CODE OF PRACTICE -

USING PROTECTIVE CLOTHING AND EQUIPMENT FOR WORKS ON VESSELS

(issued under section 44A of the Shipping and Port Control Ordinance, Cap. 313)

Marine Industrial Safety Section
Marine Department, HKSAR

(1st Edition - January 2007)
(2nd Edition - January 2016)

- The scheduled effective date of this Code of Practice (2nd Edition) is 15.01.2016. A grace period of three months from the effective date will be given until 14.04.2016. Marine Department will continue to enforce the 1st Edition of Code of Practice during the grace period.

- Use of existing serviceable protective clothing and equipment meeting standards stated in Appendix 2 of the 1st Edition of Code of Practice is allowed until the time of the next renewal but should not exceed 18 months from the effective date of the 2nd Edition of Code of Practice (i.e. 14.07.2017).

Record on Updating and Amendments

This Code of Practice is issued under section 44A of the Shipping and Port Control Ordinance (Cap 313). This Code was first notified in the gazette notice on 2nd February 2007 to take effect immediately. Subsequent updating and amendments would be notified to the industry through further notice in the Gazette from time to time. This record sheet is intended for record keeping of the amendment history of this Code.

Amendment No.	Gazette No.	Gazette Date	Effective Date	Topic Areas / pages
01(a)	G.N. 241	15.01.2016	15.01.2016	Paragraphs amended: 2.3, 3.2.1, 4.2.2, 5.3.1, 5.3.2, 5.3.3, 5.3.4, 5.3.5, 5.3.7, 5.4.1, 5.4.2, 6.1, 6.2, 7.4, 9.2.1, 9.2.2, 9.2.3, 9.2.7, 9.2.8, 12.2, 12.2.1, 12.2.3, Appendix 2
01(b)	G.N. 241	15.01.2016	15.01.2016	Paragraphs added: 5.4.7, 6.3, 6.4, 9.2.9, 12.2.2, A2.2.2

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Foreword

Accident investigations reveal that a lot of occupational injuries can be avoided or reduced if proper protective clothing and equipment are worn or used by workers. Protective clothing and equipment should be used in conjunction with engineering, work practice, and administrative controls. It should not be used as a substitute for these controls.

This code of practice (hereafter referred to as the "Code") provides a practical guide to the marine industry on the use of protective clothing and equipment at work and how to comply with section 21 of the Shipping and Port Control (Works) Regulation, Cap. 313X (the "Regulation").

Any protective clothing and equipment used pursuant to the requirements under the Regulation should comply with the relevant standard(s) set out in Appendix. However, compliance with other equivalent national or international standards would also be acceptable.

This approved code of practice is issued by the Director of Marine (the Director) under section 44A(1) of the Shipping and Port Control Ordinance, Cap.313. (the "Ordinance"). Section 44A(1) of the Ordinance empowers the Director to issue code of practice for the purpose of providing guidance in respect of any one or more of the requirements of Part V of the Ordinance or of regulations made under the Ordinance. It is important to note that compliance with this Code does not, of itself, confer immunity from any legal obligations in Hong Kong. Employers, persons in charge of works, and owners and masters of vessels, are reminded to observe other legal requirements during works.

Section 44A(4) of the Ordinance stipulates that a failure by any person to observe a provision of an approved code shall not of itself cause him to incur any criminal liability, but where –

(a) in any criminal proceedings the defendant is alleged to have committed an offence either -
    (i) by reason of a contravention of or a failure to comply with, whether by act or omission, the Ordinance or regulations under the Ordinance; or
    (ii) by reason of a failure to discharge or perform a duty imposed by the Ordinance or such regulations; and
(b) the matter to which the alleged contravention or failure relates is one to which, in the opinion of the court, an approved codes relates,

then the section 44A(5) of the Ordinance shall apply as regards to the proceedings.

Section 44A(5) of the Ordinance stipulates that in any criminal proceedings to which the section applies, the following, namely -

(a) compliance with a provision of an approved code found by the court to be relevant to a matter to which a contravention or failure alleged in the proceedings relates;
(b) a contravention of or failure to comply with, whether by act or omission, any such provision so found,

may be relied on by any party to the proceedings as tending to establish or to negative any liability which is in question in the proceedings.

1. Scope

1.1 This Code provides guidance and reference on the use of protective clothing and equipment for carrying out works on vessels so as to ensure that there is no unnecessary risk of accident or bodily injury.

1.2 Some of the provisions of this Code relate to the statutory obligations under the Ordinance and the Regulation.

1.3 The relevant statutory provisions are indicated at the left margin of the relevant Code. They are mandatory requirements which are to be complied with. Readers should read the relevant statutory provisions for details.

2. Interpretation

Shipping and Port Control (Works) Regulation section 21(4)

2.1 **Ear protector** (聽覺保護器) means a device for hearing protection. Ear protector includes ear-muffs and ear plugs.

Shipping and Port Control Ordinance section 2

2.2 **Person in charge of works** (工程負責人) means -

(a) the owner or master of, or other person having control over, a vessel on, to or by means of which any works are to be, or are being, carried out;

(b) a principal contractor or sub-contractor, if any, who contracts to carry out, or who carries out, any works; or

(c) any other person having for the time being the command or charge of any works being carried out on, to or by means of a vessel.

2.3 **Protective clothing and equipment** (防護衣物及裝備) means a personal protective equipment used by a person employed for carrying out works. It includes clothing or other work accessories designed to protect against workplace hazards.

Shipping and Port Control (Works) Regulation section 21(4)

Protective clothing and equipment includes safety helmet, safety goggles, ear protector, safety footwear, safety harness, respirators, buoyancy aids and other body protection.

3. Responsibility of Employer and Person in Charge of Works

3.1 Provision and Use of Protective Clothing and Equipment

Shipping and Port Control (Works) Regulation section 21

3.1.1 An employer and a person in charge of works shall -

(a) ensure that each person employed is provided with an appropriate safety helmet and, so far as reasonably practicable, other protective clothing and equipment that are appropriate to prevent bodily injury to that person employed; and

(b) take reasonable measures to ensure that a person employed does not remain on board a vessel when works are being carried out unless the person employed is wearing an appropriate safety helmet and, if any other protective clothing and equipment are provided under sub-paragraph (a) above, using those other appropriate protective clothing and equipment.

3.1.2 The protective clothing and equipment provided to the persons employed should comply with standards set by the Commissioner for Labour from time to time, or other equivalent national/international standards. Acceptable standards are shown in Appendix 2.

3.1.3 To reduce the possibility of malfunction of protective clothing and equipment, employers and persons in charge of works must ensure that it is properly fitted and maintained in a clean and serviceable condition. Defective or damaged protective clothing and equipment should not be used.

3.2 Hazard Assessment

3.2.1 Employers and persons in charge of works should assess the workplace, the works environment and the works process, to determine if hazards that require the use of head, eye, face, hand, foot or other body protection equipment are present or are likely to be present. If hazards or the likelihood of hazards are found, employers and persons in charge of works must select and ensure persons employed use properly fitted protective clothing and equipment suitable for protection from these hazards.

3.2.2 It should be noted that the use of protective clothing and equipment may itself cause hazards - for example, through reduced field of vision, loss of dexterity or agility.

3.3 Training and Supervision

3.3.1 Employers and persons in charge of works should train persons employed on the protection limitations of protective clothing and equipment, and on its proper use and maintenance.

Shipping and Port Control (Works) Regulation section 23

3.3.2 Employer and person in charge of works shall ensure the provision of such information, instruction, training and supervision as may be necessary to ensure, so far as reasonable practicable, the safety of a person employed at work.

3.3.3 Before carrying out works which requires the use of protective clothing and equipment, persons employed must be trained and instructed to know: when protective clothing and equipment is necessary, what type is necessary, how it is to be worn/used, and what its limitations are, as well as its proper care, maintenance, useful life, and disposal.

3.3.4 Persons in charge of works are to supervise and monitor persons employed for wearing proper protective clothing and equipment. This includes the steps to monitor the effectiveness of the protective clothing and equipment during use by observing the actual protection provided by the protective clothing and equipment. The results of monitoring would be very useful in providing information for reviewing the selection of the protective clothing and equipment.

3.3.5 Persons in charge of works or employers should maintain proper records of issuing protective clothing and equipment and of providing the relevant training to persons employed.

