the site office of the occupier of the worksite.

(5) In any worksite with a compressed air environment —

- (a) all high and low pressure air supply lines shall be equipped with check valves;



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- (b) low pressure air shall be maintained and regulated automatically; and
  - (c) low pressure air shall be provided with manually operated control valves.

(6) The total capacity of the low pressure air compressors shall be sufficient to maintain the pressure in the air locks and working chambers in a worksite to cater for emergencies.

(7) Every air main supplying the working chamber or air lock in a worksite shall be protected against accidental damage and where it is not practicable to provide such protection, an additional air main shall be provided.

(8) At least 2 low pressure feedlines with regulating valves shall be provided for every working chamber in a worksite and at least one of them shall extend to within 30 metres of the working face of the tunnel.

(9) The concentrations of toxic airborne contaminants in a compressed air environment in a worksite shall not exceed the permissible exposure levels in parts per million specified in the Workplace Safety and Health (General Provisions) Regulations (Rg 1).

(10) Where measurements are made to determine the concentrations of toxic airborne contaminants in a compressed air environment in a worksite, the measured concentrations in parts per million shall be corrected to the atmospheric pressure, and the corrected concentrations shall not exceed the permissible exposure levels specified in the Workplace Safety and Health (General Provisions) Regulations.

### **Power source**

**97.—**(1) Every low pressure air compressor in a worksite shall be provided with at least 2 independent and separate sources of power supply which shall be capable of supplying power to operate the air compressor and its ancillary systems automatically when one source of power supply fails.

(2) Alternate use from one independent source of power supply to the other shall be made once fortnightly to ensure that the equipment may be operated from either source of supply.

(3) No transformer shall be used in a compressed air environment in a worksite unless the transformer is of the dry type.

### **Temperature and humidity**

**98.**—(1) The temperature in any working chamber, man-lock or medical lock in a worksite shall not exceed 29°C and the relative humidity shall not exceed 85%.

(2) A wet and dry bulb thermometer, in good working order, shall be provided in every working chamber in a worksite.

(3) A lock attendant shall be appointed to record the readings of the thermometer in the lock attendant's register.

(4) It shall be the duty of the lock attendant to record the readings of the thermometer at least once in every 4 hours in the lock attendant's register.

(5) Any lock attendant who contravenes paragraph (4) shall be guilty of an offence and shall be liable on conviction to a fine not exceeding \$1,000 and, in the case of a second or subsequent offence, to a fine not exceeding \$5,000.

### **Means of communications**

**99.** Effective and reliable means of communication, such as a telephone network, shall be maintained at all times and such means of communication shall connect the following locations:

- (a) the working chamber at the face of an excavation;
- (b) the working chamber side of the man-lock near the door;
- (c) the interior of each chamber of the man-lock;
- (d) the man and medical lock attendants' station;
- (e) the compressor plant; and
- (f) the first-aid station.

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**Appointment of competent person for compressed air works**

**100.**—(1) Sufficient number of competent persons shall be present on site to supervise the execution of work in a compressed air environment in the worksite at all times when such work is being carried out.

(2) Suitably qualified and experienced persons shall be appointed who shall at all times be in control of the air supply plant and be in attendance at the site when any person is employed in the compressed air environment.

(3) Competent persons shall be appointed as gauge attendants who shall at all times be in control of the control valve plant and be in attendance at the site when any person is employed in the compressed air environment.

(4) For the purpose of paragraph (3), no gauge attendant shall take charge of the air control valves of more than one heading unless they are in the same location.

(5) The air controls of each caisson shall be under the charge of a gauge attendant.

**Identification badges**

**101.**—(1) Identification badges containing relevant particulars shall be issued to any person who is employed in the compressed air environment in the worksite for the guidance of others should the person be taken ill after leaving work.

(2) It shall be the duty of every person who has been issued an identification badge under paragraph (1) to wear the badge at all times while at work in the worksite.

(3) Any person who contravenes paragraph (2) shall be guilty of an offence and shall be liable on conviction to a fine not exceeding \$1,000 and, in the case of a second or subsequent conviction, to a fine not exceeding \$2,000.

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**Conditions for person working in compressed air environment**

**102.**—(1) Every person who is employed in a compressed air environment in the worksite shall spend not less than 12 consecutive hours at atmospheric pressure in any 24-hour period.

(2) A person who has never worked in a compressed air environment before shall not be employed in compressed air work in the worksite unless he is accompanied by a person who had previously worked in a compressed air environment.

