Hong Kong Institute of Construction

Safety and Health Handbook

2023 Version

香港建造學院 HONG KONG INSTITUTE OF CONSTRUCTION

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Foreword

The vision of Hong Kong Institute of Construction ("HKIC") is to nurture an accomplished construction workforce with sound professional skills, theoretical knowledge, safety awareness, innovative ideas, passion and pride for the construction industry of Hong Kong.

One of our missions is to promote a culture of work safety and sustainability for the construction industry. Therefore, reaching an excellent standard of safety and health performance is one of the most important objectives for the operation of HKIC.

In order to facilitate a clear understanding of safety and health issues by HKIC's stakeholders, HKIC and the Corporate Safety Department (CST) have jointly prepared this safety manual, which aims to clarify related rules and regulations to advance safety collaborations amongst stakeholders and to promote safety first culture in HKIC.

Hong Kong Institute of Construction Safety & Health Policy Statement

Hong Kong Institute of Construction (HKIC) is committed to ensuring the safety and health of all its employees, students, candidates and visitors.

We see health and safety as a requisite element of our operation. We also aim to excel in safety and health, and to achieve an accident-free operation.

HKIC is committed to mitigating all risks from safety and health aspects in HKIC's operation through continual improvement approaches and to taking all reasonably practicable steps to implement and maintain an effective Safety and Health Management System.

In addition, HKIC will:

- ensure that workplace safety and health will be the prime commitment of students, employees at all levels, from front-line to top management;
- strictly comply with all relevant safety and health legislation and other requirements;
- conduct risk management in order to eliminate hazard and risk or control risks to an acceptable level;
- provide adequate resources to implement and maintain effective Safety Management System;
- provide appropriate safety training, instruction, supervision and information to all employees, students, candidates, contractors and visitors ; and
- communicate with stakeholders at all levels on safety and health matters.

This HKIC Safety and Health Policy shall apply to all HKIC operations, including all campuses, training grounds and other HKIC's premises.

1 Workshop Safety Essentials

1.1 Keep proper safety attitude at all times and take care of the safety and health of yourself and others.

1.2 Wear safety helmet, chin strap, safety shoes and properly use personal protective equipment within workshop areas

1.3 Properly maintain housekeeping and keep passageways free from any obstructions.

1.4 Working platform must be inspected by competent person to ensure its stability.

1.5 Take proper fall prevention measures when working above ground.

1.6 Ensure electrical tools are properly insulated or earthed

1.7 Ensure safety guarding is properly installed for all dangerous parts of machines.

1.8 No participation of training or testing is allowed under the influence of alcohol or medicine.

1.9 Smoking is prohibited within all premises of HKIC.

1.10 Immediately report all unsafe circumstances or accidents to instructor and duty officer/ venue in-charge.

2 Safety Organisation

Safety is a shared responsibility! Both occupational safety and health are equally important. There is a safety management structure comprising all levels of involved parties to perform safety management responsibilities. All staff and students may report on unsafe practices within the safety management framework.

2.1 Director - Hong Kong Institute of Construction

2.1.1 Direct and guide the implementation of safety management system to ensure its effectiveness.

2.2 Assistant Director – Training

2.2.1 Assist the Director – Hong Kong Institute of Construction to direct and guide the implementation of safety management system to ensure its effectiveness.

2.3 Head of Training / Deputy Principal - Hong Kong Institute of Construction

2.3.1 As the decision-makers, monitor the normal and effective operation of safety management unit.

2.3.2 Be fully accountable to the top management for safety and health at work.

2.3.3 Implement safety management system according to the Safety Policy.

2.3.4 Make everyone understand the requirements of Safety Policy.

2.4 Training/Trade Testing Superintendents

2.4.1 As the coordinator of safety management unit, lead the normal and effective operation of the unit.

2.4.2 Lead the discussion on safety management unit duly, and report the conclusions to the management.

2.4.3 Co-ordinate the routine safety management activities of campus/testing.

2.5 Supervising Instructors

2.5.1 As a participant of safety management unit, implement the discussed safety measure arrangement.

2.5.2 Conduct assessment and identify the existing and potential risk prior to the allocation of work, and take adequate measures to minimise the identified risk.

2.5.3 Implement safety rules and safe working procedures.

2.5.4 Conduct daily check on responsible workplace / workshop, and take immediate action to rectify the unsafe condition once found.

2.5.5 Ensure that the subordinates are properly instructed, and with necessary personal protective equipment to enable work to be carried out safely.

2.5.6 Provide clear instructions to subordinates that accident prevention as part of daily works, improve the safety awareness of subordinates through regular review of working procedures.

2.5.7 Arrange regular checks, maintenance and repairs of tools, machinery and equipment.

2.5.8 Arrange examination of lifting appliances and workshop machinery so as to meet statutory requirements.

2.6 Instructors/Assistant Instructors

2.6.1 Carry out assessment according to the workshop activities in advance in order to identify the existing and potential risks, and to take countermeasures to minimise or control the risks.

2.6.2 Implement safety rules and safe working procedures.

2.6.3 Inculcate the students the safe working procedures and safety precautions prior to the commencement of training / class.

2.6.4 Ensure that the students are properly guided, and equipped with necessary personal protective equipment to enable operation to be done safely.

2.6.5 Immediately rectify the improper and unsafe operating methods of students.

2.6.6 If unsafe condition is found, suspend the training and report to the supervisor immediately.

2.6.7 Be aware of the physical and mental fitness of students to ensure that they are fit for performing training activities.

2.7 Instructor Assistants/General Workers

2.7.1 Maintain the workshops and storerooms in a clean and tidy condition.

2.7.2 Check training tools, issue no damaged tools and report the defects to the responsible instructor.

2.7.3 Report any defects found in training machinery and equipment to the responsible instructor.

2.7.4 Keep all access and fire exits free from obstruction.

2.7.5 Assist the instructor in the implementation of safety rules.

2.8 Students

2.8.1 Comply with all of the safe working rules and procedures, take responsibility for your own and others' safety.

2.8.2 Follow the guidance of instructors to properly use the provided safety equipment.

2.8.3 Properly use all training tools.

2.8.4 If any unsafe conditions is found, suspend current activity and report to the instructor.

2.8.5 Clean up the workshop after the training work.

2.8.6 Actively engaged in safety-related activities or trainings.

2.9 Officer – Corporate Safety

2.9.1 Advise the management on measures to meet with the safety requirements and submit monthly report to the management.

2.9.2 Identify workplace potential hazard through routine inspections (includes operation method, use of equipment and workplace condition), attend the discussion on safety management unit to discuss the safety matters with the involved parties for proposing practicable safety measures to the management.

2.9.3 Convey and implement safety rules.

2.9.4 Carry out accident investigation and submit report with recommendations to the management.

2.9.5 Arrange safety training and provide safety promotional information for students, instructing staff and other concerned parties for participation.

2.9.6 Acquire up-to-date safety knowledge to facilitate the training needs of HKIC.

2.9.7 Analyze accident figures and prepare suggestion for improvement.

3 Safety Training

Safe operating processes are the key in all activities. Considering the actual circumstances students will face when working in construction site after graduation, students are encouraged to be equipped with various safety knowledge, enhancing safety awareness. In light of the aforesaid objective, students should actively participate in the following safety training.

Safety Training Plan

Target Group / Training Item	Advanced Diploma Programme Students	Construction Diploma Programme Students	Construction Certificate Programme Students	Certificate Course Students
Safety Induction	●	●	●	
Routine Safety Training	●	●	●	●
Occupational Health Training	●	●	●	●
Emergency Preparedness Training	●	●	●	●
First Aid Training	●	●	●	
Foundation Construction Safety Training	●	●	●	●
Safety Training Course for Construction Worker of Specified Trade (Silver Card Course)		○	○	○
Safety Training in Confined Spaces Operation	●	○	○	○
Gas Welding Safety Training		○		○
Construction Safety Supervision Training	●			

Remarks: ●Applicable to all courses

○Applicable to designated courses

HKIC may adjust the safety training arrangement according to the training schedule.

4 General Safety Rules

4.1 Personal Protection

Although it is the last resort to provide personal protective equipment as safety measure, everyone shall observe to use the specified protective equipment under certain circumstances.

Be equipped with personal protective equipment if the circumstances require.

The following criteria refer to the general requirements of the use of personal protective equipment.

4.1.1 For students, wear the uniform clothing issued by the campus, do not wear tie and neckerchief at work to avoid danger. Student must follow instructor's advice on clothing.

4.1.2 Wear safety helmet, fitted with Y-type chin strap, and safety shoes whenever in the workshop.

4.1.3 As a last resort, wear safety belt or other fall protection equipment (such as fall arresting device and independent lifelines, etc.) when working at height, and fasten the helmet Y-type chin strap.

4.1.4 Wear appropriate eye protection equipment if flying particles or debris, harmful lights, or corrosive substances may involve in the operation.

4.1.5 If the arm or hand exposes to hazard of extreme temperatures; cuts and punctures; contact with chemicals; electric shock, wear appropriate safety gloves for protection.

