

WORKPLACE SAFETY AND HEALTH ACT

(CHAPTER 354A, SECTION 65)

WORKPLACE SAFETY AND HEALTH (GENERAL PROVISIONS) REGULATIONS

[1st March 2006]

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PART I

PRELIMINARY

Citation

1. These Regulations may be cited as the Workplace Safety and Health (General Provisions) Regulations.

Definitions

2. In these Regulations, unless the context otherwise requires —

"competent person" means a person who has sufficient experience and training to perform the work required to be carried out, and has passed such courses as the Commissioner may require for that work;

"electrical equipment" —

(a) means any machine, appliance, apparatus or lighting fitting which consumes or utilises electricity in its operation or use; and

(b) includes any cable, wire and other device necessary to enable it to be connected to a source of electricity supply;

"hazardous substance" means any hazardous substance specified in Part II of the Fifth Schedule to the Act;

"PEL (Long Term)" means the permissible exposure level over an 8-hour working day and a 40-hour work week;

"PEL (Short Term)" means the permissible exposure level over a 15-minute period during any working day;

"permissible exposure level" means the maximum time weighted average concentration of a toxic substance to which any person may be exposed;

"plant" means any machinery, vessel, pipe or other apparatus or combination thereof which is connected or used for the purpose of making a product;

"safe working load" means —

(a) the safe working load specified in the certificate of test and examination obtained for the purposes of regulation 19, 20 or 21; or

(b) where there is no such certificate, the safe working load as ascertained by an authorised examiner;

"safe working pressure" means the pressure specified in the report of examination referred to in regulation 28, 29 or 31;

"tank" includes any pipe and valve thereof and all its fittings and attachments;

"time weighted average concentration" means the concentration determined by adding together the products of each concentration and the corresponding time over which that concentration was measured, and dividing the sum by the total time over which the measurements were taken;

"toxic substance" means any substance which may cause irritation, bodily injury or any harmful effect to a person through ingestion, inhalation or contact with any body surface, and includes any substance specified in the First Schedule;

"transmission machinery" means every shaft, wheel, drum, pulley, system of fast and loose pulleys, coupling, clutch, driving-belt or other device by which the motion of a prime mover is transmitted to or received by any machine or appliance.

PART II

GENERAL PROVISIONS RELATING TO HEALTH

Infectious agents and biohazardous material

3.—(1) Where any person at work in any workplace carries out any process, operation or work involving exposure to any infectious agents or biohazardous material which may constitute a risk to his health, it shall be the duty of the employer of that person to take effective measures to protect that person from their harmful effects.

(2) In this regulation, "biohazardous material" includes —

- (a) any substance which contains toxins;
- (b) any biological waste;
- (c) any culture medium;
- (d) any contaminated blood, urine or faeces;
- (e) any infected tissue or organ; and
- (f) any infected animal.

Overcrowding

4.It shall be the duty of the occupier of a workplace to ensure that while work is carried on in the workplace, the workplace is not overcrowded so as to pose safety and health risks to the persons at work therein.

Ventilation

5.—(1) Subject to paragraph (3), it shall be the duty of the occupier of a workplace to ensure that every workroom of the workplace is provided with adequate ventilation.

(2) Where gases, vapours or other impurities are generated in the course of any process or work carried out in a workplace which may be injurious to health, it shall be the duty of the occupier of the workplace to provide effective and suitable ventilation —

(a) for securing and maintaining the circulation of fresh air in the workplace; and

(b) to render harmless, so far as is reasonably practicable, all such gases, vapours or other impurities.

(3) This regulation shall not apply to any workplace where it is impracticable to make provision for adequate ventilation and where suitable air-supplied breathing apparatus is provided to persons at work in the workplace.

Lighting

6.It shall be the duty of the occupier of a workplace to provide and maintain sufficient and suitable lighting, whether natural or artificial, in every part of the workplace in which persons are at work or passing.

Drainage of floors

7.In any workplace where any process is carried on which renders the floor liable to be wet, it shall be the duty of the occupier of the workplace to provide and maintain, so far as is reasonably practicable, effective means for draining off the wet.

Sanitary conveniences

8.It shall be the duty of the occupier of a workplace —

(a) to provide, maintain and keep clean, sufficient and suitable sanitary conveniences for the persons at work in the workplace; and

(b) to provide and maintain sufficient and suitable lighting for these sanitary conveniences.

Reduction of vibration

9.In any workplace where persons are at work in any process or operation which involves exposure to vibration which may constitute a risk to their health, it shall be the duty of the occupier of the workplace to provide, so far as is reasonably practicable, effective means to reduce the vibration.

Protection against excessive heat or cold and harmful radiations

10.It shall be the duty of the occupier of a workplace to take all reasonably practicable measures to ensure that persons at work in the workplace are protected from excessive heat or cold and harmful radiations.

PART III

GENERAL PROVISIONS RELATING TO SAFETY

Prime movers

11. Subject to regulation 13, it shall be the duty of the occupier of a workplace to ensure that in every workplace where a prime mover is used, every flywheel connected to the prime mover and every moving part of the prime mover is securely fenced, whether the flywheel or prime mover is situated in the engine house or not.

Electric generator, motor, transmission machinery, etc.

12.—(1) Subject to regulation 13, it shall be the duty of the occupier of a workplace to ensure that every dangerous part (including any flywheel) of any electric generator, motor, transmission machinery or other machinery in the workplace is securely fenced unless the dangerous part of the generator, motor or machinery —

(a) is in such a position or of such construction as to be safe to every person at work in the workplace as it would be if securely fenced; or

(b) is made safe for persons at work in the workplace by other effective means which will protect the persons from being injured by the dangerous part when that part is in motion or in use.

(2) It shall be the duty of the occupier of a workplace to ensure that in any room or place in the workplace where transmission machinery is used, there is provided and maintained efficient devices or appliances in that room or place by which the power can promptly be cut off from the transmission machinery.

(3) Without prejudice to the generality of paragraph (1), it shall be the duty of the occupier of a workplace to ensure that any part of a stock-bar used in a workplace which projects beyond the headstock of a lathe is securely fenced or is otherwise made safe to every person at work in the workplace.

Removal of fencing from machinery

13.—(1) Subject to paragraph (2), the fencing or other effective means referred to in regulations 11 and 12 (1) which are used to render machinery safe may be removed to such extent as is necessary when —

(a) a person is carrying out in the workplace, while the part of machinery is in motion

—

(i) any examination of the machinery or part of the machinery; or

(ii) any lubrication or adjustment shown by such examination to be immediately necessary,

being an examination, a lubrication or an adjustment which is necessary to be carried out while the part of machinery is in motion; or

(b) a person is carrying out in the workplace any lubrication or any mounting or shifting of belts in respect of any part of a transmission machinery and if —

(i) the Commissioner has determined that, owing to the continuous nature of such process, the stopping of that part would seriously interfere with the carrying on of the process in the workplace; and

(ii) the lubrication or mounting or shifting of belts is carried out by such methods and in such circumstances and subject to such conditions as the Commissioner may determine.

(2) Paragraph (1) shall only apply where —

(a) the relevant examination, lubrication or other operation is carried out by a person who —

(i) has attained the age of 18 years;

(ii) has been trained to carry out, and is acquainted with the dangers of moving machinery connected with the relevant examination, lubrication or other operation; and

(iii) is wearing clothing which has no loose ends and which is fastened by means having no exposed loose ends;

(b) another person, instructed as to the steps to be taken in case of an emergency, is immediately available within sight or hearing of the person carrying out the relevant examination, lubrication or other operation; and

(c) any ladder or work platform in use for the carrying out of the relevant examination, lubrication or other operation is securely fixed or lashed, or is firmly held by a person stationed at the foot of the ladder.

Electrical installation and equipment

14.—(1) It shall be the duty of the occupier of a workplace to ensure that every electrical installation and electrical equipment in the workplace —

(a) is of good construction, sound material and free from defects; and

(b) is used and maintained in such manner so that it is safe to use.

(2) It shall be the duty of the occupier of a workplace to ensure that all reasonably practicable measures are taken to protect any person against the risks of electric shock arising from or in connection with the use at work of any electrical installation or equipment in the workplace.

Construction and maintenance of fencing or other safeguards

15.—(1) It shall be the duty of the occupier of a workplace to ensure that all fencing or other safeguards required to be provided for the purposes of regulations 11 and 12 are —

(a) of substantial construction;

(b) properly maintained; and

(c) kept in position and properly adjusted to render the machinery safe for any person while the parts required to be fenced or safeguarded are in motion or in use.

(2) Paragraph (1) (c) shall not apply where —

(a) the parts mentioned in that paragraph are necessarily exposed in motion for examination and for any lubrication or adjustment shown by such examination to be immediately necessary; and

(b) all the conditions specified in regulation 13 (2) are complied with.

Lock-out procedures

16.—(1) It shall be the duty of the occupier of a workplace to establish and implement lock-out procedures relating to the inspection, cleaning, repair or maintenance of any plant, machinery, equipment or electrical installation in the workplace that, if inadvertently activated or energised, is liable to cause bodily injury to any person.

(2) It shall be the duty of the occupier of a workplace to ensure that every person carrying out any inspection, cleaning, repair or maintenance of any plant, machinery, equipment or electrical installation in the workplace is fully instructed on the lock-out procedures for that work before commencing that work.

(3) In this regulation, “lock-out procedures” means a set of procedures —

(a) to ensure that all energy sources to the relevant plant, machinery, equipment or electrical installation are isolated, disconnected or discharged; and

(b) to prevent any part of the plant, machinery, equipment or electrical installation from being inadvertently activated or energised.

Protective measures relating to tanks, structures, sumps or pits containing dangerous substances

17.—(1) Where any tank, structure, sump or pit in a workplace contains any scalding, burning, corrosive or toxic liquid and the edge of the tank, structure, sump or pit is less than one metre above the highest ground or platform from which a person might fall into it, it shall be the duty of the occupier of the workplace to ensure that —

(a) the tank, structure, sump or pit is securely covered or is securely fenced to a height of at least one metre above that ground or platform; or

(b) where by reason of the nature of the work, neither secure covering nor secure fencing to that height is practicable, all reasonably practicable steps are taken by covering, fencing or other means to prevent any person from falling into the tank, structure, sump or pit.

(2) Where any tank, structure, sump or pit in a workplace contains any scalding, burning, corrosive or toxic liquid but is not securely covered, it shall be the duty of the occupier of the workplace to ensure that no ladder, stair or gangway is placed above, across or inside it unless the ladder, stair or gangway is —

(a) at least 500 millimetres wide; and

(b) securely fenced to a height of at least one metre and securely fixed.

(3) Where any such tank, structure, sump or pit in a workplace referred to in paragraph (2) adjoins another tank, structure, sump or pit, and —

(a) the space between them, clear of any surrounding brick or other work, is less than 500 millimetres in width; or

(b) each tank, structure, sump or pit is not securely fenced to a height of at least one metre,

it shall be the duty of the occupier of the workplace to ensure that secure barriers are so placed as to prevent passage between them.

(4) For the purposes of this regulation, a ladder, stair or gangway shall not be considered to be securely fenced unless it is provided either with sheet fencing or with an upper and a lower rail and toe boards.

