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**FORWARD**

- 1 The Qatar Construction Specifications (QCS) includes references and certain sections which address occupational health and safety. To ensure that the users of the RD/SAMAS are fully aware of where occupational health and safety issues are addressed in the QCS, the following table summarises where potential overlaps may occur. For consistency, it is recommended that in matters relating to occupational health and safety reference is made first to the RD/SAMAS. For the purpose of clarity, however, references are made in the relevant section of the RD/SAMAS to their comparable sections in the QCS and vice versa.
- 2 The purpose of QCS is to provide as a general technical guide for acceptable construction work practices in the State of Qatar, considering this; any addition for technology, material, specification, standard that are not mentioned in this section or their modification, shall be subject to approval as stated in the introduction of QCS (00-02).

Sr. No	QCS Section No.	Part No.	Part Name	Item No.	Item Name
1	1	7	Submittals	7.5.2	Health and Safety Organization Chart
2	1	7	Submittals	7.6.1	Health and Safety Plan
3	1	8	Building Demolition and Waste Management	8.1.6	Safety
4	1	10	Welfare, Occupational Health and Safety	All	All
5	1	11	Engineer's Site Facilities	11.4.6	Safety Equipment and Clothing
6	1	14	Temporary Works and Equipment	14.4	Test Certificates for Cranes and Lifting Tackle
7	1	15	Temporary Controls	All	All
8	1	16	Traffic Diversions	16.1.3	Safety
9	3	1	General	1.4.12	Safety and Management
10	4	1	General Requirements for Piling Work	1.6	Safety
11	4	4	Deep Foundations	4.9.1.7	Safety Precautions
12	4	4	Deep Foundations	4.9.1.13	Protection of Testing Equipment
13	6	1	General	1.6	Temporary Fencing
14	6	7	Asphalt Plants	7.8.13	Safety Requirements
15	6	14	Works in Relation to Services	14.2.2	Safety
16	8	1	General	1.3.2	Health and Safety
17	8	8	Protective Coatings and Painting	8.1.9	Safety
18	8	9	Trenchless Pipeline Construction	9.2.5	Safety Requirements
19	8	10	Pipeline Cleaning and Inspection Survey	10.1.7	Safety Requirements
20	8	11	Sewer Rehabilitation	11.2.2	Safety
21	9	1	General	1.2.8	Safety Guards
22	9	1	General	1.2.16	Noise Levels and Vibration
23	19	5	Hot Water Storage	5.1.6	Safety
24	21	1	General Provisions for electrical Installation	1.1.11	Fire and Safety Precautions
25	21	1	General Provisions for electrical Installation	1.1.23	Safety Interlocks
26	24	1	General	1.1.4	Scaffolding
27	29	1	Design Related Issues Aspects	1.1.5	Fire Resistance Period
28	29	3	Geotechnical Specifications	2.3.1.5	Safety
29	29	4	Tunnel	4.5.8	Safety Regulations
30	29	4	Tunnel	4.5.9	Fire Prevention
31	29	4	Tunnel	4.6.4	Safety Measures and Systems
32	29	7	Concrete Structures	7.1.10	Safety Railing

## Construction Site Safety

### 1.2.1 The Management of Health on Site

#### 1.2.1.1 Introduction

- 1 One of the reasons why Contractors have safe systems of work is to avoid accidents and keep employees at work instead of being off sick.

#### Reference

- 2 Refer to Section 11 – Part 1 – 1.8.1 – Sources of Health and Safety Information.

- 3 The following standards are referred to in this part of specification:

- BS 5228 Code of practice for noise and vibration control on construction and open sites-
- EN 166 ..... Personal eye-protection – Specifications; (ISO 16321-1 Eye and face protection for occupational use — Part 1: General requirements; ISO 16321-3 Eye and face protection for occupational use — Part 3: Additional requirements for mesh protectors)
- EN 169 Personal eye-protection - Filters for welding and related techniques - Transmittance requirements and recommended use; (ISO 16321-1 Eye and face protection for occupational use — Part 1: General requirements)
- EN 175 ..... Personal protection - Equipment for eye and face protection during welding and allied processes
- EN 397 Industrial safety helmets
- EN 812.....Industrial bump caps
- EN 60825 Radiation safety of laser products, equipment classification, requirements and user's guide (EN 60825-1 Title Safety of laser products - Part 1: Equipment classification, requirements and user's guide; EN 62471 Photobiological safety of lamps and lamp systems; IEC 60825-1 Safety of laser products - Part 1: Equipment classification and requirements)
- ISO 22000 Food safety management systems — Requirements for any organization in the food chain

*Note: Section 1, Part 13 of the QCS covers setting out of the works.*

#### 1.2.1.2 Benefits

- 1 The benefits that arise from adopting a positive policy of health risk management can be measured in legal, economic, social and moral terms.

#### Legal

- 2 Freedom from prosecution by the administrative authorities, or either Government Officials stopping or delaying Contractors works.

#### Economic

- 3 Uninterrupted production and lower staff turnover and having a good reputation with the prospect of future business.

#### Social

- 4 Being recognised by employees and others as a 'caring' Contractor and a good company to work for.

### Moral

- 5 Knowing that the Contractor and work activities are not damaging the health of staff or anyone else, given the fact that no Contractor has the right to damage the health of any employee.
- 6 While social and moral issues are not usually mentioned, it can be seen that they are becoming of greater importance, particularly when clients or contractors are looking for contractors who have a demonstrated commitment to health as well as to safety.

#### 1.2.1.3 Some of the specific health areas that need to be addressed

##### Manual handling

- 1 Giving employees the appropriate training in the correct manual handling techniques and the use of mechanical lifting aids is highly cost effective. Adequate supervision is necessary to ensure that employees then use the proper equipment and techniques and do not take 'short cuts'. This will reduce accidents, the amount of time lost on site, and the disruption to work that is caused when something goes wrong.
- 2 The part of the body most vulnerable if bad manual handling techniques are used is the back, particularly the lower back. Once it has been damaged, it is usually weakened for the rest of a person's life.
- 3 All the other major joints and muscle groups can also be easily damaged if the correct manual handling techniques are not used.
- 4 The consequences of an injury due to bad manual handling, or a musculo-skeletal injury or illness as they are often called, can be a long-term or permanent inability to work. The cost could be direct in terms of the compensation that must be paid for the worker who suffers occupational disease as well as the cost of treatment which affects both the contractor and the State of Qatar. There is also the indirect cost in terms of interruption of work, sick leave days, recruitment cost for new replacement, training cost for new hires, poor reputation, poor quality work, increased errors in productivity, etc.

##### Noise

- 5 The damage can range from temporary hearing loss to permanent hearing loss or from partial hearing loss to total deafness. As well as hearing problems, excess noise is also known to cause:
  - (a) annoyance and irritation
  - (b) loss of concentration
  - (c) reduced efficiency
  - (d) fatigue
  - (e) increased accident risk
  - (f) masking of other warning signals.
- 6 On site, the failure of an employee to understand instructions that have been given, or to hear a warning signal, can have serious consequences, both for them and for the Contractor.

#### 1.2.1.4 Vibration

- 1 A considerable number of the tools and other pieces of equipment that are currently used in the Qatar building and construction industry have a rotary or percussive action and so can cause **hand-arm vibration**. This even applies to some widely used small tools, such as hand drills that have a 'hammer' action. Other examples of tools that create vibration include pneumatic breakers, vibrating pokers, vibrating rollers, plate compactors and scabbling

machines.

- 2 The most commonly caused ill-health effect is 'vibration white finger' where the effect of the vibration damages the nerves and blood vessels in the fingers. The fingers become white and there is a loss of feeling which prevents smaller tools from being held or used properly.
- 3 Hand-arm vibration is also known to cause other vascular, neurological and muscular damage in the hands, wrists, elbows and shoulders.
- 4 **Whole-body vibration**, which is caused by the transmission of vibration to the body from sources such as moving plant or vehicles, can bring about long-term back pain.
- 5 The effects of both hand-arm vibration and whole-body vibration can be reduced by carrying out risk assessments, appropriate purchasing policies, the correct use of the equipment and the use of the appropriate anti-vibration devices such as special handles or grips.

#### 1.2.1.5 Stress

- 1 In the workplace, stress is a growing problem but one that has not been widely recognised or generally accepted within the Qatar building and construction industry.
- 2 Stress can cause physical problems such as:
  - (a) high blood pressure
  - (b) heart disease
  - (c) depression as well as behavioural problems, such as:
  - (d) anxiety
  - (e) irritability
  - (f) failure to cope as usual
  - (g) bad time-keeping. Some of the causes of stress are:
  - (h) too much work/long working hours
  - (i) confusion as to what is expected
  - (j) uncertainty as to responsibilities
  - (k) conflict of interests.
- 3 Work-related factors that lead to stress can be managed but this will require appropriate training for management and operatives. If left unchecked, the following signs of stress may quickly emerge at the workplace and cause problems.
  - (a) Loss of motivation, commitment and work output.
  - (b) Increased absence due to sickness and unauthorised reasons.
  - (c) Decline in the relationships between staff on site.
  - (d) Poor decision-making and increased errors.
  - (e) Physical illness, and perhaps stomach ulcers and heart problems.
  - (f) Mental illness.
- 4 While a reasonable degree of challenge and stress is acceptable as providing an added incentive to work, excess stress among employees is counterproductive and should be avoided if employees are to work to their best potential.
- 5 Some things that can be done to avoid or prevent stress are:

#### 1.2.1.6 Management-related

- 1 The fostering of good relationships between staff and management
- 2 Well-set, clear and achievable objectives
- 3 Good and effective two-way communications
- 4 Employee involvement
- 5 Good management support
- 6 Staff training

#### 1.2.1.7 Task-related

- 1 Well-defined tasks
- 2 Clear responsibilities
- 3 Proper use of skills
- 4 Good control of hazards and risks
- 5 Support from senior management
- 6 The benefits that come from reducing stress include:
  - (a) less sickness and absence from the workplace
  - (b) increased performance and productivity
  - (c) better staff relationships
  - (d) lower staff turnover
  - (e) increased morale
  - (f) lower overall costs.
- 7 The elements of the work-related stress standards are:
- 8 **Demands** - Issues that should be considered are workload, work patterns and the working environment.
- 9 **Control** - How much control does the individual have over the way they do their work?
- 10 **Support** - Do workers feel that adequate encouragement and resources is provided by the company, managers and colleagues?
- 11 **Relationships** - Workers at any level must not be subjected to unacceptable behaviours by anyone at work and conflicts must be effectively dealt with.
- 12 **Role** - Workers at all levels must understand their role (how they fit into the organisation) and there must not be any conflicting roles.
- 13 **Change** - People can be suspicious of the real motives behind organisational change which, whether large or small, must be well managed and effectively communicated.

### 1.2.1.8 Radiation and Sunshine

#### Radiation

- 1 Any activity which involves the use of radioactive materials, lasers or X-rays shall be performed by competent persons specially trained in the proper and safe operation of such equipment.
- 2 If all the signs and other procedures are obeyed, no-one should be at risk from ionising radiation.

#### Sunshine

- 3 One area of risk that does exist is the ultra violet radiation from sunshine. Overexposure to ultra violet radiation can cause sunburn, skin damage and skin cancer. Ultra violet radiation exposure can also damage the eyes. Sunburned skin increases the likelihood of heat related illness. Those who work in the sun should attempt to cover and/or shade exposed skin—including the neck, ears, eyes, forehead, and nose.
- 4 People most at risk include those with fair or freckled skin that does not tan or that burns before it tans. People with red or fair hair and light coloured eyes, and those who have a large number of moles (more than 50), are also at a higher level of risk.
- 5 Contractors shall make available broad-spectrum sunscreens a high sun protection factor (SPF) onsite where employees are exposed to the sun during their work.
- 6 Contractors to conduct risk assessment and implement administrative and/or engineering control measures to reduce and/or eliminate a worker's exposure to the sun. Work should be planned to be either avoided or conducted under shaded areas during the most intense periods of the day. Shelters and/or workshops to be created for activities where it cannot be avoided.

### 1.2.1.9 Ventilation

- 1 Whenever hazardous substances such as dusts, fumes, mists, vapors, or gases exist or are produced in the course of construction work, their concentrations shall not exceed the applicable Work Exposure Limit.
- 2 Ventilation and/or exhaust systems shall be designed, installed and maintained by a competent person / company.

### 1.2.1.10 Bird and bat droppings

- 1 The presence of large populations of roosting birds or a bat colony can present significant risks to health if their droppings are disturbed. This has obvious implications for some types of construction work and preliminary work such as surveys.
- 2 The main hazard is the inhalation of fungus spores which become airborne as a result of disturbance of the droppings.

### 1.2.1.11 Dermatitis

- 1 Occupational dermatitis causes lost time in the building and construction industry. Yet with proper attention to risk assessments, control measures and good working practices it could be avoided. The prevention of dermatitis would save the Qatar construction industry and Contractors large amounts of money, and also assist in improved productivity on site, as well as improving conditions for the workers.
- 2 The agents which cause dermatitis can be divided into five classes as follows:

- (a) mechanical factors such as friction, pressure and trauma
  - (b) physical factors including heat, cold, electricity, sunlight and radiation
  - (c) the use of some chemicals
  - (d) contact with some plants and their products
  - (e) contact with biological agents, organisms, insects and mites.

#### **1.2.1.12 Leptospirosis (Weil's disease)**

- 1 When working near to water or on sites that are otherwise wet, consideration must be given to the health implications associated with the presence of rats.

2 Leptospirosis is an occupational hazard for anyone working near water, damp areas or anywhere else where rats might be present. It is a disease caused by bacteria that is present in the urine of infected rats and many other animals including Dogs is therefore also in the water where they live. The bacteria thrives in damp conditions, typical of banks of rivers or streams, and can enter the body through unprotected cuts and scratches, by swallowing infected water and through the lining of the nose.

3 If anyone thinks they may have come into contact with the disease, they should be aware that the early symptoms closely resemble the symptoms of influenza, namely:

  - (a) fever
  - (b) headache
  - (c) chill. Later symptoms include:
  - (d) tightening of the skin
  - (e) a yellowing of the skin (similar to jaundice)
  - (f) internal bleeding.

4 It is essential that anyone who is at risk, and who becomes unwell with flu-like symptoms, should visit their doctor, describe where they have been working and that they are at risk from leptospirosis.

5 Persons regularly at risk, for example, canal or sewage workers should carry a card explaining their occupation and the occupational hazard of leptospirosis.

6 Personal precautions that should be taken include the following:

  - (a) discourage the presence of rats on site: do not leave food lying about or throw away food scraps
  - (b) do not handle the carcasses of dead rats
  - (c) avoid inadvertent entry or immersion in water that could be infected
  - (d) if this happens and you think that you may be infected, particularly if you swallowed any water, see a doctor as a matter of urgency
  - (e) wear appropriate PPE
  - (f) prior to entering the work area, wash any cuts or grazes in clean water. Apply antiseptic to the wound, then cover with gauze, a waterproof dressing and PPE as necessary
  - (g) upon completion of work, wash hands, forearms and all other exposed areas of skin thoroughly. Remove any wet protective clothing as soon as possible and dry it
  - (h) avoid rubbing your nose, mouth or eyes with your hands during work
  - (i) do not smoke, eat or drink without first washing your hands.

7 Leptospirosis can be fatal, typically within four to six weeks, if the early symptoms are not recognised and treated.

#### **1.2.1.13 Environmental Exposures – Contaminated ground**

- 1 The disturbance of contaminated ground can release hazardous fibres such as asbestos, hazardous gases or vapours, and dust containing levels of lead.
- 2 Where ground that has been previously used is to be disturbed, a risk assessment must be carried out to determine whether there will be residual risks to health.
- 3 The findings of a thorough assessment of the risks will determine exactly what the hazards are and how the risks can be eliminated or controlled to an acceptable level. Given the possible wide range of contaminants, the potential for ill health may result from inhalation, ingestion or skin contact with the hazardous substance.

#### **1.2.1.14 Smoking**

- 1 Although smoking is totally prohibited on many sites, Contractors in control of a site may make provision for smoking in areas which are not 'enclosed' or 'substantially enclosed', as long as non-smokers are not exposed to tobacco smoke.

#### **1.2.1.15 Repetitive strain injury**

- 1 With regard to the construction industry, the jobs where workers are most likely to develop RSI are:
  - (a) plumbers
  - (b) carpenters
  - (c) painters
  - (d) plant operators.
- 2 Methods by which workers can limit the potential for RSI are:
  - (a) avoiding long periods of repetitive tasks - job rotation
  - (b) alternating the use of the hands - picking up left- then right-handed
  - (c) taking more short breaks rather than one long break
  - (d) wearing looser fitting clothing to increase ease of movement
  - (e) keeping warm - cold muscles don't expand properly
  - (f) not overstretching - move closer to the task
  - (g) reporting pain or other symptoms immediately - RSI is easier to treat in the early stages.
- 3 Contractors can make a big difference to the health of their workers, which will have business benefits, by:
  - (a) assessing each job for the potential for RSI
  - (b) encouraging early reporting
  - (c) allowing workers to organise their work and take breaks as necessary.

## Construction Site Safety

### 1.2.2 Personal Protective Equipment

#### 1.2.2.1 Key points

- 1 The correct use of personal protective equipment (PPE) is essential in many cases to protect the wearer from harm.
- 2 Given the nature of most construction sites, the use of some items of PPE, such as safety helmets and safety footwear, is a daily occurrence.
- 3 However, it must be remembered that the use of PPE as a means of protecting against risks to health or safety is the last resort; it only protects the wearer and only then if it is:
  - 4 the right PPE for the job
  - 5 in good working order
  - 6 being used properly.
- 7 Contractors have a legal duty to investigate the use of other protective measures before resorting to the issue of PPE.
- 8 Employees must look after the PPE that has been issued to them and inform their Contractor if it becomes damaged or is lost.
- 9 Contractors have a duty to supply the necessary PPE free of charge.
- 10 Respiratory protective equipment (RPE) is a sub-group of PPE.

*Note: Section 1, Part 11 of the QCS covers safety equipment and clothing.*

#### 1.2.2.2 Introduction

- 1 Construction workers will have to wear some items of personal protective equipment (PPE), such as safety helmets and safety footwear, as a matter of course. Other PPE will have to be provided and worn as required, as indicated by the findings of a risk assessment. Generally, PPE is thought of as equipment that is designed to protect the head, ears, eyes, respiratory system, skin, hands and feet, and includes such items as gloves, safety goggles and hearing protectors. However, other categories of PPE are designed to protect individuals from falling from height and to keep them afloat in water or other liquids.
- 2 Respiratory protective equipment (RPE) is a significant sub-group of PPE. As its name suggests, it is designed to protect the respiratory system of users from hazardous and hostile atmospheres.
- 3 *For simplicity, wherever any reference is made to 'PPE', it will include 'RPE', although at appropriate places RPE will be referred to in its own right.*
- 4 All PPE must bear the CE mark to show conformity with European Standards. When Contractors are deciding how best to protect employees from a risk to their health and safety at work, the decision to issue PPE may only be made where it is found that the risk cannot be adequately controlled by other means that are equally or more effective. In effect, the issue and use of PPE is the 'last resort' in terms of risk control.
- 5 PPE must be selected by a competent person who, if necessary in conjunction with the suppliers, can identify the PPE that will be effective against the hazards present in the workplace. An example of this is the selection of the correct type of respirator or filter to protect

the user against the various types of airborne substances, either particles or gases.

- 6 It must be remembered that failure of an item of PPE, or the wrong type of PPE being used, could expose an employee to the possibility of occupational ill-health, serious injury or death.

7 These Regulations place a requirement on every Contractor to make a suitable and sufficient assessment of every work activity in order to identify any hazard that employees, or any other persons, might encounter as a result of the work being carried out.

8 When hazards are identified, it is then the Contractor's duty to either eliminate the hazard or to put control measures into place to reduce the risks to health and safety arising out of the hazards, as far as is reasonably practicable.

9 Where the hazard cannot be eliminated or the risks to health and safety controlled in any other way, as determined by a risk assessment, the Contractor must supply suitable PPE and ensure that it is used and looked after.

10 The following requirements of these Regulations all have a relevance to the selection and use of PPE:

  - (a) Contractors must provide employees with comprehensible and relevant information on any risks that exist in the workplace, details of the existing control measures that are in place and any measures to be introduced to reduce the residual risks
  - (b) Contractors must ensure that employees are provided with appropriate health surveillance and periodic medical examination where indicated as necessary by the risk assessment should refer to the Minister of Housing and Civil Service resolution #19 for the year 2005.
  - (c) Contractors must take into account each employee's capability with regards to health and safety when allocating work, and provide them with adequate health and safety training
  - (d) employees, in turn, have a duty under these Regulations to:
    - (i) use equipment (e.g. PPE) in accordance with any training and instruction given
    - (ii) inform the Contractor of any work situation or other matter which they consider presents a risk to the health and safety of themselves or others.

11 The emphasis is firmly towards engineering and organisational controls and away from 'person-based' controls such as the wearing of PPE.

### **1.2.2.3 Personal Protective Equipment**

- 1 These Regulations require that where a risk has been identified by a risk assessment and it cannot be adequately controlled by other means which are equally or more effective, then the Contractor must provide *suitable* PPE and ensure that it is correctly used and cared for by employees.
  - 2 Detailed requirements of any such risk assessment require the problem to be thought through in a structured manner and the right equipment chosen for the right reasons.
  - 3 A key factor is the competence of the person carrying out the assessments. If they do not get it right, the consequences for the health and safety of employees could well be very serious.
  - 4 In essence, personal protective equipment may only be used as a last resort after all other means of eliminating or controlling the risk have been considered.
  - 5 In deciding which type to issue, the Contractor must take into account the hazard that the PPE is being used to protect against and ensure that the PPE will fit the wearer and allow them to

work safely. If more than one item of PPE is being used at any one time, the Contractor must make sure that individual items of PPE are compatible and do not adversely affect the performance of each other.

- 6 Whenever PPE is to be issued, the Contractor must ensure that employees have been given adequate and appropriate information, instruction and training to enable the employees to understand the risks being protected against, the purpose of the PPE and the manner in which it is to be used.

7 Whilst the Contractor must ensure that personal protective equipment is supplied and used, the employee has duties to:

  - properly use the PPE provided, in accordance with the information, instruction and training that they have been given
  - return PPE to its storage facility, where provided, after use
  - know the procedures for reporting loss of any PPE or defects in it to their Contractor.

8 The assessment must consider:

  - an assessment of the risks to health and safety that have not been controlled by other means
  - the nature of the risks to health and safety against which the PPE is to protect the user
  - a comparison of the nature of the risks and the performance capabilities of the PPE
  - the compatibility of the PPE under consideration and any other PPE that will be worn at the same time.

9 Contractors and self-employed persons must:

  - review such assessments if it is thought that they are no longer valid or if there has been a significant change in the matters to which it relates
  - incorporate any changes that are indicated by the review.

10 These Regulations require that Contractors ensure that PPE that has been provided to employees is maintained (which includes replacement or cleaning) in an efficient state, efficient working order and good repair.

11 These Regulations require that Contractors provide suitable storage facilities for PPE that has been issued, for when it is not in use.

12 These Regulations require that Contractors who have provided employees with PPE also provide *adequate and appropriate* information, instruction and training to enable employees to know:

  - the risk or risks for which the PPE has been provided
  - the purpose for which, and the manner in which, the PPE is to be used
  - any actions that they (users) must take to keep the PPE in the suitable condition.

13 Training can be theoretical and/or practical. Where appropriate the Contractor should, at appropriate intervals, arrange suitable demonstrations in the correct wearing of PPE.

14 These Regulations place a legal duty on:

  - Contractors* to take reasonable steps to ensure that the PPE provided to employees is used correctly
  - employees* to use the PPE provided in accordance with any instruction and training provided
  - employees* to take reasonable steps to return PPE to any storage facilities provided.

#### **1.2.2.4 Construction (Head Protection)**

- 1 These Regulations require that all at-risk persons involved in construction and engineering-construction activities are provided with, and wear, **suitable head protection** on site.



- 2 Under these Regulations, the term '**suitable head protection**' means any head protection that is designed to protect the wearer against any foreseeable risk of head injury, other than by falling. It must, with necessary adjustment, fit comfortably.
- 3 Whilst generally the Contractor's interpretation of this legislation means that safety helmets are worn at all times on site except when in safe areas such as site offices and canteens, individual Contractors may decide that on certain sites they are able to designate other 'safe areas' or 'safe routes' where helmets need not be worn.
- 4 This decision must be based on the findings of a risk assessment which must investigate fully the danger of workers being hit by anything falling from above or of them hitting their head and being injured. It is not unknown for 'protected routes' to be created on larger sites enabling people to gain access to office complexes etc. from the site entrance, without the need to wear full PPE.
- (a) any head protection provided under these Regulations has to comply with any relevant European Standards and must therefore carry a CE mark
  - (b) before selecting any head protection for employees, the Contractor or self-employed person must carry out an assessment to determine whether it is suitable.
- 5 In order to determine whether it is suitable, the assessment must compare the required protection characteristics of the head protection with the known risks.
- 6 *Contractors* must:
- (a) review such assessments if it is thought that they are no longer valid or if there has been a significant change in the matters to which it relates
  - (b) incorporate any changes that are indicated by the review.
- 7 In general, suitable head protection will be an industrial safety helmet conforming to EN 397. For work in confined spaces, a bump cap designed to EN 812 may be more suitable, but is restrictive in use.

#### **1.2.2.5 Contractor's duties**

- 1 The Contractor must:
- (a) carry out an assessment to determine the suitability of head protection
  - (b) produce written rules on the use of head protection or provide directions (such as verbal instructions and safety signs) to reinforce when and where head protection must be worn and bring those rules to the attention of any persons who might be affected by them
  - (c) provide each employee with suitable head protection and adequate storage facilities
  - (d) ensure that all head protection is adequately maintained and, where necessary, replaced.
- 2 The Contractor must also keep records of the assessment and details of the control measures implemented. These will need to be reviewed as a result of any significant change in the work to which the protection relates or when its suitability is no longer valid.

#### **1.2.2.6 Employees' duties**

- 1 Employees must:
- (a) co-operate with their Contractor
  - (b) wear the head protection provided in accordance with instructions or written rules
  - (c) take reasonable care of the head protection provided and report any loss, defect or concerns about its serviceability.

- 2 No other workers are covered by this exemption.

#### **Provision, maintenance and replacement of suitable head protection**

- 3 Every Contractor must provide each employee with suitable head protection where, due to the nature of the work or activity, they are at risk from head injuries. All self-employed persons have an obligation to provide themselves with suitable head protection in similar circumstances. In both cases, the head protection must be adequately maintained to ensure serviceability, and it should be replaced as necessary.
- 4 The assessment should be reviewed as a result of any significant change in the work to which the protection relates or it is no longer suitable. Contractors should ensure that storage for head protection is available when it is not in use.

#### **Ensuring suitable head protection is worn**

- 5 Every Contractor and anyone who has control over persons at work have a duty to ensure suitable head protection is worn.

#### **Rules and directions**

- 6 As part of pre-planning for the commencement of work, written rules on the use of head protection **should be established** by site management, particularly on multi-contractor sites.
- 7 Rules should be clear, unambiguous and brought to the notice of those affected. Persons in control should consult with any interested parties in matters relating to head protection.
- 8 Where written rules are not in place, verbal instructions or the provision of safety signs may help to provide a procedure and a reinforcement of when and where to use suitable head protection.

#### **Wearing of suitable head protection**

- 9 In compliance with written rules or instructions given by those in control of operations or works, employees should wear suitable head protection as directed.

#### **Reporting the loss of, or defect in, head protection**

- 10 Every employee, having been provided with head protection, should take reasonable care of it, reporting any loss, obvious defects or concern about its serviceability to the Contractor, under the arrangements that have been made. These arrangements should enable repairs or replacement head protection to be provided, before the employee concerned is allowed to restart work.

### **1.2.2.7 Personal Protective Equipment (Control of Substances Hazardous to Health)**

- 1 These Regulations place a duty on Contractors to ensure that the exposure of their employees to substances hazardous to health is either prevented or, where this is not reasonably practicable adequately controlled.
- 2 These control measures include:
- Contractors must either prevent exposure of employees to substances hazardous to health or, where this is not reasonably practicable, adequately control exposure.
  - The preferable method of prevention or control is to substitute the substance or process with a non-hazardous or less hazardous substance or process.
  - Controls shall be, in order of priority, by engineering controls, by providing ventilation, by implementing organisational controls then, as a *last resort*, providing suitable personal protective equipment.

- (d) All employees must make proper use of any PPE, and must take all steps to return it to its place of storage after use and report any defects to their Contractor.
  - (e) Adequate maintenance, examination and testing of control measures provided must be undertaken to ensure they are in efficient working order and, in the case of PPE, maintained in a clean condition.
  - (f) Information, instruction and training must be provided for persons who may be exposed to substances hazardous to health so that they are aware of the danger of exposure and the precautions which should be taken.

#### **1.2.2.8 Personal Protective Equipment (Work at Height)**

- 1 These Regulations are relevant where PPE in the form of a safety harness, lanyard, a fall-arrest block or other personal fall-arrest equipment is used.
  - 2 The key provisions of these Regulations are that Contractors should:
    - (a) where it is reasonably practicable, avoid the need to carry out work at height
    - (b) where such work cannot be avoided, select the most appropriate equipment for the work and to prevent falls
    - (c) reduce the distance of, and potential consequences of, any fall
    - (d) ensure that the work is risk assessment-based and that it is carried out safely
    - (e) ensure the work is carried out by trained and competent persons who are adequately supervised.
  - 3 These Regulations require that Contractors follow current best industry practice when selecting equipment for work at height. In particular, Contractors are required to take account of:
    - (a) working conditions and risks to the safety of the persons at work
    - (b) access and egress, and distances to be negotiated
    - (c) distance and consequences of any potential fall
    - (d) duration and frequency of use of the work equipment
    - (e) need for and ease of evacuation and rescue in an emergency
    - (f) any additional risks posed by the installation, use or removal of the work equipment, and any evacuation or rescue from it.
  - 4 The requirements are:
    - (a) a personal fall protection system shall only be used if a risk assessment has shown that the work can be done safely while it is being used, and that the use of other, safer work equipment is not reasonably practicable
    - (b) the user and a sufficient number of others have been trained in its use and in rescue procedures
    - (c) it shall be suitable and of sufficient strength for the purpose for which it is to be used and will withstand any foreseeable loading
    - (d) it fits the wearer and is correctly fitted or worn
    - (e) it is designed to minimise injury to the user in the event of a fall, and is such that the user will not fall or slip out of it if they do fall
    - (f) it is designed, installed and used so as to prevent unplanned or uncontrolled movement of the user.

- 5 Any anchorage point must be suitable and of sufficient strength to support any foreseeable loading. If designed to do so, the equipment must be securely attached to at least one such anchorage point when in use.
- 6 All safety harnesses, lanyards and other fall prevention or fall arrest equipment must comply with the appropriate British and European standards.

### 1.2.2.9 Common-use types of PPE

#### Hearing protection

- 1 Construction activity and equipment generate excessive noise, which can cause permanent hearing damage in those exposed to it unless appropriate control measures are put in place.
- 2 Excessive noise can also cause annoyance, fatigue, loss of concentration and disrupted communication, and may lead directly or indirectly to an increased risk of accidents.
- 3 There are two basic types of hearing protection:
  - (a) ear plugs - either disposable or reusable
  - (b) ear defenders.

#### Disposable ear plugs

- 4 These are made of very fine mineral fibre, sometimes ready shaped. They must be inserted correctly and, if taken out, should not be reused. They should only be handled with clean hands.
- 5 Employees need to be instructed on how to insert disposable ear plugs correctly or the assumed level of protection will not be reached.

#### Reusable ear plugs

- 6 These are made of rubber or plastic, and need regular and careful washing. They must be a good fit. A competent person should be responsible for instructing employees in their correct fitting and use. Different sizes may be required for each ear. Reusable ear plugs, like disposable ones, must be fitted with clean hands as any contamination by dirt, grease or swarf may cause ear irritation.

#### Ear defenders

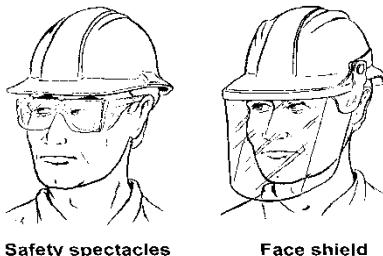
- 7 Ear defenders, sometimes referred to as 'ear muffs', completely cover the ear, and are sealed to the head with a foam or liquid-filled seal.
- 8 Badly designed or badly produced ear defenders may give little or no protection against the noise.
- 9 Facial hair and the side arms of spectacles may interfere with the seal and reduce the amount of protection given by ear defenders.

### 1.2.2.10 Eye protection

- 1 Construction personnel engaged in a wide range of activities (for example, grinding, welding, cutting, hammering, handling chemicals) run the risk of eye injury. The risks include:
  - (a) impact of solids
  - (b) ingress of liquid, dust or gas
  - (c) splashes of hot metal
  - (d) exposure to glare.

2 Contractors have a duty to provide eye protection to employees who may be exposed to eye injury, and must take all reasonable steps to ensure that it is worn. Assessments must be carried out to determine when eye protection is required and what type is appropriate for the work activities.

3 The two main types of eye protection -safety spectacles (including safety goggles) and face shields



4 All types of eye protection must:

- (a) comply with British or International Standards
- (b) suit the type of work or risk involved -including resistance to impact, heat, dust and chemical penetration
- (c) suit the user to ensure minimum discomfort and ease of movement whilst working
- (d) be marked to identify their type and suitability
- (e) be kept clean and disinfected.

5 Lasers that are now widely used on construction sites for setting datums, levelling, surveying, and so on can pose a particular hazard. They must be operated by competent and fully trained persons. If high powered lasers are used, eye protection equipment will be needed to give the required level of protection to those at risk. A safe system of work must be in place to exclude anyone not involved in the activity from the area.

#### 1.2.2.11 Respiratory protection

##### The hazards

- 1 Dust has long been known as hazardous to the health of construction workers, especially when inhaled for long periods. While the health issues associated with asbestos are well recognised, the greater part of the dust problem in the industry currently relates to more common substances, for example, cement, plaster, wood, MDF, stone, silica, fillers and plastics. High speed cutting of most materials can produce sufficient dust to cause a health hazard.
- 2 Dust that is visible in the air is generally accepted as being hazardous. However, dust that is too fine to be seen by the naked eye also causes many health problems, the symptoms of which may take many years to manifest themselves. Small dust particles of any material entering the lungs can be absorbed into the body and can cause scarring and sometimes cancer within the lungs. Skin irritation, dermatitis and ulceration can be caused by contact with some dusts.
- 3 Eating food with dirty or dust-covered hands can cause stomach disorders.
- 4 Fumes from certain substances, such as solvents, paints and adhesives, can have serious health implications. When used in poorly ventilated or confined spaces, it is not uncommon for fatalities to occur.
- 5 Whenever respiratory protective equipment (RPE) is to be used for work, a test check that a facepiece (the respirator) matches the person's facial features and seals adequately to the

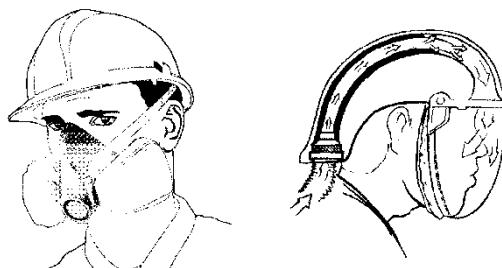
wearer's face. It will also ensure that incorrectly fitting facepieces are not selected for use. This test must be carried out by a competent person.

- 6 The training of employees in the correct use of RPE is essential before first use and should be repeated at suitable intervals. It is essential that training is carried out by a competent person and covers:
- (a) why the RPE is necessary
  - (b) the hazards, the risks and the effects of exposure
  - (c) what RPE is to be provided
  - (d) how the RPE works
  - (e) why facepiece fit testing might be necessary
  - (f) how to wear and check the RPE correctly
  - (g) fit-checking the RPE before use
  - (h) what maintenance is required and when
  - (i) where and how to clean the RPE and store it
  - (j) how to report defects in the RPE or any other problem with it
  - (k) the Contractor's responsibilities and those of employees
  - (l) use and misuse of the RPE.

### Selecting RPE

- 7 The provision and use of RPE must only be considered when equally or more effective protective control measures cannot be used. The failure of RPE could have serious consequences. The importance of the correct type of RPE being provided and used cannot be overstated as it must be assumed that the user will be working in a hostile environment.
- 8 However, there are several potential problems arising from the selection and/or use of RPE:
- (a) the *failure* of an item of RPE, where for whatever reason, such as lack of routine maintenance, it fails to provide the necessary level of protection
  - (b) the *misuse* of RPE, such as it being mistreated or not used in accordance with the manufacturer's instructions, or the training given
  - (c) it being the *wrong type* of RPE, for example there would be no protection from a filtering respirator designed solely to capture airborne dust if being used, where the workplace hazard is in fact a toxic gas
  - (d) the effectiveness of the '*face fit*'. Many types of RPE depend upon a good seal between the facepiece and the skin of the user at all times, including where physical activity and exertion are required. Factors such as facial hair or the shape of the face can interfere with a good fit.
- 9 Each type of RPE is assigned a 'protection factor' which gives the user some idea of the level of protection that the device will provide. For example, a filtering half-mask marked:
- 10 **FF P1** is a low efficiency device offering a protection factor of 4
- 11 **FF P2** is a medium efficiency device offering a protection factor of 10
- 12 **FF P3** is a high efficiency device offering a protection factor of 20
- 13 A protection factor of 10 means that in controlled conditions, for every 10 units of contaminant outside the mask, only 1 unit will get inside the mask, or for every 20 units outside the mask there will be 2 units inside, and so on. It is important, therefore, that the correct filter is selected for the type and level of contaminant in the air.

- 14 There are many types of RPE, including:
- (a) disposable face mask respirators
  - (b) half-mask dust respirators
  - (c) high efficiency dust respirators
  - (d) positive pressure powered respirators
  - (e) ventilator visor or helmet respirators
  - (f) compressed air line breathing apparatus
  - (g) self-contained breathing apparatus.
- 15 It should be noted that nuisance dust masks (simple gauze filters or cup-shaped filters often held in place by a single strap) are not classed as personal protective equipment or respiratory protective equipment. They do not meet any current standards.



High efficiency  
dust respirator

Ventilated visor and  
ventilated helmet  
respirator

- 16 The Contractor must carry out an assessment to determine **when** RPE is required and **what type** is appropriate for controlling exposure to the hazardous material. Selecting RPE that is both suitable for the user and the job must be carried out by a competent person. This is because this choice will depend on a number of interacting factors, such as:
- (a) the nature of the hazards and materials
  - (b) the measured dust concentrations
  - (c) the period of exposure
  - (d) if working outdoors, the prevailing weather conditions.
  - (e) suitability for each user - field of vision, provision for communication and the need to move in cramped or difficult working places, such as confined spaces.

#### Using and maintaining RPE

- 17 Both the Contractor and the employee have a duty to ensure that all RPE provided is used correctly and that it is stored correctly after use.
- 18 Contractors must also ensure that non-disposable RPE is thoroughly examined and tested at appropriate intervals. Such examinations and tests should be carried out at least every month, and more frequently where conditions are particularly severe. Longer intervals may be more appropriate in the case of certain RPE, for example, half-mask respirators used infrequently for short spells against air contaminants of relatively low toxicity. However, the longest interval between examinations and tests should not exceed three months.
- 19 Disposable RPE, provided it is only used for one working day or shift then disposed of, does not require any examination or tests.

#### 1.2.2.12 Skin protection

##### Industrial dermatitis

- 1 Industrial dermatitis is caused by contact between the skin (usually the hands) and irritant substances. Many types of gloves are available to prevent such contact. It is essential that a risk assessment identifies the properties of the hazardous substance so that the correct type of glove can be provided.
- 2 Dermatitis, an inflammatory skin disease, accounts for over half of all working days lost through industrial sickness. There are two general types:
- 3 contact or irritant dermatitis - usually where the skin comes into contact with an irritant substance
- 4 allergic or sensitive dermatitis - where a person develops an allergic reaction to a substance.
- 5 With different people, some substances are known to have the effect as either an irritant or a sensitiser, such as turpentine.
- 6 In the course of their work, many construction workers are likely to come into contact with one or more possible skin irritants, such as:
  - (a) cement, lime and plaster
  - (b) certain types of wood, resins, fungicides and pesticides
  - (c) paint
  - (d) tar, pitch and bitumen
  - (e) solvents, thinners and degreasers
  - (f) mineral oils and grease.

##### Cuts and abrasions

- 7 Many people working in the construction industry will carry out manual work that will render them susceptible to cuts and abrasions if the correct type of gloves are not provided and worn.
- 8 Again, gloves designed to protect the hands against cuts and abrasions are freely available.
- 9 Generally, rigger gloves offer adequate protection for most activities although for some activities, such as handling sheet glass, specialist Kevlar-impregnated gloves will be necessary.

#### 1.2.2.13 Hot works

- 1 Activities such as welding and grinding will require that the hands, forearms and face are protected against high temperatures and welding fumes or grinding sparks. To achieve this level of protection it is necessary for those who carry out such activities to wear specialist PPE made for the purpose. For example, welders should wear welding gauntlets that extend up to the elbow and a face shield.

#### 1.2.2.14 Acid and alkali burns

- 1 Some substances that are in common use in the construction industry have sufficiently strong acid or alkali properties to cause burns to the skin.
- 2 Gloves are available to protect the users of such substances from chemical burns.

### 1.2.2.15 Vibration

- 1 Special anti-vibration gloves will help lessen the effects of using rotary or percussive hand tools (which can lead to vibration white finger) but most are ineffective at the most damaging frequencies and are of more value in keeping the hands warm.

### 1.2.2.16 Selection of hand protection

- 1 British Standards cover many types of protective glove but care is needed in selecting the right type for a particular hazard. For example, a glove suitable for handling abrasive materials may offer no protection against chemicals, while the appropriate glove to protect the skin against contact with diesel oil may offer no protection against some solvents.
- 2 All manufacturers offer advice on the most suitable gloves for specific types of hazard, some of which are summarised in the following table.

Hazard	Recommended type
Acids, concrete, brickwork, stain removers, solvents, alkalis	Neoprene, nitrile, PVC, rubber
Esters, ethers, ketones (mastic, sealers), aldehydes, petroleum-based products	Medium and heavy weight rubber, neoprene, nitrile, PVC
High and low temperatures	Nitrile, PVC, medium and heavyweight rubber
Abrasion, unloading bricks and blocks, general materials handling	Rubber, nitrile, PVC, neoprene, chrome-leather with reinforced palm
Bitumen, hot work	Asbestos substitute or 'Nomex' gloves

- 3 It should be noted that industrial safety gloves are rated from 1-4 for their resistance to abrasion, tear and puncture, and 1-5 for blade cut. Those specifying and purchasing work gloves must ensure that the correct grade is obtained, if necessary by speaking to the manufacturers or suppliers.

### 1.2.2.17 Foot protection

- 1 It is essential that protective footwear is worn when people are on site, both from a Contractor's point of view, in being able to provide a safe place and a safe method of working, and from an employee's position where safety footwear has a benefit in preventing injuries.
- 2 Wellington boots, for example, whether reinforced with protective toecaps or soles or not, are essential in preventing burns from wet cement or concrete. The cement content, when mixed with water, becomes highly corrosive and will cause severe burns to body tissue.



- 3 The above picture shows the severely burnt legs of a man who was ignorant of the dangers of wet cement, the effect it can have on skin, and the need to wear Wellington boots to protect the legs.

#### **Other clothing**

- 4 Other clothing that protects the wearer against any risk to their health or safety, for example a high-visibility waistcoat, is classified as PPE whereas clothing such as uniforms, the primary purpose of which is to promote a corporate image, is not.

#### **1.2.2.18 Fall protection**

- 1 Items of equipment that are used by a person to prevent that person falling from height are also classified as PPE. Examples of this type of equipment are:
- (a) safety harness
  - (b) fall-arrest or restraint lanyard
  - (c) inertia reel fall-arrest block.
- 2 All the Contractors' and employees' duties that apply to other types of PPE apply to this type of equipment also.
- 3 A major additional consideration regarding the use of this type of PPE is the prompt rescue of anyone who has fallen and is suspended in a harness. A medical condition known as suspension trauma, which at worst can result in the death of the suspended person, can occur if rescue is not carried out within 10 minutes.

#### **1.2.2.19 Life jackets**

- 1 Another category of PPE is that which enables the user to keep afloat should they fall into water or other liquids. These are broadly divided into life jackets and buoyancy aids.
- 2 In many circumstances it will be necessary for operatives to simultaneously wear more than one item of PPE.
- 3 Whilst this is entirely acceptable, attention should be given to ensuring that the different types of PPE are compatible with each other, to avoid the possibility of a dangerous situation.
- 4 For example, hearing protectors that are fitted directly to a safety helmet will not be effective if the safety helmet is poorly fitting and, by moving around on the head, does not allow the hearing protectors to form an effective seal around the ears.

#### **1.2.2.20 Consultation with employees**

- 1 Contractors are likely to be far more successful in persuading employees to wear the PPE provided if the employees themselves are involved in the process of selecting the PPE purchased.
- 2 PPE can be cumbersome and uncomfortable and the cheapest may not be the most suitable for the wearer. In such circumstances the likelihood is that it will not be worn, at least not for long, leaving the worker unprotected against the hazard.
- 3 It is much better to purchase PPE that fits comfortably and will be used willingly.

