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Ministry of Labour and Human Resources  
Department of Labour



**Regulation on Occupational Health and  
Safety for the Construction Industry,  
2022**

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Royal Government of Bhutan  
Ministry of Labour and Human Resources



March 1st, 2022

## Foreword

The Ministry through the Department of Labour is please to bring out the revised Regulation on Occupational Health and Safety for the Construction Industry. This Regulation contains all the legal requirements clearly prescribes procedures and standards, which is comprehensive and easy to implement at construction sites, and is in keeping with the international practices.

The construction industry is one of the fastest growing industries and the largest employing sector. It is also one of the highest contributing sectors to Gross National Product. However, when it comes to Occupational Health and Safety, much remains to be done on the three fronts of engineering, education and enforcement of health and safety. Despite the construction industry being dominated by a very large number of such small companies and private individual's constructions, little is known of their occupational health and safety needs, practices and constraints. Therefore, health and safety has been one of the primary concerns of the Ministry of Labour and Human Resources and earnest efforts are being made to promote safety and health in the construction industry.

The Ministry recognizes the fact that a separate health and safety legislation, beside the general Regulation on OHS and Welfare, is vitally important for the construction industry to protect construction employees from workplace hazards, no matter how low a risk is. Through this Regulation the Ministry encourages every employer to develop and operate their own work safety and health plans/programs, and prevent the construction accidents and injuries and to reduce and ultimately eliminate the associated hazards and risks. This will not only save a great deal of pain and suffering to employees but will also help to reduce many direct and indirect financial costs related to these accidents and injuries.

The Ministry hopes that employers and employees in the construction industry will duly comply with the provisions of this Regulation.

This Regulation will supersede the "General Rules and Regulation on Occupational Health and Safety in the Construction, Manufacturing, Mining, and Service Industries, 2006".

I earnestly appeal to all to promote safe, harmonious and productive workplaces.

(Karma Dorji)  
**Minister**

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## **Introduction**

In exercise of the powers conferred in Section 234, read with provisions of Chapter IX of the Labour and Employment Act of Bhutan 2007, the Ministry of Labour and Human Resources, hereby promulgates this Regulation concerning general provisions on construction safety and related matters.

## **Chapter 1**

### **Preliminary**

1. This Regulation shall be called “Regulation on Occupational Health and Safety for the Construction Industry, 2022”.
2. This Regulation contains legal requirements that must be met by all workplaces engaged in construction activity within the coverage of the Labour and Employment Act of Bhutan 2007 that come under the inspectorial jurisdiction of the Department of Labour, Ministry of Labour and Human Resources.
3. This Regulation shall come into force with effect from March 1<sup>st</sup> 2022.

### **Purpose**

4. The purpose of this Regulation is to establish occupational health and safety standards on construction health and safety read with relevant provisions enshrined in “Regulation on Occupational Health, Safety and Welfare, 2022” as applicable to construction sites. It is to ensure safety and health for employees, as well as other

persons at construction sites, from work related risks to their health, safety, and wellbeing as provided in Chapter IX of the Labour and Employment Act of Bhutan 2007.

## **Scope**

5. This Regulation shall apply to all construction sites where one or more persons are employed falling within the scope of the Labour and Employment Act of Bhutan 2007.

## **Chapter 2**

### **Health and Safety Management**

#### **Duties of Employer**

6. The employer shall provide and maintain a safe and healthy working environment for all employees and any other person present at a workplace conforming to the Regulation on Occupational Health, Safety and Welfare, 2022.

#### **Age of Employment**

7. No person shall employ any person under the age of 18 for any construction activities.

#### **Duties of Employee**

8. The employee shall take reasonable care for his or her own health and safety, and for the health and safety of any other employee or person who may be affected by his or her acts or omissions at the workplace conforming to the Regulation on Occupational Health, Safety and Welfare, 2022.