(5) Where any tank, structure, sump or pit in a workplace contains any scalding, burning, corrosive or toxic liquid, it shall be the duty of the occupier of the workplace to ensure that a warning notice indicating the nature of the danger and in a form readily understood by persons at work in that workplace —

(a) is marked on or attached to the tank, structure, sump or pit; or

(b) if this is not reasonably practicable, is posted nearby.

Self-acting machines

18.—(1) It shall be the duty of the occupier of a workplace to take all reasonably practicable steps to ensure that any self-acting machine in the workplace poses no risk to the safety and health of any person working in the workplace.

(2) The reasonably practicable steps include the following:

(a) ensuring that no traversing part of any self-acting machine nor any material carried thereon shall, if the space into which it runs is a space over which any person (whether or not at work) is liable to pass, be less than 500 millimetres measured from any fixed structure not being part of the machine to the furthest point of its inward or outward traverse;

(b) ensuring that no person at work in the workplace shall, when the machine is in operation, be in the space between any traversing part of the machine and any fixed part of the machine towards which the traversing part moves on the inward run; and

(c) displaying on such machinery or at a place nearest to the process or work a notice written in languages understood by the persons at work using such machinery or in any such process or work describing the safety measures to be observed.

Hoists and lifts

19.—(1) No hoist or lift shall be used in a workplace unless an authorised examiner has —

(a) tested and examined the hoist or lift after its installation; and

(b) issued and signed a certificate of test and examination, specifying the safe working load of the hoist or lift.

(2) The certificate of test and examination referred to in paragraph (1) (b) shall be kept available for inspection.

(3) Subject to paragraph (10) (c), every hoist or lift used in a workplace shall be thoroughly examined by an authorised examiner at least once every 6 months or at such other intervals as the Commissioner may determine.

(4) Every hoistway or liftway used in a workplace shall be efficiently protected by a substantial enclosure fitted with gates that will, when the gates are shut, prevent any person from falling down the way or coming into contact with any moving part of the hoist or lift.

(5) Subject to paragraph (10) (b), any gate referred to in paragraph (4) shall be fitted with efficient interlocking or other devices to ensure that —

(a) the gate cannot be opened except when the cage or platform is at the landing; and

(b) the cage or platform cannot be moved away from the landing until the gate is closed.

(6) Every hoist or lift and every enclosure referred to in paragraph (4) shall be so constructed as to prevent any part of any person or any goods carried in the hoist or lift being trapped between —

(a) any part of the hoist or lift and any fixed structure; or

(b) the counterbalance weight and any other moving part of the hoist or lift.

(7) Every hoist or lift shall be marked conspicuously with the maximum working load which it can safely carry.

(8) No hoist or lift shall be used in a workplace to carry a load exceeding its maximum working load.

- (9) The following additional requirements shall apply to lifts used in a workplace:
- (a) efficient automatic devices shall be provided and maintained to prevent the cage or platform from over-running;
 - (b) every cage shall, on each side from which access is afforded to a landing, be fitted with a gate with efficient devices to ensure that, when persons or goods are in the cage, the cage —
 - (i) cannot be raised or lowered unless all the gates are closed; and
 - (ii) will come to rest when a gate is opened; and
 - (c) where the cage or platform of the lift is suspended by rope or chain —
 - (i) the cage or platform shall be separately connected with at least 2 ropes or chains, each rope or chain and its attachments being capable of carrying the whole weight of the cage or platform and its maximum working load; and
 - (ii) efficient devices shall be provided and maintained which will support the cage or platform with its maximum working load in the event of a breakage of the ropes or chains or any of their attachments.
- (10) In the case of a hoist or lift used in a workplace which is not powered with mechanical power —
- (a) paragraph (9) shall not apply;
 - (b) the gate referred to in paragraph (4) shall be kept closed and fastened except when the cage or platform is at rest at the landing; and
 - (c) a thorough examination of the hoist or lift shall be carried out at least once every year by an authorised examiner.
- (11) Where a hoistway or liftway inside a workplace passes through 2 or more floors —
- (a) the hoistway or liftway shall be completely enclosed with fire-resisting materials, except that the top shall be enclosed only by some material easily broken in case of fire, or be provided with a vent; and
 - (b) all means of access to the hoist or lift shall be fitted with doors of fire-resisting materials.
- (12) It shall be the duty of the occupier of a workplace in which a hoist or lift is used to comply with paragraphs (1) to (11).
- (13) It shall be the duty of an authorised examiner to —
- (a) issue and sign a certificate, in a form determined by the Commissioner, of the result of the examination referred to in paragraph (3);

- (b) provide the certificate referred to in sub-paragraph (a) to the occupier of the workplace;
- (c) inform the Commissioner —
 - (i) as soon as is reasonably practicable, if the examination shows that the hoist or lift cannot continue to be used safely unless repairs are made; or
 - (ii) in any other case, within 28 days of the completion of the examination, of the results of the examination in a manner acceptable to the Commissioner; and
- (d) exercise all due diligence in making any certification or in conducting any test or examination of any hoist or lift under this regulation.

(14) For the purposes of this regulation, no lifting machine or appliance shall be considered to be a hoist or lift unless it has a cage or platform and the direction of movement of the cage or platform is restricted by a guide or guides.

(15) This regulation shall not apply to any lift which has been inspected and tested under the Building Maintenance and Strata Management (Lift and Building Maintenance) Regulations 2005 (G.N. No. S 194/2005) and for which a Certificate of Lift Maintenance and Testing has been lodged with the Commissioner of Buildings.

Lifting gears

20.—(1) No lifting gear of whatever material shall be used in a workplace unless an authorised examiner has —

- (a) tested and examined the lifting gear; and
 - (b) issued and signed a certificate of test and examination, specifying the safe working load of the lifting gear.
- (2) The certificate of test and examination referred to in paragraph (1) (b) shall be kept available for inspection.
- (3) Every lifting gear used in a workplace shall be thoroughly examined by an authorised examiner at least once every year or at such other intervals as the Commissioner may determine.
- (4) Subject to paragraph (5), every lifting gear shall be annealed at the following intervals:
- (a) if in regular use —
 - (i) in the case of chains used in connection with molten metal or molten slag, at least once every 6 months; or
 - (ii) in any other case, at least once every year; or
 - (b) if not in regular use, only when necessary.

(5) Paragraph (4) shall not apply to the following classes of lifting gear:

- (a) chains made of malleable cast iron;
- (b) plate link chains;
- (c) chains, rings, hooks, shackles and swivels made of steel or of any non-ferrous metal;
- (d) pitched chains working on sprocket or pocketed wheels;
- (e) rings, hooks, shackles and swivels permanently attached to pitched chains, pulley blocks or weighing machines;
- (f) hooks and swivels having screw-threaded parts or ball-bearings or other case-hardened parts;
- (g) socket shackles secured to wire ropes by white metal capping;
- (h) bordeaux connections;
- (i) rope or rope sling; and
- (j) any chain or lifting tackle which has been subjected to the heat treatment known as “normalising” instead of annealing.

(6) No lifting gear shall be loaded beyond its safe working load except by an authorised examiner or an inspector for the purpose of testing such lifting gear.

(7) It shall be the duty of the occupier of a workplace in which a lifting gear is used to comply with paragraphs (1) to (4) and (6).

(8) Paragraphs (1) and (3) do not apply to any lifting gear which consists of natural fibre ropes or natural fibre slings.

(9) It shall be the duty of an authorised examiner to —

- (a) issue and sign a certificate, in a form determined by the Commissioner, of the result of the examination referred to in paragraph (3);
- (b) provide the certificate referred to in sub-paragraph (a) to the occupier of the workplace;
- (c) inform the Commissioner —
 - (i) as soon as is reasonably practicable, if the examination shows that the lifting gear cannot continue to be used safely unless repairs are made; or
 - (ii) in any other case, within 28 days of the completion of the examination, of the results of the examination in a manner acceptable to the Commissioner;and

(d) exercise all due diligence in making any certification or in conducting any test or examination of any lifting gear under this regulation.

(10) It shall be the duty of the owner of a lifting gear to ensure that it is —

(a) of good construction, sound material, adequate strength and free from patent defect; and

(b) properly maintained.

(11) An inspector may at any time test any lifting gear and may prohibit its further use if he is not satisfied that the lifting gear is safe for the use to which it is put.

(12) Any person who contravenes any prohibition of an inspector under paragraph (11) shall be guilty of an 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.

Lifting appliances and lifting machines

21.—(1) No lifting appliance or lifting machine shall be used unless an authorised examiner has —

(a) tested and examined the lifting appliance or lifting machine; and

(b) issued and signed a certificate of test and examination, specifying the safe working load of the lifting appliance or lifting machine.

(2) The certificate of test and examination referred to in paragraph (1) (b) shall be kept available for inspection.

(3) Every lifting appliance and lifting machine shall be thoroughly examined by an authorised examiner at least once every year or at such other intervals as the Commissioner may determine.

(4) Every crane, crab and winch shall be provided with a readily accessible and efficient brake or other safety device —

(a) which will prevent the fall of the load when suspended; and

(b) by which the load can be effectively controlled while being lowered.

(5) Every hand winch shall be fitted with an efficient pawl capable of sustaining the safe working load.

(6) Every lifting appliance and lifting machine —

(a) shall be conspicuously marked with its safe working load or loads and a distinctive number or other means of identification; and

(b) in the case of a jib crane so constructed that the safe working load may be varied by the raising or lowering of the jib, shall have an accurate indicator, which must be placed so as to be clearly visible to the driver of the jib crane, that shows the radius of the jib at any time and the safe working load corresponding to that radius.

(7) No lifting appliance or lifting machine shall be loaded beyond its safe working load except by an authorised examiner or an inspector for the purpose of testing such lifting appliance or lifting machine.

(8) Every lifting appliance and lifting machine shall be adequately and securely supported and —

- (a) every rope, chain or wire;
- (b) every part of a stage, framework or other structure; and
- (c) every mast, beam, pole or other article of plant supporting any part of the lifting appliance or lifting machine,

shall be of good construction, sound material and adequate strength, having regard to the nature of the lifting appliance, its lifting and reaching capacity and the circumstances of its use.

(9) All rails on which a travelling crane moves, and every track on which the carriage of a transporter or runway moves shall —

- (a) be of proper size and adequate strength;
- (b) have an even running surface;
- (c) be properly laid, adequately supported or suspended; and
- (d) be properly maintained.

(10) If any person at work at any place in a workplace is on or near the wheel tracks of an overhead travelling crane where he would be liable to be struck by the crane, effective measures shall be taken to ensure that the crane does not approach within 6 metres of that place.

(11) If any person at work in a workplace is not on or near the wheel tracks of an overhead travelling crane but is in a place above floor level where he would be liable to be struck by an overhead travelling crane, or by any load carried by the crane, effective measures shall be taken to warn him of the approach of the crane unless the work of the person is so connected with or dependent on the movements of the crane as to make the warning unnecessary.

(12) A lifting machine shall not be operated except by —

- (a) a person trained and competent to operate that machine; or
- (b) a person under training who is under the direct supervision of a qualified person.

(13) No person below the age of 18 years shall be at work —

- (a) operating any lifting machine driven by mechanical power; or
- (b) giving signals to the operator of any lifting machine.

(14) It shall be the duty of the occupier of a workplace in which any lifting appliance or lifting machine is used to comply with paragraphs (1) to (13).

