

**Approval Conditions for**

**Operating**

**Mandatory Safety Training Courses**

**Part II – Module 1(a)**

**Course Design and Specifications**

**For**

**(A) Mandatory Basic Safety Training  
Course (Construction Work)**

**(B) Mandatory Basic Safety Training  
Revalidation Course (Construction  
Work)**

## Version Control Record

<b>Version</b>	<b>Release Date</b>	<b>Effective Date</b>	<b>Significant Changes</b>
<b>1.0</b>	<b>5 September 2011</b>	<b>26 September 2011 ( Effective date for Sections 8.1, 9.1 and 11 is 10 October 2011 )</b>	
<b>2.0</b>	<b>22 August 2012</b>	<b>1 October 2012</b>	<b>Sections 1.8, 1.9 &amp; 9 Annexes 1-3,4A &amp; 5</b>
<b>3.0</b>	<b>3 June 2014</b>	<b>3 June 2014</b>	<b>Annex 4 Section 7</b>
<b>3.1</b>	<b>1 June 2015</b>	<b>1 June 2015</b>	<b>Address of Occupational Safety and Health Training Centre, Labour Department</b>
<b>4.0</b>	<b>27 December 2017</b>	<b>26 March 2018</b>	<b>Sections 1.8.1, 1.8.2, 1.8.4, 1.9.1, 1.9.2, 6.1, 6.2, 9.1, 10.1, 10.2, 10.2.1 &amp; 10.2.2 Annexes 2-4 &amp; 4A</b>

### **Inquiry**

For further inquiry on matters relating to the application for recognition of the MST courses, please contact:

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## 1. Overview

- 1.1 The terms and abbreviations adopted in this module follow those defined in Part I. This module is Part II – 1(a) of the AC which covers 2 MBST (Construction Work) courses, i.e. full course and revalidation course. This module should be read together with Part I of this AC.
- 1.2 Section 6BA of the Factories and Industrial Undertakings Ordinance, Cap 59, requires that every employed person carrying out construction work should have successfully completed the relevant safety training course, i.e. MBST (Construction Work) Course, and should have been issued a relevant certificate. In this regard, the CL is empowered by section 6BA(2) of the Ordinance to recognise the following safety training courses:
- (A) Mandatory Basic Safety Training Course (Construction Work) (“full course”); and
  - (B) Mandatory Basic Safety Training Revalidation Course (Construction Work) (“revalidation course”).
- 1.3 Procedures for application for course recognition are stipulated in the GN. Applicant who wishes to run full course or revalidation course should submit an application to the CL for course recognition.
- 1.4 Unless stated otherwise, requirements stated in this module are applicable to both full course and revalidation course.
- 1.5 TCP should ensure that the course materials used should comply with the requirements of this AC.
- 1.6 The objective of the full course is to provide basic safety training to employed persons carrying out construction work in order to enhance their safety awareness and therefore to prevent work accidents and occupational diseases. The trainees will be issued with a MBST (Construction Work) certificate upon successful completion of the

course.

- 1.7 Revalidation course aims to provide refresher training to holder of MBST (Construction Work) certificate so as to refresh and update what was learnt in the past MBST (Construction Work) course attended. Upon successful completion of the course, the trainee will be issued a new certificate.
  
- 1.8 At the end of **full** course, the trainees should be able to:
  - 1.8.1 Understand the basic principles of work safety;
  - 1.8.2 Know the basic legal requirements prescribed under relevant safety legislation applicable to construction sites;
  - 1.8.3 Comprehend the potential hazards of common work processes on construction sites and their preventive measures;
  - 1.8.4 Know the possible causes of, and means of preventing, accidents and diseases that are common on construction sites;
  - 1.8.5 Understand the basic principles of fire prevention;
  - 1.8.6 List the essential elements of emergency preparedness;
  - 1.8.7 Understand the importance of, and procedures for, reporting accidents and dangerous occurrences on construction sites;
  - 1.8.8 Grasp the types, purposes, correct selection procedures and the proper use of personal protective equipment commonly required on construction sites; and
  - 1.8.9 Demonstrate the necessary safety attitude to safeguard themselves and other workers.
  
- 1.9 At the end of revalidation course, the trainees should be able to:
  - 1.9.1 Understand the basic principles of work safety;
  - 1.9.2 Comprehend the potential hazards of common work processes on construction sites and their preventive measures;
  - 1.9.3 Understand the basic principles of fire prevention;
  - 1.9.4 List the essential elements of emergency preparedness;
  - 1.9.5 Understand the importance of, and procedures for, reporting accidents and dangerous occurrences on construction sites;
  - 1.9.6 Grasp the types, purposes, correct selection procedures and the proper use of personal protective equipment commonly

- required on construction sites; and
- 1.9.7 Demonstrate the necessary safety attitude to safeguard themselves and other workers.

## **2. Admission criteria**

- 2.1 Full course is run for trainee who does not possess a MBST (Construction Work) certificate or possesses a MBST (Construction Work) certificate which has expired for more than 3 months.
- 2.2 A TCP should ensure that applicant to be admitted to a revalidation course should, at the time of application, be holding a MBST (Construction Work) certificate which either will expire within 6 months or has expired for not more than 3 months.
- 2.3 A TCP should ensure that applicant to be admitted to a full course or revalidation course should meet the requirements stipulated under Regulation 4A of the Construction Sites (Safety) Regulations.

## **3. Qualifications of trainer**

- 3.1 A TCP should ensure that its trainer should at least possess one of the qualifications from 1 to 3 stipulated in **Annex 1**.

## **4. Trainees to trainer ratio**

- 4.1 A TCP should ensure that the maximum ratio of trainees to trainer is 30 to 1 and it is the same for theory session and hands-on session.

## **5. Class size**

- 5.1 A TCP should ensure that the maximum size of a class is 30 trainees

and it is the same for theory session and hands-on session.

## **6. Course duration**

6.1 A TCP should ensure that the minimum course duration of full course should be 7.5 hours (break between half-day sessions or lunch time are not included) and it should include hands-on sessions of about 70 minutes (with reasonable time allocation for each practice) on the practice of correct posture of manual handling operations, using safety harness with lifeline and fall-arresting device and safety helmet with Y-type chin strap, an examination session of 30 minutes and a total of not more than 30 minutes recess time.

6.2 A TCP should ensure that the minimum course duration of revalidation course should be 3.5 hours and it should include a hands-on session of about 35 minutes on the practice of using safety harness with lifeline and fall-arresting device and safety helmet with Y-type chin strap, an examination session of 30 minutes and a total of not more than 15 minutes recess time.

## **7. Attendance**

7.1 A TCP should ensure that any trainee who is absent from the class for more than 15 minutes for any half-day sessions will be disqualified to attend the examination.

## **8. Lesson plan**

8.1 A TCP should ensure that its full course and revalidation course should be taught in accordance with the lesson plans stipulated at **Annex 2** and **Annex 3**, respectively.

## **9. Course contents**

9.1 A TCP should ensure the course materials used for full course and revalidation course should include all the topics and details stipulated at **Annex 4** and **Annex 4A**, respectively. The course contents include the reference teaching time and the additional requirements for the delivery. The TCP should also supplement additional materials in accordance with the needs of the trainees and the latest safety information.

## **10. Display, demonstration and practising**

10.1 A TCP should provide suitable and sufficient equipment for the purpose of display, demonstration and practising. The details are stated in relevant sections of the course contents at **Annexes 4** and **4A**.

10.2 A TCP should ensure that every trainee should safely complete the hands-on practices. A TCP should provide the following equipment for each trainee for hands-on practice:

10.2.1 for the MBST Full Course:

- a set of full body harness with lifeline and fall-arresting device;
- a safety helmet with a Y-type chin strap; and
- an empty carton box (of approximately A4 size; for practising the correct posture of manual handling operations).

10.2.2 for the MBST Revalidation Course:

- a set of full body harness with lifeline and fall-arresting device; and
- a safety helmet with a Y-type chin strap.



## **11. Examination**

- 11.1 A TCP should ensure that every trainee attending the examination should meet the required attendance and the requirement of completing the hands-on practice.
- 11.2 A TCP should ensure that the examination papers used are issued and specified by LD.
- 11.3 A TCP should provide the answer sheet at **Annex 5** to the trainee for the examination.
- 11.4 A TCP should ensure that the invigilator and the trainee should sign on the answer sheet.
- 11.5 Time allowed for the examination is 30 minutes and the passing mark is 60%.

## **12. Validity period of certificate**

- 12.1 A TCP should ensure that the validity period of MBST (Construction Work) certificate issued is 3 years.
- 12.2 For full course, validity period of the certificate should be counted from the date when the trainee successfully completes the course.
- 12.3 For revalidation course, validity of the certificate should be counted from the day—
  - 12.3.1 immediately after the expiry date of the current certificate if the revalidation course is successfully completed within 6 months prior to expiry of the current certificate, or
  - 12.3.2 of completing the revalidation course if the revalidation course is successfully completed within 3 months after expiry of the current certificate.

### 13. Standard certificate format

13.1 A TCP should ensure that front side of the MBST (Construction Work) certificate should be designed with the required words, in the format as shown in **Figure 1** and according to the specifications below. The reverse side is left to the TCP to include other information as appropriate, which should be commensurate with the purpose of the certificate.

Figure 1: Required Words and Design Format of the Front Side of MBST (Construction Work) Certificate

建造業安全訓練證明書  
Construction Industry Safety Training Certificate  
工廠及工業經營條例第 6BA(2)條  
Section 6BA(2) of the Factories and Industrial Undertakings Ordinance

持證人姓名 Holder's Name  
(中文) :  
(English) :

編號 Reference No. :

完成課程日期 Date of Course Completion :  
(日日/月月/年年年年) (dd/mm/yyyy)

有效期限 Validity Period : 由 From 至 To 止  
(日日/月月/年年年年) (dd/mm/yyyy)

本證明書由 [某發證機構] 簽發  
Issued by [provider of recognised training course]

此證明書須由持證人擁有及保存。  
This certificate is owned and should be kept by the certificate holder.

(not to scale)

- 13.1.1 The certificate should be made of durable materials, either laminated or plastic, and in standard size of 85 mm x 55 mm;
- 13.1.2 A photograph (minimum size of not less than 20 mm x 25 mm) of the trainee should be incorporated into the certificate for easy identification;
- 13.1.3 For laminated card, the corner of the trainee's photo should be stamped with the TCP's company's chop;
- 13.1.4 For plastic card, the trainee's photo should be printed on the card;
- 13.1.5 Unless otherwise specified, information on the certificate should be printed in both Chinese and English;

13.1.6 The certificate should contain the following information:

- The name of certificate, i.e. “建造業安全訓練證明書” and “Construction Industry Safety Training Certificate”;
- The empowering legislation, i.e. “工廠及工業經營條例第 6BA(2)條” and “Section 6BA(2) of the Factories and Industrial Undertakings Ordinance”;
- The Chinese and English name as printed on the Hong Kong Identity Card (or equivalent identity documents) of the certificate holder;
- Reference number of the certificate (an “R” should be appended to the last digit of the reference number to denote that the certificate is issued for a revalidation course);
- Date of Course Completion (in the format of DD/MM/YYYY);
- Validity period with starting date and expiry date (in the format of DD/MM/YYYY);
- Name of the certificate issuing course provider; and
- The wordings of “此證明書須由持證人擁有及保存。” and “This certificate is owned and should be kept by the certificate holder.”

## 14. Training records

- 14.1 A TCP should submit the record of every certificate issued according to the required details stipulated in Table 1 as well as the name of the course.

**Table 1 : Example of Training Records**

<b>HKID/ Passport No. (TRT1)</b>	<b>Name of trainee (TRT2)</b>	<b>Class Ref. (TRC1)</b>	<b>Name of Trainer (TRC2)</b>	<b>Date of Course completion (TRC3)</b>	<b>Certificate Effective Date (TRT3)</b>	<b>Certificate Expiry Date (TRT4)</b>	<b>Certificate Serial No. (TRT5)</b>
A123456(1)	Chan Siu On	ABC1	HAU To-si	13/06/2011	13/06/2011	12/06/2014	W396000201R
A123457(2)	Chan Siu Chuen	ABC1	HAU To-si	13/06/2011	23/09/2011	22/09/2014	W396000202R
A123458(3)	Chan Siu Feng	ABC2	HAU To-si	18/06/2011	18/06/2011	17/06/2014	W396000203
A123459(4)	Chan Siu Lin	ABC2	HAU To-si	18/06/2011	18/06/2011	17/06/2014	W396000204

## Annex 1

### Qualifications of Trainer for MBST (Construction Work) Courses

<b>Qualifications</b>			
1.	A Registered Safety Officer under the Factories and Industrial Undertakings (Safety Officers and Safety Supervisors) Regulations; or		
2.	A person possessing at least any one of the following qualifications and experience from (i) to (iv); or		
	<b>Academic Qualifications</b>	<b>Experience</b>	
i.	A recognised degree or post-graduate diploma in occupational safety and health, or equivalent.	A cumulative total of <b><u>not less than one year</u></b> of experience directly involving occupational safety and health related work.	or
ii.	A degree in Science or Engineering, or equivalent, and a recognised certificate, diploma or higher diploma in occupational safety and health.	A cumulative total of <b><u>not less than one year</u></b> of experience directly involving occupational safety and health related work.	or
iii.	A recognised certificate, diploma or higher diploma in occupational safety and health.	A cumulative total of <b><u>not less than two years</u></b> of experience directly involving occupational safety and health related work, <b><u>one year</u></b> of such experience must be obtained after the academic qualification on the left column.	or
iv.	A recognised certificate in construction safety.	A cumulative total of <b><u>not less than two years</u></b> of experience directly involving occupational safety and health related work, <b><u>one year</u></b> of such experience must be obtained after the academic qualification on the left column.	
3.	A person recognised by the CL as being competent to teach training course of MBST (Construction Work).		