4.1.6 Wear earmuffs or earplugs in noisy area or noise control zone for hearing protection.

4.1.7 When undergoing spray paint, polishing, handling fine powder, demolition, any other dusty operation or operation that may involve working in environment with present of toxic gases or lack of oxygen, use proper mask or approved breathing apparatus for protection.

4.1.8 Regularly clean and check the personal protective equipment to keep it in a good condition. Report to the supervisor for repair or replacement if any damages are found.

4.2 Health Assurance

HKIC concerns the occupational health issues during training, and will make the training environment complies with occupational health conditions. It is the last defense to use personal protective equipment to protect the operatives against occupational health hazards. Engineering control methods should ultimately be considered to deal with the following common occupational health issues.

4.2.1 Exhaust gas of fuel engines

(a) Mainly produced by mobile generator (temporary light), air compressor, site vehicles, and loadshifting machinery.

(b) Exhaust gas comprises hydrocarbons (carcinogenic), carbon dioxide, carbon monoxide, and lead.

4.2.2 Flammable and toxic gases

(a) Fumes emitted from sludge during drainage works, excavations, and caisson construction. Such fumes comprise hydrogen sulfide, methane, carbon dioxide, and carbon monoxide.

(b) Hydrogen sulfide, methane, and carbon monoxide are flammable gases, and in high concentration may cause explosion and health hazards.

4.2.3 Dust (including asbestos and free silica)

(a) Asbestos is widely used in heat insulation and fire protection such as fire retardant, fire proof paint, asbestos pipe.

(b) Apart from dust pollution, asbestos dust is hazardous to the health which can cause lung cancer, mesothelioma, asbestosis, and chronic bronchitis.

(c) Silica dust is produced by breaking rock with silicon mineral (such as tunnel works and caisson construction).

(d) Free silica dust can cause silicosis and complicate with chronic bronchitis.

4.2.4 Chemicals

(a) Chemicals, including paints, thinners, and corrosive liquids, are harmful to the health if handling in a wrong way.

(b) Read the safety label on the container. Understand the hazards and take necessary safety precautions accordingly.

4.2.5 Noise

(a) Long-term exposure to noisy working environment can cause temporary or permanent hearing loss.

(b) Pile driver, air compressor, generator, and woodworking machinery are the major sources of noise in construction industry.

(c) Wear hearing protector when working in the noise control area.

4.2.6 Prevention of heat stroke at work in hot environment

(a) Heat stroke refers to the health problems encountered in a hot environment. Common symptoms include thirst, headache, dizziness, weak and rapid pulse, and even muscle cramps.

(b) Take heed of weather report to schedule the outdoor works. Avoid working under direct sunlight and set up temporary sunshade whenever possible.

(c) Increase air flow by means of mechanical ventilation or air conditioning system.

(d) Minimise physical demand by using mechanical aids at work or increase the manpower for the work task.

(e) Allow workers to rotate worksites within the shift to reduce their exposure to the hot environment.

(f) Set regular breaks and make arrangements for workers to rest in a cool and shady place. Encourage workers to take plenty of water to replenish the fluid lost through sweating.

(g) Wear light-coloured and loose-fitting clothing to help to reduce heat absorption and enhance heat dissipation.

(h) Wear long sleeve clothing or short sleeve clothing with a pair of sun protection arm sleeves can reduce the exposure of skin to the sunshine when undertaking outdoor work.

(i) Approved accessories can be fixed to the helmet (for example: neck shade), the face, neck and back can be further protected from direct sunshine.

4.2.7 Mosquito control

(a) Apart from inflamed and itchy skin effects, mosquito bite can transmit serious diseases, such as dengue fever, malaria, and Japanese encephalitis.

(b) Mosquito breeding is impossible without water. Clear stagnant water is the most fundamental measure to prevent mosquito breeding.

(c) Dispose articles that are able to contain water such as empty lunch boxes, cans, pit or trench. Dispose these articles into covered container and remove from the workplace regularly. Tidy up the workplace and check for any accumulation of water inside the workplace.

(d) Maintain effective drainage. Maintain flat surfaces to prevent accumulation of water.

4.2.8 Infectious diseases

(a) Virus and respiratory tract infection that can be transmitted human-to-human can cause discomfort of the infected person, severe illness and even fatal illness.

(b) Ensure a hygienic toilet and work environment. Use disinfection agents/liquid soap that provided in the workplace/toilet and keep the environment clean and dry.

(c) Adequately clean and disinfect workplace and common area, especially focus on places with frequent flow of people and frequently touched surfaces.

(d) Ensure good ventilation in the workplace, and use artificial ventilation such as blowers/fans to facilitate air flow.

(e) Always maintain good personal hygiene, wear a mask and clean the hands frequently.

(f) If you have any symptoms such as fever, cough, sore throat, shortness of breath, malaise etc., you should deal with the case as directed by the medical unit.

(g) Pay attention to the latest announcements of institute and government for appropriate response.

4.3 General rules for operating machineries

4.3.1 Do not operate any machineries unless properly trained by instructor. All machineries must be operated under appropriate guidance and prior approval by instructor.

4.3.2 Check the machine according to the manufacturer manual and test or run the machine correspondingly to make clear that the machine is normal for operation. Do not wear cotton gloves or loosen objects when operating machine with exposed rotating part to avoid being caught into the dangerous part.

4.3.3 Properly adjust the safety guard before using the machine. All dangerous parts of the machine must be securely protected. Never remove protective guarding when machine is operating.

4.3.4 Except training practice, do not interfere with or try to repair any mechanical or power tools.

4.3.5 Do not use defective tool.

4.3.6 Power off all electrical equipment, clean up and check the machinery or hand tools after completing the work, then return it to the storage area.

4.4 Workshop housekeeping and other general rules

4.4.1 Student must obtain instructor's permission and understand the job nature and work environment, such as the location of electrical switches, fire escapes, etc, before commencing works.

4.4.2 All stairs and corridors must keep clean and free from obstruction.

4.4.3 Under the guidance of instructor and instructor's assistant, clean up any work area includes workshop, work table before leaving, and place the refuse to designated area.

4.4.4 Do not obstruct the access and interfere with the firefighting equipment.

4.4.5 Ensure no naked flame present when storing or using flammable substances.

4.4.6 Do not run, play or perform hazardous activities in the training facility and mind your behavior so as not to endanger yourself and the others.

4.4.7 Do not eat in the workshop. Mind personal hygiene before dining.

4.4.8 If the following happens, stop working and duly report to instructor/supervisor:

- physically uncomfortable;
- dangerous situation presents;
- an accident occurs;
- irregular operation of machinery comes with abnormal vibration, noise or smell.

4.4.9 For students, do not listen to the audio equipment, consume alcoholic drinks, cigarette or any drugs that may influence the consciousness.

4.4.10 Do not ignore any physical problems, beware of infectious diseases. In case of feeling unwell, immediately seek for medical consultation.

5 Emergency Preparedness

Emergency preparedness refers to the response to emergency conditions.

5.1 Fire

When there is a fire, follow the fire escape route to evacuate immediately and report to the Fire Services Department for help. Fire precautions and prompt reaction can reduce the loss of lives and property. Everyone should be familiar with the fire escape routes, and the location of firefighting equipment and its use. All firefighting equipment must be regularly inspected and maintained in a good condition for emergency use.

5.1.1 Firefighting equipment

(a) Fixed equipment. Such equipment includes automatic sprinkler system, inert gas system, fire hose reel, and smoke detectors, etc. They are designed to be used for the purpose of extinguishing, attacking, preventing, limiting or giving warning of fire.

(b) Portable equipment. Such equipment includes fire extinguishers, fire blankets, and sand buckets, etc. They are normally brought into use by the one to fight a fire prior to the arrival of the Fire Services.

5.1.2 Application of common fire extinguishers:

	Class 1 Papers, Textiles, Woods, Plastics	**Class 2** Flammable Liquids Solvents, Oil, Grease	**Class 3** Electrical Appliances, Motors, Electrical switches
Carbon Dioxide Gas	✘	✓	✓
Water	✓	✘	✘
Dry Powder	✓	✓	✓
Foam	✓	✓	✘

(a) User should follow the instructions labelled on the fire extinguishers.

(b) Never use fire hose reel on fires involving electrical or flammable liquids.

(c) Bucket of sand can only use to extinguish small fires only. Fire blanket is used on fire involving flammable liquids and small fires.

5.1.3 Smoke detectors can detect the occurrence of fire and give warning of fire.

5.1.4 Firefighting equipment should not be blocked by obstruction. All accesses, corridors and stairways must be maintained to free from obstruction. Never lock the smoke doors.

5.1.5 All smoke doors must remain closed at all times to prevent the spread of fire and smoke in case of fire.

5.1.6 Other notes on fire and emergency evacuation

(a) Understand the fire notices of campus. Know the action to be taken in case of fire or fire alarm.

(b) Learn to use workshop fire-fighting equipment.

(c) Recognize all evacuation routes. Notify the instructor if the route is obstructed.