#### **Rights of Employee**

9. Subject to the provisions of Sections 162 to 165 of the Labour and Employment Act of Bhutan 2007, the supervisor or employer receiving a report made under the relevant Sections of the Labour and Employment Act of Bhutan 2007 shall immediately investigate the matter, and:

- (1) ensure that the reported unsafe condition is removed without delay; or
- (2) if in his or her opinion, the report is not valid, must inform the person who made the report.

## **Notification of Construction Work**

10. An employer or contractor who undertakes construction work shall, within 7 days after the commencement of the work, furnish in writing to the Chief Labour Administrator the following information:
  - (1) the contractor's name and address;
  - (2) if the contractor is a firm, the name under which it carries out business and the name and address of every partner in the firm;
  - (3) the name and address of every subcontractor employed on the work;
  - (4) the location of the construction site;
  - (5) the nature of the work;
  - (6) the date upon which the work commenced;
  - (7) whether any mechanical power is being or will be used in connection with the work and, if so, the nature of mechanical power;
  - (8) the expected duration of the work; and
  - (9) occupational health and safety plans and programs applicable for the worksite.
11. Section 10 shall not apply:

- (1) for any worksite employing less than 20 employees or will be employed on the work at any one time or at the date of commencement of the work; or
- (2) if the contractor has reasonable grounds for believing that the work will be completed in a period of less than 6 weeks from that date; or
- (3) if any other construction work is being undertaken at the same construction site and the information specified in Section 10 has been furnished to the Chief Labour Administrator in respect of that construction work.

### **Notification of Completion**

12. An employer or contractor required to furnish information under Sections 10 and 11, shall within 7 days after the date of completion of the relevant construction work, notify the Chief Labour Administrator in writing of the date of completion.

### **Health and Safety Policy**

13. The employer of every establishment employing 12 or more construction employees shall prepare a written statement of health and safety policy in accordance with the relevant provisions contained in “Regulation on Occupational Health, Safety and Welfare, 2022”.

### **Health and Safety Committee**

14. At construction sites there shall be appointed, organized and maintained a Health and Safety Committee, and a

Safety Officer conforming to the “Regulation on Occupational Health, Safety and Welfare, 2022.”

### **Safety Officer**

15. The employer of every workplace employing 20 or more employees shall appoint a Safety Officer conforming to the “Regulation on Occupational Health, Safety and Welfare, 2022.”

### **Safety Representative**

16. At every workplace, there shall be a Health and Safety Representative nominated by the employees.

### **Construction Safety Supervisor**

17. The employer shall appoint a Construction Safety Supervisor at every construction/project site irrespective of size and number of employees employed.
18. Section 17 shall not apply in the event the construction company undertakes only one project at a time and if the Safety Officer appointed under Section 15 is engaged fully at the project site.
19. The Construction Safety Supervisor shall be certified by a competent authority and registered with the Ministry of Labour and Human Resources.
20. A Construction Safety Supervisor shall ensure the health and safety of all employees under their direct supervision conforming to Sections 14 and 15 of “Chapter 3: General Duties and Rights” of Regulation on Occupational Health, Safety and Welfare, 2022.

## **Workplace Emergency Action Plan**

21. An employer shall ensure that at a construction site, in any case where more than 100 employees are employed, the workplace emergency action plan(s) are in place to handle emergencies such as but not limited to:
- (1) fire and explosion;
  - (2) collapse of lifting appliances and transport equipment;
  - (3) collapse of building, sheds or structures, etc;
  - (4) gas leakage or spillage of dangerous goods or chemicals;
  - (5) Highly infectious(communicable) diseases including public health emergencies;
  - (6) drowning of building employees, sinking of vessels; and
  - (7) landslides which bury building employees, floods, storms and other natural calamities, is prepared and submitted for approval to the Chief Labour Administrator.

## **Personal Protective Equipment**

22. Suitable personal protective equipment shall be provided by the employer in accordance to the provision on personal protective equipment in “Regulation on Occupational Health, Safety and Welfare, 2022”.