**Annex 2****Lesson Plan for Mandatory Basic Safety Training Course  
(Construction Work)**

<b>Section</b>	<b>Topic &amp; Content</b>	<b>Time (Minutes)</b>
1	Introduction to Arrangements of the Course	10
2	General Concept of Work Safety	30
3	Relevant Occupational Safety and Health Legislation Applicable to Construction Work	20
4	Potential Hazards in Various Operations and Activities on Construction sites and their Preventions	210
4.1	Work-above-ground	
4.2	Safe Use of Electricity	
<b>Recess</b>		<b>15</b>
4.3	Use of Machinery and Tools	
4.4	Confined Spaces and Excavation Works	
4.5	Welding and Cutting	
<b>Break between Half-day Sessions or Lunch Break</b>		
4.6	Other Hazards	
4.7	Occupational Health	
4.8	Management and Tidiness of Construction Sites	
5	Fire Prevention Measures and Use of Fire Extinguishers on Construction Sites	15
6	The Basic Elements of Emergency Preparedness	5
7	Handling of Accidents and Dangerous Occurrences and Reporting Procedures	5
8	Explanation, Demonstration and Practice on the Selection and Use of Personal Protective Equipment	80
8.1	Factors for Consideration in Selection of PPE	
8.2	Categories of PPE	
<b>Recess</b>		<b>15</b>
8.3	Practice on Use of PPE	
9	Conclusion of the Course	5
10	Written Examination	30
11	Review of the Examination Paper After the Examination	10
<b>Total Time 【Class+Exam+Review】</b>		<b>450 (7.5 Hrs)</b>

**Annex 3****Lesson Plan for Mandatory Basic Safety Training  
Revalidation Course (Construction Work)**

<b>Section</b>	<b>Topic &amp; Content</b>	<b>Time (Minutes)</b>
1	Introduction to Arrangements of the Course	5
2	General Concept of Work Safety and Safe Working Practice	100
	<b>Recess</b>	<b>15</b>
3	Emergency Preparedness and Handling of Accidents	5
4	Explanation, Demonstration and Practice on the Selection and Use of Personal Protective Equipment	35
5	Fire Prevention Measures and Use of Fire Extinguishers on Construction Sites	7
6	Conclusion of the Course	3
7	Written Examination	30
8	Review of the Examination Paper After the Examination	10
	<b>Total Time 【Class+Exam+Review】</b>	<b>210 (3.5 Hrs)</b>

**Course Contents for Mandatory Basic Safety Training Course  
(Construction Work)**



**Course Contents for**  
**Mandatory Basic Safety Training Course**  
**(Construction Work)**

Section 6BA(2) of Factories and Industrial Undertakings Ordinance



**Occupational Safety and Health Branch**  
**Labour Department**

**This Course Contents prepared by  
The Occupational Safety and Health Branch  
Labour Department**

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**This Edition December 2017**

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## **1. Introduction to Arrangements of the Course**

[Reference teaching time for Section 1: 10 mins]

### **1.1 Training Venue, Training Equipment and Examination Requirements**

- To introduce briefly about the training venue, training equipment and the examination requirements

### **1.2 Introduction to the Course Contents**

- To introduce briefly about the course structure and contents

### **1.3 Objectives of the Course**

Under Section 6BA(2) of Factories and Industrial Undertakings Ordinance (“the Ordinance”), from 1 May 2001 onwards, a person shall receive safety training course recognised by the Commissioner for Labour and hold a valid certificate (generally known as Green Card (Construction work)) before he can be employed to carry out construction work. And proprietors shall only employ persons who are issued with a valid certificate to carry out construction work. The person shall carry the certificate with him while at work in the industrial undertaking and produce it upon demand by the proprietor or an occupational safety officer of the Labour Department.

The objective of the mandatory basic safety training course is to enhance workers’ safety awareness and prevent work accidents. At the end of the course, the trainees should be able to:

- Understand the basic principles of work safety;
- Know the basic legal requirements prescribed under relevant safety legislation applicable to construction sites;
- Comprehend the potential hazards of common work processes on construction sites and their preventive measures;
- Know the possible causes of, and means of preventing, accidents and diseases that are common on construction sites;
- Grasp the types, purposes, correct selection procedures and the proper use of personal protective equipment commonly required on construction sites; and
- Demonstrate the necessary safety attitude to safeguard themselves and other workers.

## **2. General Concept of Work Safety**

[Reference teaching time for Section 2: 30 mins]

### **2.1 Introduction [Playing Video: Your Family Needs You]**

Most accidents can be prevented by taking simple measures or adopting proper working procedures. If we work carefully and take appropriate safety measures, there will definitely be fewer work injury cases. The Occupational Safety and Health Ordinance, which came into operation on 23 May 1997, covers most workplaces in order to protect the safety and health of employees at work.

Other legislation applicable to construction sites includes the Factories and Industrial Undertakings Ordinance and its subsidiary legislation, particularly the Construction Sites (Safety) Regulations. Employees should cooperate with their employers and other persons in complying with the safety legislation and guidelines, and should not do anything to endanger themselves and other persons.

### **2.2 Three Most Common Types of Accidents on Construction Sites in Recent Years**

By making reference to the statistics provided by the Labour Department, list the three most common types of accidents and for each type of accidents, the numbers of accidents and fatalities for recent years.

The latest occupational safety and health related “Press Releases” and “Work Safety Alert” published in the Labour Department’s homepage must be explained to the trainees.

### **2.3 Causes of Accidents and Preventive Measures**

#### **Definition of Accident**

An accident is a single, or a series of, unplanned event which may be causing death, injury, occupational disease, or lead to equipment or property damage, or damage to the working environment.

#### **2.3.1 Causes of Accidents**

- Inadequate control by management
- Improper working procedures
- Unsafe environment
- Unsafe act

### **2.3.2 Unsafe Acts (Worker's Responsibility)**

- Not using designated personal protective equipment
- Using unsafe equipment or machines
- Improper method in handling materials

### **2.3.3 Unsafe Working Environment (Employer's Responsibility)**

- Venue, lighting or ventilation system not properly arranged
- Floor edges and working platform without fencing
- Materials placed on passageway

### **2.3.4 Prevention of Accidents**

- Employers should provide a safe working environment and personal protective equipment.
- Employers should provide safety training to their employees. By safety training, employees' safety awareness and vigilance could be enhanced which in turn reduce accidents.
- Employees should use personal protective equipment as instructed by their employers.
- The Government should formulate proper safety laws; organize promotion activities; educate the stakeholders of the legislative requirements; and supervise the implementation of the laws. To ensure safety at work, anyone violating the laws should be prosecuted.
- Maintaining good housekeeping at a workplace can reduce the occurrence of accidents, and provide a safe and effective working environment.
- The purpose of a permit-to-work system is to ensure a workplace is safe for work.

## **2.4 Effects of Accidents on Individuals, Employers and the Society**

Workplace accidents not only cause sufferings to the victims and their families, but also result in financial losses arising from stoppage of work, insurance claims, medical and rehabilitation expenses, etc. Accidents will bring to different parties the following effects:

- The injured person: In addition to physical injuries, he would also suffer from psychological impacts. He may become incapacitated and financial problems follow.

- Family members: They lose financial support and need to take care of the injured person.
- The employer: Progress of the work would be affected; experienced workers are lost; and the employer may need to bear criminal and civil responsibilities for breaching safety regulations.
- The society: Losses in terms of medical and rehabilitation expenses, lowered productivity and weakened competitiveness.

### **3. Relevant Occupational Safety and Health Legislation Applicable to Construction Work**

[Reference teaching time for Section 3: 20 mins]

#### **3.1 Occupational Safety and Health Ordinance and Subsidiary Legislation (Chapter 509)**

##### **Purposes**

- To ensure the safety and health of employees when they are at work
- To prescribe measures that will make the workplaces safer and healthier for employees
- To improve the safety and health standards applicable to workplaces
- To improve the safety and health aspects of working environments of employees

##### **Coverage**

- This ordinance covers almost all workplaces - places where employees work, including offices, shopping arcades, supermarkets, hospitals, construction sites, etc.
- However, there are a few exceptions, including places where only self-employed persons work and domestic premises where the only employees are domestic servants.
- Every employer must, so far as reasonably practicable, ensure the safety and health at work of all his employees.

##### **3.1.1 Occupational Safety and Health Regulation**

The main provisions of the Regulation are to:

- prevent accidents
- prevent fire
- provide a safe and healthy work environment
- ensure hygiene
- provide first aid facilities
- ensure safe manual handling operations

##### **3.1.2 Occupational Safety and Health (Display Screen Equipment) Regulation**

- Prescribes measures for protecting the safety and health of employees who use display screen equipment at work

#### **3.2 Factories and Industrial Undertakings Ordinance and Subsidiary Legislation (Chapter 59)**

**[Playing Video: Demolishing a Brick Wall]**



- provide for the safety and health protection to workers in the industrial sector
- Sections 6A and 6B: general duties on proprietor and persons employed with regard to the health and safety at work
- Section 6BA: mandatory basic safety training
- Coverage
  - factories
  - construction sites
  - catering establishments
  - cargo and container handling undertakings
  - repair workshops and other industrial workplaces
- General Duties of Proprietors
 

Every proprietor of an industrial undertaking must, so far as is reasonably practicable, ensure the safety and health at work of all persons employed by him. The matters to which that duty extends include:

  - providing and maintaining plant and work systems that do not endanger safety or health;
  - making arrangements for ensuring safety and health in connection with the use, handling, storage or transport of plant or substances;
  - providing all necessary information, instruction, training, and supervision for ensuring safety and health;
  - providing and maintaining all parts of the workplace and means of access to and egress from the workplace that is safe and without risk to health; and
  - providing and maintaining a working environment that is safe and without risk to health.
- General Duties of Persons Employed
  - Every person employed at an industrial undertaking must take reasonable care for the safety and health of himself and others; and
  - co-operate with the proprietor of an industrial undertaking to enable any duty or requirement for securing the safety and health of persons employed at the industrial undertaking to be performed or complied with.

### **3.2.1 Subsidiary Legislation under Factories and Industrial Undertakings Ordinance**

Under the Factories and Industrial Undertakings Ordinance, there are subsidiary regulations covering various aspects of hazardous work activities in factories, building and engineering construction sites, catering establishments, cargo and container handling undertakings and other industrial workplaces. The subsidiary

regulations prescribe detailed safety and health standards on work situations, plant and machinery, processes and substances.

### **3.2.2 Subsidiary Regulations include:**

- Factories and Industrial Undertakings Regulations
- Construction Sites (Safety) Regulations
- Factories and Industrial Undertakings (Confined Spaces) Regulation
- Factories and Industrial Undertakings (Notification of Occupational Diseases) Regulations
- Factories and Industrial Undertakings (Woodworking Machinery) Regulations
- Factories and Industrial Undertakings (Lifting Appliances & Lifting Gear) Regulations
- Factories and Industrial Undertakings (Abrasive Wheels) Regulations
- Factories and Industrial Undertakings (Work in Compressed Air) Regulations
- Factories and Industrial Undertakings (Spraying of Flammable Liquids) Regulations
- Factories and Industrial Undertakings (Cartridge-Operated Fixing Tools) Regulations
- Factories and Industrial Undertakings (Protection of Eyes) Regulations
- Factories and Industrial Undertakings (Noise at Work) Regulation
- Factories and Industrial Undertakings (Electricity) Regulations
- Factories and Industrial Undertakings (Asbestos) Regulation
- Factories and Industrial Undertakings (Blasting by Abrasives) Special Regulations
- Factories and Industrial Undertakings (Safety Officers and Safety Supervisors) Regulations
- Factories and Industrial Undertakings (Dangerous Substances) Regulations
- Factories and Industrial Undertakings (Suspended Working Platforms) Regulation
- Factories and Industrial Undertakings (Loadshifting Machinery) Regulation
- Factories and Industrial Undertakings (Gas Welding and Flame Cutting) Regulation
- Factories and Industrial Undertakings (Safety Management) Regulation

### **3.3 Construction Sites (Safety) Regulations (Chapter 59I )**

These regulations control the construction, maintenance, use and operation of hoists, scaffolds, and working platforms. There are also provisions for the use of personal

protective equipment for protection against falling of person, falling objects and drowning in a construction site. There are miscellaneous safety requirements such as prevention of inhalation of dust and fumes, protection of eyes, and the provision of first aid facilities.

Under this regulation, at least one person trained in first aid should be employed on site, where 30 to 99 workmen are employed on a site.

Adequate ventilation shall be provided to prevent workmen from inhaling dust or fumes arising from grinding, cleaning, spraying, mixing or working of any material which causes dust or fumes to be given off of a character and extent likely to be injurious to the health of workmen employed in work. Suitable and adequate lighting necessary to secure workmen's safety shall be provided. Drinking water must be provided to workers.

### **3.4 Code of Practice**

The Code of Practice (hereinafter referred as the Code) is approved and issued by the Commissioner for Labour under Section 7A of the Factories and Industrial Undertakings Ordinance, Chapter 59 of the Laws of Hong Kong (hereinafter referred as the FIUO). It provides a practical guidance to proprietors of industrial undertakings and the employees for compliance with the requirements under the provisions of the Sections 6A and 6B of FIUO concerning the general duties of proprietor and employee. It is important to note that compliance with the Code does not of itself confer immunity from legal obligations.

The Code has a special legal status. Although failure to observe any guidance contained in the Code is not in itself an offence that failure may be taken by a court in criminal proceedings as a relevant factor in determining whether or not a person has breached any of the provisions of the regulations to which the guidance relates.

Codes of practice that are often used include:

- Code of Practice for Bamboo Scaffolding Safety
- Code of Practice for Safety and Health at Work in Confined Spaces
- Code of Practice for Metal Scaffolding Safety
- Code of Practice for Safe Use of Tower Cranes
- Code of Practice for Safe Use of Mobile Cranes

## 4. Potential Hazards in Various Operations and Activities on Construction sites and their Preventions

[Reference teaching time for Section 4: 210 mins]

### 4.1 Work-above-ground

(This section must be conducted in an interactive manner through discussion with trainees)

#### Reference

- Construction Sites (Safety) Regulations
- Factories and Industrial Undertakings (Suspended Working Platforms) Regulation
- Code of Practice for Bamboo Scaffolding Safety
- Code of Practice for Metal Scaffolding Safety
- Code of Practice for Safe Use and Operation of Suspended Working Platforms

#### Potential Hazards

- Workers falling from locations of work-above-ground, including working platforms, scaffolds or other workplaces
- Workers falling from toppling or collapsing working platforms or scaffolds
- Falling objects from the working platform hitting workers below
- Toppling of the power-operated elevating work platform
- The safe working load of the platform exceeded, leading to breaking of the hydraulic boom and subsequently collapse of the platform
- The power-operated elevating work platform hitting another object
- The power-operated elevating work platform hitting an overhead electricity line

#### 4.1.1 Basic Principles and Requirements

Most of the fatal accidents in relation to the construction industry involved work-above-ground. The basic principles and requirements for preventing workers from falling during work-above-ground are:

- Work-above-ground should be avoided where possible. If work-above-ground cannot be avoided, risk assessments should be conducted to eliminate work-related hazards or to control the risks before commencing work.
  - Examine the work-above-ground to look for the hazards and decide who might be harmed.

- Evaluate the risks of the hazards.
  - Formulate safe work methods.
  - Implement proper safety precautions.
- Adequate and proper safety facilities should be provided for conducting work-above-ground.
  - Adequate steps should be taken to prevent any person from falling from a height of 2 metres or more.
  - Suitable and adequate safe access to or egress from every place of work should be provided.
  - Suitable guard-rails should be erected at any place where hazardous conditions are present.
  - If it is impracticable to provide and use safety equipment (e.g. working platforms, guard-rails, gangways and runs, etc.), suitable and adequate safety nets and safety belts can be provided instead. If it is impracticable to provide safety nets, suitable and adequate safety belts should be provided instead. Safety belts should be attached continuously to a suitable and secure anchorage (e.g. an independent lifeline).