(d) In case of fire, do not use the lift to avoid trapping.

5.2 Thunderstorms

5.2.1 Outdoor operations are vulnerable to weather factors, be aware of the weather changes. Follow the instructions of instructor to take the appropriate protective measures to be taken under the adverse weather conditions.

5.2.2 Thunder and lightning is likely in thunderstorms. Suspend all outdoor operations, stay indoors in case of thunderstorms.

5.2.3 In case of thunderstorm, never touch metal installations such as antenna, water pipe, metal wire, and do not to stay at high altitude or open areas and keep away from trees or powerlines towers.

5.2.4 A designated shelter should be provided in the workplace, do not use temporary structures for shelter purposes.

5.3 First aid and emergency / accident cases

The first aid information listed below are for reference only. First aid services should only be performed by qualified first aiders, otherwise do not perform any treatment to make the injury worse. Report the case immediately so that the injured person can get proper care.

In most cases, keep a distance with the injured for proper air circulation.

5.3.1 Handling of heat stroke

(a) Cool down the body temperature of the casualty as soon as possible (e.g. to wrap the body by a cool and wet towel or to fan the body)

(b) Move the casualty to a cool place.

(c) Keep watch for the casualty's conscious level and respiratory status.

(d) Admit the casualty to the hospital for medical treatment as soon as possible.

5.3.2 Electric shock

(a) If electricity was conducted through human body may cause severe damage or death.

(b) If the casualty is in contact with electric current, shut down the electric circuit or separate the person from the electric circuit as soon as possible. Make sure it is safe before performing rescue.

(c) If the casualty is not breathing and has no pulse, start cardiopulmonary resuscitation.

(d) Send the casualty to hospital for treatment as soon as possible.

5.4 Hints to Emergency Preparedness

5.4.1 Read the notices of campus on accident, incident, near miss, adverse weather, or emergency case in order to know the actions to be taken.

5.4.2 Actively participate in emergency drill arranged by the campus so as to actually understand the actions to be taken in case of emergency.

5.4.3 All personnel should cease to operation and seek assistance in case of accident or encountered in unsafe condition.

5.4.4 Staff and students should cooperate with relevant department to facilitate the accident investigation.

6 Process Control

This is a control programme to enable the operator to work safely. It can also be the safe operating procedures or practices derived from risk control measures that formulated based on the risk assessment report. Dynamic risk assessment should be conducted when there are major changes or other unforeseeable risks in the programme, so as to monitor, evaluate and eliminate the risks continuously and quickly.

6.1 Working-above-ground and prevention of falls

Working-above-ground generally refers to a workplace from which a person is liable to fall. Fall of person is the most common accident in working-above-ground. Major causes including unsafe working platform, underestimate the risk of working-above-ground, misuse of ladders, lack of fencing at dangerous places, and failing to use fall protection equipment, etc. In order to prevent such accident, the following points must be noted:

6.1.1 Safety hints on floor edges, void areas, liftshaft openings, and floor openings

(a) Workplace from which a person is liable to fall a distance of more than 2 metres shall be provided with secure guardrails includes top guard-rails of a height between 900mm and 1150mm, intermediate guard-rails of a height between 450mm and 600mm, and toe-boards not less than 200mm in height.

(b) Do not interfere with the measures for the protection of falls, such as removing guardrail installed in floor edge,

void areas, liftshaft openings and floor openings etc.

(c) All steps ladder, access and egress to work area must be provided with adequate lighting.

(d) Floor openings must be completely fenced off or protected by secure coverings such as plywood fixed with nails, and clearly and boldly marked with warning signal “Floor opening, Do not remove”.

(e) If it is impracticable to erect safe working platform, equip with safety belt/harness together with fall arresting device attached to a secure anchorage point or independent lifeline to prevent injury or death caused by falling from height. Independent lifeline shall be extended to ground and avoid to leave the lifeline on the external wall for a long period of time to prevent its strength from being affected by the weather factors.

(f) Check the fall protection equipment full body safety harness and independent lifeline before use. Refuse to use defective equipment and report the case for rectification.

(g) Clean up and properly store all fall protection equipment after use.

(h) Conduct regular safety check to fall protection facilities such as guardrail, toe-board, handrail, floor opening cover to ensure its position, structure and security is in proper condition.

6.1.2 Safe use of working platforms

(a) In case of working at height, use safe working platform

to prevent any person from falling from a height of 2 metres or more. The platform shall be stable, with secure structure and provided with guard-rails and toe-boards with adequate height (see item 6.1.1(a) for safety standards).

(b) Working platform shall be provided with safe means of access.

(c) The width of working platform shall not less than 400mm. Boards or planks forming the platform shall not less than 25mm in thickness. The width of gangway or run used for movement of materials shall not less than 650mm.

(d) Boards or planks forming the platform shall be of sound material, adequate strength and with adequate thickness to avoid undesirable breakage.

(e) Working platform shall be closely boarded or planked.

(f) Boards or planks forming the platform shall rest securely and evenly on its support.

(g) Boards or planks forming the platform shall not protrude beyond its end support to a distance exceeding 150mm unless secured to prevent tipping.

(h) Mind the surface condition of working platform to prevent from slipping and do not jump on the platform.

(i) Do not concentrate the loads on the working platform to prevent overloading.

(j) Working platform may provide with protective mesh/screen to prevent the risk of falling object, the mesh opening should be less than 20mm.

(k) Regardless this platform is erected by competent worker,

all working platform should be thoroughly checked before use to ensure its' structure was not altered.

6.1.3 Safe use of light-duty working platforms

(a) Prioritise to use appropriate working platforms irrespective of the working height (see item 6.1.2 for safety standards).

(b) For working-above-ground where working platforms could not be erected under special conditions (e.g. restrictive work space) and the work concerned is of simple nature, use of suitable light-duty working platforms such as step stools, hop-up platforms or step platforms should be considered.

(c) All light-duty working platforms must comply with applicable safety standards. Step stools must comply with EN14183 standard. Hop-up platforms or step platforms must comply with EN131-7 standard, both types of platform shall have a width of not less than 400mm and fitted with fencing and toe-board together with castors for the ease of carrying. All light-duty working platforms must have safe means of access and egress.

(d) Strictly observe the permissible height limit of light-duty working platforms. Step stools should be less than 500mm, hop-up platforms and step platforms should be limited to 2000mm.

(e) Attend the safety training arranged by the campus, fully understand the safe use of light-duty working platforms,

and become a trained person to use light-duty working platforms.

(f) Bear in mind that only one person is permitted to work on each light-duty working platform at one time.

(g) Before using the light-duty working platform, read the user manual carefully, then conduct a pre-work visual check according to the checklist, and finally display the completed checklist on the light-duty working platform so as to ensure that it is in good condition and free from defects.

(h) Before stepping on the light-duty working platform, fully extend and lock in position of stabilisers or outriggers of the platform in accordance with the manufacturer's manual to ensure the stability.

(i) Face to the light-duty working platform when ascending or descending the working platform. Do not apply excessive force to the working platform and induce lateral force rendering the overturning of the working platform.

(j) Strictly control the permissible height limit of light-duty working platforms (see item 6.1.3(d)). Other ladders (including: hanging ladders, straight ladders and folding ladders) are prohibited from being used as working platforms regardless of their height.

(k) Ladders can only be used as access under the following conditions, for examples, placed on a level and firm footing, placed at a ratio of the bottom edge 1: height 4, and the upper end is higher 1 metre above the landing

against which the ladder leans.

(l) Under no circumstances should a wooden or substandard ladder/ light-duty working platform be used as working-above-ground facilities.

6.1.4 Safe use of bamboo scaffolding

(a) The entire bamboo scaffold shall of a closely spaced bamboo scaffold design, ledger bamboo-to-bamboo spacing shall not more than 100mm wide so that a suitable working platform can erect at each working position on a scaffold layer.

(b) Provide safe access and egress from the scaffold for workers. Construct access and egress openings on scaffold layers, such openings must be positioned in an off-set pattern and protected by covering. Every covering provided for an opening shall be clearly and boldly marked as to show its purpose.

(c) Check the scaffolding thoroughly, do not use before it was ensured secure.

(d) If nylon strips or ties are found damage or loose, report to supervisor immediately for maintenance.

(e) If scaffolding members are found defective, report immediately for maintenance.

(f) Always stabilise the body. Do not overstretch out of the scaffolding.

(g) Do not overload the scaffolding.

(h) Do not remove the wall-tie, anchor or any scaffolding members.

(i) Move on the scaffolding in a safe manner, always maintain 3 point contact (maintain 3 contact point and 1 moving point at all time), while gripping the standards of the scaffolding tightly.

(j) If there is a risk of falling, equip with full body safety harness together with fall arresting device attached to a secure anchorage point or independent lifeline.

(k) Check the fall protection equipment before use. Refuse to use defective equipment and report the case for rectification.

(l) Clean up and properly store all fall protection equipment after use.