(15) It shall be the duty of an authorised examiner to —

(a) issue and sign a certificate, in a form determined by the Commissioner, of the result of the examination referred to in paragraph (3);

(b) provide the certificate referred to in sub-paragraph (a) to the occupier of the workplace;

(c) inform the Commissioner —

(i) as soon as is reasonably practicable, if the examination shows that the lifting appliance or lifting machine cannot continue to be used safely unless repairs are made; or

(ii) in any other case, within 28 days of the completion of the examination, of the results of the examination in a manner acceptable to the Commissioner; and

(d) exercise all due diligence in making any certification or in conducting any test or examination of any lifting appliance or lifting machine under this regulation.

(16) It shall be the duty of the owner of a lifting appliance or lifting machine to ensure that it is —

(a) of good mechanical construction, sound material and adequate strength; and

(b) properly maintained.

(17) An inspector may at any time test any lifting appliance or lifting machine and may prohibit its further use if he is not satisfied that the lifting appliance or lifting machine is safe for the use to which it is put.

(18) Any person who contravenes any prohibition of an inspector under paragraph (17) shall be guilty of an 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.

Register of lifting gears, etc.

22. It shall be the duty of the occupier of a workplace to keep a register containing such particulars as the Commissioner may specify with respect to the lifting gears, lifting appliances and lifting machines to which regulations 20 and 21 apply.

Measures to be taken to prevent falls

23.—(1) All openings in floors of a workplace shall be securely covered or fenced unless the nature of the work renders such covering or fencing impracticable.

(2) For every staircase in a workplace or which affords a means of exit from the workplace, a substantial handrail shall be provided and maintained, which —

(a) if the staircase has an open side, shall be on that side; and

(b) if the staircase has 2 open sides, shall be on both sides.

(3) Any open side of a staircase in a workplace shall be guarded by the provision and maintenance of a lower rail or other effective means.

(4) Every teagle opening or similar doorway used for hoisting or lowering goods or materials in a workplace, whether by mechanical power or otherwise, shall be —

(a) securely fenced; and

(b) provided with a secure handhold on each side of the opening or doorway.

(5) Any fencing referred to in paragraph (4) shall —

(a) be properly maintained; and

(b) except when goods or materials are being hoisted or lowered at the opening or doorway, be kept in position.

(6) It shall be the duty of the occupier of a workplace to comply with paragraphs (1) to (5).

(7) Subject to paragraph (8), any person who has to work at a place from which he would be liable to fall —

(a) a distance of more than 2 metres; or

(b) into any substance which is likely to cause drowning or asphyxiation,

shall be provided with a secure foothold and handhold at the place so far as is reasonably practicable for ensuring his safety.

(8) Where it is not reasonably practicable to provide a secure foothold or handhold as required under paragraph (7), other suitable means such as a safety harness or safety belt shall be provided for ensuring the safety of every person working at such places.

(9) Where a safety harness or safety belt is provided under paragraph (8) —

(a) there shall be sufficient and secured anchorage, by means of a life line or otherwise for the safety harness or safety belt; and

(b) the anchorage shall not be lower than the level of the working position of the person wearing the safety harness or safety belt.

(10) It shall be the duty of the employer of the person referred to in paragraph (7) to comply with paragraphs (7), (8) and (9).

(11) It shall be the duty of the employer of a person who is exposed to the risk of falling into water and of drowning to provide —

(a) equipment and means of rescuing and resuscitating drowning persons; and

(b) suitable life jackets or other equipment for keeping such persons afloat in the event that they fall into the water.

(12) No person shall require, permit or direct any person to work at a place from which he would be liable to fall —

(a) a distance of more than 2 metres; or

(b) into any substance which is likely to cause drowning or asphyxiation,

unless the requirements of paragraphs (7), (8) and (9) have been complied with.

(13) Any person who contravenes paragraph (12) shall be guilty of an 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.

Storage of goods

24.—(1) All goods, articles and substances which are stored, stacked or placed in a workplace shall be stored, stacked or placed —

(a) in such manner as not to interfere with —

(i) the adequate distribution of natural or artificial light;

(ii) the proper operation of any machinery or other equipment;

(iii) the unobstructed use of passageways or traffic lanes; and

(iv) the efficient functioning of sprinkler systems or the use of other fire-fighting equipment;

(b) on a firm foundation not liable to settle;

(c) in such manner as not to overload the foundation or floors; and

(d) in such manner, and using such supporting structures as may be necessary, as to ensure the stability, and to prevent the collapse, of the goods, articles or substances.

(2) Any goods, articles or substances which are stored, stacked or placed in a workplace shall not be stored, stacked or placed against a wall or partition unless the wall or partition is of sufficient strength to withstand the pressure.

(3) If loads are to be suspended from the roof of any workplace, the roof shall be of sufficient strength to carry the loads.

(4) It shall be the duty of the occupier of a workplace to comply with paragraphs (1), (2) and (3).

25.Deleted by S 463/2009, wef 01/11/2009.

Precautions with regard to explosive or flammable dust, gas, vapour or substance

26.—(1) Where any process in a plant used in a workplace gives rise to dust, gas, vapour or substance that may escape into any place of work and the dust, gas, vapour or substance that may escape is of such a character and is to such an extent as to be liable to explode on ignition —

(a) all reasonably practicable steps shall be taken to prevent such an explosion —

(i) by enclosure of the plant used in the process;

(ii) by removal or prevention of accumulation of the dust, gas, vapour or substance;

(iii) by exclusion or effective enclosure of possible sources of ignition; or

(iv) by the use of suitable flame-proof equipment; and

(b) unless the plant in which the process is carried out is so constructed as to withstand the pressure likely to be produced by any such explosion, all reasonably practicable steps shall be taken to restrict the spread and effects of such an explosion by the provision of chokes, baffles and vents, or other equally effective appliances in the plant.

(2) Where any part of a plant in a workplace contains any explosive or flammable gas or vapour under pressure greater than atmospheric pressure, that part shall not be opened, unless it is positively isolated, depressurised and vented to a safe location, and where necessary, purged to remove any residual gas or vapour.

(3) No plant, tank or vessel in a workplace that contains, or has contained, any explosive or flammable substance shall be subjected to —

(a) any welding, brazing or soldering operation;

(b) any cutting operation which involves the application of heat; or

(c) any operation involving the application of heat for the purpose of taking apart or removing the plant, tank or vessel or any part of it,

until all reasonably practicable steps have been taken to remove the substance and any fumes, gas or vapour arising from it, or to render the substance and fumes, gas or vapour non-explosive and non-flammable.

(4) If any plant, tank or vessel in a workplace has been subjected to any operation referred to in paragraph (3) (a), (b) or (c), no explosive or flammable substance shall be allowed to enter the plant, tank or vessel until the metal has cooled sufficiently to prevent any risk of igniting the substance.

(5) No plant, tank or vessel in a workplace which contains, or has contained, any explosive or flammable substance shall be subjected to any operation referred to in paragraph (3) (a), (b) or (c) unless such plant, tank or vessel has been inspected and a competent person has certified that —

(a) it is free from —

(i) any explosive or flammable substance; and

(ii) any fumes, gas or vapour arising from any such substance; or

(b) any explosive or flammable substance, and any fumes, gas or vapour arising from any such substance, have been rendered non-explosive and non-flammable, and that it is safe for the operation to be carried out.

(6) Any certificate issued by a competent person under paragraph (5) in respect of any workplace referred to in that paragraph shall be kept available at all times for inspection by an inspector.

(7) It shall be the duty of the occupier of a workplace referred to in paragraphs (1) to (6) to comply with those paragraphs.

(8) It shall be the duty of a competent person to exercise all due diligence in making any inspection and certification under this regulation.

Conditions before steam boiler, steam receiver, air receiver or refrigerating plant pressure receiver may be used

27.—(1) Subject to paragraph (2), it shall be the duty of the owner of any steam boiler, steam receiver, air receiver or refrigerating plant pressure receiver (referred to in this regulation as relevant equipment) who intends to put the relevant equipment into use in a workplace to —

(a) obtain, in such form and manner as may be determined by the Commissioner, the approval of the Commissioner to use the relevant equipment;

(b) ensure that such examination and test by an authorised examiner as may be specified by the Commissioner has been satisfactorily carried out;

(c) obtain from the authorised examiner a report of the examination and test referred to in sub-paragraph (b), specifying the safe working pressure of the relevant equipment and stating the nature of the tests to which the relevant equipment and its fittings have been submitted;

(d) keep the report referred to in sub-paragraph (c) available for inspection; and

(e) mark the relevant equipment so as to enable it to be identified as the relevant equipment to which the report refers.

(2) Paragraph (1) shall not apply to —

- (a) any steam boiler referred to in regulation 28 (20) (a) or (21);
- (b) any steam receiver referred to in regulation 29 (11);
- (c) any air receiver that has been examined in accordance with regulation 31 (5) and reported on in accordance with regulation 31 (10) or any air receiver referred to in regulation 31 (12); and
- (d) any refrigerating plant pressure receiver where the safe working pressure does not exceed 0.5 bar or the product of its safe working pressure and volume does not exceed 100 bar-litre.

Steam boilers

28.—(1) Every steam boiler shall be —

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

(2) Every steam boiler, whether separate or one of a range —

- (a) shall have attached to it —
 - (i) a suitable safety valve which is —
 - (A) separate from and incapable of being isolated by any stop-valve;
 - (B) adjusted so as to prevent the boiler from being worked at a pressure greater than the safe working pressure; and
 - (C) fixed directly, or as close as practicable, to the boiler;
 - (ii) a suitable stop-valve connecting the boiler to the steam pipe;
 - (iii) a correct steam pressure gauge, connected to the steam space and easily visible by the boiler attendant, which —
 - (A) indicates the pressure of steam in the boiler; and
 - (B) is marked, in a distinctive colour, with the safe working pressure;

(iv) at least one water gauge of transparent material or any other type approved by the Commissioner thereof which —

(A) shows the water level in the boiler; and

(B) if the gauge is of the glass tubular type and the working pressure in the boiler normally exceeds 275 kilo-newtons per square metre, is provided with an efficient guard that does not obstruct the reading of the gauge; and

(v) where it is one of 2 or more boilers, a plate bearing a distinctive number which shall be easily visible;

(b) shall be provided with means for attaching a test pressure gauge; and

(c) shall be provided with —

(i) a suitable fusible plug; or

(ii) an efficient low-water alarm device.

(3) Paragraph (2) (a) (ii) shall not apply to any economiser.

(4) Paragraph (2) (a) (iii), (iv) and (v), (b) and (c) shall not apply to any economiser or superheater.

(5) Paragraph (2) (a) (iv), (b) and (c) shall not apply to any steam boiler —

(a) which uses electricity as the only form of power;

(b) which has a maximum steam volume of not more than 40 litres and a safe working pressure of not more than 4 bars; and

(c) into which water is fed manually at the start of the steam generation process and cannot be fed continuously from a potable water main.

(6) Every —

(a) steam boiler referred to in paragraph (5), including all its fittings and attachments, shall be thoroughly examined by an authorised examiner at least once every 2 years and also after any extensive repair; and

(b) surface of the external shell of a steam boiler referred to in paragraph (5) shall be examined by an authorised examiner at least once every 6 years, and for the purpose of such examination, the insulation on the shell shall be removed completely.

(7) For the purposes of paragraph (2), a lever-valve shall not be considered to be a suitable safety valve.