#### **4.1.2 Equipment for Work-above-ground**

**[Introduce work-above-ground equipment, e.g. step platform/hop-up platform /working platform by using real objects or in a powerpoint]**

##### **4.1.2.1 Scaffolds and Working Platforms**

**[Playing Video: Working on a Scaffold at the External Wall]**

- All scaffolds shall be erected by trained workmen under the immediate supervision of a competent person.
- Scaffolds and Working platforms shall be properly designed, for example, installation of suitable safe means of access and egress, handrails and guardrails, and adequate supports to strengthen the stability of the tubular scaffolds. When a worker conducting scaffold erection or maintenance work is at risk of falling, suitable safety measures should be taken.
- A scaffold shall be inspected with a report (Form 5) made by a competent person to certify the scaffold is safe before use for the first time, within 14 days (2 weeks) immediately preceding each use and after exposure to adverse weather conditions.
- Strictly follow the instructions of a competent person. Do not alter the

scaffold unless authorized to do so. Do not work on an unfinished scaffold.

- When it is necessary to work on a mobile scaffold, lock the wheels of the scaffold before you start working.
- Closely boarded or planked working platforms should be provided so that work can be safely done on them.
- The width of a working platform should not be less than 400 millimetres.
- The top guard-rail of a working platform should be fixed at a height between 900 millimetres and 1150 millimetres from the working platform. The intermediate guard-rail should be fixed at a height between 450 millimetres and 600 millimetres from the working platform.
  - The main purpose of the guardrails of a working platform is to prevent fall of workers.
- The height of the toe-boards of a working platform should not be less than 200 millimetres.
  - The main purpose of the toe-boards of a working platform is to prevent fall of workers, substances and tools.

#### **4.1.2.2 Light-duty Working Platforms**

- For work-above-ground, suitable working platforms (e.g. mobile working platforms) should be used. For work-above-ground below 2 metres where working platforms could not be erected under restrictive work space and the work concerned is of simple nature, use of suitable light-duty working platforms such as step platforms and hop-up platforms should be considered.
- Light-duty working platforms should conform to national or international standards.
- Only one person is permitted to work on each light-duty working person at one time. Never place excessive materials on the light-duty working platforms to avoid overloading the light-duty working platforms.
- Light-duty working platforms should be erected on firm, even and level ground. Use of light-duty working platforms on ramps and stairs should be prohibited.
- When ascending or descending light-duty working platforms, the workers should face the light-duty working platforms; hands should be free from carrying heavy objects; and the workers should maintain 3 points of contact with the light-duty working platforms.
- Light-duty working platforms should not be used if there are exposed live metal

parts or potentially exposed live conductors in the surrounding of the workplaces.

- Light-duty working platforms should be erected as near as possible to the job locations. To prevent toppling of the light-duty working platforms, the workers should not overstretch the bodies outside the light-duty working platforms.
- Before use, inspection of the light-duty working platforms should be conducted. Stop using the light-duty working platforms when they are found damaged.
- After use, the working platforms should be properly stored and maintained.
- Workers using light-duty working platforms should have received relevant safety training provided by the suppliers such that they can correctly erect, dismantle and use the light-duty working platforms.

#### **4.1.2.3 Fencings and Coverings**

- To prevent any person from falling, floor edges and openings shall be installed with secure fencing or covering.
- If you discover any dangerous places that have not been installed with fencing/covering, or the fencing/covering has been damaged, immediately reinstall or repair the fencing/covering. If this work is outside your capability, inform your supervisor. The correct safety measure is not to work at a floor edge not equipped with guardrails.

#### **4.1.2.4 Truss-out Bamboo Scaffolds [Playing Video: Truss-out Scaffold]**

- Every truss-out bamboo scaffold should be properly designed by a professional engineer of structural engineering discipline and relevant working procedures drawn up.
- Construction material of the building wall should be examined prior to the erection work. Selected proper anchor bolts should be used. Metal brackets (T-shaped metal brackets (should comply with “Guidelines on the Design and Construction of Bamboo Scaffolds” issued by the Building Department)) for supporting the scaffold should be securely fixed to the building wall with three or more anchor bolts. Anchor bolts should be installed in accordance with the installation procedures specified by the manufacturer. The depth and the size of the drill hole should also be appropriate to fit the diameter of the bolt.
- Erection of a truss-out bamboo scaffold should be carried out by trained workmen with adequate training and experience and under the supervision of a

competent person who was appointed by the contractor for this purpose.

- Suitable fall arresting equipment, namely safety harnesses, fall arresters and independent lifelines should be provided and worn by workers who are at risk of falling from a height. An effective monitoring system should be implemented to ensure that the workers make full and proper use of the safety equipment.
- Sufficient information, instruction, training and supervision should be provided to the workers to ensure safety at work.
- If it is difficult to anchor the fall arresting equipment to a fixed anchorage point due to physical constraints, a transportable temporary anchor device can provide an alternative.

#### 4.1.2.5 Ladders **[Playing Video: Mobile Metal Scaffold / Ladder]**

- Ladders should be restricted for access/egress purpose only and should not be used for work. Only when all the other measures (including working platforms and light-duty working platforms) are found not feasible and a permit-to-work for use of ladders has been issued by a competent person with a thorough risk assessment conducted and all necessary safety measures related to use of ladders taken, ladders can be used for work-above-ground at height less than 2 metres.
- A ladder for access/egress purpose should meet the following conditions:
  - Use a ladder which is of good construction, sound material and adequate strength.
  - Examine the ladder before using it and inspect it at regular intervals.
  - Place the ladder on a level and firm footing.
  - Place the ladder at an appropriate angle. For straight ladder, the ladder should be placed on a 1:4 ratio (75°) of setback distance to height.
  - Ensure that the ladder has a sufficient length. The upper end of the ladder should be at least 1 metre above the landing against which the ladder leans.
  - Ladder's upper or lower end shall be securely fixed or secured by another worker.
  - When climbing up or down a ladder, the user should avoid carrying heavy objects. The user should face the ladder and maintain 3 points of contact with the ladder.
  - If there are exposed live metal parts or potentially exposed live conductors nearby, do not use metal ladders.



#### **4.1.2.6 Suspended Working Platforms [Playing Video: Suspended Working Platform]**

- A competent person is responsible for on-site inspection, supervision on the installation and use of a suspended working platform.
- Every person working on a suspended working platform shall be at least 18 years old, and has undergone training and obtained a certificate in respect of such training.
- Every person carried on a suspended working platform shall wear a safety belt that is attached to an independent lifeline.
- When a suspended working platform is used, the safe working load and the maximum number of persons carried shall not be exceeded and workers are not allowed to climb onto or beyond the guardrails of the suspended working platform.
- A wire rope shall be replaced immediately if there is any damage.
- A suspended working platform shall clearly and legibly mark on the platform the safe working load, the maximum number of persons that may be carried at any one time, every person riding on a suspended working platform shall wear a safety belt properly attached to an independent lifeline.
- Every suspended working platform should be inspected in the immediately preceding 7 days before its use by a competent person. A statement to the effect that it is in safe working order should be entered into an approved form by the competent person.

#### **4.1.2.7 Power-operated Elevating Work Platforms**

- A competent person is responsible for on-site inspection, supervision on the installation and use of a power-operated elevating work platform.
- Every person carried on the platform of a power-operated elevating work platform shall wear a safety belt that is attached to a specified anchorage point of the platform designated by the manufacturer.
- When a power-operated elevating work platform is used, the safe working load and the maximum number of persons carried shall not be exceeded and workers are not allowed to climb onto or beyond the guardrails of the platform.
- A power-operated elevating work platform shall clearly and legibly mark on the platform the safe working load, the maximum number of persons that may be

carried at any one time.

- A power-operated elevating work platform should be regularly examined by a competent examiner (such as a registered professional engineer) and certified to be safe for use. The examination reports should be properly kept.
- Every power-operated elevating work platform should be inspected in the immediately preceding 7 days before its use by a competent person. A statement to the effect that it is in safe working order should be entered into an inspection record by the competent person. The inspection records should be properly kept.

#### **4.2 Safe Use of Electricity [Playing Videos: ①Maintenance Work and ②Electrocuted When Welding]**

(This section must be conducted in an interactive manner through discussion with trainees)

##### **Reference**

- Factories and Industrial Undertakings (Electricity) Regulations

##### **Potential Hazards**

- Improper repairing of electrical appliances may cause electric shock, burnt, fire and explosion, etc.
- Small currents passing directly through the heart during electrocution can cause fatal arrhythmias. Electrocution is mainly due to serious injury of the heart.

##### **Preventive Measures**

- The following situations would lead to electricity accidents: the insulation of the electrical tool being used is damaged, electric arc welding work is conducted at a humid environment, and the electrical tool is modified by the worker rendering the live parts exposed. (When a worker uses a portable electrical tool, he should not modify it by himself.)
- The following items are capable of preventing accidents of electric shock: loads should not be placed on electric wires, regularly inspect and maintain electrical tools, and adopt "permit-to-work" system.
- All hand-held portable tools should be double-insulated. The design of double-insulated electrical tools is targeted at current leakage.
- While a worker is using a portable electrical tool, he should follow the

operation rules set by the manufacturer, check the tool before use, and use appropriate plug for connecting the power so as to ensure the tool is in proper function.

- A double-insulated tool is identified by being distinctively marked. This marking consists of the double insulation symbol (a square within a square “回”).
- The design of double-insulated electrical tools is to avoid current leakage.
- Non-double insulated hand tools should be earthed to prevent electric shock accident. A portable electrical tool can be used without earthing when it is of double-insulated construction.
- Any electrical tool should be checked periodically by a qualified electrician to ensure its normal functioning.
- Before using an electric tool, check the tool and its plug and connecting cable.
- Do not use a damaged tool. (Allowing the live parts of electric wires exposed may cause electric shock.)
- Always comply with the safety measures for electrical works and never insert electric wires into a socket directly. (Not using an electric plug to connect power is an unsafe practice.)
- Workers should not use electrical appliances if their clothes are wet.
- Place the electric cable and hose of a tool at an appropriate position to avoid tripping hazards.
- Do not use an electric tool unless its connecting cable is well protected.
- Do not use an electric tool unless its metal casing is earthed and its power supply is provided with an earth leakage circuit breaker.
- Do not repair or alter any electrical installation unless competent to do so. If you meet any fault or problem regarding an electrical installation, report it to your supervisor immediately; the electrical installation must be repaired by a competent electrician.
- The wiring and connections for any electrical appliance using outdoors must be waterproof. For working in a humid environment, electrical installations of waterproof design should be used.
- Avoid using electrical equipment in a congested and wet workplace. Use suitable personal protective equipment such as insulating gloves and mat if necessary. While using a portable electrical tool in a humid workplace, one

should stand on an insulating mat to reduce the risk of electric shock.

- Electrical work should only be carried out by a registered electrical worker of appropriate grade. Before and during electrical installation work, the electricity source should be cut and isolated. As far as practicable, work with live parts should be avoided.
- A risk assessment should be conducted by a competent person before commencement of electrical installation work to identify any risk of electrical hazard. Appropriate safety precautions should be devised to eliminate or control the electrical hazards involved:
  - Isolating the electricity source for the electrical installation and its on/off switch
  - Locking off the power supply with warning notices displayed so as to prevent that any person unintentionally switches on the power supply ensuring that in the course of work, the workers shall not touch any live part.
- Under special circumstances when live work is necessary,
  - The work should be conducted by a registered electrician with relevant knowledge and training. Adequate precautions, e.g. the use of an insulation screen, should be taken to prevent any person from touching live parts unintentionally
  - Suitable personal protective equipment, such as insulating gloves, hand tools, mats and screen as well as safety shoes should be provided and used. A permit-to-work system should be implemented. Supervision on the electrical work and the safety measures should be reinforced.
- Adequate information, training, instruction and supervision should be provided for workers engaged in electrical works.

### **4.3 Use of Machinery and Tools**

(This section must be conducted in an interactive manner through discussion with trainees)

#### **Reference**

- Construction Sites (Safety) Regulations
- Factories and Industrial Undertakings (Guarding and Operation of Machinery) Regulations

#### **Potential Hazards**

- If a dangerous part of a machine is not properly guarded, a worker could be hurt by the dangerous part due to entanglement, shearing, crushing, trapping or

cutting.

- Failure of machine guarding is the common cause of accidents involving machine operations.

### **Preventive Measures**

- Do not use machines (such as saw, grinder and drill, etc) unless their dangerous parts have been effectively guarded.
- Workers should not wear cotton gloves while operating or working on machines with revolving parts where there is a possibility of the gloves being caught by rapidly moving parts.
- For machine repairing, workers should not dismantle the protective guard while testing a machine for ease of adjustment.
- For repairing the revolving parts of a machine, avoid contact of the revolving parts with personal belongings to prevent from being caught by the machine. Do not conduct cleaning work on a machine which is in motion and adopt measures to prevent personnel not responsible for the repairing work from coming near.

### **4.3.1 Lifting Operations Using Lifting Appliances and Gear [Playing Video: Lifting]**

#### **Reference**

- Factories and Industrial Undertakings (Lifting Appliances and Lifting Gear) Regulations
- Code of Practice for Safe Use of Tower Cranes
- Code of Practice for Safe Use of Mobile Cranes

#### **Lifting appliances commonly used on construction sites**

- Tower crane
- Crawler-mounted crane
- Truck-mounted crane
- Wheel-mounted telescopic crane

#### **Lifting gear commonly used on construction sites**

- chain sling
- rope sling
- ring
- link
- hook

- plate clamp
- shackle
- swivel

### **Potential Hazards**

- Overturning of the crane
- Overloading of the crane leading to breaking and collapse of the lifting boom
- Objects falling down during lifting operation and hit workers below
- The lifting boom colliding with obstacles
- The lifting boom touching overhead power lines

### **Preventive Measures**

- Lifting appliances and lifting gear must be regularly inspected, thorough examined and tested by competent examiners. (Regarding colour coding of lifting gear, please refer to the relevant guidance of Works Branch of Development Bureau).
- All cranes shall be repaired and maintained regularly by competent person so as to ensure they are always kept in good operating conditions.
- Follow the safe working instructions of the manufacturer of a lifting appliance.
- An automatic safe load indicator shall be installed at a crane with a maximum safe working load of 1 tonne or above.
- 6-month period - The owner of any chain, rope, or lifting gear used for raising or lowering or as a means of suspension shall ensure that each chain, rope or lifting gear in use has been thoroughly examined by a competent examiner with the issuance of approved form in the preceding 6 months before it is used.
- 12-month period - Lifting appliances shall be thoroughly examined by a competent examiner with the issuance of approved form at least once in the preceding 12 months.
- Crane operators shall attain 18 years old, have undergone relevant training and hold valid certificates.
- Before using lifting gear such as a hook, shackle or chain sling, check whether there is any wear and tear.
- Lifting gear used in lifting operations (such as rope slings and chain slings) shall be marked with safe working load.
- Check the weight of the load to be lifted. Do not exceed the safe working load

of a lifting appliance or lifting gear.