4. Responsibility of Works Supervisor and Person Employed

4.1 Responsibility of Works Supervisor

Shipping and Port Control (Works) Regulation section 20

4.1.1 It shall be the duty of a works supervisor appointed pursuant to section 19 of the Regulation to assist the person in charge of works in performing any duties imposed on that person in charge of works under the Regulation.

4.1.2 A works supervisor should assist the employer and person in charge of works to ensure that the persons employed are provided with an appropriate safety helmet and other appropriate protective clothing and equipment and that the persons employed are wearing them when the works are being carried out.

4.2 Responsibility of Person Employed

Shipping and Port Control (Works) Regulation section 24

4.2.1 A person employed at work shall wear an appropriate safety helmet and use other appropriate protective clothing and equipment provided to him by his employer or person in charge of works under the Regulation. He shall take reasonable care for the safety of himself and of other persons who may be affected by his act or omission. He shall cooperate with or assist a works supervisor to the extent necessary for enabling the works supervisor to perform the duty imposed on him under section 20(1)(a) or (b) of the Regulation.

4.2.2 A person employed should take reasonable care of the protective clothing and equipment provided to him by his employer or person in charge of works. He should report to them or the works supervisor any defects or expiry of the protective clothing and equipment found. Any defective or expired protective clothing and equipment should not be used.

4.2.3 Persons employed must be aware that the protective clothing and equipment is designed to create a protection against workplace hazards but it does not eliminate the hazards. If the protective clothing and equipment fails, exposure to hazards will occur.

5. Head Protection

5.1 Accident investigations into serious injuries to persons employed on vessels have revealed that many of them resulted in head injuries. Had they been wearing protective headgear, their injuries could be minimized.

Shipping and Port Control (Works) Regulation section 24

5.2 Hence a person employed shall wear an appropriate safety helmet at work.

5.3 **Safety Helmet**

5.3.1 Many accidents such as parting of a rope causing head injury are of a type difficult to control. Safety helmet should be worn at all times while at work. When a person employed is to have rest or carrying out clerical work inside the deck house (including the accommodation) or is inside a well-protected crane operating cabin where there is no unnecessary risk of head injury, he may put off his safety helmet. But when the person employed leaves such deck house or operating cabin, he must put on his helmet before leaving that space.

5.3.2 The safety helmets are worn for protection against impact hazards. They must resist penetration and absorb the shock of a blow. Materials used in safety helmets should be water-resistant.

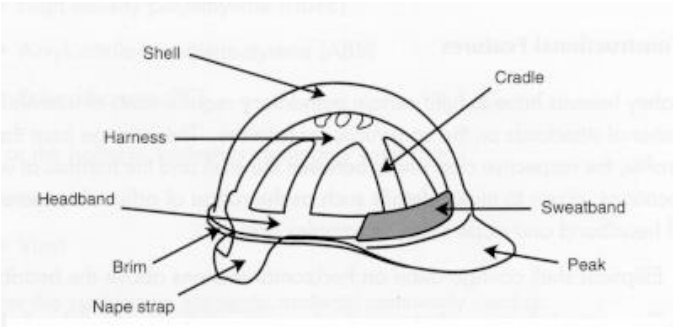
5.3.3 Each safety helmet consists essentially of a shell and the harness inside the shell. The general design of a safety helmet is shown at Figure 5.1. Ventilation is provided by a space between the headband and the shell. Headbands are adjustable to the right size. The suitable standards for safety helmets are shown at Appendix 2: A2.1.

5.3.4 Safety helmets should be cleaned regularly. Manufacturers should be consulted with regard to paint or cleaning materials for their safety helmets because some paints and thinner may damage the shell and hence reduce the expected protection.

5.3.5 A safety helmet should be frequently inspected for any signs of damage. If damage occurs, the safety helmet should be renewed.

5.3.6 Safety helmets should be worn in the correct way. Safety helmets should not be used for other purposes such as seats, receptacles and steps, etc. A safety helmet should not be transferred by throwing as it may accidentally fall on the deck resulting damage.

5.3.7 The expiry date of a safety helmet will depend on the manufacturing materials. Manufacturers' advice should be sought for deciding the life span of a safety helmet. Normally, the useful life of a plastic helmet is less than two and a half years. Hence periodic replacement of safety helmets should be carried out.



General design of a safety helmet

(The sketch is extracted from the *Guidance Notes on The Selection, Use and Maintenance of Safety Helmets*, published by Occupational Safety and Health Branch of Labour Department)

Helmet with normal peak

Helmet with little peak

Figure 5.1: Safety Helmets

5.4 **Selection**

5.4.1 The safety helmet chosen should provide the desired protection and comfort and not create any additional safety problems.

5.4.2 It is important to choose a correct type of safety helmets which can provide protection against the hazards existing in the workplace. The hazards may include being struck by falling objects or swinging objects (e.g. wire ropes, sling hooks).

5.4.3 Whenever possible, the safety helmet should be selected on the basis that it will not hinder the work to be done. For example, a safety helmet with little or no peak is helpful to have an unrestricted upward vision for a worker engaged at container handling.

5.4.4 The colour of safety helmets should be conspicuous against the background. Safety helmets with lighter colour will provide better heat reflection and good conspicuity.

5.4.5 Where the job involves work with repeated bending or frequently looking upwards or downwards, or in windy conditions, chin straps should be provided and used.

5.4.6 Fitness is one of the important elements for ensuring the proper functioning of safety helmets in case of an impact. A proper safety helmet should have the right shell size for the wearer and an easily adjustable headband, nape and chin strap.

5.4.7 Unauthorized modification or incorrectly use of safety helmet may impair its function, lower the safety margin and therefore it should not be used.

6. Safety Footwear

6.1 Foot injuries often result from wearing unsuitable footwear. Lashing bars, twist locks, wire rope slings, parts of dismantled machinery etc. may fall off and hit on the foot of a person employed at work. The steel deck of a vessel may become slippery when there are oil or grease stains. The container top may become slippery after rain. Hence suitable safety footwear such as slip resistant safety shoes should be worn while at work on deck, on container top, in cargo hold or in machinery space.

6.2 Safety shoes should be sturdy, with slip resistant soles and have adequate protection against impact for the toes. Where there is reasonably foreseeable risk of the sole injury of the person employed, such as employed in marine construction, safety shoes with steel (or other materials having the same protection effects) soles should be provided to the person employed. If oil stains are commonly found in the workplace, such as in machinery space, oil-resistant safety shoes should be provided to the person employed. The suitable standards for safety shoes are set out in Appendix 2: A2.2.1.

6.3 The Person In Charge should determine the type of footwear suitable for the works. He should consider the primary objective of consideration. If the persons employed in shipboard container lashing operation and often subjected to the risk of foot injury of fallen object from height, they should wear safety shoes having adequate protection against the impact for the toes. Slingers working in mid-stream container operations will have a lot of movement on container top, the primary objective should consider the easy movement and anti-slip property of protective shoes instead of protection against impact. They should wear protective shoes.

6.4 Since there is no standard suitable for the protective shoes for mid-stream container operation, the basic slip resistance requirement of protective shoes are specified and set out in Appendix 2: A2.2.2

6.5 Periodic inspections should be carried out to the footwear. Any damaged footwear or worn soles should be renewed.

Figure 6.1: Safety Shoes and Safety Boots
(The sketch is extracted from the *Guidelines for the use of Personal Protective Equipment,* published by Occupational Safety and Health Council)

7. Hearing Protection

7.1 Noise is undesired sound. Besides being a nuisance, noise may interfere with working efficiency, by hindering communications between persons employed; it may also be a cause of accidents, by masking warning signals; but most importantly, it may damage the hearing of persons employed.

7.2 Studies on occupational noise exposure and hearing impairment reveals that persons employed on vessels have high hearing loss. There is no cure for noise-induced hearing loss, so the prevention of excessive noise exposure at work is the only way to avoid hearing damage. When a person employed at work is likely to be exposed to a noise such as in machinery spaces or adjacent to a running engine, of sound pressure level above 90 dB(A), an employer should, so far as reasonably practicable, reduce the exposure to noise of the persons employed. Noise reduction methods include elimination, substitution, segregation and engineering control.

7.3 If noise reduction methods cannot reduce the noise level below 90 dB(A), persons employed exposed to such high level of noise should wear ear protectors at work. Generally, the diesel generators, derrick winch engines, piling and grit blasting operations are likely to generate noise of sound pressure level above 90 dB(A).