(m) Ensure the scaffolding has been inspected by a competent person before use for the first time, after alteration, after any exposure to weather conditions likely to have affected its stability, and at regular intervals not exceeding 14 days immediately preceding each use of the scaffolding. The inspection report shall subsequently displace in a conspicuous place. Use only scaffolding with inspection report displayed.

(n) Never climbing along the standards/ledgers of the scaffolding.

(o) In case of metal scaffolding, adopt the same safety measures as above with additional consideration for the provision of earthing connection to the metal scaffolding.

6.1.5 Safe use of mobile metal working platform

(a) Mobile metal working platform is metal scaffolding.

Members forming the platform shall be of sound material, adequate strength and free from patent defects.

(b) Mobile metal working platform shall be erected by trained workers in accordance with the manufacturer's instructions. The platform shall be erected on a flat, stable ground and be inspected by a competent person after erection (see item 6.1.5(b) for requirements).

(c) Mobile metal working platform shall consist only one tier of working platform, and provide with safe means of access.

(d) Working platform on the metal scaffolding must meet the safety requirements (see section 6.1.2 for details).

(e) Never attempt to increase the working height on the platform.

(f) Take measures to prevent object falling from the platform. Beware of overhead objects, and no person should remain on the platform during movement. Immediately lock the castors after moving the platform.

6.2 Prevention of falling object

Falling object and improper material stacking are common causes of accident in construction industry. Adequate measures shall be taken and safety equipment should be properly used to prevent the occurrence of such accident.

6.2.1 Stacking of materials

(a) Materials must be stacked properly. The stack height is depends on the material nature and height ratio, to avoid collapse or blow by strong wind. Do not obstruct the

access to avoid accident during material transportation.

(b) Check to ensure that the stacking place is sufficient to support the load.

(c) Do not stack materials, tools or machineries on scaffolding or close to the floor/excavation trench's edge or opening to avoid material fall from height or collapse of trench due to overloading.

6.2.2 Preventive measures

(a) External wall and builder's lift should fully enclosed with mesh, catch fan for protection. Such measures should also be used for frequently used access.

(b) Remove the debris that accumulated on the nylon mesh, catch fan frequently.

(c) Working platform shall be provided with toe-board of minimum 200 mm height to avoid material or tools falling from the platform.

(d) Materials or machineries shall be transported with proper method, such as by means of lifting equipment. Never drop materials freely from the height.

(e) Loads must be securely slung in the lifting activity, never put too much material in the lifting buckets to avoid fall of material during lifting.

(f) Use proper waste chute or conveyor to remove the debris from the height. Enclose the dumping area with warning notice displayed, if necessary, a lookout man should be deployed to avoid unauthorized entry.

(g) All personnel must strictly comply with the requirement

to wear safety helmet.

(h) Hand tools shall be attached with hand strap to minimise the risk of falling from hands when working at height.

(i) Segregate the working at height area with appropriate warning notices displayed, if necessary, a lookout man should be deployed to avoid unauthorized entry.

6.3 Electricity

Improper use of electricity can cause great loss in production time, property damage, and even casualties.

6.3.1 Power switch

(a) Understand the location of power switch and the emergency stop switch before using electricity.

(b) Equip the power supply with easily reachable power switch.

(c) Do not touch the switches with wet hands.

(d) Power off and lock the supply after the completion of work.

6.3.2 Cables

(a) Maintain good cable management and ensure it was properly installed and Do not attempt to extend the cable or overload the socket. If necessary, cable conduit or trench can be used for protection.

(b) Cable with mechanical protection and insulation should be used for installation of temporary power supply.

(c) Connect the portable electric tools with double insulated

cords.

(d) Keep power cables off the floor, or they may get damage or trip somebody.

(e) Replace the cables immediately if damaged.

(f) Do not put cables on wet floor or in the water.

(g) Switch off the power before cable connecting work.

(h) Make sure that all cables are of appropriate capacity suitable for the demand.

(i) Treat cable as live line if in doubt, do not attempt to cut or remove the cable. For such cases, report to supervisor and arrange by a Registered Electrical Worker (REW) to handle.

6.3.3 Plugs and sockets

(a) Connect electric tools with appropriate plugs and sockets. Use 3 legged plug for single phase circuit, 4 legged electric plug for 3 phase 3 wire circuit and use 5 legged plug for 3 phase 4 wire circuit.

(b) Use plugs and sockets with British Standard 4343 or other equivalent standard.

(c) Use connectors with British Standard 4343 or other equivalent standard.

(d) Do not use multiple electric tools on one socket to avoid overload.

(e) Connect the cable to the terminal correctly and firmly. (e.g. L=Live, N=Neutral, E=Earthing)

(f) All electrical works must be undertaken by a REW.

6.3.4 Electric tools

(a) Electric tools must be stored properly and maintained regularly. Check the tools before use, arrange to repair if something wrong.

(b) Cease to use the faulty tools and switch off the power supply and report for repair.

(c) Plugs must be free from defects, connect the cable to the terminal correctly and firmly.

(d) Electric tools must be earthed properly (except double insulated tools).

(e) Be familiar with the usage of tools, especially the switching method.

(f) Keep the tools dry. Never let them damp or wet.

(g) Always wear appropriate clothing and footwear, do not operate with bare foot. Use insulation safety shoes for electrical works. If working in wet environments, appropriate measure should be conducted such as:

(i) Use dry plywood to elevate the standing area

(ii) Wear insulation safety boots

(iii) Lay insulation mat on working area.

6.3.5 Lighting Equipment

(a) Lighting equipment should be installed on a stand stably.

(b) Metal casing of lighting equipment must be properly earthed.

(c) Do not touch the lighting equipment with wet hands.

(d) Lighting equipment of 110V with the appropriate plug and socket are recommended. An appropriate transformer should be used.

(e) Portable lighting equipment should be fitted with protective casing and insulated handle. Unplug the equipment before undertaking maintenance or replacing light bulbs.

(f) Do not place any flammable material or combustible material such as paper near the lighting equipment. Aware of the high temperature of lighting equipment to prevent fire.

6.3.6 Other safe practices

(a) The reliability of temporary electrical installation and equipment (especially on work site) should be properly checked by a competent electrician regularly.

(b) Should properly set up electricity main switches for individual workshops. Electric circuit should be protected by adequate circuit breaker. The installation should be properly inspected and regularly maintained by REW

(c) Both electrical installation and equipment should be properly inspected and regularly maintained by a REW

(d) Report any irregularities of electrical appliances to the responsible person to arrange REW to repair. Do not attempt to repair faulty electrical appliances except for authorized competent person.

(e) Proper safety measures must be taken in case of working with conductor, apparatus, switch board or on live electricity network. For example, isolate the working electricity network, lock the switch and display warning notice. Keep the key by the person who engages in such electrical work.

(f) A notice in red characters and letters each not less than 50 mm high on a white background reading "危險－在修理中 DANGER UNDER REPAIR" shall be placed and displayed in a visible position at, on or near any conductor apparatus or switchboard being worked.

(g) Label the power switches clearly. Do not block the access to the switches.

(h) Label the earthing connections with both Chinese and English : "SAFETY ELECTRICAL CONNECTION-DO NOT REMOVE"及"安全接地終端-切勿移去" to prevent them from interference or damage.

6.4 Lifting

Lifting activity is a common operation on construction sites for handling heavy material. Lifting equipment should therefore be properly maintained. Use of defective lifting equipment or undertake the lifting activity incorrectly can cause serious accident. Cease to use defective equipment and report for repair. The safety legislation clearly specifies the requirements for the inspection, examination, and testing of lifting equipment. Furthermore, barricading a fatal zone in the lifting operations can prevent unauthorised persons from entering the fatal zone.

6.4.1 Use of slings

(a) Slings should be of good construction, sound material, adequate strength, and free from patent defect such as rust, deform and twist.

(b) Lubricate wire rope slings to maintain durability and for smooth lifting operation.

(c) Each sling should be clearly marked with safe working load and means of identification.Wire rope sling should not be used if in any lengths of 10 diameters, the total number of visible broken wires exceeds 5% of the total number of wires in the rope.

(d) No sling should be used for any load exceeding its safe

working load.

(e) Wear leather gloves when handling wire rope.

(f) Do not use deformed slings. Never use kinked slings.

(g) The lifted object must be slung correctly and lower loads onto adequate battens to prevent damage to the slings. When detaching sling, do not use excessive force.

(h) Slings should be protected by suitable packing from sharp edges or corners of the load.

(i) Store and maintain the slings properly, inspect regularly to check for rust and should apply lubricant to the slings regularly to achieve better maintenance.

(j) Examine all slings before use. Each sling in use should be thoroughly examined by a competent examiner in the preceding 6 months or before it is first used and a certificate in the approved form in which the competent examiner has made a statement that it is in safe working order has been obtained.

(k) The upper ends of the sling legs of a double or multiple slings should be connected by means of a shackle, ring, or link of adequate strength.

(l) Adopt colour coding system for slings to easy identification of its working condition. Common colour coding system is using blue, yellow, green and orange to represent January to March, April to June, July to September and October to December respectively. For damaged slings and slings pending for examination will use red and white respectively for idenfication.