- Cranes should only be operated on a uniform, level and firm ground with sufficient load bearing capacity to withstand the maximum in-service loadings of the crane.
- In order to avoid the sinkage or collapse of the supporting surface and overturning or collapse of the crane, the loading should be distributed over a sufficiently large area. Steel plates of adequate strength, suitable mats or suitable timber blocking should therefore be used;
- If outriggers are provided, the beams should be fully extended and timber blocking should be used to support the load as far as practicable. The jacks should be suitably extended so that all the crane tyres are clear of the ground;
- Adopt the correct lifting method. The centre of gravity of goods should be checked to ensure the goods are lifted steadily and securely.
- Do not use a lifting appliance or lifting gear unless it has been inspected weekly and certified safe by a competent person.
- Do not use a lifting appliance unless it has been regularly repaired and maintained by a competent person. No unauthorized repair is allowed.
- Follow the safe working instructions of the manufacturer of a lifting appliance.
- Employ a signaller to assist the lifting when the operator of the lifting appliance does not have an unrestricted view.
- Do not work beneath any suspended load and do not work within the lifting operation area.
- Use appropriate equipment, such as "goal posts" to restrict the height of the jib when there is a need for using a telescoping jib crane underneath an overhead cable.
- The minimum depth of a cage or receptacle used for carrying persons is 900mm; and the cage or receptacle shall be clearly marked the safe working load and the maximum number of persons that may be carried at any one time.
- Passenger hoists and tower working platforms should be operated by trained workers to avoid dangerous conditions.

#### **4.3.2 Use of Loadshifting Machines**

**[Playing Video: Loadshifting Machinery]**

**Reference**

- Factories and Industrial Undertakings (Loadshifting Machinery) Regulation
- Code of Practice on Safe Use of Excavators

### **Potential Hazards**

- Striking of persons by a moving loadshifting machine
- Overturning of the loadshifting machine
- Touching of underground cables or overhead power lines

### **Preventive Measures**

- A loadshifting machine shall only be operated by a person who has attended a relevant training course and holds a valid certificate.
- Unless you are a worker concerned, do not work in an area where a loader, an excavator, etc. is in operation.
- When a loadshifting machine (such as an excavator) is working, reasonable measures should be taken to prevent persons from having access to that place, such as by fencing off the place.
- Do not operate any loadshifting machinery without training and approval.
- The proprietor/contractor should ensure that the operator of loadshifting machine has attained the age of 18 years and holds a valid certificate.
- In order to achieve safe operation of an excavator, each worker engaged in work associated with the excavator should understand and follow instructions and information given by his supervisor on system of work, work procedures and safety precautions.

### **4.3.3 Material Hoist [Playing Videos: ①Material Hoist and ②Elevator]**

#### **Reference**

- Construction Sites (Safety) Regulations

### **Potential Hazards**

- A worker slips and falls into the hoistway
- A worker is trapped by the moving part of the hoist
- Materials drop through a hole in the hoistway enclosure and hit a worker



## **Preventive Measures**

- Do not ride on a material hoist (carrying of workers prohibited).
- Do not operate a material hoist without prior proper training.
- The safe working load should be marked on the platform or cage of a material hoist.
- Do not exceed the safe working load of a material hoist.
- Do not use a material hoist unless it has been examined and certified safe by a competent examiner.
- Do not use a material hoist unless its gates have been installed with an effective interlocking safety system. The hoist is only to be operated after all the gates have been closed.
- Do not use a material hoist unless it has been repaired and maintained by a competent person. No unauthorized repair is allowed.
- Do not put loose materials into receptacles unless properly secured.
- Ensure good communication with the operator of a material hoist. All signals should be understood and followed.

### **4.3.4 Woodworking Machinery (Mainly Circular Saws)**

#### **Reference**

- Factories and Industrial Undertakings (Woodworking Machinery) Regulations
- Construction Sites (Safety) Regulations

#### **Potential Hazards**

- The high speed woodworking machines (such as circular saw, spindle moulders) create nip points which can lacerate body parts
- The blade catches the timber and violently throws it back to the front of the saw, towards the operator

#### **Preventive Measures**

- The top of a circular saw shall be covered by a strong and easily adjustable guard.
- There shall be a riving knife behind and in direct line with a circular saw.
- The part of a circular saw below the bench table shall be protected by 2 plates

of metal or other suitable materials.

- A suitable push-stick shall be kept available for use at the bench.

#### **4.3.5 Use of Abrasive Wheels**

##### **Reference**

- Factories and Industrial Undertakings (Abrasive Wheels) Regulations
- Factories and Industrial Undertakings (Protection of Eyes) Regulations

##### **Potential Hazards**

- Bursting of wheels as the result of:
  - defective wheel
  - over-speeding
  - faulty mounting
  - misuse
- Contact with the wheel
- Injury to the eyes from flying particles

##### **Preventive Measures**

- A notice, in English and Chinese, stating the maximum permissible speed in revolutions per minute specified by the manufacturer for every abrasive wheel shall be kept permanently fixed in the grinding room or place where grinding is carried out.
- Every abrasive wheel shall not be operated at a speed in excess of the maximum permissible speed in revolutions per minute specified by the manufacturer for that wheel.
- Select an appropriate abrasive wheel.
- Every abrasive wheel shall be properly mounted.
- Every abrasive wheel shall be mounted by a competent person appointed by the proprietor in writing.
- A guard shall be provided and kept in position at every abrasive wheel in motion.
- Persons carrying out dry grinding operations and truing or dressing an abrasive wheel should wear a dust/mist mask or respirator and eye protector.

#### **4.3.6 Use of Cartridge-operated Fixing Tools**

## Reference

- Factories and Industrial Undertakings (Cartridge-Operated Fixing Tools) Regulations
- Factories and Industrial Undertakings (Protection of Eyes) Regulations
- Factories and Industrial Undertakings (Noise at Work) Regulation

## Potential Hazards

- Through penetration of the material
- Eye injury from fragmentation of brittle materials during firing
- Noise from explosive source of the tool
- Explosion/fire caused by cartridge ignition particularly in a flammable atmosphere
- Electric shock

## Preventive Measures

- Do not operate a cartridge-operated fixing tool unless you have possessed a valid certificate.
- Wear suitable eye and ear protectors as well as safety helmet while operating a cartridge-operated fixing tool.
- Use a cartridge-operated fixing tool with great care.

### 4.4 Confined Spaces and Excavation Works

(This section must be conducted in an interactive manner through discussion with trainees)

#### 4.4.1 Confined Spaces **[Playing Video: Manhole]**

##### Reference

- Factories and Industrial Undertakings (Confined Spaces) Regulation
- Code of Practice for Safety and Health at Work in Confined Spaces

A “confined space” is defined to mean any place in which, by virtue of its enclosed nature, there arises a reasonably foreseeable specified risk, and without limiting the generality of the foregoing, includes any chamber, tank, vat, pit, well, sewer, tunnel, pipe, flue, boiler, pressure receiver, hatch, caisson, shaft or silo in which such risk arises.

## **Potential Hazards**

- The major hazards in a confined space include the presence of the following:
  - a flammable, explosive or oxygen enriched atmosphere
  - a harmful or toxic atmosphere; an oxygen deficient atmosphere
  - free flowing solids or liquids
  - excessive heat
- The threats against the safety and health of workers (specified risks) include:
  - serious injury arising from a fire or explosion
  - loss of consciousness arising from an increase in body temperature caused by, for example, heat stress in the work environment
  - loss of consciousness or asphyxiation arising from gas, fume, vapour or the lack of oxygen
  - drowning arising from an increase in the level of liquid
  - asphyxiation arising from a free flowing solid or the inability to reach a respirable environment due to entrapment by a free flowing solid

## **Preventive Measures**

- To appoint a competent person to carry out a risk assessment for work in the confined space before a worker enters a confined space (such as sewage pipe, manhole or water tank).
- To carry out an air monitoring to determine if a hazardous atmosphere exists by a competent person using a suitable gas detector before a worker enters a confined space. The purpose of the air monitoring is to determine whether the amounts of gas components in a confined space is safe or not (whether exceed the dangerous levels or not).
- To ensure that no worker other than certified workers who have been issued with a work permit enters or works in a confined space (such as sewage pipe, manhole or water tank).
- Workers working in a confined space should be equipped with appropriate personal protective equipment. With adequate safety precautions being taken, a self-contained respirator should be worn when a worker enters a confined space to rescue an unconscious worker.
- A person shall be stationed outside a confined space to communicate with the workers inside when work is being carried out in the confined space.
- To ensure that the risk assessment report and the related certificate (work permit) issued are displayed in a conspicuous place at the entrance of the

confined space.

- Avoid accumulating exhaust gases inside a confined space, and ensure the fresh air ducts extend to all locations of the workplace.
- The proprietor should provide safety measures including forced ventilation before a worker enters a confined space.
- A certified worker is not allowed to remain in a confined space once the safe period of the work permit has been expired.

#### **4.4.2 Excavation Works**

##### **Reference**

- Construction Sites (Safety) Regulations
- Code of Practice on Safe Use of Excavators

##### **Potential Hazards**

- Probably the most common hazard when working in excavations and trenches is the threat of cave-in
- Electric shock, fire or explosion as the result of underground utilities damaged during excavation work

##### **Preventive Measures**

- Detection of underground utilities should be done prior to the commencement of an excavation work. Make sure enough protection has been given for any exposed utilities when the work starts. The advice on working near underground electricity cables is listed in the section 4.4.2.1.
- An excavation shall be examined by a Competent Person at least once in every seven days and statutory Form 4 should be filled in as a record of inspection.
- No load or plant shall be placed or moved near the edge of an excavation, shaft, pit or opening in the ground as its weight may cause the side of those places to collapse.
- Keep the fence on all sides of an excavation intact.
- Use safe access for ingress and egress.
- Make sure that a trench is securely shored before working in it (installation of shoring can prevent collapse of the trench).
- Suitable support should be applied at the edge of an excavation to avoid any

damage caused by a collapse of the excavation.

- During excavation, if the floor is cracked and the support is broken or loosened, stop the work immediately, leave the pit and report to the superior.
- An excavator shall only be operated by a person who has attained the age of 18 years, is trained and holds a valid certificate applicable to the excavator.

#### **4.4.2.1 Working Near Underground Electricity Cables**

- Advice to site personnel when working near underground electricity cables :
  - Damaging underground electricity cables is dangerous and can often cause flashover, electric shock, burns, or even explosion or fire incident.
  - Damage can result from excavation, ground penetration or earth moving operations by machinery.
  - Underground electricity cables may be found under roads, footpaths and on sites. Always assume that they are present and treat any cables found anywhere as LIVE.
- In the past, many electricity accidents were caused by accidental damage of the underground electricity cables when excavation work, earthmoving work or ground penetration work were carried out by site personnel. Also, damage to underground electricity cables can cause serious injuries or death to the site personnel. In addition, the electricity supply may also be interrupted by accidents, causing inconvenience to the public.
- In view of this, Electrical and Mechanical Services Department issued the Code of Practice (COP) on Working near Electricity Supply Lines. The COP stipulates that before starting works near underground electricity cables, working party shall appoint competent persons to carry out the cable detection work and to ensure the alignment and depth of the underground electricity cables in the works site.
- In addition, during the course of works, site personnel shall make reference to the competent person written report to use appropriate tools such as hand tools, hand-held power tools, mechanical excavators, etc. to carry out the work. The tool shall maintain an adequate safe working distance from the underground electricity cables. Site personnel should not use mechanical excavator or hand-held power tool directly on the alignment of the underground electricity cables, as determined and marked by the competent person.
- For details of the Code of Practice (COP) on Working near Electricity Supply Lines, please visit the following Electrical and Mechanical Services Department 's webpage :

[http://www.emsd.gov.hk/en/electricity\\_safety/publications/codes\\_of\\_practice/index.html](http://www.emsd.gov.hk/en/electricity_safety/publications/codes_of_practice/index.html)

## **4.5 Welding and Cutting**

(This section must be conducted in an interactive manner through discussion with trainees)

### **4.5.1 Gas Welding and Flame Cutting**

#### **Reference**

- Factories and Industrial Undertakings (Gas Welding and Flame Cutting) Regulation
- Factories and Industrial Undertakings (Protection of Eyes) Regulations
- Code of Practice : Safety and Health at Work for Gas Welding and Flame Cutting

Normally, the colours of oxygen cylinder and acetylene cylinder are black and maroon respectively

#### **Potential Hazards**

- Fire and explosion resulted from release of flammable fuel gases or oxygen into the atmosphere
- Fire and explosion resulted from flashback at the blowpipe or overheating of the acetylene cylinder
- Explosion from over-pressurisation of the gas supply system
- Due to the radiation and toxic fumes or gases emitted during the process, the resultant health problems include: (i) eye discomfort and burns from the intense light and heat emitted from the operation, and (ii) corneal ulcer and conjunctivitis from foreign particles e.g. slag and cutting sparks
- Illness due to inhalation of fumes or gases formed during the process, such as metal fume fever, bronchial and pulmonary irritation

#### **Preventive Measures**

- Do not conduct gas welding or flame cutting unless you have attained the age of 18 years and hold a valid certificate.
- Do not use any gas cylinder unless it has been fitted with a flashback arrestor.
- Wear personal protective equipment. Workers should wear an approved eye

protector for welding work.

- Keep gas cylinders in an upright position at a ventilated area.
- Place fire extinguishers within reach.
- Keep gas cylinders in an upright position and secure them properly to avoid overturning. Keep them far away from a place where hot processes are being undertaken.
- If gas leakage is detected, report it to your supervisor immediately.
- If there are other people, a screen should be used for segregating the sparks to avoid injuring others.
- Flammable substances should not be stored in workplaces for welding work. Before conducting flame cutting work on a used pipe, the pipe should be thoroughly cleansed to remove any residual substances.