7.4 An employer and person in charge of works should provide ear protectors to persons employed if they are likely to expose to a noise of sound pressure level above 90 dB(A) generated from the machinery, equipment or appliances, at the process of works on a vessel. The prime function of ear protectors is to reduce the noise level at the wearer's ear to within safe limits, i.e. below 90 dB(A).

7.5 Ear Protectors

7.5.1 Ear protectors include earmuffs and ear plugs. Appropriate ear protectors should be selected in order to reduce the noise level received by persons employed to below 90 dB(A). Reference of suitable ear protectors may be made to the list of approved Ear- Protectors issued by the Labour Department from time to time. The list of approved Ear-Protectors can be obtained from the Labour Department.

7.5.2 Earmuffs have two rigid cups that enclose completely both ears. With an elastic band, the cups are designed to press against the head to provide good acoustic seal.

7.5.3 Ear plugs are made of soft flexible materials such as glasswool, foam rubber, silicon rubber, wax, paper, cotton, etc. They are to be inserted into the ear canals for noise reduction. It is important that they must conform with the ear canals for them to work properly. During very noisy operation, earmuffs and ear plugs may be used together to provide better noise reduction.

7.5.4 Ear protectors must not create excessive discomfort to the persons employed. They must not affect the safety of the wearers or the performance of other safety equipment such as safety helmets in use.

7.5.5 Ear protectors are to be kept clean and disinfected after use. Employers or persons in charge of works should provide facilities to person employed to clean, disinfect and safe keeping of their ear protectors.

7.5.6 Ear protectors must be maintained in good condition. Points to check include :-

(a) the condition of ear muff seals, which may be torn or become hardened with age;

(b) the tension of headband;

(c) unauthorized modifications such as holes drilled in ear muffs; and

(d) resilience and softness of earplugs.

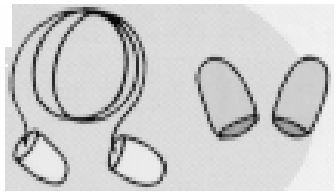


Figure 7.1: Ear Plugs and Earmuffs

(The sketch is extracted from the *Guidelines for the use of Personal Protective Equipment,* published by Occupational Safety and Health Council)

8. Eye and Face Protection

8.1 Where there is a reasonable probability of eye or face injury from flying particles, molten, injurious light radiation and liquid chemicals, etc., appropriate protective clothing and equipment for eye or face protection should be used.

8.2 Protective clothing and equipment for eye or face protection should :-

a) provide adequate protection against the particular hazards for which they are designed;

b) not be excessively discomfort when worn under the designated conditions;

c) fit snugly without interfering with the movements or vision of the wearer;

d) be reasonably durable;

e) be easily cleanable and capable of being disinfected; and

f) be kept clean and in good repair.

8.3 Each eye, face or face and eye protection equipment is designed for a particular hazard. In selecting the protection equipment, consider the kind and degree of hazard, and select the protector accordingly. Persons who use corrective spectacles but are required to wear eye or face protection should wear those goggles or face shields which provide optical correction or would not disturb the spectacles when worn over.

8.4 **Safety Goggles and Face Shields**

8.4.1 Safety goggles fitted with suitable filter lenses should be used for gas welding. For electric welding, face shields fitted with suitable filter lenses should be used. Use of sunglasses as the sole means of protection should not be permitted. The suitable standards for eye and face protection equipment are shown in Appendix 2: A2.3.

8.4.2 Suitable eye protection should be worn by persons employed during hand cleaning tubes, scaling boilers and cleaning backends. Safety goggles should be worn when operating a power tool such as a grinder or scaling machine. If there is any risk of eye injury, persons employed nearby should also wear goggles. Safety goggles are manufactured in several styles for specific uses such as protecting against dusts and splashes, and in chipper's, welder's, and cutter's models.

8.4.3 It should be ensured that the user of the goggles or face shield knows how to clean and maintain the equipment if it is issued on a permanent personal loan basis. Only substances which can have no adverse effect should be used for cleaning the lenses and head-bands. Where goggles or face shields are issued on temporary loan, they should be taken apart and thoroughly washed and disinfected before reuse. After cleaning, all eye protection equipment should be placed in individual polythene bags and stored in a dry and dust-proof cupboard.

8.4.4 If the lens of goggles or face shield becomes chipped, pitted or partly opaque it should be scrapped. The headband and its adjusting device should be in an efficient condition. Slack, worn-out, sweat-soaked, or twisted headbands do not hold the eye protector in proper position. Visual inspection can determine when the headband elasticity is reduced to a point below proper function.

Figure 8.1: Safety Goggles

(The sketch is extracted from the *Guidelines for the use of Personal Protective Equipment,* published by Occupational Safety and Health Council)

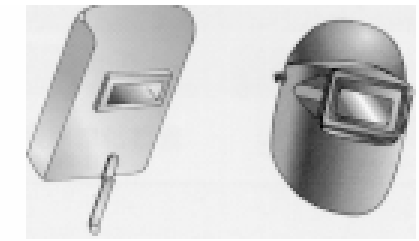


Figure 8.2: Face Shields

(The sketch is extracted from the *Guidelines for the use of Personal Protective Equipment,* published by Occupational Safety and Health Council)

9. Protection against Drowning

9.1 Where work is being carried out overside or in an exposed position where there is reasonably foreseeable risk of falling or being washed overboard, a lifebuoy with sufficient lifeline (not less than 30 metres) should be provided. In addition, a lifejacket or buoyancy aid should be provided to the person employed.

9.2 **Lifejacket and Buoyancy Aid**

9.2.1 When works are carried out, every person employed working at or passing shipside or other structure which is not installed with any fencing stanchions or any hand grips where having a foreseeable risk of falling into the sea should wear a lifejacket or buoyancy aid.

9.2.2 A lifejacket or buoyancy aid means a garment or device which, when correctly worn or used in water, will provide a specific amount of buoyancy positioned in the garment or device to enable the wearer to float in a face-up or vertical position with mouth and nose clear of the water even when the wearer is in an unconscious situation.

9.2.3 A lifejacket or buoyancy aid must not depend on oral inflation. It is advisable to choose an automatic inflatable lifejacket when selecting inflatable lifejacket or buoyancy aid. Employer and Person In Charge should provide relevant training to employees, such as operation method and inspection procedure, records should be kept for inspection, including date of training, lifejacket and buoyancy aid details, such as serial number and identifications, date of issue, inspection and renewal should also be included. User should check the lifejacket and buoyancy aid for good maintenance, such as gas bottle is properly installed. Supervisor or Person In Charge should be reported if defects are found. Lifejackets and buoyancy aids with defects should be renewed. The suitable standards for lifejackets and buoyancy aids are shown in Appendix 2: A2.4.

9.2.4 A lifejacket or buoyancy aid should fit the wearer, and allow the wearer freedom in action and movement. It should not unduly restrict his vision, hearing or breathing, nor contain any component causing injury to the wearer in normal use. Automatic inflatable lifejacket is preferable since it allows the wearer more freedom in action and less discomfort in hot weather.

9.2.5 The lifejacket or buoyancy aid should have distinctive and easily visible colour. Retro-reflective material should also be affixed on its surface which is normally above water when it is in use so can aid in locating the wearer to facilitate the rescue. In addition and as appropriate, the protective cover of a lifejacket should be made of robust material which is resistant to abrasion, puncture and molten

metal splash.

9.2.6 The lifejacket or buoyancy aid should preferably be provided with a whistle and/or a self-activating light (for night work) which can aid in locating the wearer to facilitate the rescue.

9.2.7 The lifejacket or buoyancy aid should be properly maintained in a good serviceable condition as per the manufacturer's instructions. They should be inspected and checked periodically. An automatic inflatable lifejacket is required to be serviced by an authorized agent at least once a year. Defective, not examined or expired unit should not be used.

9.2.8 The lifejacket or buoyancy aid should be kept in a convenient location to enable the persons employed easy to take off and to wear them whenever the need arises.

9.2.9 The lifejacket or buoyancy aid described in this Code of Practice is specified for works on vessels. They are different from and cannot replace the life-saving appliances on vessels as required by the relevant local regulation.