(3) A person who has not carried out any work in a compressed air environment for more than 14 consecutive days shall not carry out such work in a compressed air environment exceeding one bar for more than 4 hours in one day.

(4) The total period of time in a day which the person referred to in paragraph (3) spends in a compressed air environment shall not in any subsequent day be increased by more than one hour on each subsequent day.

(5) No person shall carry out any work in a compressed air environment at a pressure exceeding 3.5 bars except in an emergency.

(6) No person suffering from a cold, chest infection, sore throat or ear ache shall carry out any work in a compressed air environment unless the person has been medically examined and certified fit by a medical practitioner.

(7) For the purpose of this regulation, the period of time a person spends in a compressed air environment shall include the time spent by the person in the man-lock for compression and decompression.

**Condition for multiple entries in compressed air environment**

**103.**—(1) No person who has undergone 3 decompressions from a pressure exceeding one bar in any 24-hour period preceding the time he is to enter a compressed air environment shall carry out any work in compressed air in the worksite except for the purpose of carrying out rescue work.

(2) This regulation shall not apply to any person who is a supervisor of works being carried out in a compressed air environment or who is

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engaged in maintenance work in a compressed air environment provided that —

- (a) the person shall not be so employed on more than 5 occasions in any 24-hour period;
- (b) the employment is not for more than half an hour on any one occasion;
- (c) there is an interval of not less than 1½ hours between each such employment; and
- (d) the maximum pressure at which that person is so employed does not exceed 2 bars.

### **Prohibition on consumption of alcohol and smoking**

**104.**—(1) Where work in a compressed air environment in a worksite is carried out —

- (a) no person shall consume alcohol or smoke while at work in the compressed air environment;
- (b) no person shall carry cigarettes, cigarette lighters, matches or other sources of ignition into the compressed air environment; and
- (c) no person who has consumed alcohol shall be allowed to undergo compression in any lock in the worksite other than in a medical lock.

(2) Any person who contravenes paragraph (1) shall be guilty of an offence and shall be liable on conviction to a fine not exceeding \$1,000 and, in the case of a second or subsequent conviction, to a fine not exceeding \$2,000.

### **Man-locks**

**105.**—(1) Where work is carried out in any compressed air tunnel in a worksite, a suitably constructed and equipped man-lock shall be provided for each tunnel.

(2) The man-locks shall be sufficiently strong to withstand any air pressure, internal or external, to which the structure may be subjected whilst in use and in an emergency.

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(3) The man-lock shall be of adequate size to accommodate all persons likely to use the lock at any one time.

(4) The man-lock shall be maintained in working order and in a clean state at all times.

(5) Provision shall be made to enable any person inside the man-lock or working chamber to control the doors of the man-lock or working chamber in order to leave the man-lock or working chamber in the case of an emergency.

(6) Except in the case of an emergency, no person shall operate the controls for the opening and closing of the doors of the man-lock and working chamber unless he has been authorised by the lock attendant.

(7) A notice which can be easily read and understood by any person employed to work in the man-lock shall be affixed in each man-lock to indicate —

(a) the precautions to be taken during his compression or decompression and after decompression; and

(b) the maximum number of persons who may be accommodated in the man-lock.

### **Compression and decompression procedure and use of man-lock**

**106.**—(1) Except in an emergency, compression of persons before they enter a working chamber in a worksite and decompression of persons who are leaving a working chamber in a worksite shall be carried out only in a man-lock.

(2) In an emergency, a materials lock may be used in a worksite for the compression and decompression of persons and a record of such use and particulars of the emergency shall be made and produced for inspection by an inspector when required by the inspector.

(3) Compression and decompression of persons working in a compressed air environment in a worksite shall be carried out in accordance with the procedures approved by the Commissioner.

(4) A man-lock in a worksite shall not be used for any purpose other than for the compression or decompression of persons.

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**Medical locks**

**107.**—(1) Subject to paragraph (2), where persons are employed in a working chamber in a worksite at a pressure exceeding one bar, a suitably constructed and equipped medical lock shall be provided and maintained.

(2) Where more than 100 persons are employed in a compressed air environment in a worksite exceeding one bar, a medical lock shall be provided for every 100 persons or less.

(3) In a worksite, every medical lock shall be —

- (a) situated as near as possible to the man-lock;
- (b) of an appropriate size and shall comprise at least 2 compartments so that one of the compartments can be entered into whilst the other is under pressure;
- (c) equipped with such facilities and medicines in readiness for use at any time; and
- (d) maintained in working order and in a clean state at all times, including any ancillary equipment in the medical lock.