(8) No steam boiler (other than a steam boiler using electricity as the only form of power) shall be operated except by or under the control of a person who has successfully completed a training course acceptable to the Commissioner on the operation of that steam boiler.

- (9) Any steam boiler using electricity as the only form of power shall —
- (a) have attached to it a steam pressure control device which shall be set to the pressure at or below the maximum permissible working pressure of the boiler; and
 - (b) have a safety valve attached to the boiler which shall be examined and tested by a competent person at least once a month, and the report on every such test shall be recorded and shall be made available for inspection at any time by an inspector.
- (10) No person shall enter or be in any steam boiler that is one of a range of 2 or more steam boilers —
- (a) unless all inlets through which steam or hot water might otherwise enter the boiler from any other part of the range are disconnected from the part; or
 - (b) unless —
 - (i) all valves or taps controlling such steam and hot water entry are closed and securely locked; and
 - (ii) where the boiler has a blow-off pipe in common with one or more other boilers or which delivers into a common blow-off vessel or sump, the blow-off valve or tap on each such boiler is so constructed that it can only be opened by a key which —
 - (A) cannot be removed until the valve or tap is closed; and
 - (B) is the only key in use for that set of blow-off valves or taps; and
 - (c) until the particular boiler has been sufficiently cooled to make it safe for the person entering or being in the particular boiler.
- (11) No work shall be permitted in any boiler-furnace or boiler- flue until it has been sufficiently cooled by ventilation or by other means to make it safe for the persons at work to work there.
- (12) Subject to paragraphs (6), and (14) and regulation 31A, every steam boiler shall be examined by an authorised examiner —
- (a) at least once every year; and
 - (b) after any extensive repairs.
- (13) It shall be the duty of the owner of a steam boiler used in a workplace to comply with paragraphs (1), (2), (6) and (8) to (12).
- (14) An authorised examiner may, in his discretion, arrange to make the examination referred to in paragraph (12) within 3 months after the one year has expired.
- (16) Any examination in accordance with the requirements of paragraph (12) shall consist —

(a) of an examination of the boiler when it is cold and the interior and exterior have been prepared in the manner specified by the Commissioner; and

(b) except in the case of an economiser or a superheater, of an examination when it is under normal steam pressure which —

(i) must be made as soon as possible after the examination of the boiler when cold; and

(ii) must include an examination to determine whether the safety valve is so adjusted as to prevent the boiler from being worked at a pressure greater than the safe working pressure, unless prior written permission has been obtained from the Commissioner.

(17) It shall be the duty of an authorised examiner to —

(a) issue and sign a report, in a form determined by the Commissioner, of the result of the examination referred to in paragraph (12);

(b) provide a copy of the report referred to in sub-paragraph (a) to the owner of the steam boiler;

(c) inform the Commissioner —

(i) as soon as is reasonably practicable, if the examination shows that the steam boiler cannot continue to be used safely unless repairs are carried out; or

(ii) in any other case, within 28 days of the completion of the examination, of the results of the examination in a manner acceptable to the Commissioner; and

(d) exercise all due diligence in making any report or in conducting any examination of any steam boiler under this regulation.

(18) Where the report of any examination under this regulation specifies conditions for securing the safe working of a steam boiler, it shall be the duty of the owner of the steam boiler to ensure that the boiler is not used except in accordance with those conditions.

(19) For the purposes of any report to be made under paragraph (17) or regulation 27 (1) (c), the examination of a steam boiler when it is cold and its examination when it is under steam pressure shall be treated as separate examinations.

(20) Paragraphs (12) and (14) to (19) shall not apply to —

(a) any steam boiler with a maximum permissible working pressure not exceeding 0.5 bar; and

(b) any steam boiler referred to in paragraph (5).

(21) This regulation shall not apply to any steam boiler of a locomotive which is the property of or used by the railway administered by the Government of Malaysia.

Steam receivers

29.—(1) Every steam receiver shall be —

(a) of good construction, sound material and adequate strength;

(b) free from patent defects; and

(c) properly maintained.

(2) Every steam receiver that is not constructed and maintained to safely withstand either the safe working pressure of the steam boiler or the maximum pressure which can be obtained in the pipe connecting the receiver with any source of supply, shall be fitted with —

(a) a suitable reducing valve or other suitable automatic appliance to prevent the safe working pressure of the receiver being exceeded;

(b) a suitable safety valve so adjusted as to permit the steam to escape as soon as the safe working pressure is exceeded, or a suitable appliance for cutting off automatically the supply of steam as soon as the safe working pressure is exceeded;

(c) a correct steam pressure gauge indicating the pressure of steam in the receiver;

(d) a suitable stop-valve; and

(e) except where only one steam receiver is in use, a plate bearing a distinctive number which shall be easily visible.

(3) The safety valve and steam pressure gauge referred to in paragraph (2) shall be fitted either —

(a) on the steam receiver; or

(b) on the supply pipe between the receiver and the reducing valve or other appliance to prevent the safe working pressure from being exceeded.

(4) For the purposes of paragraph (2) (a) to (d), any set of receivers supplied with steam through a single pipe and forming part of a single machine may be treated as one receiver if the set of receivers is fitted on the single pipe.

(5) For the purposes of paragraph (2) (a), (b) and (c), any other set of receivers supplied with steam through a single pipe may be treated as one receiver if the set of receivers is fitted on the single pipe, provided that the reducing valve or other appliance to prevent the safe working pressure being exceeded is fitted on that single pipe.

(6) Subject to paragraph (7) and regulation 31A, every steam receiver shall be examined by an authorised examiner —

(a) at least once every 2 years; and

(b) after any extensive repairs.

(7) An authorised examiner may, in his discretion, arrange to make the examination referred to in paragraph (6) within 3 months after the 2 years have expired.

(9) It shall be the duty of the owner of a steam receiver used in a workplace to comply with paragraphs (1), (2), (3) and (6).

(10) It shall be the duty of an authorised examiner to —

(a) issue and sign a report, in a form determined by the Commissioner, of the result of the examination referred to in paragraph (6);

(b) provide a copy of the report referred to in sub-paragraph (a) to the owner of the steam receiver; and

(c) inform the Commissioner —

(i) as soon as is reasonably practicable, if the examination shows that the steam receiver cannot continue to be used safely unless repairs are carried out; or

(ii) in any other case, within 28 days of the completion of the examination, of the results of the examination in a manner acceptable to the Commissioner; and

(d) exercise all due diligence in making any report or in conducting any examination of any steam receiver under this regulation.

(11) Paragraphs (6), (7), (8) and (10) shall not apply to any steam receiver where the safe working pressure does not exceed 0.5 bar or the product of its safe working pressure and volume does not exceed 100 bar-litre.

Steam containers

30. The owner of every steam container used in a workplace shall ensure that the steam container shall be so maintained as to secure that the outlet is at all times kept open and free from obstruction.

Air receivers

31.—(1) Every air receiver shall be of sound construction and properly maintained.

(2) Every air receiver shall —

- (a) be conspicuously marked with its safe working pressure;
 - (b) in the case of a receiver connected with an air compressing plant —
 - (i) be so constructed as to withstand with safety the maximum pressure which can be obtained in the compressor; or
 - ii) be fitted with a suitable reducing valve or other suitable appliance to prevent the safe working pressure of the receiver from being exceeded;
 - (c) be fitted with a suitable safety valve so adjusted as to permit the air to escape as soon as the safe working pressure is exceeded;
 - (d) be fitted with an accurate pressure gauge indicating the pressure in the receiver;
 - (e) except in the case of a receiver in which substance in the form of solid or liquid is stored and from which it is forced by compressed air, be fitted with a suitable appliance for draining the receiver;
 - (f) be provided with a suitable manhole, handhole or other means which will allow the interior to be thoroughly cleaned; and
 - (g) where there is more than one receiver in use in the workplace, bear a distinguishing mark which shall be easily visible.
- (3) For the purpose of paragraph (2) (c) or (d), but subject to paragraph (4), any set of air receivers supplied with air through a single pipe may be treated as one receiver.
- (4) Where a suitable reducing valve or other suitable appliance to prevent the safe working pressure from being exceeded is required to be fitted on the air receiver, the valve or appliance must be fitted on the single pipe.
- (5) Subject to paragraph (6) and regulation 31A, every air receiver shall be —
- (a) thoroughly cleaned; and
 - (b) examined by an authorised examiner at least once every 2 years.
- (6) An authorised examiner may, in his discretion, arrange to make the examination referred to in paragraph (5) within 3 months after the 2 years have expired.
- (8) For the purpose of paragraph (5), where the receiver is of solid drawn construction and is constructed so that the internal surface cannot be thoroughly examined, a suitable hydraulic test of the receiver shall be carried out in lieu of internal examination.
- (9) It shall be the duty of the owner of an air receiver used in a workplace to comply with paragraphs (1), (2), (4), (5) and (8).
- (10) It shall be the duty of an authorised examiner to —
- (a) issue and sign a report, in a form determined by the Commissioner, of the result of the examination referred to in paragraph (5);

(b) provide a copy of the report referred to in sub-paragraph (a) to the owner of the air receiver; and

(c) inform the Commissioner —

(i) as soon as is reasonably practicable, if the examination shows that the air receiver cannot continue to be used safely unless repairs are carried out; or

(ii) in any other case, within 28 days of the completion of the examination, of the results of the examination in a manner acceptable to the Commissioner; and

(d) exercise all due diligence in making any report or in conducting any examination of any air receiver under this regulation.

(11) Any person who charges an air receiver used in a workplace from the cylinder of an internal combustion engine shall be guilty of an 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.

(12) Paragraphs (5) to (8) and (10) shall not apply to any air receiver where the safe working pressure does not exceed 0.5 bar or the product of its safe working pressure and volume does not exceed 100 bar-litre.

Extension of time for examination of steam boilers, steam receivers and air receivers

31A.— (1) The Commissioner may, on an application made by the owner of a steam boiler, steam receiver or air receiver, allow the time delimited by regulation 28, 29 or 31 for the examination by an authorised examiner of the steam boiler, steam receiver or air receiver, as the case may be, to be extended subject to such conditions as the Commissioner may determine in any particular case.

(2) An application made under paragraph (1) shall be accompanied by —

(a) the payment of a non-refundable fee to the Commissioner of \$115; and

(b) a certificate issued by a competent person appointed by the owner of the steam boiler, steam receiver or air receiver, as the case may be, recommending the extended period within which the examination of the steam boiler, steam receiver or air receiver is to be made.

(3) It shall be the duty of the competent person referred to in paragraph (2)(b) —

(a) before issuing the certificate referred to in paragraph (2)(b), to take so far as is reasonably practicable such measures that are necessary to assess and examine the steam boiler, steam receiver or air receiver, as the case may be, to ensure that it is safe for its intended use during the extended period; and

(b) to issue, as soon as is reasonably practicable, to the owner of the steam boiler, steam receiver or air receiver, as the case may be, the certificate referred to in paragraph (2)(b).

(4) Any competent person referred to in paragraph (2)(b) who, without reasonable excuse, contravenes any duty imposed on him under paragraph (3) shall be guilty of an offence and shall be liable on conviction to a fine not exceeding \$5,000 and, in the case of a second or subsequent conviction, to a fine not exceeding \$10,000 or to imprisonment for a term not exceeding 6 months or to both.