#### **4.5.2 Electric Arc Welding [Playing Video: Arc Welding]**

##### **Reference**

- Construction Sites (Safety) Regulations
- Factories and Industrial Undertakings (Protection of Eyes) Regulations
- Code of Practice : Safety and Health at Work for Manual Electric Arc Welding

##### **Potential Hazards**

- Common welding-related hazards include electric shock, radiation, heat and toxic fumes
- Long-term inhalation of metal dust may lead to non-fibrotic pneumoconiosis
- The ultraviolet rays generated in electric arc welding would cause hazards to the eyes of a worker

##### **Preventive Measures**

- Avoid conducting welding on a wet floor or at an open area during a rainy day.
- Suitable personal protective equipment, such as eye and face protectors, insulated welding gloves and safety shoes or boots, should be provided to and used by the welding worker.
- Keep the welding area well ventilated, and suitably and sufficiently lit. Make sure suitable fire extinguishers are available.



## **4.6 Other Hazards**

### **4.6.1 Working under Inclement Weather**

#### **Reference**

- Code of Practice in Times of Typhoons and Rainstorms

Each year, Hong Kong experiences typhoons, rainstorms and thunderstorms between mid-spring and mid-autumn, and strong monsoon winds in summer and winter. These adverse weathers may create danger to people working outdoors, especially in exposed areas. Sometimes, people working in covered structures or indoors may also be affected.

#### **Potential Hazards**

- Collapse of temporary structures or plants causing injury to people nearby and damage to properties
- Loss of body balance resulting in falls
- Flying or falling objects
- Electric shock or electrocution to people directly or through conductive objects
- Fire
- Electric shock or electrocution due to leakage of current from wet electrical equipment
- Slipping arising from wet floor surface
- Slipping of tools, equipment, or articles from hands
- Flooding leading to drowning and damage to plants or structures
- Landslips and collapse of roads as a result of persistent heavy rainfall

#### **Preventive Measures**

- Stop work at places with risks of falling objects or fall of persons.
- Remove or secure loose materials.
- Secure plants and scaffolds.
- Use suitable personal protective equipment e.g. safety helmets.
- Protect from breakage of window glasses.

- Stay away from metal pipes, cables, structures or fences.
- Keep close watch on weather broadcasts.
- Follow safety instructions.
- Always remain alert on changes of working environment.
- Be familiar with the escape route in case of emergency.
- Use safe means of transport and route for evacuation.
- Evacuate to safe shelters to avoid exposure to strong winds.

#### **4.6.2 Working with Chemicals**

##### **Reference**

- Factories and Industrial Undertakings (Dangerous Substances) Regulations

Chemicals are generally classified in seven categories, namely corrosive, explosive, toxic, harmful, irritant, oxidizing and flammable.

##### **Potential Hazards**

- Causing fire, explosion
- Releasing harmful/toxic gases or airborne particles
- Splashing of hot, corrosive or toxic liquids
- Resulting in injuries, ulcer, intoxication and even death
- For dangerous substances, the major routes of entry into the human body are ingestion, skin absorption and inhalation

##### **Preventive Measures**

- The essential information of a chemical label should include the symbol, chemical name, particular risks and safety precautions.
- Studying the label content outside a container is the proper way for identifying the name, classification, risks and precautions of the chemical in the container.
- Always keep the work area well-ventilated.
- Wear proper personal protective equipment. Aprons, safety shoes, rubber gloves and face shields should be used for handling chemicals.
- Don't touch chemicals with bare hands. For handling a chemical, wear

protective gloves specific for that chemical.

- Prohibit smoking and eating at workplaces where chemicals are being used or stored.
- Fully understand and follow the safe working procedures.
- Keep away from any ignition source when handling flammable substances.
- Flammable substances should be stored at a metal cabinet. Rags, after used for cleaning a flammable liquid, should be placed in a metal container with a lid.
- The employee who is responsible for handling chemicals should correctly use the protective clothing and equipment provided by the employer.

## 4.7. Occupational Health

### 4.7.1 Manual Handling **[Playing Video: Manual Handling Operations]**

**[Demonstration: Correct posture of manual handling operations]**

**[Practice: Correct posture of manual handling operations]**

#### Reference

- Occupational Safety and Health Regulation

A manual handling operation means that a load is moved or supported by a person's hands or arms, or by some other forms of bodily effort. It includes lifting, lowering, pushing, pulling and carrying the load.

#### Potential Hazards

- The waist is most likely to be injured if a worker lifts goods improperly. Incorrect manual handling operations involving awkward postures, incorrect application of bodily force, prolonged or frequently repetitive motions, jerky motions or unexpected movements and pressure, etc. can lead to injuries such as
  - strain and sprain, back pain, hernia and damage to the back
  - damage to the joints, ligaments, muscles and intervertebral discs
- A wet and slippery floor is also dangerous to manual handling work

#### Preventive Measures

- Avoid manual handling operations as far as possible to minimize the risk of injury.

- Carry out risk assessment. For example, estimate the weight of the load.
- Conduct manual handling operations with a proper method. Lift an object with a correct posture by holding the object close to the body, lifting with the legs by slowly straightening them and keeping the back straight.
- A sudden increase of the movement speed should not be done to avoid sustaining injury during a manual lifting.
- Don't transport a load by twisting the upper body only.
- Transport goods with the assistance of a mechanical tool (e.g. a trolley of good structure). However, consideration should also be made on whether the floor surface is even and whether there is any potential hazard along the path of transportation.
- Seek assistance from someone in lifting a load if necessary.
- Doing some warm-up exercises before conducting manual handling operation can render the muscle and cardiopulmonary system more adaptable to the change so as to reduce injury.
- Wear suitable protective equipment. Put on gloves as far as possible to protect your hands from any cut, scratch or puncture, and wear safety boots or shoes to prevent injury to toes by heavy falling objects.

#### **4.7.2 Asbestosis**

##### **Reference**

- Factories and Industrial Undertakings (Asbestos) Regulation
- Factories and Industrial Undertakings (Notification of Occupational Diseases) Regulations
- Code of Practice : Safety and Health at Work with Asbestos

##### **Potential Hazards**

- A worker while performing renovation/demolition work may inhale the fibers of asbestos
- Asbestosis is caused by the asbestos fibers penetrating into the lungs, causing scar tissues by making tiny cuts in the alveoli (air sacs), thus decreasing the amount of oxygen that the lungs can process
- Long-term inhalation of asbestos fibers may lead to lung cancer

##### **Preventive Measures**

- Consult or employ a registered asbestos consultant to conduct assessment and remove all the asbestos by registered contractors.
- Prevent the exposure of any workman to asbestos.
- During any demolition works, if asbestos is found, the demolition works should be stopped and report the case to the management.
- Reduce the exposure of any workman to asbestos to the lowest level reasonably practicable.
- Provide every workman who is or is liable to be exposed to asbestos with approved respiratory protective equipment that is suitable for the circumstances.
- Ensure the full and proper use by each workman of the respiratory protective equipment.

#### **4.7.3 Silicosis**

##### **Reference**

- Factories and Industrial Undertakings (Notification of Occupational Diseases) Regulations

##### **Potential Hazards**

- Silicosis is caused by inhalation of fine particles of dust containing crystalline silica. The dust penetrates deep in the lungs where it attacks the tissues and causes progressive deterioration of pulmonary function.
- The onset of the disease is usually after some years of exposure to silica dust. Silicosis is most likely caused by work processes for handling stones or stone products.

##### **Preventive Measures**

- Every effort should be made to reduce the formation of dust at source by attention to the processes and work method. If all practicable measures fail to confine the environment dust contamination within the occupational exposure limits, exposed persons should wear suitable respiratory protectors.
- Respiratory protectors should be selected to protect against the prevalent dust level.
- Ensure that every worker fully and correctly use the respiratory protective equipment.

#### **4.7.4 Working in Hot Weather**

- While a Very Hot Weather Warning is in force, employers should assess the risk of heat stroke to their employees and adopt effective preventive measures such as providing cool drinking water, setting up temporary sunshade and providing mechanical aids to reduce physical exertion of employees.
- Employees should drink water regularly and be mindful of their physical condition. If early heat stroke symptoms such as headache or thirst appear, they should inform their supervisors, and seek medical help immediately.

#### **4.7.5 Working under Noisy Environment**

##### **Reference**

- Factories and Industrial Undertakings (Noise at Work) Regulation

##### **Potential Hazards**

- Deafness as a result of prolonged exposure to high-intensity sound
- Intermittent work in a noisy environment can cause irritability, distraction of concentration, hearing damage and increase of the risk of accidents

##### **Preventive Measures**

- If people have to work in an ear protection zone, they will need to wear suitable ear protectors (ear muffs or ear plugs) to reduce the hazard.
- Where there are high levels of impact noise, such as piling work, earmuffs and ear plugs may be used together to provide better noise reduction.

### **4.8 Management and Tidiness of Construction Sites**

#### **4.8.1 Housekeeping of Construction Sites**

- The oil and water at passageway should be cleared.
- Chemical substances should be stored in a proper container

#### **4.8.2 Construction Site Management**

- Maintaining good housekeeping at a workplace can reduce the occurrence of accidents, provide a safe and effective working environment, For example :
  - Remove or flatten the projected nails at timber
  - The loosen material and construction material should be stored in a

designated place in a construction site.

- Providing traffic signs, maintaining road signs and segregation of vehicles and pedestrians are efficient ways to reduce traffic incidents in sites
- Maintain the passageway with sufficient lighting
- The purpose of a permit-to-work system is to ensure a workplace is safe for work

## 5. Fire Prevention Measures and Use of Fire Extinguishers on Construction Sites

[Reference teaching time for Section 5: 15 mins]

[Playing Video: Inflammable Liquids Used in Painting]

[Demonstrate how to use a fire extinguisher (can be achieved by playing video: Use of Dry Powder Fire Extinguishers)]

### Formation of Fire

- Fuel, oxygen and heat

### Reference

- Fuel - it is the material that can be burnt, such as solvent-based adhesives, which are used in laying rubber floor tiles.
- Air – Oxygen is the most common supporter of combustion.
- Heat Source – Examples of common heat sources are: cigarette butts not yet extinguished, sparks generated from metal welding and cutting processes etc.

### Potential Hazards

- In a fire, people may get hurt by heat and flames, but the majority of death and injuries in fires were due to inhalation of hazardous smoke or toxic gases.

### Preventive Measures

- Keep a workplace clean and tidy all the time.
- Be careful when using machines and equipment which will generate sparks or heat.
- No smoking and naked flame is allowed at any storage area of flammable or explosive materials.
- Know the storage place of fire extinguishers and the operation methods of the fire extinguishers.
- The following ways are to prevent combustion (fire) :
  - Isolating the fuel;
  - Isolating the air; or
  - Cooling down the heat source.
- What type of fire extinguisher you use should depend on what type of fire it is.
- In order to ensure that the fire service installations will be functioning properly when needed, these installations should be routinely tested and maintained.
- Smoke doors should be closed all the time.
- Make sure that workers know the assembly points after fire evacuation.



- Shreds moistened with flammable substances should be placed in a metal container with lid.
- Formulate emergency contingency measures for fire incidents, so that the losses resulted from fire could be minimized.

**Type of extinguisher suitable for extinguishing fire involving**

Type of fire Type of extinguisher	Class 1 Paper, Textiles, Wood, Plastic	Class 2 Flammable liquids, Solvent, Oil, Grease	Class 3 Electrical Appliances, Motors, Electrical switches	Notes
<b>Carbon Dioxide Gas</b>	X	✓	✓	Vapours will asphyxiate.  Withdraw to open air after use.
<b>Water</b>	✓	X	X	<b>Never</b> on fires involving electrical or flammable liquids or metals.
<b>Dry Powder</b>	✓	✓	✓	Discharged dry powder may reduce visibility and cause disorientation.
<b>Foam</b>	✓	✓	X	<b>Never</b> on electrical fires.

## **6. The Basic Elements of Emergency Preparedness**

[Reference teaching time for Section 6: 5 mins]

### **6.1 Action to be Taken in case of an Emergency and Evacuation Procedures**

- The employer should draw up emergency response measures and evacuation procedures. For instance, the procedure for fire escape, preparedness and contingency plans for landslide, etc.
- Employees should receive sufficient training in safety at workplaces and know the relevant information (e.g. means of escape, assembly points, etc.) and safety procedures.

### **6.2 Action to be Taken at times of Bad Weather**

- Employees working outdoors in times of bad weather (e.g. typhoon, thunderstorm and rainstorm) may sustain serious or the fatal accidents. The employer should formulate safety measures to prevent any accident in the workplace.
- Employees working outdoors in exposed areas in times of bad weather, should stop work and take shelter.

### **6.3 Qualified First Aiders and First Aid Facilities**

- The quantity of first aid facilities in the construction site depends on the number of employees.
- The contractor responsible for a construction site at which not less than 30, but less than 100 workmen are employed, should provide at least one person trained in first aid.

## **7. Handling of Accidents and Dangerous Occurrences and Reporting Procedures**

[Reference teaching time for Section 7: 5 mins]

### **7.1 Handling of Work Injury**

- For any work injury to a worker, the worker should inform the supervisor immediately and receive suitable treatment.
- Unless a worker has received adequate first aid training, the worker should not move the victim.
- If a worker is seriously injured or needs to be hospitalized, the supervisor should inform the safety department and call police immediately.
- If a worker falls from height, inform the first aider to take care of the worker but do not move the worker.

### **7.2 Reporting Workplace Accidents and Dangerous Occurrences**

Reports of Accidents resulting in death or serious bodily injury

- The employer should notify it to an occupational safety officer of the Labour Department within 24 hours after the time when the accident occurred.

Reports of Accidents resulting in Incapacity

- According to the Employees' Compensation Ordinance, for an accident that results in an employee being incapacitated from working for a period exceeding 3 days, the employer should report it in writing to the Labour Department within 14 days after the date of the accident.

Reporting Dangerous Occurrences (For example, collapse of crane, disintegration of grinding wheel, etc)

- Every dangerous occurrence which occurs at a workplace, whether any personal injury has been caused or not, shall be reported to the Labour Department within 24 hours of its occurrence.

## 8. Explanation, Demonstration and Practice on the Selection and Use of Personal Protective Equipment

[Reference teaching time for Section 8: 80 mins]

### Reference

- Construction Sites (Safety) Regulations
- Factories and Industrial Undertakings (Noise at Work) Regulations
- Factories and Industrial Undertakings (Protection of Eyes) Regulations
- Factories and Industrial Undertakings (Gas Welding and Flame Cutting) Regulations
- Factories and Industrial Undertakings (Confined Spaces) Regulations
- Factories and Industrial Undertakings (Dangerous Substances) Regulations

Personal protective equipment (PPE) is intended to be worn or otherwise used by a person at work for protecting the person against one or more hazards to his/her safety or health. Use of PPE is the last resort when controlling the sources of accident is impracticable. PPE should be handled with care and stored properly when not in use. The equipment should be kept clean and maintained in good condition.

Employers have duties on guidance, training and supervision with respect to use of PPE. They should ensure that their employees know why and when PPE is used, its maintenance or replacement schedule and limitations.

PPE should be provided by employers. Employees must wear PPE for the entire period of exposure to hazards.