(4) A medical lock in a worksite where work in a compressed air environment is carried out shall not be used for any purpose other than —

- (a) for a therapeutic purpose in accordance with these Regulations; and
- (b) for the training and testing of persons for fitness to work in a compressed air environment.

**Man-lock and medical lock attendants**

**108.**—(1) Every man-lock and medical lock in a worksite where work in a compressed air environment is carried out shall be under the charge of a lock attendant.

(2) No person shall be employed as a man-lock or medical lock attendant in such a worksite for more than 12 consecutive hours in any period of 24 hours.

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(3) No person shall be employed as a man-lock or medical lock attendant in a worksite where work in a compressed air environment is carried out unless he has —

- (a) been certified to be medically fit by a medical practitioner;
- (b) been trained in first-aid; and
- (c) received adequate training to familiarise him with the hazards associated with compression, decompression and compressed air illness and with the keeping of records under these Regulations.

(4) Any person who wilfully obstructs, delays or refuses to carry out any instruction given by a man-lock attendant in the course of the attendant's employment in a worksite shall be guilty of an offence and shall be liable on conviction to a fine not exceeding \$1,000 and, in the case of a second or subsequent conviction, to a fine not exceeding \$2,000.

#### **Attendance at man-lock**

**109.**—(1) A man-lock attendant shall be in attendance at a man-lock in the worksite at all times when any person is in the man-lock or in a working chamber to which the man-lock affords direct or indirect access.

(2) Each man-lock attendant station in a worksite shall be provided with a first-aid box.

(3) It shall be the duty of the man-lock attendant at the worksite where work in a compressed air environment is carried out to —

- (a) maintain a lock attendant's register; and
- (b) carry out the compression and decompression of persons in a compressed air environment in accordance with the approved procedures.

#### **Attendance at medical lock**

**110.**—(1) A medical lock attendant shall be in attendance at the medical lock in a worksite where work in a compressed air environment is carried out —



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- (a) when any person is employed in a compressed air environment in the worksite at a pressure exceeding one bar;
  - (b) when any person is being treated in the medical lock; and
  - (c) during the period of 24 hours immediately after the last decompression of a person in a man-lock in the worksite from a pressure exceeding one bar has taken place.

(2) Arrangements shall be made to ensure that all records of pressures and other relevant information regarding conditions in the man-lock and working chamber in the worksite are accessible to the medical lock attendant at any time when the records and information are required by him.

### **Appointment of medical practitioner**

**111.**—(1) Where any work is carried out in a compressed air environment in a worksite, a medical practitioner shall be appointed for the purpose of —

- (a) supervising medical lock attendants; and
- (b) attending to and treating persons suffering from compressed air illness and other conditions arising from work in a compressed air environment at all times.

(2) No medical practitioner shall be appointed under paragraph (1) unless the medical practitioner —

- (a) is suitably qualified and familiar with the problems associated with work in a compressed air environment and the medical aspects of that work; and
- (b) has been registered with the Commissioner as a designated workplace doctor.

(3) It shall be the duty of the medical practitioner appointed under paragraph (1) to take, so far as is reasonably practicable, such steps as are necessary to ensure that he performs his functions referred to in paragraph (1)(a) or (b) properly.

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**Resting facilities and first-aid room**

**112.**—(1) Where persons employed in a compressed air environment in a worksite are required to remain at the worksite for one hour or more after decompression from pressures exceeding one bar, adequate and suitable facilities shall be provided for the persons to rest in the worksite.

(2) A first-aid room shall be provided and readily available at the worksite.

**Maintenance of records**

**113.**—(1) A register showing the name, identity card number, passport number, work permit number, date of birth, nationality, home address and occupation of each employee employed in a compressed air environment shall be prepared and kept.

(2) A copy of every lock attendant's register maintained under regulation 109(3)(a) shall be kept for a period of 3 years after its making.

**Training of personnel**

**114.** It shall be the duty of —

- (a) the employer of any person who carries out any work in a compressed air environment in a worksite; or
- (b) the principal under whose direction any person carries out any work in a compressed air environment in a worksite,

to ensure that the person does not carry out such work unless the person has received adequate safety and health training to familiarise himself with the hazards associated with such work and the precautions to be observed.

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PART XIII  
EXPLOSIVES

**General duty on employer and principal**

**115.** It shall be the duty of —

- (a) the employer of any person who carries out work in a worksite which involves the handling or use of explosives;  
or
- (b) the principal under whose direction any person carries out work in a worksite which involves the handling or use of explosives,

to comply with regulations 116, 117 and 118.