## **Protection of the Public**

23. A safe covered walkway shall be constructed over the sidewalk for use by pedestrians in a building construction work less than 2.3 m from a sidewalk or public road.

## **Safety Signage**

24. An employer shall display safety signs and symbols at the work site in accordance with the Regulation on Occupational Health, Safety and Welfare, 2022.

## **Hazard Identification and Risk Assessment**

25. In every workplace, the employer shall identify the hazards and conduct a risk assessment in accordance with the Regulation on Occupational Health, Safety and Welfare, 2022.

## **Penalty**

26. An employer who contravenes Sections 10, 17 and 23 of this Regulation shall be liable to pay a fine of:
- (1) First instance: Ninety (90) times the Daily National Minimum Wage.
  - (2) Second instance: One Hundred and Eighty (180) times the Daily National Minimum Wage.
  - (3) Third and repeated instances: Three Hundred and Sixty (360) times the Daily National Minimum Wage.

## Chapter 3

### General Safety Provision

#### General Provisions

27. The employer or contractor responsible for any construction site shall take suitable and adequate steps to ensure that, so far as is reasonably practicable, no person gains access to any place on the site where any hazardous conditions are present.
28. For the purpose of this Regulation, "hazardous conditions" includes the following conditions:
  - (1) that may give rise to a risk of persons falling from a height;
  - (2) unprotected edge or opening at a place of work;
  - (3) improper design and construction of a place of work;
  - (4) inadequate or insecure support or anchoring of a place of work; and
  - (5) improper maintenance of a place of work.

#### Fire Protection

29. An employer shall ensure at a construction site of a building or other construction work that, such construction site is provided with:
  - (1) effective fire extinguishing equipment , reliable as per the workplace activity to sufficiently extinguish any probable fire at such construction site;

- (2) an adequate water supply at ample pressure as per national standards; and
- (3) number of trained persons required to operate the fire extinguishing equipment provided under Section 29(1).

### **Fencing of Motors**

30. An employer shall ensure at a construction site that:
  - (1) all motors cogwheels, chains and friction gearing, flywheels, shafting, dangerous and moving parts of machinery (whether or not driven by mechanical power) and steam pipes are securely fenced or lagged;
  - (2) the fencing of dangerous parts of machinery is not removed while such machinery is in motion or in use;
  - (3) no part of any machinery which is in motion and which is not securely fenced is examined, lubricated, adjusted or repaired except by a person skilled for such examination, lubrication, adjustment or repairs;
  - (4) machine parts are cleaned when such machine is stopped; and
  - (5) when a machine is stopped for servicing or repairs, adequate measures are taken to ensure that such machine does not restart inadvertently.

## **Barricade and Fencing of Construction Site**

31. The employer must barricade the construction sites, excavations, holes, floors, and roof openings, raised platforms, overhead work and restricted areas.
32. Notwithstanding Section 31 of this Regulation, the employer shall ensure that barriers are erected in the following activities but not limited to:
  - (1) wherever construction debris is dropped without the use of an enclosed chute;
  - (2) areas with temporary wiring operating at more than 600 volts;
  - (3) work areas for electrical equipment with exposed energized parts;
  - (4) the swing radius of the rotating superstructure of cranes or other equipment;
  - (5) wherever equipment is left unattended near a roadway at night;
  - (6) areas used for the preparation of explosive charges or blasting operations;
  - (7) street openings/ manholes; and
  - (8) construction areas in energized electrical substations.
33. As far as reasonably practicable, the employer shall enclose the construction site to restrict the entry of other persons, or if not possible take adequate health and

safety measures and precautions to eliminate or reduce the risk to employees and general public.