## Construction Site Safety

### 1.2.3 Control of Substances Hazardous to Health (COSHH)

#### 1.2.3.1 Key points

- 1 Many of the substances used or *created* during work processes have the potential to cause harm to the health of anyone exposed to them.
- 2 Many COSHH issues relate to substances *created* such as dust or fumes, as opposed to chemicals that have been bought in.
- 3 Hazardous substances that are already present on site when it is first occupied can also pose hazards to health.
- 4 All purchased products that are hazardous to health must carry an appropriate warning symbol on the packaging, however those hazardous substances which are *created* by the work process or are already present on site will carry no such 'health warning'.
- 5 Contractors have duties to establish the health risks to their employees, and others who may come into contact with hazardous substances, by carrying out an appropriate assessment and must put in place adequate control measures.
- 6 The assessment should take into account how the substance is used and should not merely be a copy of the supplier's information.
- 7 Ideally, exposure to any hazardous substance would be rendered impossible by:
  - (a) the substitution of safer substances
  - (b) changing the way that the job is carried out so that the substance is not necessary
  - (c) modifying the method of its use, for example total enclosure of the process.
- 8 In many cases, none of these measures is practical in a construction site environment: if the prevention of exposure is not possible, the level of exposure must be controlled.
- 9 Using PPE to control exposure must only be considered as a last resort after other methods have been explored and found not to be reasonably practicable.
- 10 In some cases employees exposed to hazardous substances must be offered health surveillance.

#### 1.2.3.2 Introduction

- 1 These Regulations are based on very simple principles. The intention of these Regulations is to protect human health from exposure to hazardous substances by either totally preventing exposure or, where that is not reasonably practicable, controlling the level of exposure to safe values, by appropriate means.
- 2 COSHH deals with all harmful substances in relation to their health effects. However, these Regulations do not cover any flammable or explosive properties that the substances might also possess.

### 1.2.3.3 Sources of harm

- 1 Many of the basic substances (products) bought in and used in the construction industry have the potential to harm the health of people using them, for example sand, cement, synthetic mineral fibre, adhesives, solvents, resins, and mineral oils.
- 2 Additionally, many of the essential construction processes can create potentially hazardous substances, for example the inhalation of:
  - (a) dust from mixing cement, taking down ceilings and walls, chasing out or cutting blocks
  - (b) solvent fumes arising from the application of adhesives for surface finishes
  - (c) metal fumes and toxic gases, such as carbon monoxide, nitrous fumes and ozone, which can be created by welding or hot cutting processes.
- 3 A third group of substances, also covered by these Regulations, are harmful substances (including micro-organisms) that may already be on site when a project commences. Examples are:
  - (a) leptospirosis, which can be spread by the urine of infected rats
  - (b) discarded needles and syringes, which have the potential to pass on blood-borne diseases such as HIV and hepatitis
  - (c) hazardous materials buried or simply left by a previous user of the land.
- 4 The Regulations cover substances that have chronic or delayed effects, for example, substances that are carcinogenic (cause cancer), mutagenic (cause mutation of the body) or teratogenic (cause malformation of an embryo).
- 5 The purpose of these Regulations is to safeguard the health of people using or coming into contact with any substance that is harmful to health.
- 6 These Regulations apply to those substances that are classified as being very toxic, toxic, harmful, corrosive or irritant.

### 1.2.3.4 Workplace exposure limits (WEL)

- 1 Unsurprisingly, some hazardous substances have legal limits to which people may be exposed. All of these substances have a Workplace Exposure Limit (WEL) that represents a concentration of a substance in the air measured over a specific period of time. The taking of such measurements (workplace monitoring) is a specialist activity which must be carried out by someone who is competent to do so and who possess the appropriate equipment.
- 2 Such monitoring must be carried out where a (COSHH) risk assessment indicates it is necessary.
- 3 The following substances, all of which have a WEL, are commonly used in or produced by construction activities:
  - (a) general dust
  - (b) hardwood dust
  - (c) softwood dust
  - (d) silica
  - (e) white spirit
  - (f) pulverised fuel ash
  - (g) synthetic mineral fibre - rock wool/ fibreglass
  - (h) asphalt

- (i) welding/cutting fume
  - (j) gypsum
  - (k) Portland cement
  - (l) micro-organisms associated with:
    - (i) blood products
    - (ii) Weil's disease
    - (iii) tetanus
    - (iv) sewage
    - (v) certain 'black mould' species
    - (vi) anthrax.

4 This list is not exhaustive. Every Contractor has a legal duty to access competent health and safety advice. Failing to establish that an in-use substance has a WEL, or failing to control exposure to it, are criminal offences under Qatar Law.

5 A list of all WELs is published by the UK Health and Safety Executive (HSE) in Guidance Note EH40/2005, available in hard copy or for download via the:

6 HSE website at <http://www.hse.gov.uk/pubns/books/eh40.htm>

#### 1.2.3.5 Is there a COSH problem?

1 Those who plan and carry out work that could result in exposure to hazardous substances may have difficulty in appreciating that there is a (real or potential) problem. This is particularly true when a hazardous substance is created by the work process.

2 For example, a hardwood plank should not pose any serious health issues in the form that it is delivered to site. However, cutting or sanding it will produce dust that, unless controlled, has the potential to cause irritation of the nasal passages, sensitisation or, on rare occasions, nasal cancer. Cutting, sawing, grinding or sanding any substances has the potential to liberate harmful dust. Furthermore, many types of hot works will create harmful fumes or gasses which may be inhaled unless the process is closely controlled.

3 The COSHH Regulations place a duty on the Contractor to assess whether or not a hazard to the health of the employees, or other persons, will arise from the presence of hazardous substances during work activities. This process is known as carrying out a COSHH assessment.

4 The decision-making process that must be worked through when carrying out an assessment will be familiar to anyone who has completed risk assessments.

5 Establishing the degree of risk can require expertise and experience. For example, if the only way to complete an activity involves using a particularly hazardous substance (for example dry rot treatments), the work will have to be well planned, managed and closely controlled. This would result in a high hazard/low risk situation.

6 Conversely, it is possible to create very high exposures that may be harmful to health from apparently low risk substances like dust, which is a common COSHH problem in construction.

### **1.2.3.6 Definitions**

- 1 The meanings of the following words need to be clearly understood.
  - 2 **Substance** means any natural or artificial substance, in solid, liquid, gaseous or vapour form, and includes micro-organisms.

3 **Hazard** is the potential for the substance to cause harm, illness or damage to health.

4 **Risk** is the likelihood that the hazardous potential of the substance will be realised.

### 1.2.3.7 Control of Substances Hazardous to Health

1 These Regulations place a duty on Contractors.

2 These duties cover:

- (a) people actually working with substances
- (b) other people such as the public or other contractors who might be affected.

3 Significant findings of the Coshh assessment and the actions that will be taken to control exposures must be written down.

4 The main requirements of these Regulations are as follows.

- (a) Assess the health risks to employees or other people created by work activities that involves substances hazardous to health.
- (b) Implement suitable control measures to effectively protect employees and others from exposure.
- (c) Review the assessment if there have been any changes that may invalidate it, such as:
  - (i) a change in the way the work is carried out, or
  - (ii) the results of monitoring indicating that existing control measures are not effective.

5 The emphasis under Coshh is to avoid exposure to hazardous substances unless it is not reasonably practicable to do so, in which case adequate control measures must be put in place to control exposure to a safe level.

6 These Regulations require the following thought process in relation to control:

- (a) Can the work be carried out by a less hazardous method that does not require the use of hazardous substances?
- (b) If not, can the substance be changed (substituted)?

7 If the answer to both of these questions is 'no' then the introduction of measures to control exposure will be necessary.

8 'Engineering' controls should be the first controls to be considered, such as pouring devices to stop splashes, the use of dust extraction, increasing ventilation and so on. PPE should not be considered as a control until engineering control options have been exhausted. PPE:

- (a) can be expensive
- (b) can be unpleasant to wear
- (c) only protects the wearer and then only if it is being used correctly and maintained
- (d) often requires considerable management effort to ensure that it is used correctly.

9 Removing the need to buy and use it makes good occupational health and business sense.

10 The requirements of these Regulations are very thorough and one of those requirements is to ensure that the control measures which have been identified as suitable are properly used.

11 To ensure that the control measures are effective, the Regulations require that:

- (a) extract ventilation systems must be thoroughly examined periodically

- (b) if using substances which are known to damage health, part of the assessment is likely to identify that health surveillance is necessary. Any records must be kept for 40 years and made available to the people who have been exposed to the hazard
  - (c) there is a duty to communicate the information and provide relevant training to people who may be exposed
  - (d) emergency arrangements are put in place and, where required, practised.

### **1.2.3.8 Summary of COSHH**

- 1 Contractors must carry out a risk assessment of health risks created by work involving substances hazardous to health. Each assessment must take account of:

  - (a) the hazardous properties of the substance
  - (b) information provided by the supplier on the potential harmful effects
  - (c) the type, level and duration of exposure
  - (d) the way in which the job will be carried out, including the amount of the substance used (or present in the case of substances created by a work process)
  - (e) activities such as maintenance where there is the potential for high levels of exposure
  - (f) any published WEL for the substance (EH40 Benchmarked Standards to which the Qatar Construction Industry will adopt)
  - (g) the effects of any control measures which are, or will be, in place
  - (h) the results of any health surveillance and/or exposure monitoring that has been undertaken
  - (i) the risks where there is exposure to more than one hazardous substance at any one time
  - (j) other information that the Contractor may need or have in order to complete the assessment.

2 Any assessment must be reviewed regularly if there is reason to suspect that the assessment is no longer valid, or if there has been a significant change in the work to which the assessment relates, or exposure monitoring results indicate it is necessary.

3 Contractors must record significant findings of the risk assessment and the steps taken to prevent or control exposure.

4 Contractors must either prevent exposure of employees to substances hazardous to health or, where this is not reasonably practicable, adequately control exposure.

5 The preferable method of prevention or control is to replace the substance or process with a non-hazardous or less hazardous substance or process.

6 Controls shall be, in order of priority: engineering controls, organisational controls, then, as a last resort, providing suitable personal protective equipment (PPE).

7 The control measures must:

  - (a) ensure the safe handling, storage, transportation and disposal of hazardous substances
  - (b) ensure maintenance procedures, which involve exposure to hazardous substances, are suitable
  - (c) reduce to a minimum the number of people exposed, the level and duration of exposure and the quantity of hazardous substances present in the workplace
  - (d) include control of the working environment, including the provision of adequate ventilation

- (e) include adequate hygiene and washing facilities.
- 8 These Regulations contain further details of measures that must be taken to control exposure to carcinogens, mutagens and biological agents.
- 9 With regard to these Regulations, it is considered that control of exposure will be generally adequate if:
- (a) work activities are organised to minimise the release and spread of hazardous substances
  - (b) account is taken of the routes of exposure - inhalation, skin absorption and ingestion
  - (c) the control measures selected:
    - (i) are proportionate to the degree of health risk
    - (ii) are effective in minimising the escape and spread of the substance
    - (iii) may, where necessary, include a combination of control measures, including PPE
  - (d) the control measures selected are periodically reviewed for their effectiveness
  - (e) users of hazardous substances are informed of the hazards and risks and trained in the use of the control measures provided
  - (f) it does not increase the overall risks to health or safety from other sources.

#### 1.2.3.9 Control Measures

- 1 Contractors who provide any control measure are required to ensure that it is properly used or applied. All employees must:
- (a) make proper use of any control measure (including PPE) provided
  - (b) take all steps to return it to its place of storage after use
  - (c) report any defects in the control measure to their Contractor.
- 2 Where control measures are provided, adequate maintenance, examination and testing of control measures, including any PPE provided, must be undertaken to ensure they are in efficient working order and remain clean.
- 3 Where engineering controls are undertaken, the Contractor must ensure thorough examinations and testing are carried out on a regular basis.

#### 1.2.3.10 Monitoring

- 1 Where indicated as necessary by the COSHH assessment, monitoring of the exposure to hazardous substances must be undertaken using suitable procedures, unless it can be demonstrated by another method of evaluation that exposure is adequately controlled.
- 2 Suitable records of any monitoring should be kept for five years, or 40 years if personal exposures occur.

#### 1.2.3.11 Health surveillance

- 1 Health surveillance, where it is appropriate for protecting employees' health, must be carried out and recorded. Should refer to the Minister of Housing and Civil Service resolution #19 for the year 2005 about the health surveillance and periodic medical examination.
- 2 Where an employee requires medical surveillance following exposure, and it has been decided that the employee cannot continue in that work, the Contractor must take steps to ensure the employee adheres to the medical decision unless it has been cancelled.

- 3 Upon reasonable notice, a Contractor must allow the employee to access any medical records applying to them.

#### **1.2.3.12 Information, instruction and training**

- 1 Information, instruction and training must be provided for persons who may be exposed to substances hazardous to health so that they are aware of the danger of exposure and the precautions which should be taken.

### **1.2.3.13 Procedures**

- 1 Procedures to deal with accidents, incidents and emergencies involving hazardous substances must be provided. These procedures should include:

- (a) first-aid provisions
  - (b) the use of safety drills and their regular testing
  - (c) identification and details of hazards
  - (d) specific hazards that are likely to occur during any accident, incident or emergency, together with warning and communication systems and emergency actions.

- 2 These procedures must be made available to accident and emergency services, and be displayed on site.

#### **1.2.3.14 COSHH responsibilities**

## Designers

- 1 The chain of responsibilities starts at the design stage of a project. Under CDM, designers have a duty to consider the risks created for the construction, maintenance, cleaning and use of a structure that could arise out of their designs. This must include consideration of COSHH issues.
  - 2 It is important to be aware that this may not eliminate all 'COSHH risks'. Consider, for example, the periodic painting of a high level structure. It may be considered preferable to continue to use a solvent-based paint, as opposed to a water-based paint (a less hazardous product) on the grounds that the periods between painting will be longer, thereby reducing the frequency of working at height.
  - 3 Furthermore, designers must take all reasonable steps to provide sufficient COSHH information about aspects of the design or its construction or maintenance, to adequately assist the client, other designers and contractors to comply with their duties under these Regulations.

## Clients

- 4 CDM places a duty on the client to provide pre-construction information to other parties involved in a project to protect the health and safety of anyone carrying out construction work, anyone affected by it or those who will use the structure as a place of work.

5 This will obviously include providing information on any known existing hazardous substances, such as the presence of hazardous residues in pipework or the existence of contaminated ground. Where necessary, this may involve commissioning surveys or taking samples to enable accurate information to be available for a risk-based control. It is no longer acceptable for the client to say: 'there may be the presence of x'.



### **Shared Workplace**

- 6 Under CDM, organisations that share a workplace must:
  - (a) co-operate with the Contractor and help them ensure the work is carried out safely
  - (b) have undertaken their own COSHH assessments in relation to the work they are to undertake
  - (c) have effective arrangements to ensure that control measures are put in place and are monitored.
- 7 Some risks are likely to have been highlighted in the information provided by the client and designers. Often designers may simply not be aware of what the job entails, or they may believe the risks are commonplace and therefore any competent contractor should be aware of them.

### **Employees**

- 8 Employees have duties to:
  - (a) work with their Contractor to enable them to comply with the law
  - (b) make proper use of any control measures provided (including PPE)
  - (c) return any control measure, where provided (mainly PPE), to its accommodation after use
  - (d) report any defects in the control measures to their Contractor
  - (e) attend health surveillance medicals where required (the Contractor must pay for the medical and it must be in paid work time).

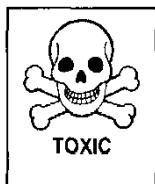
#### **1.2.3.15 Work on another Contractor's premises**

- 1 Under CDM the client has a duty to provide pre-construction information to the Contractor, including the information necessary for maintenance or other work to be carried out, where this work is being done in an occupied premises.
- 2 Examples of such information are:
  - (a) details of the substances contained in pipework or tanks, if for example a pipefitter is to break into a pipe to replace a valve.
  - (b) what gases, vapours or fumes may be discharged through a rooftop ventilation duct during the time a roofer has to work next to it.
- 3 There is also a requirement for the client to make sure that contractors are aware of emergency procedures that might arise out of the use of any particular substance(s) on the site. Obviously, this duty is reciprocal. The contractor has a duty to inform the client or the site occupier if (the contractor's) work poses risks to the client's staff and visitors and to outline how the risks will be controlled. This is particularly important where the client has out-of-hours security staff. Often, arrangements that are effective during the working day, to ensure that the contractor and client liaise, can become non-effective after normal working hours, for example by the security staff entering an agreed exclusion zone due to ignorance of the hazards present.

#### **1.2.3.16 Information**

- 1 Information about hazards from substances purchased can be found in several sources:
  - (a) Information on labels.
  - (b) Information provided by the manufacturer or supplier of the substance
- 2 Many suppliers have Material Safety Data Sheets (MSDS) on their websites.

- 3 Data sheets must contain certain information:
- (a) Identification of the substance or preparation and the company or undertaking providing the substance.
  - (b) Composition and information on ingredients.
  - (c) Hazard identification.
  - (d) First-aid measures.
  - (e) Fire-fighting measures.
  - (f) Accidental release measures.
  - (g) Handling and storage.
  - (h) Exposure controls and personal protection.
  - (i) Physical and chemical properties.
  - (j) Stability and reactivity.
  - (k) Toxicological information.
  - (l) Ecological information.
  - (m) Disposal considerations.
  - (n) Transport information.
  - (o) Other information.
- 4 If the substance is a carcinogen or a mutagen, i.e. capable of causing cancer or mutation of the body, every possible step should be taken to eliminate the need for its use.
- 5 It is considerably harder to find out information about substances created by the work process.
- 1.2.3.17 Carrying out an assessment**
- 1 An assessment is the fundamental requirement of COSHH. It is in two parts.
- 2 Firstly, a Contractor must not carry out any work that is liable to expose employees to any substance hazardous to health, unless a suitable and sufficient assessment of the risks created by the work has been made.
- 3 Secondly, if the first step indicates that substances hazardous to health will be used or created, Contractors must identify the actions to be taken to comply with these Regulations.
- 4 The procedure itself is fairly simple but does take time and effort. It involves:
- (a) identifying jobs, working processes and procedures that involve the use or generation of substances that are hazardous to health
  - (b) identifying all the hazardous substances in use in the workplace, very toxic, toxic, harmful, corrosive or irritant
  - (c) identifying how the hazardous substances are stored and used. This means how they **are** used, not how they **should** be used

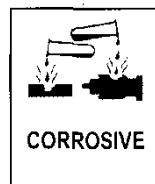


**Very toxic or toxic**

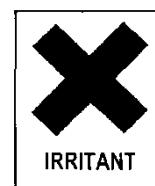
Substances that, in low quantities, cause death or acute or chronic damage to health when inhaled, swallowed or absorbed via the skin

**Harmful**

Substances that may cause death or acute or chronic damage to health when inhaled, swallowed or absorbed via the skin.

**Corrosive**

Substances that may, on contact with living tissues, destroy them.

**Irritant**

Non-corrosive substances that through immediate, prolonged or repeated contact with the skin or mucous membrane, may cause inflammation.

- (d) identifying how these hazardous substances might enter the body. Normally these methods are classed as:
    - (iv) inhalation into the lungs, when the substance is in the form of a gas, vapour, fume, mist, aerosol or dust
    - (v) absorption through the skin or eyes by contact with a substance that can penetrate unbroken skin, or is absorbed through unprotected cuts or grazes
    - (vi) injection by contact with contaminated sharp objects or high-pressure equipment, e.g. water jetting
    - (vii) ingestion by swallowing particles of a hazardous substance resulting from hand-to-mouth transfer
  - (e) identifying the amount of exposure. This involves knowing how much of the substance will be used, how people will be exposed to it and if there are is a workplace exposure limit
  - (f) investigating the possible health effects of such exposure
  - (g) identifying who is at risk, for example the persons using it or anyone who enters the area within the following 24 hours
  - (h) considering the effectiveness of the control measures already in place, for example whether the concentration of vapour is likely to be above the WEL
  - (i) identifying the risk to workers if control measures deteriorate or fail or if an emergency occurs, for example if a volatile solvent is accidentally spilt resulting in a high concentration of hazardous vapour in the workplace
  - (j) finally, from the above considerations, making a decision upon whether a substance represents a health risk or not. If the answer is 'no', the findings should be recorded. If 'yes', action will be necessary to either prevent or control exposure.
- 5 Completed assessments must be made available to the person who is going to carry out the work so that they are aware of the health hazards present and the control measures that they must use.

**1.2.3.18 Who can make an assessment?**

- 1 Anyone who is competent.

**1.2.3.19 So how do you do one?****General requirements**

- 1 The process must be carried out at an early stage to ensure that safe systems of working are developed before anyone is exposed to potentially harmful substances. However, further details can be added as the job progresses.
- 2 The process of compiling the list of substances must consider the whole lifespan of the site, for example the chemical treatment of vegetation, and the removal and treatment of contaminated land before construction starts to the treatment of new timber fencing at the end of the project.
- 3 When carrying out an assessment, in addition to considering normal usage, it is important to also consider the potential for exposure when the substance is:
  - (a) handled or stored
  - (b) transported
  - (c) accidentally released as the result of an accident
  - (d) used for cleaning or maintenance
  - (e) disposed of as waste.

**1.2.3.20 Step 1: Find out what is (or will be) on site****Bought-in products**

- 1 The first, and easiest, stage is to look at the substances that are bought in. This involves identifying what is used and what is not hazardous to health. Most construction processes are relatively simple as they rarely use a large number of substances or involve mixing of substances. Mechanical workshops, for example where plant is serviced, tend to be more challenging simply because of the amount of chemicals present in the substances that they normally use.
- 2 Another consideration is the substances that will be brought onto site by other contractors, how those substances might affect other people and the quality of the contractors' COSHH assessments.
- 3 Furthermore, the site office and other accommodation must not be overlooked. For example, it is not unreasonable to suppose that strong cleaning materials will be used in catering and other welfare facilities.
- 4 Having made a list of all substances, it is then sensible to identify any products that are obviously not hazardous, so that they can be ruled out.
- 5 Taking cleaning chemicals as an example, washing-up liquid does not have any warning symbols on it and therefore, other than noting its presence, no further action is necessary.
- 6 However, the information on a container of bleach should provide the basis for determining how it can be used safely. Of the two products that have been considered, one requires no control measures to be identified but the second does.

**Created by the work process**

- 7 The situation becomes more complicated when potentially harmful substance, such as many forms of dust or fumes, are created by work processes. The situation is further complicated if the substance created has a WEL that must not be exceeded. This may require that exposure levels are measured unless exposure can be eliminated or controlled to a known safe level.

Again, it will be necessary to also consider potentially harmful processes that will be carried out by other contractors.

- 8 Depending upon the complexity of the project, it may not be possible to complete this part of the exercise prior to the start of the project unless all work processes and substances that will be created are known. In these circumstances, it will be a case of building up the COSHH information as the job progresses, but this must be achieved in such a way that no-one is exposed to a potentially harmful substance until the assessment of it has been carried out and appropriate controls are in place.

## **Already present on site**

- 9 A third category of potentially harmful substances is those substances, including micro-organisms, that may already be present on site.

10 Examples are:

  - (a) land heavily contaminated with fuels, oils and other hazardous liquids which have seeped into the ground over many years
  - (b) residues of hazardous substances left in pipework, underground tanks and drums
  - (c) substances such as asbestos and polychlorinated biphenyls (PCBs) that were deliberately buried by the past users of the land.

11 Also in contaminated land there could be sources of micro-organisms. These include:

  - (a) leptospirosis (Weil's disease) from the presence of infected rats or their carcases
  - (b) infected syringes, needles and other items associated with drug-taking, for example where a derelict site is being refurbished
  - (c) tetanus from infected ground or other materials
  - (d) a range of respiratory diseases arising from the disturbance of accumulated bird or bat droppings
  - (e) pipework and sumps containing sewage sludge residue.

### 1.2.3.21 Step 2: Substitution

- 1 If there is a way around using a potentially hazardous substance, designers and planners should take advantage of it.
  - 2 Returning to the cleaning materials example, there is no reason why a Coshh assessment cannot be carried out for bleach, but the first rule of Coshh is to not use the potentially hazardous product.
  - 3 Can a safe alternative product be identified? If nothing else, it will be one less Coshh assessment to carry out.
  - 4 There are many similar situations, when simply changing the product is either no risk or a risk that is easier to control.
  - 5 Other examples include:
    - (a) altering the work method so the process that produces the exposure is no longer necessary, e.g. using a demolition shear to cut structural steelwork rather than gas cutting and therefore avoiding a process that may produce metal fumes and toxic gases
    - (b) changing the work method to prevent the production of a hazardous waste product, e.g. purchasing panels of the correct size, rather than cutting oversize panels on site and producing dust. Given the pressure on reducing waste and manual handling, this is another example where 'good health and safety is good business'

- (c) it may be possible to obtain and use the hazardous substance in a safer form, e.g. as a liquid or paste rather than as a powder, if using the powder may result in airborne dust being inhaled by workers.

6 These examples of controlling the 'COSHH risk' may indicate that some companies are already doing COSHH assessments without realising it.

### **1.2.3.22 Step 3. Exposures - who, what, how much and how often?**

- 1 Now the assessment process really starts -having identified the substances that may be harmful for health, the assessment needs to consider the exposures.
  - 2 Who is exposed? Is it just the person using the substance or can it affect other people?
  - 3 What are they going to do with it? The decision to either spray or apply paint by brush may make a significant difference. Spray application will probably mean a much smaller droplet size, creating a more severe respiratory hazard. This assessment needs to be honest and objective. For example, paint removal gels state on the tin that they are only for brush application, although it is physically possible to spray them. However, the controls required to spray without potentially damaging the skin, eyes or lungs are completely different to those required for brush application.
  - 4 How often and how much of a substance is used and for how long are also very important factors.

### **1.2.3.23 Step 4. Implementing controls**

- 1 The first step is to consider in detail how the work practices involving potentially hazardous substances will be carried out. The person carrying out the assessment must be sufficiently familiar with each process to know exactly how it is carried out.
  - 2 As an example, a woodworking company purchased vacuum cleaners to remove sawdust in the woodworking machine shop. They believed that this would result in airborne dust being reduced to a safe level. However, it was found that the employees continued to use brushes to sweep the dust into large heaps, which they then vacuumed up. This obviously circumvented the intended control measure of vacuuming instead of sweeping.

## **Elimination/substitution**

- 3 As has already been stated, the first and most effective controls are elimination or substitution, which means either changing the task completely or changing the substance for a less harmful one.

## **Engineering controls**

- 4 The next tier of control is referred to as 'engineering controls'. This encompasses a wide range of solutions, which traditionally would have been more common in a workshop or manufacturing environment as they encompass such techniques as completely enclosing processes, automating a process or installing high efficiency ventilation. However, as the Qatar construction industry responds to occupational health issues, it is becoming more common to see features such as:

  - (a) hand-powered tools fitted with dust extraction apparatus (either in-built or with a fitting which enables a vacuum cleaner to be attached)
  - (b) free-standing dust extraction and collection units
  - (c) air handling units that dilute the concentration of any airborne substance
  - (d) motorised table-saws that enable wet-cutting to be carried out

- (e) using hydraulic croppers to cut brick pavers rather than disc-cutting them, to reduce exposure to dust

(f) lead paint removal by a system that does not heat the paint sufficiently to liberate lead fumes.

5 Some control measures are very simple, for example damping down the dust on a floor slab before sweeping. Other situations may require a little more thought and ingenuity.

6 However, it is not always possible or 'reasonably practicable' to introduce engineering controls and so the implementation of certain organisational controls may be possible.

### Organisational controls

7 These ARE CONCERNED WITH INVESTIGATING WHETHER THE WAY IN WHICH THE JOB IS CARRIED OUT CAN BE CHANGED SO THAT INDIVIDUAL EXPOSURE IS REDUCED. FOR EXAMPLE, BY CARRYING OUT A JOB OUT OF NORMAL WORKING HOURS, THE NUMBER OF PERSONS EXPOSED, WHO WOULD OTHERWISE HAVE TO WEAR PPE, WILL BE SIGNIFICANTLY REDUCED.

8 FURTHER EXAMPLES include:

(a) job rotation so that no individual person is exposed to a substance above its WEL

(b) moving a work activity into the open air to prevent the accumulation of vapour or fumes.

### Personal protective equipment (PPE)

9 If it is found that it is not reasonably practicable to implement any of the above control measures, the use of PPE may be the only control measure that can be effectively used. Where the health hazard is an airborne substance, respiratory protective equipment (RPE) will be required.

10 It is important to remember that anyone wearing a mask must be face-fit tested for that type of mask, and have no facial features, such as a beard, which would interfere with the seal between the face and the mask. This problem can be overcome by using the loose fitting 'airstream' type of RPE where the mask does not seal to the face and a stream of filtered air from a blower unit not only aids breathing but also creates an 'over-pressure' around the face area to stop substances from entering it.

11 As with all PPE, there need to be arrangements to check that it is:

(a) adequate and suitable for the job

(b) a proper fit

(c) stored safely when not in use

(d) checked for defects and maintained as appropriate

(e) disposed of safely

(f) replaced as necessary

12 Users need to be trained on all these points and must be informed of the operational limits of the equipment, i.e. what it cannot do as well as what it can do.

13 In some circumstances the application of control measures will continue after the actual work activity is completed. For example, some jobs will require the operatives to go through a full decontamination procedure, e.g. working with heavily contaminated land. Anyone who has been in the live working area may have to follow a strict procedure about where they take boots and overalls off, or even go through a shower, and it may involve wearing additional gloves to ensure that contaminants are kept off their skin when decontaminating.

14 Often, simply washing hands with hot soapy water will suffice. Good COSHH practice and the provision of good welfare facilities are very closely linked. This may mean in some circumstances that eating and drinking are not allowed other than in designated clean zones.

### The assessment

- 15 The assessment is a 'considered Judgement' that balances the hazardous properties of the substance, the method by which it will be handled and the environment in which it will be used.
- 16 The skill of the COSHH assessor is to:
  - (a) sift through the information contained on the material safety data sheet (MSDS) and other sources such as on the container
  - (b) extract the useful information
  - (c) incorporate their knowledge of how, when and where the substance is used
  - (d) from the information available, produce a useful and useable COSHH assessment to guide those who will be doing the work.
- 17 Examples of an MSDS and a COSHH assessment are in Appendices 2 and 3, and show how the mass of information on the MSDS can be condensed into a usable assessment.

### Emergencies

- 18 If significant or dangerous accidental releases or leakages of a hazardous substance are possible, despite the control measures which have been implemented, an emergency plan should be drawn up and instigated for achieving suitable control and for safeguarding the health of anyone who may be affected.
- 19 The emergency plan should include first-aid provisions and safety drills, including the testing of drills at regular intervals. Any particular hazards that are likely to occur as a result of the emergency must be specified.
- 20 The emergency plan should be made available to all people potentially affected and be displayed on site. It should also be made available to the accident and emergency services.

#### 1.2.3.24 Review of assessments and control measures

- 1 An assessment should be reviewed regularly, and at once, if:
  - (a) there is reason to believe that it is no longer valid, e.g. new information on health risks has come to light
  - (b) the work to which it relates has changed significantly, e.g. new substances have been introduced, or the method of working is to change, such as the use of a spray gun to apply paint instead of a brush or roller
  - (c) environment and/or health monitoring results indicate it is necessary.
- 2 The definition of 'regularly' will depend on a number of factors, such as the nature of the risk. However, the maximum period between reviews should not exceed five years.
- 3 Each review should trigger an opportunity to consider whether exposure can now be prevented, for example, by substituting a less hazardous substance or by process changes. Similarly, control measures should be reappraised to see whether they are still adequate or if further improvements are necessary and possible.

### Use of control measures

- 4 Contractors should have procedures in place to ensure that measures provided to control exposure to hazardous substances, including the provision of PPE, are properly used or applied. These procedures should include regular inspections of working practices and a system to ensure that, where remedial action is found to be necessary, it is promptly taken.

- 5 Employees have a duty to:
- (a) make full and proper use of any control measures and to properly wear any PPE provided for their use
  - (b) take all reasonable steps to return the PPE after use to the accommodation provided
  - (c) notify any defects at once to management.
- 6 These are all common sense measures. Work with hazardous substances also dictates that employees make every effort to practise a high standard of personal hygiene, for example, by:
- (a) removing any protective clothing (this may be contaminated) and thoroughly washing before eating and drinking
  - (b) consuming food and drink only in mess rooms or canteens
  - (c) making full use of shower facilities
  - (d) using the storage facilities provided and keeping personal protective clothing separate from ordinary clothing, to avoid possible contamination
  - (e) smoking only in designated areas and thoroughly washing hands before handling cigarettes or tobacco, otherwise contamination may spread from hands to the mouth and ingested into the stomach, which can lead, in some circumstances, to serious health problems.

#### **Maintenance, examination and test of control measures**

- 7 Contractors are required to ensure that all measures installed to prevent or control exposure to substances hazardous to health under these Regulations are maintained in efficient working order and in good repair.
- 8 Certain engineering controls require thorough examination and tests, as follows.

#### **Local exhaust ventilation plant**

- 9 Local exhaust ventilation plant should be examined and tested at least once every 14 months.
- 10 Any defects in local exhaust ventilation systems must be reported and promptly rectified.

#### **Non-disposable respiratory protective equipment (RPE)**

- 11 Thorough examinations and tests of non-disposable respiratory protective equipment (RPE) should be carried out, where appropriate, at suitable intervals.
- 12 Examinations and tests should be carried out at least every month, and more frequently where the conditions of use are particularly severe. Longer intervals may be more appropriate in the case of certain RPE, e.g. half-mask respirators used infrequently for short spells against air contaminants of relatively low toxicity. However, the longest interval between examinations and tests should not exceed three months.
- 13 Face-fit testing by someone who is competent is required for any tight-fitting masks. For full face masks, this needs to be quantitative testing using a computerised method.

#### **Disposable RPE**

- 14 No examinations or tests are required, provided that the disposable RPE is used for only one working day or shift and then disposed of.
- 15 Again, face-fit testing by a competent person is required. This can be qualitative testing using a sweet/bitter solution to check the effectiveness of the fit.

**Records**

- 16 All examinations, tests and repairs carried out on engineering controls and non-disposable RPE should be suitably recorded in any format provided they are easily retrievable. These records should be kept for at least five years.

**1.2.3.25 Monitoring exposure at the workplace**

- 1 There are certain situations, outlined below, in which the monitoring of exposure to a hazardous substance is required. Sometimes, however, it is so obvious that there is a problem that the money may be better spent on solving the problem rather than simply confirming what was already suspected.
- 2 Monitoring is required in the following circumstances:
  - (a) where a serious health hazard could arise because of failure or deterioration of the control measures
  - (b) where it is necessary to ensure that a workplace exposure limit (WEL) or Contractor-imposed working standard is not exceeded. Significant exposure to silica dust may require monitoring
  - (c) when it is necessary to carry out an additional check on the effectiveness of any control measure
- 3 An example of monitoring would be the use of a personal sampler to monitor an airborne contaminant in the breathing zone of an employee.

**Monitoring records**

- 4 Monitoring records must be kept in a suitable format and be available either as individual records or as a suitable summary for five years. If they are representative of the personal exposures of identifiable employees, the records must be kept for at least 40 years.

**1.2.3.26 Health surveillance**

- 1 The main purpose of health surveillance is to detect problems with the health of employees at the earliest possible stage. The purpose of control measures is to prevent damage to the health of employees; this is something that health surveillance cannot do. However, adverse health surveillance results may indicate that the existing control measures are not working properly.
- 2 Health surveillance has to be undertaken when:
  - (a) an employee is exposed to a substance that is hazardous to health and there is an identifiable disease or adverse health effect related to this exposure (which may occur because of the conditions of the work) and there are valid techniques for detecting indications of the disease or effect. For example, isocyanates used in 'two pack paints' are respiratory irritants and can result in sensitisation and asthma.
- 3 Working on contaminated land often requires some form of health surveillance. This may include lung function testing or direct analysis of blood, urine or hair samples. Normally this would occur before during and after the work. It allows a personal baseline to be established and then simply acts as a check that the control measures are working.
- 4 Suitable health surveillance can be undertaken by an appointed doctor or a registered medical practitioner or an examination by an occupational health nurse. At the other end of the scale, health surveillance could simply involve a trained manager or supervisor inspecting an employee's hands and forearms, looking for the early signs of dermatitis.
- 5 Contractors are required to keep health records of employees under health surveillance for at least 40 years from the date of the last entry.

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- 6 Should refer to the Minister of Housing and Civil Service resolution #19 for the year 2005 about the health surveillance and periodic medical examination.

**1.2.3.27 Information, instruction and training for people who may be exposed to hazardous substances**

- 1 If an employee is likely to be exposed to substances hazardous to health, the Contractor must provide sufficient information, instruction and training so that the employee is aware of:
  - (a) the health risks, and
  - (b) the precautions that should be taken.
- 2 It is important that workers do not put themselves at risk due to lack of information, instruction or training.
- 3 Therefore, they should be knowledgeable of the health risks, the precautions they should take (including the control measures), and be able to use the supplied personal protective equipment effectively.
- 4 They should also know what procedures to follow in the event of an emergency.

### 1.2.3 Appendix 1

#### Management action plan

- |    |  |
|----|--|
| 1. | Compile an inventory of all hazardous substances to which employees may be exposed, which are either purchased (proprietary products) or created by a work process (dust, fumes etc.) or may be already on site (micro-organisms, contaminated land, residues etc.).   |
| 2. | Gather relevant technical information about each substance from sources such as labelling, safety data sheets. For each substance, evaluate the work task(s) and working practices associated with it. If necessary, observe the work activity in which the hazardous substance is used or created.  |
| 3. | From information and observations made, decide if there are any risks to health.   |
| 4. | Assess what action needs to be taken to prevent exposure (PRIORITY), or to control it to an acceptable level. Record the significant findings of the assessment.   |
| 5. | Take the actions necessary to ensure that the appropriate control measures are provided, properly used and maintained as necessary. Provide all users of (or those creating) each hazardous substance with the necessary information, instruction and training. From the information gained, decide if there is any requirement for exposure monitoring and health surveillance. |
| 6. | Review the assessment regularly and revise it as necessary.  |

### 1.2.3 Appendix 2

#### Example of a material safety data sheet - diesel fuel

**Product name:** AUTO DIESEL / DERV  
**Synonyms:** G.O.R.V., Ultra-Low Sulphur Diesel,  
AD10

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#### 1. Identification of the substance / preparation and of the company

##### Name and address of manufacturer/supplier:

Telephone: Facsimile:

##### Emergency contact:

Health and safety emergency telephone:

##### Application:

For use as a fuel in diesel engines only. Any other use implies a processing operation which may change its essential characteristics and liability for safety of the product will transfer to the processor.

#### 2. Composition / information on ingredients

##### Petroleum hydrocarbons >99%

Saturated olefinic and aromatic: C10 to C26 - may contain Polycyclic Aromatic Hydrocarbons - PAHs.

CAS No. 068334-30-5. EINECS No. 269-822-7, R40.

##### Additives

1. Middle distillate flow improvers (various) up to 1000ppm. (Dispersion of Ethylene vinyl acetate in an organic solvent).
2. Cetane improvers (Alkyl Nitrates) - up to 500ppm. CAS No. 27247-96-7, EINECS No. 269-822-7.
3. May contain dye and chemical marker - gas oil marker concentrate. CAS No. 68334-30-5.
4. Antistatic additive 1-3ppm
5. May contain a multifunctional detergent

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### **3. Hazard identification**

#### **Health hazards:**

This product contains amounts of Polycyclic Aromatic Hydrocarbons, some of which are known from experimental animal studies to be skin carcinogens. Prolonged and repeated exposure may therefore cause dermatitis and there is a risk of skin cancer. The risk of skin cancer will be very low, providing the handling precautions are such that prolonged and repeated skin contact is avoided and good personal hygiene is observed. Aspiration of liquid into the lungs directly or as a result of vomiting following ingestion of the liquid can cause severe lung damage and death.

#### **Safety hazards:**

Product can accumulate static charges, which may be a possible ignition source (see Section 7). However product does contain an antistatic additive.

#### **Environmental hazards:**

Dangerous for the environment. Toxic to aquatic organisms. May cause long-term adverse effects in the environment.

### **4. First aid measures**

**Eyes:** Rinse immediately with plenty of water until irritation subsides. If irritation persists, obtain medical attention.

**Skin:** Immediate flush with large amounts of water, using soap if available. Remove contaminated clothing, including shoes, after flushing has begun. If irritation persists, get medical attention.

**Inhalation:** In emergency situations use proper respiratory protection to immediately remove the affected victim from exposure. Administer artificial respiration if breathing has stopped. Keep at rest. Call for prompt medical attention.

**Ingestion:** DO NOT INDUCE VOMITING, since it is important that no amount of the material should enter the lungs (aspiration). Keep at rest. Get prompt medical attention.

**Pressure injection:** ALWAYS OBTAIN IMMEDIATE MEDICAL ATTENTION EVEN THOUGH THE INJURY MAY APPEAR MINOR.

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## 5. Fire-fighting measures

**Extinguishing media:** Foam, dry chemical powder, carbon dioxide.

**Fire and explosion hazards:** Flammable liquid, moderate hazard. Liquid can release vapours that readily form flammable mixtures at or above the flash point.

**Static discharge:** Material can accumulate static charges which may cause an incendiary electrical discharge. However, this product does contain an antistatic additive.

**Special fire-fighting procedures:** Water fog or spray to cool fire exposed surfaces (e.g. containers) and to protect personnel, should only be used by personnel trained in firefighting.

Cut off "fuel"; depending on circumstances, either allow the fire to burn out under controlled conditions or use foam or dry chemical powder to extinguish the fire. Respiratory and eye protection required for fire-fighting personnel exposed to fumes or smoke.

**Hazardous combustion products:** Smoke, sulphur oxides and carbon monoxide in the event of incomplete combustion.

## 6. Accidental release measures

**Personal precautions:** See Section 8

**Environmental precautions:** Land spill: Eliminate sources of ignition. Shut off source taking normal safety precautions. Prevent liquid from entering sewers, watercourses or low lying areas; advise the relevant authorities if it has, or if it contaminates soil/vegetation. Take measures to minimise the effects of groundwater.

Water spill: Eliminate the spill immediately with booms. Warn shipping. Notify port and other relevant authorities.

**Decontamination procedures:** Recover by skimming or pumping using explosion-proof equipment, or contain spilled liquid with booms, sand or other suitable absorbent and remove mechanically into containers. If necessary, dispose of absorbed residues as directed in Section 13.

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## 7. Handling and storage

Store product in cool, well ventilated surroundings, well away from sources of ignition. Provide suitable mechanical equipment for the safe handling of drums and heavy packages.

Electrical equipment and fittings must comply with local Regulations regarding fire prevention with this class of product.

**Load/unload temperature:** Ambient to 40°C

**Storage temperature:** Ambient to 40°C

**Special precautions:**

Use the correct grounding procedure. Store and handle in closed or properly vented containers. Ensure compliance with statutory requirements for storage and handling. Check for and prevent potential leaks from containers.

## 8. Exposure controls / personal protection

Workplace exposure limit:	Substance	8-hour TWA	STEL	Source / Other Information
	Mineral oil mist	5 mgm-3	10 mgm-3	HSE Guidance: not listed in EH 40
<b>Personal protection:</b>	In open systems where contact is likely, wear safety goggles (EN 166), chemical-resistant overalls and chemically impervious gloves (EN 374). Where only incidental contact is likely, wear safety glasses with side shields. No other special precautions are necessary provided skin/eye contact is avoided. Where concentrations in air may exceed the OES approved respirators may be required (EN 405).			
<b>Monitoring methods:</b>	Health & Safety Executive (HSE), Methods for the determination of Hazardous Substances (MHDS); MDHS 84 <a href="http://www.hsl.gov.uk/search.htm">www.hsl.gov.uk/search.htm</a>			

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## 9. Physical and chemical properties

<b>Appearance:</b>	Clear straw-coloured liquid	<b>Odour:</b>	Pungent petroleum
<b>Density at 15°C:</b>	0.82 g/ml	<b>pH:</b>	Not applicable
<b>Vapour pressure at 20°C:</b>	< 0.3 Kpa	<b>Vapour density (air=1):</b>	< air
<b>Boiling point:</b>	180 - 390°C	<b>Pour point:</b>	-24°C
<b>Flash point (closed cup):</b>	> 55°C	<b>Auto-ignition temperature:</b>	250- 270°C
<b>Flammability limit, in air, % by volume:</b>		<b>LEL: 0.5, UEL: 6.0</b>	
<b>Kinematic viscosity at 20°C, mm<sup>2</sup>s<sup>-1</sup></b>	4.8		
<b>Kinematic viscosity at 40°C, mm<sup>2</sup>s<sup>-1</sup></b>	3.0		
<b>Solubility:</b>	<b>Negligible</b>		

PLEASE NOTE THAT THESE PROPERTIES DO NOT CONSTITUTE A SPECIFICATION.

## 10. Stability and reactivity

<b>Stability:</b>	The product is stable and not subject to polymerisation.
<b>Conditions to avoid:</b>	Avoid exposure to extreme heat.
<b>Materials to avoid:</b>	Avoid contact with strong oxidising agents such as liquid chlorine.
<b>Hazardous decomposition products:</b>	Product does not decompose at ambient temperature.

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## 11. Toxicological information

The following toxicological assessment of health effects is based on a knowledge of the toxicity of the product's components.