### 8.1 Factors for Consideration in Selection of PPE

Factors to be considered in selecting suitable PPE:

- Can the PPE provide effective protection against the hazards and whether it is suitable for use in the work process?
  - For example, eye protectors designed for metal or rock cutting cannot provide adequate protection for gas welding or flame cutting workers;
- Can the PPE prevent or reduce the hazards without creating unsafe working conditions?
- Can the PPE be adjusted to fit the user's body properly?
- Has consideration been given to the health of the user?

- What is the load of PPE imposed on the user?
  - For example, duration of use of the PPE, physical strength required for the work and requirements on communication and visibility.
- If one or more types of PPE have to be worn, are they compatible? For instance, will the use of a certain type of respirator prevent the user from wearing an eye protector correctly?

## 8.2 Categories of PPE

### 8.2.1 Safety Helmets **[Demonstrate using the real object of PPE]**

- Wear a safety helmet on a construction site under all circumstances.
- A safety helmet is primarily intended to protect the top of the head from being injured by falling objects.
- A suitable safety helmet should bear appropriate marking indicating the conformity to certain international/ national standards such as European Standard.
- A safety helmet should be equipped with a chin-strip.
- Keep the harness of a safety helmet clean and make sure that it fits well.
- Do not drill any holes on a safety helmet or use it for pounding.

### 8.2.2 Safety Shoes **[Explain by means of powerpoint or the real object of PPE]**

- Safety shoes should have steel toe caps, steel soles, slip-proof and water-proof characteristics.

### 8.2.3 Safety Gloves **[Explain by means of powerpoint or the real object of PPE]**

- Protect hands from getting injured by abrasion; cuts and punctures; contact with chemicals; electric shock; skin infection.
- Types of safety gloves include rubber gloves, steel, mesh gloves, leather gloves, wrist and arm protective devices.
- Workers should not wear cotton gloves for operating a machine with revolving parts so as to avoid causing injury to hands due to entangling of cotton gloves with the revolving parts of the machine.

#### **8.2.4 Ear Protection [Demonstrate by using the real object of PPE or by playing video]**

- Ear muffs are the most efficient noise isolation ear protectors.
- Wear ear protectors in areas with high noise levels.
- Properly wear ear protectors according to the manufacturer's instructions.
- Do not reuse disposable ear plugs.
- Clean ear protectors regularly.

#### **8.2.5 Eye Protection [Explain by means of powerpoint or the real object of PPE]**

- When there is a risk of eye injury, such as in concrete breaking or using abrasive wheels, suitable eye protectors should be worn.
- Take proper care of the eye protectors provided to you.
- Replace damaged or defective eye protectors immediately.
- Ensure that eye protectors are comfortable to wear, and keep clean.

#### **8.2.6 Breathing Apparatus [Demonstrate by using the real object of PPE or by playing video]**

- Protect workers against dust; fibres, hazardous gases and fumes and prevent workers from oxygen deficiency.
- Types of breathing apparatus include: disposable cartridge respirators; full-face/half-face respirators; air-supplied hoods; self-contained respirators.
- When using breathing apparatus, it must be properly fitted on the wearer's face.
- Breathing apparatus should be cleaned thoroughly after each use.

#### **8.2.7 Protective Clothing [Explain by means of powerpoint or the real object of PPE]**

- Protective clothing protects workers against injuries caused by hazards such as contact with chemicals or flame, striking, stabbing, radiation, drowning, extreme cold, hot or adverse weather conditions.
- Types of protective clothing: General purpose protective clothing; disposable overalls; specialized protective clothing such as cold resistant clothing; chemical or radiation protective clothing; high visibility clothing,

puncture-resistant aprons and lifejacket used for land-based work carried out adjacent to water.

### **8.2.8 Full Body Harnesses Attached to Independent Lifelines and Fall Arresting Devices** [Demonstrate using the real object of PPE]

- The most suitable way to use a safety belt is to attach its snap-hook to a level higher than the user's waist.
- When falling from height, a full body harness (commonly known as parachute type) could better reduce the downward momentum and protect the user's waist from injury than a general safety belt.
  - Before using a safety belt, the following should be considered: any defects on the safety belt, any suitable anchorage, independent lifeline and fall arresting device, and whether the standard is met or not.
  - When using a safety belt for fall protection, the safety belt should be attached to a fixed anchorage point or a fall arrester of an independent lifeline.

## **8.3 Practice on Use of PPE**

### [Practical Section to be conducted with the use of the real object of PPE]

#### **8.3.1 Practice: Use of Full Body Harnesses Attached to Lifelines and Fall Arresting Devices**

The following points should be noted in practising the use of a fall arrester:

- When the fall arrester is attached to a lifeline, the upward marking “↑” should be pointing upwards.
- Correctly attach the fall arrester to the lifeline and make sure the opening device of the fall arrester is securely locked.
- Trainee pulls the lanyard of the fall arrester by hand to appreciate the locking mechanism of the fall arrester.
- The fall arrester should be at a level higher than the safety harness when a person is working at a fixed location.
- Each fall arrester should be used by one person at one time. Any collision with another object could lead to damages of the fall arrester and thus should be avoided.
- Do not allow the safety harness, lifeline and the fall arrester to contact fire or



chemicals so as to prevent damages to the synthetic fibers of the ropes.

### **8.3.2 Practice: Use of Safety Helmets with Y-type Chin Straps**

Procedures for the practice:

- Each trainee will be provided with a safety helmet with Y-type chin strap for hands-on practice.
- A safety helmet should be checked by a trainee before use. All parts and accessories of the helmet must be operational and undamaged, in particular, the correct assembly of the shell and harness.
- The headband of the safety helmet should be adjusted to fit the size of the trainee's head.
- The tightness of chin strap should be adjusted to be as comfortable as possible and fit the trainees to avoid falling off.

(Note : The training course provider should ensure that the safety helmets and accessories are clean and hygienic for use.)



**Occupational Safety and Health Branch**  
**Labour Department**

**Course Contents for Mandatory Basic Safety Training  
Revalidation Course (Construction Work)**

**Course Contents for**  
**Mandatory Basic Safety Training Revalidation Course**  
**(Construction Work)**

Section 6BA(2) of Factories and Industrial Undertakings Ordinance



**Occupational Safety and Health Branch**  
**Labour Department**

**This Course Contents prepared by  
The Occupational Safety and Health Branch  
Labour Department**

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**This Edition December 2017**

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## **1. Introduction to Arrangements of the Course**

[Reference teaching time for Section 1: 5 mins]

### **1.1 Training Venue, Training Equipment and Examination Requirements**

- To introduce briefly about the training venue, training equipment and the examination requirements

### **1.2 Introduction to the Course Contents**

- To introduce briefly about the course structure and contents

### **1.3 Objectives of the Course**

Under Section 6BA(2) of Factories and Industrial Undertakings Ordinance (“the Ordinance”), from 1 May 2001 onwards, a person shall receive safety training course recognised by the Commissioner for Labour and hold a valid certificate (generally known as Green Card (Construction work)) before he can be employed to carry out construction work. And proprietors shall only employ persons who are issued with a valid certificate to carry out construction work.

The person shall carry the certificate with him while at work in the industrial undertaking and produce it upon demand by the proprietor or an occupational safety officer of the Labour Department.

The objective of the mandatory basic safety training course is to enhance workers’ safety awareness and prevent work accidents.

## 2. General Concept of Work Safety and Safe Working Practice

[Reference teaching time for Section 2: 100 mins]

### 2.1 General Concept of Construction Site Safety

#### 2.1.1 Introduction

Most accidents can be prevented by taking simple measures or adopting proper working procedures.

Other legislation applicable to construction sites includes the Factories and Industrial Undertakings Ordinance and its subsidiary legislation, particularly the Construction Sites (Safety) Regulations. Employees should cooperate with their employers and other persons in complying with the safety legislation and guidelines, and should not do anything to endanger themselves and other persons.

#### General Duties of Proprietors

Every proprietor of an industrial undertaking must, so far as is reasonably practicable, ensure the safety and health at work of all persons employed by him. The matters to which that duty extends include:

- providing and maintaining plant and work systems that do not endanger safety or health;
- making arrangements for ensuring safety and health in connection with the use, handling, storage or transport of plant or substances;
- providing all necessary information, instruction, training, and supervision for ensuring safety and health;
- providing and maintaining all parts of the workplace and means of access to and egress from the workplace that is safe and without risk to health; and
- providing and maintaining a working environment that is safe and without risk to health.

#### 2.1.2 Three Most Common Types of Accidents on Construction Sites in Recent Years

[Playing Video: Your Family Needs You]

- By making reference to the statistics provided by the Labour Department, list the three most common types of accidents and for each type of accidents, the numbers of accidents and fatalities for recent years.

#### 2.1.3 Causes of Accidents and Preventive Measures



- **Definition of Accident**  
An accident is a single, or a series of, unplanned event which may be causing death, injury, occupational disease, or lead to equipment or property damage, or damage to the working environment.
- **Consequences of Accidents**  
Workplace accidents not only cause sufferings to the victims and their families, they also incur costs arising from work stoppages, insurance claims, medical and rehabilitation expenses, etc.

#### **2.1.3.1 Causes of Accidents**

- Inadequate control by management
- Improper working procedures
- Unsafe environment
- Unsafe act

#### **2.1.3.2 Unsafe Acts (Worker's Responsibility)**

- Not using designated personal protective equipment
- Using unsafe equipment or machines
- Improper method in handling materials

#### **2.1.3.3 Unsafe Working Environment (Employer's Responsibility)**

- Venue, lighting or ventilation system not properly arranged
- Floor edges and working platform without fencing
- Materials placed on passageway

#### **2.1.3.4 Prevention of Accidents**

- Employers should provide a safe working environment and personal protective equipment
- Employers should provide safety training to their employees. By safety training, employees' safety awareness and vigilance could be enhanced which in turn reduce accidents.

- Employees should use personal protective equipment as instructed by their employers.
- The Government should formulate proper safety laws; organize promotion activities; educate the stakeholders of the legislative requirements; and supervise the implementation of the laws. To ensure safety at work, anyone violating the laws should be prosecuted.
- Maintaining good housekeeping at a workplace can reduce the occurrence of accidents, and provide a safe and effective working environment.
- The purpose of a permit-to-work system is to ensure a workplace is safe for work.

## **2.2 Safe Working Practice**

### **2.2.1 Work-above-ground**

(This section must be conducted in an interactive manner through discussion with trainees)

#### **Potential Hazards**

- Workers falling from locations of work-above-ground, including working platforms, scaffolds or other workplaces
- Workers falling from toppling or collapsing working platforms or scaffolds
- Falling objects from the working platform hitting workers below
- Toppling of the power-operated elevating work platform
- The safe working load of the platform exceeded, leading to breaking of the hydraulic boom and subsequently collapse of the platform
- The power-operated elevating work platform hitting another object
- The power-operated elevating work platform hitting an overhead electricity line

#### **2.2.1.1 Basic Principles and Requirements**

Most of the fatal accidents in relation to the construction industry involved work-above-ground. The basic principles and requirements for preventing workers from falling during work-above-ground are:

- Work-above-ground should be avoided where possible. If work-above-ground cannot be avoided, risk assessments should be conducted to eliminate work-related hazards or to control the risks before commencing work.
  - Examine the work-above-ground to look for the hazards and decide who might be

harmed.

- Evaluate the risks of the hazards.
  - Formulate safe work methods.
  - Implement proper safety precautions.
- Adequate and proper safety facilities should be provided for conducting work-above-ground.

### **2.2.1.2 Equipment for Work-above-ground**

**[Introduce work-above-ground equipment, e.g. step platform/hop-up platform/working platform by using real object or in a powerpoint]**

#### **2.2.1.2.1 Scaffolds and Working Platforms**

**[Playing Video: Working on a Scaffold at the External Wall]**

- All scaffolds shall be erected by trained workmen under the immediate supervision of a competent person.
- Scaffolds and working platforms shall be properly designed, for example, installation of suitable safe means of access and egress, handrails and guardrails, and adequate supports to strengthen the stability of the tubular scaffolds. When a worker conducting scaffold erection or maintenance work is at risk of falling, suitable safety measures should be taken.
- A scaffold shall be inspected with a report (Form 5) made by a competent person to certify the scaffold is safe before use for the first time, within 14 days (2 weeks) immediately preceding each use and after exposure to adverse weather conditions.
- When it is necessary to work on a mobile scaffold, lock the wheels of the scaffold before you start working.
- Closely boarded or planked working platforms should be provided so that work can be safely done on them.
- The width of a working platform should not be less than 400 millimetres.
- The top guard-rail of a working platform should be fixed at a height between 900 millimetres and 1150 millimetres from the working platform. The intermediate guard-rail should be fixed at a height between 450 millimetres and 600 millimetres from the working platform.
- The height of the toe-boards of a working platform should not be less than 200 millimetres.

#### **2.2.1.2.2 Light-duty Working Platforms**

- For work-above-ground, suitable working platforms (e.g. mobile working platforms) should be used. For work-above-ground below 2 metres where working platforms could not be erected under restrictive work space and the work concerned is of simple nature, use of suitable light-duty working platforms such as step platforms and hop-up platforms should be considered.
- Light-duty working platforms should be erected on a firm, even and level ground. Use of light-duty working platforms on ramps and stairs should be prohibited.
- When ascending or descending a light-duty working platform, the worker should face the light-duty working platform; the hands should be free from carrying heavy objects; and the worker should maintain 3 points of contact with the light-duty working platform.
- Light-duty working platforms should not be used if there are exposed live metal parts or potentially exposed live conductors in the surrounding of the workplaces.
- Before use, inspection of the light-duty working platform should be conducted. Stop using the light-duty working platform when it is found damaged.

#### **2.2.1.2.3 Fencings and Coverings**

- To prevent any person from falling, floor edges and openings shall be installed with secure fencing or covering.

#### **2.2.1.2.4 Truss-out Bamboo Scaffolds**

##### **[Playing Video: Truss-out Scaffold]**

- Every truss-out bamboo scaffold should be properly designed by a professional engineer of structural engineering discipline and relevant working procedures drawn up.
- Construction material of the building wall should be examined prior to the erection work. Selected proper anchor bolts should be used. Metal brackets (T-shaped metal brackets (should comply with “Guidelines on the Design and Construction of Bamboo Scaffolds” issued by the Building Department)) for supporting the scaffold should be securely fixed to the building wall with three or more anchor bolts.
- Erection should be carried out by trained workmen with adequate training and experience and under the supervision of a competent person who was appointed by the contractor for this purpose.

- Suitable fall arresting equipment, namely safety harnesses, fall arresters and independent lifelines should be provided and worn by workers who are at risk of falling from a height. An effective monitoring system should be implemented to ensure that the workers make full and proper use of the safety equipment.
- If it is difficult to anchor the fall arresting equipment to a fixed anchorage point due to physical constraints, a transportable temporary anchor device can provide an alternative.