Figure 9.1: Automatic Inflatable Lifejacket

10. Protection from Fall

10.1 Safety Harness and Safety Belt

10.1.1 All persons employed who are working at height (aloft), outboard, below decks or in any other area where there is a reasonably foreseeable risk of falling more than two metres, should wear a safety harness attached to a lifeline as far as reasonably practicable. There is evidence showing that even for relatively short unrestrained falls, the wearing of a safety belt only can lead to injuries such as broken ribs. Hence if safety belt is used for protection from fall, it should be preferably provided with shock absorber.

10.1.2 For example, when a person employed is working at the derrick mast for repairing the swivel block at mast top where there is a risk of falling, he should wear a safety harness or safety belt. For the measures to be taken to prevent the fall of persons employed when working on the container tops, please refer to the Code of Practice - Shipboard Container Handling.

10.1.3 Safety harness includes full body harness, rescue harness, semi-harness or chest harness. Safety belt includes general purpose safety belt, work positioning safety belt, pole safety belt, or linesman safety belt.

10.1.4 Safety harnesses and safety belts work with their lanyards attached or connected to anchorages such as fixed anchors, independent lifelines or fall arresters, to either limit or arrest the fall. A suitable anchorage point should be adequately strong.

10.1.5 A safety harness or safety belt should be free from defects. It must be checked before use. Its correct assembly and function should be checked before use.

10.2 Selection

10.2.1 Full investigations should be conducted before purchase of safety harness or safety belt and selection of anchorage system, in order to determine the appropriate type of equipment that most suit the class of work and environmental conditions.

10.2.2 Prior to selecting the safety harness or belt and its anchorage, the employer or person in charge of works should conduct assessment of the workplace conditions where the equipment is required. Such assessment should include the environmental factors and hazards which may be encountered during the activity and the proposed precautionary measures to be taken. The hazards may include chemical and electrical hazards, the paths of movement of persons employed and all fall hazards along such paths.

10.2.3 In the selection of a safety harness or safety belt for any particular task, care should be taken to ensure that the equipment gives the wearer, as far as it is reasonably practicable in respect to safety, the maximum degree of comfort, freedom of movement and, in the event of falling, the greatest possible security against injury. The injury may be resulted either from impact at the fall with the deck or with the surrounding structures; or from the belt or harness as a result of a suddenly arrested fall. The safety harness or belt should fit the wearer correctly. If it is to be worn in addition to a lifejacket or buoyancy aid, the employer or person in charge of works should ensure that these items function together effectively and will not interfere with other pieces of equipment.

10.2.4 The suitable standards for safety harness and safety belts are shown in Appendix 2: A2.5.

10.2.5 During the selection of the anchorage system, particular attention should be drawn to the choice and limitation of connectors, fittings, the self-locking devices, shock absorbers, lifelines and supports of the anchorage to be used. All types of anchorage or fall-arresting system must be able to offer continuous protection throughout the period when the person employed is exposed to the risk of fall.

10.2.6 The selection of the type of anchorages will depend on the nature and location of the task and the workplace environment and conditions. Types of anchorage include fixed anchorage, vertical independent lifeline, horizontal lifeline and a fall arresting system.

10.3 **Maintenance**

10.3.1 Every set of safety harness or belt equipment including its associated equipment such as lanyard, fall arresting device, etc., should be properly maintained in good serviceable conditions. The lanyard and safety harness or belt should be kept away from spark, heat and not come into contact with acids and alkalis. If the equipment has been used to arrest a free fall, it should be withdrawn from service and referred for inspection by a competent person.

10.3.2 After use, the equipment should be properly cleaned and stored away from direct sunlight in a cool, dry place.

10.4 **Training**

Training should be provided to the persons employed and it includes :-

a) how to use the equipment and proper wearing, adjusting, and interconnecting of the equipment;

b) how to estimate and limit the maximum arresting force to an acceptable limit for the system;

c) proper attachment locations on the equipment;

d) intended function and performance characteristic in respect of each item of equipment;

e) proper attachment methods including compatibility of the sizes of snap hooks, D-rings, and other connections to reduce the probability of accidental disengagement; and

f) how to rescue after a fall.

10.5 **Abstract of the Guidance Notes**

10.5.1 The book – *Guidance Notes on Classification and Use of Safety Belts and their Anchorage Systems* – is published by the Labour Department and its abstract is attached in Appendix 3.

10.5.2 The above-mentioned *Guidance Notes* provides information on certain configurations of anchorage systems, the types and uses of safety harness and safety belts.

11. Respiratory Protective Equipment

11.1 Respiratory protective equipment is essential for protection when work has to be done in conditions of irritating, dangerous or poisonous dust, fumes or gases. There are two main types of equipment which perform different functions :-

(a) a respirator filters the air before it is inhaled; and

(b) breathing apparatus supplies air or oxygen from an uncontaminated source.

11.2 It is most important that the face-piece of respirators and breathing apparatus is fitted correctly to avoid leakage. The wearing of spectacles, unless adequately designed for that purpose, is likely to adversely affect the face seal.

11.3 Respirators may be required to be worn by persons employed during grit blasting, loading of debris, and welding. In the selection of the correct equipment, amongst the factors to be taken into account are the location, the nature of the substance or substances against which protection is required, their likely concentrations in air, the possible duration of exposure and the kind of work to be performed. See Figure 11.1: Respiratory Protective Equipment Chart. The respirator selected must be of a type designed to protect against the hazards being met. Self-contained breathing apparatus and the canister and cartridge type respirators provide protection to different degrees for relatively short period of time, whereas the air hose type breathing apparatus provides protection for as long as the face-piece is supplied with breathable air. Dust respirators provide protection for long periods at low airborne dust concentrations. Canister, cartridge and dust respirators interfere little with the wearer's mobility. But at high work rates the inhalation and exhalation resistance results in discomfort which can limit the period of time for which these may be worn, as also will adverse environmental conditions of temperature and humidity. The compressed air type breathing apparatus however obviates these objections.