- On eyes:** Slightly irritating but does not damage eye tissue.
- On skin:** Low order of acute toxicity. Irritating. Prolonged or repeated contact may also lead to more serious skin disorders, including skin cancer. Certain components present in this material may be absorbed through the skin, possibly in toxic quantities.
- By inhalation:** In high concentrations and/or at elevated temperatures, vapour or mist is irritating to mucous membranes, may cause headaches and dizziness, may be anaesthetic and may cause other central nervous system effects. Elevated temperatures or mechanical action may form vapours, mists or fumes, which may be irritating to the eyes, nose, throat and lungs. Avoid breathing vapours, mists or fumes.
- By ingestion:** Low order of acute/systemic toxicity. Minute amounts aspirated into the lungs during ingestion or vomiting may cause severe pulmonary injury and death.
- Chronic:** Contains Polycyclic Aromatic Hydrocarbons (PAHs). Prolonged and/or repeated skin contact with certain PAHs has been shown to cause skin cancer. Prolonged and/or repeated exposure by inhalation of certain PAHs may also cause cancer of the lung and of other sites of the body.
- Acute:** Based upon animal test data from similar materials and products, the acute toxicity of this product is expected to be:  
ORAL LD50 > 5000 mg/kg DERMAL LD50 > 2000 mg/kg

## 12. Ecological information

In the absence of specific environmental data for this product, this assessment is based on information developed with other crude oils. Gas oils released into the environment will float on water and spread on the surface; on release to soils, gas oils show some mobility and predominantly absorb.

**Ecotoxicity:** Dangerous for the environment. Toxic to invertebrates and slightly toxic to fish.

**Mobility:** Some mobility in soils.

**Persistence and degradability:** Lighter components volatilise and in air undergo photolysis to give half-lives of less than a day. Photoxidation of liquid hydrocarbons on the water surface also contributes to the loss process. Slow to moderate degradation in water and soil.

**Bioaccumulation potential:** Potential to bioaccumulate, but metabolic processes may reduce this tendency.

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### **13. Disposal considerations**

### **14. Transport information**

**Classification for transport:** Rails cars, tank trucks, tankers, barges, drum.

**Shipping name:** Diesel Fuel      **UN Number:** 1202

**Packaging group:** III      **UN Class:** 3

**Marine pollutant:** See Section 6      **ADR/RID:** Class 3

**ICAO/IATA:** Class 3      **Emergency action code:** 3Y

### **15. Regulatory information**

**Hazard label data:** Xn Harmful      N Dangerous for the Environment

**R & S phrases:** R40 Limited evidence of carcinogenic effect

R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment

S2 Keep out of reach of children

S36/37 Wear suitable protective clothing and gloves

S61 Avoid releases into the environment, see Section 6

**EC Directives:**

**Statutory information:**

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## **16. Other information**

The data and advice given apply when the product is sold for the stated application or applications. The product is not sold as suitable for any other application. Use of the product for applications other than as stated in this sheet may give rise to risks not mentioned in this sheet. You should not use the product other than for the stated application or applications.

If you have purchased the product for supply to a third party for use at work, it is your duty to take all necessary steps to ensure that any person handling or using the product is provided with the information in this sheet.

If you are an Contractor, it is your duty to tell your employees and others who may be affected about any hazards described in this sheet and about any precautions that should be taken.

### 1.2.3 Appendix 3

#### COSHH assessment - diesel fuel

Name of hazardous substance:	Auto diesel
Substance hazard classification:	Flammable, harmful/irritant
Trade name(s):	Any auto fuel production company
Substance used for:	Motive power for plant and other diesel powered vehicles

Potential hazards	Safety precautions	Emergency procedures
Inhalation: can lead to nausea and headaches.	Avoid inhaling vapour or mist; ensure good ventilation. Remove the victim from exposure.	Remove to fresh air. Seek medical attention if conditions severe.
Skin contact: can be irritating and have a defatting effect.	Avoid prolonged/repeated contact. Wear PVC gloves. Do not use as a cleaning agent.	Remove contaminated clothing. Wash skin thoroughly with soap and warm water.
Eye contact: will cause irritation.	Wear eye protection if splashing can occur.	Rinse immediately with plenty of water until irritation subsides. Seek medical advice.
Ingestion: will irritate mouth, throat etc.	Do not eat, drink or smoke during use.	Do not induce vomiting. Wash mouth with water. Seek immediate medical attention.
Fire: products of combustion are toxic. Vapour/air mixture is explosive.	Do not smoke during use. Avoid heat sources and open flames.	Clear the area. Do not inhale vapours, smoke etc.
Spillage: fumes/vapour likely to collect in low areas.	Do not allow to enter drains. Eliminate ignition sources. Ensure good ventilation.	Contain with sand or granules. Remove into a container. Dispose of as hazardous waste.
<b>Additional information:</b> Environmentally damaging.		
<b>Assessment date</b>		<b>Next review date</b>

Approved for use by (print name and position)	
Signature	

## Construction Site Safety

### 1.2.4 First Aid and Medical Care at Work

#### 1.2.4.1 Key points

- 1 Employers shall provide first aid and medical care to their workers in accordance with Qatar Supreme Council of Health, Qatar Labour Law, and the Ministerial Decisions on Health and Safety for additional legal requirements.
- 2 Trained first-aid staff and first-aid equipment must be available on site at all times while there is work being performed.
- 3 A first aid clinic with full time nurse(s) and/or medical clinic with a full time doctor(s) may also be required in accordance with the Qatar Supreme Council of Health, Qatar Labour Law, and the Ministerial Decisions on Health and Safety for additional legal requirements
- 4 Everyone working on site shall know where the first aiders and the first-aid kits can be found.
- 5 All accidents causing injury must be recorded in an accident book.
- 6 In an emergency, assess the situation but do not put yourself in danger.
- 7 Don't move casualties who are obviously injured unless it is necessary to do so - summon the first aider immediately and contact external emergency services.

#### 1.2.4.2 Introduction

- 1 These Regulations provide a flexible framework within which Contractors can develop effective first-aid arrangements appropriate to their workplace and the size of their workforce.
- 2 Refer to the Qatar Supreme Council of Health, Qatar Labour Law, and the Ministerial Decisions on Health and Safety for additional legal requirements.
- 3 The following four factors will influence decisions:
  - (a) workplace hazards and risks
  - (b) the nature of the undertaking and its history of accidents
  - (c) the size of the establishment and distribution of employees
  - (d) the location of the establishment and the locations to which employees go in the course of their work.

#### 1.2.4.3 Definition of first aid

- 1 First aid is defined as the follows:
  - (a) in cases where a person will need help from a doctor or a nurse: treatment for the purpose of preserving life and minimising the consequences of injury or illness until such help is obtained.
  - (b) treatment of minor injuries which would otherwise receive no treatment or which do not need treatment by a doctor or nurse.
- 2 It should be noted that the definition covers any illness at work and not just accidents. You must, therefore, plan for times when someone has a heart attack or just collapses.
- 3 Emergency first aiders can give a restricted range of first aid treatment to someone who is injured or becomes ill at work. Fully trained first aiders can do the above, plus apply first aid to a range of specific injuries and illnesses.
- 4 Contractors are required to:

- (a) provide adequate first-aid equipment and facilities appropriate to the type of work or operations undertaken and in accordance with the Qatar Supreme Council of Health, Qatar Labour Law, and the Ministerial Decisions on Health and Safety for additional legal requirements.
  - (b) appoint a sufficient number of suitable and trained people to render first aid to employees who are injured or become ill at work in accordance with the Qatar Supreme Council of Health, Qatar Labour Law, and the Ministerial Decisions on Health and Safety for additional legal requirements.
  - (c) appoint a sufficient number of suitable people who, in the temporary absence of the first aider, will be capable of dealing with an injured or ill employee needing help from a medical practitioner or nurse, and who are able to take charge of first-aid equipment and facilities
  - (d) inform employees of the first-aid arrangements, including the location of equipment and personnel. This will require that notices be posted and signs displayed. Provision should be made for employees with language or reading difficulties.

## Shared facilities

- 5 To avoid the unnecessary duplication of facilities where employees of more than one Contractor are working together, arrangements may be made to share facilities. Whilst there is no requirement for shared facilities to be formally recorded, industry best practice is that the arrangements are recorded in writing, with each Contractor retaining a copy.
  - 6 In such circumstances, it is the responsibility of each Contractor to ensure that the agreed facilities are actually provided, and that all their employees are aware of these arrangements.

### **Trained and suitable personnel**

- 7 First aiders must have received training and hold a current first-aid certificate issued by a recognised training organisation.
  - 8 Where first aiders have received first-aid instruction relating to special or unusual hazards in the workplace, they should undergo refresher training and re-examination as necessary. The Contractor must keep a written record of such training.

### **Number of first aiders required**

- 9 For construction, which the table categorises as 'higher risk', the recommendation is as follows.

	<b>Number of employees</b>	<b>Number of first aid trained staff</b>
10	Less than 5: At least one appointed person	
11	5-100: At least one first aider or emergency first aider per 25 employees or part thereof	
12	More than 100: At least one first aider per 25 employees or part thereof	
13	In determining the total number of qualified first aiders required, additional factors should be considered. These are:	
	(a) the type of work or operations being carried out	
	(b) whether or not employees work alone or in scattered and isolated locations	
	(c) whether there are special or unusual hazards	
	(d) whether or not there is shift work -first-aid cover will be required at all times that work is being carried out	

- (e) the maximum number of people likely to be on site at any one time
- (f) the remoteness of emergency medical services
- (g) cover for first-aiders' holidays and sickness absence - first-aid cover will be required at all times that work is being carried out
- (h) the presence of work-placement trainees.

- 14 On sites where special or unusual hazards are present, a proportionately larger number of first aiders, having regard to the factors already mentioned, will be needed. Good practice should encourage all the contractor's site personnel to be trained in basic emergency aid.
- 15 On major construction projects where there is a site nurse, and/or a doctor on call, their advice in connection with first aid should be followed.

#### **1.2.4.4 Appointed persons**

- 1 An appointed person is someone who has been nominated by the Contractor to take charge of a situation, e.g. to call an ambulance if there is a serious illness or injury.
- 2 They will act in the absence of the trained first aider or in situations where it is deemed that a first aider is not required, such as in a small non-hazardous working area, and where there is easy access to professional medical assistance, such as a hospital accident and emergency department.
- 3 Emergency first-aid training should be considered for all appointed persons.
- 4 Appointed persons must not be regarded as an alternative to qualified first aiders and they must not be required to render first aid. The appointed person is responsible for first-aid equipment in the absence of the first aider or in the circumstances described above.

#### **1.2.4.5 Equipment and facilities**

##### **Location of first-aid facilities**

- 1 All employees shall have quick and easy access to first-aid facilities on site. Where employees are working in large numbers and in close proximity, facilities should be centralised in that area. When employees are spread over a wider area, it is necessary to distribute first aiders and equipment accordingly. Sometimes, a combination of these arrangements may be appropriate.
- 2 All employees must be aware of the location of first-aid facilities and the arrangements for providing treatment. The location of first-aid facilities should be clearly marked with the appropriate symbol:

**White symbol and letters on a green background**



**First Aid**



**Emergency  
eye wash**

**First-aid boxes**

- 3 Every Contractor must provide one or more first-aid boxes in accordance with the Qatar Supreme Council of Health, Qatar Labour Law, and the Ministerial Decisions on Health and Safety for additional legal requirements. They should be strategically placed, readily accessible and clearly marked with a white cross on a green background. The container should hold first-aid equipment and nothing else, and should protect the contents from dust and damp.
- 4 It is essential that the contents of first-aid boxes are replenished after use and checked frequently by the first aider or appointed person. Some of the items are prone to deterioration after a certain period. The minimum recommended contents of the first-aid box are listed in Appendix 1, which should be adjusted following an assessment of the first aid needs of a specific site.

**Travelling first-aid kits**

- 5 Special or small travelling first-aid kits should be provided to those employees:
  - (a) who are working alone or in small groups in isolated locations, e.g. maintenance gangs
  - (b) whose work involves travel in remote areas
  - (c) who use potentially dangerous tools or machinery.
- 6 The first-aid kit should only contain the items as recommended in Appendix 1.

**Supplementary equipment**

- 7 Where first aiders are employed, stretchers or appropriate carrying equipment, such as a carrying chair or wheelchair, should be provided in an accessible location clearly identified by a sign. If a site covers a large area, or contains a number of distinct working areas, it will be necessary to provide such equipment at a number of suitable locations.
- 8 However, it is recommended that, in most incidents, casualties are moved as little as possible before the emergency services arrive.



**White symbol and letters on a green background**

### **First-aid rooms**

- 9 On a large building or construction site, a first-aid room, suitably staffed and equipped, should be provided. The need for such a room cannot be decided purely on the numbers of persons employed, but should be assessed on the type of work being carried out and whether hospital A&E or other emergency facilities are close to hand.
- 10 The first-aid room will normally be under the control of the first aider who should be nearby or on call, with access to the room when employees are at work. The name of this person should be displayed, together with the names and locations of all other first aiders and appointed persons. On some larger sites, the first-aid room will be staffed by a qualified nurse.
- 11 The room should be clearly identified, available at all times and used only for rendering first aid. It should be of sufficient size to contain a couch with adequate space around it to allow people to work, and provided with an access door to allow the passage of a stretcher or other carrying equipment. Pillows and blankets should be provided and be frequently cleaned.
- 12 The room itself should be cleaned each working day, have smooth-topped impermeable working surfaces and provision for privacy and refuse disposal.
- 13 Heating, lighting and ventilation should be effective. In addition to the first-aid materials (see Appendix 1) which should be stored in a suitable cabinet, there should be:
  - (a) a sink with running hot and cold water
  - (b) drinking water
  - (c) soap, nail brush and paper towels
  - (d) clean garments for use by first-aid personnel
  - (e) a suitable container for disposal of clinical waste (yellow bags).
- 14 In first-aid rooms that are supervised by the site nurse, other items may be provided on their advice.
- 15 The room should have a telephone, where possible, and a siren or klaxon to alert personnel on call.
- 16 A sufficient number of first aiders should be provided in any work area that is not within easy reach (approximately three minutes) of the first-aid room.
- 17 First aid rooms shall be inspected and licensed per the Qatar Supreme Council of Health requirements.

#### **1.2.4.6 Training and qualifications**

- 1 The Contractor is responsible for ensuring that those people who have been selected as fully qualified first aiders have undergone training and possess adequate qualifications. Additional training may be necessary to cope with any special hazards in a particular working environment.
- 2 Instruction in emergency first aid, such as resuscitation, control of bleeding and treatment of unconsciousness, is desirable for all staff.

#### **Initial selection of first aiders**

- 3 Whilst it is desirable to appoint staff who have already received first-aid training and utilise their skills, in many instances this may not be an option. On most new sites it is unlikely that a trained first aider will be available, and it will be necessary to arrange training for a suitable member of staff.

**In selecting people for this role, the following factors should be considered:**

- 4 friendly, reassuring disposition
- 5 acceptable to male and female staff
- 6 able to cope with stressful and physically demanding emergency procedures
- 7 able to remain calm in an emergency
- 8 employed on a task which they can leave immediately in order to go to the scene of an emergency
- 9 capable of acquiring the knowledge and qualifications required.

**Training of fully qualified first aiders**

- 10 The First Aid training course, including examination will:
  - (a) normally take three full days (18 'classroom' hours), however
  - (b) it need not be completed in a period of three consecutive days - 'split courses' will be permitted.
- 11 On completion of the course, each student must be able to demonstrate that they are able to:
  - (a) recognise minor and major illnesses
  - (b) act safely, promptly and effectively with emergencies at work
  - (c) use first-aid equipment, including the contents of the first-aid container
  - (d) understand the duties of Contractors and the legal framework
  - (e) maintain simple factual records on the treatment or management of emergencies
  - (f) recognise the importance of personal hygiene in first-aid procedures.
- 12 Students must also be able to deal with a casualty who:
  - (a) requires cardiopulmonary resuscitation
  - (b) is bleeding or wounded
  - (c) is suffering from shock
  - (d) is unconscious
  - (e) is suffering from an injury to bones, muscles or joints
  - (f) has an eye injury
  - (g) has been overcome by gas or fumes
  - (h) has been burned or scalded
  - (i) has been poisoned or exposed to a harmful substance.
- 13 Students must also be able to manage the transportation of the casualty as required by workplace circumstances.
- 14 It may be necessary to provide specialised instruction in the use of protective equipment or rescue techniques, where these are important in the trainee's workplace or if special hazards exist there.

### **Expiry of certificates**

- 15 First-aid certificates should be valid for three years. Re-qualification training, with re-examination, will be required before re-certification.
- 16 First aiders can undertake re-qualification training up to 3 months before the expiry of their current first-aid certificate. The certificate will be dated to 'run on' from the expiry date of the previous one. Ideally, Contractors will take advantage of this period.
- 17 However, where this is not possible or practical, re-qualification training can be taken within 28 days after the previous certificate expires.
- 18 Where within the 28 day period, the student:
  - (a) passes the re-qualification training, a certificate will be issued, backdated to the expiry of the previous one
  - (b) fails to pass the re-qualification training, the full First Aid at Work course must be taken again, and passed, for a certificate to be issued.
- 19 In effect, these arrangements provide Contractors with a four month window in which to get each first aider re-certified.

### **Re-qualification training**

- 20 Re-qualification training for fully qualified first aiders including re-examination:
  - (a) must last at least 12 hours (two days)
  - (b) can be 'split' over a longer period, but
  - (c) must be completed within a period of six weeks.

### **Refresher training**

- 21 Contractors are strongly recommended that fully qualified first aiders attend a three-hour refresher course each year to brush up on their basic skills and learn about new techniques and developments.

### **Training of first aiders for special or unusual situations**

- 22 First aiders should have completed training in the subjects described for first aiders, and been given any specialised training related to the particular requirements of their workplace and its hazards.
- 23 Some workers carry their own medication, such as inhalers for asthma or 'Epipens' which contain injectable adrenaline for the treatment of severe allergic (anaphylactic) reactions, for example to peanuts. These medications are prescribed by a doctor. If an individual needs to take their own prescribed medication, the first aider's role is limited to helping them do so and contacting the emergency services as appropriate.

### **Training of emergency first aiders**

- 24 Emergency first aiders must undertake a six-hour course, with their certificate being valid for three years. Similar to fully qualified first aiders, the Contractor is recommended that emergency first aiders undertake an annual three-hour basic skills update and refresher course.
- 25 To requalify and retain their certification for a further three years, emergency first aiders must retake the six-hour course within their three-year qualification period.

**Training of appointed persons**

26 Training courses cover the following subjects:

- (a) what to do in an emergency
- (b) cardio-pulmonary resuscitation
- (c) first aid for the wounded or bleeding
- (d) first aid for an unconscious casualty.

**Training records**

27 Contractors must keep written records of all training that has been given to employees and the results of that training.

**1.2.4.7 Miscellaneous****Ambulance**

1 The local ambulance service should be informed about large sites and of any particularly hazardous operations being undertaken. It is helpful to supply a map locating the site and its entrances and, where appropriate, the first-aid room.

**Induction**

2 Induction training for employees and other persons joining the site should include details of the location of first-aid boxes, qualified first-aid personnel and actions to be taken in cases of injury or illness.

**Record of treatment**

3 First-aid treatment should be recorded. The use of an accident book does not normally allow enough detail to be gathered and an additional treatment book may be necessary, particularly in order to keep a record of the use of first-aid materials.

**1.2.4.8 Accident reporting**

1 All accidents causing any injury must be recorded and, where necessary, reported to the Administrative Authority.

## 1.2.4 Appendix 1

### Recommended contents of first-aid boxes

Item	First-aid boxes	Travelling first-aid kits
Guidance card*	1	1
Individually wrapped sterile adhesive dressings (assorted sizes)	20	6
Sterile eye pads, with attachment	2	Nil
Individually wrapped triangular bandages	4	2
Safety pins	6	2
Medium-sized, individually wrapped, sterile, unmedicated wound dressings (approx. 12 cm x 12 cm)	6	Nil
Large, sterile, individually wrapped, unmedicated wound dressings (approx. 18 cm x 18 cm)	2	1
Individually wrapped, moist cleaning wipes (suggested minimum number)	Nil	6
Disposable gloves (pair)	1	1

Where tap water is not readily available for eye irrigation, sterile water or sterile normal saline (0.9%) in sealed disposable containers should be provided.

### Travelling first-aid kits

Small travelling first-aid kits are designed for use where the workforce is dispersed widely (possibly with hazardous tools), for employees working away from their Contractor's establishment.

**Construction Site Safety****1.2.4 Appendix 2****Health and Safety (First Aid Checklist)****Checklist****First-aid provision**

- 1 How many employees are involved?
- 2 How is the workforce distributed/grouped? (Widely dispersed, etc.?)
- 3 Are remote locations involved?
- 4 Are shirts worked?
- 5 What is the nature of the work?
- 6 Does it involve special operations?
- 7 Can particular hazards be identified, such as falls, electric shock, dangerous substances?
- 8 How many first aiders are needed -consider holiday and sickness cover?

**Training**

- 9 Which personnel require first-aid training?
- 10 Does the training offered meet foreseeable needs?
- 11 Is there a system to trigger a warning to management when a first aider is within three months of their certificate expiring?
- 12 Are training records kept?
- 13 Are individuals working in isolated locations trained to cope with emergencies?
- 14 Where appointed persons are in charge, do they understand their duties?
- 15 Does induction training cover first-aid arrangements?

**Equipment**

- 16 Is first-aid equipment placed in locations where it is likely to be needed?
- 17 Does it meet foreseeable needs, special hazards, etc.?
- 18 Are travelling first-aid kits available when required?
- 19 Is a first-aid room needed, or available, and suitably equipped?
- 20 Are information signs provided?
- 21 Are first-aid boxes and kits properly stocked and maintained?

**General**

- 22 Has responsibility for first-aid provision and organisation been assigned to an individual?
- 23 Are there established procedures for reviewing:
  - (a) training and equipment needs?
  - (b) new work processes?
  - (c) special operations?
  - (d) changes in work patterns, site locations, size of labour force?
  - (e) arrangements with contractors?

## 1.2.4 Appendix 3

### Health and Safety (First Aid Checklist)

Basic advice on first aid at work

#### What to do in an emergency

##### Priorities

- 1 Assess the situation - do not put yourself in danger.
- 2 Make the area safe.
- 3 Assess all casualties and attend first to any unconscious casualties.
- 4 Send for help - do not delay.
- 5 Follow the advice given below.

##### Check for consciousness

- 6 If there is no response to gentle shaking of the shoulders and shouting, the casualty may be unconscious. Your priorities are to:
  - 7 shout for help
  - 8 open the airway
  - 9 check for normal breathing
  - 10 take appropriate action.
- 11 The priority is to check the Airway, Breathing and Circulation. This is the **ABC** of resuscitation.

##### A - Airway

- 12 To open the airway:
  - (a) Place one hand on the casualty's forehead and gently tilt the head back.
  - (b) Remove any obvious obstruction from the casualty's mouth.
  - (c) Lift chin with two fingertips.

##### B - Breathing

- 13 Look along the chest, listen and feel at the mouth for signs of normal breathing, for no more than 10 seconds.

##### If the casualty is breathing:

- 14 Place in the recovery position and ensure the airway remains open.
- 15 Send for help.
- 16 Monitor that the casualty continues to breathe until help arrives.

##### If the casualty is not breathing:

- 17 Send for help.
- 18 Start chest compressions (see CPR below).

## C-CPR

### To start chest compressions:

- 19 Lean over the casualty and, with your arms straight, press down on the centre of the breastbone, 4-5 cm, and then release.
- 20 Repeat at a rate of about 100 times a minute (more than one compression per second!)
- 21 After 30 compressions, open the airway again.
- 22 Pinch the casualty's nose closed and allow the mouth to open.
- 23 Take a normal breath and place your mouth around the casualty's mouth, making a good seal.
- 24 Blow steadily into the mouth while watching for the chest rising.
- 25 Remove your mouth from the casualty and watch for the chest falling.
- 26 Give a second breath and then start 30 compressions again without delay.
- 27 Continue with chest compressions and rescue breaths in a ratio of 30:2 until qualified help takes over or the casualty starts to breathe normally.

### Severe bleeding

- 28 Apply direct pressure to the wound.
- 29 Raise and support the injured part (unless broken).
- 30 Apply a dressing and bandage firmly in place.

### Broken bones and spinal injuries

- 31 If a broken bone or spinal injury is suspected, *obtain expert help. Do not move casualties unless they are in immediate danger.*

### Burns

- 32 Burns can be serious so, if in doubt, seek medical help. Cool the part of the body affected with cold water until pain is relieved. Thorough cooling may take 10 minutes or more, but this must not delay taking the casualty to hospital.
- 33 Certain chemicals may seriously irritate or damage the skin. Avoid contaminating yourself with the chemical. Treat in the same way as for other burns but flood the affected area with water for 20 minutes. Continue treatment even on the way to hospital, if necessary. Remove any contaminated clothing which is not stuck to the skin.

### Burning clothing

- 34 To extinguish the burning clothing of anyone involved in a fire, lay, push or knock the person to the floor to reduce the spread of flames. Cover the burning area with a blanket, coat or other items to smother the flames but do not use synthetic materials (for example, polyester). DO NOT REMOVE ANY OF THE VICTIM'S CLOTHES.
- 35 Apply large amounts of water to the area of the burns as quickly as possible to cool the affected parts, and then keep them wet with more water. Seek medical help urgently.

### Eye injuries

- 36 All eye injuries are potentially serious. If there is something in the eye, wash out the eye with clean water or sterile fluid from a sealed container, to remove loose material. Do not attempt to remove anything that is embedded in the eye.
- 37 If chemicals are involved, flush the eye with water or sterile fluid for at least 10 minutes, whilst gently holding the eyelids open. Ask the casualty to hold a pad over the injured eye and send them to hospital.

**Record keeping**

- 38 It is good practice to record in a book any incidents involving injuries or illness that have been attended, including the following information in your entry:
- 39 Date, time and place of incident.
- 40 Name and job of injured or ill person.
- 41 Details of injury/illness and any first aid given.
- 42 What happened to the casualty immediately afterwards (for example, went back to work, went home, went to hospital).
- 43 Name and signature of the person dealing with the incident.
- 44 This information can help identify accident trends and possible areas for improvement in the control of health and safety risks.

## Construction Site Safety

### 1.2.5 Food Safety on Site

#### 1.2.5.1 Key points

- 1 Getting food hygiene wrong can have severe implications for many other people.
- 2 Anyone who handles food for consumption by others:
  - (a) must have training in basic food handling techniques;
  - (b) must report to their supervisor details of any illness that they may be suffering from;
  - (c) may have to be suspended from work if they contract an infectious illness.
- 3 Premises in which food is handled, prepared and served must conform to certain standards of construction and cleanliness.
- 4 All employees' food service facilities and operations shall meet the applicable laws, ordinances, regulations of Qatar and ISO 22000.

#### 1.2.5.2 Introduction

- 1 Food poisoning is caused by bacteria (germs or bugs) which have lain dormant in most uncooked or unprepared foods, whether meat, fish, poultry and some vegetables.
- 2 Food poisoning keeps people off work through sickness, just as accidents do.
- 3 Applying appropriate hygiene standards on site are essential because of the potential for:
  - (a) time lost through sickness absence being reduced
  - (b) avoiding lost production

#### 1.2.5.3 Definitions

- 1 **Food** - food or drink of any description, or any of the ingredients used in the preparation of food.
- 2 **Food area** - any room or food area in which a person engages in the handling of food, including a server, counter or outside grill preparation area.

#### The premises

- 3 The **Premises** are defined as the siting, design and construction of the premises must aim to avoid the contamination of food and harbouring of pests. It must be kept clean and in good repair so as to avoid food contamination.
- 4 Surfaces in contact with food must be easy to clean and, where necessary, disinfect. This will require the use of smooth, washable, non-toxic materials.
- 5 Adequate provision must be made for cleaning foodstuffs, and the cleaning and (where necessary) disinfection of utensils and equipment. You must take all reasonable, practical steps to avoid the risk of contamination of food or ingredients.
- 6 Washbasins must be designated for washing hands, have hot and cold (or appropriately mixed) running water, and be equipped with soap and suitable hand-drying facilities, such as disposable towels. Lavatories must not lead directly into food rooms and they must be kept clean, maintained in good repair and ventilated.
- 7 Adequate arrangements and facilities for the hygienic storage and disposal of hazardous and inedible substances and waste (whether liquid or solid) must be available. Food waste must

not be allowed to accumulate in food rooms and should be deposited in closable containers.

- 8 Adequate facilities and arrangements for maintaining and monitoring suitable food temperature conditions must be available. (See also below.)

## The food

- 9 Food shall be stored, handled and served in accordance with applicable laws, ordinances, regulations of Qatar and ISO 22000.

- 10 Stored raw materials and ingredients must be kept in appropriate conditions which will prevent harmful deterioration and be protected from contamination likely to make them unfit for human consumption.

Water

- 11 There must be an adequate supply of potable (clean, drinkable) water which must be used whenever necessary to ensure foodstuffs are not contaminated. This includes the use of ice which must also be made, handled and stored in a way that protects it from contamination.

## Temperature control

- 12 Foods intended for supply which need temperature control for safety must be held either **HOT** at or above a minimum temperature of 63°C or **CHILLED** at or below a maximum temperature of 8°C.

13

## **Food Handlers**

- 14 Food handlers Anyone who works in a food handling area must maintain a high degree of personal cleanliness. The way in which they work must also be clean and hygienic. Food handlers must wear clean and, where appropriate, protective over-clothes. Adequate changing facilities must be provided where necessary.

- 15 Food handlers must protect food and ingredients against contamination, which is likely to render them unfit for human consumption or create a health hazard. For example, uncooked poultry should not contaminate ready-to-eat foods, either through direct contact or via work surfaces or equipment.

- 16 Anyone whose work involves handling food should:

- (a) must have training in basic food handling techniques;
  - (b) must be licensed or certified per applicable laws, ordinances, regulations of Qatar and ISO 22000.
  - (c) observe good personal hygiene
  - (d) routinely wash their hands before handling foods
  - (e) never smoke in food handling areas
  - (f) report any illness (like infected wounds, skin infections, diarrhoea or vomiting) to their manager or supervisor immediately.
  - (g) may have to be suspended from work if they contract an infectious illness.

- 17 If any employee reports that they are suffering from any condition or illness, Contractors may have to exclude them from food handling areas. Such action should be taken urgently.

- 18 Food handlers must receive adequate supervision, instruction and training in food hygiene.

### **Microwave ovens**

- 19 On sites where microwave ovens are used, the following points must be noted.
- (a) Metal containers or utensils must not be placed in a microwave oven.
  - (b) Door seals of microwave ovens should be periodically examined to see that they are not damaged.
  - (c) Microwave ovens should not be overloaded by trying to cook too many things at the same time.
  - (d) Frozen food should be properly thawed.
  - (e) Food should be thoroughly cooked. Follow instructions on the packaging and leave to stand.
  - (f) Do not attempt to add anything to or stir any liquid which has just been removed from a microwave oven and has not been allowed to stand, by using a metal spoon or utensil. Such an action may cause the liquid to boil violently.
  - (g) Always adhere to the supplier's or manufacturer's instructions

### **1.2.5.4 Drinking water**

- 1 An adequate supply of drinking water shall be provided in all places of work.
- 2 Portable containers used to dispense drinking water shall be capable of being tightly closed, and equipped with a tap.
- 3 Any container used to distribute drinking water shall be clearly marked as to the nature of its contents and not used for any other purpose.
- 4 The common drinking cup is prohibited.
- 5 The drinking water provided must meet the standards for drinking purposes of the State of Qatar. Employer shall have water tested periodically and maintain water quality records on site.

### **1.2.5.5 Toilets**

- 1 Toilets shall be provided for employees according to the Qatar Labour Law.
- 2 Under temporary field conditions, provisions shall be made to assure not less than one toilet facility is available.
- 3 Toilets shall be maintained and cleaned daily.

### **1.2.5.6 Washing facilities**

- 1 The employer shall provide adequate washing facilities for employees – especially those engaged in the application of paints, coating, herbicides, or insecticides, or in other operations where contaminants may be harmful to the employees.
- 2 Such facilities shall be in near proximity to the worksite and shall be so equipped as to enable employees to remove such substances.
- 3 Washing facilities shall be maintained in a sanitary condition with hand soap or similar cleansing agents provided.

## Construction Site Safety

### 1.2.6 Working with Lead

#### 1.2.6.1 Key points

- 1 Lead can be a major health hazard if exposure is not prevented or adequately controlled.
- 2 Lead is a cumulative poison that can find its way into the bloodstream and collect in tissues, particularly the bone marrow.
- 3 The ways that lead is likely to get into the body are through:
  - (a) the inhalation of fumes or dust;
  - (b) the ingestion of lead particles through hand to mouth contact.
- 4 All work with lead, or lead-containing products, must be the subject of a risk assessment.
- 5 Builders, carpenters, decorators etc., who remove old paint, particularly if involved in window renovation, may be exposed to 'significant' quantities of lead without realising it.
- 6 Where the risk assessment indicates that employees' exposure to lead is likely to be 'significant', certain monitoring actions must be taken with regard to the employees affected and the workplace itself.
- 7 'Significant exposure' is defined in these Regulations.
- 8 During health surveillance, employees' exposure to lead is measured by the concentration of lead in their blood or urine.
- 9 Above a certain level of exposure, Contractors have a legal duty to temporarily suspend the affected worker(s) from further work with lead.

#### 1.2.6.2 Introduction

- 1 Exposure to lead, dust, fumes and vapour constitutes a major hazard in the construction industry who work with lead and lead products. Construction workers most at risk include:
  - (a) plumbers working on lead flashing, upstands and gutters
  - (b) operatives handling old architectural lead work
  - (c) painters rubbing down or burning off old paintwork
  - (d) demolition operatives
  - (e) anyone involved in structural renovation or refurbishment, including conservation or heritage projects.

#### 1.2.6.3 The Management of Health and Safety at Work

- 1 These Regulations place a requirement on every Contractor to make a suitable and sufficient assessment of every work activity in order to identify any hazard that employees or any other person might encounter as a result of the work being carried out.
- 2 Once those hazards have been identified, it is then the Contractor's duty to put control measures into place in order either to eliminate the hazard or, where this is not possible, to reduce the risks of injury or ill health arising from the hazards, as far as is reasonably practicable.
- 3 The Contractor must provide employees with comprehensible and relevant information on any

risks in the workplace and on any control measures in place to reduce those risks.

- 4 Employees, in turn, have a duty to tell their Contractor of any work situation which presents a risk to themselves or to others, or of any matter which affects the health and safety of themselves or other persons. The main consideration will be identifying where lead is present and taking the appropriate actions to protect the health of lead workers and, if necessary, other people who may be affected by the work.

#### 1.2.6.4 Control of Lead at Work

- 1 These Regulations aim to give greater health protection to people at work by reducing their exposure to lead and thus the concentrations of lead in their blood. Where concentrations are too high, Contractors are required to remove employees from work with lead. This is known as the 'suspension level'.
- 2 Concentration levels of lead in blood, which are below the suspension level and known as 'action levels', have been set.
- 3 If these lower levels are breached, Contractors have a duty to investigate and remedy the cause. Contractors are also required to take steps to reduce the concentrations of lead in air to a level not exceeding the occupational exposure limits stated in these Regulations.
- 4 The main requirements of these Regulations include:

##### Duties under these Regulations

- 5 A Contractor who is working with lead, or a substance or material containing lead, has to protect from exposure anyone who may be affected by the work as well as their own employees. This includes:
- (a) the workers of other Contractors including those not engaged in work with lead, such as maintenance staff and cleaners
  - (b) visitors to the work site
  - (c) the families of those who are exposed to lead at work who may become affected by lead carried home unintentionally on the clothing and footwear of the employee are particularly at risk of lead poisoning, and therefore have lower blood-lead action and suspension levels than other people.
  - (d) the occupiers of premises, including private dwellings, irrespective of whether the occupiers are present whilst the work is carried out or they reoccupy the premises later.

##### Assessment of the risks to health

- 6 Every Contractor is required to make a suitable and sufficient assessment of the risk to the health and safety of employees while at work. This includes other people who are not employees but who may be exposed as a result of the way the Contractor carries out the work concerned. The assessment must be reviewed as often as is necessary and in other certain specified circumstances, and a record made of any significant findings. Such an assessment is to allow the Contractor to make a decision whether the work concerned is likely to result in an employee being significantly exposed to lead, and to identify the measures needed to prevent or adequately control exposure.

##### Control of exposure

- 7 Every Contractor must ensure that the exposure of employees to lead is either prevented or, where this is not reasonably practicable, adequately controlled by means of appropriate control measures.
- 8 As the preferred control measure, the Contractor must consider the use of alternative materials

or processes as a means of eliminating or reducing the risks to the health of employees.

- 9 Where it is not reasonably practicable to prevent exposure to lead, the Contractor must introduce protective measures which are appropriate to the work activity and consistent with the findings of the risk assessment. In order of priority, these must be:
- (a) the design and use of the work process, systems and engineering controls
  - (b) control of exposure at source, including ventilation systems, and
  - (c) where adequate control cannot be achieved by other means, the provision and use of suitable PPE.
- 10 The control measure(s) must include:
- (a) the safe handling, storage and transportation of lead and waste which contains lead
  - (b) suitable maintenance procedures
  - (c) reducing to the minimum required for the task in hand, the number of employees exposed, the level and duration of exposure and the quantity of lead present in the workplace
  - (d) control of the working environment, including, where appropriate, general ventilation
  - (e) appropriate hygiene measures, including washing facilities.
- 11 Irrespective of these control measures, where the exposure to lead is, or is likely to be significant, the Contractor must provide suitable and sufficient protective clothing.
- 12 Where the inhalation of lead fumes is possible, the control measures will only be regarded as adequate if:
- (a) the occupational exposure limit is not exceeded
  - (b) or if it is, the Contractor identifies the reason and takes immediate steps to rectify the situation.
- 13 Contractors must take reasonable steps to ensure that any control measure provided is properly used or applied.
- 14 Employees must make full and proper use of any control measure provided, and:
- (a) take all reasonable steps, where appropriate, to return anything provided as a control measure to its accommodation (storage) after use
    - (i) report any defect in any control measure provided to the Contractor.
- 15 Adequate control of exposure to lead covers all routes of possible exposure, such as inhalation, Absorption through the skin and ingestion.

### **Eating, drinking and smoking**

- 16 Adequate steps must be taken to control the ingestion of lead. A Contractor must ensure that, as far as is reasonably practicable, employees do not eat, drink or smoke in any place which is, or is liable to become, contaminated by lead. In practical terms, employees must be warned against doing so. Furthermore, under these Regulations employees have a legal duty not to eat, drink or smoke in any place that they have reason to believe is contaminated by lead.

### **Maintenance, examination and testing of control measures**

- 17 All control measures provided, including PPE, must be well maintained, kept in a good state of repair and cleaned as necessary. Any defect in the equipment, or failure to use and apply it properly, which could result in a loss of efficiency or effectiveness, thus reducing the level of protection, should be identified and rectified as soon as possible.

### Air monitoring

- 18 Where employees are liable to receive significant exposure to lead, Contractors must establish a programme of air monitoring including keeping records of the findings of such monitoring.

### Medical surveillance

- 19 Where exposure to lead is significant, the Contractor must:
- (a) make sure that employees are under medical surveillance by a 'relevant doctor'
  - (b) provide suitable facilities for health surveillance to be carried out where the procedures are to be carried out at the Contractor's premises
  - (c) maintain health surveillance records and retain them for 40 years
  - (d) allow employees reasonable access to their personal health records
  - (e) take steps to determine the reasons why any employee's blood sample exceeds the appropriate action level and take appropriate remedial action
  - (f) take the necessary actions, including reviewing the risk assessment, where an employee's blood or urine sample reaches the 'suspension level'.

- 20 Employees for whom health surveillance has been arranged must, when required by the Contractor (and at the cost of the Contractor), make themselves available for the necessary health surveillance procedures and supply the relevant doctor with such health-related information as the doctor may require.

### Information, instruction and training

- 21 Contractors who undertake work liable to expose employees to lead shall provide such information, instruction and training as is suitable and sufficient to know the risks to health, and the precautions which should be taken.

### Arrangements for accidents, incidents and emergencies

- 22 The Contractor, in attempting to protect the health of employees from an accident, incident or emergency, must ensure that procedures, including the provision of first aid facilities and safety drills, have been prepared and can be put into effect should such an occasion arise. The Contractor must also ensure that information on such emergency arrangements has been notified to accident and emergency services and that all such information is displayed within the workplace.

### 1.2.6.5 Training

- 1 There is a specific requirement to ensure that the information, instruction and training provided for persons working with lead includes:
- (a) the type of lead being worked, the potential health hazards and symptoms
  - (b) the relevant occupational exposure limit, action level and suspension level (as explained)
  - (c) any other sources of information
  - (d) the significant findings of the risk assessment
  - (e) the control measures that are in place and which must be used to enable work to be carried out safely
  - (f) the results of any monitoring carried out
  - (g) the results of previous health surveillance, in such a way that the confidentiality of individual cases is not breached.

#### 1.2.6.6 Personal Protective Equipment

- 1 These Regulations require that where a risk of exposure to lead has been identified by a risk assessment and it cannot be adequately controlled by other means which are equally or more effective, the Contractor must provide personal protective equipment (PPE) and ensure it is properly used by employees.
- 2 Users of PPE must be trained in its use and care as appropriate.
- 3 In essence, PPE may only be used as a last resort after all other means of eliminating or controlling the risk have been considered and are not reasonably practicable.

#### 1.2.6.7 Construction (Design and Management) CDM

- 1 In the context of this section the important requirements of these Regulations are for provision of adequate welfare facilities, particularly in respect of personal hygiene. Contractors must provide or make available:
  - (a) suitable and sufficient washing facilities, including showers if necessary due to the nature of the work
  - (b) hot and cold (or warm) water, soap or other cleanser and towels or other effective means of drying
  - (c) suitable and sufficient changing rooms
  - (d) lockers or other facilities in which to secure work clothing that is not taken home and personal clothing that is not worn at work
  - (e) suitable rest facilities where meals may be prepared and eaten.

#### 1.2.6.8 Provision and Use of Work Equipment

- 1 These Regulations require that a Contractor only supplies work equipment that is correct and suitable for the job for which the equipment is going to be used.
- 2 These Regulations also require that users of work equipment are trained in its use, as appropriate.

#### 1.2.6.9 Control of exposure to lead in the workplace

##### The hazard

- 1 Lead is a cumulative poison that will find its way into the bloodstream and can collect in tissues, particularly the bone marrow. Lead poisoning may occur through exposure to lead in its pure form or exposure to products containing lead.
- 2 Lead affects the body's ability to produce haemoglobin, which is the protein in blood that carries oxygen to the tissues.
- 3 Inorganic lead, the type likely to be encountered during construction activities, can enter the body in one of two ways:
  - (a) by inhalation of dust or fumes
  - (b) via the digestive tract from hand-to-mouth transfer of lead particles.
- 4 Inhalation is by far the most common route of entry.
- 5 Whilst the control of exposure through inhalation will be largely controlled by actions taken by the Contractor, the control of exposure through ingestion depends upon the good personal hygiene practices of employees working with lead.

### Risk assessment

- 6 Contractors must not carry out any work that may expose employees to lead unless a suitable and sufficient risk assessment has been carried out.
- 7 The purpose of the risk assessment is to enable the Contractor to:
  - (a) assess whether the exposure of employees to lead is likely to be significant
  - (b) identify the measures necessary to prevent or control exposure.

### Control measures

- 8 Control measures involve substituting lead with less hazardous substances or, if this is not possible, using engineering and organisational methods, similar to those outlined for COSHH, to control exposure.
- 9 The control of exposure to lead (by inhalation) will only be regarded as adequate:
  - (a) if the concentration of lead in air is kept below the OEL (see below)
  - (b) if, where the OEL is exceeded, the Contractor identifies the reasons and takes immediate steps to remedy the situation.

### Air monitoring

- 10 Where a risk assessment indicates that employees may be liable to significant exposure to lead, the **CONTRACTOR MUST ARRANGE FOR AIR MONITORING TO BE CARRIED OUT TO ESTABLISH THE LEVELS OF LEAD IN THE AIR AT THE PLACE OF WORK.**
- 11 **AIR MONITORING WILL INVOLVE USING SPECIALIST EQUIPMENT, WHICH IS FITTED TO THE EMPLOYEE BEING MONITORED, TO TAKE AN AIR SAMPLE FROM THE EMPLOYEE'S 'BREATHING ZONE' OVER A SET PERIOD OF TIME.**
- 12 **USING STATIC AIR-MONITORING EQUIPMENT TO TAKE AIR SAMPLES IS NOT ACCEPTABLE AS THE RESULTS WILL NOT BE REPRESENTATIVE OF ANY EMPLOYEE'S PERSONAL EXPOSURE.**
- 13 **GENERALLY, DEPENDING UPON THE CIRCUMSTANCES, MONITORING MUST BE CARRIED OUT AT EITHER THREE-MONTHLY OR YEARLY INTERVALS. AIR MONITORING WILL DETERMINE WHETHER THE OEL HAS BEEN BREACHED.**
- 14 **THE CONTRACTOR HAS A DUTY TO RETAIN RECORDS OF AIR MONITORING RESULTS FOR A PERIOD OF FIVE YEARS.**
- 15 **GIVEN THE TEMPORARY NATURE OF CONSTRUCTION SITES, AND THE EVEN SHORTER PERIODS WHEN EMPLOYEES MIGHT ACTUALLY BE EXPOSED TO LEAD, THE ABOVE REQUIREMENT IS CONSIDERED TO BE LARGEY ACADEMIC FOR THE CONSTRUCTION INDUSTRY. WITH TRADESMEN SUCH AS PLUMBERS AND PAINTERS BEING POTENTIALLY EXPOSED TO LEAD MANY TIMES BUT over relatively short periods, it will be for the Contractor to decide how frequently air monitoring should be carried out to confirm whether or not existing control measures are adequate.**

### Occupational Exposure Limit (OEL)

- 16 The standard for inorganic lead in air is 0.15 milligrams of lead per cubic metre of air determined on an eight-hour time-weighted concentration.
- 17 This quantifies the standard to be met by the control measures for airborne lead under these Regulations.