Periodical examinations when authorised examiner is not available

32.—(1) If any person required under these Regulations to arrange for an authorised examiner to carry out any periodical examination is unable to locate an authorised examiner willing to carry out the inspection within the required time, the person shall —

- (a) immediately inform the Commissioner of that fact in such form as the Commissioner may specify;
- (b) provide the Commissioner with —
 - (i) particulars of the machinery or plant which is to be examined;
 - (ii) the date on which the machinery or plant was last examined by an authorised examiner; and
 - (iii) the particulars of the person who last carried out the examination; and
- (c) ensure that the machinery or plant is examined as required by these Regulations by an authorised examiner within 30 days of the Commissioner informing him of an authorised examiner who is willing to carry out the examination.

(2) Any person who complies with paragraph (1) shall not be guilty of any offence in respect of the contravention of the provision in these Regulations requiring the examination by an authorised examiner.

Pressure vessel containing hazardous substance

33.—(1) It shall be the duty of the owner of a pressure vessel used in any workplace that contains any hazardous substance to ensure that it is —

- (a) of good construction, sound material and adequate strength;
- (b) free from patent defects;
- (c) properly maintained; and
- (d) inspected by a competent person before use and thereafter within such period as the Commissioner may specify.

(2) The owner of a pressure vessel shall —

- (a) maintain a record of the inspection referred to in paragraph (1) (d); and
- (b) keep such record available for inspection by an inspector.

(3) It shall be the duty of a competent person to exercise all due diligence in conducting any inspection under this regulation.

Pipes and equipment conveying certain substances

34.It shall be the duty of the occupier of a workplace to ensure that every pipe, pump, compressor and other equipment in the workplace used to convey steam, air, refrigerant or any hazardous substance, and each part and fitting of, and attachment to, every pipe, pump, compressor and other equipment is —

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

Gas plants

35.—(1) Every gas plant shall be of sound construction and properly maintained.

(2) Every gas plant shall be inspected by a competent person before use and thereafter within such period as the Commissioner may specify.

(3) Every water-sealed gasholder which has a storage capacity of not less than 25 cubic metres shall be examined externally by a competent person at least once every 2 years.

(4) A record of the examination referred to in paragraph (3) containing such particulars as the Commissioner may determine shall be entered in or attached to a register.

(5) No gasholder shall be repaired or demolished except under the direct supervision of a person who —

(a) by his training and experience; and

(b) with his knowledge of the necessary precautions against risks of explosion and of persons being overcome by gas,

is competent to supervise the work.

(6) No gas filling shall be allowed except under the direct supervision of a person who —

(a) by his training and experience; and

(b) with his knowledge of the necessary precautions against any risk,

is competent to supervise the work.

(7) No gas cylinder shall be filled unless —

(a) the cylinder has been examined or tested by a competent person —

(i) where the cylinder is for corrosive gases, at least once every 2 years; or

(ii) where the cylinder is for other gases, at least once every 5 years; and

(b) the result of such examination or test is entered in a register and kept for inspection by an inspector.

(8) It shall be the duty of the owner of a gas plant used in a workplace to comply with paragraphs (1) to (7).

(9) It shall be the duty of a competent person to exercise all due diligence in conducting any test or examination under this regulation.

Repair of pressure vessel

36. If repairs to any pressure vessel used in a workplace are likely to cause a dangerous occurrence if improperly carried out, it shall be the duty of the owner of the pressure vessel to obtain the written approval of the Commissioner before the repairs are carried out.

Prevention of fire

37.—(1) All reasonably practicable steps shall be taken in a workplace to keep sources of heat or ignition separate from —

- (a) flammable materials in the workplace; or
- (b) any process carried on at the workplace that gives rise to any flammable gas or vapour.

(2) There shall be provided and maintained in a workplace means of extinguishing fire which shall be —

- (a) readily accessible;
- (b) adequate and suitable having regard to the circumstances of each case; and
- (c) tested by a competent person at such regular intervals as the Commissioner may determine.

(3) It shall be the duty of the occupier of a workplace to comply with paragraphs (1) and (2).

Safety provisions in case of fire

38.—(1) There shall be provided in a workplace such means of escape in case of fire for the persons at work in the workplace —

- (a) as may be reasonably required in the circumstances of each case; and
- (b) which shall be properly maintained and kept free from obstruction.

(2) The contents of any room in which persons are at work shall be so arranged or disposed that there is a free passageway for all persons at work in the room to a means of escape in case of fire.

(3) In every workplace, all doors affording any person at work in a workplace means of exit from —

- (a) the workplace;
- (b) any room in the workplace; or
- (c) any building or enclosure in which the workplace is situated,

shall only be locked or fastened in such a manner that the doors can easily and immediately be opened from the inside.

- (4) In every workplace, all doors affording means of exit from the workplace for the persons at work in the workplace shall, except in the case of sliding doors, be constructed to open outwards.
- (5) Every exit affording means of escape in case of fire or giving access to such means of escape shall be conspicuously marked with an exit sign of an adequate size.
- (6) In every workplace, effective steps shall be taken to ensure that all the persons at work in the workplace are familiar with —
- (a) the means of escape in case of fire and their use; and
 - (b) the routine to be followed in case of fire.
- (7) In every workplace, there shall be effective warning devices that —
- (a) are capable of being operated without exposing any person to undue risk;
 - (b) are maintained and tested at least once every month;
 - (c) give warning in case of fire; and
 - (d) are clearly audible throughout the workplace.
- (8) It shall be the duty of the occupier of a workplace to comply with paragraphs (1) to (7).

PART IV

SPECIAL PROVISIONS RELATING TO HEALTH, SAFETY AND WELFARE

Toxic dust, fumes or other contaminants

39.—(1) Where any process or work carried on in any workplace is likely to produce or give off any toxic dust, fumes, gas, vapour, mist, fibre or other contaminants, all reasonably practicable measures shall be taken to —

- (a) prevent their accumulation in the workplace; and
 - (b) protect persons at work in the workplace against exposure to the toxic dust, fumes, gas, vapour, mist, fibre or other contaminants through inhalation, ingestion or skin contact.
- (2) The measures to be taken under paragraph (1) shall, where appropriate, include one or more of the following:
- (a) carrying out the process or work in isolated areas where persons not connected with the process or work are prohibited from being present;
 - (b) carrying out the process or work in closed vessels or systems to prevent persons at work in the workplace from coming into contact with the toxic dust, fumes, gas, vapour, mist, fibre or other contaminants;

(c) providing adequate ventilation to dilute the fumes, gas, vapour, mist, fibre or other contaminants;

(d) providing local exhaust ventilation to remove the toxic dust, fumes, gas, vapour, mist, fibre or other contaminants at their sources of emission; and

(e) carrying out the process or work wet.

(3) The local exhaust ventilation system referred to in paragraph (2) (d) shall be so designed, constructed, operated and maintained that the toxic dust, fumes, gas, vapour, mist, fibre or other contaminants are safely and effectively removed at the source of generation and are not dispersed or scattered in the surrounding air.

(4) Accumulation of toxic dust fibre or waste on the floors, walls, work benches or other surfaces in any workplace shall be removed by washing, vacuum cleaning or other suitable means in a manner that will not make the toxic dust fibre or waste airborne.

(5) No stationary internal combustion engine shall be used unless provision is made for conducting the exhaust gases from the engine into the open air.

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

(7) Notwithstanding paragraph (6), the Commissioner may, by order in writing, require the occupier of a workplace to engage a competent person —

(a) to monitor, test or assess the environment of any workplace for potential health hazards; and

(b) to take air samples in the breathing zone of the persons who are exposed to toxic dust, fumes, gases, vapours, mists, fibres or other contaminants by using appropriate personal sampling equipment.

(8) A record of the result of every test carried out under paragraphs (6) and (7) shall be kept available for inspection by an inspector for at least 5 years from the date of the test or such other period as the Commissioner may specify in writing.

(9) Paragraphs (1), (2), (6) and (7) shall not apply to any workplace where —

(a) it is impracticable to comply with such requirements; and

(b) suitable air-supplied breathing apparatus is used by every person at the workplace.

(10) The air-supplied breathing apparatus used under paragraph (9) shall be supplied with air —

(a) of a temperature and humidity comfortable for breathing; and

(b) which has been suitably treated to remove particles of any material, oil mist, vapour, odour, carbon monoxide and carbon dioxide.

(11) It shall be the duty of the occupier of a workplace to comply with paragraphs (1) to (6), (8) and (10).

(12) It shall be the duty of a competent person to exercise all due diligence in conducting any test under this regulation.

Permissible exposure levels of toxic substances

40.—(1) It shall be the duty of the occupier of a workplace to take all reasonably practicable measures to ensure that no person at work in the workplace is exposed to the toxic substances specified in the First Schedule in excess of the permissible exposure levels specified in that Schedule.

(2) Where the PEL (Short Term) of a toxic substance is not specified in the First Schedule, the PEL (Short Term) of the substance shall be deemed to be exceeded if the time weighted average concentration of the substance measured over a 15-minute period during any working day exceeds 5 times the PEL (Long Term) of that substance as specified in that Schedule.

(3) Where there is exposure to more than one toxic substance at the same time and the substances have similar harmful effects, the permissible exposure level shall be deemed to have been exceeded if the sum of the ratios between the time weighted average concentration and the permissible exposure level of each substance exceeds one.

Hazardous substances

41.—(1) All hazardous substances in a workplace shall be placed under the control of a competent person who has adequate knowledge of the properties of the hazardous substances and their dangers.

(2) Adequate warning notices in languages understood by all persons at work in a workplace specifying the nature of the danger of the hazardous substances shall be placed —

(a) at all entrances to any workroom; and

(b) at appropriate locations,

where the hazardous substances are used or present.

(3) Persons at work in a workplace who are liable to be exposed to hazardous substances shall be warned of the hazards involved and the precautionary measures to be taken.

(4) All hazardous substances in a workplace shall be kept, stored, used, handled or disposed of in such a manner as not to pose a risk to the health and safety of any person at work in the workplace.

(5) It shall be the duty of the occupier of a workplace to comply with paragraphs (1) to (4).

(6) Any person at work in a workplace who wilfully or recklessly does any act that may result in any other person being exposed to hazardous substances shall be guilty of an 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.

Warning labels

42. It shall be the duty of the occupier of a workplace in which there is any container of hazardous substances to ensure that, so far as is reasonably practicable, every such container is affixed with one or more warning labels that conform with —

- (a) any Singapore Standard relating to the classification and labelling of hazardous substances; or
- (b) such other standards, codes of practice or guidance relating to the classification and labelling of hazardous substances as is issued or approved by the Council.

Safety data sheet

43.—(1) Where any hazardous substance is used, handled or stored in a workplace, it shall be the duty of the occupier of the workplace to —

- (a) obtain a safety data sheet of the substance;
- (b) assess the information in the safety data sheet and take precautionary measures to ensure the safe use of the substance; and
- (c) make available the safety data sheet to all persons at work in the workplace who are liable to be exposed to the substance.

(2) Where any hazardous substance is sold to any person for use in a workplace, it shall be the duty of the seller or any agent of the seller who caused or procured the sale to provide the buyer with a safety data sheet for the substance that —

- (a) gives accurate and adequate information on the substance; and
- (b) conforms with any Singapore Standard relating to safety data sheets or such other standards, codes of practice or guidance as is issued or approved by the Council.