11.4 Standards for respirators and breathing apparatus is shown in Appendix 2: A2.6.

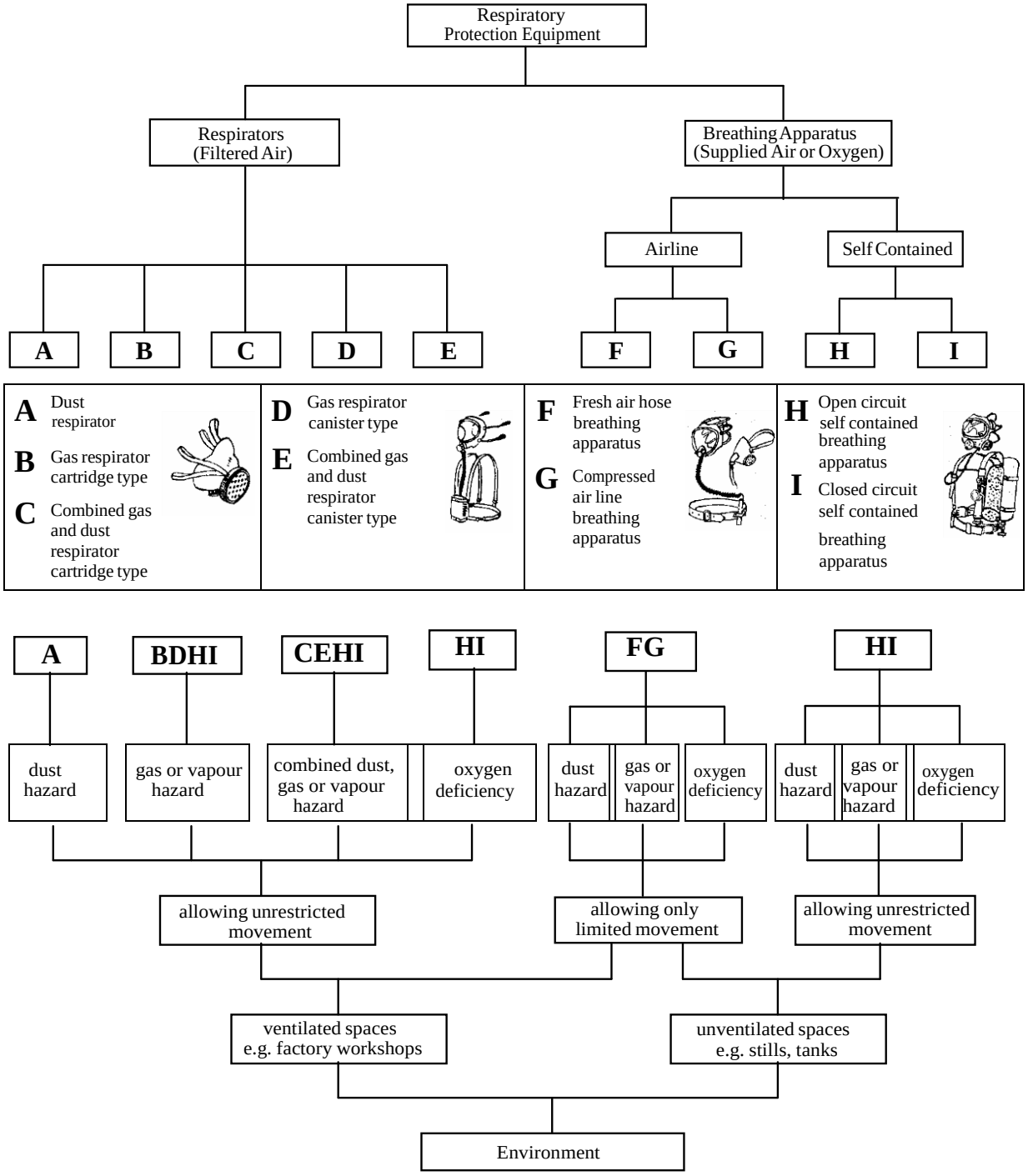


Figure 11.1: Respiratory Protective Equipment Chart

11.5 **Respirator**

11.5.1 The dust respirator gives protection against dust and aerosol sprays but not against gases. There are many types of dust respirator available but they are generally of the ori-nasal type, i.e. half-masks covering the nose and mouth. Many types of light, simple face masks are also available and are extremely useful for protecting against dust nuisance and non-toxic sprays but should never be used in place of proper protection against harmful dusts or sprays.

11.5.2 The cartridge-type of respirator consists of a full face-piece or half mask connected to a replaceable cartridge containing absorbent or adsorbent material and a particulate filter. It is designed to provide protection against low concentrations of certain relatively non-toxic gases and vapours.

11.5.3 The canister-type of respirator incorporates a full face-piece connected to an absorbent or adsorbent material contained in a replaceable canister carried in a sling on the back side of the wearer. This type gives considerably more protection than the cartridge type.

11.5.4 The filters, canisters and cartridges incorporated in respirators are designed to provide protection against certain specified dusts or gases. Different types are available to provide protection against different hazards and it is therefore important that the appropriate type is selected for the particular circumstances or conditions being encountered. They have limited effective life and must be replaced or renewed at intervals in accordance with manufacturer's instructions.

11.5.5 The respirators should be taken apart, cleaned, inspected and tested in accordance with manufacturer's instruction. The head harness straps should be properly fitted. Leakage tests should be carried out paying special attention to the corrugated tubes and the areas around eye-pieces or frames around wide-vision masks. The valves should be checked and the respirators disinfected.

11.5.6 Respirators provide no protection against oxygen deficient atmosphere. They should not be used to provide protection in confined spaces against dangerous fumes, gases or vapours. Only airline or self-contained breathing apparatus is capable of giving respiratory protection in such circumstances.

11.6 **Breathing Apparatus**

11.6.1 All parts of the breathing apparatus including the face mask should be inspected, cleaned, disinfected and tested at regular intervals. The pressure regulator should be checked.

11.6.2 Air Line Breathing Apparatus

(a) Filters attached to the belts should be taken apart, cleaned, disinfected, dried and re-assembled. Filter agents should be renewed as necessary. Any unusual accumulation of oil, dirt or foreign matter in filters should be investigated.

(b) The entire length of air hose should be examined to ensure that it is in good condition.

11.6.3 Self-contained Breathing Apparatus

(a) Person employed required to wear the equipment should be trained and instructed in its use.

(b) The cylinders should always be kept in a fully charged condition.

(c) The equipment should be maintained in accordance with the maker's recommendations. Maintenance record cards should be provided for each set of equipment.

12. Body Protection

12.1 Special outer clothing would be needed for protection when persons employed are exposed to particular contaminating or corrosive substances.

12.2 **Reflective Vest**

12.2.1 Reflective vest should be worn by persons employed when working in cargo handling or marine construction and safe to be seen.

12.2.2 The signaller in cargo handling or marine construction should wear reflective vest of colour different from other workers for easy identification.

12.2.3 The colour of the reflective vest should be conspicuous against the background and have retroreflective material adhered to it. The suitable standard for a reflective vest is shown in Appendix 2: A2.7.

12.3 **Protective Overall and Apron**

Where there is a reasonably foreseeable risk of injury at work from substances which are corrosive or likely to be absorbed through skin, protective overalls or aprons should be used for body protection. The suitable standard for protective clothing is shown in Appendix 2: A2.8.

13. Hand Protection

13.1 Examples of injuries to arms and hands are burns, cuts, electrical shocks, amputation, and absorption of chemicals.

13.2 Common hazards include physical hazards (such as abrasion, puncture, laceration, cut, burn, freezing and electric shock), chemical hazards (such as corrosive chemical, poison) and biological hazards (such as skin infection).

13.3 There is a wide assortment of gloves, hand pads, sleeves, and wristlets for protection against various hazardous situations.

13.4 The following types of gloves are commonly in use :-

- general purpose gloves (cotton or leather);
- gloves for handling chemicals;
- gloves for protection against hot substances;
- gloves for protection against laceration and cut; and
- gloves for protection against electric shock.

13.5 Gloves may have reflective materials so that they are highly visible during slinging or fixing twist locks process in cargo handling.

13.6 Employers and persons in charge of works should determine what hand protection is needed for their persons employed. The protective clothing and equipment should be selected to fit the job. Certain occupations require special protection. For example, electricians need special protection from shocks and burns. Rubber is considered the best material for insulating gloves and sleeves from these hazards.

13.7 **Selection**

13.7.1 A number of factors need to be taken into account when choosing a glove for a particular application. In the initial selection process the following are of primary importance :-

(a) the toxic properties of the chemical;

(b) the works activities being undertaken; and

(c) the performance characteristics of the gloves including chemical, puncture, tear and abrasion resistance characteristics.

13.7.2 Gloves should fit for the user's hands and not create excessive discomfort.

13.8 Standards for gloves are shown in Appendix 2: A2.9.

References

1. *Chemical Safety in the Workplace – Guidance Notes on Personal Protective Equipment (PPE) for Use and Handling of Chemicals*, 2002, by the Occupational Safety and Health Branch of the Labour Department, Hong Kong SAR.
2. *Code of Practice for the Protection of Hearing in Industrial Undertakings*, 1992, by the Labour Department, Hong Kong SAR.
3. *Code of Practice on Safety Management*, 2002, by the Occupational Safety and Health Branch of the Labour Department, Hong Kong SAR.
4. *Code of Practice: Safety and Health at Work (Land-based Construction over Water - Prevention of Fall)*, 1999, by the Occupational Safety and Health Branch of the Labour Department, Hong Kong SAR.
5. *Code of Practice: Safety and Health at Work for Gas Welding and Flame Cutting*, 2000, by the Occupational Safety and Health Branch of the Labour Department, Hong Kong SAR.
6. *Code of Safe Working Practices for Merchant Seamen*, 1998, by the Maritime and Coastguard Agency, Department of the Environment, Transport and the Regions, United Kingdom.
7. *Factories and Industrial Undertakings (Dangerous Substances) Regulations, Chapter 59AB,* Laws of Hong Kong.
8. *Guidance Notes - Factories and Industrial Undertakings (Noise at Work) Regulation*, 1993, by the Labour Department, Hong Kong SAR.
9. *Guidance Notes on Classification and Use of Safety Belts and their Anchorage Systems*, 2005, by the Occupational Safety and Health Branch of the Labour Department, Hong Kong SAR.
10. *Guidance Notes on The Selection, Use and Maintenance of Safety Helmets*, 2000, by the Occupational Safety and Health Branch of the Labour Department, Hong Kong SAR.
11. *Merchant Shipping (Safety) (Protective Clothing and Equipment) Regulations, Chapter 369AO*, Laws of Hong Kong.
12. *Guidelines for the use of Personal Protective Equipment*, 1999, by the Occupational Safety and Health Council, Hong Kong SAR.
13. *Personal Protective Equipment*, 1995, by the Occupational Safety and Health Administration, Department of Labor, United States of America.
14. *Personal Protective Equipment - Protective Gloves*, Green Cross, volume 10 no.6, November 2000, by the Occupational Safety and Health Council, Hong Kong.
15. *Shipbuilding and Ship-repairing Safety Guide*, 1973, by the Marine Department, Hong Kong SAR.