### **Medical surveillance**

- 18 Medical surveillance to detect exposure to lead involves measuring the concentration of lead in the blood or urine and therefore necessitates the involvement of suitable trained, medical staff.
- 19 Where a risk assessment indicates that employees' exposure to lead is likely to be significant, the Contractor has a duty to arrange medical surveillance for the affected employees.
- 20 If medical surveillance detects blood-lead concentrations at or above those outlined below, this will trigger continued surveillance:
  - (a) all employees: 35 micrograms of lead, or greater, per decilitre of blood.

### **Action levels**

- 21 The action levels for lead are:
  - (a) young persons (aged 16-17): 40 micrograms of lead per decilitre of blood
  - (b) all other employees: 50 micrograms of lead per decilitre of blood.
- 22 If medical surveillance detects blood-lead concentrations at or above these action levels, the Contractor must:
  - (a) recognise that the employee's blood-lead level is near the 'suspension level'
  - (b) investigate the effectiveness of existing control measures and take the necessary actions to reduce employees' blood-lead levels below the action level
  - (c) prevent the blood-lead level of affected employees from reaching the suspension level.

### **Suspension levels**

- 23 If medical surveillance reveals that an employee's blood-lead level has reached or exceeded the levels outlined below, a doctor must decide whether to temporarily suspend them from work which exposes them to lead:
  - (a) young persons (aged 16-17): 50 micrograms of lead per decilitre of blood
  - (b) all other employees: 60 micrograms of lead per decilitre of blood.
- 24 In such circumstances, the Contractor must:
  - (a) ensure that a doctor makes an entry in the health record of affected employee(s) as to whether, in the doctor's professional opinion, they should be suspended from further work liable to expose them to lead
  - (b) review the relevant risk assessment
  - (c) review the actions taken to prevent exposure to lead
  - (d) provide for a review of the health of any other employees who may have been similarly exposed.
- 25 If the doctor thinks that there is no need to suspend the affected employee(s) from work, the doctor must note in their health records:
  - (a) the reasons for that decision
  - (b) any conditions under which working with lead may continue.
- 26 A Contractor must act on the doctor's decision and an employee will not be able to work with lead again or be exposed to it until the doctor considers it safe to do so.

27 (Refer to Appendix 2 for an example of a health surveillance record form.)

### **Significant levels**

- 28 Significant exposure to lead can occur where:
- (a) any employee is, or is liable to be, exposed to a concentration of lead in the atmosphere exceeding half the occupational exposure limit for lead
  - (b) there is a substantial risk of an employee ingesting lead
  - (c) there is a risk of contact between the skin and lead alkyls or other substances containing lead which can be absorbed through the skin.
- 29 Contractors must provide employees with protective clothing, monitor lead in air concentration, and place the employees concerned under medical surveillance.
- 30 Personal protective equipment will be required where control measures are not practicable.

### **Types of work liable to result in significant exposure to lead**

- 31 Some types of work with lead carried out as part of construction or decorating activities, have the potential to result in significant exposure to lead unless the Contractor provides adequate controls and ensures that they are used. For example:
- (a) burning off old paint
  - (b) dry-sanding old paint
  - (c) high temperature lead-work such as lead smelting, burning and welding
  - (d) working with metallic lead and alloys containing lead, for example, soldering
  - (e) disc abrasion of lead surfaces and cutting lead with abrasive wheels
  - (f) spray painting with lead-based paints
  - (g) work inside tanks that have contained petrol
  - (h) manufacture of leaded glass
  - (i) hot cutting, demolition and dismantling operations
  - (j) otherwise removing or disturbing old lead sheet thereby raising contaminated dust
  - (k) recovering lead from scrap and waste
  - (l) welding galvanised metal and flame cutting steelwork that has been painted with lead-based paint.
- 32 Those operations which do not usually produce significant levels include low temperature work, ordinary plumbing, soldering, handling clean sheets or pipes of lead, rough painting.

### **How does lead affect your health?**

- 33 If the level of lead in the body gets too high, it can cause headaches, tiredness, irritability, constipation, nausea, stomach pains and loss of weight. Continued uncontrolled exposure could cause far more serious symptoms, such as kidney damage, nerve and brain damage. A developing unborn child is at particular risk from exposure to lead, particularly in the early weeks before a pregnancy becomes known.

### **Prevention of exposure**

- 34 The Contractor has a duty to assess the nature and extent of the exposure to lead and, on the basis of this assessment, to determine the measures necessary to control exposure and comply with these Regulations.

- 35 Action should be taken to reduce the amount of lead breathed by operatives to below the lead in air standard.

36 The basic need is to prevent the liberation of lead dust, fumes or vapour into the workplace.

37 If surface finishes are to be disturbed, always check for the presence of lead paint or, if this is not possible, assume the worst (that it is a lead-based paint) and take the appropriate precautions.

38 Ways of testing for the presence of lead include:

  - (a) a variety of destructive tests for paint sampling, although these result in damage to painted surfaces in order for samples to be taken
  - (b) disposable test kits: instant, on-site lead/no lead result with 95% accuracy. (These are an indicator only, **not** a laboratory-standard test)
  - (c) paint-sampling kits which are ready-to-use (for non-lab professionals) for submission of samples for chemical analysis. A laboratory-standard test
  - (d) dust-wipe sampling kits which are ready-to-use dust sampling kits (for non-lab professionals) for submission of samples for chemical analysis. A laboratory-standard test
  - (e) hand-portable devices that use XRF (x-ray fluorescence) technology to obtain laboratory standard readings instantly, on site.

#### **1.2.6.10 Personal protective equipment**

## **Respiratory protective equipment**

- 1 Where control measures do not reduce the lead in air levels to below the control limits, respiratory protective equipment of a type suited to the hazard or process involved must be provided, and all employees must be properly trained to use it. All such equipment should be serviced, cleaned, maintained and stored correctly, as is appropriate.
  - 2 Depending upon whether the hazard is lead dust or fumes, adequate protection will be given by the use of compressed air-line breathing apparatus, self-contained breathing apparatus, or a full-face positive pressure powered respirator fitted with a high efficiency filter.

## **Protective clothing**

- 3 Wherever exposure is significant, protective clothing must be provided. It must be suited to the hazard or process involved, should resist the permeation of lead dust, and not collect or harbour dust. Employees must be instructed to report any damaged or defective ventilation plant or protective equipment, without delay, to their supervisor or safety representative.

#### **1.2.6.11 Working with lead-based paints**

- 1 The residues of lead-based paints are a health hazard. Operatives carrying out the removal of old lead-based paint, and anyone else who might be adversely affected, must be adequately protected when applying or removing paints containing lead.
  - 2 Similarly, the occupiers of premises (including the residents of private housing) must be protected by not being allowed to return to their premises (or contaminated parts of those premises) until they have been thoroughly and effectively cleaned (see below).
  - 3 The findings of a risk assessment, carried out before any surface finish is disturbed, will indicate the most appropriate of removal and safety precautions which must be taken.
  - 4 See Appendix 3 for specimen record details.

**Sanding**

- 5 Unless appropriate RPE and protective clothing are worn, old lead paint should never be dry-sanded by hand as this activity will liberate lead-rich dust into the air. Again, unless appropriate RPE and protective clothing are worn and effective measures are taken to clear up the residue, mechanical sanding can only be used if the sander is fitted with a dust extraction/ collection unit incorporating a high efficiency particle air HEPA filter.
- 6 Wet sanding of lead-based paint is acceptable, providing the residue is collected before it dries out with the potential to become airborne dust.
- 7 As a result, the subsequent dry sanding of apparently 'clean' wood can liberate a significant amount of lead-containing dust into the air.

**Burning**

- 8 Unless appropriate RPE is worn, blow-lamps or gas torches must not be used to burn off old lead paint as these will heat the paint sufficiently to liberate lead fumes into the air.

**Solvents**

- 9 Lead paint may be removed by using a solvent or water-rinseable paint remover. If a solvent is used, the work area must be well-ventilated and no smoking or naked flames allowed. Suitable RPE and other appropriate PPE should be used.

**Hot-air gun**

- 10 These must not be confused with blow-lamps and gas torches. A hot-air gun will not raise the temperature of the paint sufficiently to allow lead fumes to be created. When using a hot-air gun, the old paint must be scraped off as soon as it is sufficiently soft and before it re-hardens. Care must be taken to ensure that the paint does not burn as this indicates that it is reaching too high a temperature where fumes may be given off. The use of RPE to protect against lead-containing dust may be necessary.

**Infra-red heating**

- 11 A product is available that safely lifts the old paint from the base material by heating it to a safe temperature using an infra-red heater. Whilst warm, the paint can be safely scraped off. This method is particularly suitable where large surface areas have to be stripped.
- 12 The main benefits of using this method, which acts by heating the resins in the wood and breaking the bond between the wood and the first layer of paint, are:
  - (a) all layers of paint are removed in 'a single hit'
  - (b) virtually all residual lead is removed from within the grain of the wood
  - (c) large surface areas can be safely stripped more quickly than by using other methods.

**Spraying**

- 13 Spraying methods should not normally be employed for applying lead-based paints.

**Cleaning up the work area**

- 14 All surfaces that have been stripped of paint should be washed down thoroughly, either with a proprietary lead-specific detergent or with a solution of dishwasher detergent in hot water, and then wiped down again with clean water.
- 15 Any residual dust and other debris should be removed using a vacuum cleaner fitted with a

HEPA filter. Depending upon the level of contamination, it may be necessary to wear appropriate RPE whilst doing this.

- 16 Normal vacuum cleaners (domestic or industrial) should not be used as their filters are not sufficiently efficient to retain the lead-containing dust.

#### **1.2.6.12 Personal hygiene**

- 1 Anyone who works with lead should take simple personal hygiene measures to prevent the inhalation or ingestion of lead during and after work.

## **Changing and washing facilities**

- 2 To avoid any risk to health or damage to any clothing concerned, the Contractor must provide separate accommodation for an employee's own clothing and any protective clothing the employee may have to wear at work. This requirement will normally apply for protective clothing worn for work with lead.

3 Adequate and suitable washing facilities are required where operatives are exposed to lead. Where employees are exposed to lead, washing and changing facilities provided should allow them to meet a high standard of personal hygiene so as to minimise the risk of them ingesting or otherwise absorbing lead.

4 The design of the washing facilities should be related to the nature and degree of exposure to lead as indicated by the assessment. Where employees are significantly exposed to lead, and if washbasins alone would not be adequate, the washing facilities should include showers or baths.

5 An example would be where work is carried out in dusty conditions which could result in the whole body being contaminated by lead. Then the provision of showers or baths would be essential.

6 Washing facilities should provide at least:

  - (a) one washbasin for every five persons. Basins should be of sufficient size to permit arms to be immersed up to the elbow
  - (b) a constant supply of hot and cold or warm water (running water where reasonably practicable)
  - (c) soap or other cleaning materials
  - (d) nail brushes
  - (e) warm air dryers or roller towels; communal towels should not be used.

7 For certain types of work, such as lead work, carried out at premises or sites where such work is not regularly done (for example, certain tank cleaning and lead burning operations), mobile caravan type washing/showering facilities of suitable design should be provided.

## Eating, drinking and smoking

- 8 These Regulations require Contractors to reduce the risk of ingestion of lead by ensuring that employees do not eat, drink or smoke in places which are contaminated, or likely to be contaminated, from lead arising from work activities. Therefore, Contractors should reduce the risk of employees ingesting lead by ensuring that they are given adequate information on the specific areas that might be contaminated by lead and in which they should not eat (including chewing gum or tobacco), drinker smoke.

9 The information should be reinforced by displaying a prominent notice to identify those areas in which employees may, or may not, eat, drink or smoke.

10 The following points should be noted:

- (a) clean areas, canteens or mess rooms should be isolated from lead-contaminated work areas
  - (b) protective clothing should be removed before entering these areas
  - (c) washing should take place before eating meals or drinking
  - (d) the Contractor must advise employees where they may not eat, drink or smoke
  - (e) Employees are not to eat, drink or smoke in any place where there is risk of contamination by lead.

## 1.2.6 Appendix 1

### Lead hazards

#### Safety checklist

- 1 Has a risk assessment been carried out?
- 2 Have all persons who have to work with lead received adequate information, instruction and training?
- 3 Has the nature and extent of any exposure to lead been assessed?
- 4 Is the monitoring of lead in air levels carried out?
- 5 Is medical surveillance of individuals necessary and, if so, undertaken?
- 6 If medical surveillance is necessary, are medical records kept as required?
- 7 Are measures in place to control levels of exposure to lead?
- 8 Is protective equipment and clothing in use, as necessary and required?
- 9 Is the correct type of respiratory equipment being used for the hazard being encountered?
- 10 Are measures being taken to control the spread of any lead contamination?
- 11 Is there adequate provision of washing and changing facilities?
- 12 Are separate areas provided for eating and drinking?
- 13 Are all operatives adequately trained in safe working procedures?
- 14 Are operatives aware of the risks to health that can arise from not working safely?
- 15 Are records being kept as required by these Regulations?
- 16 Are arrangements in place to deal with accidents, incidents and emergencies?

## 1.2.6 Appendix 2

### Specimen health surveillance record

Recorded details of an employee under medical surveillance because of exposure to lead

Employee's details	
Name:	
Permanent address:	
Place of birth:	
Date of birth:	
Sex:	

Doctor's details	
Name:	
Address:	
Telephone number:	

Contractor's details	
Name:	
Address:	
Telephone number:	

<b>Employment details</b>	
Years exposed to lead before starting of current employment:	
Date of first exposure to lead in current employment: (Day Month Year)	
Date of end of exposure to lead in current employment: (Day Month Year)	

<b>Additional information</b>	
a) the reason for medical surveillance	
b) the dates of initial and periodic medical surveillance	
c) the results of clinical assessments	
d) the results of measuring blood-lead concentrations and of any other biological tests in enough detail to allow adverse trends to be identified, and	
e) action taken, including periods moved to work not involving exposure to lead, and periods of suspension.	

## Construction Site Safety

### 1.2.7 Manual Handling

#### 1.2.7.1 Key points

- 1 Poorly thought out or badly performed manual handling activities are the cause of many injuries to construction workers.
- 2 'Manual handling' includes lifting, lowering, pulling, pushing or carrying a load by physical effort.
- 3 Several factors will determine whether it is safe for an individual to manually handle any particular load.
- 4 Contractors must:
  - (a) avoid so far as reasonably practicable their employees having to carry out manual handling activities likely to result in an injury;
  - (b) where that is not reasonably practicable, assess the risks to the employee;
  - (c) put in place control measures to prevent such an injury occurring.
- 5 Employees must:
  - (a) make full and proper use of the Contractor's safe system of work;
  - (b) use (lifting) equipment and machinery in accordance with instruction and training given;
  - (c) report to the Contractor any situation where it is considered that the system of working is not safe.
- 6 Where sustaining an injury is a possibility and handling a load cannot be avoided, using a mechanical means of carrying out the activity is the best solution.

*Note: Section 1, Part 9.2 of the QCS covers the manual handling of materials.*

#### 1.2.7.2 Introduction

- 1 All construction and building work involves lifting and handling to some extent. Although mechanical equipment should be used whenever practicable, much of the work will inevitably continue to be done manually. The risk of injury can be greatly reduced by a knowledge and application of correct lifting and handling techniques and by taking a few elementary precautions.

#### 1.2.7.3 The Management of Health and Safety at Work

- 1 These Regulations place a requirement on every Contractor to make a suitable and sufficient assessment of every work activity, including those that involve manual handling, to identify any hazard to employees which might be encountered during their work, or to any other person who might be affected by their operations.
- 2 Once those hazards have been identified, it is then the Contractor's duty to put control measures into place, either to remove the hazard or, where this is not possible, to reduce the risk of injury resulting from manual handling activities, as far as is reasonably practicable.
- 3 The Contractor must provide employees with comprehensible and relevant information on any (manual handling) risks that exist in the workplace and any control measures that are in place to reduce those risks.
- 4 Employees, in turn, have a duty under these Regulations to inform the Contractor of any work (manual handling) situation that presents a risk to themselves or others.

#### 1.2.7.4 Manual Handling Operations

- 1 These Regulations specify how Contractors have to deal with risks to the safety and health of employees who have to carry out manual handling in the course of their employment, as follows:
  - (a) Assess the manual handling task to identify any risk that may be inherent in the operation.
  - (b) Avoid the need to carry out manual handling as far as possible.
  - (c) Where a risk is identified, implement control measures to reduce that risk.
- 2 The requirements relevant to lifting and handling are described below.

##### **Contractor's duties**

- 3 Each Contractor shall, so far as is reasonably practicable, avoid the need for employees to undertake any manual handling operations at work, that involve a risk of their being injured; or where this is not reasonably practicable, each Contractor shall:
  - (a) make a suitable and sufficient assessment of all such manual handling operations to be undertaken by their employees.
  - (b) take appropriate steps to implement control measures, thereby reducing the risk of injury to those employees undertaking any manual handling operations, to the lowest level which is reasonably practicable
  - (c) take appropriate steps to provide any of those employees who are undertaking any manual handling operations with general indications and, where it is reasonably practicable to do so, precise information on:
    - (d) the weight of each load
    - (e) the heaviest side of the load whose centre of gravity is not positioned centrally.
- 4 Any assessment that a Contractor has made must be reviewed where:
  - (a) there is reason to suspect that it is no longer valid, or
  - (b) there has been a significant change to the manual handling operations to which that assessment relates.
- 5 Where changes to an assessment are required, as a result of any review, a Contractor shall make them.
- 6 When determining for the purposes of these Regulations whether manual handling operations at work involve a risk of injury, and to determine the appropriate steps needed to reduce that risk, particular regard shall be taken to check:
  - (a) the physical suitability of the employee to carry out the operation
  - (b) the clothing, footwear and other personal effects worn by the employee
  - (c) the employee's knowledge and training
  - (d) the results of any relevant risk assessment carried out
  - (e) whether the employee is within a group of employees identified by that assessment as being especially at risk
  - (f) the results of any health surveillance already carried out
- 7 Contractors must additionally:
  - (a) provide safe systems and places of work
  - (b) ensure the safety of their employees and, where possible, the absence of risks in the

handling, storage and transport of all types of articles and substances

- (c) provide the information, instruction, training and supervision necessary to ensure the health and safety of their employees.

#### **Employee's duties**

8 It is the duty of each employee, while at work, to:

- (a) make full and proper use of any system of work provided for use by the Contractor in connection with manual handling.
- (b) Use any machinery or equipment provided by the Contractor in accordance with any training or instruction received.
- (c) Inform the Contractor, or anyone else responsible for safety, of any dangerous work practice or shortcomings in the Contractor's arrangements for safety.

#### **1.2.7.5 Construction (Design and Management) CDM**

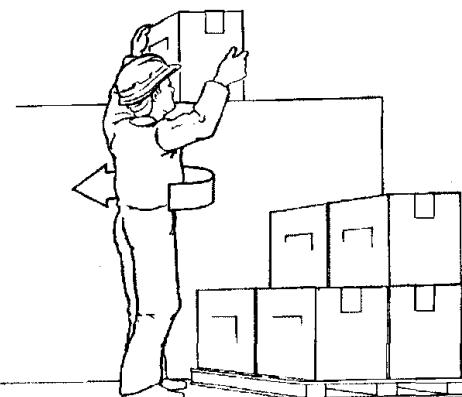
1 Designers have the potential to minimise the amount of manual handling that is necessary during any construction project and therefore the injuries that might arise from it. Examples of how this might be achieved are:

- (a) designing site layouts such that 'double handling' is eliminated and manual handling distances are minimised
- (b) incorporating mechanical lifting points into components that would otherwise have had to be manually handled into place
- (c) taking advantage of technological advances by specifying modern components made from lighter material
- (d) ensuring that designs allow for adequate access for construction plant, such as excavators and dumpers, where excavation work and other earth-moving activities are necessary.

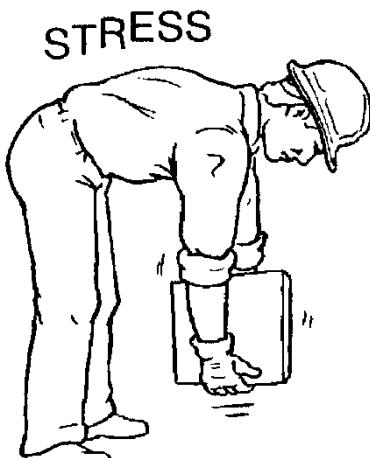
#### **1.2.7.6 Common injuries**

1 **Strains and sprains to muscles and joints, torn ligaments and tendons, disc trouble and hernias.** These are often caused by sudden and awkward movements, for example, twisting or jerking while lifting, or handling heavy loads. They are also caused by persons attempting to lift loads beyond their physical capabilities. The muscles of the abdominal wall are particularly vulnerable, and excessive strain may lead to ruptures.

- (a) Cuts and abrasions from rough surfaces, sharp or jagged edges, splinters, projections, etc. Personal protective equipment and clothing should be worn as necessary, such as leather gloves to protect the hands.
- (b) Back injuries are most frequently sustained while lifting and handling manually. They may be the cumulative effect of repeated minor injuries, or the result of an abrupt strain. Stoop lifting (see below) should be avoided; it greatly increases the chances of sustaining back injuries.



- 2 The risk of injury is reduced by a knowledge of correct lifting techniques and by not attempting to lift excessively heavy loads without assistance.



**Stoop lifting**

- (a) **Crushing of limbs**, etc. by falling loads, or by fingers, hands or feet becoming trapped by loads.
- 3 Correct positioning of hands and feet in relation to the movement of the load is essential. Timber wedges or other blocks should be used when beginning to raise or lower heavy loads to enable a secure grip to be achieved and to prevent fingers and hands becoming crushed when lowering the load. Safety shoes with steel toecaps will protect the feet. Soles of footwear should also provide a secure grip.

#### **1.2.7.7 Making an assessment**

- 1 Completing the assessment is the Contractor's responsibility. Expert help may be needed in difficult or unusual cases.
- 2 Often assessments can be done by a team of people and, although employees should not make their own assessments, their involvement will often be beneficial.
- 3 A Contractor should make provision for properly trained manual handling assessment teams, but if there are special difficulties and it is decided to call in outside assistance, the Contractor should ensure that the person engaged is competent to make the type of assessments required and that clear instructions are given.
- 4 The wide range of manual handling tasks that arise on every building and construction site need to be fully identified. This should be systematically carried out by looking at individual tasks and the way in which they are carried out.
- 5 By grading these factors, e.g. low/medium/high, the assessor will be able to more clearly identify the overall risk.
- 6 Whilst carrying out the assessment, the assessor should consider ways of reducing any risk found.
- 7 An assessment should not just be a paper exercise but should be used to pinpoint the unsafe features of the work task, so that the Contractor may improve the situation, by implementing control measures.
- 8 It is quite acceptable to group any manual handling tasks which have common features into a single manual handling assessment, but care must be taken to ensure that the range of risks is common to all tasks covered by the single risk assessment. However, when taking this

approach, it can be tempting to make a task fit the assessment rather than make the assessment fit the task. The important thing is to identify any risk of injury, and then point the way to practical improvements.

- 9 Significant findings should be recorded and kept, but this is not necessary if the findings are obvious and the assessments easily repeated.

### 1.2.7.8 Lifting capacities

- 1 The weight that can be lifted by any individual will vary according to personal physique, age, condition and practice, and the techniques employed. Lifting capacity declines with age and an older person may not be capable of lifting the same load as a younger person; this, however, can be offset to some extent by employing a better technique.
  - 2 The general rule is that the load should not be lifted if it causes a feeling of strain. Assistance should be available if required, and employees must not be required to lift loads beyond their capacity.
  - 3 Youthful exuberance and bravado often tempt younger employees to attempt to lift loads that are too heavy. While they may succeed in the short term, long-term damage may be done to the ligaments, muscles and back.
  - 4 If single person handling is needed, either blocks or other materials of 20 kg or lighter should be specified and used, or other precautions should be implemented to reduce the risk by, for example, the provision of mechanical handling.
  - 5 With blocks or other materials weighing less than 20 kg, manual handling risks are still significant and suitable precautions should be taken to minimise these risks as much as possible.

#### 1.2.7.9 Abdominal belts

- Research has shown that abdominal belts do not necessarily prevent manual handling injuries and may, in some cases, make things worse.

#### **1.2.7.10 Preparing to lift**

- 1 Before **LIFTING** and handling any load, the following points should be established:

  - (a) What has to be moved?
  - (b) Does it really have to be moved?
  - (c) What does it weigh?
  - (d) Can it be broken down into smaller loads?
  - (e) Can the process that requires it to be moved be changed?
  - (f) Where is the load's centre of gravity?
  - (g) Can it be safely handled by one person?
  - (h) Will assistance be required?
  - (i) Can the move be carried out more safely with mechanical assistance?
  - (j) How far does it have to be moved and from where to where?
  - (k) Is the route clear of obstructions?
  - (l) Can it be put down safely?

2 Suitable protective clothing should be worn. This may include gloves, safety footwear, safety helmets, and special overalls if hot or corrosive substances are to be carried.

- 3 Ensure that the lifting and lowering areas are clear of tripping hazards, and likewise check the route over which the load is to be carried.

#### 1.2.7.11 The load

- 1 Large, heavy loads should, if possible, be broken down into smaller, lighter and more manageable sizes. It is obviously easier to lift 10 kg five times than to try and lift 50 kg once.
- 2 Where the load has to be moved by a woman, the weight should be reduced by approximately 30%.
- 3 As a rough guide, where lifting is repetitive, weights should be reduced as follows:

Special factors in operation	Rough guide
Operation repeated once or twice a minute	Reduce weight by 30%
Operation repeated five to eight times a minute	Reduce weight by 50%
Operation repeated more than 12 times per minute	Reduce weight by 80%
'Average' female	Reduce weight by 30%
Handler twists through 45 degrees	Reduce weight by 10%
Handler twists through 90 degrees	Reduce weight by 20%
Handler seated and twisting	Less than 5 kg
Handler seated	About 5 kg
Pushing or pulling a load (assuming that force is applied with hands between knuckle and shoulder height)	About 25 kg for starting or stopping a load About 10 kg for keeping a load in motion

- 4 The size and shape of a load may be as significant as its weight in determining whether assistance is required. Large awkward loads, which require the arms to be extended in front of the body, place more strain on the back and abdomen than compact objects carried close to the body.
- 5 The absence of natural or designed handling points can also make it difficult to raise and carry objects without strain and may require barrows or other lifting and handling aids.
- 6 Not all loads need to be carried, of course. It may be easiest to roll or push them, depending on the contents. Even so, assistance might still be required to avoid the risk of injury.



### 1.2.7.12 Kinetic method of lifting

- 1 Kinetic handling must be taught by trainers. It cannot be 'picked up'. It is important that postural errors are corrected during training before bad habits are established.
- 2 The main features of this method are that it:
  - (a) utilises the strong leg and thigh muscles - not the weaker back muscles as in stoop lifting
  - (b) maintains the natural shape of the spine throughout the lift. Although the body may be bent over, the spine remains straight
  - (c) uses the momentum of body weight to initiate forward movement.
- 3 The correct posture (such as the position of various parts of the body) in performing a task is essential. Important points are:
  - (a) correct position of feet
  - (b) knees bent
  - (c) straight back
  - (d) arms close to body for lifting and carrying
  - (e) correct grip or hold
  - (f) chin in, head up
  - (g) use of body weight.
- 4 Some lifting and handling techniques employing the kinetic method are described on the next page.

#### Bend at the knees (1)

- 5 The weight to be lifted must be within the lifting capacity of the individual worker and the load should be approached squarely, facing the intended direction of travel. The feet are positioned about a hip's width apart, one foot **SLIGHTLY** in front of the body. The knees are bent and the body lowered as close to the load as possible while remaining relaxed and balanced. The back should be straight from hips to shoulders, but not necessarily vertical.

#### Grasp the load (2)

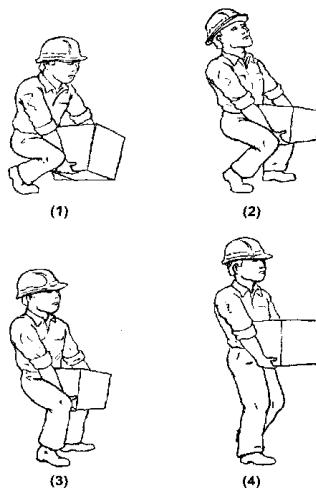
- 6 The load is tilted with one hand (if necessary) so that the other hand can obtain a secure grip at the corner nearest the body. The free hand is then transferred to the furthest corner of the load and drawn as close to the trunk as possible. Arms should be well tucked in to provide maximum support to the load.

#### Lift, using the legs (3)

- 7 The load can then be lifted by straightening the legs so that the body and load move upwards in unison. All movements should be smooth and natural. Jerking, twisting or straining movements should be avoided.
- 8 Lifting should feel comfortable. Lifting movements will remain smooth and natural providing the back and head are kept naturally erect. This is achieved by looking straight ahead when straightening the legs, instead of looking down at the load.

**Carrying the load (4)**

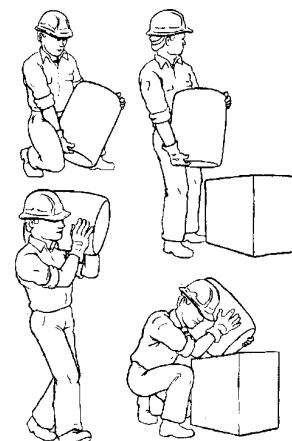
- 9 The load should be held firmly into the body and carried to where it is to be deposited. The closer the centre of gravity of the load can be kept to the body, the easier and more natural the lift. It is important to be able to see over or around the load so as to avoid tripping hazards.
- 10 When the weight is approaching the maximum lifting capacity of the individual, it will be necessary to lean back on the hips with the load to bring the trunk to the erect position before straightening the legs to lift the load. In this instance the body is being used simply as a counterbalance to keep muscular effort to a minimum.

**1.2.7.13 Changing grip**

- 1 Grips should not be changed while carrying the load. First rest the load on a ledge or other firm support, then change the grip if necessary.

**1.2.7.14 Stacking**

- 1 Loads should not be lifted above shoulder height. When it is impossible to lift and stack with the elbows tucked into the sides of the body, a platform should be used to stand on. An intermediate platform should also be used when lifting loads down from a higher level.

**1.2.7.15 Use of a lifting platform**

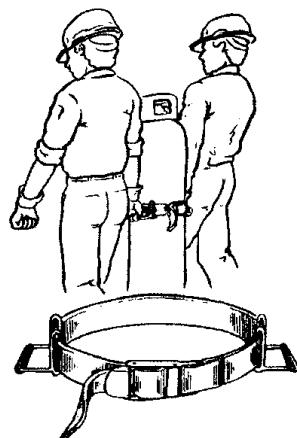
- 1 The squat position is adopted as near to the load as possible. Keeping a straight back and using the leg muscles, the load should be lifted onto a platform. The person lifting the load then stands as near to the platform as possible and, bending at the knees and hips (NOT the back), eases the load onto their shoulder, adjusts for balance and straightens at the knees and hips.
- 2 For lowering the load, the procedure is reversed.
- 3 Carrying a load under one arm, supported on the hip, causes strain and should be avoided.

**1.2.7.16 Hand hook or lifting aids**

- 1 Hand hooks or lifting aids should be used if loads are unwieldy or so irregular in shape that a good grip cannot be maintained. If hooks are being used, care must be taken to ensure that the contents of the load are not damaged.

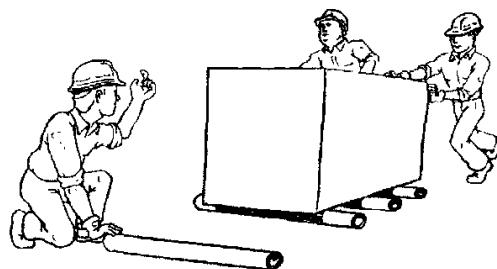
#### 1.2.7.17 Team lifting

- 1 When large or awkward weights are involved, assistance should be sought. The person assisting should be of similar height and build, so that the raised load does not become unbalanced or unevenly distributed.
- 2 Co-ordinating team activity is important in team lifting. One person should give directions during all lifting, carrying and lowering operations.
- 3 Properly designed lifting aids will enable some tasks to be performed more quickly and easily, and eliminate the risk of injury or damage.



#### 1.2.7.18 Using rollers to move a load

- 4 Lengths of steel pipe or proper rollers can be used to roll or slew heavy crates. The load is pushed gently forward on two or more rollers, and further rollers are inserted under the front end as necessary.
- 5 Care must be taken by the person placing the rollers to avoid being trapped as the load moves forward, and to ensure that those pushing do not trip over the rollers that have previously been used.



- 6 Whenever practical, mechanical handling and lifting should replace manual techniques. This will reduce the risk of fatigue, improve efficiency and reduce the risk of accidents.

**Construction Site Safety****1.2.7 Appendix 1****Safety checklist****Manual handling and lifting****Preparation**

- 1 What is being lifted?
- 2 Where to and how far?
- 3 Has a manual handling risk assessment been carried out?
- 4 Would mechanical means be more practical or appropriate?
- 5 Is the operation part of a routine? If so, could it be more effectively planned and executed?
- 6 How many people will be needed to move the load safely?
- 7 Are they all trained in kinetic lifting and handling?
- 8 Are proper (kinetic) lifting methods being employed?
- 9 What methods and equipment will be required?
- 10 Is the required equipment available?
- 11 Is the lifting and handling area clear of hazards?

**Lifting and handling**

- 12 Is the proper personal protective clothing in use?
- 13 Is co-ordination satisfactory in dual and team lifting with one person taking charge of the lift?
- 14 Is the necessary equipment in use or to hand?
- 15 Are excessively heavy weights being lifted?
- 16 Are loads being deposited or stacked safely and securely?
- 17 Is adequate supervision employed where necessary?

**After lifting and handling**

- 18 Are any incidents or accidents reported and recorded?
- 19 Where injuries have been sustained, has medical attention been sought?
- 20 Is the damage or loss of equipment recorded?

**Construction Site Safety****1.2.7 Appendix 2****Manual handling of loads: Assessment checklist****Section A - Preliminary**

Task name: Task description:  Load weight: Frequency of lift:  Carry distances (if applicable):  Are other manual handling tasks carried out by these operators? Assessment discussed with employees/safety representatives	Is an assessment needed? (An assessment will be needed if there is a potential risk of injury, eg if the task falls outside the guidelines) Yes/No*        * Circle as appropriate
--	--

**If 'Yes' continue. If 'No' the assessment need go no further.**

Operations covered by this assessment (detailed description):   Locations:   Personnel involved:   Date of assessment:	Diagrams (other information including existing control measures):
---	---

**Overall assessment of the risk of injury?**

Low/ Medium/ High\*

\* Circle as appropriate

Make your overall assessment **after** you have completed Section B.

**Section B: Lifting and carrying - More detailed assessment, where necessary**

Questions to consider:	If yes, tick appropriate level of risk			Problems occurring from the task (Make rough notes in this column in preparation for the possible remedial action to be taken)	Possible remedial action e.g. changes to be made to the task, load, working environment etc. Who needs to be involved in implementing the changes?
	Low	Med	High		
Do the tasks involve:					
• holding loads away from trunk?					
• twisting?					
• stooping?					
• reaching upwards?					
• large vertical movement?					
• long carrying distances?					
• strenuous pushing or pulling?					
• unpredictable movement of loads?					
• repetitive handling?					
• insufficient rest or recovery?					
• a work rate imposed by a process?					
Are the loads:					
• heavy?					
• bulky/unwieldy?					
• difficult to grasp?					
• unstable/unpredictable?					
• intrinsically harmful (eg sharp/hot)?					

**Section B: Lifting and carrying - More detailed assessment, where necessary**

Questions to consider:	If yes, tick appropriate level of risk			Problems occurring from the task (Make rough notes in this column in preparation for the possible remedial action to be taken)	Possible remedial action e.g. changes to be made to the task, load, working environment etc. Who needs to be involved in implementing the changes?
	Low	Med	High		
Consider the working environment - are there:					
• constraints on posture?					
• poor floors?					
• variations in levels?					
• hot/cold/humid conditions?					
• strong air movements?					
• poor lighting conditions?					
Consider individual capability - does the job:					
• require unusual capability?					
• pose a risk to those with a health problem or a physical or learning difficulty?					
• pose a risk to those who are pregnant?					
• call for special information/training?					

**Section B: Lifting and carrying - More detailed assessment, where necessary**

Questions to consider:	Yes/No	Problems occurring from the task (Make rough notes in this column in preparation for the possible remedial action to be taken)	Possible remedial action e.g. changes to be made to the task, load, working environment etc. Who needs to be involved in implementing the changes?
<b>Other factors to consider</b>			
<b>Protective clothing</b>			
<ul style="list-style-type: none"><li>• Is movement or posture hindered by clothing or personal protective equipment?</li></ul>	Yes/No		
<ul style="list-style-type: none"><li>• Is there an absence of the correct/suitable PPE being worn?</li></ul>	Yes/No		
<b>Work organisation (psychosocial factors)</b>			
<ul style="list-style-type: none"><li>• Do workers feel that there has been a lack of consideration given to the planning and scheduling of tasks/rest breaks?</li></ul>	Yes/No		
<ul style="list-style-type: none"><li>• Do workers feel that there is poor / communication between managers and employees (eg not involved in risk assessments or decisions on changes in workstation design)?</li></ul>	Yes/No		
<ul style="list-style-type: none"><li>• Are there sudden changes in workload, or seasonal changes in volume without mechanisms for dealing with the change?</li></ul>	Yes/No		
<ul style="list-style-type: none"><li>• Do workers feel they have not been given enough training and information to carry out the task successfully?</li></ul>	Yes/No		

**Section C - Remedial action to be taken**

Remedial steps that should be taken, in order of priority:	Person responsible for implementing controls	Target implementation date	Completed Y/N
1			
2			
3			
4			
5			
6			
7			
8			
9			
Date by which actions should be completed:			
Date for review of assessment:			
Assessor's name:	Signature:		

**TAKE ACTION ... AND CHECK THAT IT HAS THE DESIRED EFFECT**

## 1.2.8 Asbestos in the Workplace

### 1.2.8.1 Key points

- 1 Asbestos is the name given to a group of naturally occurring minerals that are resistant to heat and corrosion. Asbestos has been used in products, such as insulation for pipes (steam lines for example), floor tiles, building materials, and in vehicle brakes and clutches.
- 2 Asbestos is often encountered during the removal of asbestos materials due to renovation, repairs, or demolition.
- 3 **Breathing asbestos fibers will cause diseases such as asbestosis, cancer of the lung, and other diseases such as mesothelioma - all of which are disabling and fatal.**
- 4 Before any work with asbestos is carried out a written risk assessment must be made.
- 5 A written, site specific plan of work must be kept on site and followed.
- 6 Anyone who does any work with asbestos must be specifically trained and competent to do it, and this training must be repeated annually.

*Note: Section 1, Part 9 of the QCS covers manual handling of materials.*

### 1.2.8.2 Introduction

- 1 The key is a **RISK** assessment, which needs to be carried out by someone who is competent in terms of:
  - (a) working with asbestos
  - (b) the requirements of these Regulations
- 2 Asbestos is a risk to health when airborne fibres are breathed in. The greater the number of fibres, and the longer the period over which they are breathed in, the greater the risk of incurable asbestos-related diseases developing. These include cancers in the lungs and chest lining.
- 3 However, asbestos that is in a good condition, which is not damaged and is not likely to be worked on or disturbed, does not pose any immediate problem.
- 4 Although asbestos building materials and products have been largely replaced by safer alternatives, there remains the issue of the ongoing and long-term management of existing asbestos where its removal is not practicable.
- 5 Locating and identifying asbestos containing materials (ACMs) can be difficult, as its appearance may be changed by surface coatings, heat or ageing. It may also be encapsulated by, or be concealed beneath, other materials. Past uses of asbestos include:

#### **Insulation and sprayed coatings using moulded or pre-formed lagging**

- 6 boilers, plant and pipework
- 7 fire protection to steel work
- 8 thermal and acoustic insulation of buildings, including loose packing

#### **Insulation board**

- 9 fire protection to doors
- 10 claddings on walls and ceilings

- 11 partitioning
- 12 ceiling tiles
- 13 fire breaks in ceiling voids

#### **Asbestos cement**

- 14 corrugated roof sheets
- 15 flat sheets for cladding and partitions
- 16 roof and rainwater drainage goods
- 17 underground pipes
- 18 bath panels
- 19 artificial roof slates

#### **Other uses**

- 20 vinyl or thermoplastic floor tiles
- 21 insulation of electrical equipment
- 22 some textured coatings
- 23 bakelite sanitary ware, and other products.
- 24 Asbestos-based friction materials were widely used in brake and clutch linings in vehicles and plant, together with gaskets and packing in engines and heating or ventilation systems. Substitute materials have been developed in most cases.

#### **1.2.8.3 Types of asbestos and its identification**

- 1 Asbestos is a naturally occurring fibrous silicate mineral material, which does not burn and is resistant to most acids and alkalis. The fire protection and insulative properties of asbestos were the main reason for its use over the years. Three main types of asbestos have been used in the construction industry:
  - (a) chrysotile (white)
  - (b) amosite (brown)
  - (c) crocidolite (blue).
- 2 Although the colours are often used to differentiate between the different types of asbestos, the actual colour of a material suspected of being asbestos is not necessarily an accurate indication as to whether or not it is asbestos or an asbestos-containing material, or if it is, of what type.
- 3 Changes in colour may occur due to:
  - (a) it ageing or simply becoming dirty
  - (b) the effects of heat
  - (c) surface coatings being applied
  - (d) encapsulation
  - (e) oil or chemical splashes.

- 4 The type of asbestos used in the lagging of boilers can be particularly difficult to identify visually. Repairs and modifications can mean that boilers or pipework may be lagged by a mixture of different types of asbestos.
- 5 Asbestos was widely used as fire protection in building materials, for thermal insulation and also as a sprayed coating to steel structural members. All of these uses now present significant management issues associated with the maintenance of the asbestos over the remaining life span of the building, or the removal of the asbestos during renovation, refurbishment or demolition.
- 6 Working with, among, or alongside asbestos materials demands stringent control, and compliance with recommended precautionary measures and methods of work.

#### 1.2.8.4 Control of Asbestos

- 1 **Risk assessment** - an assessment of risk carried out by someone with both the theoretical background and practical experience of the intended work with asbestos-containing materials.
- 2 While a competent construction manager may be able to form an opinion as to whether a material may be asbestos or an asbestos-containing material, the decision as to who can do the work, and the standards that the work should be carried out to, are likely to require specialist advice.
- 3 If you are a contractor working on someone else's premises, you should be given information about the presence of asbestos and what they expect you to do about it. **If you are not given this, you should not start work.**
- 4 **Note 1.** This requires a survey by a competent person. If representative samples are needed for laboratory analysis, this may well be a task for a competent technician. Where multiple samples are taken, each sample and the sample point should be numbered. If samples are being sent for analysis, it is a requirement that any laboratory carrying out analysis has the necessary facilities, expertise and quality control procedures. Any samples should be well sealed, for example inside two zip lock plastic bags.
- 5 **Note 2.** If in doubt presume that the material is asbestos or ACM until you can prove that it is not. It is better to 'overprotect', than to expose employees and others to asbestos.
- 6 **Note 3.** A plan of the premises showing where the materials are will always be extremely useful, and will be essential in larger premises. Such a plan would form an integral part of the ongoing management of the asbestos or ACM.
- 7 **Note 4.** A risk assessment should be undertaken by a competent person who has sufficient knowledge of the subject.
- 8 If the materials are in good condition, not liable to be damaged, and will not be disturbed or worked on, then the risk is probably low. If the materials are flaky, crumbling, in a place where they can be damaged by, for example, forklift trucks, then the risk is high. Given the known ill health caused by asbestos, then a high risk of damage calls for urgent actions.
- 9 **Note 5.** This could be work by your employees, or any contractors or subcontractors brought in for carpentry, flooring, partitioning, ceiling fixing, plumbing, electrical or other work.
- 10 **Note 6.** If material is not going to be removed by an asbestos removal contractor, consider how you are going to manage the long-term presence of the asbestos. If it is in good condition and not liable to be damaged, then routine inspection and monitoring may be enough if records are kept. A sealing coat may be needed, or other protective works necessary, to lower and to further control the risk.
- 11 **Note 7.** Make it happen by putting your plan into action. What is the organisation, what are the arrangements for the implementation of the plan and who has the responsibility?