**Handling of explosives**

**116.—**(1) Explosives shall not be handled or used in a worksite except in accordance with the manufacturer's instructions and by or under the immediate control of a designated person with adequate knowledge of the dangers connected with their use.

(2) Reasonably practicable steps shall be taken to ensure that, when a charge is fired in a worksite, all persons are in such positions which do not expose them to risk of injury from the explosion or from flying materials caused by the explosion.

**Smoking, open lights, etc.**

**117.—**(1) Smoking, open lights and flame or spark producing devices shall be prohibited in or around the explosive magazine or storage enclosure in a worksite.

(2) Appropriate warning signs of the prohibitions, understood by persons involved in the work in the worksite relating to the handling or use of explosives, shall be posted and maintained at every place where the explosives are kept or stored.

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**Opening packages**

**118.**—(1) Packages of explosives in a worksite shall not be opened at any point less than 15.5 metres distance from any explosive magazine.

(2) Metallic instruments shall not be used for opening packages of explosives in a worksite.

**Deepening holes**

**119.** It shall be the duty of —

- (a) the employer of any person who carries out work involving drilling of holes in a worksite; or
- (b) the principal under whose direction any person carries out work involving drilling of holes in a worksite,

to ensure that no drilling of holes is carried out in the worksite if the hole has at any time contained explosives.

**Size of holes**

**120.**—(1) It shall be the duty of —

- (a) the employer of any person who carries out the work of drilling of holes to hold any cartridge of explosives in a worksite; or
- (b) the principal under whose direction any person carries out the work of drilling of holes to hold any cartridge of explosives in a worksite,

to comply with paragraphs (2) and (3).

(2) Any drilled hole in a worksite to hold any cartridge of explosives shall be of sufficient size.

(3) Cartridges of explosives of the proper size shall be selected so that every cartridge can be easily inserted to the bottom of the drilled hole in the worksite without forcing or ramming.

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**Removing cartridge wrappers**

**121.** It shall be the duty of —

- (a) the employer of any person who carries out the work of loading of dynamites into bored holes in a worksite; or
- (b) the principal under whose direction any person carries out the work of loading of dynamites into bored holes in a worksite,

to ensure that the dynamites are not removed from their original wrappers before being loaded into the bored holes in the worksite.

**Loading near other operations**

**122.—**(1) It shall be the duty of —

- (a) the employer of any person who carries out the work of loading of holes with explosives in a worksite; or
- (b) the principal under whose direction any person carries out the work of loading of holes with explosives in a worksite,

to take all reasonably practicable measures to ensure that paragraphs (2) and (3) are complied with.

(2) The loading of holes with explosives in a worksite shall be carried out under the direct supervision of a blaster.

(3) The loading of holes with explosives in a worksite shall not be carried out within dangerous proximity to drilling or any other operations in the worksite.

**Loading and tamping**

**123.** It shall be the duty of —

- (a) the employer of any person who carries out the work of loading and tamping of explosives in a worksite; or
- (b) the principal under whose direction any person carries out the work of loading and tamping of explosives in a worksite,

to ensure that only a hardwood rod free from any metal part is used for the work.

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**Work of firing of any blast**

**124.** Unless otherwise provided, it shall be the duty of —

- (a) the employer of any person who carries out the work of firing of any blast in a worksite; or
- (b) the principal under whose direction any person carries out the work of firing of any blast in a worksite,

to take all reasonably practicable steps to ensure that regulations 125, 126 and 127 are complied with.

**Warning and retreat**

**125.**—(1) Before the firing of any blast in a worksite, it shall be the duty of the person firing the blast —

- (a) to sound a warning distinctly audible to all persons within the danger zone; and
- (b) to ensure that no blast shall be fired while any person is in the danger zone.

(2) When the warning is sounded, all persons within the danger zone shall retire to a safe distance or to a safe shelter.

**Return to blast area**

**126.** No person shall return from such safe distance or safe shelter referred to in regulation 125(2) until permitted to do so by the blaster as announced by audible or visible signal.

**Misfires**

**127.**—(1) When there is a misfire of any blast in a worksite, every person in the danger zone shall retire to a safe distance or a safe shelter.

(2) No person, other than a person appointed to dispose misfired charges, shall enter the danger zone until the misfired charge is disposed of.