APPENDICES

Appendix 1

Relevant Provisions of
the Shipping and Port Control (Works) Regulation, Cap. 313X

A1.1 Section 20(1) - Duties of works supervisors

(1) A works supervisor shall –

(a) supervise works carried out on, to or by means of a vessel in accordance with the safety instructions given by a person in charge of works;

(b) assist a person in charge of works in performing any duties imposed on that person under this Regulation;

(c) carry with him while at work a certificate referred to in section 19(2)(b)(iii); and

(d) produce the certificate to an inspector for inspection on demand.

A1.2 Sections 21(1), (2) & (4) - Safety helmets, etc.

(1) A person employed shall be provided with an appropriate safety helmet and, so far as reasonably practicable, other protective clothing and equipment that are appropriate to prevent bodily injury to that person.

(2) Reasonable measures shall be taken to ensure that a person employed does not remain on the vessel when works are being carried out unless he is –

(a) wearing an appropriate safety helmet; and

(b) if any other protective clothing and equipment are provided under subsection (1), using those other clothing and equipment.

(4) In this section, "protective clothing and equipment" (防護衣物及裝備) includes safety goggles, ear protectors (which include ear-muffs and ear

plugs), safety shoes, safety harness, respirators, buoyancy aids and other body protection.

A1.3 Sections 23(1), (2) & (3) - General duties of persons in charge of works and employers

(1) Any machinery, equipment or appliance provided for use by a person employed in relation to works shall be in a safe working condition.

(2) Measures shall, in so far as reasonably practicable, be taken to ensure the safety of a person employed at work.

(3) There shall be provided such information, instruction, training or supervision as may be necessary to ensure, in so far as reasonably practicable, the safety of the person employed at work.

A1.4 Sections 24(1) & (2) – Persons employed to take care of others while at work and to cooperate with works supervisors

(1) A person employed at work shall -

(a) take reasonable care for the safety of himself and of other persons who may be affected by his act or omission; and

(b) wear an appropriate safety helmet and use other appropriate protective clothing and equipment provided to him under section 21.

(2) A person employed at work shall cooperate with or assist a works supervisors to the extent necessary for enabling the works supervisor to perform the duty imposed on him under section 20(1)(a) or (b).

Appendix 2

Standards for various protective clothing and equipment

(Other equivalent standards not mentioned below would also be acceptable)

A2.1 Standards for Safety Helmets

1. American National Standard, ANSI Z89.1-2014 - For industrial head protection

2. Australian/New Zealand Standard, AS/NZS 1801:1997 - Occupational protective helmets

3. Canadian Standard, CSA Z94.1-2015 – Industrial Protective Headwear – Performance, selection, care and use

4. European Standard, EN 397:2002+A1:2012 –Industrial safety helmets

5. International Standard, ISO 3873:1977 - Industrial safety helmets

6. Japanese Industrial Standard, JIS T 8131:2000 - Industrial safety helmets

7. People's Republic of China National Standard, GB 2811-2007 - Safety helmets

8. Singapore Standard, SS 98:2013 - Specification for industrial safety helmets

A2.2 Standards for Safety Footwear

A2.2.1 Standards for Safety Shoes

1. American Society for Testing and Materials, ASTM F2413-2005 – Standard Specification for Performance Requirements for Protective Footwear

2. British, European and International Standard, BS EN ISO 20345:2011 - Personal protective equipment. Safety footwear

3. Japanese Industrial Standard, JIS T 8101:2006 – Protective footwear

4. People's Republic of China National Standard, GB 12623-90 –

Modular technical requirements for protective footwear

A2.2.2 Standards for Protective shoes

1. Slip resistance
   Coefficient of Kinetic friction 0.2 or above

A2.3 Standards for Eye and Face Protection

1. American National Standard, ANSI Z87.1-2003 – Practice for occupational and educational eye and face protection

2. Australian/New Zealand Standard, AS/NZS 1337:2010 – Eye and face protectors for occupational applications

3. Australian/New Zealand Standard, AS/NZS 1338.1:2012 – Filters for protection against radiation generated in welding and allied operations

4. British and European Standard, BS EN 166: 2002 – Personal eye-protection. Specifications

5. British and European Standard, BS EN 175:1997 – Personal protection. Equipment for eye and face protection during welding and allied processes

6. Japanese Industrial Standard, JIS T 8147:2003 – Personal eye protectors

7. People's Republic of China National Standard, GB/T 3609.1-2008 – Equipment for eye and face protection during welding operations

A2.4 Standards for Lifejackets and Buoyancy Aids

1. People's Republic of China, Standard of Transport Industry, JT346-2004 – Specification for marine inflatable lifejacket

2. British Standard, BS EN ISO 12402-1 to -4:2006+A1:2010 -- Personal buoyancy aids – Lifejacket, performance level 100 and above

A2.5 Standards for Safety Harness, Safety Belt, Anchorage and Fall Arrester

1. Australian/New Zealand Standard, AS/NZS 1891.1: 2007 –Harnesses

and ancillary equipment

2. American National Standard, ANSI A10. 32-2012 –Personal Fall Protection Used in Construction and Demolition Operations

3. American National Standard, ANSI Z359.1-2007 - Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

4. British and European Standard, BS EN 358:2000 - Personal protective equipment for work positioning and prevention of falls from a height. Belts for work positioning and restraint and work positioning lanyards

5. British and European Standard, BS EN 360:2002 - Personal protective equipment against falls from a height. Retractable type fall arresters

6. British and European Standard, BS EN 361:2002 - Personal protective equipment against falls from a height. Full body harness

7. British and European Standard, BS EN 795:1997 - Protection against falls from a height.- Anchor devices. Requirements and testing

8. Japanese Industrial Standard, JIS T8165-2012 - Safety belts for linemen

9. Ministry of Labour Notification No.67, Safety Belt Standard of Japan's Ministry of Labour, 1975

10. People's Republic of China National Standard, GB 6095-2009 – Safety belts

A2.6 Standards for Respirators and Breathing Apparatus

1. American National Standard, ANSI Z88.2-2015 - Practices for Respiratory Protection

2. British and European Standard, BS EN 136:1998 – Full face mask

3. British and European Standard, BS EN 137: 2006 – Self-contained open-circuit compressed air breathing apparatus with full face mask

4. British and European Standard, BS EN 138:1994 – Fresh air hose with half, full facemask or mouthpiece

5. British and European Standard, BS EN 14594:2005 – Compressed air line breathing apparatus

6. British and European Standard, BS EN 14387:2008 – Gas filter(s) and combined filter(s)

7. British and European Standard, BS EN 143:2000 – Particle filters

8. British and European Standard, BS EN 145:1998 – Self-contained closed circuit compressed oxygen or oxygen/nitrogen BA

9. British and European Standard, BS EN 149:2001+A1:2009 – Filtering half masks against particles

10. British and European Standard, BS EN 269:1995 – Powered fresh air hose with hood

11. People's Republic of China National Standard, GB 2626-2006 – Non-power air-purifying particle respirator

12. People's Republic of China National Standard, GB/T 16556-2007 – Self-contained open-circuit compressed air breathing apparatus

13. Australian/New Zealand Standards, AS/NZS 1716:2003/Amdt:2005 – Respiratory protective devices

A2.7 Standard for Reflective Vest

1. British, European and International Standard, BS EN ISO 20471: 2013 – High-visibility clothing

A2.8 Standard for Protective Clothing

1. British, European and International Standard, BS EN ISO 13688:2013 – Protective clothing

A2.9 Standards for Gloves

1. British and European Standard, BS EN 374-3:2003 – Protective gloves against chemical and micro-organisms
2. British and European Standard, BS EN 388:2003 – Protective gloves against mechanical risks
3. British and European Standard, BS EN 407:2004 – Protective gloves against thermal risks (heat and/or fire)
4. British and European Standard, BS EN 420:2003+A1:2009 - General requirements for protective gloves
5. People's Republic of China National Standard, GB/T 12624-2009 – General requirements for protective gloves
6. Australian/New Zealand Standards, AS/NZS 2161:2000 – Occupational protective gloves
7. International Standard of International Electrotechnical Commission, IEC 60903:2014 – Live working – Electrical insulating gloves
8. British and European Standard, BS EN 60903:2003 – Live working – Gloves of insulating material

Appendix 3

Abstract of the "Guidance Notes on Classification and Use of Safety Belts and their Anchorage Systems"

(the "*Guidance Notes on Classification and Use of Safety Belts and their Anchorage Systems*" is published by the Occupational Safety and Health Branch, Labour Department)

Introduction

"Safety belt" referred in this guidance notes is a collective name for the following types of harnesses and belts :-

(i) safety harness or full body harness;
(ii) semi-harness or chest harness;
(iii) rescue harness;
(iv) work positioning belt, pole safety belt or lineman safety belt; and
(v) general purpose safety belt.