- 12 **Note 8.** A regular review of the action plan will ensure that it is working that the control measures are still effective, and that inspection, monitoring and recording are in fact taking place. It may be the case that procedures, notices and policies that have been in place for a length of time tend to be overlooked. A fresh approach may therefore be needed.
- 13 **Note 9.** Part of this information will be the signs that will have been placed to identify the asbestos or ACM. In a large workplace or premises, this may also mean keeping a register that describes every individual room or workplace and the asbestos or ACM that is in there. This means that visiting subcontractors can be told exactly what asbestos or ACMs to expect in the areas in which they will be working.
- 14 These Regulations also impose duties on Contractors for the protection of employees who may be exposed to asbestos at work, and other persons affected or who may be at risk of being affected by such work.

#### 1.2.8.5 Representative sampling

- 1 To confirm or identify the type of asbestos or ACM on the premises, a series of samples may have to be taken for laboratory analysis. Methods employed in taking samples of asbestos will vary according to its type and location. Guidance on taking samples is available in the UK publication MDHS100.
- 2 Anyone removing samples for analysis must be competent to do so and use appropriate protective clothing and respiratory equipment, particularly if the work involves cutting, boring, drilling or otherwise creating airborne dust or fibres. Precautionary measures to be observed include:
  - (a) no people, other than those taking the sample, to be in the area
  - (b) the area from where the sample is to be taken should be dampened using a 'killer spray'
  - (c) a knife, core borer or hand drill should be used to place the sample in a suitably labelled, scalable container. Do not use any tools that will create airborne fibres
  - (d) other surfaces on which asbestos dust may fall should be covered with an impervious sheet. The area should be subsequently cleaned by using a dustless method, e.g. a damp cloth, which should be disposed of in a sealed polythene bag
  - (e) any disturbed or damaged surfaces should be sealed after a sample has been taken.
- 3 The results of the analysis will determine what action should be included in the management plan.

#### 1.2.8.6 Asbestos surveys

- 1 All asbestos surveys must be carried out by a competent person who can demonstrate the following:
  - (a) evidence of their training and experience in such work
  - (b) types of survey outlined below they are qualified to carry out
  - (c) that they are going to carry out the survey in accordance with the HSE guidance MDHS100
- 2 If an individual surveyor is to be appointed, a check should be made as to whether they have personnel certification for asbestos surveys from a certification body which has been approved by a recognised accreditation body under the standard ISO 17024,
- 3 All surveys should be subject to a quality assurance process. It is important to note that ISO 9000 accreditation is not the correct standard for assessing asbestos surveys. ISO 17020 is the relevant standard.
- 4 The competence schemes are:

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(a)	The United Kingdom Accreditation Service UKAS. This is accreditation by the United Kingdom Accreditation Service against ISO 17020, and is normally held by an organisation such as the surveying division of a licensed contractor or an asbestos laboratory. <a href="http://www.ukas.org.uk">www.ukas.org.uk</a>	
(b)	National Individual Asbestos Certification Scheme (NIACS) is a scheme jointly run by the Asbestos Removal Contractors Association and the Royal Institute of Chartered Surveyors. It accredits individual surveyors. <a href="http://www.niacs.org.uk">www.niacs.org.uk</a>	
(c)	Asbestos Building Inspectors Certification Scheme (ABICS) is a scheme run by the British Occupational Hygiene Society. It also accredits individual surveyors. <a href="http://www.bohs.org/standardTemplate.aspx/Home/Professional/ABICS">www.bohs.org/standardTemplate.aspx/Home/Professional/ABICS</a>	
5	A UKAS or equivalent laboratory should have carried out all analysis of asbestos samples.	
6	Three types of survey are defined within HSE's publication MDHS 100:	
(a)	<b>Type 1</b> - presumptive survey - during which the surveyor does not take any samples. Instead, using their skill and judgement alone, the surveyor identifies materials as containing asbestos or not. The survey is of the asbestos risks that the building poses to its occupants in normal use.	
(b)	<b>Type 2</b> - sampling survey - the surveyor makes use of sampling and subsequent laboratory analysis to confirm whether or not a material contains asbestos. The survey is of the asbestos risks that the building poses to its occupants in normal use.	
(c)	<b>Type 3</b> - invasive survey - the surveyor samples and breaks into the structure and fabric of the building to try to find the asbestos-containing materials, before a contractor does so in the course of their work.	
7	Anyone applying the results of a survey should initially check if the surveyor has written any caveats on the survey. It is common to exclude access to areas which are over 3 metres above ground level, as it is not possible for a single surveyor to safely use a ladder higher than this because they cannot foot it. There may be other areas that have not been accessed.	
8	Asbestos surveyors are taught to identify the 'spaces' where asbestos is likely to be found and to survey accordingly. The meaning of 'spaces' can be anything from a boiler room, to a roof void, an office, an underground duct, a cavity between the two leafs of a wall or anywhere else that asbestos or an asbestos-containing material might have been used.	
9	A 'no access' comment on an asbestos report could be simply because:	
(a)	the door of a room was locked and the surveyor could not gain entry	
(b)	the 'space' was an underground duct and a mini digger was required to lift the covers	
(c)	a suspended floor had no access other than by destroying the floor	
(d)	the electrical system being live during the survey.	
10	To understand the difference between a Type 2 and Type 3 survey, the simplest explanation is to consider a studwork wall which forms a firebreak. It was originally covered in asbestos insulation board and then covered over with plasterboard. In a Type 1 and Type 2 survey, the surveyor would correctly identify the outer surface as being plasterboard.	
11	During these surveys there would be no need to carry out any invasive testing and therefore the asbestos insulation board lies undiscovered. Type 3 surveys would be invasive and the surveyor would be expected to check under the plasterboard for other materials. In the previous case, if a building contractor only commissioned a Type 2 survey upon which to plan their work, they may find the asbestos insulation board unexpectedly. Invasive checks must be made before invasive work is carried out.	
12	Just because the surveyor did not find any asbestos does not mean that there is no asbestos present. In all cases it is important to remember that surveying is as much an art as a science and there will be mistakes. There are also some asbestos-containing materials which would	

only be found by luck rather than judgement, for example, asbestos cement shuttering in a slab, or asbestos insulation board used as packers inside a stud work wall. It is important to be wary of unidentified building products and for everyone to have sufficient asbestos awareness training. There should also be management who are in a position to stop work if necessary and question the presence of any 'funny looking plasterboard' found.

### 1.2.8.7 Working with asbestos

#### Requirements of the Regulations

- 1 A Contractor who carries out any work in a building or structure is required to:
  - (a) make a suitable and sufficient assessment as to whether asbestos is, or is liable to be, present in the premises where work is being carried out. Under CDM, the client has a duty regardless of the size of the project to provide information such as the presence of asbestos
  - (b) note that:
    - (i) this information should normally be in the form of Type 3 surveys as defined in the HSE publication MDHS 100 for most invasive construction work
    - (ii) any information on the presence of asbestos supplied by the client based upon a Type 2 survey, must be closely scrutinised to ensure that the construction work will not disturb more of the structure than the surveyor checked
- 2 identify that the material does not contain asbestos or assume it contains brown or blue asbestos
- 3 ensure that a competent person carries out an assessment to decide the likely exposure for the proposed work methods.
- 4 prepare a suitable written plan of work
- 5 provide adequate information, instruction and training, for employees and others
- 6 ensure that training is repeated on an annual basis for any work with asbestos
- 7 prevent or reduce asbestos exposure to the lowest level reasonably practicable by means other than the use of respiratory protective equipment (RPE), for example use an asbestos H class vacuum cleaner or other fibre suppression techniques
- 8 ensure the proper use of respiratory protective equipment and that face-fit testing is carried out
- 9 maintain respiratory equipment in a clean, efficient state, good order and repair. Regularly examine and test exhaust ventilation equipment
- 10 provide adequate and suitable protective clothing and ensure that it is cleaned or disposed of appropriately
- 11 prevent the spread of asbestos from the workplace
- 12 ensure premises and plant involved in work with asbestos are kept clean
- 13 monitor the air where employees are exposed to asbestos and keep suitable records for a specific period
- 14 ensure that air monitoring is only carried out by a UKAS or equivalent accredited laboratory
- 15 provide washing and changing facilities that are adequate and suitable for employees exposed to asbestos, and storage for protective clothing and personal clothing (not worn during working

### **Asbestos areas and respirator zones**

- 16 Where an asbestos removal contractor is undertaking the removal of asbestos, in order to ensure that people other than those involved in asbestos work are not exposed to asbestos by entering 'asbestos areas', such areas should be designated and clearly identified, using notices.
- 17 Areas where the removal contractors are working, and where control limits for exposure to airborne fibres are liable to be exceeded, will be designated as respirator zones to ensure that only removal contractors wearing respiratory protective equipment are allowed to " enter.
- 18 Contractors with asbestos removal contractors on their premises should strictly prohibit entry into these areas by their own employees.

### **Medical surveillance**

- 19 Asbestos removal contractors must ensure that their employees, who are liable to be exposed to asbestos, are under regular medical surveillance by an employment medical adviser or appointed doctor.
- 20 Medical examinations should be provided before work with asbestos starts and at prescribed periods thereafter, currently every two years.
- 21 Health records containing information on medical examinations have to be maintained and kept for 40 years after the date of the last entry.

### **Washing and changing facilities**

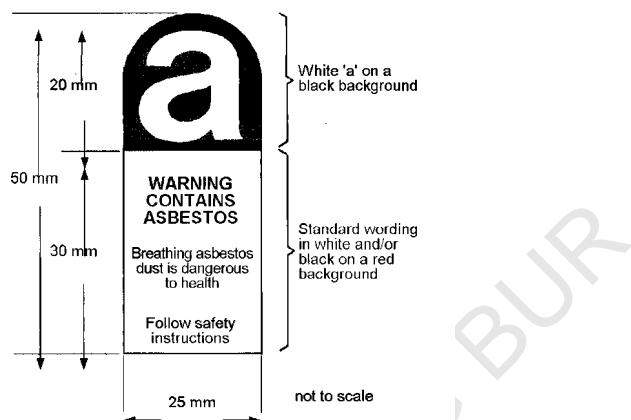
- 22 Asbestos removal contractors must provide adequate and suitable washing and changing facilities for their employees. Where protective clothing and respiratory equipment are in use, storage must be provided for contaminated items.
- 23 Separate storage must be provided for personal clothing not worn during working hours.

### **Storage, dispatch, labeling of asbestos waste**

- 24 Asbestos waste is considered to be of two types - combined or fibrous. Combined was previously called bonded and effectively the asbestos is well bound into the material. Roofing felt, vinyl floor tiles and most asbestos cement is categorised as combined. Asbestos insulation board, pipe lagging and sprayed coating are fibrous. Professional advice may be needed to ensure that the waste is correctly categorised.
- 25 There is no requirement to bag or wrap asbestos cement sheets, or gutters removed externally, where they can be placed straight into a suitable skip. The skip should be secured if it is left overnight. It is good practice to bag or wrap waste from internal work to guarantee that when the waste is carried outside there will be no asbestos debris dropped. If a van is being used to carry asbestos waste, the material must be double bagged and the bags secured by putting them in a lidded bin, for example.
- 26 Any fibrous asbestos removed should be sealed in proper containers and correctly marked before despatch. Typically, this will be double-bagged with the inner bag being red and the outer clear.
- 27 Containers should be designed and constructed so as to retain the asbestos without any spillage or loss during normal handling.

**Labelling of asbestos waste and used protective clothing**

- 28 Where the asbestos removal contractor uses labels on waste or removed asbestos, the label must be clearly and indelibly printed so that the words in the lower half can be easily read. These words must be printed as specified in the diagram.
- 29 The label has to be firmly affixed to the packaging using an adhesive type label, or directly printed onto the packaging (plastic bag).

**Labelling requirement****Disposal of removed asbestos**

- 30 In essence, there is a duty of care put on everyone in the waste disposal chain. Clients, whether they are at work or domestic, have a responsibility to ensure that the waste is disposed of correctly. They can be prosecuted if the waste is fly tipped. Where asbestos has been removed as part of a project, a prudent contractor would ensure that proof of disposal formed part of the information that was given to the client.

**Other aspects**

- 31 Concerns regarding aspects of health and safety that are often associated with working with asbestos, such as working at height, the risk of fire, working in confined spaces, the use of machinery, burning, cutting and lifting. It is important not to view asbestos as a hazard in isolation.

## Construction Site Safety

### 1.2.9 The Control of Gases, Vapours, Mists, Dust and Fumes

#### 1.2.9.1 Key Points

- 1 The inhalation of dust or fumes has the potential to cause severe respiratory illness.
- 2 Asbestos fibres and lead dust are particularly hazardous if inhaled.
- 3 The dust of some types of wood can be irritating to the skin.
- 4 The creation of airborne dust or fumes should ideally be prevented although this is often not possible in a construction site environment.
- 5 Where the prevention of dust or fumes is not possible, the extent of exposure must be controlled to a level that is safe.
- 6 Control of dust can be achieved by:
  - (a) extraction of dust and fumes through stand-alone extractor units
  - (b) collection of dust in 'collector bags' attached to powered hand tools
  - (c) wet cutting of solid materials such as thermal blocks, bricks or ceramic tiles
  - (d) where practical, carrying out of work activities in the open air rather than in enclosed spaces.
- 7 Hazardous fumes usually result from:
  - (a) processes in which materials are heated, such as welding, lead burning or grinding
  - (b) uncontrolled use of substances such as solvents and adhesives
  - (c) the use of equipment and plant powered by internal combustion engines.

Note: Section 1, Part 15.2.3 of the QCS covers the control of dust.

#### 1.2.9.2 Introduction Inhalation

- 1 The exposure of employees to airborne dust or fumes can result in severe respiratory illnesses, such as occupational asthma. Such diseases can be totally disabling, causing those affected to give up work or change their employment. Exposure of the skin to some hazardous dusts can result in severe irritation and ulceration of the affected areas.

#### 1.2.9.3 Dust Inhalation

- 1 Dust is the name for a mix of tiny solid particles. It consists of a wide mix of components. In the construction context, the mix will reflect the work activities.
- 2 It is widely known that almost any excess levels of dust can cause health problems. Harmful effects range from simple skin irritation to severe respiratory illness.
- 3 Not all harmful dusts are visible. Dusts that are too fine to be seen by the naked eye are the cause of many serious health problems. Like most occupational health problems, it can take several years for symptoms of ill health to manifest themselves.
- 4 Skin irritation, dermatitis and ulceration can be caused by contact with some types of dusts. Other types of dust, being soluble, may be absorbed through the skin via cuts and abrasions.
- 5 The inhalation of dust can cause wheezing, coughing, breathlessness, bronchitis, nasal and other types of cancer. Dust also contains bacteria and viruses and therefore has the potential to cause stomach disorders. These can result from ingesting airborne dust or from eating food with contaminated hands.

- 6 Such problems are not likely to arise if occupational exposure limits are not exceeded and safe systems of work are maintained.
- 7 The inhalation of any dust will eventually cause respiratory problems especially if it contains materials such as lead, silica and/or asbestos. Inhalation of dust will contribute to such conditions as asthma, bronchitis, pneumoconiosis and certain types of lung cancer. Some dusts cause an allergic reaction where breathing problems are caused immediately after a dust is breathed in. As well as presenting a health hazard, some types of airborne dusts are also combustible.
- 8 Whenever practicable, the generation of dust should be eliminated, and where it cannot be eliminated it should be controlled by ventilation or extraction. The use of personal protective equipment by employees must be regarded as the very last resort when all other methods of control have been examined and found not to be practicable.
- 9 Respiratory protection (i.e. dust masks, respirators, etc.) with protection rating in accordance with the activity shall be provided to workers in order to prevent or reduce the inhalation of dust.
- 10 Workers shall be trained in the fit, use, and maintenance.
- 11 Medical grade masks are not effective protection against dust and shall not be used.

#### 1.2.9.4 Fumes

- 1 Hazardous fumes can be produced when some building materials are heated or otherwise worked. A common form of respiratory illness, which has flu-like symptoms, is caused by the inhalation of welding fumes. Other sources of hazardous fumes are:
- (a) uncontrolled exposure to liquid substances such as solvents or paints
  - (b) the use of equipment and plant which is powered by internal combustion engines.

#### 1.2.9.5 Health and Safety at Work (Construction Sites)

- 1 The relevant provisions are as follows.
- (a) Contractors must provide and maintain plant and systems of work that are safe and without risks to health.
  - (b) Contractors must make arrangements for safe handling, storage, and transport of articles and substances.
  - (c) Contractors must provide adequate information, instruction, training and supervision.
  - (d) Contractors have a duty to ensure persons not in their employment are not exposed to risks to their health and safety.
  - (e) Persons in control of premises must use the best practicable means to ensure that noxious or offensive substances do not enter the atmosphere
  - (f) Contractors must not charge an employee for personal protective equipment that is provided in accordance with statutory requirements relating to health and safety.
- 2 Employees have a duty to:
- (a) exercise reasonable care for their own health and safety and that of others who may be affected by their acts or omissions; to co-operate with their Contractor in enabling him or her to carry out his or her duties under the relevant statutory provisions
  - (b) not intentionally or recklessly interfere with, or misuse, anything provided in the interests of health, safety and welfare.

### 1.2.9.6 The Management of Health and Safety at Work

- 1 These Regulations place a legal duty on every Contractor to make a suitable and sufficient assessment of every work activity to identify any hazard that employees or any other person might encounter as a result of the work being carried out.
- 2 Once those hazards have been identified, it is then the Contractor's duty to put control measures in place to either eliminate the hazards or, where this is not possible, reduce the risk of injury or ill health resulting from those hazards, so far as is reasonably practicable.
- 3 Where a hazard is identified that requires it, the Contractor must offer appropriate health surveillance to employees. This must take into account all the risks to their health and safety that have been identified.
- 4 The Contractor must provide employees with comprehensible and relevant information on the risks that exist in the workplace and inform them of the control measures that are in place to reduce those risks.
- 5 Employees, in turn, have a duty under these Regulations to tell their Contractor of any work situation which presents a risk to the health and safety of themselves and to any other person who may be affected.
- 6 These Regulations require that Contractors assess the health risks to their employees arising out of exposure to hazardous dusts and fumes, and, if reasonably practicable, put control measures in place to eliminate the work processes and the use of substances that cause exposure. If this is not reasonably practicable, Contractors must:
  - (a) control exposure to an acceptable level, and
  - (b) inform employees of the hazards involved and the control measures in place
  - (c) mitigate the effects of any exposure by providing health surveillance where necessary.

### 1.2.9.7 Training

- 1 It should be noted that these Regulations place a legal duty on the Contractor to provide employees with adequate information, instruction, training and supervision to be able to carry out any work task safely and without risks to their health.

### 1.2.9.8 Respiratory / Inhalation Hazards

- 1 The following paragraphs describe the main respiratory hazards which may be encountered on site.
- 2 **Dusts** are produced when solid materials are broken down into finer particles. The longer that the dust stays in the air then the easier it is to breathe in. Airborne dust is usually respirable dust.
- 3 **Mists** are tiny liquid droplets formed by atomisation of the liquid, for example, when spraying or using an aerosol. Mists may be a combination of several hazardous substances.
- 4 **Metal fumes** occur when metal is vaporised at high temperatures, for example, when welding and gas cutting. The physical properties of fumes can be confusing, particularly when identifying suitable respiratory protective equipment (RPE). Usually, metal 'fume' is actually a solid particle by the time it is inhaled.
- 5 When welding is taking place the temperature of the metal at the weld is sufficiently high for the elements in the metal to become gaseous. However, 2-3 mm away from the weld the gases have cooled down sufficiently for the fume to solidify out as small particles.
- 6 Consequently, when purchasing RPE to protect against fume, a device that protects against

solid particles rather than gases is required.

- 7 **Gases** are airborne at room temperature and normally mix with the air that we breathe. Examples include propane, butane, acetylene, carbon monoxide and hydrogen sulphide. Gases can spread very quickly.
- 8 **Vapours** are the gaseous state of substances that are liquids or solids at room temperature. They usually form when substances evaporate.
- 9 One example is the vapour from a tin of glue or solvent that has been left open.

### 1.2.9.9 Exposure Limits

- 1 Exposure to any unlisted substance or general nuisance dust should be limited by reducing dust levels to the minimum reasonably practicable. These levels should not exceed 10 milligrams of dust per cubic metre of air, when measured over an eight hour period ( $10 \text{ mg/m}^3$  8H TWA). Within that figure, only  $4 \text{ mg/m}^3$  should be respirable dust.
- 2 Generally speaking, if visible dust can be seen in the air, it is highly possible that the 10 mg limit is being approached (or exceeded), and the application of COSHH should be considered.

### 1.2.9.10 Control of Dust

- 1 Dust in its many forms has been the cause of health problems throughout the history of the building and construction industry. While much attention has been given to newly recognised hazards, the greater part of the dust problem relates to more common substances.
- 2 Dust is taken here to mean anything that forms a powder or cloud and is a nuisance, including cement, wood, stone, silica, fillers and plastics. The high speed cutting and grinding of most materials can produce dust.
- 3 Dust in confined spaces is a particular hazard, because of the potential risk of explosion. The most obvious example is in coal mines. Flour dust can also be explosive, and whilst that is normally a process industry risk, for companies who may maintain or cut up extraction plant in bakeries and flour/feed mills, it is something that does require consideration.
- 4 In all cases, knowledge of the hazards associated with materials, processes and operations is required, and of the specific precautions and protective equipment necessary to reduce or eliminate the risk to health and safety.
- 5 In many cases, the control of dust will not be difficult to achieve. The accumulation of 'general dust' can be controlled by good housekeeping and simple measures, such as 'damping down'.
- 6 Where the creation of dust is more localised, such as during the cutting, grinding or sanding of solid materials, satisfactory control will often be achieved by the extraction and collection of the dust through attachments fitted to power tools or by 'wet cutting'. Even where the collection of dust is not practical, it will often be possible to create an enclosure around the activity and ensure that the person carrying it out uses appropriate RPE.
- 7 Conversely, carrying out some dust-generating activities in the open air may be preferable to allow the dust to disperse, depending upon the hazard posed by the quantity and nature of the dust so created.

#### Wood dust

- 8 Impregnated timber and some hardwoods (such as teak, African mahogany and iroko) are known to be health hazards. The inhalation of hardwood dusts through the nose is a known cause of nasal cancer.

- 9 A list of some timbers known to present risks is given below. Protection is not normally required when working on these timbers with hand tools in the open, but harmful dusts can be produced when using machine tools (e.g. sanders or saws) in enclosed or poorly ventilated areas. An assessment should be made and, if ventilation or dust extraction cannot be improved to remove or reduce the dust problem, a dust respirator should be worn.

### **Medium density fibreboard**

- 10 Medium density fibreboard (MDF) is a commonly used material in the construction sector. It is manufactured from wood dust glued together with a urea-formaldehyde binder.
- 11 The risks associated with MDF are exposure to dust and dried urea-formaldehyde during use.
- 12 The primary issue for construction workers is simply the huge amount of dust that any work with MDF generates. Given the makeup of the product this is not really surprising. The exposure level normally used is the same as softwood dust - 5 mg/m<sup>3</sup> on a time weighted average exposure of eight hours

### **Selection of timbers and their irritant effects**

- 13 The severity and frequency of any symptoms will vary with individuals. They are also dose-related.
- (a) **Camphor wood** - asthma, dermatitis
  - (b) **Red cedar** – asthma, bronchial trouble, sneezing, watering of eyes, rhinitis, dermatitis, septic wounds from splinters
  - (c) **Dahoma** - irritation of mucous membranes and chest, sneezing, coughing, running eyes and nose, dermatitis
  - (d) **Ebony** - irritation of nose and throat, dermatitis
  - (e) **Guarea (also West African cedar)** - mild nasal irritation, sneezing, coughing, running eyes; can cause severe vomiting, chest irritation, blisters around the eyes and dermatitis
  - (f) **Iroko** - skin and eye irritation, asthma and symptoms of the common cold
  - (g) **Machaerium** - dermatitis
  - (h) **Sapele** - dermatitis, allergic extrinsic alveolitis
  - (i) **Mahogany** - asthma, dermatitis
  - (j) **Chestnut** - asthma, dermatitis, rhinitis
  - (k) **Mansonia** - irritation of mucous membranes, sneezing, nasal haemorrhage, eyes sore and bloodshot, dizziness, dermatitis
  - (l) **Satinwood** - dermatitis, headache, coughing
  - (m) **Teak** - dermatitis, eye inflammation. Effects are severe once the skin's protective layer has been penetrated
  - (n) **Walnut** - asthma, dermatitis, conjunctivitis, rhinitis
  - (o) **Yew** - bronchial asthma and dermatitis
- 14 Generally speaking, the greater the amount and the finer the dust, the greater the risk of health problems.
- 15 Both hardwood and softwood dusts have a workplace exposure limit of 5 mg/m<sup>3</sup> on a time weighted average exposure of eight hours. As both are known causes of asthma dust levels need to be controlled to as low a level as possible.

**Other common sources of dust**

- 16 When cleaning stone, brick and concrete facades, or any metal structure with dry or wet grit blasting, control measures will include the use of respiratory protective equipment. This is likely to be a high performance type such as a powered respirator. When cleaning siliceous masonry, airline equipment may be required.
- 17 Although this type of cleaning operation is commonly called 'sand blasting', sand must not be used for blast cleaning because of the known health hazard caused by airborne sand and silica.
- 18 Effective preventative measures must be taken if exposure to crystalline silica is possible.
- 19 Protection is also necessary when using mechanical cleaning methods.
- 20 Exhaust ventilation devices should be fitted to power tools, or the operative should be provided with high efficiency breathing apparatus.
- 21 The cutting and chasing of masonry, stone, brickwork, plaster, thermal insulating blocks and concrete, creates a dust hazard. Therefore, extraction equipment should be provided, the process performed wet or respirators worn, depending on the assessment made.
- 22 Crystalline silica (also known as quartz) is present in sand and rock and can also be found in building materials such as cement, concrete, plaster, bricks and tiles.
- 23 Dust from plastic fillers can damage the lungs if inhaled, as can dust from resin-based fillers, and fibrous particles of glass fibre, rockwool and similar insulation materials.
- 24 The dry sanding of lead-based paint can result in exposure to hazardous levels of lead dust. Softening with heat guns and scraping, or the use of chemical stripping agents, will usually be effective. If sanding is required, wet and dry paper with a solution of dishwater detergent can be used. A dishwasher tablet dissolved in about 5 litres of water will give the required solution strength. The form of detergent used for dishwashers is effective at binding and stabilising the lead chromate used in paint.
- 25 The disturbance of asbestos is likely to result in airborne fibres (dust) which can result in cancer, and other respiratory illnesses, if inhaled.
- 26 Where a work activity involves the creation or disturbance of dust, a COSHH assessment must be carried out.

**1.2.9.11 Control of fumes**

- 1 Within the wide range of activities carried out in the construction industry there are numerous operations which liberate fumes into the atmosphere and cause risks to the health and safety of people at work. Every effort must be made to minimise these risks. Fumes may be classified as a substance hazardous to health and thereby require an assessment of the risk to health to be carried out.
- 2 If a risk does exist, control measures such as mechanical extraction systems and adequate natural air ventilation can prevent high concentrations of fumes forming to create a hazard, particularly in confined areas.
- 3 The HSE publication EH40 'Occupational exposure limits' lists a level of exposure for each type of fume or pollutant. This represents the maximum limit at which it is considered safe for work to take place.
- 4 EH 40/2005 has been supplemented by a table on HSE's website, which has the up-to-date list of workplace exposure levels:[www.hse.gov.uk/coshh/table1.pdf](http://www.hse.gov.uk/coshh/table1.pdf)

- 5 Every reasonably practicable measure should be taken to reduce any exposure as far below the limit given as is possible.
- 6 If the fume type is listed in EH40, or is otherwise a hazard to anyone's health, the provisions of the COSHH Regulations will apply. Therefore, an assessment of the risk and the provision of any necessary precautions must be made.
- 7 Some of the more common causes of fumes are listed below and discussed under subsequent headings:
- (a) welding or flame cutting
  - (b) lead burning (both cutting and melting)
  - (c) cable burning (this practice must not be carried out on site)
  - (d) the use of solvents, paints, adhesives and so on
  - (e) internal combustion engines.

#### 1.2.9.12 Welding

- 1 During welding and flame cutting, toxic fume hazards can arise from:
- (a) nitrogen oxide gases
  - (b) ozone
  - (c) phosgene gas
  - (d) carbon monoxide gas.
- 2 These are mainly caused by the very high temperatures and the presence of volatile substances, sometimes as contaminants, but often as shielding agents or flux.
- 3 The inhalation during welding of freshly formed metal oxides (such as zinc, cadmium, chrome, nickel, copper and mercury) may lead to an acute 'flu-like' illness termed 'metal fume fever'.
- 4 The fever is most commonly caused by fumes created while working with galvanised or zinc-coated metals, especially in confined spaces.
- 5 Fumes arising from the cutting and welding of cadmium are especially dangerous, even in the open air. Prolonged or recurrent exposure may result in cadmium poisoning.

#### Precautionary measures

- 6 A risk assessment, including a COSHH assessment, as appropriate.
- 7 The use of extraction systems and fume hoods to remove fumes from the breathing zone.
- 8 The use of respiratory equipment, particularly in confined spaces where high concentrations of fumes can be anticipated.

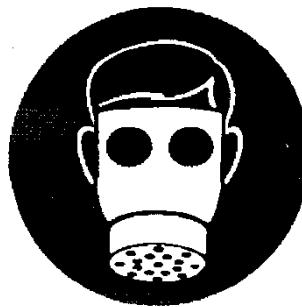
#### 1.2.9.13 Lead burning

- 1 Lead burning is the process whereby lead is heated to its molten state so that it can be poured into joints, or flame cut to shape, or flame heated so that it can be bent and formed into various shapes.
- 2 This process is employed extensively in sheet lead work by workers in the plumbing trades, in the formation of roof drainage, guttering, chimney flashings and so on.
- 3 This will mean that the operatives will need to be under health surveillance.

4 The creation of fumes by the heating of lead exposes operatives to risk. The following safety points should be observed:

- (a) the use of local exhaust ventilation, or other means, to evacuate fumes from the immediate working area where reasonably practicable
- (b) the use of respiratory equipment of an approved type in the appropriate cases
- (c) the provision of protective clothing and storage for that clothing, along with adequate washing facilities.

### **Wear respirator**



#### **1.2.9.14 Cable Burning**

1 Quite simply this is not an acceptable practice at anywhere other than a specialised processing facility. This method of recovering metal from cables, by burning off the insulation, often results in the creation of fumes which can be very toxic.

#### **1.2.9.15 Solvents and Vapours**

1 Chlorinated solvents, paints, adhesives and thinners all require precautions to be taken during their use. If they are hazardous to health, they must be handled and used in accordance with these Regulations.

##### **Avoid breathing the vapour**

2 Most solvents are safe when used correctly but, in common with other compounds of hydrocarbons, the inhalation of a high concentration of vapour will cause drowsiness, headaches and giddiness. Severe exposure may lead to unconsciousness or even prove fatal. Extraction or exhaust ventilation may be needed or, where this is not available, respiratory protective equipment must be used.

3 Long term exposure to solvents may affect the central nervous system. Other chemicals may also have adverse effects. An example is isocyanate, which is a component of expanding foams contained in aerosol tins.

4 Some of the vapours are considerably heavier than air and may collect at low levels, particularly in still conditions. This can cause displacement of the oxygen present and lead to the risk of suffocation. It can also lead to a build-up of solvent fume at explosive concentrations.

##### **Other precautions with solvents**

5 DO NOT

- (a) take solvents internally or 'sniff' any solvent
- (b) smoke when using solvents
- (c) use the solvent in a place which is not well ventilated - but avoid draughts

- (d) lean over any vessel containing the solvent liquid or vapour
- (e) store solvents in buckets or other open storage vessels
- (f) enter vessels which have contained or have been cleaned with solvents, unless proper tests have been made to ensure it is safe to do so
- (g) allow solvent liquid or vapour to come into contact with naked flames or red hot surfaces, e.g. welding arcs. Acidic and toxic decomposition products will be formed.

#### **1.2.9.16 Internal combustion engines**

- 1 The nature of the construction industry, the activities carried out and the drive to get a job finished may lead some people into taking unnecessary risks. The majority of people are aware that internal combustion engines should not be used within confined spaces unless the exhaust gases are led directly to the open air. However, when for example the concrete is too hard, or a pipe will not cut by hand and the job is late, people will often ignore such a basic safety requirement and start a petrol engine disc cutter in a cellar. It is an error which could be fatal.
- 2 There is a potential for excavations to be contaminated by exhaust gases which are heavier than air and could simply roll down into the excavation. On projects with forced ventilation systems such as tunnels and shafts, the additional loading on the system needs to be factored in before petrol or diesel powered equipment is used.
- 3 In large buildings the use of forklift trucks, and other vehicles with internal combustion engines, can cause carbon monoxide to reach unacceptable levels, if there is no system to extract exhaust pollution. Simply opening the doors may not be enough.
- 4 In all cases of doubt, a COSHH assessment should be made by a competent person and, where necessary, the appropriate controls introduced.

#### **1.2.9.17 General Precautions**

- 1 The following points are especially important:
  - (a) the identification of potentially hazardous work processes, materials and substances before work starts
  - (b) the provision of information, instruction and training to employees
  - (c) the strict observance of all
  - (d) recommendations and procedures advised by the manufacturer
  - (e) the effective supervision of employees, and the monitoring of work methods and practices
  - (f) the provision of protective clothing and equipment before any work starts
  - (g) the correct disposal of waste materials and containers as recommended by the manufacturers
  - (h) cleaning, for example, by extracting dust using a vacuum cleaner, rather than stirring it up by sweeping
  - (i) personal hygiene, including the cleansing of hands before consuming food, the use of barrier creams, the removal and storage of contaminated clothing during meals, and the correct laundering or disposal of contaminated clothing
  - (j) to avoid, where practical, carrying out potentially hazardous work activities in confined areas to lessen the chances of dust concentrations or fumes building up.

#### **1.2.9.18 Protective Equipment**

- 1 Given the nature of some work activities, it is not always practical to completely contain the

airborne dust or fumes created. In these circumstances, if no other control measure is reasonably practicable, respiratory protective equipment (RPE) and other PPE as necessary, must be provided for each person working with, or otherwise exposed to, airborne dust or fumes.

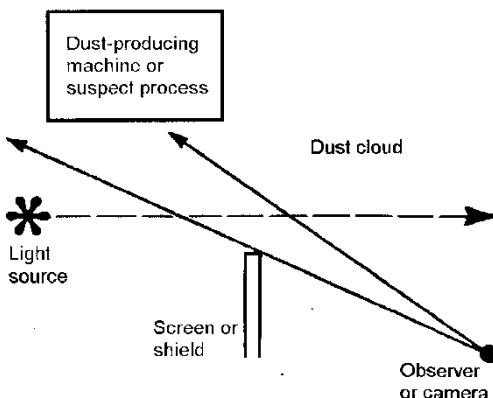
- 2 There are various types of respiratory protective equipment approved for use. Details of types and permissible uses are available from the manufacturers.

#### 1.2.9.19 Asphalt Fumes

- 1 Inhalation of bitumen fumes may cause irritation of the respiratory tract, chronic bronchitis and other respiratory disorders. Fumes of the carrier material (white spirit, gas oils or kerosine) may also cause irritation to the respiratory tract or "organic solvent syndrome". Spraying of emulsions can result in the generation of a mist which may also be hazardous.

#### 1.2.9.20 Dust sampling

- 1 Sampling is usually carried out by a specialist using metered pumps with membrane filters. The dust collected is weighed in relation to the amount of air sampled. Dust samples can also be examined for type.
- 2 There are also some direct-reading dust sampling monitors available. However, there is some doubt as to the accuracy of these instruments. They are very useful for a long-term project where they can be calibrated regularly by comparing their readings against samples taken from membrane filters.
- 3 They are not recommended as the sole means of measuring a personal exposure to dust. It is also important to be aware that there are a number of different laboratory techniques required for analysis, for example, measuring exposure to silica normally requires X-ray diffraction.
- 4 **Use of Tyndall Beam to identify dust clouds**
- 5 The Tyndall Beam is a useful way to determine whether a problem exists before investigating further. It uses the common phenomenon of dust being highlighted in a shaft of light.



#### 1.2.9.21 Training and Supervision

- 1 New employees should receive full instruction before starting work and should be familiarised with the following:
  - (a) the health risks associated with dust and the preventative measures in operation, as identified by the risk assessment

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(b)	the correct use and cleaning of protective clothing and equipment	
(c)	the reasons for air sampling	
(d)	their duties in respect of the correct use of equipment and of safe systems of work in operation	
(e)	the procedures for reporting defective or inadequate equipment.	

ARAB ENGINEERING BUREAU

**Construction site Safety****1.2.9 Appendix 1****Control of fumes****Safety checklist**

- 1 An assessment must be carried out.
- 2 All hazardous processes and operations have been identified.
- 3 All personnel have been fully instructed in the types of hazard likely to be encountered.
- 4 There is adequate supervision of all work operations.
- 5 All personnel are competent to carry out the work operations.
- 6 Correct and adequate protective clothing is provided and used.
- 7 Respiratory protective equipment is provided and used, as necessary.
- 8 Face fit testing and records for the RPE are available.
- 9 Exhaust ventilation or extraction equipment is used, as required.
- 10 The correct type of eye protection is provided and used, as necessary.
- 11 Safe working methods are being adhered to.
- 12 No one under 16 years is employed (lead burning).
- 13 Chlorinated solvents, paints, adhesives, and so on are:
  - (a) stored safely
  - (b) used safely.
- 14 Personnel have been made aware of the hazards that exist when working with chlorinated solvents, paints, adhesives, and so on.
- 15 Engine exhaust gases are led directly out of confined spaces.

**Dust hazards****Safety checklist**

- 16 There is adequate supervision of all work operations.
- 17 Materials, substances and associated hazards have been properly identified.
- 18 Manufacturers' or suppliers' instructions are available and observed.
- 19 Power tools are fitted with a dust extraction and collection facility.
- 20 Local exhaust ventilation is fitted to workshop machinery.
- 21 The correct protective equipment is supplied and clothing provided.
- 22 Operatives have been instructed in the use of materials and are aware of the hazards associated with those materials.
- 23 There is provision for the ongoing training of employees.
- 24 There is provision for, and operation of, safe systems of work.
- 25 There is adequate provision of washing facilities, and facilities for storing overalls, and other work wear during meal breaks.
- 26 Correct procedures for the storage, identification and disposal of waste materials or substances are followed.
- 27 Adequate arrangements have been made for air sampling, as necessary.

## Construction Site Safety

### 1.2.10 Occupational Noise Exposure & Control

#### 1.2.10.1 Key points

- 1 Contractors and employees have duties under these Regulations.
- 2 Noise experienced at work, in the home and social environments can cause permanent damage to hearing.
- 3 There are often early signs that the hearing is being damaged; these should not be ignored.
- 4 Contractors should seek to control noise by other, equally or more effective, ways before resorting to personal protective equipment.
- 5 Effective pre-planning of site activities and the active management of noise during the construction process can significantly reduce noise exposure on site.
- 6 In addition to hearing damage, excessive noise can have other health and safety implications, such as not being able to hear alarms or shouted warnings.
- 7 Establishing the noise levels on site might not necessarily involve arranging for noise measurements to be taken.

*Note: Section 1, Part 15.2.3 of the QCS covers noise control.*

#### 1.2.10.2 Introduction

- 1 High levels of noise on construction sites often come from machinery used for demolition, excavation or piling, from compressors and concrete mixers, etc. Other operations, such as hammering, riveting and the use of cartridge-operated fixing tools, may also be the source of excessive noise.
- 2 The degree of nuisance or damage caused by noise is related to the nature of the noise generated as well as its loudness. Intermittent noise is often more disruptive than a continuous noise and high-pitched sounds are more disturbing than low frequency ones. Exposure to high levels of noise can cause permanent damage to hearing in the form of partial or total deafness.
- 3 Contractors have a duty to control noise and protect their workers and other persons from its effects. Noise is also a source of annoyance and disruption, and may directly or indirectly lead to an increase in the risk of accidents. Every reasonably practicable step should be taken to control it.

#### 1.2.10.3 The Management of Health and Safety at Work

- 1 These Regulations place a requirement on every Contractor to make a suitable and sufficient assessment of every work activity to identify any hazard that employees or any other person might encounter as a result of the work being carried out.
- 2 When hazards are identified, it is then the Contractor's duty to either eliminate the hazard or to put control measures into place to reduce the risks to health and safety arising from the hazards, as far as is reasonably practicable.
- 3 The Contractor must provide employees with comprehensible and relevant information on any risks that exist in the workplace and on any control measures that are in place to reduce those risks.
- 4 Employees, in turn, have legal duties under these Regulations to:
  - (a) tell their Contractor of any work situation which presents a risk to the health and safety of themselves or any other persons who may be affected by their work activities
  - (b) use all machinery and equipment in accordance with any training provided.

- 5 These Regulations require that, additionally, the Contractor provides employees with adequate information, instruction, training and supervision to be able to carry out any work safely and without risks to their health.
- 6 Contractors must assess the risks to employees' health arising from noise and put effective control measures in place.

#### 1.2.10.4 Control of Noise at Work

- 1 These Regulations:
- (a) place duties on Contractors and employees
  - (b) allow personal exposure to noise to be measured over a weekly, rather than an 8-hour, period in situations where employees are exposed to widely varying noise levels
  - (c) give employees the right to hearing checks where a noise assessment indicates their hearing could be at risk.
  - (d) Note: Section 1, Part 15.2.3 of the QCS also covers noise control.

#### Action and limit values

- 2 These Regulations specify the following three levels of exposure to noise, each of which requires that certain actions be taken:
- 3 **Lower exposure action value.** This is reached when a daily or weekly personal exposure reaches 80 dB(A) or a peak sound pressure of 135 dB(C) occurs.
- 4 **Upper exposure action value.** This is reached when a daily or weekly personal exposure reaches 85 dB(A) or a peak sound pressure of 137 dB(C) occurs.
- 5 **Exposure limit value.** This is the maximum level of noise to which anyone at work may be exposed. It is set at 87 dB(A) at the ear, measured on a daily or weekly basis as appropriate or when a peak sound pressure of 140 dB(C) occurs.

#### Contractor's duties

- 6 These Regulations place a duty on Contractors with respect to the health and safety of employees, the Contractor is, so far as is reasonably practicable, also under a similar duty to anyone else at work who may be affected by the noise created by the Contractor's work activities
- 7 When applying the '**exposure limit value**', Contractors may take account of any hearing protection worn; *it is the level of noise actually entering the ear*. Therefore, the performance characteristics of any hearing protection worn can be taken into account when assessing the noise exposure of individuals. Similarly, it must be taken into account when decisions are taken on the purchase of personal hearing protectors.
- 8 If employees are likely to be exposed to noise **at or above the lower exposure action value**, the Contractor must:
- (a) carry out a suitable and sufficient assessment of the risks to employees and ensure that it identifies the measures necessary to adequately control the level of noise at work. When carrying out the risk assessment the Contractor must assess noise exposure by:
    - (i) observing work practices
    - (ii) referring to information on the probable level of noise issued by tool and equipment manufacturers
    - (iii) *only if necessary*, arranging for noise levels to be measured.

- 9 If employees are likely to be exposed at or above the 'upper exposure action value' or the 'exposure limit value', the risk assessment must also include consideration of:
- (a) the level and type of noise and its duration, including any exposure to 'peak sound pressure'
  - (b) the effects that the noise might have on the health of employees exposed to it
  - (c) so far as is practicable, the effects on the health of employees resulting from an interaction between exposure to noise and any ototoxic substances (mainly common-use solvents) that are in use or between noise and vibration
  - (d) the possibility of warning alarms or other audible systems not being heard
  - (e) information provided by the manufacturers of equipment that generates the noise
  - (f) the possibility of using alternative, less noisy equipment
  - (g) exposure of employees to noise when not actually working, such as in rest areas and canteens
  - (h) the results of previous health surveillance and published information
  - (i) the availability of suitable personal hearing protectors, taking into account their performance.
- 10 The Contractor must regularly review the risk assessment and immediately if:
- (a) there is reason to believe that it is no longer valid
  - (b) there has been a significant change in the work to which the assessment applies and implement changes to the risk assessment as identified by the review process.
- 11 The Contractor must inform at-risk employees of the findings of the risk assessment and record:
- (a) the significant findings of the risk assessment as soon as is practicable after it has been made or changed
  - (b) the control measures that have been put in place to eliminate or reduce the noise, including the provision of hearing protection and employee training.
- 12 Records may be kept in any form so long as they are easily retrievable and can be printed.
- 13 The Contractor must also:
- (a) generally eliminate at source the risk of hearing damage or reduce it to the lowest level that is reasonably practicable, irrespective of noise levels
  - (b) where exposure is likely to be at or above the upper exposure action value, reduce the noise, as far as is reasonably practicable, by implementing organisational and technical measures other than by providing personal hearing protectors.
- 14 Contractors must consider the following:
- (a) alternative, less noisy methods of carrying out the work
  - (b) alternative, less noisy tools for carrying out the work
  - (c) the layout of the workplace, including any rest facilities
  - (d) providing employees with adequate information and training so that they can minimise their exposure to noise
  - (e) the reduction of noise by technical means
  - (f) effective maintenance programmes for equipment that can generate noise, the workplace itself and workplace systems
  - (g) limiting the duration and intensity of exposure to noise
  - (h) adjusting work schedules and ensuring adequate rest periods.