#### **2.2.1.2.5 Ladders [Playing Video: Mobile Metal Scaffold / Ladder]**

- Ladders should be restricted for access/egress purpose only and should not be used for work. Only when all the other measures (including working platforms and light-duty working platforms) are found not feasible and a permit-to-work for use of ladders has been issued by a competent person with a thorough risk assessment conducted and all necessary safety measures related to use of ladders taken, ladders can be used for work-above-ground at height less than 2 metres.
- A ladder for access/egress purpose should meet the following conditions:
  - Use a ladder which is of good construction, sound material and adequate strength.
  - Examine the ladder before using it and inspect it at regular intervals.
  - Place the ladder on a level and firm footing.
  - Place the ladder at an appropriate angle. For straight ladder, the ladder should be placed on a 1:4 ratio (75°) of setback distance to height.
  - Ensure that the ladder has a sufficient length. The upper end of the ladder should be at least 1 metre above the landing against which the ladder leans.
  - Ladder's upper or lower end shall be securely fixed or secured by another worker.
  - When climbing up or down a ladder, the user should avoid carrying heavy objects. The user should face the ladder and maintain 3 points of contact with the ladder.
  - If there are exposed live metal parts or potentially exposed live conductors nearby, do not use metal ladders.

#### **2.2.1.2.6 Suspended Working Platforms**

- A competent person is responsible for on-site inspection, supervision on the installation and use of a suspended working platform.
- Every person working on a suspended working platform shall be at least 18 years old, and has undergone training and obtained a certificate in respect of such training.
- Every person carried on a suspended working platform shall wear a safety belt that is attached to an independent lifeline.

- A suspended working platform shall clearly and legibly mark on the platform the safe working load, the maximum number of persons that may be carried at any one time, every person riding on a suspended working platform shall wear a safety belt properly attached to an independent lifeline.
- Every suspended working platform should be inspected in the immediately preceding 7 days before its use by a competent person. A statement to the effect that it is in safe working order should be entered into an approved form by the competent person.

#### **2.2.1.2.7 Power-operated Elevating Work Platforms**

- A competent person is responsible for on-site inspection, supervision on the installation and use of a power-operated elevating work platform.
- Every person carried on the platform of a power-operated elevating work platform shall wear a safety belt that is attached to a specified anchorage point of the platform designated by the manufacturer.
- When a power-operated elevating work platform is used, the safe working load and the maximum number of persons carried shall not be exceeded and workers are not allowed to climb onto or beyond the guardrails of the platform.
- A power-operated elevating work platform shall clearly and legibly mark on the platform the safe working load, the maximum number of persons that may be carried at any one time.
- A power-operated elevating work platform should be regularly examined by a competent examiner (such as a registered professional engineer) and certified to be safe for use. The examination reports should be properly kept.
- Every power-operated elevating work platform should be inspected in the immediately preceding 7 days before its use by a competent person. A statement to the effect that it is in safe working order should be entered into an inspection record by the competent person. The inspection records should be properly kept.

#### **2.2.2 Safe Use of Electricity [Playing Video: Maintenance Work]**

(This section must be conducted in an interactive manner through discussion with trainees)

##### **Potential Hazards**

- Improper repairing of electrical appliances may cause electric shock, burnt, fire and explosion, etc.

- Small currents passing directly through the heart during electrocution can cause fatal arrhythmias. Electrocution is mainly due to serious injury of the heart.

### **Preventive Measures**

- While a worker is using a portable electrical tool, he should follow the operation rules set by the manufacturer, check the tool before use, and use appropriate plug for connecting the power so as to ensure the tool is in proper function.
- A double-insulated tool is identified by being distinctively marked. This marking consists of the double insulation symbol (a square within a square “ $\square$ ”). The design of double-insulated electrical tools is to avoid current leakage.
- Non-double insulated hand tools should be earthed to prevent electric shock accidents. A portable electrical tool can be used without earthing when it is of double-insulated construction.
- Do not use a damaged tool. (Allowing the live parts of electric wires exposed may cause electric shock.)
- Always comply with the safety measures for electrical works and never insert electric wires into a socket directly. (Not using an electric plug to connect power is an unsafe practice.)
- Workers should not use electrical appliances if their clothes are wet.
- Do not use an electric tool unless its metal casing is earthed and its power supply is provided with an earth leakage circuit breaker.
- Do not repair or alter any electrical installation unless competent to do so.
- The wiring and connections for any electrical appliance using outdoors must be waterproof. For working in a humid environment, electrical installations of waterproof design should be used.
- Avoid using electrical equipment in a congested and wet workplace. Use suitable personal protective equipment such as insulating gloves and mats if necessary.
- Electrical work should only be carried out by a registered electrical worker of appropriate grade. Before and during electrical installation work, the electricity source should be cut and isolated. As far as practicable, work with live parts should be avoided.
- A risk assessment should be conducted by a competent person before commencement of electrical installation work to identify any risk of electrical hazard. Appropriate safety

precautions should be devised to eliminate or control the electrical hazards involved:

- Isolating the electricity source for the electrical installation and its on/off switch
  - Locking off the power supply with warning notices displayed so as to prevent that any person unintentionally switches on the power supply ensuring that in the course of work, the workers shall not touch any live part.
- Under special circumstances when live work is necessary,
    - The work should be conducted by a registered electrician with relevant knowledge and training. Adequate precautions, e.g. the use of an insulation screen, should be taken to prevent any person from touching the live parts unintentionally
    - Suitable personal protective equipment, such as insulating gloves, hand tools, mats and screen as well as safety shoes should be provided and used. A permit-to-work system should be implemented. Supervision on the electrical work and the safety measures should be reinforced.

### **2.2.3 Use of Machinery and Tools**

(This section must be conducted in an interactive manner through discussion with trainees)

#### **Potential Hazards**

- If a dangerous part of a machine is not properly guarded, a worker could be hurt by the dangerous part due to entanglement, shearing, crushing, trapping or cutting.
- Failure of machine guarding is the common cause of accidents involving machine operations.

#### **Preventive Measures**

- Do not use machines (such as saw, grinder and drill, etc) unless their dangerous parts have been effectively guarded.
- Workers should not wear cotton gloves while operating or working on machines with revolving parts where there is a possibility of the gloves being caught by the rapidly moving parts.
- For machine repairing, workers should not dismantle the protective guard while testing a machine for ease of adjustment.
- For repairing the revolving parts of a machine, avoid contact of the revolving parts with the personal belongings to prevent from being caught by the machine. Do not conduct cleaning work on a machine which is in motion and adopt measures to prevent personnel not responsible for the repairing work from coming near.



### **2.2.3.1 Lifting Operations Using Lifting Appliances and Gear**

**[Playing Video: Lifting]**

#### **Lifting appliances commonly used on construction site**

- Tower crane
- Crawler-mounted crane
- Truck-mounted crane
- Wheel-mounted telescopic crane

#### **Lifting gear commonly used on construction site**

- chain sling
- rope sling
- ring
- link

#### **Potential Hazards**

- Overturning of the crane
- Overloading of the crane leading to breaking and collapse of the lifting boom
- Objects falling down during lifting operation and hit workers below
- The lifting boom colliding with obstacles
- The lifting boom touching overhead power lines

#### **Preventive Measures**

- Lifting appliances and lifting gear must be regularly inspected, thorough examined and tested by competent examiners. (Regarding colour coding of lifting gear, please refer to the relevant guidance of Works Branch of Development Bureau).
- An automatic safe load indicator shall be installed at a crane with a maximum safe working load of 1 tonne or above.
- Crane operators shall attain 18 years old, have undergone relevant training and hold valid certificates.
- Before using lifting gear such as a hook, shackle or chain sling, check whether there is any wear and tear.
- Lifting gear used in lifting operations (such as rope slings and chain slings) shall be marked with the safe working load.

- Check the weight of the load to be lifted. Do not exceed the safe working load of a lifting appliance or lifting gear.
- A crane should only be operated on a uniform, level and firm ground with sufficient load bearing capacity to withstand the maximum in-service loadings of the crane.
- In order to avoid the sinkage or collapse of the supporting surface and overturning or collapse of a crane, the loading should be distributed over a sufficiently large area. Steel plates of adequate strength, suitable mats or suitable timber blocking should therefore be used;
- If outriggers are provided, the beams should be fully extended and timber blocking should be used to support the load as far as practicable. The jacks should be suitably extended so that all the crane tyres are clear of the ground;
- Employ a signaller to assist the lifting when the operator of the lifting appliance does not have an unrestricted view.
- Do not work beneath any suspended load and do not work within the lifting operation area.
- Use appropriate equipment, such as "goal posts" to restrict the height of the jib when there is a need for using a telescoping jib crane underneath an overhead cable.
- The minimum depth of a cage or receptacle used for carrying persons is 900mm and the cage or receptacle shall be clearly marked the safe working load, and the maximum number of persons that may be carried at any one time.
- Passenger hoists and tower working platforms should be operated by trained workers to avoid dangerous conditions.

### **2.2.3.2 Use of Loadshifting Machines**

**[Playing Video: Loadshifting Machinery]**

#### **Potential Hazards**

- Striking of persons by a moving loadshifting machine
- Overturning of a loadshifting machine
- Touching of underground cable or overhead power lines

#### **Preventive Measures**

- A loadshifting machine shall only be operated by a person who has attended a relevant training course and holds a valid certificate.
- When a loadshifting machine (such as an excavator) is working, reasonable measures should be taken to prevent persons from having access to that place, such as by fencing off the place.
- The proprietor/contractor should ensure that the operator of loadshifting machine has attained the age of 18 years and holds a valid certificate.
- In order to achieve safe operation of an excavator, each worker engaged in work associated with the excavator should understand and follow instructions and information given by his supervisor on system of work, work procedures and safety precautions.

### **2.2.3.3 Material Hoist [Playing Video: Material Hoist]**

#### **Potential Hazards**

- A worker slips and falls into the hoistway
- A worker is trapped by the moving part of the hoist
- Materials drop through a hole in the hoistway enclosure and hit a worker

#### **Preventive Measures**

- Do not ride on a material hoist (carrying of workers prohibited).
- Do not operate a material hoist without prior proper training.
- Do not exceed the safe working load of a material hoist.
- Do not use a material hoist unless its gates have been installed with an effective interlocking safety system. The hoist is only to be operated after all the gates have been closed.
- Do not use a material hoist unless it has been repaired and maintained by a competent person. No unauthorized repair is allowed.
- Do not put loose materials into the receptacle unless properly secured.
- Ensure good communication with the operator of a material hoist. All signals should be understood and followed.

### **2.2.3.4 Woodworking Machinery (Mainly Circular Saw)**

## Potential Hazards

- The high speed woodworking machines (such as circular saws, spindle moulders) create nip points which can lacerate body parts
- The blade catches the timber and violently throws it back to the front of the saw, towards the operator

## Preventive Measures

- The top of a circular saw shall be covered by a strong and easily adjustable guard.
- There shall be a riving knife behind and in direct line with a circular saw.
- The part of a circular saw below the bench table shall be protected by 2 plates of metal or other suitable materials.
- A suitable push-stick shall be kept available for use at the bench.

### 2.2.4 Confined Spaces and Excavation Works

(This section must be conducted in an interactive manner through discussion with trainees)

#### 2.2.4.1 Confined Spaces **[Playing Video: Manhole]**

## Potential Hazards

- The major hazards in a confined space include the presence of the following:
  - a flammable, explosive or oxygen enriched atmosphere
  - a harmful or toxic atmosphere; an oxygen deficient atmosphere
  - free flowing solids or liquids
  - excessive heat
- The threats against the safety and health of workers (specified risks) include:
  - serious injury arising from a fire or explosion
  - loss of consciousness arising from an increase in body temperature caused by, for example, heat stress in the work environment
  - loss of consciousness or asphyxiation arising from gas, fume, vapour or the lack of oxygen
  - drowning arising from an increase in the level of liquid
  - asphyxiation arising from a free flowing solid or the inability to reach a respirable environment due to entrapment by a free flowing solid

## **Preventive Measures**

- To appoint a competent person to carry out a risk assessment for work in the confined space before a worker enters a confined space (such as a sewage pipe, manhole or water tank).
- To carry out an air monitoring to determine if a hazardous atmosphere exists by a competent person using a suitable gas detector before a worker enters a confined space. The purpose of the air monitoring is to determine whether the amounts of gas components in a confined space is safe or not (whether exceed the dangerous levels or not).
- To ensure that no workers other than certified workers who have been issued with a work permit enter or work in a confined space (such as sewage pipe, manhole or water tank).
- Workers working in a confined space should be equipped with appropriate personal protective equipment. With adequate safety precautions being taken, a self-contained respirator should be worn when a worker enters a confined space to rescue an unconscious worker.
- A person shall be stationed outside a confined space to communicate with the workers inside when work is being carried out in the confined space.
- To ensure that the risk assessment report and the related certificate (work permit) issued are displayed in a conspicuous place at the entrance of the confined space.
- The proprietor should provide safety measures including forced ventilation before a worker enters a confined space.
- A certified worker is not allowed to remain in a confined space once the safe period of the work permit has been expired.

### **2.2.4.2 Excavation Works**

#### **Potential Hazards**

- Probably the most common hazard when working in excavations and trenches is the threat of cave-in
- Electric shock, fire and explosion as the result of underground utilities damaged during excavation work.

## **Preventive Measures**

- Detection of underground utilities should be done prior to the commencement of an excavation work. Make sure enough protection has been given for any exposed utilities when the work starts.
- An excavation shall be examined by a Competent Person at least once in every seven days and statutory Form 4 should be filled in as a record of inspection.
- No load or plant shall be placed or moved near the edge of an excavation, shaft, pit or opening in the ground as its weight may cause the side of those places to collapse.
- Make sure that a trench is securely shored before working in it (installation of shoring can prevent collapse of the trench).
- Suitable support should be applied at the edge of an excavation to avoid any damage caused by a collapse of the excavation.
- An excavator shall only be operated by a person who has attained the age of 18 years, is trained and holds a valid certificate applicable to the excavator.

### **2.2.4.2.1 Working Near Underground Electricity Cables**

- Advice to site personnel when working near underground electricity cables :
  - Damaging underground electricity cables is dangerous and can often cause flashover, electric shock, burns, or even explosion or fire incident.
  - Damage can result from excavation, ground penetration or earth moving operations by machinery.
  - Underground electricity cables may be found under roads, footpaths and on sites. Always assume that they are present and treat any cables found anywhere as LIVE.
- The Code of Practice issued by Electrical and Mechanical Services Department stipulates that before starting works near underground electricity cables, working party shall appoint competent persons to carry out the cable detection work and to ensure the alignment and depth of the underground electricity cables in the works site.
- Site personnel shall make reference to the competent person written report to use appropriate tools such as hand tools, hand-held power tools, mechanical excavators, etc. to carry out the work. The tool shall maintain an adequate safe working distance from the underground electricity cables.