(3) It shall be the duty of the blaster who fired the blast in a worksite —

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- (a) to examine the blast area for evidence of misfired charges immediately following the blast; and
  - (b) to immediately report any misfire to the designated person.
- (4) It shall be the duty of the designated person to —
- (a) appoint the necessary personnel to dispose of the misfired charge; and
  - (b) determine the safe and proper method of its disposal.

### **Operations during thunderstorm**

**128.** In the event of a thunderstorm, it shall be the duty of the occupier of a worksite to ensure that —

- (a) any handling or use of explosives in a worksite shall be stopped immediately; and
- (b) there shall be immediate evacuation of all persons in the area where the explosives are being handled or used to a place of safety in a proper location as determined by the designated person.

## **PART XIV**

### **PILING**

#### **Stability of adjacent structures**

**129.—(1)** It shall be the duty of the occupier of a worksite to ensure that before carrying out any piling work which may affect the stability of any structure within the worksite —

- (a) the structure is adequately supported by underpinning, sheet piling, bracing or other means of shoring in accordance with the design of a professional engineer; and
- (b) a certificate under paragraph (3)(ii) has been issued in respect of the underpinning, sheet piling, bracing or other means of shoring.

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(2) It shall be the duty of the professional engineer who designs the underpinning, sheet piling, bracing or other means of shoring as required under paragraph (1) to support any structure —

- (a) to take, so far as is reasonably practicable, such measures as are necessary to ensure that his design can be executed safely by any person constructing the underpinning, sheet piling, bracing or other means of shoring according to his design;
- (b) to provide to any person who is constructing or who is to construct the underpinning, sheet piling, bracing or other means of shoring all design documentation (including all relevant calculations, drawings and construction procedures) as is necessary to ensure that the underpinning, sheet piling, bracing or other means of shoring is constructed in accordance with his design; and
- (c) to take, so far as is reasonably practicable, such measures as are necessary to ensure that the structure is safe to any person working on or near the structure by reason of such underpinning, sheet piling, bracing or other means of shoring.

(3) It shall be the duty of —

- (a) the professional engineer who designed the underpinning, sheet piling, bracing or other means of shoring to support any structure in a worksite; or
- (b) any other professional engineer who is appointed by the occupier of a worksite to oversee the construction of any underpinning, sheet piling, bracing or other means of shoring to support any structure in a worksite,

to take, so far as is reasonably practicable, such measures as are necessary to ensure that the underpinning, sheet piling, bracing or other means of shoring —

- (i) is constructed in accordance with the design of the professional engineer who designed it; and



- (ii) is safe for its intended use when completely constructed and if so, issue a certificate stating that the underpinning, sheet piling, bracing or other means of shoring is safe for its intended use.

### **Inspection**

**130.**—(1) It shall be the duty of —

- (a) the employer of any person who carries out any work involving the use of any piling equipment in a worksite; or
- (b) the principal under whose direction any person carries out any work involving the use of any piling equipment in a worksite,

to ensure that the piling equipment is inspected daily by a designated person before the start of any piling work for the day and that every defect is corrected before the piling equipment is used.

(2) It shall be the duty of a designated person to take, so far as is reasonably practicable, such measures as are necessary to ensure that any inspection carried out under paragraph (1) is conducted properly.

### **Pile driver not in use**

**131.** It shall be the duty of —

- (a) the employer of any person who carries out any work involving the operation of a pile driver in a worksite; or
- (b) the principal under whose direction any person carries out any work involving the operation of a pile driver in a worksite,

to ensure that when the pile driver is not in use, the hammer is choked or blocked in the leads or lowered to the ground.

### **Pile testing**

**132.**—(1) It shall be the duty of —

- (a) the employer of any person who carries out any work involving the testing of piles in a worksite; or

(b) the principal under whose direction any person carries out any work involving the testing of piles in a worksite, to comply with paragraphs (2) to (5).

(2) The testing of piles in a worksite shall be conducted under the direct supervision of a designated person.

(3) Reasonably practicable measures shall be taken to warn persons not to approach the pile test area in a worksite.

(4) No person shall be allowed to approach a pile test area in a worksite while the process of increasing or decreasing test loading is being carried out.

(5) No person shall be allowed to approach a pile test area in a worksite while the process of increasing or decreasing test loading is not in progress unless under the specific instruction of the designated person.

(6) It shall be the duty of the designated person to take, so far as is reasonably practicable, such measures as are necessary to ascertain that the pile testing system in a worksite is in a stable condition and is safe for approach.