6.4.2 Use of pulley block

(a) Do not use the tip of the hook for lifting. The lifting hook should be fitted with safety latch.

(b) Report any metal chain with cracked or cut links. Do not connect cut links by any means.

(c) Do not use pulley block with corroded or deformed metal chain.

(d) Examine carefully for dents and corrosion pits.

(e) Make sure that the chain is not kinked or twisted.

(f) Do not drop the lifting appliance on hard surfaces.

(g) Assess the weight of load before lifting to prevent from overloading. Never exceed the safe working load as marked on the pulley block.

(h) Properly attach the pulley block to a secure anchorage point of adequate strength.

(i) Immediately after use, return the pulley block to store for proper storage and maintenance.

(j) Examine all pulley blocks before use. Each pulley block in use should be thoroughly examined by a competent examiner in the preceding 12 months before it is used and a certificate in the approved form in which the competent examiner has made a statement that it is in safe working order has been obtained.

6.4.3 Use of shackles

(a) Examine all shackles before use. Each shackle in use should be thoroughly examined by a competent examiner in the preceding 6 months before it is used and a certificate in the approved form in which the competent examiner has made a statement that it is in safe working order has been obtained.

(b) Each shackle must be marked with its safe working load.

(c) Do not use shackle with corroded or deformed part.

(d) Make sure that shackle is fitted with a right pin. Do not make any alteration or other material for replacement.

(e) Assess the weight of load before lifting to prevent from overloading. Never exceed the safe working load as marked on the shackle.

(f) Adopt colour coding system for shackles for easy identification of the working condition. Please refer to item 6.4.1(l).

6.4.4 Other safe practices

(a) Appoint competent signalers to provide clear signals in the lifting activity. The signaler should guide the lifting cautiously and with proper attitude.

(b) Loads must be properly slung and attached to the lowest point of the lifting hook. Lifting hook must be fitted with safety latch.

(c) Load must be vertically lifted and not slewed over personnel.

(d) Check for possible hazard and obstruction before commencing lifting operation.

(e) Implement the 3 steps of trial lifting. Before lifting, all personnel keep a distance from the lifting load for 3 meters, then lift the load about 300 mm above the ground, suspend for 3 seconds, check the stability of load that is being lifted, make sure the load is balance and secure before raising the load. Make it right if doubtful.

(f) Never touch the slings, wire rope or moving parts of lifting plant.

(g) Safety barriers should be placed to protect persons from entering the lifting area. No personnel can stay under the lifted load.

(h) No personnel should sit, ride or stand on the load.

(i) The upper ends of the sling legs of a double or multiple slings should be connected by means of a shackle, ring, or link of adequate strength.

(j) In case of multiple slings, understand the safe working load at different angles of the legs. Use appropriate lifting gears to facilitate the lifting activity. Normally, the included angle between sling legs should not exceed 90 degrees, otherwise will greatly affect lifting capacity of slings, for example the lifting capacity will be reduced half when the included angle reaches 120 degree.

(k) All plant operators, slingers, and signalers could be communicated with each other. Ensure that the communication is free from interference.

6.4.5 Use of cranes

(a) Cranes must be equipped with automatic safe load indicator and install reverse camera if applicable. Examine all cranes before use. Each crane in use should be thoroughly examined by a competent examiner in the preceding 12 months and inspected by a competent person weekly before it is used, and a certificate in the approved form in which the competent examiner/person has made a statement that it is in safe working order has been obtained.

(b) Only trained and certified operators can operate crane. No one should operate crane unless authorized. All crane operators, slingers, and signalers should be well trained and familiar with the lifting operations.

(c) All cranes must be clearly marked with the safe working load in accordance with the test certificate. Do not operate the crane if warning signals of the automatic safe load indicator are recognized.

(d) Work only on the signals of the authorized slinger or signaler. Do not undertake the operation in the absence of slinger or signaler if the lifting activity is not visible.

(e) Check the lifting wire, wire drum before operation.

(f) Loads must not be slewed over personnel. No one should stay under the lifted load.

(g) Do not drag the load and avoid sudden movement.

(h) Carry out daily check before starting the crane. For example, crane structure, wire rope, braking system, limiting switch, ensure they are in safe working condition.

(i) In each lift, lifting signal should only be signaled by one signalman, using recognized signal.

(j) Terminate the lifting operation under adverse weather conditions likely to endanger the stability of crane. Always comply with crane maker's instructions.

(k) Additional notes on the use of hydraulic cranes or crawler cranes:

  (i) Check the outriggers or crawler chain of crane to ensure the stability of cranes.

  (ii) Use crane under its lifting capacity in accordance with operation radius, jib length and lifting angle.

  (iii) Use tag line to help guide a load when working with a crane, ensure the lifting path is not obstructed.

  (iv) Maintain an unobstructed passageway of 600mm wide or more between the slewing or other moving parts of cranes and the fixtures.

  (v) If overhead power lines are near, ensure that current has been switched off, or, if it is not, adequate barriers are provided to guard against contacts.

(vi) Do not use crane on slope.

(vii) No crane parking on loose surface to avoid overturning.

(viii) Never use crane with outriggers not fully extended.

6.4.6 Safe use of material hoist

(a) Examine hoist before use. Each hoist in use should be thoroughly examined by a competent examiner in the preceding 6 months and inspected by a competent person weekly before it is used, and a certificate in the approved form in which the competent examiner/person has made a statement that it is in safe working order has been obtained.

(b) Always check lifting rope, brakes and safety devices.

(c) Report defect to the supervisor. Fence off the defective hoist with warning notice displayed.

(d) Use the hoist in accordance with the safe working load. Prohibit to carry passenger.

(e) Protect the hoistway. Keep all hoist gates closed.

(f) Electrical signaling switch to be installed in place to prevent accidentally pressing the switch.

(g) Hoist cannot be installed more than one electrical signaling switch

(h) Except erection and dismantling, never climb in the hoistway or approach to the unfenced hoistway.

(i) Do not remove the hoistway guardrails. Keep all hoist gates closed.

(j) Properly stack materials on the hoist platform.

(k) Operate the hoist with clear signaling system.

(l) Never operate the hoist without applying the braking system.

(m) Safe working procedure should be checked accordingly to ensure the safety in erection, height alteration, and dismantling of hoist.

(n) Wear full body safety harness in erection, height alteration, or dismantling of hoist.

6.5 Loadshifting machinery

Construction plants manufacturers have taken into account the safety design of loadshifting machinery. However, many accidents were caused by lack of proper maintenance and repair to machinery or poor operation manner of plant operator. Therefore, in order to ensure the safe operation of loadshifting machinery, it is necessary to carry out risk assessment, provide proper and regular maintenance, checking and repair work. Furthermore, barricading a fatal zone in the loadshifting machinery operation area can prevent unauthorised persons from entering the fatal zone. If applicable, the machinery should also equipped with reverse camera. Routine daily checking or some simple maintenance works can be conducted by operator, for regular maintenance work and repair work must be conducted by competent plant mechanic.

6.5.1 Pre-use check of bull-dozer and excavator

(a) Check the brake system.

(b) Check tension of the crawler chain.

(c) Check the whole machine to ensure it is free from defect.

(d) Check and ensure that engine oil is in normal level.

(e) Check the following according to the manufacturer's instructions:

  (i) Check the coolant is in normal level.

  (ii) Check the transmission oil is in normal level.

  (iii) Check the steering oil is in normal level.

  (iv) Check the fuel is in normal level.

  (v) Check the hydraulic oil is in normal level.

(f) Check the ground condition to verify ground conditions are suitable for the operation.

(g) Adjustment seat to a proper position.

(h) Check and make sure that all fuel tank cap, radiator cap, have been tightened.

(i) Clean up the machine body, ensure free from grease or oil.

(j) After starting up the machine engine, check all functions and attachments, ensure it's in safe working order before commencing work.

(k) Repair all defective items before operation.

6.5.2 During operation

(a) Unfamiliar with the machinery can be one of the cause of accident. Operator should have received adequate training and testing in safe operation of the machine. If the machinery is a specified loadshifting machinery under the legislation, the operator driver must be at least 18 years old, completed approved training course and hold a valid certificate. Instructor should illustrate the operation details and the possible risks.

(b) When moving the machinery, ensure that the width of the road is sufficient for the machinery to go through.

(c) Suitably fence off the operation area.

(d) Ensure no overhead cables or other objects is obstructing the driveway.

(e) Ensure the ground condition is able to support the weight of the machine.

(f) Ensure the bridge structure is able to support the weight of the machine.

(g) Only operate the machine in the driving cabin, do not attempt to operate the machine in other position such as standing on the crawler chain.

(h) No getting on/off the machine during operation. Upon completion, turn off the engine and park the machine in a safe place.

(i) Always check the surroundings to make sure that no one is endangered by the operation or no obstructions are presented.

(j) Ensure the stability of soil when operating the machine on slope.

(k) Stop operating if the machinery is found not working normally or that it has any operating problem.