It includes a lanyard. When a safety belt works with an appropriate anchorage system, they form a personal fall arresting system.

Use of Equipment

Anchorage

The anchorage point of a safety belt should be as nearly vertical as possible directly above the place of work to reduce the liability to swing. Where the possibility of swing in the event of a fall is unavoidable, the user should use a second line to limit the swing.

It is undesirable to use a structural member with sharp edges as an anchorage for a rope lifeline. If it is unavoidable, then the lifeline must be protected by suitable packing.

Each lifeline should be used by one person only at any particular time.

During use

- All safety belts should be fitted and used in accordance with the manufacturer's instructions.
- Attach the snaphook at higher level than the user's waist.
- Fasten the belt firmly around the user's waist.

- Protect the lanyard and the belt from coming into contact with acids and alkalis.
- Keep the lanyard and belt away from spark, heat or heated structure.
- Never hook two lanyards together.
- Do not wrap a lanyard around any sharp edge. Forces exerted during a fall could cut the lanyard.
- Do not trail a lanyard. It may result in improper function of the safety catch and abrasion of the lanyard.
- Detach the lanyard from the anchorage point only while the user reaches a safe place.
- If the equipment has been used to arrest a free fall, the equipment should be withdrawn from service and referred for inspection by a competent person.

Classification of Safety Belts

(1) Safety Harness or Full Body Harness

General safety harnesses are harnesses incorporating thigh straps and shoulder straps used in conjunction with safety lanyards, for attachment to anchorage points. All straps and any waist belt shall be capable of adjustment to fit the user and means of adjustment shall be provided. The harness may be incorporated within a garment. The harness should provide support for the body around the lower chest, over the shoulders and around the thighs. The D-ring or other equivalent facility provided for the attachment of the lanyard is located in the upper part of the harness so that angle formed between the spine of a suspended user and the safety lanyard does not exceed a certain angle specified by the national standards. A typical full body harness was shown in Figure 1.

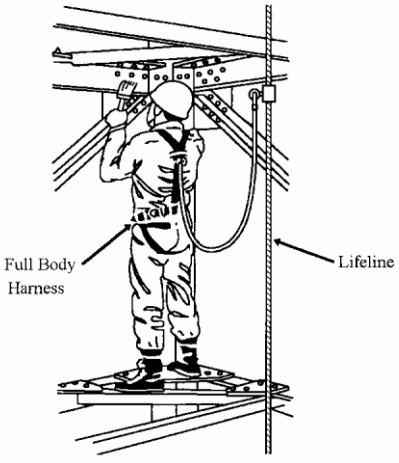


Figure 1: Full Body Harness attached to independent lifeline.

(2) General Purpose Safety Belt

General purpose safety belts are belts used in conjunction with safety lanyards incorporating attachment devices, for attachment to anchorage points. It consists of a body belt provided with one or more D-rings for attachment to a safety line or anchorage.

Depending on the specifications of various national standards, the length of lanyards varies from 1.5 metre to 3.0 metres.

Figure 3 shows the general shape of the general purpose safety belt.

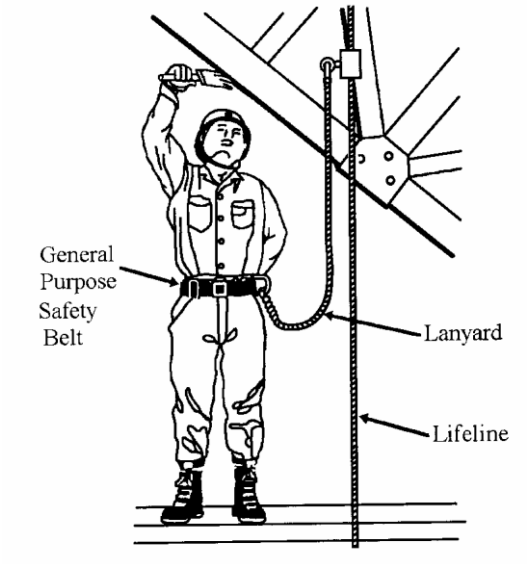


Figure 3: General Purpose Safety Belt

(3) Work Positioning Belt, Pole or Linesman Safety Belt

It consists of a waist strap, a back support, a buckle, two D-rings for attachment of a lanyard. Some belts can be equipped with adjustable shoulder and sitting straps. The lanyard accompanies with a rope adjuster to keep its length to a specified dimension.

It is designed for use of linesmen and other required to work on poles or similar structures in conditions where the belts are continuously loaded. Figure 4 shows a general shape of such a belt.

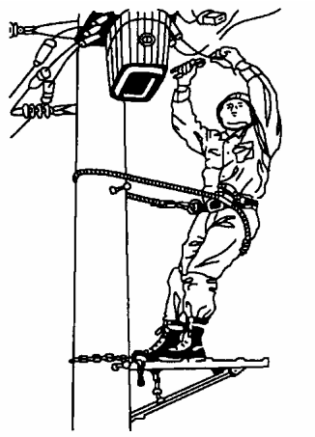


Figure 4: Work Positioning Belt

Anchorage of Safety Belt

Anchorages can be of a fixed anchor, or an independent lifeline, or a fall arresting system.

The selection of the type of anchorages will depend on the nature and location of the task and the type of construction of the building or supporting structure. Prior to selecting an anchorage, an assessment of the workplace conditions should be made by a competent person. The equipment and anchorage point must match the work situation and workplace environmental factors.

(1) Fixed Anchorage

Fixed anchorage is used for direct attachment of the lanyard of the safety belt to prevent fall from height. Fixed anchorage can be a built-in eye bolt, a rigid beam or a strong column.

It is not recommended to anchor the lanyard to railings or any member of a temporary scaffolding, bamboo scaffolding, or in any section of water, gas and drainage pipes as these structures are not designed to withstand sudden shock load or impact force.

Fixed anchorages should be selected and located so that

- the lanyard can be attached before the user moves into a position where he would be at risk from a fall;
- the anchorage is of a material strong enough to take the shock load of the arrest of a falling person; due regard should be paid to possible deterioration of the anchorage, e.g. that caused by atmospheric conditions;
- the length of fall is restricted so that a person wearing safety belt will not fall through heights specified by the specifications of the belt;
- all anchorages should be designed to withstand a minimum pull-out force of 5 kN.

(2) Vertical Independent Lifeline

Independent lifeline works with a lanyard and a positioning devices such as a rope chuck, rope grab or rope adjuster, the upper end of which is securely attached to a structural anchorage point. Figure 8 shows the use of a vertical independent lifeline.

The lifeline can be of fibre rope or metal cables. The minimum diameter of a fibre rope lifeline is 15.9 mm under ANSI. Metal cables used for lifeline shall have a minimum diameter of 8 mm and a minimum static breaking strength of 25 kN when tested in accordance with EN 12385 – 1:2002.

Fibre rope and metal cable lifeline shall be fitted with an end stop. Wire ropes should not be used where electrical hazards are present. Lifeline shall be of a single continuous line. It shall suspend freely from its anchorage point without contact with structure along its length or other objects which would adversely affect its function in conjunction with other components of the safety belt.

It shall be extended to or below the lowest level to which the user is expected to travel. Each worker shall be provided with a separate lifeline and only one person is allowed to anchor his safety belt to one lifeline.

The anchorage point for the lifeline shall be structural safe. Reinforced concrete beam or column, structural steel members are suitable anchorage points.

It is not recommended to fix the upper end of a lifeline to any temporary work such as scaffolding members, window frames, roof pipes etc.