- 15 The Contractor must ensure that employees are not exposed to noise above the **exposure limit value**, or if they are, immediately:
- reduce exposure to below the exposure limit value
  - identify the reasons for the exposure limit value being exceeded
  - take appropriate actions to prevent it occurring again.
- 16 Contractors must:
- ensure that the level of noise in rest facilities that are under their control is reduced to a suitable level for their purpose
  - adjust and adapt any measures taken to prevent exposure to noise to take account of any person(s) whose health is likely to be particularly at risk from exposure to noise
  - inform employees of the measures taken to eliminate or control the level of noise in the workplace.
- 17 Where employees are exposed to noise at or above the **lower exposure action value** but below the **upper exposure action value**, the Contractor must make suitable personal hearing protectors available to employees who request them.
- 18 Where employees are exposed to noise at or above the **upper exposure action value**, the Contractor must:
- designate the affected part of the workplace as a 'Hearing Protection Zone'
  - identify the extent of the area by signs indicating that hearing protectors are to be worn
  - restrict access to the area where practicable and it is justified by the level of risk
  - ensure so far as is reasonably practicable that all employees entering the hearing protection zone wear personal hearing protection.
- 19 Hearing protectors must be selected, so as to eliminate the risk to hearing or reduce it to as low a level as is reasonably practicable
- 20 Contractors must:
- ensure so far as is practicable that anything provided to comply with these Regulations, *except personal hearing protectors*, is fully and properly used
  - ensure that anything provided to comply with these Regulations is maintained in good working order and in a good state of repair
- 21 If the risk assessment indicates that there is a risk to the health of employees exposed to noise, the Contractor must ensure that those employees are placed under suitable health surveillance, including providing them with hearing tests.
- 22 The Contractor must:
- ensure that a record is kept and maintained for each employee who undergoes health surveillance and that records are readily available in a suitable format
  - allow employees to see their health surveillance records on being given reasonable notice
- 23 Where, as a result of health surveillance, an employee is found to have identifiable hearing damage, the Contractor must ensure that the employee is examined by a doctor and, if necessary, a specialist. Where the hearing damage is found to be as a result of exposure to noise at work, the Contractor must:
- ensure that the employee is informed by a suitably qualified person
  - review the risk assessment
  - review existing control measures, taking into account any advice given by a doctor,

- occupational health professional or administrative authority
- (d) consider reassigning the employee to other work where there is no risk of further exposure, taking into account any advice given as above
- (e) continue with the health surveillance of affected employees.
- 24 Where employees are exposed to noise at or above the **lower exposure action value**, the Contractor must provide the employees with suitable and sufficient information, instruction and training, which must include:
- (a) the nature of the risks arising from exposure to noise
  - (b) the control measures taken to eliminate or reduce exposure
  - (c) the exposure limit value and the lower and upper exposure action values
  - (d) the significant findings of the risk assessment
  - (e) the availability and provision of personal hearing protectors and how to use them correctly
  - (f) why and how to detect and report signs of hearing damage
  - (g) the employees' entitlement to health surveillance
  - (h) how to work safely to minimise noise exposure and thereby avoid hearing damage
  - (i) the collective results of any health surveillance carried out, anonymised so as not to reveal the personal health record of any individual.
- 25 The information, instruction and training provided as above must be updated by the Contractor to take account of any significant changes of the type of work carried out or method of working.

### **Employees' duties**

- 26 Employees must:
- (a) make full and proper use of personal hearing protectors if the noise exposure exceeds the upper exposure action value
  - (b) make full and proper use of other control measures provided by the Contractor
  - (c) report any defects in the personal hearing protectors or other control measures to their Contractor
  - (d) make themselves available for health surveillance checks (during working hours) as required by the Contractor, the health surveillance being at the Contractor's expense.

#### **1.2.10.5 The nature of noise**

- 1 **Sound** is the transmission of air vibrations at different frequencies. **Noise** is sometimes defined as unwanted sound. The ear is a pressure-sensitive mechanism, detecting small changes of air pressure over a wide range of frequencies of 20-20,000 cycles per second. The unit of frequency is the hertz (Hz). Those with impaired hearing due to age or other forms of hearing loss are less likely to be able to hear the higher frequency range.
- 2 Audiometry is the technique used to determine the capacity of the ear to detect sounds of varying loudness over a range of frequencies. It can be used to measure an individual's hearing capacity against a recognised standard. Successive audiometric checks can confirm whether or not a person is suffering from progressive hearing loss.
- 3 When judging the level of noise, the '**rules of thumb**' are that if you have to raise your voice to make yourself understood at 2 metres from the other person, the background noise is around 85 dB(A). If the distance is only 1 metre, the noise is around 90 dB(A).
- 4 A peak sound pressure of 137 dB(C) will be produced by many impact tools such as cartridge-

operated tools.

- 5 Two "types' of noise may damage the hearing of the people who are exposed to it:
- (a) Continual or periodic noise, which even if varying over the course of time, can be measured and averaged out over an eight-hour (or in some circumstances a weekly) reference period. This is known as the 'daily (or weekly) personal noise exposure' as referred to in these Regulations. This is the common everyday noise that is experienced on many construction sites.
  - (b) Sudden, short bursts of loud impulsive noise such as experienced during the driving of piles, the use of explosives or the use of some hand tools. The references in these Regulations to 'peak sound pressure' are to this type of noise.

#### **1.2.10.6 Effects of noise at work**

- 1 Noise levels may fluctuate widely or be relatively steady. A reasonably steady sound level is where the level fluctuates through a total of less than 8 dB(A) on a slow response scale.
- 2 Exposure to noise can have the following consequences:
  - (a) It can cause annoyance and irritation.
  - (b) It may affect concentration and efficiency.
  - (c) It may cause fatigue and the likelihood of accident proneness.
  - (d) It can mask out other sounds, preventing a person's ears from registering instructions and warnings.
  - (e) It can result in temporary hearing loss.
  - (f) Regular exposure to loud noise can cause damage to the ear and permanent loss of hearing.
- 3 There is also growing evidence that continued exposure to noise has consequential effects on some other illnesses.

#### **Hearing loss**

- 4 Hearing loss can be temporary or permanent. Temporary deafness is often experienced after leaving a noisy place. It is often accompanied by a ringing in the ears. Although hearing usually recovers within a few hours, this symptom should not be ignored. It should be taken as a sign that further or continued exposure to noise is likely to result in permanent damage. Permanent hearing damage can also be caused immediately by sudden and loud noises, for example from explosives or cartridge-operated tools.
- 5 Hearing loss due to prolonged exposure to noise is usually gradual. It may only be when damage caused by exposure to noise over the years combines with normal hearing loss due to ageing that people realise how deaf they have become.
- 6 Prolonged exposure to noise can also cause tinnitus, which can be described as a permanent ringing, whistling or buzzing in the ears. This distressing condition can lead to disturbed sleep which, in turn, can lead to fatigue even before an employee arrives at work.

#### **Other adverse effects of noise**

- 7 At work, noise can also be a safety hazard, interfering with communication, the understanding of instructions and, most serious of all, making warnings harder to hear. Noise can also cause stress.

### 1.2.10.7 Establishing noise levels

#### Unit of measurement

- 1 The unit of measurement for sound levels (noise) is called a decibel (dB). This scale is logarithmic and means that 90 dB is ten times the intensity of 80 dB and one hundred times the intensity of 70 dB.
- 2 An increase of 3 dB doubles the energy in the sound. This means that, for example, 87 dB is actually twice as damaging as 84 dB, even though the 3 dB difference in sound level is difficult to perceive.
- 3 Sound level meters, used for measuring noise levels, have standard 'filters' built into them that attenuate or emphasise signals at different frequencies in order to simulate how the sound affects the ear. This is known as 'frequency weighting'.
- 4 An instrument with a frequency weighting known as an 'A' weighted scale is commonly used on construction sites to measure noise from the working environment. Readings are expressed as dB(A).
- 5 Sudden impact noises, hammer blows, etc. are measured in terms of maximum pressure. In this case measurements are 'C' weighted and therefore expressed as dB(C).
- 6 Risk assessments should be based on measurements of the 'Leq', which is *an average of the level of noise for the duration of the measurement*.

#### Risk assessments

- 7 If any employee is likely to be exposed to noise **at or above the lower exposure action value**, the Contractor must carry out a risk assessment which may or may not result in the need for a competent person to measure the actual level of noise exposure.
- 8 Any new tool or equipment that generates a potentially harmful level of noise should state the actual level of noise generated, either on the tool itself or in the accompanying documents. This can be useful in identifying potentially problematic tools, but it is important to remember that the actual noise experienced by the operator depends on many factors, such as the acoustics of the working environment, tool configuration and material being worked.

#### Survey of noise levels

- 9 If it is necessary to resort to the measurement of noise, someone who is competent in evaluating the type of workplace, the use of the equipment and the interpretation of the results must be engaged. They must be able to draw valid conclusions from the information obtained and advise management on the actions needed to comply with the requirements of legislation.
- 10 The aim of the noise assessment is to:
  - (a) identify workers who may be at risk of hearing damage to enable an action plan to be prepared to control the noise exposure
  - (b) determine the daily personal noise exposure (LEP,d) of workers (including times when not actually working (for example, rest areas) and from non-occupational sources such as personal entertainment systems)
  - (c) identify additional information to comply with these Regulations, for example, whether noise control measures or hearing protection are needed and, if so, where and what type.
- 11 The Contractor must:
  - (a) keep a record of the noise assessments and the employees exposed to the noise

- (b) regularly review those assessments. This should be done biannually or whenever it is considered that the assessment is no longer valid, for example, whenever there is new equipment or a change to the process that may alter noise levels
  - (c) use the assessment to develop an action plan for introducing noise control measures
  - (d) deal with the immediate risk by providing personal hearing protectors (this should only be until other controls have been investigated and implemented)
  - (e) identify what steps are reasonably practicable to reduce the noise exposure of employees by engineering or other organisational means
  - (f) establish priorities for action and consider what changes may need to be phased in over the course of time.
- 12 Ideally, one person, with sufficient authority, will be given the responsibility for ensuring that these Regulations are complied with and for co-ordinating and monitoring the noise reduction programme where necessary.
- 13 Nomograms (see Appendix 4) can be used to establish the equivalent continuous sound level for an eight hour period or daily personal noise exposure (LE<sub>p,d</sub>)

#### Typical sound intensities

	SOUND INTENSITY RATIO	SOUND LEVEL IN dB(A)	SOUND SOURCE PAIN THRESHOLD
Harmful range	100 000 000 000 000	140	Jet engine
	10 000 000 000 000	130	Riveting hammer
<b>THRESHOLD OF FEELING</b>			
Critical zone	1 000 000 000 000	120	Propeller aircraft
	100 000 000 000	110	Rock drill
	10 000 000 000	100	Plate fabrication shop
	1 000 000 000	90	Heavy vehicle
<b>Safe range</b>			
	100 000 000	80	Very busy traffic
	10 000 000	70	Private car
	1 000 000	60	Ordinary conversation
	100 000	50	Quiet office
	10 000	40	Soft music from radio
	1 000	30	Quiet whisper
	100	20	Quiet urban dwelling
	10	10	Rustle of a leaf
	1	0	THRESHOLD OF HEARING

#### 1.2.10.8 Avoiding exposure to noise

##### Planning against excess noise levels

- 1 Attention should be given at the planning stage to developing a noise control strategy that considers the following factors:
- (a) The design of the project, and of the processes and equipment which will be involved.
  - (b) The phasing of differing operations, especially if a number of contractors are working on site.
  - (c) The location of the site; or sites if the project involves more than one location.
  - (d) The noise levels that are likely to be produced by the work being carried out.
  - (e) The layout of the site, including the siting of access points, batching plants, etc.

- (f) The hours of working which are planned.
  - (g) The provisions available for controlling noise on site.
  - (h) The possibility of disturbance to nearby residents and properties. (If this is likely, the situation and measures to be taken to reduce noise should be explained to persons likely to be affected.)
- 2 Failure to plan the control of noise may lead to delay and increased cost later. Where appropriate, noise levels must be a consideration for designers under CDM.

***Reference BS 5228 Noise and vibration control on construction and open sites***

**Managing noise levels during construction**

- 3 Exposure to noise can be eliminated or reduced by:
- (a) controlling noise at source
  - (b) employing engineering controls where possible
  - (c) using a purchasing/hire policy for plant, equipment and tools that takes noise into account
  - (d) introducing alternative methods and processes that eliminate or reduce noise levels
  - (e) giving consideration to the careful siting of noisy plant, and equipment
  - (f) where practical, storing bulk materials to form an acoustic screen
  - (g) carrying out job rotation for employees to reduce exposure to noise
  - (h) providing rest rooms or acoustic refuges for staff during breaks from work
  - (i) rearranging work locations for staff, if possible, away from noisy equipment
  - (j) as a last resort, providing personal hearing protectors.

**Control of noise at source**

- 4 Controlling the noise at its source can be achieved by a variety of means, by:
- (a) the design and manufacture of the equipment.
  - (b) the use of acoustic covers and exhaust silencers for equipment
  - (c) the use of alternative, less noisy equipment or methods of working
  - (d) enclosing noisy equipment within temporary structures
  - (e) regular inspection and maintenance of the equipment being used
  - (f) fitting noise-absorbent mountings to reduce the transmission of noise through adjacent structures.

***Reference BS 5228 Noise and vibration control on construction and open sites***

**Engineering controls**

- 5 Measures that can be taken include ensuring that all equipment which has the potential to create excessive noise:
- (a) is kept well maintained
  - (b) is kept in good order, including ensuring that there are no loose panels or casing and that exhaust mufflers are in good condition
  - (c) is not left running when it is not actually in use.

**Siting or location**

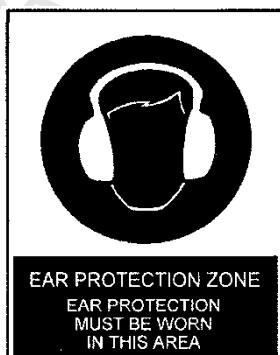
- 6 Effective siting or location includes:
- Removing the source of the noise to a distance whenever possible (see Appendix 2).
  - Orientating plant to direct the noise away from the work area.
  - Placing site buildings, stores, etc. between the noise source and noise sensitive areas.
  - Screening the noise source with a barrier, wall, acoustic screen, spoil heap, or by locating the source behind partly completed buildings.
- 7 The effectiveness of a noise barrier will depend on its dimensions, its position relative to the source and the listener, and the material used in the construction of the barrier. Care must be taken to ensure that barriers do not, by reflecting sound, transfer the noise nuisance from one sensitive area to another and so create a health problem for someone else.

**Effect on working hours**

- 8 The effect on maximum working times of exposures to equivalent continuous sound levels without any hearing protection are listed in Appendix 1 of this section.

**1.2.10.9 Personal hearing protectors**

- All hearing protectors produced or imported by reputable companies are manufactured to British or International Standards. As with all PPE for use at work, ear protectors should be selected by a competent person who can ensure, in discussion with the supplier, that it possesses the necessary performance characteristics. Most leading manufacturers and suppliers will offer their own advisory service.
- Competence in the selection of this type of PPE is particularly important as ear protectors that give good protection against noise at a high frequency may not offer very much protection against low frequency noise, and vice versa.
- All reasonably practicable methods must be used to reduce noise levels, but where these remain at or above the upper exposure action value, after control measures have been implemented, ear protectors must be made available and worn. Ear protectors are not a substitute for other methods of noise control, they are an absolute last resort.
- Employees may initially be reluctant to wear ear protection and those who are at risk must be made aware of the potential for hearing loss that can be caused by exposure to excessive noise levels.



**Mandatory warning sign:**

**"Wear ear protectors"**

**Colour: white symbol on circular blue background**

**Other considerations**

- 5 Personal hearing protectors must be provided on an individual basis.
- 6 A competent person must be responsible for any training that may be necessary in the correct use of personal hearing protectors.
- 7 Personal hearing protectors should normally be provided as an interim measure while more effective and permanent methods of control are sought.
- 8 Employees must be trained in the use, care and storage of ear protectors.
- 9 Ear protectors must be suited to the user and suitable for the type of noise.
- 10 They must provide an effective seal.
- 11 They should be stored in a clean place when not in use, unless disposable.
- 12 They should be inspected regularly for deterioration or damage and replaced when necessary, unless disposable.
- 13 Personal hearing protectors should not 'over protect' whereby users can become isolated from their work environment and unable to hear warnings.
- 14 **Note:** A check should be made to ensure that hazard warning signals are audible to individuals wearing ear protectors, and the volume, tone, or method of signalling changed if necessary.

**1.2.10.10 Types of personal hearing protectors**

- 1 The two basic types of protector are ear plugs and ear defenders.
- 2 **Disposable ear plugs:** These are made of very fine mineral fibre or foam, sometimes ready shaped. They must be inserted correctly and, if taken out, should not be reused. They should only be handled with clean hands.
- 3 **Reusable ear plugs:** These are made of rubber or plastic, and need regular, careful washing. The initial supply and fitting should be carried out by trained persons. Different sizes may be required for each ear and must be a good fit. They must be fitted with clean hands as any contamination by dirt, grease or swarf may cause ear irritation. Ear plugs are therefore unsuitable on site for intermittent use, such as can occur when operating a breaker.
- 4 **Ear defenders (or muffs):** These completely cover the ear and are sealed to the head with a foam or liquid-filled seal. Badly designed or badly produced defenders may give little or no protection against noise. Other points are as follows:
  - (a) pressure from the seal may cause wearers to complain of tightness, but loose defenders lose most of their protective capability and are ineffective
  - (b) damage and deterioration to seals also results in ineffectiveness and loss of protection
  - (c) in fitting, account needs to be taken of people with different sized or shaped heads or ears, hair styles and spectacles
  - (d) facial hair and the arms of spectacles may interfere with the seal on ear defenders
  - (e) defenders fitted to safety helmets may cause problems by not fitting tightly to the ear, or by moving as the helmet moves
  - (f) defenders must be chosen to deal with a particular noise problem; ones that offer protection against low frequency sound may be ineffective at high frequency, and vice versa.
- 5 Ear defenders which incorporate a sound enhancement system are available. When noise

levels are low, sound detected by a microphone is replayed to the wearer enabling them to communicate normally. When noise levels are high, the sound replay system is automatically cut, such that the defenders act as regular ear protectors. Such products are particularly suitable for those exposed to unpredictable short bursts of noise.

- 6 Ear protectors are only effective while they are being used. If protectors are worn for only half the shift, only some 10% protection is gained; if worn for 7% out of 8 hours, the protection factor is still only 75%.
- 7 Contractors providing hearing protectors that perform 4 dB better than the required minimum, in order to take into account 'real world' factors such as poor fitting.

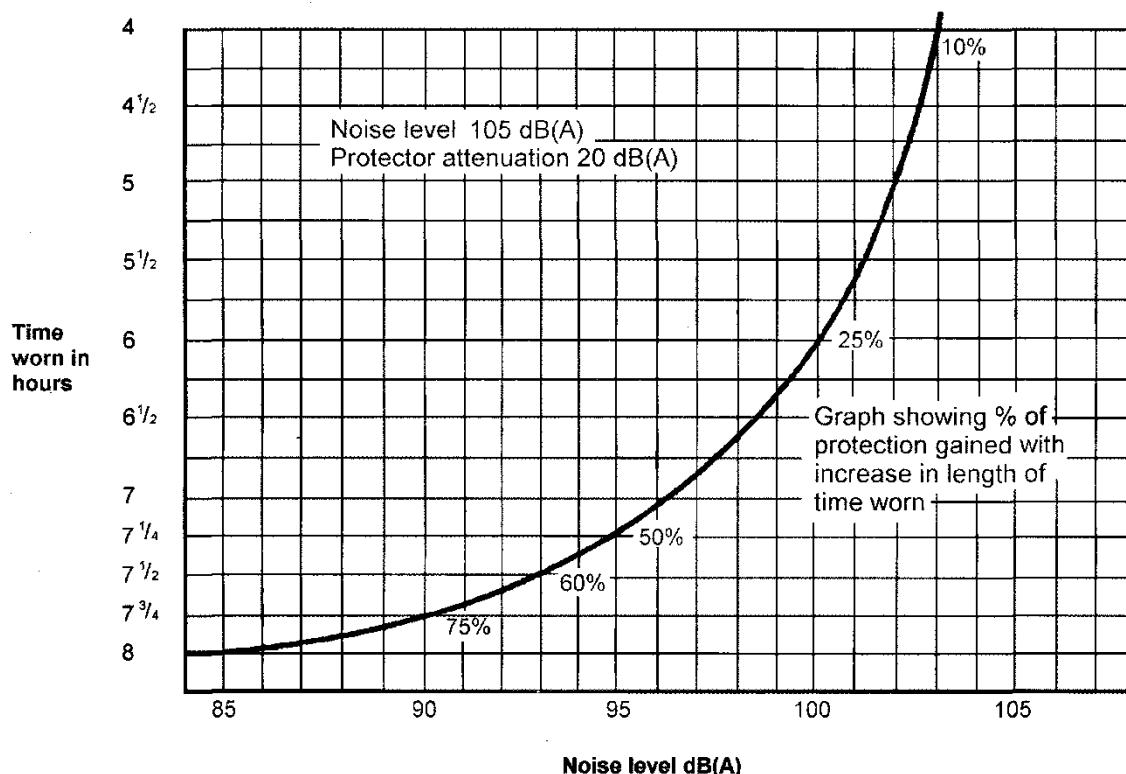
ARAB ENGINEERING BUREAU

## 1.2.10. Appendix 1

### The effect on maximum working times due to exposure without protection

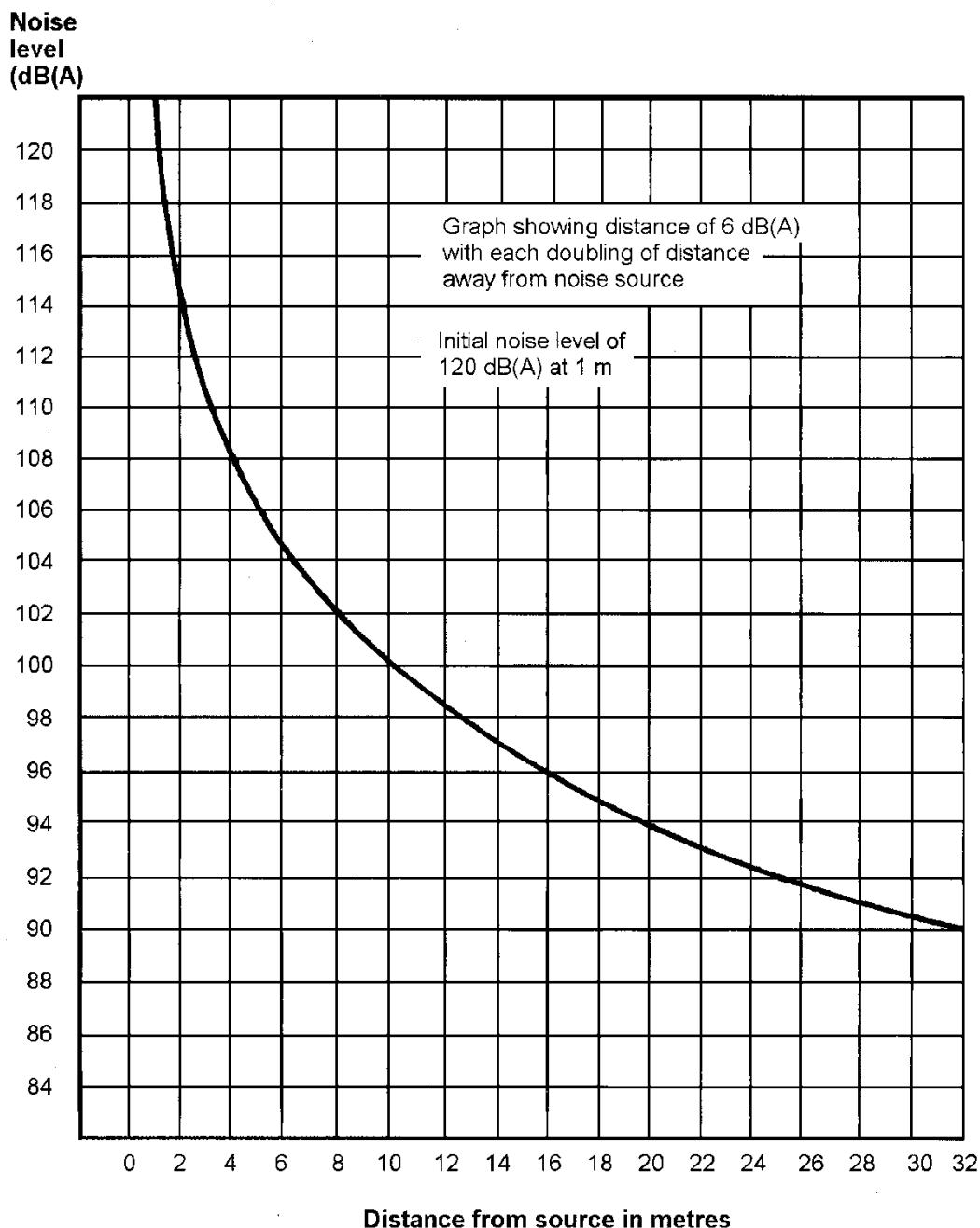
Average noise level dB(A)	Maximum exposure in one working day if 80 dB(A) (LEp,d) is not exceeded
80	8 hours
83	4 hours
86	2 hours
89	1 hour
92	30 minutes
95	15 minutes
98	7.5 minutes
101	3.75 minutes

### Increase of protection gained in relation to time if ear protectors are worn



### 1.2.10. Appendix 2

#### How sound levels vary with distance from source

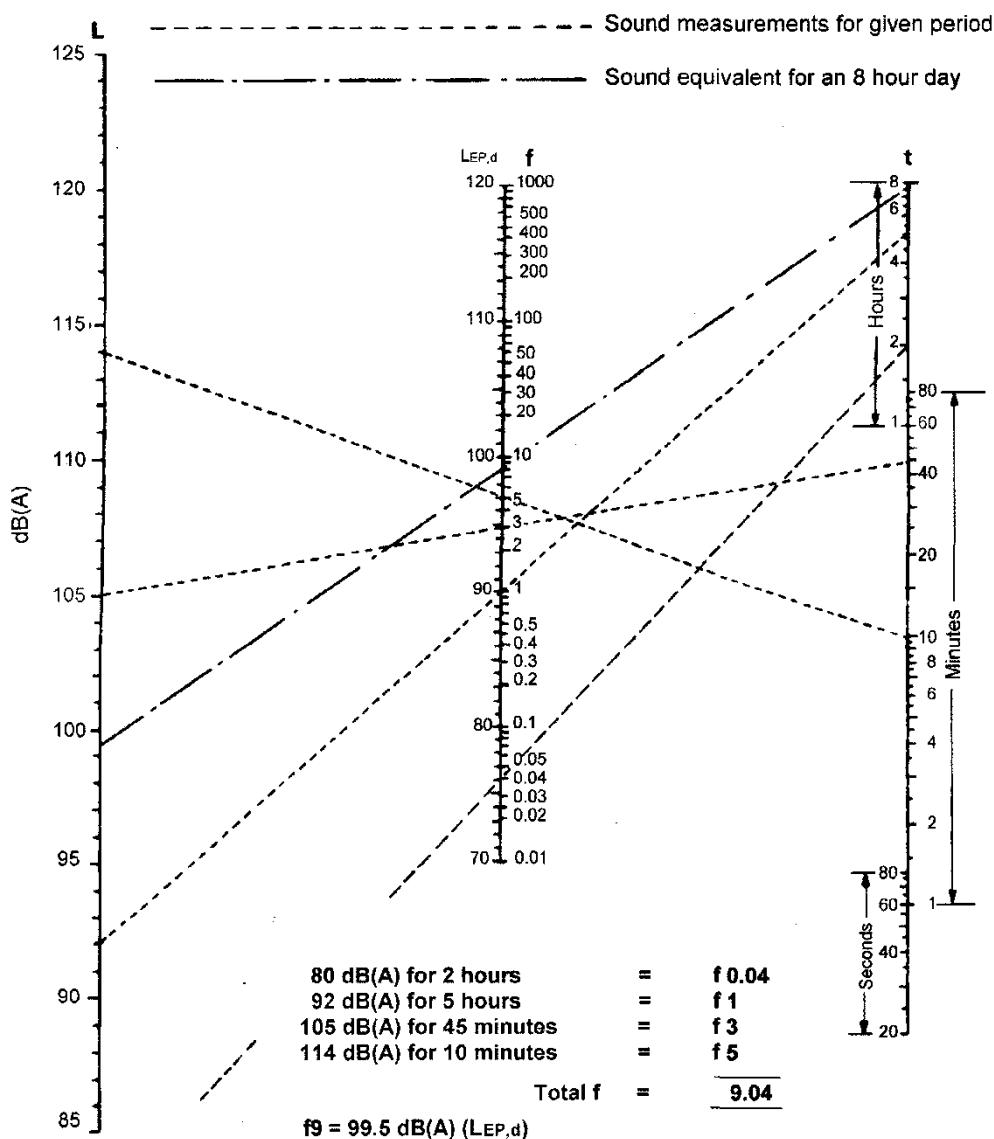
**Notes:**

- 1 This assumes that the sound at the measurement point only comes directly from the source and there are no reflections from the ground or any other objects
- 2 This is the noise level at the ear and not at the source
- 3 The graphs on pages 14 and 15 of this module are based on the International Organisation for Standardisation standard where an increase of 3 dB(A) is regarded as doubling the noise level or halving the exposure time.

## B10. Appendix 3

### Calculating personal noise exposure

- 1 Nomogram for calculation of equivalent continuous sound level for an eight hour period, so giving the daily personal noise exposure.



- 2 For each exposure, connect sound level dB(A) with exposure duration  $t$  and read fractional exposure  $f$  on centre scale.
- 3 Add together values of  $f$  received during one day to obtain total value of  $f$ ,
- 4 Read equivalent continuous sound level opposite total value of  $f$ , by drawing a line through  $f_9$  from the time scale  $t = 8$  to read  $LEP,d$  on the  $L$  scale.
- 5 The noise exposure figures on the nomogram are illustrative only and do not represent a legal or safe level of exposure to noise.

## 1.2.10 Appendix 4

### Some typical sound levels of construction and piling equipment

(Levels given are average at source)

Sound level dB(A)	Construction equipment	Piling equipment
95	Hand tools - electric	
100	Hand tools - air	
101	Forklifts	
102	Hammer drill	
103	Dumpers	
104	Concrete mixer	
105	Hand tools - petrol	
106	Tower cranes	
107	Circular bench saw	
108	Trucks	
109	Excavators	6 tonne drop hammer (cased piles)
110	Crawler cranes	
111	Heavy lorries	
112	Ready mix	
113	Hoists diesel	
114	Loading shovel	
115	Rock drill	
116	Batching plant	Trench hammer (sheet piles)
117	Generators	Rotary bored piles
118	Loaders	Screen drop hammer (sheet piles)
119	Cranes - lorry mounted	
120	Compressors - compactors	Impact boring (driving case method)
121	Bulldozers - graders	2 tonne drop hammer (pre-cast concrete piles)
125		Vibration system (sheet piles)
126		Resonant system 'h' section
128		Single acting air hammer (pre-cast concrete)
136		Diesel hammer (sheet piles)
138		Double acting air hammer (sheet piles)

These sound levels are for guidance only. Information should be sought from the manufacturer or the plant hire company regarding machines on site.

Noise levels emitted from the machines will be affected by the competence of the operator and the quality of maintenance.

For accurate measurement of site noise, a survey is necessary.

## 1.2.10 Appendix 5

### Summary of legal requirements

Contractors' duties	Exposure below the <b>lower exposure action value</b> of 80 dB(A)	Exposure at or above the <b>lower exposure action values</b> of 80 dB(A) or peak sound pressure of 135dB(C)	Exposure at or above the <b>upper exposure action values</b> of 85dB(A) or peak sound pressure of 137dB(C)	Exposure at or above the <b>exposure limit values</b> of 87dB(A) or peak sound pressure of 140 dB
<b>Assessment of noise exposure</b> Risk assessment to be carried out and reviewed as necessary Record of significant findings and control measures put in place Risk assessment to include extra considerations in higher risk situations		✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓
<b>General duty to reduce risk</b> Risk of hearing damage to be eliminated or reduced to the lowest level reasonably practicable Implement organisational and technical control measures, excluding issue of personal hearing protection Reduce exposure below exposure limit value (ELV), if ELV breached, identify why and modify organisational and technical measures Ensure noise exposure in rest facilities is kept to acceptable level Adapt control measures as necessary to take account of employee(s) who may be particularly at risk from exposure to noise Consult with employees on protective measures taken	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓

Contractors' duties (continued)	Exposure below the <b>lower exposure action value</b> of 80dB(A)	Exposure at or above the <b>lower exposure action values</b> of 80 dB(A) or peak sound pressure of 135dB(C)	Exposure at or above the <b>upper exposure action values</b> of 85 dB(A) or peak sound pressure of 137 dB(C)	Exposure at or above the <b>exposure limit values</b> of 87dB(A)or peak sound pressure of 140 dB
<p><b>Provision of hearing protection</b></p> <p>Ensure that personal hearing protectors are:</p> <ul style="list-style-type: none"><li>• provided to employees who ask for them</li><li>• provided to all those exposed</li><li>• used by all those exposed.</li></ul> <p>Create hearing protection zones, designated by appropriate signs and:</p> <ul style="list-style-type: none"><li>• restrict access if justified by the level of risk</li><li>• ensure as far as is reasonably practicable that all who go into a marked hearing protection zone use hearing protection.</li></ul>		✓	✓	✓

<b>Contractors' duties (continued)</b>	Exposure below the lower exposure action value of 80 dB(A)	Exposure at or above the lower exposure action values of 80 dB(A) or peak sound pressure of 135dB(C)	Exposure at or above the upper exposure action values of 85 dB(A) or peak sound pressure of 137 dB(C)	Exposure at or above the exposure limit values of 87 dB(A) or peak sound pressure of 140 dB
<b>Maintenance and use of equipment</b> Ensure so far as is reasonably practicable that:			✓	✓
<ul style="list-style-type: none"> <li>• all equipment provided under these Regulations, except personal hearing protectors, are fully and properly used</li> <li>• all equipment is maintained in an efficient state and good working order.</li> </ul>	✓	✓	✓	✓
<b>Information instruction and training</b> Provide adequate information, instruction and training and update it as necessary, on:			✓	✓
<ul style="list-style-type: none"> <li>• the nature of the risks to hearing from noise }</li> <li>• the organisational and technical measures taken }</li> <li>• the action and limit values }</li> <li>• the significant findings of the risk assessment }</li> <li>• how to obtain a personal hearing protector }</li> <li>• how to detect and report signs of hearing damage }</li> <li>• the entitlement to health surveillance }</li> <li>• the results of any <i>collective</i> health surveillance. }</li> </ul>		✓	✓	✓
Provide information, instruction and training for anyone who has responsibilities for ensuring the Contractor's legal duties are carried out.		✓	✓	✓

<b>Contractors' duties (continued)</b>	Exposure below the lower exposure action value of 80dB(A)	Exposure at or above the lower exposure action values of 80dB(A) or peak sound pressure of 135dB(C)	Exposure at or above the upper exposure action values of 85dB(A) or peak sound pressure of 137 dB(C)	Exposure at or above the exposure limit values of 87dB(A) or peak sound pressure of 140 dB
<b>Health surveillance</b>  Provide as appropriate if the risk assessment indicates there to be } a risk to employees' health resulting from noise at work }  Keep and maintain records of health surveillance } Enable employees access to their own health surveillance }  Where employee found to have hearing damage: } • ensure the employee is informed by a suitably qualified person } • review the risk assessment and control measures } • consider assigning the employee to alternative (non-noisy) work } • continue with health surveillance. }		✓	✓	✓
<b>Employee's duties</b>				
<b>Use of equipment</b>  Employees must: • make full and proper use of personal hearing protectors • use any other control measures provided by the Contractor • report any defects discovered in the protective measures to the Contractor.	✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓
<b>Health surveillance</b>  Attend health surveillance procedures as required by the Contractor in working hours and at the Contractor's expense.		✓	✓	✓

## Construction Site Safety

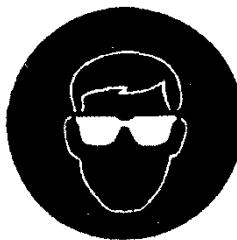
### 1.2.11 Protection of the Eyes

#### 1.2.11.1 Key points

- 1 Many eye injuries occur to people at work each year because eye protection is not being worn.
- 2 These accidents are easily preventable simply by wearing the correct type of eye protection.
- 3 The loss of sight, even in one eye, will have a profound effect on the sufferer.
- 4 Given the nature of most construction sites, in many cases protection of the eyes will be achieved by the issue and wearing of appropriate personal protective equipment (PPE).
- 5 In common with other types of PPE, Contractors must:
  - (a) identify the correct type of eye protection necessary;
  - (b) provide it at no charge to employees who need it;
  - (c) provide adequate information, instruction and training in its use;
  - (d) make sure that it is worn.
- 6 Users of eye protection must:
  - (a) wear it when there is a risk of eye injury as indicated by a risk assessment;
  - (b) look after it, particularly with regard to protecting the lenses or face shield;
  - (c) return it to any accommodation allocated to it when not in use;
  - (d) report to the Contractor any defect, such as scratched or crazed lenses, and obtain a replacement;
  - (e) report to the Contractor if it is lost and seek a replacement.

#### 1.2.11.2 Introduction

- 1 A person's eyes are very vulnerable and an accident or injury can completely change that person's way of life.
- 2 Analysis of the injuries to people's eyes shows that damage is caused as follows:
  - (a) 75% by impact
  - (b) 10% by abrasion following ingress of dust or other foreign body
  - (c) 15% by burns or chemical contamination.
- 3 The majority of these injuries would have been prevented if the correct eye protection had been worn.
- 4 Contractors must make a provision for the protection of the eyes of employees at work.
- 5 The protection provided must conform to the approved specifications and includes goggles, visors, spectacles, face screens and fixed shields, either free standing or attached to machinery or plant.



**Wear eye protection**

### **The Management of Health and Safety at Work**

#### **1.2.11.3 Personal Protective Equipment**

##### **Duties of Contractors**

- 1 If a risk assessment identifies that employees may be exposed to a risk of injury to their eyes then, unless the risk can be adequately controlled by other means, the Contractor has a duty to supply eye protection and must take all reasonable steps to ensure that it is worn. Selection of all personal protective equipment should be carried out by a competent person.

##### **Eye protectors and shields Issue and availability**

- 2 Eye protectors should be:
  - (a) issued on a personal basis to the person at risk
  - (b) maintained and readily available in sufficient numbers for persons occasionally employed.

##### **Replacement of eye protectors**

- 3 Eye protectors should be kept available in sufficient numbers so that any which become lost, destroyed or defective can be replaced.

##### **Construction and marking**

- 4 All eye protectors and shields provided must comply with British or International specifications and be:
  - (a) suitable for the type of work or risk involved
  - (b) suitable for the user to give them minimum discomfort and ease of movement whilst working
  - (c) marked to identify their type and suitability
  - (d) maintained, kept clean and disinfected.

##### **Fixed shields**

- 5 Fixed shields provided must:
  - (a) conform to the relevant European Standard specification
  - (b) be cleaned regularly, disinfected and properly maintained
  - (c) be so constructed and kept in position as to protect the eyes.

##### **Duties of employees**

- 6 It is the duty of an employee:

- (a) to tell their Contractor of any work situation which presents a risk to the health and safety of themselves or others
- (b) where there is any risk of injury to the eyes, to use the protection provided in accordance with the instructions and training given
  - (i) to take care of eye protectors
  - (ii) to report any loss or defect to the Contractor.

#### 1.2.11.4 Eye Protection

##### Identifying the type of hazard

- 1 Only when the Contractor has carried out a risk assessment to determine the hazards can the correct type of eye protector be supplied.
- 2 Some of the types of hazard detailed require eye protectors to have sufficiently strong lenses or shield to withstand the impact of particles or fragments striking them.
- 3 The effectiveness of the seal made between the eye protectors and the operator's skin is very important in affording protection against the type of hazard where irritant or corrosive materials are involved.
- 4 The ability to withstand high temperatures or reduce strong light and glare is a main requirement for the other types of eye protector.
- 5 For further information concerning specific requirements or combinations of different kinds of protection, manufacturers' literature should be consulted.

#### 1.2.11.5 Types of eye protector

- 1 There are several types of eye protector and it is important to select and issue the correct type to give the required protection. The types and their markings are listed in Appendix 1.



General purpose safety spectacles



Face shield

- 2 Examples of the types of work for which the various standards of eye protection might be used, are listed in Appendix 2.

#### 1.2.11.6 Eye protection safety checklist

- 1 Have operations requiring eye protection been identified?
- 2 Has the work activity been assessed to determine what, if any, hazards exist?
- 3 Are appropriate types of eye protection available for the various work activities to be carried out?

- 4 Does all eye protection comply with the relevant standard?
- 5 Is the eye protection supplied on a personal basis to employees?
- 6 Are there sufficient quantities of eye protectors available for occasional users?
- 7 Is the use of eye protection satisfactorily monitored?
- 8 Have employees been informed of work activities requiring eye protection?
- 9 Have employees been trained in the correct use and maintenance of eye protection?
- 10 Are employees aware of their responsibilities with regards to the care and reporting of loss or defective eye protectors?
- 11 Are appropriate safety signs displayed?

#### **1.2.11.7 Lasers**

- 1 Items of equipment producing light amplification by the stimulated emission of radiation, more normally known as lasers, are widely used on construction sites, mainly for alignment and levelling in civil engineering. Most are of the helium or neon continuous wave type and emit visible light, but some lasers emit in the invisible infrared region of the electromagnetic spectrum, and these require extra caution.
- 2 The optical radiation produced by a laser is absorbed by the first few centimetres of the body and so the skin and eyes are the tissues most at risk of damage.
- 3 All lasers should comply with EN 60825. This standard groups laser products into five classes (with some subclasses), based on acceptable emission levels, and is intended to ensure that the manufacturer and user of laser products comply with current requirements.
- 4 *Appendix 3 reproduces an extract of information contained in EN 60825.*
- 5 The use of Class 1 and 2 products is preferred on construction sites because these represent the lowest risk of eye injury. However, even these lower power lasers can cause eye damage if they are misused, for example, staring directly into the beam or viewing the beam through any magnifying device.
- 6 Class 3R and 3B lasers, which may sometimes be in use, can involve hazards to both the user and other personnel. Those who maintain, operate and supervise the use of these products must be fully trained, competent and capable of implementing the necessary safety and hazard control procedures.
- 7 Where lower power lasers are used, the human 'blink reflex' will offer some protection. However, this should not be relied upon and is unlikely to offer any protection from higher power lasers.
- 8 Appendix 4 outlines the hazards arising out of the uses of the various classes of laser and control measures necessary.

#### **General procedures**

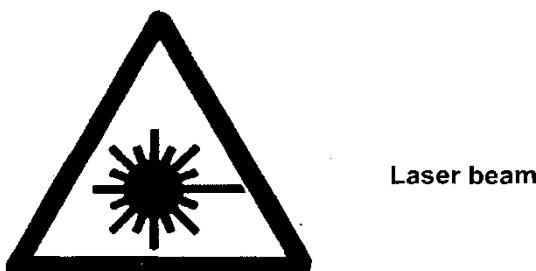
- 9 Full training and information must be given to persons using lasers.
- 10 There should be no unauthorised access to any laser equipment.
- 11 All personnel must be aware of the hazards when working with lasers, the safe working

procedures and accident reporting procedures.

- 12 Any necessary eye protection equipment, hazard signs, barriers, etc. must be available and in use as necessary.
- 13 Any eye protectors used in conjunction with lasers must be suited to the wavelength of the laser in use. General purpose safety glasses offer no protection whatsoever against lasers and should not be used.
- 14 All hazard areas must be clearly defined with signs and barriers.
- 15 The laser beam should only be directed at non-reflecting surfaces. Any adjacent reflective surfaces must be covered, otherwise the beam will diverge and could affect other areas and people not directly involved in the job.
- 16 Extra care must be taken when working near reflective surfaces (e.g. water, dust, spray) which cannot be marked or covered.
- 17 Special precautions must be taken when working near roads, airfields and other public areas, where a stray beam could cause a hazard.
- 18 When work activities require the use of high powered lasers, the work should, when possible, be undertaken when the site is vacated (such as evenings or weekends). If this is not possible, special precautions will be necessary to ensure that unauthorised persons do not enter the work area or any designated area.
- 19 See Appendix 3 for specific precautions.

#### **In the event of an eye injury caused by a laser**

- 20 No medication is to be applied to the eye.
- 21 The eye involved should be covered with a clean, dry material.
- 22 Immediate medical attention should be sought.
- 23 A thorough ophthalmic examination should be carried out within 24 hours, with a full biophysical investigation.



Laser beam

#### **Laser safety checklist**

- 24 Has a risk assessment been carried out?
- 25 Only competent and trained people must be allowed to operate laser equipment.

- 26 The hazard area should be defined and clearly marked.
- 27 Create an 'exclusion zone' when the more powerful classes of laser are being used.
- 28 When work with lasers is taking place, only authorised people should be allowed in the area.
- 29 The correct eye protection must be in use during all laser operations.
- 30 There should be no danger to any other person(s) resulting from stray reflections or from any activity involving the use of lasers.
- 31 Where necessary, the source and direction of the laser beam should be clearly identified.
- 32 The laser beam should only be directed at a non-reflecting surface.
- 33 Any other reflective surfaces should be covered.
- 34 All laser equipment should comply with British Standard EN 60825.
- 35 Beam attenuators and any other safety devices must be in use when using Class 3R and 3B products.