(l) Operate controls of the machinery steadily and avoid sudden or abrupt operation. Operator should be aware on the road condition and keep constant speed if possible.

(m) Never carry passengers or operate the machinery without permission.

(n) Ensure no obstacles or person along the moving path when moving forward, backward or rotating. All personnel must keep a safe distance from the machinery. The machinery must install with reversing warning system.

(o) Operate the machinery in a slow speed. Give way to loaded vehicles. Keep a safe distance from other site vehicles. No parts of the machinery should obstruct the sight of operator.

(p) Keep the loaded bucket as close as possible to the ground when moving the machinery so as to maintain stability.

(q) Excavators are lifting appliances. Conduct examination, testing, inspection, and marking safe working load to excavators according to the legislation. All loadshifting machinery must not be overloaded.

(r) When one end of the wire rope is attached to the machine and the other end fastened to a heavy object,

drive slowly. Avoid sudden movement to avoid twisting and entanglement of wire rope.

(s) Always wear safety helmet. Engage the operator restraint system of the machinery, if provided.

6.5.3 Operation on the slopes, note the following points:

(a) Move the machinery straight up and down the slope. Avoid moving parallel to the slope.

(b) Position the machinery straight up/down the slope. Avoid positioning parallel to the slope.

(c) Use the right gear on steep slope.

(d) Never shift to neutral gear and allow the machinery to slide down the slope uncontrolled. Select the low gear when moving downhill, and do not shift gear if not necessary. Apply the brake instead of the steering system to stop the machinery.

(e) Working on the slopes may be affected by a number of factors, such as soil condition, the weight of the load, and the type of machinery used.

(f) Operator should be extremely alert to operate on a steep slope, as it may slide downward more easily when triggered by vibration or slight jumping of machine.

6.5.4 Safety measures and checking after operation:

(a) Park the machinery at a safe place.

(b) Lower the attachment of the machinery onto the ground. Ensure the attachment is secured when raised to a high position for maintenance work.

(c) Shift to neutral gear.

(d) Apply all locking systems.

(e) Switch off engine.

(f) Clean up dirt between the crawler chain and roller.

(g) Check for oil leakage and loose parts. Report for repair if abnormal conditions are found.

(h) Switch off the engine before fueling up the machinery. Smoking and naked lights are strictly prohibited in fueling process.

(i) Carry out the repair or maintenance works by a competent person only.

6.6 Gondola

Gondolas are widely adopted in recent years, it is commonly used in commercial buildings and construction sites, mainly serve as man-carrying vehicle in window cleaning and external wall repair works in multi-storey building. Lots of serious accidents in gondola happened in the industry, mostly involve failure of gondola's engine or problems with suspension wire rope, other causes involve overloading, insecure anchorage point, defected guardrail, insufficient personal protective equipment and human error during operation etc. Therefore, it is vital to carry out risk assessment, periodic examination and test, maintenance programme, and training programme to ensure the safe use of gondola.

6.6.1 Gondolas and its anchor shall be of good construction, sound material, adequate strength, and free from patent defect. Gondolas shall be securely attached to the anchor.

6.6.2 Gondola shall be properly installed and maintained, Proper arrangements shall be engaged to prevent the gondola from tipping, tilting or swinging. Gondola shall be properly anchored in order to ensure the stability. In addition, gondola must keep a certain distance from the building wall to prevent the occurrence of bumping.

6.6.3 Every lever, handle, switch or other devices used for controlling the gondola shall be provided with a suitable spring or other locking arrangement to prevent accidental movement or displacement. Ensure to clearly indicate the purpose and mode of operation of those devices.

6.6.4 The erection, dismantling, or alteration of gondola must be carry out under the direct supervision of a competent person.

6.6.5 Every person working on a gondola must wear a full body safety harness that is attached to an independent lifeline or an anchorage with fittings. A notice in the prescribed form must be displayed prominently on a gondola to remind those to wear full body safety harness.

6.6.6 No gondola should be used under weather conditions likely to endanger its stability or cause danger to the persons carried on it. Every gondola must be load tested and thoroughly examined by a competent examiner after exposure to weather conditions likely to have affected its stability

6.6.7 Every person working on a gondola must be at least 18 years old, and has undergone recognized training and obtained a certificate in respect of such training.

6.6.8 Every gondola must be at least 440mm wide, either closely boarded, planked or plated. The gondola must also be provided on all sides with toe boards placed at a height not less than 200mm above its floor level, and with guard-rails with adequate strength and height. The guard-rails must be so positioned that the top one is at a height between 900mm to 1150mm above the floor level and the lowest one is not more than 700mm above the top of the toe board.

6.6.9 Before using the gondola, barricading a fatal zone in the gondola operation area can prevent unauthorised

persons from entering the fatal zone. The suspension ropes and safety ropes of gondola should be inspected and found in safe working condition by a competent person prior to the commencement of daily work. A notice in the prescribed form must be displayed prominently on a gondola to remind to carry out such inspection

6.6.10 Examine gondola before use. Each gondola in use should be periodically examined by a competent examiner and a certificate in the approved form in which the competent examiner has made a statement that it is in safe working order has been obtained. Display the certificate on the gondola for information as well.

6.6.11 Mark the safe working load on the gondola. No overloading.

6.6.12 Gondola must be inspected by a competent person weekly and a certificate in the approved form in which the competent person has made a statement that it is in safe working order has been obtained. Display the certificate on the gondola for information as well.

6.6.13 Observe electrical safety. Establish effective communication system for working on gondola.

6.6.14 Respond to emergency situations promptly in accordance with the emergency procedures.

6.6.15 Report the defects for rectification.

6.6.16 Gondola should not be used under weather conditions likely to endanger its stability or cause danger to the persons carried thereon. Gondola should also not be

used where there is thunder and storm in the vicinity, during rainy periods or when a strong wind signal is hoisted.

6.7 Manual handling

This operation takes place every time a load is moved or supported manually. Common types of injury include hernia, torn back muscles, slipped disc, cut and bruises to the legs and feet, and crush injuries to the toes, etc. To prevent injury, it is necessary to change the unsafe practices by handling the load in a right way.

6.7.1 Risk assessment before operation

(a) Make a preliminary risk assessment to find out the possible risks before the operation.

(b) Make a further assessment if the hazardous operations cannot be avoided.

(c) Arrange for preventive and protective measures to reduce and control the risks.

(d) Keep a record of the assessment, and appoint sufficient competent person to assist in carrying out the preventive and protective measures.

6.7.2 General safe practices

(a) Handle the load from the top of the stacked load.

(b) Arrange team lifting, use lifting aid to handle heavy load. Appoint a supervisor to supervise the handling process.

(c) Check the load for cracks, sharp projections, sharp edges, burrs, rough or slippery surfaces.

(d) Prevent the load pressing on your hands and feet.

(e) Clean the load surfaces before handling to remove grease, water or other slippery substances.

(f) Clean the hands before handling to remove grease, water or other slippery substances.

(g) Where possible, gloves should be worn to protect against cuts, scratches or punctures.

(h) Pay particular attention when carrying the load approaching to a machine being operated.

(i) Wear safety shoes to protect the feet from falling loads.

(j) Appoint a supervisor to supervise the handling process in team lifting, simple command should only be given by the supervise to avoid confusion.

(k) Assess the work environment, clear obstacles, and make sufficient space before the handling process.

(l) Make sure the load should not obstruct the sight of operator.

6.7.3 Hints on manual handling

(a) Lift an object with a correct posture: spread your feet, distance between feet should be same as your shoulder length. Balance the body well.

(b) Avoid bending the back, keep back straight, knees bent can reduce the risk of back sprain and damage to the intervertebral discs.

(c) When lifting, keep the object as close to your body as possible and keep your arm straight, it can reduce the effort of your arm.

(d) Grasp the object firmly so that your grip will not slip.

(e) Keep chin near to the chest, maintain a good sight, keep back straight and lift the object with the legs, slowly

straightening them.

(f) Always lift smoothly and avoid jerky motions. Turn with the legs and never twist your back.

6.8 Power tools and machinery

Improper use or maintenance of power tools or machinery can cause serious accidents and result in permanent disability. Therefore, it is important to adopt sufficient safety measures to prevent the occurrence of such accident.

6.8.1 Safe Use of machinery (inclusive of woodworking machinery)

(a) Operator must be properly trained and familiar with the operation. Unauthorized operation is strictly prohibited.

(b) Choose the appropriate machine to operate, never use the machine beyond its intended purpose.

(c) Ensure that switches are indicated with their functions. Machine must have fitted with emergency stop switch.

(d) Connect the power supply firmly and earthed the machine correctly to prevent electrical hazards.

(e) Machine must be fitted with contactor.

(f) Properly guard all the dangerous parts of the machine, such as cutter head, transmission belt, gear, flywheel or other moving part.

(g) Make sure that cutting elements of the machine are free from defects and securely installed before working.

(h) Check all parts and guarding of the machine before operation. Make sure it was sufficiently lubricated.

(i) Remove all obstacles (such as material debris) in cutter head or any moving part before operation.