### **2.2.5 Welding and Cutting**

(This section must be conducted in an interactive manner through discussion with trainees)

### 2.2.5.1 Gas Welding and Flame Cutting

#### Potential Hazards

- Fire and explosion resulted from release of flammable fuel gases or oxygen into the atmosphere
- Fire and explosion resulted from flashback at the blowpipe or overheating of the acetylene cylinder
- Explosion from over-pressurisation of the gas supply system
- Due to the radiation and toxic fumes or gases emitted during the process, the resultant health problems include: (i) eye discomfort and burns from the intense light and heat emitted from the operation, and (ii) corneal ulcer and conjunctivitis from foreign particles e.g. slag and cutting sparks
- Illness due to inhalation of fumes or gases formed during the process, such as metal fume fever, bronchial and pulmonary irritation

#### Preventive Measures

- Do not conduct gas welding or flame cutting unless you have attained the age of 18 years and hold a valid certificate.
- Do not use any gas cylinder unless it has been fitted with a flashback arrestor.
- Wear personal protective equipment. Workers should wear an approved eye protector for welding work.
- Keep the gas cylinders in an upright position and secure them properly to avoid overturning. Keep them far away from a place where hot processes are being undertaken.
- Flammable substances should not be stored in workplaces for welding work. Before conducting flame cutting work on a used pipe, the pipe should be thoroughly cleansed to remove any residual substances.

### 2.2.5.2 Electric Arc Welding **[Playing Video: Arc Welding]**

#### Potential Hazards

- Common welding-related hazards include electric shock, radiation, heat and toxic fumes

- Long-term inhalation of metal dust may lead to non-fibrotic pneumoconiosis
- The ultraviolet rays generated in electric arc welding would cause hazards to the eyes of a worker

### **Preventive Measures**

- Avoid conducting welding on a wet floor or at an open area during a rainy day.
- Suitable personal protective equipment, such as eye and face protectors, insulated welding gloves and safety shoes or boots, should be provided to and used by the welding worker.
- Keep the welding area well ventilated, and suitably and sufficiently lit. Make sure suitable fire extinguishers are available.

## **2.2.6 Occupational Health**

### **2.2.6.1 Manual Handling**

#### **[Demonstration: Correct Posture of Manual Handling Operations]**

### **Potential Hazards**

- The waist is most likely to be injured if a worker lifts goods improperly. Incorrect manual handling operations involving awkward postures, incorrect application of bodily force, prolonged or frequently repetitive motions, jerky motions or unexpected movements and pressure, etc. can lead to injuries.

### **Preventive Measures**

- Carry out risk assessment. For example, estimate the weight of the load.
- Conduct manual handling operations with a proper method. Lift an object with a correct posture by holding the object close to the body, lifting with the legs by slowly straightening them and keeping the back straight.
- A sudden increase of the movement speed should not be done to avoid sustaining injury during a manual lifting.
- Transport goods with the assistance of a mechanical tool, (e.g. a trolley of good structure) but consideration should also be made on whether the floor surface is even and whether there is any potential hazard along the path of transportation.
- Seek assistance from someone in lifting a load if necessary.



- Do some warm-up exercises before conducting manual handling operations.

### **2.2.6.2 Working in Hot Weather**

- When a Very Hot Weather Warning is in force, employers should assess the risk of heat stroke to their employees and adopt effective preventive measures such as providing cool drinking water, setting up temporary sunshade and providing mechanical aids to reduce physical exertion of employees.
- Employees should drink water regularly and be mindful of their physical condition. If early heat stroke symptoms such as headache or thirst appear, they should inform their supervisors, and seek medical help immediately.

### **2.2.6.3 Working with Chemicals**

- Chemicals are generally classified in seven categories, namely corrosive, explosive, toxic, harmful, irritant, oxidizing and flammable.

#### **Potential Hazards**

- Causing fire, explosion
- Releasing harmful/toxic gases or airborne particles
- Splashing of hot, corrosive or toxic liquids
- Resulting in injuries, ulcer, intoxication and even death
- For dangerous substances, the major routes of entry into the human body are ingestion, skin absorption and inhalation

#### **Preventive Measures**

- The essential information of a chemical label should include the symbol, chemical name, particular risks and safety precautions.
- Studying the label content outside a container is the proper way for identifying the name, classification, risks and precautions of the chemical in the container.
- Always keep the work area well-ventilated.
- Wear proper personal protective equipment. Aprons, safety shoes, rubber gloves and face shields should be used for handling chemicals.
- Don't touch chemicals with bare hands. For handling a chemical, wear protective gloves

specific for that chemical.

- Prohibit smoking and eating at workplaces where chemicals are being used or stored.
- Fully understand and follow the safe working procedures.
- Keep away from any ignition source when handling flammable substances.
- Flammable substances should be stored at a metal cabinet. Rags, after used for cleaning a flammable liquid, should be placed in a metal container with a lid.
- The employee who is responsible for handling chemicals should correctly use the protective equipment provided by the employer.

### **3. Emergency Preparedness and Handling of Accidents**

[Reference teaching time for Section 3: 5 mins]

#### **3.1 Emergency Preparedness**

##### **3.1.1 Action to be Taken in case of an Emergency and Evacuation Procedures**

- The employer should draw up emergency measures and evacuation procedures. For instance, the procedure for fire escape, preparedness and contingency plans for landslide, etc.
- In the event of fire or emergency in a construction site, employees should know what actions to be taken.

##### **3.1.2 Action to be Taken in Times of Bad Weather**

- Employees working outdoors in times of bad weather (e.g. typhoon, thunderstorm and rainstorm), may sustain serious or fatal accidents. The employer should formulate safety measures.
- Employees working outdoors in exposed areas in times of bad weather, should stop work and take shelter.

##### **3.1.3 Qualified First Aider and First Aid Facilities**

- The quantity of first aid facilities in a construction site depends on the number of employees.
- The contractor responsible for a construction site at which not less than 30, but less than 100 workmen are employed, should provide at least one person trained in first aid.

#### **3.2 Handling of Accidents**

- For any work injury to a worker, the worker should inform the supervisor immediately and receive suitable treatment.
- Unless a worker has received adequate first aid training, the worker should not move the victim.
- If a worker is seriously injured or need to be hospitalized, the supervisor should inform the safety department and call police immediately.

- If a worker falls from height, inform first aider to take care of the worker but do not move the worker.

## 4. Explaining, Demonstration and Practice on the Selection and Use of Personal Protective Equipment

[Reference teaching time for Section 4: 35 mins]

Personal protective equipment (PPE) is intended to be worn or otherwise used by a person at work and protects the person against one or more hazards to his/her safety or health. Use of PPE is the last resort when controlling the sources of accident is impracticable.

PPE should be provided by employers. Employees must wear PPE for the entire period of exposure to hazards.

### 4.1 Factors for Consideration in Selection of PPE

Factors to consider in selecting suitable PPE:

- Can the PPE provide effective protection against the hazards and whether it is suitable for use in the work process?
- Can the PPE prevent or reduce the hazards without creating unsafe working conditions?
- Can the PPE be adjusted to fit the user's body properly?
- Has consideration been given to the health of the user?
- What is the load of PPE imposed on the user?

### 4.2 Categories of PPE

#### 4.2.1 Safety Helmets [Demonstrate using the real object of PPE]

- Wear a safety helmet on a construction site under all circumstances.
- A safety helmet is primarily intended to protect the top of the head from being injured by falling objects.
- A suitable safety helmet should bear appropriate marking indicating the conformity to certain international/ national standards such as European Standard.
- A safety helmet should be equipped with a chin-strip.

#### 4.2.2 Safety Shoes [Explain by means of powerpoint or the real object of PPE]

- Safety shoes should have steel toe caps, steel soles, slip-proof and water-proof characteristics.

#### **4.2.3 Safety Gloves [Explain by means of powerpoint or the real object of PPE]**

- Protect hands from getting injured by abrasion; cuts and punctures; contact with chemicals; electric shock; skin infection.
- Types of safety gloves include rubber gloves, steel, mesh gloves, leather gloves, wrist and arm protective devices.

#### **4.2.4 Ear Protection [Demonstrate by using the real object of PPE or by playing video]**

- Ear muffs are the most efficient noise isolation ear protectors.
- Wear ear protectors in areas with high noise levels.
- Properly wear ear protectors according to the manufacturer's instructions.

#### **4.2.5 Eye Protection [Explain by means of powerpoint or the real object of PPE]**

- When there is a risk of eye injury, such as in concrete breaking or using abrasive wheels, suitable eye protectors should be worn.
- Take proper care of the eye protectors provided to you.
- Replace damaged or defective eye protectors immediately.
- Ensure that eye protectors are comfortable to wear, and keep clean.

#### **4.2.6 Breathing Apparatus [Demonstrate by using the real object of PPE or by playing video]**

- Protect workers against dust, fibres, hazardous gases and fumes and prevent workers from oxygen deficiency.
- Types of breathing apparatus include: disposable cartridge respirators; full-face/half-face respirators; air-supplied hoods; self-contained respirators.
- When using breathing apparatus, it must be properly fitted on the wearer's face.
- Breathing apparatus should be cleaned thoroughly after each use.

#### **4.2.7 Protective Clothing [Explain by means of powerpoint or the real object of PPE]**

- Protective clothing protects workers against injuries caused by hazards such as contact with chemicals or flame, striking, stabbing, radiation, drowning, extreme cold, hot or adverse weather conditions.
- Types of protective clothing: general purpose protective clothing; disposable overalls; specialized protective clothing such as cold resistant clothing; chemical or radiation protective clothing; high visibility clothing, puncture-resistant aprons and lifejacket used for land-based work carried out adjacent to water.

#### **4.2.8 Full Body Harnesses Attached to Independent Lifelines and Fall Arresting Devices [Demonstrate using the real object of PPE]**

- The most suitable way to use a safety belt is to attach its snap-hook to a level higher than the user's waist.
- When falling from height, a full body harness (commonly known as parachute type) could better reduce the downward momentum and protect the user's waist from injury than the general safety belt.
  - Before using a safety belt, the following should be considered: any defects on the safety belt, any suitable anchorage, independent lifeline and fall arresting device, and whether the standard is met or not.
  - When using a safety belt for fall protection, the safety belt should be attached to a fixed anchorage point or attached to a fall arrestor of an independent life line.

### **4.3 Practice on Use of PPE**

#### **[Practical Section to be conducted with the use of the real object of PPE]**

##### **4.3.1 Practice: Use of Full Body Harnesses Attached to Lifelines and Fall Arresting Devices**

The following points should be noted in practising the use of a fall arrester:

- When the fall arrester is attached to a lifeline, the upward marking “↑” should be pointing upwards.
- Correctly attach the fall arrester to the lifeline and make sure the opening device of the fall arrester is securely locked.
- Trainee pulls the lanyard of the fall arrester by hand to appreciate the locking mechanism of the fall arrester.

- The fall arrester should be at a level higher than the safety harness when a person is working at a fixed location.
- Each fall arrester should be used by one person at one time. Any collision with another object could lead to damages of the fall arrester and thus should be avoided.
- Do not allow the safety harness, lifeline and the fall arrester to contact fire or chemicals so as to prevent damages to the devices and the synthetic fibers of the ropes.

#### **4.3.2 Practice: Use of Safety Helmets with Y-type Chin Straps**

Procedures for the practice:

- Each trainee will be provided with a safety helmet with a Y-type chin strap for hands-on practice.
- A safety helmet should be checked by a trainee before use. All parts and accessories of the helmet must be operational and undamaged, in particular, the correct assembly of the shell and harness.
- The headband of the safety helmet should be adjusted to fit the size of the trainee's head.
- The tightness of chin strap should be adjusted to be as comfortable as possible and fit the trainees to avoid falling off.

(Note : The training course provider should ensure that the safety helmets and accessories are clean and hygienic for use.)



## 5. Fire Prevention Measures and Use of Fire Extinguishers on Construction Sites

[Teaching time for Section 5 for reference: 7 mins]

[Playing Video: Use of Dry Powder Fire Extinguishers]

### Formation of Fire

- Fuel, oxygen and heat

### Potential Hazards

- In a fire, people may get hurt by the heat and flame, but the majority of deaths and injuries in fires were due to inhalation of hazardous smoke or toxic gases.

### Preventive Measures

- No smoking and naked flame is allowed at any storage area of flammable or explosive materials.
- The following ways are to prevent combustion( fire) :
  - Isolating the fuel;
  - Isolating the air; or
  - Cooling down the heat source.
- What type of fire extinguisher you use should depend on what type of fire it is.

**Type of extinguisher suitable for extinguishing fire involving**

Type of fire Type of extinguisher	Class 1 Paper, Textiles, Wood, Plastic	Class 2 Flammable liquids, Solvent, Oil, Grease	Class 3 Electrical Appliances, Motors, Electrical switches	Notes
<b>Carbon Dioxide Gas</b>	X	✓	✓	Vapours will asphyxiate.  Withdraw to open air after use.
<b>Water</b>	✓	X	X	<b>Never</b> on fires involving electrical or flammable liquids or metals.
<b>Dry Powder</b>	✓	✓	✓	Discharged dry powder may reduce visibility and cause disorientation.
<b>Foam</b>	✓	✓	X	<b>Never</b> on electrical fires.



**Occupational Safety and Health Branch  
Labour Department**

**Answer Sheet for MBST (Construction Work) Courses**

## MBST (Construction Work) Courses

### Answer Sheet

Name of Course Provider : \_\_\_\_\_

Class Ref. (TRC1): \_\_\_\_\_

Examination Paper Code : \_\_\_\_\_

Date of Examination : \_\_\_\_\_

Examination Start Time : \_\_\_\_\_

Name of Trainee : \_\_\_\_\_

Mark: \_\_\_\_\_

#### Instructions to Trainees

1. The examination paper consists of 20 multiple choice questions. Each correct answer carries 5 marks. Please answer all questions.
2. The passing mark of the examination is 60. The examination must be finished in 30 minutes.
3. Please read the questions carefully and put a tick in the answer box you choose for the question.
4. If you tick more than one answer box for one question, no marks will be awarded.
5. Please initial next to your final answer whenever amendment is made.
6. If you have any questions, please raise your hand and ask the examiner or invigilator.

Question	Answer			
	A	B	C	D
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Question	Answer			
	A	B	C	D
11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please tick only one box to denote if the trainee has used the question paper reading service and also if it is read in English.

Not required

Read in English

Read in language other than English

Signature of Trainee : \_\_\_\_\_

Date: \_\_\_\_\_

Name and Signature of Invigilator : \_\_\_\_\_

Date: \_\_\_\_\_