(3) Any seller or agent of any seller who fails to provide a safety data sheet under paragraph (2) or any person who provides inaccurate, inadequate or misleading information in a safety data sheet shall be guilty of an offence and shall be liable on conviction to a fine not exceeding \$10,000.

Exclusion from regulations 41, 42 and 43

44.—(1) Regulations 41, 42 and 43 shall not apply in respect of the use, handling or storage in a workplace, or the sale for use in a workplace, of any hazardous substance that is in a consumer package and that is intended for retail sale.

(2) In this regulation —

“consumer package” means a container that is intended for retail display and sale to households or offices, and includes a container that is transported or distributed as part of a larger consolidated container that consists of a number of identical consumer packages;

“container” means anything in or by which substances are or have been wholly or partly encased, covered or packed.

PART V

MISCELLANEOUS

Offence

45. Any person who contravenes any provision of these Regulations which imposes a duty on him for which no penalty is expressly provided shall be guilty of an 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.

FIRST SCHEDULE

Regulations 2 and 40

PERMISSIBLE EXPOSURE LEVELS OF TOXIC SUBSTANCES

<i>Toxic Substance</i>	<i>Permissible Exposure Level (PEL)</i>			
	<i>PEL (Long Term)</i>		<i>PEL (Short Term)</i>	
	<i>ppm^a</i>	<i>mg/m^{3 b}</i>	<i>ppm^a</i>	<i>mg/m^{3 b}</i>
Acetaldehyde	—	—	25	45
Acetic acid	10	25	15	37
Acetic anhydride	5	21	—	—
Acetone	750	1780	1000	2380
Acetone cyanohydrin	—	—	4.7	5
Acetonitrile	40	67	60	101
Acetophenone	10	49	—	—
Acetylene tetrabromide	1	14	—	—
Acrolein	0.1	0.23	0.3	0.69
Acrylamide	—	0.03	—	—
Acrylic acid	2	5.9	—	—
Acrylonitrile (Vinyl cyanide)	2	4.3	—	—
Adipic acid	—	5	—	—
Adiponitrile	2	8.8	—	—

Aldrin	—	0.25	—	—
Allyl alcohol	2	4.8	4	9.5
Allyl chloride	1	3	2	6
Allyl glycidyl ether (AGE)	5	23	10	47
Allyl propyl disulfide	2	12	3	18
Aluminium				
Metal dust	—	10	—	—
Pyro powders, as Al	—	5	—	—
Welding fumes, as Al	—	5	—	—
Soluble salts, as Al	—	2	—	—
Alkyls, as Al	—	2	—	—
Aluminium oxide	—	10	—	—
2-Aminopyridine	0.5	1.9	—	—
Amitrole	—	0.2	—	—
Ammonia	25	17	35	24
Ammonium chloride fume	—	10	—	20
Ammonium perfluorooctanoate	—	0.01	—	—
Ammonium sulfamate	—	10	—	—
n-Amyl acetate	100	532	—	—
sec-Amyl acetate	125	665	—	—
Aniline	2	7.6	—	—
Anisidine	0.1	0.5	—	—
Antimony and compounds, as Sb	—	0.5	—	—

Antimony trioxide, as Sb	—	0.5	—	—
Arsenic, elemental and inorganic compounds, as As	—	0.01	—	—
Arsine	0.05	0.16	—	—
Asbestos (all forms)	—	0.1 (fibre/cc)	—	—
Asphalt (petroleum) fumes	—	5	—	—
Atrazine	—	5	—	—
Azinphos-methyl	—	0.2	—	—
Barium, soluble compounds, as Ba	—	0.5	—	—
Barium sulfate	—	10	—	—
Benomyl	0.84	10	—	—
Benzene	1	3.18	—	—
Benzoyl peroxide	—	5	—	—
Benzyl chloride	1	5.2	—	—
Beryllium and compounds, as Be	—	0.002	—	—
Biphenyl	0.2	1.3	—	—
Bismuth telluride,				
Undoped	—	10	—	—
Se-doped	—	5	—	—
Borates, tetra sodium salts				
Anhydrous	—	1	—	—
Decahydrate	—	5	—	—
Pentahydrate	—	1	—	—

Boron oxide	—	10	—	—
Boron tribromide	—	—	1	10
Boron trifluoride	—	—	1	2.8
Bromacil	—	10	—	—
Bromine	0.1	0.66	0.2	1.3
Bromine pentafluoride	0.1	0.72	—	—
Bromoform	0.5	5.2	—	—
1,3-Butadiene	2	4.4	—	—
Butane	800	1900	—	—
n-Butanol	—	—	50	152
sec-Butanol	100	303	—	—
tert-Butanol	100	303	—	—
2-Butoxyethanol (EGBE)	25	121	—	—
n-Butyl acetate	150	713	200	950
sec-Butyl acetate	200	950	—	—
tert-Butyl acetate	200	950	—	—
n-Butyl acrylate	10	52	—	—
n-Butylamine	—	—	5	15
tert-Butyl chromate, as CrO ₃	—	—	—	0.1
n-Butyl glycidyl ether (BGE)	25	133	—	0.1
n-Butyl lactate	5	30	—	—
Butyl mercaptan (Butanethiol)	0.5	1.8	—	—
o-sec-Butylphenol	5	31	—	—

p-tert-Butyl toluene	1	6.1	—	—
Cadmium, as Cd				
Elemental	—	0.01	—	—
Compounds	—	0.002	—	—
Calcium carbonate (Limestone, Marble)	—	10	—	—
Calcium chromate, as Cr	—	0.001	—	—
Calcium cyanamide	—	0.5	—	—
Calcium cyanide	—	—	—	5
Calcium hydroxide	—	5	—	—
Calcium oxide	—	2	—	—
Calcium silicate	—	10	—	—
Calcium sulfate	—	10	—	—
Camphor	2	12	3	19
Caprolactam				
Dust	—	1	—	3
Vapour	5	23	10	46
Captafol	—	0.1	—	—
Captan	—	5	—	—
Carbaryl	—	5	—	—
Carbofuran	—	0.1	—	—
Carbon black	—	3.5	—	—
Carbon dioxide	5000	9000	30,000	54,000
Carbon disulfide	10	31	—	—

Carbon monoxide	25	29	—	—
Carbon tetrabromide	0.1	1.4	0.3	4.1
Carbon tetrachloride (Tetrachloromethane)	5	31	10	63
Carbonyl fluoride	2	5.4	5	13
Catechol (Pyrocatechol)	5	23	—	—
Cellulose	—	10	—	—
Cesium hydroxide	—	2	—	—
Chlordane	—	0.5	—	—
Chlorinated camphene (Toxaphene)	—	0.5	—	—
Chlorinated diphenyl oxide	—	0.5	—	—
Chlorine	0.5	1.5	1	2.9
Chlorine dioxide	0.1	0.28	0.3	0.83
Chlorine trifluoride	—	—	0.1	0.38
Chloroacetaldehyde	—	—	1	3.2
Chloroacetone	—	—	1	3.8
2-Chloroacetophenone (Phenacyl chloride)	0.05	0.32	—	—
Chloroacetyl chloride	0.05	0.23	0.15	0.69
Chlorobenzene (Monochlorobenzene)	10	46	—	—
o-Chlorobenzylidene malononitrile	—	—	0.05	0.39
Chlorobromomethane (Bromochloromethane)	200	1060	—	—
Chlorodifluoromethane	1000	3540	—	—
Chlorodiphenyl (42% chlorine)	—	1	—	—

Chlorodiphenyl (54% chlorine)	—	0.5	—	—
Chloroform (Trichloromethane)	10	49	—	—
bis (Chloromethyl) ether	0.001	0.0047	—	—
1-Chloro-1-nitropropane	2	10	—	—
Chloropentafluoroethane	1000	6320	—	—
Chloropicrin (Trichloronitromethane)	0.1	0.67	—	—
β -Chloroprene (2-Chloro-1,3-butadiene)	10	36	—	—
2-Chloropropionic acid	0.1	0.44	—	—
o-Chlorostyrene	50	283	75	425
o-Chlorotoluene	50	259	—	—
Chlorpyrifos	—	0.2	—	—
Chromium, metal and inorganic compounds, as Cr				
Metal and Cr III compounds	—	0.5	—	—
Water-soluble Cr VI compounds	—	0.05	—	—
Insoluble Cr VI compounds	—	0.01	—	—
Chromyl chloride	0.025	0.16	—	—
Clopidol	—	10	—	—
Coal, respirable dust	—	2	—	—
Coal tar pitch volatiles (Polycyclic aromatic hydrocarbons), as benzene solubles	—	0.2	—	—
Cobalt, elemental and inorganic compounds, as Co	—	0.02	—	—
Cobalt carbonyl, as Co	—	0.1	—	—

Cobalt hydrocarbonyl, as Co	—	0.1	—	—
Copper				
Fume	—	0.2	—	—
Dusts and mists, as Cu	—	1	—	—
Cotton dust, raw	—	0.2	—	—
Cresol	5	22	—	—
Crotonaldehyde	2	5.7	—	—
Crufomate	—	5	—	—
Cumene	50	246	—	—
Cyanamide	—	2	—	—
Cyanogen	10	21	—	—
Cyanogen chloride	—	—	0.3	0.75
Cyclohexane	300	1030	—	—
Cyclohexanol	50	206	—	—
Cyclohexanone	25	100	—	—
Cyclohexene	300	1010	—	—
Cyclohexylamine	10	41	—	—
Cyclonite	—	1.5	—	—
Cyclopentadiene	75	203	—	—
Cyclopentane	600	1720	—	—
Cyhexatin (Tricyclo hexyltin)	—	5	—	—
DDT (Dichlorodiphenyltrichloroethane)	—	1	—	—
Decaborane	0.05	0.25	0.15	0.75

Demeton	0.01	0.11	—	—
Diacetone alcohol (4-Hydroxy-4-methyl-2-pentanone)	50	238	—	—
Diazinon	—	0.1	—	—
Diazomethane	0.2	0.34	—	—
Diborane	0.1	0.11	—	—
2-N-Dibutylaminoethanol	0.5	3.5	—	—
Dibutyl phenyl phosphate	0.3	3.5	—	—
Dibutyl phosphate	1	8.6	2	17
Dibutyl phthalate	—	5	—	—
Dichloroacetylene	—	—	0.1	0.39
o-Dichlorobenzene	25	150	50	301
p-Dichlorobenzene	10	60	—	—
1,4-Dichloro-2-butene	0.005	0.025	—	—
Dichlorodifluoromethane	1000	4950	—	—
1,3-Dichloro-5,5-dimethyl hydantoin	—	0.2	—	0.4
1,1-Dichloroethane (Ethylidene chloride)	100	405	—	—
1,2-Dichloroethylene (Acetylene dichloride)	200	793	—	—
Dichloroethyl ether	5	29	10	58
Dichlorofluoromethane	10	42	—	—
1,1-Dichloro-1-nitroethane	2	12	—	—
1,3-Dichloropropene	1	4.5	—	—