(j) Isolate the machine and switch off the power supply and lock up the switch before conduct repairing work.

(k) In case any guarding was damaged, loosen or missing, report to the supervisor immediately and suspend the machine until properly repaired.

(l) Do not interfere with the guarding.

(m) Check the machine according to the manufacturer manual and test or run the machine correspondingly to make clear that the machine is normal for operation.

(n) Wear adequate personal protective equipment but never wear cotton gloves, tie, neckerchief, rings or necklace and tie up long hair when operating machine with exposed revolving parts to avoid those things being caught by rapidly moving parts.

(o) Keep the hands with distance from the dangerous part of the machine by using push-stick or other aids.

(p) Cutting tools should be kept sharp. Blunt tool tends to apply force to push the work piece that may cause accidents.

(q) Wear appropriate eye protection equipment if flying particles or debris, harmful sparks present in the operation.

(r) Switch off the machine before removing debris or setting the machine guarding.

(s) Maintain sufficient space for the operation.

(t) Use a brush or other tools to remove chips/debris, avoid

using hands.

(u) Remove all debris after operation.

(v) Adequate lighting must be provided to the operating area.

(w) Keep floor condition clean.

6.8.2 Power drill

(a) Check all switches before operation.

(b) Install the drill bit securely.

(c) Apply gentle force when start to drill to prevent movement of the drill and cause injury.

(d) Select the right drill bit according to the work, drill in a right manner to prevent bit binding.

(e) Do not force to drill. Frequently raise the drill bit to remove cuttings.

(f) Use a clamp to secure the work piece.

(g) Never wear cotton gloves, tie and neckerchief when operating drilling machine to avoid those things being caught by rapidly moving parts.

(h) Wear suitable eye protection equipment.

(i) Keep the hands with distance from the revolving part of the drill.

(j) Fit appropriate guarding to drill press, the guarding should be able to cover the drill bit.

(k) Maintain the machine working platform and surrounding is free from debris.

(l) Shut down the drill before removing material debris.

6.8.3 Abrasive wheel

(a) Selection the right wheel for the job.

(b) Operator should be trained, instructed, and familiar with the operation of abrasive wheel.

(c) Abrasive wheel should be mounted by a trained and experienced competent person.

(d) Do not use defective wheel such as wheel with irregular surface and crack.

(e) Allow abrasive machine to test run for a few minutes after mounting new wheel to ensure the newly mounted wheel is under normal condition before operation. Keep distance from the trial run to avoid possible breakage of wheel.

(f) Do not exceed the maximum permissible speed.

(g) Abrasive wheel should be equipped with effective guarding.

(h) Guard the abrasive wheel with minimum work point exposed.

(i) Properly adjusted the protective screen. Maintain a clear vision to the protective screen.

(j) Work-rest for supporting a work piece shall be properly adjusted so as to be as close as possible (not exceeding 3mm) to the exposed part of abrasive wheel.

(k) Conduct a trial run before operation.

(l) Wear suitable eye protection equipment.

(m) Apply gentle force. Never apply excessive force on abrasive wheel.

(n) Never grinding on the sides of straight-sided wheels or bursting of wheels may occurred.

(o) No cotton waste should be placed near the moving wheels.

(p) Lubricate the spindles regularly.

(q) Maintain good housekeeping and non-slippery floor. Adequate lighting must be provided to the operating area.

(r) Display the approved warning notice, list of competent person for mounting abrasive wheel, the maximum permissible speed of abrasive wheel and the maximum working speed of spindle on a conspicuous space.

6.8.4 Portable circular saw

(a) In case of portable circular saw used as bench circular saw, it must be provided with crown guard, riving knife, full guarding under bench plates, and push stick. Such protective measures should not be removed during operation.

(b) Electric circular saws must be earthed properly (except double insulated saws).

(c) Before cutting small work pieces, the work piece must be securely fixed.

(d) Before starting, adjust the blade properly. Never adjust the blade when the machine is in motion.

(e) Always check the saw blade for defects and bluntness, suspend the equipment if any defect was found.

(f) Remove the nails or similar metal objects on the timber before sawing.

(g) Wear appropriate eye protection equipment if flying particles or debris, present in the operation.

6.8.5 Handheld planer

(a) Electric handheld planers must be earthed properly (except double insulated planers).
(b) Follow the instructions provided by the manufacturer when using planer.
(c) Keep distance from the blade when using.
(d) The work piece must be securely fixed on the table.
(e) Push the work piece gently. Do not apply excessive force.
(f) When planing, keep power cord away from planer.
(g) Switch off the machine immediately after planing.
(h) Wear appropriate eye protection equipment if flying particles or debris, present in the operation.

6.8.6 Cartridge-operated fixing tools

(a) Person under eighteen years of age is not allowed to use such tools.
(b) Use only tools approved by the Labour Department.
(c) Users must hold a certificate of competency approved the Commissioner for Labour. Operator can only operate model that specified on the license.
(d) Use cartridges, pins and ancillary equipment specified by the manufacturer.
(e) A tool box, of strong construction and fitted with locking device, should be provided for the storage of cartridge-

operated fixing tool, its cartridges, pins and ancillary equipment. Bring the locked tool box to place of work.

(f) Only load the cartridge-operated fixing tool when it is used. Loaded tool should not be unattended or stored in the tool box.

(g) Keep the manufacturer's instruction manual, both in Chinese and English, in the tool box. The manual should contain descriptions in using, maintenance and selection of cartridge-operated fixing tool and its ancillary equipment.

(h) When using the tool, notify the supervisor, and inform the person in the vicinity of operation.

(i) Provide sufficient lighting. Stand firmly during operation to avoid loose balance due to the recoil.

(j) Do not use the tool in an environment containing flammable or explosive gases.

(k) Wear safety helmet, impact-proof goggles and ear protectors.

(l) Suspend the tools and report to supervisors immediately if defect was found.

6.9 Hand tools

Improper use of hand tools or lack of maintenance of hand tools can cause accidents.

6.9.1 Maintenance of hand tools

(a) Examine the conditions of hand tools if they are well-constructed and free from defects. In case of worn out or damaged parts are found, suspend the tools and

report for repair without delay.

(b) Care should be paid to the cleanliness of tools. Check regularly.

(c) Hand tools should be systemically kept or stored at tool-rack or toolbox after use.

(d) In case of the worn out or damaged parts of hand tool cannot be repaired, the whole tool should be discarded immediately.

6.9.2 General safe practices

(a) Always use the correct tool for the job.

(b) Carefully place the hand tools, avoid placing tools on running machinery, working platform, scaffold, overhead duct, top of the staircase etc. Precautions should be taken to prevent tools falling from height or slipping out from hands while working at height.

(c) Pass hand tools properly. No throwing of tools.

(d) Blade of the sharp tools should be facing inward when being placed in the toolbox.

6.9.3 Hammer

(a) Hammer handle must be installed securely.

(b) Do not use the hammer handle other than holding for hammering, or use the hammer handle as a lever so as to avoid damage to the hammer handle.

(c) If the hammer handle cracked, never tied with a rope or wire, should be replaced with a new hammer handle.

(d) When hammering, hammer face should be parallel to the

work piece.

(e) Select the right tool for the job. Do not use a sledgehammer for nailing.

(f) Hold the hammer grip in hammering. Mind the positions of thumb and fingers.

(g) Avoid hammer face stained with grease.

6.9.4 Wrench and Spanner

(a) Use the appropriate tool for the job. Do not use the tool as a lever by extending the length of handle.

(b) Do not use the tool beyond its intended purpose.

(c) Avoid jaws and sockets stained with grease.

(d) Keep tools away from heat, otherwise may cause metal embrittlement.

(e) Apply pulling force when use a wrench.

6.9.5 Chisel

(a) Wear appropriate eye protection equipment if flying particles or debris, present in the operation.

(b) Keep a distance of 30mm between the handle top and the fingers when holding the chisel.

(c) Hold the chisel steadily with finger muscles in a relaxation condition so that the hand will slide along the chisel in case of a wrong hitting in chiseling. Never grasp the chisel tightly.

(d) Focus the sight to the chisel cutting edge instead of the chisel head.

(e) Report for repairing the tool with mushroomed chisel

head.

(f) Stand behind the cutting edge of chisel.

(g) Keep a safe distance to the chisel head when chiseling.

(h) Do not use a chisel for prying, or it may cause damage to the chisel.

(i) Do not place the chisel near the bench edge, so as to avoid it from falling and causing accident.

6.9.6 Screwdriver

(a) Do not use pliers to turn the screwdriver.

(b) When using a screwdriver, never hold the work piece in your hand, otherwise the tip can cut the hand or wrist in case of the screwdriver displacing from the drive of the screw.

(c) Do not use screwdriver with cracked handle, bended shank or blunt tip.

(d) Select the right tool for the job.

6.9.7 File

(a) File should be fitted with handle. Do not use file without handle.

(b) Always use a brush to remove the filing particles and clean the file.

(c) Avoid files stained with grease.

(d) When filing, use a clamp to clamp the work piece securely.

(e) Do not use a file for prying or hammering.