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## Construction Site Safety

### 1.2.11 Appendix 1

#### The standards of eye protection

Hazard description	Marking
Increased robustness	EN 166 (1 or 2).S
Low energy impact (45 m/sec)	EN 166 (1 or 2).F
Medium energy impact (120 m/sec)	EN 166 (1 or 2).B
High energy impact (190 m/sec)	EN 166 (1 or 2).A
Droplets and splashes of liquid	EN 166 (1 or 2).3
Large dust particles	EN 166 (1 or 2).4
Gas and fine dust particles	EN 166 (1 or 2).5
Short circuit electric arc	EN 166 (1 or 2).8
Molten metal and hot solids	EN 166 (1 or 2).9
Hard coat (resistance to fine particles)	EN 166 (1 or 2).K
Non-mist (resistance to fogging)	EN 166 (1 or 2).N
Face shields (welding)	EN 175

#### Notes:

- 1 The 1 or 2 in the EN numbers refer to the optical characteristics of the PPE.
- 2 Eye protectors manufactured to the British and European Standard are subjected to a number of tests (including temperature, robustness and optical quality) before approval.
- 3 In the test of robustness, for example, general purpose goggles to EN 166.1 .S must withstand the impact of a 6 mm steel ball travelling at 12 m/sec (43.45 km/h). Impact goggles to EN 166.1.F must withstand the impact at 45 m/sec (160.93 km/h) and for EN 166.1.B they must withstand an impact at 120 m/sec (434.52 km/h).
- 4 Eye protection to EN 166 A is for specialist applications and is only available in the form of a face shield.
- 5 Safety goggles are marked with a combination of letters and numbers to indicate the standard of protection provided, for example:
  - (a) EN 166.1 .F is impact-resistant to a low energy projectile.
  - (b) EN 166.1.B.3.4 is impact-resistant to medium energy projectiles, droplets, splashes of liquid and large dust particles.
  - (c) EN 166.1.A.9 is impact-resistant to high energy projectiles, molten metal and hot solids.

## 1.2.11 Appendix 2

### Selecting eye protection

- 1 The following hazards are those most likely to be encountered in construction operations. Approved eye protection is required and must be provided for all persons engaged in any of the processes specified below.
- 2 The protection listed below is recommended as containing good practical value, but should be regarded as the **minimum** standard required.
- 3 Eye protection must be selected in the light of the work activity to be undertaken and the assessed level of risk. A suitable and sufficient risk assessment will identify hazards and indicate the control measures required to minimise the likelihood and severity of potential risks.

Process to be considered	Hazard	Recommended protection	BS specification
<b>PART I Processes in which approved eye protectors are required</b>			
Use of compressed air with shot or other abrasives for blasting or cleaning (1, 2)	High speed flying fragments or particles	Goggles Face shield	EN 166.B
Cleaning by means of high pressure water jets (3)	Flying fragments or particles	Goggles Spectacles Face shield	EN 166.S
Use of hand or power tools to strike masonry nails (4)	Flying fragments or particles	Goggles Spectacles Face shield	EN 166.F
Handling and use of cartridge-operated tools (5)	High speed flying fragments or particles	Goggles Face shield	EN 166.B
Chipping of metal, chipping; knocking out or cutting of cold rivets, bolts, nuts, lugs, pins, collars etc. using hand or power tools (6)	Flying fragments or particles	Goggles Spectacles Face shield	EN 166.F
Chipping or scuffing of paint, scale, slag, rust etc. from metal and other hard materials using hand or power tools (7)	Flying particles, dust	Goggles	EN 166.4
Use of power-driven high-speed metal cutting saw, or abrasive cutting-off wheel or disc (8)	High speed flying fragments or particles	Goggles Face shield	EN 166.B

Operation, maintenance, dismantling or demolition of plant which contains or has contained acids, alkalis, corrosive materials, or other dangerous substances, whether liquid or solid (11)	Flying particles, chemical splash, injurious dust	Goggles	EN 166.3 and 4
Handling in open vessels or manipulation of the substances described above (12)	Flying particles, chemical splash, injurious dust	Goggles	EN 166.3 and 4
Pressure injection of liquids or solutions into buildings or structures (14)	Chemical splashes	Goggles	EN 166.3
Use of hand or power tools to drive in bolts, pins, collars etc. (13)	Flying fragments or particles	Goggles Spectacles Face shield	EN 166.F
Breaking up of metal by use of a hammer (whether power-driven or not) or a tup	Flying fragments or particles	Goggles Spectacles Face shield	EN 166.F
Use of compressed air to remove swarf, dust, dirt etc. (17)	Flying fragments or particles	Goggles Spectacles Face shield	EN 166.S
Pouring or skimming molten metal (18)	Molten metal, splash, sparks	Goggles Face shield	EN 166.9
Breaking, cutting, dressing, carving or drilling with hand or power tools the following materials:(i) Glass, hard plastics, concrete, fired clay, plaster, slag, natural or artificial stone, and any similar materials. Also any articles consisting wholly or partly of these materials(ii) Stonework, brickwork, or blockwork(iii) Bricks, tiles, or blocks (16)	Flying fragments or particles	Goggles Spectacles Face shield	EN 166.F
Cutting of wire and related operations (21)	Flying fragments or particles	Goggles Spectacles Face shield	EN 166.S
Cutting of wire or metal strapping under tension (22)	High speed flying fragments or particles	Goggles Spectacles Face shield	EN 166.B
Processing and handling of glass or cullet (23)	Flying fragments or particles	Goggles Spectacles Face shield	EN 166.S

**PART II Processes in which approved shields or approved fixed shields are required**

Electric arc welding (24)	Glare, radiation, heat, spatter	Fixed shield and/or welding helmet or band screen	Housing EN 175 Filters EN 169
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**PART III Processes in which approved eye protectors or approved shields or approved fixed shields are required**

Gas welding (25)	Glare, radiation, heat, splatter	Goggles	Housing EN 175 Filters EN 169
Cutting, boring, cleaning, surface-conditioning, or spraying of material using apparatus supplied with oxygen or flammable gas under pressure (27)	Flying fragments or particles	Goggles	Housing EN 175 Filters EN 169
Processes involving the use of lasers (28)	Radiation and burning	Fixed shield Goggles	EN 60825

**PART IV Process in which approved eye protectors or approved shields or approved fixed shields are required**

Truing or dressing of abrasive wheels (29)	High speed particles or fragments	Fixed shield and/or goggles	EN 166 B
Dry grinding of materials or articles using a power-driven wheel, disc or band, or a portable tool (31)	Flying particles or hot sparks	Goggles Spectacles Face shield	EN 166 F
Machining of metals including any dry grinding process not elsewhere specified (34)	Flying particles	Goggles Spectacles	EN 166 S
Welding of metals by an electric resistance process or a submerged electric arc (35)	Flying particles, spatter	Goggles Spectacles Face shield	EN 166 S

**Cases in which protection is required for persons at risk from, but not employed in, the process**

Chipping of metal, chipping; knocking out or cutting of cold rivets, bolts, nuts, lugs, pins, collars, etc. using hand or power tools (1)	Flying fragments or particles	Goggles Spectacles Face shield Fixed shield	EN 166 F
Electric arc welding (2)	Glare, radiation, spatter	Cover Goggles Spectacles	EN 166 S Filters EN 169
Process involving lasers	Radiation and burning	Goggles Spectacles	EN 60825

## Construction Site Safety

### 1.2.11 Appendix 3

#### Summary of technical requirements when using lasers

This table constitutes a quick reference guide for the safe use of lasers. For further authoritative information, consult EN 60825:1991.

Classification Requirement	Class 1	Class 2	Class 3R (formerly Class 3A)	Class 3B	Class 4
Labelling	Hazard warning label Yellow background with black symbol and border, with the words CLASS 1 LASER PRODUCT	1) Hazard warning label Yellow background with black symbol and border 2) Explanatory label (black/yellow) LASER RADIATION DO NOT STARE INTO BEAM CLASS 2 LASER PRODUCT	As 1 - 2 except explanatory label to read: LASER RADIATION DO NOT STARE INTO BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS CLASS 3R LASER PRODUCT	As 1 - 3 except explanatory label to read: LASER RADIATION AVOID EXPOSURE TO BEAM CLASS 3B LASER PRODUCT	As 1 - 3 except explanatory label to read: LASER RADIATION AVOID SKIN OR EYE EXPOSURE TO DIRECT OR SCATTERED RADIATION CLASS 4 LASER PRODUCT
Key control	Not required			Remove key when not in use	
Beam attenuator	Not required			When in use prevents inadvertent exposure	
Emission indicator device	Not required			Indicates laser is energised	
Warning signs	Not required			Follow precautions on warning signs	
Beam path	Not required	Terminate beam at end of useful length			
Specular reflection	Not required			Prevent unintentional reflections	
Eye protection	Not required		Required if engineering and administrative procedures not applicable and MPE exceeded		
Protective clothing	Not required			Sometimes required	Specific requirements
Training	Not required		Required for all operator and maintenance personnel		

## Construction Site Safety

### 1.2.11 Appendix 4

#### Laser health risks and control

Class of laser	Health risks	Control measures
Class 1M	Potentially harmful to the eye but only if deliberately viewed through an optical magnifying device, such as binoculars.	No one must be allowed to deliberately look at the beam or to direct the beam into another person's eyes.  Magnifying devices such as binoculars must not be used by any person who may be exposed to a laser beam whilst using them.
Class 2	May be harmful to the eyes if deliberately misused, for example, if someone stares directly into the beam.	As above.
Class 2M	Harmful to the eyes if viewed through an magnifying optical device.	As above.
Class 3R (formerly Class 3A)	These are higher power lasers that can cause eye injuries, generally exposure is no more hazardous than to a Class 2 device because of the human 'blink reflex'.	EN 60825 specifies minimum training requirements for the users of Class 3 and 4 lasers. This will include information on the risks from the beam and the advice against misuse.
Class 3B and Class 4	A higher power laser that can cause eye injury, either directly from viewing the beam or from reflections.	Appropriate eye protection (PPE) must be worn whenever Class 3R or more powerful lasers are used. Class 3B and Class 4 lasers. Particular training on these classes of laser is required. The human 'blink reflex' is not likely to offer any protection to anyone accidentally exposed to the beam.

## Construction Site Safety

### 1.2.12 Protection of the Occupational Skin

#### 1.2.12.1 Key points

- 1 Many of the substances used or created during construction activities have the potential to cause severe skin problems.
- 2 The (COSHH) risk assessment and the information on the accompanying data sheet and a substance's container should indicate the degree of risk and the preventative measures necessary.
- 3 Ideally, the risk will be eliminated by avoiding the substance altogether, although this will often not be practical.
- 4 Hazardous substances created by work processes will carry no 'health warning' but must be identified in a (COSHH) risk assessment.
- 5 Skin conditions can be prevented by such simple actions as wearing the appropriate gloves (PPE).
- 6 Barrier creams offer limited protection against some substances but should not be relied upon.
- 7 Most substances can enter the body through openings such as cuts and grazes. Other, more hazardous, substances can penetrate unbroken skin.
- 8 Periodic 'self-checks' or hand-checks carried out by someone trained to recognise the symptoms are an effective form of initial health surveillance.
- 9 Prompt medical advice should be sought if there could be an emerging health problem.
- 10 Dermal exposure to hazardous agents in the workplace can result in a variety of occupational skin diseases and systemic toxicity.
- 11 Often, efforts to protect workers from inhalation hazards take priority over preventing skin exposures.
- 12 Employers shall conduct risk assessments and implement controls and protective measures to protect workers' skin

#### 1.2.12.2 Introduction

- 1 Industrial dermatitis is a major cause of absenteeism.
- 2 It is an inflammatory skin condition which is neither infectious nor contagious. It is caused by certain irritants contained in many industrial materials. Although dermatitis is not itself an infection, it can lead to infection when the skin's natural barriers break down.
- 3 Dermal absorption is the transport of a chemical from the outer surface of the skin both into the skin and into the body. Often this can happen without the worker realizing.
- 4 Many chemicals in the workplace can be toxic, causes diseases, and even cancer if absorbed through the skin and into the bloodstream – such as pesticides, organic solvents.
- 5 Employers to ensure that workers who handle chemicals or other hazardous agents are provided with the appropriate chemical resistant gloves and clothing.
- 6 Employers to provide washing facilities.
- 7

### 1.2.12.3 Protection of the Skin

1 There are two general types commonly known as 'contact dermatitis' and 'allergic dermatitis':

#### **Irritant / Contact dermatitis**

- 2 Irritant dermatitis is usually caused by the skin coming into contact with an irritant substance - usually a chemical, but it can be a mineral.
- 3 This is sometimes also called irritant dermatitis. It is the commonest form of occupational dermatitis and results from repeated contact with any substance that irritates the skin. Such substances can include cement, lime, plaster, paint, solvents, adhesives, sawdust, oils, pitch, tar, fibreglass, white spirit, thinners and most acids and alkalis.
- 4 Repeated exposure to extreme heat or cold can lead to physical damage to the skin and make it more likely that irritant dermatitis will occur. Wet work, which involves the hands being wet for long periods (more than two hours a day) or repeatedly getting the hands wet, can also cause dermatitis. Anyone may be affected, and the length of exposure together with the strength of the irritant substance will affect the seriousness of the complaint. Most cases of dermatitis are of this type.
- 5 The effect of the substances is usually to cause the skin to dry out and crack due to the removal of the natural oils. Skin damaged in this way is very vulnerable to other infections.

#### **Sensitising / Allergic dermatitis**

- 6 Sensitising dermatitis, also known as allergic contact dermatitis, accounts for about 20% of all work-related dermatitis.
- 7 Some people develop a sudden allergic reaction following exposure to a specific substance. The reaction may be after weeks, months or even years of use or exposure to a substance without any ill effects.
- 8 However, once that sensitising dermatitis has occurred, any future exposure to the substance will again produce an adverse reaction. The exposure may be to an everyday chemical or mineral, and may be as simple as exposure to nickel in jewellery.
- 9 The outer layer of skin forms a natural defence against irritants providing it is undamaged by cuts and abrasions, or by solvents (such as hydrocarbons, benzene, tetrachloride, spirits and thinners) that remove the skin's natural protective oils. Reaction of the skin to an irritant varies from one individual to another. The reaction may be only a mild redness or it can develop into swelling, blisters and septic ulcers that are both unsightly and painful.
- 10 Personal hygiene is particularly important when working with materials which may be irritants, as resistance to an irritant varies with the type of skin. Pores, ducts and hair follicles in the skin may admit irritants to the sensitive inner skin layer and, therefore, washing thoroughly to remove dirt and grime with soap and water is an essential preventative measure.
- 11 It is equally important that clothing is kept clean. Oil-stained overalls are a known cause of skin problems around the thighs.
- 12 The best course of action is to prevent skin contact with all potentially irritant substances, even if this is achieved by issuing PPE. When total avoidance of skin contact cannot be guaranteed, it will be necessary in some cases to implement occupational health screening (depending on the hazardous properties of the substance). Initially this should involve establishing whether the persons involved in the job have had any previous adverse reaction to the substance(s) in use.
- 13 Those people who are found to be allergic to one or more substances should be identified and not be allowed to handle or come into contact with them. Any part of the body that comes into

contact with a skin irritant may be affected although it is usually the hands, wrists and forearms that are affected initially. Treatment for dermatitis should be sought as soon as possible because, if neglected, symptoms may spread to other parts of the body.

- 14 The main sensitising substances on site are cement, resins, glues, hardeners, hardwoods, chrome and nickel compounds. The allergic response is usually specific to an individual as opposed to affecting everyone, and can also appear suddenly after many years' exposure.

#### 1.2.12.4 Skin burns

- 1 Many substances that are used in the construction industry have corrosive properties that can cause severe burns to the skin. These substances have either strong acid or alkali properties.

#### 1.2.12.5 Abrasion and cuts

- 1 Manually handling objects with rough surfaces, sharp corners etc. can cause damage to the skin of the hands if appropriate gloves, such as rigger gloves, are not worn. Repetitive manual handling may even make the situation worse. Such damage breaks the surface of the skin making it more vulnerable to absorbing other substances that could potentially have severe health effects. Worn-out gloves must be thrown away and replacements obtained.
- 2 Where objects with sharp edges such as sheet glass, sheet metal components etc. have to be manually handled, gloves with cut-proof material, such as Kevlar, woven into the fabric must be worn.
- 3 Ideally, work would be organised so that the manual handling of all such objects could be avoided, however, given the nature of construction activities, total avoidance is usually not possible. For example a roof tiler may now use an inclined hoist to get the tiles up to roof level, but the hoist must still be loaded and the tiles distributed around the roof by hand.

#### 1.2.12.6 Health and Safety at Work (Construction Sites)

- 1 **Contractors** have a duty to ensure that, as far as is reasonably practicable, safe systems of work are used, that adequate welfare facilities are available and that appropriate information, instruction, training and supervision are provided, as is necessary to ensure safety and the absence of risks to health in the use, handling, storage and transport of articles and substances.
- 2 **Employees** are required to take reasonable care for their own health and safety, and that of other persons who may be affected by their work, and to co-operate with the Contractor so as to enable them to carry out their legal duties and requirements. In addition, employees must not intentionally or recklessly interfere with anything provided in the interests of health and safety.

#### 1.2.12.7 The Management of Health and Safety at Work

- 1 These Regulations place a requirement on every Contractor to make a suitable and sufficient assessment of every work activity in order to identify any hazard to employees (or any other persons) that might be encountered as a result of the work having been carried out.
- 2 When hazards are identified, it is then the Contractor's duty to either eliminate the hazard or to put control measures into place to reduce the risks to health and safety arising out of the hazards, as far as is reasonably practicable.
- 3 Where a hazard is identified that requires it, the Contractor must offer health surveillance to employees, taking into account the risks to their health and safety that have been identified.
- 4 The Contractor must provide employees with comprehensible and relevant information on any risks that exist in the workplace and control measures that are in place to reduce those risks.

- 5 Employees, in turn, have a duty under these Regulations to tell their Contractor of any work situation which presents a risk to the health and safety of themselves and any other persons who may be affected.
- 6 In the context of this module, the risk assessment must identify any substance to be used that can cause an adverse skin reaction and the control measures that are necessary to ensure that the substance can be used safely.
- 7 Employees are required to use hazardous substances provided in accordance with any training or instructions that they have received from their Contractor.

#### **1.2.12.8 Personal Protective Equipment at Work**

- 1 These Regulations require that where a risk has been identified by a risk assessment, and it cannot be adequately controlled by other means which are equally or more effective, then the Contractor must provide and ensure that suitable personal protective equipment (PPE) is used by employees.
- 2 In essence, PPE may only be used as a last resort after all other means of eliminating or controlling the risk have been considered.
- 3 In deciding which type to issue, the Contractor must take into account the risk that the PPE is being used for, and that the PPE will fit the wearer and allow them to work comfortably.
- 4 Whilst the Contractor must take 'reasonable steps' to ensure that any PPE supplied is worn, employees in turn must ensure that they wear the equipment provided and know the procedures for reporting any loss or defect to their Contractor.

#### **1.2.12.9 Construction (Design and Management) CDM**

- 1 In the context of this section, the relevant requirements of these Regulations include the provision of:
  - (a) designs that avoid foreseeable risks to health and safety
  - (b) adequate washing facilities (including showers, where appropriate)
  - (c) a supply of hot and cold (or warm) water
  - (d) soap or suitable cleansers
  - (e) towels or other means of drying.

#### **1.2.12.10 Use of harmful substances**

- 1 Specifically in relation to skin protection, Contractors must ensure that the appropriate assessments have been made on any articles and substances used at work, and that they are:
  - (a) safe and free from any risk to health, when properly used
  - (b) used in accordance with the findings of risk assessments, procedures and conditions stipulated
  - (c) properly stored, transported and handled
  - (d) properly marked to indicate any special precautions which need to be taken.
- 2 They must ensure that persons using such articles and substances are:
  - (a) suitable and able to carry out the task which is expected of them
  - (b) properly and adequately trained in their use and aware of all necessary precautions which must be taken
  - (c) provided with appropriate personal protective clothing and equipment

- (d) supplied with all necessary information
- (e) educated in the dangers of skin
- (f) conditions, and in methods to be used to prevent those conditions arising
- (g) able to detect, and be aware of, the need to report any signs of skin infection or dermatitis.
- 3 Adequate washing and first aid facilities must be provided, and barrier and cleansing creams should be available. In addition, the Contractor is responsible for providing supervision to ensure the above procedures, conditions and correct methods of work are maintained and that the proper facilities and equipment are available.

#### 1.2.12.11 Potentially harmful substances and agents

- 1 Substances and physical agents which can be potentially harmful to the skin include:
- (a) pitch, tar and bitumen
- (b) cement or lime
- (c) brick, stone, tile and plaster dust
- (d) paints, varnishes, lacquers and stains
- (e) certain types of timber (see Appendix 2)
- (f) fibreglass
- (g) certain epoxy resins
- (h) acrylic and formaldehyde resins
- (i) chromates (in primers, cement, etc.)
- (j) organic solvents
- (k) petrol, diesel and paraffin oils
- (l) white spirit and thinners
- (m) acids or alkalis
- (n) ionising radiation
- (o) solar radiation
- (p) other materials (depending on individual reactions).

#### 1.2.12.12 Effects of contact with some materials

- 1 Skin contact with certain materials can cause a variety of reactions and some examples are given below. This list is not exhaustive.
- 2 **Mineral oils, including fuel oils and mould oils**, can lead to inflammatory skin conditions- dermatitis, oil acne or even skin cancer.
- 3 These may be caused by constant contact with oil or oily clothes and rags (e.g. when placed in overall pockets).
- 4 **Chemicals, including strong alkalis and certain acids, chromates, formaldehyde**, are substances which can penetrate the skin causing ulcers (for example, chrome ulceration) and dermatitis.
- 5 Cement and lime can also cause chronic dermatitis. Wetted cement and lime become more alkaline, corrosive and therefore potentially very damaging to the skin.
- 6 **Solvents and de-greasers, including paraffin, turpentine, petroleum products, thinners**

**and similar solvents**, affect the skin by dissolving the natural oils (de-fattening) which renders it more vulnerable to attack by other substances and bacteria.

- 7 **Tar, pitch, bitumen products, including cresols and phenols like mineral oil**, cause inflammation, blisters and oil acne.
- 8 **Radiation, light and heat radiation, including X-rays, beta and gamma radiation, extremes of radiation, temperature and humidity**, make the skin more susceptible to dermatitis and other skin problems.
- 9 **Epoxy resin hardeners, glass fibres, certain woods, fungicides and insecticides** may irritate the skin and lead to dermatitis.

#### 1.2.12.13 Reducing risks

##### Substitute products

- 1 Every effort must be made to ascertain which substances have the potential to cause dermatitis and, where possible, to substitute other materials that either eliminate or reduce the danger. An alternative, where possible, may be to use a more dilute form of the substance.

##### Reducing contact

- 2 If the outcome of an assessment is that there are no alternatives, and substances that cause dermatitis have to be used, methods of work should be implemented which eliminate contact between the skin and the substance.
- 3 The use of mechanical handling equipment may be possible but, if this is not available, simple devices and instruments, including splash guards, drip trays, tongs, and scrapers, will help to reduce the risk.

##### Healthy working conditions

- 4 It may be possible to use localised ventilation and exhaust systems to deal with dust, fumes and oil spray.
- 5 Plentiful supplies of clean fresh air and comfortable working temperatures are vitally important, as is the general cleanliness of the working area, the machinery and any other equipment which is in use.
- 6 Wherever possible and appropriate, the display of warning and information signs should be prominently made, so that all employees are aware of the hazards existing in that area.

##### Warning signs (black on yellow background)



Corrosive substance

**Mandatory signs (white on blue background)**

Wash hands

**Protecting the worker**

- 7 If a Contractor intends to use any items of PPE (including gloves and barrier creams) as part of their skin protection strategy in the workplace, then it is important that the correct PPE is selected.
- 8 All PPE for skin protection that is produced or imported by reputable companies is manufactured to British and European Standards.
- 9 As with all PPE for use at work, skin protection should be selected by a competent person who can ensure, in discussion with the supplier, that it meets the appropriate standards.

**Protective clothing**

- 10 Protective clothing and other PPE provides one of the most practical ways of limiting contact between the skin and other substances. To be effective, all protective clothing must be the right size, fit for the purpose, maintained in good condition, cleaned regularly and stored carefully when not in use.



- 11 Protective clothing may include gloves, overalls, eye protectors (such as goggles, face shields), aprons, boots and leggings, depending on the work being undertaken. The protective equipment provided must be suited to the requirements of the job.

- 12 Regular inspections must be made to ensure it remains sound and adequate.

### Gloves

- 13 A glove suitable for handling abrasive materials may offer no protection against chemicals. The appropriate glove for sulphuric acid may not be approved for chromic acid.
- 14 Much care is needed in selecting the right type of glove to be used for a particular hazard. Manufacturers' charts and recommendations should be followed when selecting gloves to protect the wearer against specific hazards. A properly selected glove can be useful in the prevention of dermatitis if care is taken to avoid getting contaminants inside the gloves when putting them on and taking them off.
- 15 The modern materials from which gloves are now made enable them to be effective against hazardous substances whilst generally allowing the necessary amount of 'feel' and dexterity where these factors are an issue.

### Industrial gloves - some types and uses

Hazard	Recommended type
Acids, concrete, brickwork, stain removers, solvents, alkalis	Neoprene, nitrile, PVC, rubber
Esters, ethers, ketones (mastic, sealers), aldehydes, petroleum-based products	Medium and heavyweight rubber, neoprene, nitrile, PVC
High and low temperatures	Nitrile, PVC, medium and heavyweight rubber
Abrasion, unloading bricks and blocks, general materials handling	Rubber, nitrile, PVC, neoprene, chrome-leather with reinforced palm
Bitumen, hot work, etc.	Asbestos substitute or 'Nomex' gloves

### Barrier substances

- 16 Where exposure of the skin is unavoidable, the use of barrier creams or other preparations may limit the degree of contact.
- 17 These substances are applied before starting work and removed by washing after each spell of work. Reapplication is necessary before resuming work.
- 18 Water-soluble barrier creams are unsuitable where wet work is involved, and some substances are worn off with manual work.

- 19 There are many types of barrier substances available and it is essential that the right type is used for the work being done.
- 20 Most barrier substances afford only limited protection and should never be relied on as a sole means of protection.

### **Hygiene**

- 21 Personal cleanliness is an important factor in the prevention of dermatitis. The necessary washing facilities and an **AMPLE SUPPLY OF CLEAN WARM WATER, SOAP AND CLEAN TOWELS SHOULD BE MADE AVAILABLE NEAR TO THE WORKPLACE, AND WORKERS SHOULD BE ENCOURAGED TO USE THESE FACILITIES.**
- 22 **FACILITIES FOR CHANGING OUT OF WORK-STAINED OR CONTAMINATED CLOTHING WILL ALSO HELP TO PROMOTE PERSONAL CLEANLINESS.**
- 23 **ALL FACILITIES SHOULD BE KEPT CLEAN** and inspected regularly.

### **Skin cleansers**

- 24 Soap and water will help restore the skin to its natural state after the use of barrier creams. Skin cleansers may be required where soap and water are not adequate (such as insoluble barrier substances). With some skin cleansers (sanitisers), an additional moisturiser may be needed.
- 25 Solvents (such as paraffin, turpentine, thinners and petrol) remove the natural oils from the skin and must not be used for skin cleaning. Conditioning creams, designed to replace the natural oils of the skin removed through frequent cleansing, should be used when necessary.

### **1.2.12.14 First aid**

- 1 A healthy, intact skin is an effective barrier against some substances and infection, but the slightest cut or other injury may admit infection.
- 2 All abrasions to the skin, however minor, should be treated at once. However, be aware that some substances can penetrate unbroken skin.

### **Treatment of dermatitis**

- 3 Medical advice should be sought as early as possible when there is concern. Any treatment of dermatitis or its symptoms should be left to a doctor.

### **Inspections and examinations, educating staff in prevention**

- 4 Regular inspections of the workplace, work methods and precautionary procedures adopted will help ensure that the risk of dermatitis, or other skin complaints, is kept to a minimum. At-risk employees should be encouraged to carry out 'self-checks' for the first signs of dermatitis and, ideally, supervisors should be trained to identify dermatitis. In appropriate circumstances, arrangements should be made for workers to have regular examinations by an occupational health professional to detect early signs of skin complaints, such as dermatitis and skin cancer.
- 5 Active concern for the welfare of employees will encourage their co-operation in reporting skin irritations at an early stage. Workers are more likely to co-operate in preventative measures if they are told positively what dermatitis is and what can be done to prevent it from occurring.

### **Health risks from working in the sun**

- 6 A sunny day usually makes **MOST PEOPLE FEEL GOOD, BUT TOO MUCH SUNLIGHT CAN ACTUALLY DAMAGE THE SKIN. IT IS NOT SIMPLY SUDDEN EXPOSURE WHILE ON HOLIDAY THAT IS**

**HARMFUL. EVEN A TAN THAT HAS BEEN BUILT UP GRADUALLY CAN BE HARMFUL TO HEALTH. A TAN IS A SIGN THAT THE SKIN HAS BEEN POTENTIALLY DAMAGED.**

- 7 **SKIN DAMAGE IS CAUSED BY ULTRAVIOLET** rays in the sunlight. People whose jobs keep them outdoors for a long time (such as building, construction and civil engineering workers) may, if their skin is unprotected, get more sun on their skin than is healthy for them. They will then be at greater risk of developing skin cancer.

#### **Periodic checking of the skin**

- 8 The first warning sign is often a small scabby spot that does not clear after a few weeks. Workers should be instructed to look for changed or newly formed moles or any skin discolouration. Workers should pay particular attention to any growths that appear on the face, especially around the eyes and nose, or on the backs of hands.
- 9 If these signs are noticed, medical assistance should be sought either from the Contractors medical staff or a local general practitioner, drawing attention to any moles that grow, change or bleed.
- 10 Many of these symptoms may prove to be non-cancerous - but they need to be checked to be absolutely sure.
- 11 Even if a spot is cancerous, simple modern treatments can usually cure them. This type of cancer very rarely spreads to other parts of the body. The smaller the spot, the easier it is to cure.
- 12 Don't delay If you think something might be wrong, get it checked out
- 13 Contractors are strongly encouraged to develop a Sun Safety Policy. An example of such a policy is attached at Appendix 3 to this module.

**Construction Site Safety****1.2.12 Appendix 1****Protection of skin Safety checklist**

- 1 Have the materials or substances in use been correctly identified?
- 2 Is up-to-date manufacturers' information available on the safe use of the substances?
- 3 Have the hazardous substances that will be produced by a work process been identified?
- 4 Have the necessary risk assessments been carried out?
- 5 Has an attempt been made to control the hazard at source, for example by using a less hazardous substance?
- 6 Has a COSHH risk assessment been carried out for the substances in use?
- 7 Have the significant findings of the risk assessment been communicated to those who will be using or otherwise affected by the substance?
- 8 Are the correct warning and cautionary notices displayed?
- 9 Are the methods of handling, transport and storage correct for the substances being used?
- 10 Are there adequate selection and training procedures available for operatives using harmful substances?
- 11 Is it necessary for workers to have wet hands for long periods or repeatedly get their hands wet?
- 12 Have operatives been properly trained in the necessary precautions and protective measures required for safe working?
- 13 Are safe working procedures and methods being properly implemented?
- 14 Is the correct handling equipment available and in use?
- 15 Is there adequate ventilation where toxic materials are in use?
- 16 Are there adequate washing facilities, barrier creams and cleansing agents of the correct type available and in regular use?
- 17 Are there gloves and protective clothing of the correct type and specification available and in use?
- 18 Have they been selected by a competent person, who can be the supplier?
- 19 Is there provision for cleaning protective clothing?
- 20 Is protective clothing regularly changed?
- 21 Are there adequate supervision and inspection procedures in place?
- 22 Is medical surveillance available for operatives when applicable?
- 23 Have appropriate welfare and first aid facilities been provided?

## Construction Site Safety

### 1.2.12 Appendix 2

#### Some timbers known to produce dermatitis and other irritant effects

Commercial name	Harmful effects	Severity	Frequency
Afriormosia	Dermatitis, asthma	Can be severe	Quite frequent
African mahogany	Dermatitis	Severe	Infrequent at present
Boxwood	Dermatitis, rhinitis, asthma	Mild	Quite frequent
Chestnut	Dermatitis, conjunctivitis, asthma	Usually mild	Infrequent
Dahoma	Irritation of the chest, dermatitis	Severe	Frequent
East African camphor wood	Asthma, dermatitis	Fairly severe	Infrequent
Ebony	Irritation of nose and throat, dermatitis	Fairly severe	Fairly frequent
Guarea (also West African cedar)	Nasal irritation, severe vomiting, chest irritation, blisters and dermatitis	Effects vary from mild to severe depending on sensitivity	Quite frequent
Iroko	Skin and eye irritation, asthma, symptoms of the common cold	Usually mild, occasionally serious	Very infrequent
Machaerium	Dermatitis	Severe	Infrequent at present
Mansonia	Irritation of mucous membrane, nasal haemorrhage, sore eyes, dizziness, dermatitis	Severity varies with individuals	Frequent
Satinwood	Dermatitis, headache, coughing	Quite severe	Infrequent
Teak	Dermatitis, eye inflammation	Can be severe	Not frequent
Western red cedar	Asthma, bronchial trouble, dermatitis, septic wounds from splinters	Severe	Fairly frequent
Yew	Bronchial asthma and dermatitis	Quite severe	Infrequent

**Construction Site Safety****1.2.12 Appendix 3****Model Sun Safety Policy**

- 1 This Contractor is committed to protecting and educating its workers about the risks to health arising from excessive exposure to strong sunlight. The policy will be implemented as appropriate for all workers who are at risk. Sun protection advice will be provided as part of routine health and safety training for all.
- 2 All new employees will be made aware of the Sun Safety Policy.
- 3 Wherever possible, working hours and tasks will be scheduled to avoid the midday sunshine. Wherever possible, work that can be carried out indoors or in the shade will be scheduled during periods of strong sunshine.
- 4 All workers who are liable to be at risk will receive appropriate training on how to protect themselves from prolonged exposure to strong sunlight, regardless of their skin type or hair colour.
- 5 Workers who are at risk will be encouraged to wear full-length trousers and long-sleeved shirts throughout the year. They will be made aware that, ideally, clothing will be loose fitting and made from a close-weave fabric.
- 6 In most circumstances, the mandatory wearing of a safety helmet will provide the necessary protection for the head. In the rare circumstances where a safety helmet need not be worn, workers at risk will be advised to wear a hat.
- 7 Workers at risk will be given information on the appropriate use of sunscreen creams, including advice on the minimum recommended level of protection.
- 8 Drinking water will be provided in the shade and all workers will be encouraged to drink plenty of water to avoid dehydration.
- 9 Rest areas in the shade will be provided and workers at risk will be encouraged to use them for their rest breaks.
- 10 All contractors working on the site will be made aware of the contents of the Sun Safety Policy and will be required to adhere to its guidelines.
- 11 The effectiveness of this policy will be monitored and it will be reviewed and updated as necessary.

Signed ..... Date .....

Position .....

## Construction Site Safety

### 1.2.13 Control of Vibration

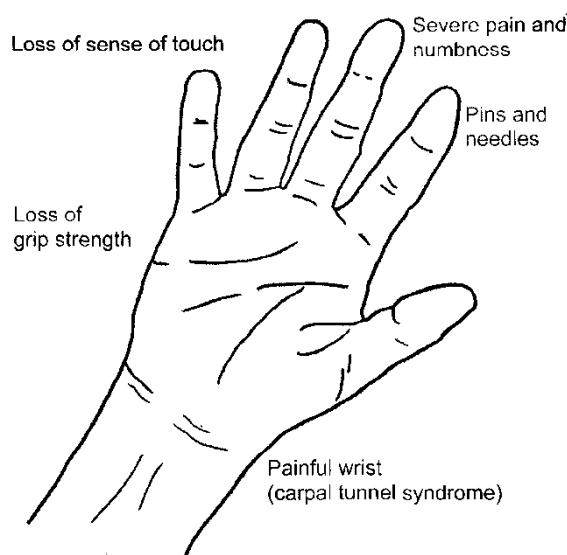
#### 1.2.13.1 Key points

- 1 Exposure to hand-arm vibration has the potential to cause disabling injuries.
- 2 Exposure to whole-body vibration can cause severe back pain.
- 3 Contractors have a legal duty to reduce the risks to the health of employees by either eliminating exposure to vibration or reducing it to an acceptable level.
- 4 Contractors have various means at their disposal of estimating exposure to vibration before resorting to having measurements carried out.
- 5 If it is necessary to have vibration measurements taken, it is essential that the person doing so is trained and competent.
- 6 Some of the things that can be done to control the potentially harmful effects of exposure to hand-arm vibration are:
  - (a) adopting alternative (non-vibrational) work methods;
  - (b) ensuring that tools are either low-vibration by design and/or well-maintained;
  - (c) adapting work patterns;
  - (d) ensuring that ergonomic factors are taken into account;
  - (e) preventing those person(s) exposed to vibration from becoming cold and/or damp;
  - (f) training workers how to minimise the risks from vibration.
- 7 Exposure to whole-body vibration can be controlled by, for example, improved technology in mobile plant (e.g. improved suspension and driver's seat), operator training, smooth operation of machines and job rotation.

#### 1.2.13.2 Introduction Hand-arm vibration

- 1 A considerable number of the tools and other pieces of equipment that are currently used in the Qatar building and construction industry have a rotary or percussive action and so can cause hand-arm vibration. This even applies to some widely used small tools, such as hand drills that have a 'hammer' action. Other examples of tools that create vibration include pneumatic breakers, vibrating pokers, vibrating rollers, plate compactors and scabbling machines.
- 2 The most commonly caused ill-health effect is 'vibration white finger' where the effect of the vibration damages the nerves and blood vessels in the fingers. The fingers become white and there is a loss of feeling which prevents smaller tools from being held or used properly.
- 3 The effects of both hand-arm vibration and whole-body vibration shall be reduced by carrying out risk assessments, appropriate equipment, administrative controls, the correct use of the equipment and the use of the appropriate anti-vibration devices such as special handles or grips.
- 4 A wide range of tools commonly used during construction and demolition activities, particularly those with a rotary or percussive action, have the potential to cause serious health problems. The seriousness of the situation will depend largely on how frequently and for how long vibrating tools are used although, as will be explained elsewhere in this module, other factors contribute to the potential for ill health.

- 5 The most common forms of ill health resulting from exposure to vibration of hands and arms are known as hand-arm vibration syndrome (HAVS) and vibration white finger (VWF), which is also known as Secondary Raynaud's Syndrome.
- 6 VWF, which is sometimes called 'dead finger' or 'dead hand', is most common in people whose hands are regularly exposed to damaging levels of vibration. Damage to the nerves and blood vessels in the fingers can lead to permanent loss of feeling and eventual disability. At worst, VWF can eventually lead to ulceration or gangrene, possibly resulting in the loss of one or more fingers. There is no effective treatment for the disorder. Exposure to vibration can also cause damage to muscles, joints and bone, which may also contribute to pain and stiffness in the hands and wrists.
- 7 If the symptoms of VWF can be seen in an employee's hands or fingers, it is clear evidence that any protective or control measures that are in use have not been effective. The damage has already been done.



**Vibration damage to areas of the hands and wrists**

- 8 The symptoms or effects of vibration white finger are usually triggered when the hands are exposed to the cold. Early indications are the fingertips rapidly becoming pale or white (blanched), with loss of feeling and perhaps also numbness and 'pins and needles'. This phase is sometimes followed by a red flush that signals the return of blood circulation to the fingers and is usually accompanied by a very uncomfortable or painful throbbing. Continued work with vibrating tools will cause the affected area to increase in size and for attacks to become more frequent over time.
- 9 Vibration damage to the fingers, hands or body is very much dose-related. The greater the exposure to vibration, the more likely there is to be damage. Increased exposure could be due to being exposed to greater magnitudes of vibration or being exposed for longer durations.
- 10 Other factors that can influence the risk of developing hand-arm vibration syndrome include:
- the grip, push and other forces used to guide and apply the vibrating tools or pieces of work equipment. The tighter the grip, the more vibration energy is transferred to the hands
  - tools with blunt cutting edges usually require more time to complete the task, higher grip and push forces, and often result in greater vibration emission
  - the exposure pattern, length and frequency of work and rest periods

- (d) how much of the hand, and other parts of the body, is exposed to the vibration
- (e) factors that potentially affect blood circulation, such as workplace temperature, smoking and individual susceptibility
- (f) the hardness of the material being worked
- (g) tool maintenance is important in order to keep it running smoothly and efficiently.

#### 1.2.13.3 Whole-body vibration

- 1 Whole-body vibration, as its name suggests, is vibration or jolting of the whole body through the surface that is supporting the body, such as a machine seat or floor.
- 2 Whole-body vibration, which often results from driving or operating some types of construction plant or vehicles, has the potential to cause back injury or make an existing back condition more painful.

#### 1.2.13.4 The Management of Health and Safety at Work

- 1 These Regulations place a requirement on every Contractor to make a suitable and sufficient assessment of every work activity to identify any hazard that employees or any other person might encounter as a result of the work being carried out.
- 2 When hazards are identified, it is the Contractor's duty to either eliminate the hazard or to put control measures into place to reduce the risks to health and safety arising out of the hazards, as far as is reasonably practicable.
- 3 The Contractor must provide employees with comprehensible and relevant information on any risks that exist in the workplace and on any control measures that are in place to reduce those risks.
- 4 Employees, in turn, have legal duties under these Regulations to:
  - (a) tell their Contractor of any work situation which presents a risk to the health and safety of themselves or any other persons who may be affected by their work activities
  - (b) use all machinery and equipment in accordance with any training provided.
- 5 These Regulations require that, additionally, the Contractor provides employees with adequate information, instruction, training and supervision to be able to carry out any work safely and without risks to their health.
- 6 The Contractor must assess the risks to employees' health arising from hand-arm vibration and whole-body vibration and put effective control measures in place.

#### 1.2.13.5 Control of Vibration

- 1 They impose duties on Contractors to protect employees (and others) who may be exposed to risk of ill health because of vibration at work.
- 2 These Regulations place legal duties on Contractors and employees with regard to the control and management of employees' exposure to vibration.

#### Definitions

- 3 These Regulations give a number of definitions, knowledge of which will help readers better understand the requirements of these Regulations.
  - (a) **Hand-arm vibration (HAV)** means mechanical vibration which is transmitted into the hands and arms by a work activity.
  - (b) **Whole-body vibration (WBV)** means mechanical vibration which is transmitted into the

body through the supporting surface when a person is seated or standing during a work activity.

- (c) **Mechanical vibration** means vibration occurring in a piece of machinery, equipment or vehicle as a result of its operation.
- (d) **Daily exposure** means the extent of the mechanical vibration to which a worker is exposed during a working day, which takes account of both the magnitude and duration of the vibration.
- (e) **Exposure action value (EAV)** means the level of daily exposure that, if exceeded, requires specific action to be taken to reduce the risk.
- (f) **Exposure limit value (ELV)** means the level of daily exposure for any worker that must not be exceeded.
- (g) **Working day** means a daily working period, irrespective of the time of day, when it begins or ends, or whether it begins or ends on the same day.
- (h) **Health surveillance** means an assessment of the state of health of an employee as related to their exposure to vibration.

4 Exposure limit and action values

5 For hand-arm vibration:

- (a) **the daily exposure action value is** 2.5 metres per second squared ( $2.5 \text{ m/s}^2 \text{ A(8)}$ )
- (b) **the daily exposure limit value is** 5 metres per second squared ( $5 \text{ m/s}^2 \text{ A(8)}$ ).

6 For whole-body vibration:

- (a) **the daily exposure action value is** 0.5 metres per second squared ( $0.5 \text{ m/s}^2 \text{ A(8)}$ )
- (b) **the daily exposure limit value is** 1.15 metres per second squared ( $1.15 \text{ m/s}^2 \text{ A(8)}$ ).

**Note:** The 'A(8)' notation after each value indicates that the measurement of exposure to vibration is 'time weighted' over an 8 hour period.

#### 1.2.13.6 Duties of Contractors

1 See flowchart at Appendix 1.

##### Contractor's duties to non-employees

2 Where these Regulations place a duty on Contractors with respect to the health and safety of employees, the Contractor shall so far as is reasonably practicable, also be under a similar duty to *anyone else, whether at work or not*, who may be affected by the vibration created by the Contractor's work activities, except for the provision of:

- (a) health surveillance
- (b) information, instruction and training unless the non-employees are at the same place of work as where the noise is being created.