2,2-Dichloropropionic acid	1	5.8	—	—
Dichlorotetrafluoroethane	1000	6990	—	—
Dichlorvos	0.1	0.90	—	—
Dicrotophos	—	0.25	—	—
Dicyclopentadiene	5	27	—	—
Dicyclopentadienyl iron	—	10	—	—
Dieldrin	—	0.25	—	—
Diethanolamine	0.46	2	—	—
Diethylamine	5	15	15	45
2-Diethylaminoethanol	2	9.6	—	—
Diethylene triamine	1	4.2	—	—
Diethyl ketone	200	705	—	—
Diethyl phthalate	—	5	—	—
Difluorodibromomethane	100	858	—	—
Diglycidyl ether (DGE)	0.1	0.53	—	—
Diisobutyl ketone (2,6-Dimethyl-4-heptanone)	25	145	—	—
Diisopropylamine	5	21	—	—
N,N-Dimethyl acetamide	10	36	—	—
Dimethylamine	5	9.2	15	27.6
Dimethylaniline (N,N-Dimethylaniline)	5	25	10	50
Dimethylformamide	10	30	—	—
1,1-Dimethylhydrazine	0.5	1.2	—	—

Dimethylphthalate	—	5	—	—
Dimethyl sulfate	0.1	0.52	—	—
Dinitolmide (3,5-Dinitro-o-toluamide)	—	5	—	—
Dinitrobenzene	0.15	1.0	—	—
Dinitro-o-cresol	—	0.2	—	—
Dinitrotoluene	—	0.15	—	—
Dioxane	25	90	—	—
Dioxathion	—	0.2	—	—
Diphenylamine	—	10	—	—
Dipropylene glycol methyl ether	100	606	150	909
Dipropyl ketone	50	233	—	—
Diquat				
Total dust	—	0.5	—	—
Respirable dust	—	0.1	—	—
Di-sec-octyl phthalate (Di (-2-ethylhexyl) phthalate)	—	5	—	10
Disulfiram	—	2	—	—
Disulfoton	—	0.1	—	—
2,6-Di-tert-butyl-p-cresol	—	10	—	—
Diuron	—	10	—	—
Divinyl benzene	10	53	—	—
Emery	—	10	—	—
Endosulfan	—	0.1	—	—

Endrin	—	0.1	—	—
Enflurane	75	566	—	—
Epichlorohydrin (1-Chloro-2, 3-epoxypropane)	2	7.6	—	—
EPN	—	0.1	—	—
Ethanol (Ethyl alcohol)	1000	1880	—	—
Ethanolamine	3	7.5	6	15
Ethion	—	0.4	—	—
2-Ethoxyethanol (EGEE)	5	18	—	—
2-Ethoxyethyl acetate (EGEEA)	5	27	—	—
Ethyl acetate	400	1440	—	—
Ethyl acrylate	5	20	15	61
Ethylamine	5	9.2	15	27.6
Ethyl amyl ketone (5-Methyl-3-heptanone)	25	131	—	—
Ethyl benzene	100	434	125	543
Ethyl bromide	5	22	—	—
Ethyl butyl ketone (3-Heptanone)	50	234	—	—
Ethyl chloride	1000	2640	—	—
Ethylene chlorohydrin	—	—	1	3.3
Ethylenediamine (1,2-Diaminoethane)	10	25	—	—
Ethylene dichloride (1,2-Dichloroethane)	10	40	—	—
Ethylene glycol	—	—	50	127
Ethylene glycol dinitrate	0.05	0.31	—	—

Ethylene oxide	1	1.8	—	—
Ethylenimine	0.5	0.88	—	—
Ethyl ether (Diethyl ether)	400	1210	500	1520
Ethyl formate	100	303	—	—
Ethylidene norbornene	—	—	5	25
Ethyl mercaptan (Ethanethiol)	0.5	1.3	—	—
N-Ethylmorpholine	5	24	—	—
Ethyl silicate	10	85	—	—
Fenamiphos	—	0.1	—	—
Fensulfothion	—	0.1	—	—
Fenthion	—	0.2	—	—
Ferbam	—	10	—	—
Ferrovandium dust	—	1	—	3
Fibrous glass dust	—	10	—	—
Fluorides, as F	—	2.5	—	—
Fluorine	1	1.6	2	3.1
Fonofos	—	0.1	—	—
Formaldehyde	—	—	0.3	0.37
Formamide	10	18	—	—
Formic acid	5	9.4	10	19
Furfural	2	7.9	—	—
Furfuryl alcohol	10	40	15	60
Gasoline	300	890	500	1480

Germanium tetrahydride	0.2	0.63	—	—
Glutaraldehyde	—	—	0.2	0.82
Glycerin mist	—	10	—	—
Glycidol (2,3-Epoxy-1-propanol)	25	76	—	—
Grain dust (oat, wheat, barley)	—	4	—	—
Graphite, respirable dust	—	2	—	—
Hafnium	—	0.5	—	—
Halothane	50	404	—	—
Heptachlor and Heptachlor epoxide	—	0.05	—	—
Heptane	400	1640	500	2050
Hexachlorobenzene	—	0.025	—	—
Hexachlorobutadiene	0.02	0.21	—	—
Hexachlorocyclopentadiene	0.01	0.11	—	—
Hexachloroethane	1	9.7	—	—
Hexachloronaphthalene	—	0.2	—	—
Hexafluoroacetone	0.1	0.68	—	—
Hexamethylene diisocyanate	0.005	0.034	—	—
1,6-Hexanediamine	0.5	2.3	—	—
Hexane (n-Hexane)	50	176	—	—
Other isomers	500	1760	1000	3500
sec-Hexyl acetate	50	295	—	—
Hexylene glycol	—	—	25	121
Hydrazine	0.1	0.13	—	—

Hydrogenated terphenyls	0.5	4.9	—	—
Hydrogen bromide	—	—	3	9.9
Hydrogen chloride	—	—	5	7.5
Hydrogen cyanide	—	—	4.7	5
Hydrogen fluoride	—	—	3	2.6
Hydrogen peroxide	1	1.4	—	—
Hydrogen selenide	0.05	0.16	—	—
Hydrogen sulfide	10	14	15	21
Hydroquinone (Dihydroxy benzene)	—	2	—	—
2-Hydroxypropyl acrylate	0.5	2.8	—	—
Indene	10	48	—	—
Indium and compounds, as In	—	0.1	—	—
Iodine	—	—	0.1	1.0
Iodoform	0.6	10	—	—
Iron oxide dust and fume, as Fe	—	5	—	—
Iron pentacarbonyl, as Fe	0.1	0.23	0.2	0.45
Iron salts, soluble, as Fe	—	1	—	—
Isoamyl acetate	100	532	—	—
Isoamyl alcohol	100	361	125	452
Isobutyl acetate	150	713	—	—
Isobutyl alcohol	50	152	—	—
Isooctyl alcohol	50	266	—	—
Isophorone	—	—	5	28

Isophorone diisocyanate	0.005	0.045	—	—
Isopropoxyethanol	25	106	—	—
Isopropyl acetate	250	1040	310	1290
Isopropyl alcohol	400	983	500	1230
Isopropylamine	5	12	10	24
N-Isopropylaniline	2	11	—	—
Isopropyl ether	250	1040	310	1300
Isopropyl glycidyl ether (IGE)	50	238	75	356
Kaolin, respirable dust	—	2	—	—
Ketene	0.5	0.86	1.5	2.6
Lead, inorganic dusts and fumes, as Pb	—	0.15	—	—
Lead arsenate	—	0.15	—	—
Lead chromate				
as Pb	—	0.05	—	—
as Cr	—	0.012	—	—
Lindane	—	0.5	—	—
Lithium hydride	—	0.025	—	—
L.P.G. (Liquified petroleum gas)	1000	1800	—	—
Magnesite	—	10	—	—
Magnesium oxide fume	—	10	—	—
Malathion	—	10	—	—
Maleic anhydride	0.25	1.0	—	—
Manganese, as Mn				

Dust and compounds	—	1	—	—
Fume	—	1	—	3
Manganese cyclopentadienyl tricarbonyl, as Mn	—	0.1	—	—
Mercury				
Alkyl compounds	—	0.01	—	0.03
Aryl compounds	—	0.1	—	—
Inorganic forms including metallic mercury	—	0.025	—	—
Mesityl oxide	15	60	25	100
Methacrylic acid	20	70	—	—
Methanol (Methyl alcohol)	200	262	250	328
Methomyl	—	2.5	—	—
Methoxychlor	—	10	—	—
2-Methoxyethanol (EGME)	5	16	—	—
2-Methoxyethyl acetate (Ethylene glycol methyl ethyl acetate, EGMEA)	5	24	—	—
4-Methoxyphenol	—	5	—	—
Methyl acetate	200	606	250	757
Methyl acetylene (Propyne)	1000	1640	—	—
Methyl acetylene-propadiene mixture (MAPP)	1000	1640	1250	2050
Methyl acrylate	10	35	—	—
Methylacrylonitrile	1	2.7	—	—
Methylal (Dimethoxymethane)	1000	3110	—	—

Methylamine	5	6.4	15	19
Methyl n-amyl ketone (2-Heptanone)	50	233	—	—
N-Methyl aniline	0.5	2.2	—	—
Methyl bromide	5	19	—	—
Methyl-tert butyl ether	40	144	—	—
Methyl n-butyl ketone (2-Hexanone)	5	20	—	—
Methyl chloride	50	103	100	207
Methyl 2-cyanoacrylate	2	9.1	4	18
Methylcyclohexane	400	1610	—	—
Methylcyclohexanol	50	234	—	—
0-Methylcyclohexanone	50	229	75	344
2-Methylcyclopentadienyl manganese tricarbonyl, as Mn	—	0.2	—	—
Methyl demeton	—	0.5	—	—
Methylene bisphenyl isocyanate (MDI, Diphenyl methane diisocyanate)	0.005	0.051	—	—
Methylene chloride (Dichloromethane)	50	174	—	—
4,4'-methylene bis (2-chloroaniline) [MOCA]	0.01	0.11	—	—
Methylene bis (4-cyclo-hexylisocyanate)	0.005	0.054	—	—
4,4'-Methylene dianiline	0.1	0.81	—	—
Methyl ethyl ketone (MEK, 2-Butanone)	200	590	300	885
Methyl ethyl ketone peroxide	—	—	0.2	1.5
Methyl formate	100	246	150	368

Methyl hydrazine	—	—	0.2	0.38
Methyl iodide	2	12	—	—
Methyl isoamyl ketone	50	234	—	—
Methyl isobutyl carbinol (Methyl amyl alcohol)	25	104	40	167
Methyl isobutyl ketone (Hexone)	50	205	75	307
Methyl isocyanate	0.02	0.047	—	—
Methyl isopropyl ketone	200	705	—	—
Methyl mercaptan (Methanethiol)	0.5	0.98	—	—
Methyl methacrylate	100	410	—	—
Methyl parathion	—	0.2	—	—
Methyl propyl ketone (2-Pentanone)	200	705	250	881
Methyl silicate	1	6	—	—
α Methyl styrene	50	242	100	483
Metribuzin	—	5	—	—
Mevinphos (Phosdrin)	0.01	0.092	0.03	0.27
Mica, respirable dust	—	3	—	—
Mineral wool fiber	—	10	—	—
Molybdenum, as Mo				
Soluble compounds	—	5	—	—
Insoluble compounds	—	10	—	—
Monocrotophos	—	0.25	—	—
Morpholine	20	71	—	—