6.9.8 Axe

(a) Keep an axe sharp to ensure efficiency and safety.

(b) Ensure axe handle is securely fixed to axe head.

(c) Safely stored the axe with an edge case. Axe edge faced downward if without an edge case.

(d) Axe edge faced outward when using, never faced toward the body.

6.9.9 Nippers

(a) Do not use nippers as pliers.

(b) Use nippers to cut soft metal rather than hard metal. Do not use nippers as nail removing tools.

6.9.10 Shovel and hoe

(a) Ensure the handle is securely fixed to shovel/hoe head.

(b) Keep the cutting edge sharp. Blade without defects and deformations.

(c) Keep a safe distance with the workers in the vicinity of shoveling/hoeing.

6.9.11 Saw

(a) Do not apply excessive force which may bend the saw blade.

(b) Store the saw properly. Do not place it on the ground, and also do not put it on a high position to avoid it falling from the height.

6.9.12 Jack

(a) Regularly check and maintain the jack.

(b) Select the right jack according to the weight of the load.

(c) Use the jack on a flat surface.

(d) Put the center of the load on the center of the jack.

6.9.13 Wheelbarrow

(a) Use wheelbarrow for the movement of materials as far as possible.

(b) Wheelbarrow should be of good construction.

(c) Wheels should be strong, free from defects, and be lubricated.

(d) Pay particular attention when using wheelbarrow on a ramp.

(e) To avoid difficulty in controlling, never overload the wheelbarrow.

(f) Move the wheelbarrow slowly, particularly when making turns.

(g) Store the wheelbarrow safely after use, avoid falling from height.

6.10 Gas welding and flame cutting

Both gas welding / flame cutting and electric arc welding are common operations in the construction industry. Failure to comply with the safety rules can cause serious accidents, such as fire, explosion, electric shock, and eyes injury.

6.10.1 Gas welding and flame cutting

(a) Gas welders should attain at least 18 years of age and hold a recognized and valid certificate prior to work (except for undertaking training). Strictly follow the manufacturer's safety instructions, and use the right equipment and accessories.

(b) Check all equipment and accessories before starting of work, such as the cylinder casing, blowpipe, pressure

regulators, accessory equipment, and gas hose.

(c) To prevent gas leakage, remove the dust from the connection points before installing the pressure regulator on the gas cylinders.

(d) Do not operate without installing pressure regulators. Use the right pressure regulator for the corresponding gas.

(e) Open the valves using cylinder key, do not use wrench or other tools. Gently and slowing release the valve when using, carefully close all valves after use.

(f) Do not use equipment and accessories stained with grease in order to prevent fires and explosions.

(g) Do not spray oxygen to remove dust. Light the fuel gas with a spark lighter, never use matches or other tools.

(h) Wear all necessary personal protective equipment, such as leather gloves, apron, eye protector with dark lenses, etc. Use screens to protect other personnel from being affected by the welding sparks, hot slag, and glare.

(i) Familiar with the colour of gas hose, red for acetylene, and blue for oxygen.

(j) Gas hoses for oxygen and acetylene should have same lengths. Do not roll up excessive gas hoses on gas cylinder or pressure regulator.

(k) Gas hoses must always check frequently for defects such as, cuts, crack, burn and worn. Avoid them from being damaged by sharp objects, heavy objects, and sparks.

(l) Do not perform gas welding where flammable

substances are presented. In case of unavoidable, beware of flying sparks or hot slag. Clear up the working area after work completion.

(m) Do not attempt to weld enclosed vessels or tanks until safety precautions have been taken, ensure all flammable or toxic gases were removed completely before performing hot work.

(n) Familiar with the fire extinguishing equipment before conducting hot work, preferable to place fire extinguishing equipment in close vicinity to the hot work location if possible.

(o) When conducting hot work on lead, aluminum or any metal that may give out toxic metal fumes, must provide sufficient ventilation and exhausting fan system, or appropriate respirator should be worn if ventilation is not available.

(p) Note that the contact of acetylene with some metals, e.g. alloy copper or silver, may generate explosive compounds.

(q) Use soap water to check for gas leakage. Contact the manufacturer to repair or replace defective equipment.

(r) All gas cylinders must be fitted with suitable and effective flashback arrestors to avoid explosion caused by flashback.

(s) Immediately close the outlet valves of the gas supplies in case of gas leakage.

(t) Follow the below procedures in case of gas cylinders overheating:

(i) Immediately close the outlet valves of the gas supplies and remove the pressure regulator.

(ii) Execute emergency evacuation.

(iii) Move the overheated gas cylinders to open space. Cool them down by submersing into or spraying with water. Open the gas cylinder valves to exhaust the gas until empty. Use appropriate screening for protection.

(iv) Close the gas cylinder valves after exhausting the gas cylinder.

(v) If the above measures are impracticable, call the Fire Services Department.

6.10.2 Storage of gas cylinders

(a) Do not expose gas cylinders to rain, sunlight. Store gas cylinders in a cool place, avoid storing in close vicinity with any heat source. All gas cylinders shall avoid contact with the power lines. Gas cylinders must not be placed on the wet mud in order to avoid corrosion.

(b) Handle gas cylinders with care. Do not throw them and avoid impact. Never use them for supporting or rolling purposes.

(c) Oxygen and acetylene cylinders shall not be stored in the same place, empty and full cylinders should also be stored separately. Label "empty" or "full" to distinguish the gas quantity of cylinders.

(d) Always secure gas cylinders in an upright position both in use or in storage.

(e) Always use a carrier/trolley for the conveyance of gas cylinders. Close the gas cylinder valves in the conveyance. Never directly sling the gas cylinders without using a carrier/trolley in the conveyance.

(f) Store gas cylinders in a place with good ventilation. The licensed dangerous goods store must be installed with explosion-proof electrical system.

(g) The licensed dangerous goods store must be fire resisted, and installed with automatic firefighting equipment.

(h) No naked fire in the place of storing gas cylinders. Welders' clothing should be free from oil and grease.

6.10.3 Electric arc welding

(a) Wear all necessary personal protective equipment, such as eye protector or face shield with dark lenses, etc.

(b) Use screens to protect neighbouring workers and pass-by from being affected by the welding sparks, hot slag, and glare.

(c) Wear leather gloves, apron or protective clothing.

(d) Properly maintain all welding equipment, conduct regular check and maintenance to ensure it was in good condition.

(e) Earth all welding equipment to prevent electric shock. Stand on an insulated mat or wear insulated safety boot where the ground is damp.

(f) Avoid to undertake electric arc welding near flammable materials. In case of unavoidable, beware of flying sparks or hot slag. Check the working area before leaving ensure work piece was properly cooled.

(g) Place fire extinguishing equipment in close vicinity to the hot work area.

(h) Ensure all flammable or toxic gases were removed completely before attempting to weld enclosed vessels or tanks.

(i) Follow the below procedures in welding in confined spaces:

(i) Perform gas testing, ensure no explosive, toxic or harmful gases present before entering confined space.

(ii) Provide adequate lighting and ventilation.

(iii) Use insulated electrode holder and wear insulated welding gloves.

(iv) A standby person shall be stationed outside the confined space to monitor the welding work and to shut down the power supply in case of emergency.

(v) Ensure rescue equipment is available at all times to enable immediate rescue of any unconscious worker.

(vi) Ensure approved respirator is available at all times for emergency use.

(j) Switch off the power after finishing the electric arc welding work.

6.11 Pre and Post-Holiday Work Safety

6.11.1 Ensure that there is no material that could catch fire in the welding room, and welding equipment is properly stored.

6.11.2 Turn off the power supply of electrical equipment and lock the cabin door of crane and loadshifting machinery.

6.11.3 Remove the tools and debris from temporary structures (including scaffolding, tower working platform), and fence the structures off.

6.11.4 Properly store chemicals and dangerous goods and locked them in designated storage area.

6.11.5 Suitably store hand tools.

6.11.6 Stably stack materials in designated storage area.

6.11.7 Ensure that the welding equipment is in good condition, and the firefighting equipment is ready before returning to operation.

6.11.8 Check the power supply of electrical equipment, and confirm that cranes and loadshifitng machinery are in good order before restarting.

6.11.9 Check the stability of temporary structures (including scaffolding, tower working platform) before using again.

6.11.10 Check chemicals and dangerous goods for leakage, hand tools are in good condition, the stability of the stacked material, determine that everything is without irregularity before operation.

7 Follow up of an accident

7.1 Notification of accident, cease operation and seek assistance in case of accident. Report the accident to direct supervisor or instructor in detail for processing afterward.

7.2 Follow up of an accident, all staff and students have the responsibility to report campus with details of the accident to enable follow-up.

Note

Contents of this publication are for reference only. Although Hong Kong Institute of Construction reviews the contents of this publication regularly, all of the safety requirements should be based on the applicable safety regulations and codes of practice.

If you have any suggestion or enquiry about this handbook, please feel free to contact Campus General Office or Corporate Safety Team.

Prepared by Hong Kong Institute of Construction and
Corporate Safety Team
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