##### Contractor's duties to employees

3 If employees are likely to be exposed to risks from vibration in the course of their work the Contractor must:

- (a) carry out an assessment of the risks to the health and safety of the employees exposed to vibration. The risk assessment must identify the measures that need to be taken to meet the requirements of these Regulations
- (b) as part of the risk assessment, assess the daily exposure of employees to vibration by:
  - (i) observing work practices

- (ii) referring to information on the probable level of vibration corresponding to the equipment used in those particular conditions
- (iii) *if necessary*, arranging for vibration levels to be measured.
- (c) assess whether any employee is likely to be exposed to vibration at or above the **exposure action value** or the **exposure limit value**.
- 4 The risk assessment must include consideration of:
- (a) the magnitude, type and duration of exposure to vibration, including intermittent vibration and repeated shocks
  - (b) the effects that the vibration might have on employees whose health is particularly at risk from exposure
  - (c) any effects that vibration might have with regard to work equipment, such as:
    - (i) the proper handling of controls
    - (ii) the reading of indicators
    - (iii) the stability of structures
    - (iv) the security of joints.
  - (d) any information provided by the manufacturers of the equipment that creates the vibration
  - (e) the availability of alternative equipment that is designed to reduce exposure to vibration
  - (f) exposure of employees to whole-body vibration when not actually working, such as in rest areas and canteens
  - (g) specific working conditions, such as working in low temperatures
  - (h) the availability of appropriate information obtained from health surveillance.
- 5 The Contractor must regularly review the risk assessment and immediately if:
- (a) there is reason to believe that it is no longer valid
  - (b) there has been a significant change in the work to which the assessment applies
  - (c) implement changes to the risk assessment as identified by the review process.
- 6 The Contractor must record:
- (a) the significant findings of the risk assessment as soon as is practicable after the risk assessment has been carried out or changed
  - (b) the measures taken to eliminate or control exposure to vibration
  - (c) the measures taken to provide information, instruction and training for at-risk employees.
- 7 The Contractor must:
- (a) ensure that exposure to vibration is eliminated at source or reduce it to the lowest level that is reasonably practicable
  - (b) where exposure is likely to be **at or above the exposure action value**, reduce exposure to vibration to as low a level as is reasonably practicable, by implementing organisational and technical measures which are appropriate to the work activity being carried out
  - (c) Contractors must take in to consideration the following general principals of prevention:
    - (i) alternative work methods which eliminate or reduce exposure to vibration
    - (ii) alternative work equipment or an appropriate ergonomic design which, taking account of the work to be done, produces the least vibration

- (iii) the design and layout of the workplace including any rest facilities
  - (iv) the provision of extra equipment that has the effect of reducing injuries caused by exposure to vibration
  - (v) the effective maintenance programmes for equipment that can create vibration, the workplace itself and workplace systems
  - (vi) the provision of information and training for at-risk employees such that they are aware of how to use work equipment correctly and safely in order to minimise exposure
  - (vii) limiting the duration and intensity of exposure to vibration
  - (viii) adjusting work schedules and ensuring adequate rest periods
  - (ix) the provision of work clothing to protect at-risk employees from cold and damp.
- 8 The Contractor must ensure that employees are not exposed to vibration above the **exposure limit value** or, if they are, immediately:
- (a) reduce exposure to below the **exposure limit value**
  - (b) identify the reasons for the **exposure limit value** being exceeded
  - (c) take appropriate actions to prevent it occurring again.
- 9 The above paragraph does not apply where the exposure of an employee to vibration is usually below the **exposure action value** but varies markedly from time to time and may *occasionally* exceed the **exposure limit value**, provided that:
- (a) the exposure to vibration averaged over one week is less than the **exposure limit value**
  - (b) there is evidence to show that the risk from the actual pattern of exposure is less than the corresponding risk from constant exposure to the **exposure limit value**
  - (c) the risk from exposure is reduced to as low a level as is reasonably practicable
  - (d) the employees concerned are subject to increased health surveillance, where appropriate.
- 10 Any measures taken to comply with these Regulations must be adapted where necessary to take account of any employee(s) who is/are particularly at risk from exposure to vibration.
- 11 If the risk assessment indicates that:
- (a) there is a risk to the health of employees who are exposed to vibration
  - (b) those employees are likely to be exposed to vibration at or above the **exposure action value**;
  - (c) the Contractor must ensure that those employees are placed under suitable health surveillance, where appropriate.
- 12 The health surveillance will be appropriate if:
- (a) a link can be established between exposure to vibration and an identifiable disease or any other adverse effect on health
  - (b) it is probable that the disease or other effect on health may occur under particular working conditions
  - (c) there are valid ways of detecting the disease or other effect on health.
- 13 The Contractor must:
- (a) ensure that a record is kept and maintained for each employee who undergoes health surveillance and that records are readily available in a suitable form
  - (b) allow employees to see their health surveillance records upon being given reasonable notice

- 14 Where, as a result of health surveillance, an employee is found to have an identifiable disease or other adverse effect on health, which is considered by a doctor or other occupational health professional to be the result of exposure to vibration, the Contractor must:
- (a) ensure that the employee is informed by a suitably qualified person, including advice regarding a need for further health surveillance
  - (b) ensure that the Contractor is informed of any significant findings of the health surveillance, allowing for medical confidentiality
  - (c) review the risk assessment
  - (d) review existing control measures, taking into account any advice given by a doctor.
  - (e) consider reassigning the employee to other work where there is no risk from further exposure, taking into account any advice given as above
  - (f) ensure that the health of any other employee(s) who has been similarly exposed is reviewed, including the provision of a medical examination where recommended by a doctor, occupational health professional or the administrative authority.
- 15 Where the risk assessment shows a risk to the health of employees who are (or are liable to be) exposed to vibration at or above the **exposure action value**, the Contractor must provide the employees and their representatives with suitable and sufficient information, instruction and training, which must include:
- (a) the organisational and technical measures taken to eliminate or control exposure to vibration
  - (b) the exposure limit value and the action values
  - (c) the significant findings of the risk assessment, including details of any measurements taken, with an explanation of the findings
  - (d) why and how to detect and report signs of injury resulting from exposure to vibration
  - (e) the employees' entitlement to health surveillance
  - (f) how to work safely to minimise exposure to vibration
  - (g) the collective results of any health surveillance carried out, anonymised so as not to reveal the personal health record of any individual.
- 16 The **INFORMATION, INSTRUCTION AND TRAINING PROVIDED AS ABOVE MUST BE UPDATED BY THE CONTRACTOR TO TAKE ACCOUNT OF ANY SIGNIFICANT CHANGES IN THE TYPE OF WORK CARRIED OUT OR METHOD OF WORKING.**
- 17 **THE CONTRACTOR** must ensure that any person, whether an employee or not, who has been given the responsibility to ensure that the Contractor's duties are carried out, for example a site manager or project manager, receives suitable and sufficient information, instruction and training to enable compliance with these Regulations.

#### 1.2.13.7 Duties of employees

- 1 Under these Regulations, employees have a legal duty to make themselves available for health surveillance checks (during working hours) as required by the Contractor, the health surveillance being at the Contractor's expense.

#### 1.2.13.8 The Provision and Use of Work Equipment

- 1 These Regulations require that Contractors only provide work equipment that is suitable for the job and ensure that it is maintained and kept in good working order.
- 2 Where the use of the equipment involves a specific risk to the health and safety of employees, the use of the equipment must be restricted to competent and specified workers.

- 3 Employees must be provided with information, instruction and training in the use of work equipment, where necessary for their health and safety.
- 4 These Regulations require Contractors to provide serviceable and suitable work equipment that will, in conjunction with other vibration management techniques, by virtue of its design or adaptability, eliminate exposure to vibration or reduce it to an acceptable level.

#### **1.2.13.9 Tools likely to cause harmful levels of vibration**

- 1 Tools and plant used in the Qatar construction industry that could cause exposure to risks from vibration include:

##### **HAV**

- (a) road and concrete breaking drills
- (b) concrete vibro thickeners
- (c) concrete pokers
- (d) plate vibrators
- (e) chisels
- (f) demolition picks
- (g) compressor guns
- (h) pneumatic drills
- (i) angle grinders
- (j) percussive (hammer) drills
- (k) sanders, and similar reciprocating tools
- (l) abrasive wheels (e.g. bench grinders)
- (m) cutting-off wheels and discs
- (n) power hammers and chisels, including 'Kango' hammers
- (o) needle guns
- (p) chainsaws
- (q) woodworking machinery.

- 2 This is irrespective of the tools' power source. Other equipment that may occasionally be used and that is a source of vibration includes rotavators, lawnmowers, brush-cutters and leaf blowers.

##### **WBV**

- (a) rough-terrain forklift trucks and tele-handlers
- (b) vibratory rollers
- (c) mobile crushers
- (d) dumper trucks and other forms of earth-moving machinery
- (e) delivery vehicles if required to travel on rough terrain.

#### **1.2.13.10 Managing vibration, vibration risk assessment in practice**

- 1 A general risk assessment can be briefly defined as a systematic examination of a work process, carried out by a competent person on behalf of a Contractor.
- 2 A vibration risk assessment follows the same principle but with the emphasis solely on

vibration and its potential to cause ill health in employees.

- 3 The principle of risk assessment is not new. In fact, it is quite likely that many Contractors have been carrying out risk assessments, including vibration risk assessments, during the day-to-day course of their business activities, possibly without thinking of the process in terms of a risk assessment.
- 4 A survey of what work activities are carried out, using what tools and equipment, and by whom, will establish who is at risk. If there is any doubt as to whether a particular job has the potential to cause vibration-induced health problems or injury, it is better to assume that it has, initially at least.
- 5 Having established who could be at risk it is necessary to examine work activities in detail to determine which work activities are of genuine concern. As outlined in the summary, only when all other investigative methods have been exhausted should it be necessary to carry out vibration measurements.
- 6 There are many sources of information available to Contractors, such as:
  - (a) the users of vibrating tools themselves; they are the ones who may have experienced the early symptoms of HAVS
  - (b) free online vibration measurement databases which are based on the actual vibration measurements achieved during the testing of hundreds of tools of different types in different conditions
  - (c) tool manufacturers' published vibration data, although this should be treated with caution as it can be based upon laboratory testing rather than 'field trials' and usually underestimates exposures under real work conditions.
- 7 In construction, it is likely that those exposed to WBV will exceed the **exposure action value** if they operate machines for several hours per day. The **exposure limit value** should only be exceeded if the machine is operated very aggressively or with non-approved attachments.
- 8 For HAV, the guidance is that an employee is probably at risk from HAVS if they are using:
  - (a) hammer action equipment for more than 15 minutes each day.
  - (b) rotary equipment for more than one hour each day.
- 9 Employees who fall into these categories, as well as other at-risk employees, should be asked to complete a short health surveillance questionnaire (details in Appendix 2).
- 10 An important factor in establishing who is at risk is the actual time that someone is using a vibrating tool, commonly referred to as the 'trigger time'. When asked, it is usual for users to overestimate the length of time that they actually use the equipment. Their response may be 'I use the equipment all day' when in fact what they mean is that they use it on-and-off all day with, for example, a total 'trigger time' of less than 60 minutes per day.

#### **1.2.13.11 The elimination or control of exposure to vibration in the workplace**

- 1 On the basis of the general principles and hierarchy of control measures, Contractors must ensure that employees' exposure to vibration is either eliminated or reduced so far as is reasonably practicable.
- 2 Where it cannot be eliminated the Contractor must introduce a programme of organisational and technical measures (control measures) consistent with their risk assessment. This must include consideration of:
  - (a) alternative methods of carrying out the work that eliminate or reduce employees' exposure to vibration, for example, stripping off surface coatings by chemical treatment rather than 'power-sanding'

- (b) choice of work equipment that, because of its design or features, or the nature of the work to be done, produces the least possible vibration
  - (c) the provision of ancillary equipment that reduces the risk of injury being caused by vibration, for example, manufacturer approved vibration absorbent handles for hand-held equipment
  - (d) proper maintenance arrangements for the work equipment, workplace and workplace systems, for example, maintaining ground surfaces over which vehicles regularly travel
  - (e) the design and layout of workplaces, workstations and rest facilities
  - (f) suitable and sufficient information and training for employees so that they may use the equipment safely and correctly in order to minimise their exposure to vibration, such as training mobile machine operators how to correctly adjust their seats and the benefits from driving less aggressively
  - (g) limitation of the duration and intensity of the vibration, for example by job rotation
  - (h) appropriate work schedules with adequate rest periods
  - (i) the provision of clothing to protect employees from cold and damp
  - (j) arranging for operatives to stay warm by providing heating for the workplace where needed and possible, together with suitable clothing and gloves
  - (k) ensuring that any new tools have vibration control measures built in
  - (l) by adopting a 'buy smooth'/'hire smooth' policy, in which a commitment is made to choose tools that incorporate low vibration technology
  - (m) the reduction of vibration transmission in the path between the source and the handles or other surfaces gripped by operatives' hands
  - (n) the minimisation of the amount of force required to apply and control the tools, and keeping them in good order.
- 3 A 'points' system has been developed by the UK Health and Safety Executive (HSE) which allows for quick estimates of the hand/arm vibration exposure for a worker. Each process is assigned a number of points per hour. Adding the points from each process carried out (calculated by multiplying the points per hour by the number of hours use) provides an estimate of the total exposure. For HAV the **exposure action value** corresponds to 100 points and the **exposure limit value** corresponds to 400 points. For WBV the **exposure action value** corresponds to 100 points and the **exposure limit value** corresponds to 529 points. Points from HAV and WBV should not be combined.
- 4 Further guidance on estimating exposure is contained in Appendix 5.
- 5 A further benefit gained as a result of controlling vibration can be the reduction in noise levels; in some circumstances reducing noise will also reduce vibration, hence many noise control techniques also involve techniques for controlling vibration. See:

[www.hse.gov.uk/vibration/hav/vibrationcalc.htm](http://www.hse.gov.uk/vibration/hav/vibrationcalc.htm)

#### 1.2.13.12 Information and training for employees

- 1 If the risk assessment shows that there is a risk to the health of employees because of vibration, or they are exposed to vibration in excess of the exposure action value, then the Contractor must give employees information, instruction and training on:
- (a) how the Contractor is 'managing' vibration in the workplace
  - (b) the exposure limit values and exposure action values
  - (c) the significant findings of the risk assessments, including details of any measurements taken
  - (d) what employees should look for in themselves as regards HAVS, VWF and low back

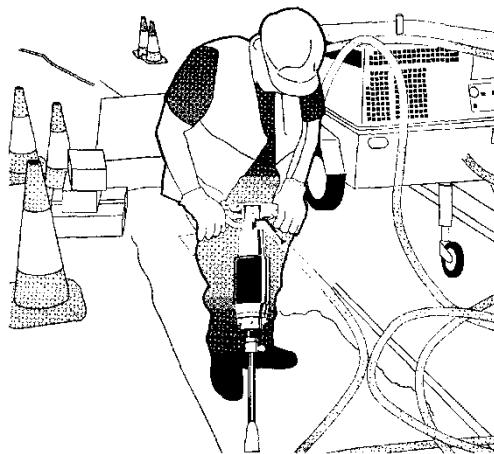
- pain and how they should inform their Contractor
- (e) the entitlement to health surveillance
  - (f) the safe working practices in place to minimise employees' exposure to vibration
  - (g) the collective (as opposed to individual) results of any health surveillance undertaken.

#### **1.2.13.13 Work equipment Selection of tools and equipment**

- 1 All equipment that is liable to vibrate, and that is manufactured for use as work equipment, should be designed to have low vibration operating characteristics.
- 2 Manufacturers are required to provide information on all aspects of their equipment, including details of any vibration that may be expected. In particular, suppliers must provide information on vibration levels if the tool or machine is likely to subject workers to levels of vibration exceeding the exposure action value of 2.5 metres per second squared.
- 3 However, as some manufacturers may base their vibration figures on laboratory simulation rather than field trials, the figures quoted may be unrealistically low. In many cases information is also available from independent real or simulated work measurements.
- 4 Vibration emission is one of many important factors to consider when selecting a tool. For example, a very heavy tool might not emit much vibration but could cause manual handling risk. Similarly, some tools might emit less vibration than others but be relatively inefficient, resulting in increased exposure times, higher grip and push forces. Always select the right tool for the job.

#### **Regular maintenance of tools**

- 5 Correctly installed and smooth running machines will, in time, vibrate as the machinery parts become worn.
- 6 The parts of machinery that contribute to vibration are:
  - (a) worn bearings
  - (b) dirty fan blades (unbalanced fans)
  - (c) worn mountings or worn anti-vibration pads
  - (d) misaligned shafts
  - (e) unbalanced rotating parts
  - (f) loose bolts
  - (g) damaged gear teeth
  - (h) blunt cutting tools and blades
  - (i) worn suspension components
  - (j) incorrect tyre pressures
  - (k) damaged seats
  - (l) damaged tyres/tracks.
- 7 The lack of correct maintenance and lubrication will produce increased vibration magnitudes.
- 8 Machines should, therefore, be maintained at regular intervals and any detected faults rectified as soon as possible, thus reducing the risk of vibration problems. Cutting tools or blades should be kept sharp by maintenance or replacement, as appropriate.



### 1.2.13.14 Health issues

#### Health surveillance

- 1 If the findings of the risk assessment, feedback from employees or other sources of information show that there is a risk to the health of employees because of their use of vibrating tools, or that employees are exposed to vibration in excess of the exposure action value, then the Contractor must ensure that the employees are under suitable medical surveillance where it is appropriate.
- 2 A recommended five-stage system of health surveillance for HAV:
  - 1 An initial questionnaire to be answered when employees first move into any job that involves exposure to vibration (see Appendix 2).
  - 2 A short questionnaire answered annually by employees exposed to vibration (see Appendix 3).
  - 3 A formal HAVS health assessment carried out by a qualified person, for example, an occupational health nurse.
  - 4 A formal diagnosis made by a doctor who is qualified in occupational health, and who will assess fitness for work
  - 3 Contractors who consider that their employees are at a potential risk from HAVS should appoint a person to manage the health surveillance programme and be actively involved in the initial stages.
  - 4 This person:
    - (a) does not need to be medically qualified
      - (i) should not attempt diagnosis or be judgemental as to the causes of HAVS with regard to individual cases
      - (ii) should receive training from an occupational health professional
      - (iii) must be able to describe the symptoms of HAVS.
  - 5 The person should have experience of the working environment, be able to gain the trust and co-operation of employees, and understand the importance of confidentiality.
  - 6 For WBV, detailed health surveillance is not possible, as there are many non-vibration causes of back pain. An example of a health monitoring questionnaire is given in Appendix 4.

**Keeping records**

- 7 Health surveillance records should be stored 'in house' in a way that retains their confidentiality, possibly under the control of the person nominated to manage the health surveillance system.
- 8 Contractors should create a health record for each individual who is exposed to vibration and keep them for at least as long as they are under health surveillance and possibly longer.
- 9 Health records should be kept up to date and should include full details of the employee's exposure to vibration and any questionnaires that have been completed.
- 10 It is considered to be good practice if employees are offered a copy of their health records when they leave the Contractor.

**Maintaining blood circulation**

- 11 Keeping the hands and body warm is essential to help maintain good blood flow to the fingers and reduce the risk of injury due to HAV.
- 12 Specific measures might include:
  - (a) wearing gloves
  - (b) using proprietary heating pads for the hands
  - (c) using tools with heated handles
  - (d) avoiding tools that have pneumatic exhausts that discharge towards the hands
  - (e) allowing operatives to warm up before starting work, and helping them to stay warm
  - (f) wearing warm, weatherproof clothing in cold, wet areas
  - (g) advising those who smoke to stop or cut down (smoking reduces blood circulation)
  - (h) massaging and exercising fingers during work breaks.

**Work patterns**

- 13 One of the most simple but also one of the most effective ways of minimising risks arising from vibration is by reducing the time when operatives are actually exposed to vibration.
- 14 If the use of a vibrating tool is shared between a team of employees, as opposed to it only being used by one person, the tool may be kept in productive use for the day.
- 15 Moving any employees not operating the tools at that time onto other areas of work will considerably lessen the effects of vibration on users, by splitting and rotating the work. This will also assist the maintenance of blood circulation, thus lessening the chances of injury or ill health being caused to users by the vibrating tool.

**Personal protective equipment**

- 16 Some retro-fit products are available that are designed to protect operators from vibration.
- 17 Only those approved by the machine manufacturers should be used.
- 18 The wearing of anti-vibration gloves is not recommended. Problems with anti-vibration gloves include:
  - (a) reduced flexibility at the hands resulting in higher grip and push forces and loss of precise tool control
  - (b) the possibility of gloves amplifying the tool vibration in some cases (these cases are

very difficult to predict)

- (c) anti-vibration gloves are only tested in one direction and vibration occurs in three directions
- (d) field trials of gloves have shown that the vibration isolation materials are not always durable.

19 However, if anti-vibration gloves are to be tried, it is essential that they carry the CE-mark and are selected by a competent person. One benefit from gloves is that they keep the hands warm and offer other protection.

20 Therefore, if a Contractor intends to provide items of PPE as part of their strategy to reduce the risks from vibration in the workplace, it is important that the correct PPE is selected. All PPE produced or imported by reputable companies is manufactured to British and European Standards. As with all PPE for use at work, gloves or anti-vibration protection should be selected by a competent person who can ensure, in discussion with the supplier, that they meet the appropriate standards. Most leading manufacturers and suppliers will offer advice on the selection of different types of gloves and other PPE.

21 Ear defenders should be worn to lessen the effects of the noise created by vibrating tools, and eye protection should be worn to avoid the risks from dust or flying particles.

#### **1.2.13.15 Summary**

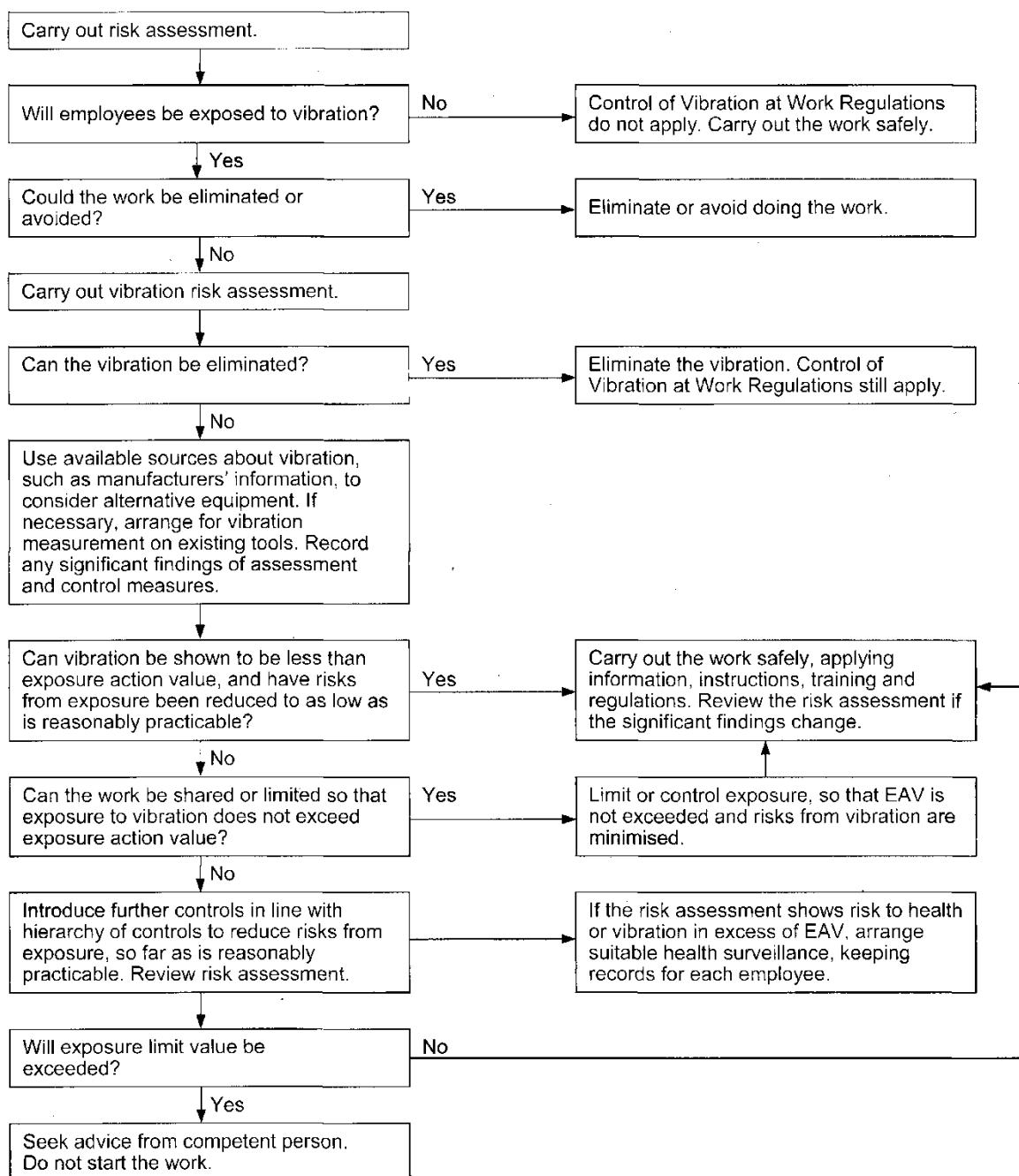
1 The control of vibration at work makes good business sense for Contractors. Employees who are able to work are of far greater benefit to the Contractor than those who are off sick as a result of work-related ill health, or those who cannot work to maximum effect due to HAVS, VWF or back pain.

2 In summary, these Regulations require that the Contractor should:

- (a) assess the risks to the health of your employees from vibration, and to effectively plan for its control
- (b) properly manage the risks
- (c) provide suitable work equipment for your employees, having regard for technical developments in tool design and vibration suppression
- (d) maintain equipment fully and correctly
- (e) give employees and supervisors information and training on the risks to health caused by vibration, and on the safe use of the work equipment that is provided
- (f) provide health surveillance/health monitoring where risks cannot be completely eliminated
- (g) consult employees on your proposals for dealing with vibration.

## 1.2.13 Appendix 1

### Vibration - actions by Contractor



HAV	WBV
Exposure action value (EAV) = 2.5 m/s <sup>2</sup>	0.5 m/s <sup>2</sup>
Exposure limit value (ELV) = 5.0 m/s <sup>2</sup>	1.15 m/s <sup>2</sup>

### 1.2.13. Appendix 2

#### Initial hand/arm vibration screening questionnaire

##### Medical in confidence - when completed

Initial screening questionnaire for workers using hand-held vibrating tools, hand-guided vibrating machines and hand-fed vibrating machines.

Date .....

Name .....

Occupation .....

Address .....

Date of birth .....

Contractor name .....

Have you ever used hand-held vibrating tools, machines or hand-fed processes in your job? Y/N

If YES:

a) list year of first exposure

.....

b) when was the last time you used them? .....  
(detail work history overleaf)

1 Do you have any tingling of the fingers lasting more than 20 minutes after using vibration equipment? Y/N

2 Do you have tingling of the fingers at any other time? Y/N

3 Do you wake at night with pain, tingling, or numbness in your hand or wrist? Y/N

4 Do one or more of your fingers go numb more than 20 minutes after using vibration equipment? Y/N

5 Have your fingers gone white\* on cold exposure? Y/N

6 If YES to 5, do you have difficulty re-warming them when leaving the cold? Y/N

7 Do your fingers go white at any other time? Y/N

8 Are you experiencing any other problems with the muscles or joints of the hands or arms? Y/N

9 Do you have difficulty picking up very small objects, e.g. screws or buttons or opening tight jars? Y/N

\* Whiteness means a clear discolouration of the fingers with a sharp edge, usually followed by a red flush.

**10 Have you ever had a neck, arm or hand injury or operation?  
If so, give details**

Y/N

11 Have you ever had any serious diseases of joints, skin, nerves, heart or blood vessels? Y/N  
If so, give details

12 Are you on any long-term medication?  
If so, give details ..... Y/N

## **Occupational history**

## Dates

**Job title**

I certify that all the answers given above are true to the best of my knowledge and belief.

**Signed:**

Date:

**Return in confidence to:**



### 1.2.13. Appendix 3

#### Annual hand/arm vibration screening questionnaire for health surveillance

Screening questionnaire for workers using hand-held vibrating tools, hand-guided vibrating machines and hand-fed vibrating machines.

Date .....

Employee name .....

Occupation .....

Address .....

Date of birth .....

National insurance number .....

Contractor name  
.....

Date of previous screening  
.....

**Have you been using hand-held vibrating tools, machines or hand-fed processes in your job, or if this is a review, since your last assessment?** Y/N  
(detail work history overleaf)

**If NO or more than 2 years since last exposure, please return the form - there is no need to answer any further questions.**

**If YES:**

1 Do you have any numbness or tingling of the fingers lasting more than 20 minutes after using vibrating equipment? Y/N

2 Do you have numbness or tingling of the fingers at any other time? Y/N

3 Do you wake at night with pain, tingling, or numbness in your hand or wrist? Y/N

4 Have any of your fingers gone white\* on cold exposure? Y/N

5 Have you noticed any change in your response to your tolerance of working outdoors in the cold? Y/N

6 Are you experiencing any other problems in your hands or arms? Y/N

7 Do you have difficulty in picking up very small objects, e.g. screws or buttons or opening tight jars? Y/N

8 Has anything changed about your health since the last assessment? Y/N

\* Whiteness means a clear discolouration of the fingers with a sharp edge, usually followed by a red flush.

10 Have you ever had a neck, arm or hand injury or operation? Y/N  
If so, give details .....

11 Have you ever had any serious diseases of joints, skin, nerves, heart or blood vessels? Y/N  
If so, give details .....

12 Are you on any long-term medication?  
If so, give details ..... Y/N

## **Occupational history**

Dates	Job title
-------	-----------

**I certify that all the answers given above are true to the best of my knowledge and belief.**

**Signed:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Return in confidence to:**

### 1.2.13 Appendix 4

#### *Sample health monitoring questionnaire*

Date of assessment.....

Employee No/Payroll No .....

Name .....

Date of birth .....

Job title .....

Yes                  No

Any change in duties since last questionnaire?

--	--

Recent experience

--	--

Is there currently any movement or activity that causes you pain in your back?

--	--

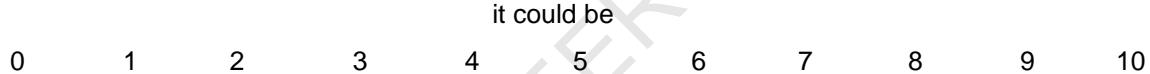
Have you suffered any back/neck/shoulder pain in the last 12 months

--	--

Please describe the severity of the pain experienced:

No pain

Pain as bad as



*Note: If severity above 5 indicated, refer on for further advice. However if rank less than 5, but for three consecutive assessments, then refer for further advice. \**

--	--

Have you had to take any medication to deal with the pain experienced?

--	--

Have you had to seek medical advice regarding this pain?

--	--

Has this back/neck/shoulder pain resulted in time off from work?

--	--

Have you had any accidents or injury to the back in the last two years?

--	--

#### **Action/advice**

Referral for further advice?

Other advice provided?

\* Further advice should be sought from an occupational health professional or GP in these cases.

I certify that all the answers given above are true to the best of my knowledge and belief.

Signed:

Date:

Return to:

### **Hand-arm vibration syndrome (HAVS):**

- is a disorder which affects the blood vessels, nerves, muscles and joints of the hand, wrist and arm.
- can become severely disabling if ignored; and
- its best known form is vibration white finger (VWF) which can be triggered by cold or wet weather and can cause severe pain in the affected fingers.

### **Signs to look out for in hand-arm vibration syndrome:**

- tingling and numbness in the fingers
- in the cold and wet, fingers go white, then blue, then red and are painful
- you can't feel things with your fingers
- pain, tingling or numbness in your hands, wrists and arms
- loss of strength in hands.

### **Occupational history**

Dates

Job title

.....

.....

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## 1.2.13 Appendix 5

### Estimating exposure to hand arm vibration

You may be able to get suitable vibration data from the equipment handbook, or from the equipment supplier. See Table 1 for guidance examples of vibration levels which have been measured on equipment in use. There are also some databases on the internet which may have suitable vibration data.

If you plan to use the manufacturer's vibration data you should check that it represents the way you use the equipment (see 'Duties of manufacturers and suppliers') since some data may underestimate workplace vibration levels substantially. Ask the manufacturer for an indication of the likely vibration emission of the tool when your employees are using it. If you are able to get vibration data from the manufacturer which is reasonably representative of the way you use the equipment, it should be suitable for you to use in estimating your employees' exposure. However, if the only information available to you is the vibration emission declared in the equipment's handbook, it may be safer to double this figure before using it for estimating daily exposures.

You also need to check, by observing them, how long employees are actually exposed to the vibration (i.e. the total daily 'trigger time' with the equipment operating and in contact with the employee's hand(s)). Employees are unlikely to be able to provide this information very accurately themselves. You could observe and measure the trigger time over, for example, half an hour and then use the result to estimate the trigger time for the full shift. Alternatively, where the work task is repetitive, e.g. drilling large numbers of holes in masonry, you could measure the trigger time when drilling several holes and multiply the average by the number of holes typically drilled in a shift

**Table 1**  
**Some typical vibration levels for common tools**

	Lowest	Typical	Highest
Road breakers	5m/s <sup>2</sup>	12 m/s <sup>2</sup>	20 m/s <sup>2</sup>
Demolition hammers	8m/s <sup>2</sup>	15 m/s <sup>2</sup>	25 m/s <sup>2</sup>
Hammer drills/combi hammers	6m/s <sup>2</sup>	9 m/s <sup>2</sup>	25 m/s <sup>2</sup>
Needle sealers	5 m/s <sup>2</sup>	-	18 m/s <sup>2</sup>
Scabblers (hammer type)	-	-	40 m/s <sup>2</sup>
Angle grinders	4 m/s <sup>2</sup>	-	8m/s <sup>2</sup>
Clay spades/jigger picks	-	16 m/s <sup>2</sup>	-
Chipping hammers (metal)	-	18 m/s <sup>2</sup>	-
Stone-working hammers	10 m/s <sup>2</sup>	-	30 m/s <sup>2</sup>
Chainsaws	-	6m/s <sup>2</sup>	-
Brushcutters	2 m/s <sup>2</sup>	4 m/s <sup>2</sup>	-
Sanders (random orbital)	-	7-10 m/s <sup>2</sup>	-

If the employee is exposed to vibration from more than one tool or work process during a typical day, you will need to collect information on likely vibration level and 'trigger time' for each one.

### Workplace vibration measurements

If you want to obtain vibration measurements for your own tools you will need to arrange for a competent person to carry out measurements for you using specialised equipment. Measurement results can be highly variable, depending on many factors, including the operator's technique, the condition of the work equipment, the material being processed and the measurement method. The competence and

experience of the person who makes the measurements is important so that they can recognise and take account of these uncertainties in producing representative vibration data.

Tool vibration ( $\text{m/s}^2$ )	3	4	5	6	7	10	12	15
Points per hour (approximate)	20	30	50	70	100	200	300	450

Multiply the points assigned to the tool vibration by the number of hours of daily 'trigger time' for the tool(s) and then compare the total with the exposure action value (EAV) and exposure limit value (ELV) points.

100 points per day = exposure action value (EAV)

400 points per day = exposure limit value (ELV)

**Table 2** Simple 'exposure points' system

## 1.2.14 Biological Hazards

### 1.2.14.1 Bacteria, viruses, fungi

- 1 Biological agents such as bacteria, viruses, and fungi, and their associated toxins have the ability to adversely affect human health in a variety of ways, ranging from relatively mild, allergic reactions to serious medical conditions, even death.
- 2 These organisms can be found in water, soil, plants, and animals. Because many microbes reproduce rapidly and require minimal resources for survival, they are a potential danger in a wide variety of occupational settings
- 3 Employer shall provide facilities for employees to practice good personal hygiene and provide necessary personal protective equipment.

### 1.2.14.2 Plants and animals

- 1 Employers shall make their workers aware of these health hazards posed by plants or animals before starting work in a specific location.
- 2 Employer shall provide necessary personal protective equipment to protect the worker from poisonous and/or infection plants and animals.

### 1.2.14.3 Animal, Bird & Rodent Faeces

- 1 Employer shall maintain a safe and clean work place and site, free from accumulation of animal, bird and rodent faeces which can harbour and spread disease.
- 2 Employer shall provide facilities for employees to practice good personal hygiene and provide necessary personal protective equipment.

### 1.2.14.4 Blood borne pathogens

- 1 **Blood borne Pathogens** mean pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).
- 2 Potentially Infectious Materials include blood, semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, anybody fluid that is visibly contaminated with blood.
- 3 Employer shall ensure that precautions shall be observed to prevent contact with blood or other potentially infectious materials.
- 4 Clean up of blood or other potentially infectious materials should only be performed by a qualified person with the appropriate training and protective equipment.

### 1.2.14.5 Needle Stick Prevention

- 1 A needle stick injury is an accidental puncture of the skin by a hypodermic needle.
- 1 It is a sad fact that the current drug culture affects the construction industry as much as other industrial sectors. The abuse of both legal and illegal drugs brings with it the risk of discovering discarded hypodermic syringes or discarded needles.
- 2 Employees in the refurbishment sector of the industry are probably at greatest risk, especially if the property is derelict or has been occupied by unauthorised occupants. However, any work in occupied or previously occupied premises carries with it some risk of finding needles that

have been randomly discarded or hidden away in areas where they are difficult to see, until it is too late.

- 3 If not handled in a safe manner, discarded needles can pose serious health risks to anyone whose skin is accidentally pricked. Blood on a needle could be infected with a hepatitis or HIV virus.
- 4 As part of site induction in the appropriate circumstances, employees should be told to assume that any needle they find has been used by a drug user and is potentially contaminated by infected blood.
- 5 Contractor site procedures should cover the actions that employees and supervisors should take whenever discarded needles are found. The removal and disposal of such items should be properly covered.
- 6 Generally, employees should be clearly told not to touch or move any needles or hypodermic syringes they find, but ask a responsible person to guard it whilst reporting the matter to their supervisor.
- 7 If a needle or syringe must be moved then suitable instructions to employees might be:
  - (a) if possible, use a pair of pliers to pick it up
  - (b) carry it with the needle pointing downwards
  - (c) do **not** wrap it in paper or put it into a litter bin
  - (d) if available, place it in a clear glass bottle or jar
  - (e) place the bottle or jar in a secure location
  - (f) carefully follow site or company procedures regarding disposal
  - (g) wash hands thoroughly.
- 8 Employees should not panic if a needle punctures the skin. Gently squeeze the area around the wound to encourage bleeding but **do not suck the wound**. Wash the site of the injury thoroughly with soap and water at the first opportunity, and obtain medical assistance as soon as possible from the nearest hospital with an accident and emergency department. If you can do so safely, take the syringe or needle with you.
- 9 If dealt with properly and promptly, the risks of a resulting health problem are small.

## 1.2.15 Heat Stress

- 1 The body reacts to heat by increasing the blood flow to the skin's surface, and by sweating. This results in cooling as sweat evaporates from the body's surface and heat is carried to the surface of the body from within by the increased blood flow. Heat can also be lost by radiation and convection from the body's surface.
- 2 Typical example of a heat stress situation:
  - (a) Someone wearing protective clothing and performing heavy work in hot and humid conditions could be at risk of heat stress because:
    - (i) Sweat evaporation is restricted by the type of clothing and the humidity of the environment.
    - (ii) Heat will be produced within the body due to the work rate and, if insufficient heat is lost, deep body temperature will rise.
    - (iii) As deep body temperature rises the body reacts by increasing the amount of sweat produced, which may lead to dehydration.
    - (iv) Heart rate also increases which puts additional strain on the body.
    - (v) If the body is gaining more heat than it can lose the deep body temperature will continue to rise.
    - (vi) Eventually it reaches a point when the body's control mechanism itself starts to fail.
    - (vii) The symptoms will worsen the longer they remain working in the same conditions.

### 1.2.15.1 Heat stress effects

- 1 Heat stress can affect individuals in different ways, and some people are more susceptible to it than others.
- 2 Typical symptoms are:
  - (a) an inability to concentrate
  - (a) muscle cramps
  - (b) heat rash
  - (c) severe thirst - a late symptom of heat stress
  - (d) fainting
  - (e) heat exhaustion - fatigue, giddiness, nausea, headache, moist skin
  - (f) heat stroke - hot dry skin, confusion, convulsions and eventual loss of consciousness.
- 3 Heat stroke is the most severe disorder and can result in death if not detected at an early stage.

### 1.2.15.2 Workplace examples

- 1 People might suffer from heat stress because of the hot environment created by the process, or restricted spaces:
  - (a) construction sites
  - (a) confined spaces
  - (b) operating machinery

- (c) tunnels
- (d) mines
- (e) compressed air tunnels
- (f) foundries and smelting operations
- (g) brick-firing and ceramics plants
- (h) boiler rooms
- (i) kitchens
- (j) laundries

#### **1.2.15.3 Control Measures**

- 1 Over time people adapt to hot conditions by sweating more, and by changing their behaviour to try and cool down, e.g. removing clothing, taking cool drinks, fanning themselves, sitting in the shade or a cool area, and/or reducing their work rate. However, in many work situations such behavioural changes may not be possible, e.g. during asbestos removal. Where there is a possibility of heat stress occurring you will need to carry out a risk assessment.
- 2 Contractors shall implement a Heat Stress Prevention Program.
- 3 Contractors shall undertake a risk assessment to reduce or eliminate heat stress.
- 4 When carrying out a risk assessment, the major factors you need to consider are:
  - (a) work rate - the harder someone works the greater the amount of body heat generated;
  - (a) working climate - this includes air temperature, humidity, air movement and effects of working near a heat source;
  - (b) worker clothing and respiratory protective equipment - may impair the efficiency of sweating and other means of temperature regulation;
  - (c) worker's age, build and medical factors - may affect an individual's tolerance.
- 5 Firstly, you will need to talk to the workers involved (and their safety representatives), to see whether they are suffering early signs of heat stress. If it seems likely that there is a problem, you may need to consult with people who are more experienced in determining the risk from hot environments, e.g. occupational hygienists, nurses or doctors.
- 6 Contractors must remove or reduce the sources of heat by:
  - (a) **CONTROLLING THE TEMPERATURE** using engineering solutions, e.g.
    - (i) change the processes,
    - (i) use fans or air conditioning,
    - (ii) use physical barriers that reduce exposure to radiant heat.
  - (b) **PROVIDE MECHANICAL AIDS** where possible to reduce the work rate.
  - (c) **REGULATE THE LENGTH OF EXPOSURE** to hot environments by:
    - (i) allowing workers to enter only when the temperature is below a set level or at cooler times of the day,
    - (ii) issuing permits to work that specify how long your workers should work in situations where there is a risk,
    - (iii) providing periodic rest breaks and rest facilities in cooler conditions.
  - (d) **PREPARE FOR DEHYDRATION**. Working in a hot environment causes sweating which helps keep people cool but means losing vital water that must be replaced. Provide cool

water in the workplace and encourage workers to drink it frequently in small amounts before, during (this is not possible in some situations e.g. respiratory protective equipment use or asbestos removal) and after working.

- (e) **PROVIDE PERSONAL PROTECTIVE EQUIPMENT.** Specialised personal protective clothing is available which incorporates, for example, personal cooling systems or breathable fabrics. This may help protect workers in certain hot environments. Protective clothing or respiratory protective equipment is often required when there will be exposure to some other hazard at work e.g. asbestos. This type of equipment, while protecting from the other hazard, may increase the risk of heat stress
- (f) **PROVIDE TRAINING FOR YOUR WORKERS,** especially new and young employees, telling them about the risks of heat stress associated with their work, what symptoms to look out for, safe working practices and emergency procedures.
- (g) **ALLOW WORKERS TO ACCLIMATISE** to their environment and identify which workers are acclimatised/assessed as fit to work in hot conditions.
- (h) **IDENTIFY EMPLOYEES WHO ARE MORE SUSCEPTIBLE** to heat stress either because of an illness/condition or medication that may encourage the early onset of heat stress, e.g. those with heart conditions. Advice may be needed from an occupational health professional or medical practitioner.
- (i) **MONITOR THE HEALTH OF WORKERS AT RISK.** Where it is considered that a residual risk remains after implementing as many control measures as practicable, you may need to monitor the health of workers exposed to the risk. You should then seek advice from occupational health professionals with a good working knowledge of the risks associated with working in heat stress situations.

- 7 In accordance with the Qatar Labour Law: During the period from June 15th until August 31st, work under direct sun rays is prohibited from 11:30 am to 3:00 pm unless special arrangement is taken by the Contractor to control and ease effect of the direct sun on the workers unless otherwise announced by the concerned authorities. This arrangement should be approved by the Engineer's and should be agreed upon before implementation.

#### 1.2.15.4 Respiratory problems Dust

- 1 The inhalation of any dust will eventually cause respiratory problems, including or contributing to such conditions as asthma, bronchitis, pneumoconiosis and certain types of lung cancer. Some dusts cause an allergic reaction where breathing problems are caused immediately after a dust is breathed in. As well as presenting a health hazard, many airborne dust clouds are also flammable or explosive.
- 2 Whenever practicable, the generation of dust should be avoided, and where it cannot be avoided it should be controlled by ventilation or extraction. The use of personal protective equipment by employees must be regarded as the very last resort when all other methods of control have been examined and found not to be practicable.

#### 1.2.15.5 Fumes including solvent fumes

- 1 The vapour given off by many substances has the potential to cause respiratory illness or other symptoms of ill health if not adequately controlled. Other symptoms include headaches, coughing, feeling sick, feeling light-headed, shortness of breath or feverishness.
- 2 As well as being inhaled and causing direct problems in the lungs, many fumes can be absorbed into the bloodstream and bring about complications in other parts of the body.
- 3 An example of this type of response is cancer of the bladder which can be caused by inhaling certain aniline fumes (a chemical made for use in textile dyes).
- 4 Potential sources of hazardous fumes, which may be inhaled if control measures are not taken, are:

- (a) solvent-based adhesives, spirit-based or solvent-based paints
  - (a) welding, especially welding galvanised metals
  - (b) oxyacetylene cutting
  - (c) engine exhausts.
- 5 If the generation or release of the fumes cannot be avoided, for example by using a water-based solvent or paint instead, then adequate natural or mechanical ventilation should be used. The use of personal protective equipment for employees must be regarded as the last resort.

END OF DOCUMENT

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