### **Footing**

**133.**—(1) It shall be the duty of —

(a) the employer of any person who carries out any work involving the placing or advancing of a piling frame in a worksite; or

(b) the principal under whose direction any person carries out any work involving the placing or advancing of a piling frame in a worksite,

to comply with paragraphs (2) and (3).

(2) Before placing or advancing a piling frame in a worksite, the ground of the worksite shall be —

(a) inspected by a designated person; and

(b) made firm and level by suitable means where necessary.

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(3) After placing or advancing a piling frame in a worksite, an inspection and correction of the footing shall be carried out to ensure stability.

## PART XV

### CRANES, EMPLOYEE'S LIFTS AND MATERIAL HANDLING MACHINERY

#### **Strength and stability**

**134.**—(1) It shall be the duty of the owner of a crane, an employee's lift or a material handling machinery being used in a worksite to ensure that the crane, employee's lift or material handling machinery is —

- (a) of good construction, sound material and adequate strength;
- (b) free from patent defects; and
- (c) properly maintained.

(2) It shall be the duty of the operator of a crane or material handling machinery being used in a worksite to ensure that the crane or machinery, as the case may be, is positioned and operated as to be stable.

#### **Capacity chart**

**135.**—(1) It shall be the duty of the owner of any crane used in a worksite to comply with paragraphs (2), (3) and (4).

(2) Where the capacity of the crane used in a worksite is variable, a capacity chart shall be provided.

(3) The capacity chart shall —

- (a) be posted and maintained in the crane which is clearly visible to the operator;
- (b) set out the safe loads for various lengths of jib at various angles and radial distances; and

(c) be prepared and certified by an authorised examiner, unless it is furnished by the manufacturer or builder of the crane.

(4) Where outriggers are provided, the safe loads with and without the use of outriggers shall be specified.

### **Thorough examination and inspection**

**136.** It shall be the duty of the occupier of a worksite to ensure that before any crane, employee's lift or material handling machinery is put into service for the first time in the worksite —

- (a) it has been thoroughly examined and inspected by a competent person; and
- (b) in the case of a crane or an employee's lift, such examination and test is conducted by an authorised examiner.

### **Handling of suspended loads**

**137.—(1)** It shall be the duty of the operator of any crane or material handling machinery used in a worksite to take, so far as is reasonably practicable, such measures as are necessary to ensure that a suspended load is not moved over any person in the worksite.

(2) It shall be the duty of —

- (a) the employer of any person who carries out any work involving lifting operations in a worksite; or
- (b) the principal under whose direction any person carries out any work involving lifting operations in a worksite,

to ensure that loads that have a tendency to swing or turn freely during hoisting are controlled by tag-lines.

### **Prohibition on riding on loads**

**138.** It shall be the duty of —

- (a) the employer of any person who carries out any work involving the use of any crane, hoisting machinery, material handling machinery or excavating machinery in the worksite; or

- (b) the principal under whose direction any person carries out any work involving the use of any crane, hoisting machinery, material handling machinery or excavating machinery in a worksite,

to ensure that no person rides on the loads, buckets, skips, cars, slings or hooks of the machinery.

### **Cranes or machinery at rest**

**139.** It shall be the duty of the operator of any crane or material handling machinery used in a worksite to ensure that no load is left suspended on the crane or material handling machinery when it is not in use.

### **Operators of employee's lift**

**140.—(1)** It shall be duty of the occupier of a worksite to ensure that —

- (a) no employee's lift is operated in the worksite unless it is in the charge of a designated person stationed in the car as its attendant; and
- (b) no person other than the lift car attendant moves the car of the employee's lift or opens the car door or gate of the employee's lift.

(2) It shall be the duty of the lift car attendant —

- (a) not to cause the lift car to move unless he is satisfied that the load is prepared for movement; and
- (b) to exercise all due diligence when operating the employee's lift.

## **PART XVI**

### **MISCELLANEOUS**

#### **Offence**

**141.** Any person who contravenes any provision of these Regulations which imposes a duty on him shall be guilty of an

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offence and shall be liable on conviction to a fine not exceeding \$20,000 or to imprisonment for a term not exceeding 2 years or to both.

**Revocation**

**142.** The Factories (Building Operations and Works of Engineering Construction) Regulations (Cap. 104, Rg 8) are revoked.

Made this 28th day of November 2007.

LEO YIP  
*Permanent Secretary,  
Ministry of Manpower,  
Singapore.*

[C010-034; AG/LEG/SL/354A/2006/1 Vol. 5]

(To be presented to Parliament under section 65(8) of the Workplace Safety and Health Act).