Naled (Dimethyl-1,2-dibromo-2,2-dichloroethyl phosphate)	—	3	—	—
Naphtha	300	1370	—	—
Naphthalene	10	52	15	79
Nickel				
Metal	—	1	—	—
Insoluble compounds, as Ni	—	1	—	—
Soluble compounds, as Ni	—	0.1	—	—
Nickel carbonyl, as Ni	0.05	0.12	—	—
Nickel sulfide, as Ni	—	1	—	—
Nicotine	—	0.5	—	—
Nitrapyrin (2-Chloro-6-(trichloromethyl)pyridine)	—	10	—	20
Nitric acid	2	5.2	4	10
Nitric oxide	25	31	—	—
p-Nitroaniline	—	3	—	—
Nitrobenzene	1	5	—	—
p-Nitrochlorobenzene	0.1	0.64	—	—
Nitroethane	100	307	—	—
Nitrogen dioxide	3	5.6	5	9.4
Nitrogen trifluoride	10	29	—	—
Nitroglycerin (NG)	0.05	0.46	—	—
Nitromethane	20	50	—	—
1-Nitropropane	25	91	—	—

2-Nitropropane	10	36	—	—
Nitrotoluene	2	11	—	—
Nitrous oxide	50	90	—	—
Nonane	200	1050	—	—
Nuisance particulates	—	10	—	—
Octachloronaphthalene	—	0.1	—	0.3
Octane	300	1400	375	1750
Oil Mist, mineral	—	5	—	10
Osmium tetroxide, as Os	0.0002	0.0016	0.0006	0.0047
Oxalic acid	—	1	—	2
Oxygen difluoride	—	—	0.05	0.11
Ozone	—	—	0.1	0.20
Paraffin wax fume	—	2	—	—
Paraquat				
Total dust	—	0.5	—	—
Respirable dust	—	0.1	—	—
Parathion	—	0.1	—	—
Pentaborane	0.005	0.013	0.015	0.039
Pentachloronaphthalene	—	0.5	—	—
Pentachloronitrobenzene	—	0.5	—	—
Pentachlorophenol	—	0.5	—	—
Pentaerythritol	—	10	—	—
Pentane	600	1770	750	2210

Perchloroethylene (Tetrachloroethylene)	25	170	100	685
Perchloromethyl mercaptan	0.1	0.76	—	—
Perchloryl fluoride	3	13	6	25
Perfluoroisobutylene	—	—	0.01	0.082
Perlite	—	10	—	—
Phenol	5	19	—	—
Phenothiazine	—	5	—	—
Phenylenediamine	—	0.1	—	—
Phenyl ether	1	7	2	14
Phenyl glycidyl ether (PGE)	0.1	0.6	—	—
Phenylhydrazine	0.1	0.44	—	—
Phenyl mercaptan	0.5	2.3	—	—
Phenylphosphine	—	—	0.05	0.23
Phorate	—	0.05	—	0.2
Phosgene	0.1	0.40	—	—
Phosphine	0.3	0.42	1	1.4
Phosphoric acid	—	1	—	3
Phosphorus	0.02	0.1	—	—
Phosphorus oxychloride	0.1	0.63	—	—
Phosphorus pentachloride	0.1	0.85	—	—
Phosphorus pentasulfide	—	1	—	3
Phosphorus trichloride	0.2	1.1	0.5	2.8
Phthalic anhydride	1	6.1	—	—

m-Phthalodinitrile	—	5	—	—
Picloram	—	10	—	—
Picric acid (2,4,6-Trinitrophenol)	—	0.1	—	—
Pindone (2-Pivalyl-1,3-indandione)	—	0.1	—	—
Piperazine dihydrochloride	—	5	—	—
Platinum				
Metal	—	1	—	—
Soluble salts, as Pt	—	0.002	—	—
Portland cement	—	10	—	—
Potassium cyanide	—	—	—	5
Potassium hydroxide	—	—	—	2
Propargyl alcohol	1	2.3	—	—
β-Propiolactone	0.5	1.5	—	—
Propionic acid	10	30	—	—
Propoxur	—	0.5	—	—
n-Propyl acetate	200	835	250	1040
n-Propyl alcohol	200	492	250	614
Propylene dichloride (1,2-Dichloropropane)	75	347	110	508
Propylene glycol dinitrate	0.05	0.34	—	—
Propylene glycol monomethyl ether	100	369	150	553
Propylene imine	2	4.7	—	—
Propylene oxide (1,2-Epoxypropane)	20	48	—	—

n-Propyl nitrate	25	107	40	172
Pyrethrum	—	5	—	—
Pyridine	5	16	—	—
Quinone	0.1	0.44	—	—
Resorcinol	10	45	20	90
Rhodium				
Metal	—	1	—	—
Insoluble compounds, as Rh	—	1	—	—
Soluble compounds, as Rh	—	0.01	—	—
Ronnel	—	10	—	—
Rotenone	—	5	—	—
Rouge	—	10	—	—
Selenium and compounds, as Se	—	0.2	—	—
Selenium hexafluoride	0.05	0.16	—	—
Sesone	—	10	—	—
Silica-Amorphous				
Diatomaceous earth (uncalcined)	—	10	—	—
Precipitated silica	—	10	—	—
Silica, fume, respirable dust	—	2	—	—
Silica, fused, respirable dust	—	0.1	—	—
Silica gel	—	10	—	—
Silica-Crystalline				
Cristobalite, respirable dust	—	0.05	—	—

Quartz, respirable dust	—	0.1	—	—
Tridymite, respirable dust	—	0.05	—	—
Tripoli, respirable dust	—	0.1	—	—
Silicon	—	10	—	—
Silicon carbide	—	10	—	—
Silicon tetrahydride	5	6.6	—	—
Silver				
Metal	—	0.1	—	—
Soluble compounds, as Ag	—	0.01	—	—
Soapstone				
Respirable dust	—	3	—	—
Total dust	—	6	—	—
Sodium azide as Hydrazoic acid	—	—	—	0.29
vapour	—	—	0.11	—
Sodium bisulfite	—	5	—	—
Sodium cyanide	—	—	—	5
Sodium fluoroacetate	—	0.05	—	—
Sodium hydroxide	—	—	—	2
Sodium metabisulfite	—	5	—	—
Starch	—	10	—	—
Stearates	—	10	—	—
Stibine	0.1	0.51	—	—
Stoddard solvent	100	525	—	—

Strontium chromate	—	0.0005	—	—
Strychnine	—	0.15	—	—
Styrene, monomer (Phenylethylene, vinyl benzene)	50	213	100	426
Subtilisins	—	—	—	0.00006
Sucrose	—	10	—	—
Sulfometuron methyl	—	5	—	—
Sulfotep	—	0.2	—	—
Sulfur dioxide	2	5.2	5	13
Sulfur hexafluoride	1000	5970	—	—
Sulfuric acid	—	1	—	3
Sulfur monochloride	—	—	1	5.5
Sulfur pentafluoride	—	—	0.01	0.10
Sulfur tetrafluoride	—	—	0.1	0.44
Sulfuryl fluoride	5	21	10	42
Sulprofos	—	1	—	—
Talc	—	2	—	—
Tantalum, metal and oxide, as Ta	—	5	—	—
Tellurium and compounds, as Te	—	0.1	—	—
Tellurium hexafluoride	0.02	0.10	—	—
Temephos	—	10	—	—
Terephthalic acid	—	10	—	—
TEPP	0.004	0.047	—	—

Terphenyls	—	—	0.53	5
1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4170	—	—
1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4170	—	—
1,1,2,2-Tetrachloroethane	1	6.9	—	—
Tetrachloronaphthalene	—	2	—	—
Tetraethyl lead, as Pb	—	0.1	—	—
Tetrahydrofuran	200	590	250	737
Tetramethyl lead, as Pb	—	0.15	—	—
Tetramethyl succinonitrile	0.5	2.8	—	—
Tetranitromethane	0.005	0.04	—	—
Tetrasodium pyrophosphate	—	5	—	—
Tetryl (2,4,6-Trinitrophenyl methylnitramine)	—	1.5	—	—
Thallium, elemental and soluble compounds, as Tl	—	0.1	—	—
4,4'-Thiobis (6-tert-butyl-m-cresol)	—	10	—	—
Thioglycolic acid	1	3.8	—	—
Thioyl chloride	—	—	1	4.9
Thiram	—	1	—	—
Tin				
Metal	—	2	—	—
Oxide inorganic compounds, as Sn	—	2	—	—
Organic compounds, as Sn	—	0.1	—	0.2
Titanium dioxide	—	10	—	—

Toluene (Toluol)	50	188	—	—
Toluene-2,4-diisocyanate (TDI)	0.005	0.036	0.02	0.14
Toluidine	2	8.8	—	—
Tributyl phosphate	0.2	2.2	—	—
Trichloroacetic acid	1	6.7	—	—
1,2,4-Trichlorobenzene	—	—	5	37
1,1,1-Trichloroethane (Methyl chloroform)	350	1910	450	2460
1,1,2-Trichloroethane	10	55	—	—
Trichloroethylene	50	269	100	537
Trichlorofluoromethane	—	—	1000	5620
Trichloronaphthalene	—	5	—	—
1,2,3-Trichloropropane	10	60	—	—
1,1,2-Trichloro-1,2,2-trifluoroethane	1000	7670	1250	9590
Triethanolamine	—	5	—	—
Triethylamine	1	4.1	5	20.7
Trifluorobromomethane	1000	6090	—	—
Trimellitic anhydride	—	—	—	0.04
Trimethylamine	5	12	15	36
Trimethyl benzene	25	123	—	—
Trimethyl phosphate	2	10	—	—
2,4,6-Trinitrotoluene (TNT)	—	0.5	—	—
Triorthocresyl phosphate	—	0.1	—	—
Triphenyl amine	—	5	—	—

Triphenyl phosphate	—	3	—	—
Tungsten, as W				
Insoluble compounds	—	5	—	10
Soluble compounds	—	1	—	3
Turpentine	100	566	—	—
Uranium				
Soluble & Insoluble compounds, as U	—	0.2	—	0.6
n-Valeraldehyde	50	176	—	—
Vanadium pentoxide Respirable dust or fume	—	0.05	—	—
Vegetable oil mists	—	10	—	—
Vinyl acetate	10	35	15	53
Vinyl bromide	5	22	—	—
Vinyl chloride (Chloroethylene)	5	13	—	—
4-Vinyl cyclohexene	0.1	0.4	—	—
Vinyl cyclohexene dioxide	10	57	—	—
Vinylidene chloride (1,1-Dichloroethylene)	5	20	20	79
Vinyl toluene	50	242	100	483
Warfarin	—	0.1	—	—
Welding fumes	—	5	—	—
Wood dust				
Hard wood	—	1	—	—
Soft wood	—	5	—	10

Xylene	100	434	150	651
m-Xylene α, α 1-diamine	—	—	—	0.1
Xylidine (dimethylaminobenzene)	0.5	2.5	—	—
Yttrium metal and compounds, as Y	—	1	—	—
Zinc chloride fume	—	1	—	2
Zinc chromates, as Cr	—	0.01	—	—
Zinc oxide				
Fume	—	5	—	10
Dust	—	10	—	—
Zirconium and compounds, as Zr	—	5	—	10

Notes:(a) ppm means parts of the substance per million parts of contaminated air by volume; and(b) mg/m³ means milligrammes of the substance per cubic metre of contaminated air.

SECOND SCHEDULE

Deleted by S 609/2009, wef 01/03/2010.

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