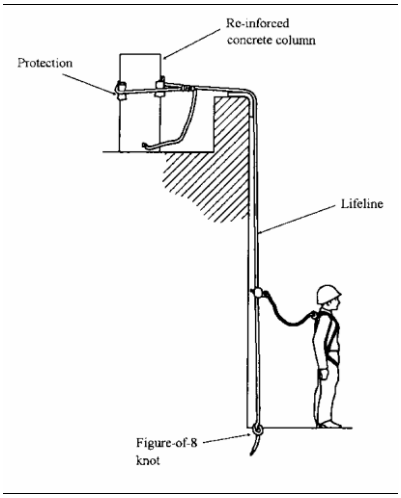


Figure 8: Vertical Independent Lifeline

(3) Horizontal Lifeline (Guide Rope)

To enable a workman to walk along beams, steel girders or other similar dangerous structure at height in shipyards etc., horizontal lifeline with a rope stretcher and a safety belt form another fall protection system. The lifeline is mounted between two supports to waist level. According to American National Standard ANSI Z359.1:1992, it is tighten up to a tensile force of 0.75 – 1.0 KN for the anchorage of a lanyard and is capable of supporting a static load of at least 2280 kg per employee using the lifeline, applied anywhere along the lifeline.

Anchorage for horizontal lifeline shall be of reinforced concrete columns or structural steel members, and shall be of a strength capable of sustaining the above loads. The angle of sag, and pre-tensioning of the lifeline shall be considered when installing the anchorages and the horizontal lifeline system. Figure 9 shows a horizontal lifeline.

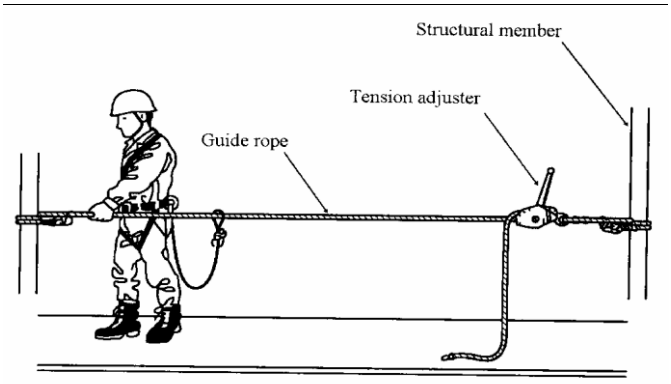


Figure 9: Horizontal Lifeline

(4) Fall Arrester

Mechanical devices have been developed for use with safety belts that will extend the working distance of the users from structural anchorage points to work level. Fall arresters become the major components of a fall arresting system. They work with lifelines, guide rails or energy absorbers to protect the user from body injury during a fall.

Two types of fall arresters are commonly used: retractable type fall arrester, guided type fall arresters either on a rigid anchorage line or on a flexible anchorage line.

A fall arrester and its accessories shall only be used if the system complies with the requirements of a national standard and the specifications issued by manufacturer. The selection of the type of fall arrester will depend on the nature

and location of the task and the structural environment. The erection must be conducted under the supervision of a competent person who should inspect the system before each use.

The user of a fall arresting system should follow all the manufacturer's instructions regarding the inspection, maintenance and storage of the equipment. Suitable training should be provided to each user before he is allowed to use the system.

(a) Retractable fall arrester

The retractable fall arrester system consists of an anchorage point, a retractable type fall arrester with a retractable lanyard such as an inertia reel, and a safety belt which is a safety harness required under BSEN or ANSI. The arrester has a self-locking function and an automatic tensioning and return facility for the lanyard.

Because a retractable type fall arrester is designed and tested so as to be a complete connecting system for fall arresting purposes, an energy absorber shall not be attached to the connector of the retractable lanyard.

A sketch of the system is at Figure 10.

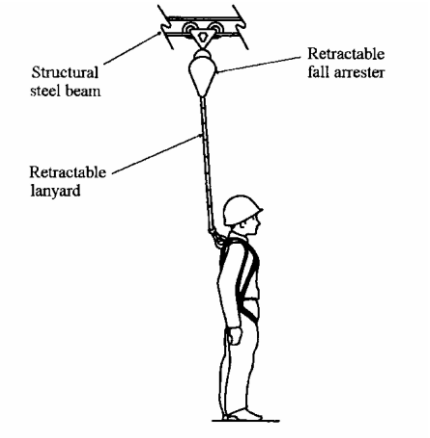


Figure 10: Retractable Fall Arrester

(b) Guided type fall arrester on a rigid anchorage line

It is an arrester with a self-locking function and a guide facility. The arrester works on a rigid anchorage line and a lanyard. An energy dissipating element may be incorporated in the guided type fall arrester.

It travels along an anchorage line, accompanies the user without requiring manual adjustment during upward or downward changes of position and locks automatically on the anchorage line when a fall occurs.

The anchorage line may be a rail or a wire rope and is secured to a structure in such a way that lateral movements of the line are limited.

Figure 11 shows the system.

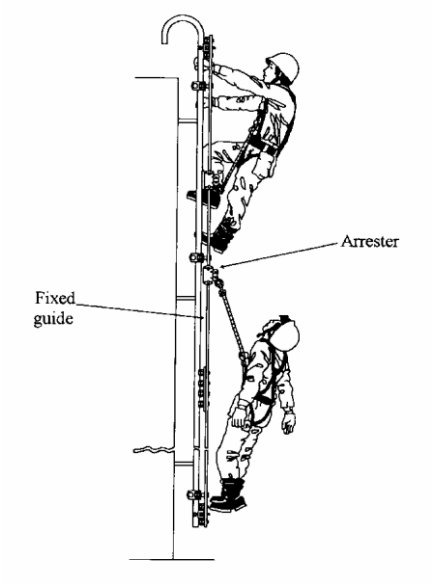


Figure 11: Guided Type Fall Arrester

(c) Guided type fall arrester on a flexible anchorage line

This system consists of a flexible anchorage line, a self-locking guided type fall arrester which is attached to the flexible anchorage line and a lanyard. The arrester travels along the anchorage line, accompanies the user without requiring manual adjustment during upward or downward changes of position and locks automatically on the anchorage line when a fall occurs. The anchorage line may be a synthetic fibre rope or a wire rope and is secured to an upper anchorage point. An energy dissipating element may be incorporated in the guided type fall arrester, in the lanyard or in the anchorage line. Figure 12 shows the system.

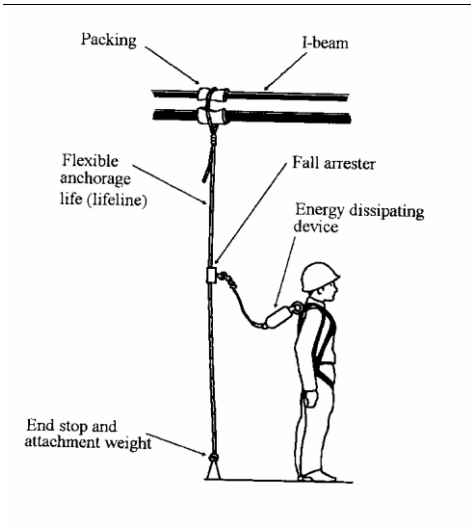


Figure 12: Flexible Anchorage Line

Appendix 4

Marine Department Contacts

1. For reporting of shipboard industrial accidents and for enquiries on occupational safety and health matters relating to shipboard industrial operations including cargo handling, ship-repairing and marine construction during office hours -

   Marine Industrial Safety Section,
   Room 2315, Harbour Building,
   38 Pier Road,
   Central, Hong Kong.
   Tel.: 2852 4477 Fax.: 2543 7209

2. For reporting of marine accidents during office hours -

   Marine Accident Investigation Section
   Room 2103, Harbour Building,
   38 Pier Road,
   Central, Hong Kong.
   Tel.: 2852 4511, 2852 4943 Fax.: 2543 0805

3. For enquiries on matters relating to dangerous goods carried by vessels during office hours -

   Dangerous Goods and Project Section
   Room 307, Harbour Building,
   38 Pier Road,
   Central, Hong Kong.
   Tel.: 2852 3085, 2852 4384 Fax.: 2815 8596

4. For reporting of marine and shipboard industrial accidents during and outside office hours -

   Vessel Traffic Centre
   Tel.: 2233 7801 Fax.: 2858 6646
   V.H.F.: Channel 12, 14, 67

5. For alerting the search and rescue authority (24 hours manned) -

   Hong Kong Maritime Rescue Co-ordination Centre (HK MRCC)
   Tel.: 2233 7999 Fax.: 2541 7714

6. Marine Department Web-site: http://www.mardep.gov.hk