34. Warning signs shall be placed on barricades/fences for the duration of the construction project.

### **Lifting and Carrying of Excessive Weight**

35. The employer shall ensure that a male worker shall not be made to lift by hand or carry overhead or over his back or shoulders any material, article, tool or appliances over 50 kg and for a female worker, over 25 kg.
36. The weight exceeding the maximum limit set out in Section 35 shall either be handled by more than one worker or by mechanical means.

### **Overhead Protection**

37. The employer shall ensure at the building or other construction work that overhead protection is erected along the periphery of every building/work under construction which shall be of 15 m or more in height when complete.
38. Overhead protection referred to in Section 37 shall not be less than 2 m wide and shall be erected at a height not more than 5 m above the base of the building and the outer edge of such overhead protection shall be 150 mm higher than the inner edge thereof or shall be erected at an angle of not more than twenty degrees to its horizontal sloping into the building.

39. The employer shall ensure at the construction work that any area exposed to risk of falling material, article or objects is roped off or cordoned off or otherwise suitably guarded from the inadvertent entry of persons other than construction employees at work in such area.

### **Fall Hazards**

40. The employer or contractor responsible for any construction site shall, so far as reasonably practicable:
- (1) identify the hazardous conditions of persons working at a height in the construction site;
  - (2) rectify any hazardous conditions of persons working at a height in the construction site;
  - (3) safeguard any person working at a height in the construction site against all hazardous conditions; and
  - (4) ensure all fall hazards are identified and appropriate fall protection measures are put in place as specified in Schedule II appended to this Regulation.

### **Slipping**

41. No employer shall allow any worker to use the passageway, scaffold, platform, or any other elevated working surface which are slippery and unsafe and he/she shall ensure that slippery surfaces are kept clean and dry to make it safe from slipping hazards.

## **Tripping**

42. The employer shall ensure that all passageways, platforms, and other places of construction work shall be free from accumulations of dust, debris, or similar material and from other obstructions that may cause tripping.

## **Fall from Height**

43. Every open side or opening into or through which a construction worker, vehicle or lifting appliance or other equipment may fall shall be covered or guarded suitably except where free access is necessary by reasons of the nature of work.
44. Wherever the employees are exposed to the hazards of falling from a height while employed at such work, they shall be provided by the employer with adequate equipment or means for saving them from such hazards.
45. Wherever there is a possibility of falling of any material, equipment or worker, adequate and suitable safety nets shall be provided by the employer.

## **Cutting**

46. Any sharp projections or protruding nails or similar projections which may cause any cutting hazard to an employee at a building or other construction site shall be removed or otherwise made safe by taking suitable measures by the employer.

## **Drowning**

47. Wherever employees are exposed to the hazards of falling into water, they shall be provided with adequate lifesaving equipment. If the Labour Inspector, considers it necessary, a well-equipped boat or launch manned with trained personnel shall be provided by the employer.

## **Electrical Hazards**

48. Before commencement of any construction work, the employer shall take adequate measures to prevent any employees from being exposed to electrical hazards such as coming into physical contact with any electrical equipment or apparatus, machines, or live electrical circuit.
49. The employer shall display and maintain suitable warning signs at conspicuous places at a building or other construction work in Dzongkha and English.
50. In workplaces at a construction site where the exact location of underground electric power lines are not known, the employees using jack hammers, crow bars or other hand-tools which may come in contact with a live electrical line, shall be provided by the employer with insulated protective gloves and footwear of the type in accordance with the provision contained in “Regulation on Occupational Health, Safety and Welfare 2022”.
51. The employer shall ensure that, as far as practicable, no wiring, which may come in contact with water or which

may be mechanically damaged, is left on the ground or floor at a building or other construction work.

52. The employer shall ensure that all electrical appliances and current carrying equipment used at a building or other construction work are made of sound material and are properly and adequately earthed.
53. The employer shall ensure that all temporary electrical installations at a construction work site are provided with earth-leakage circuit breakers.
54. The employer shall ensure that all electrical installations at a construction site comply with the requirements of any law for the time being in force.

### **Vehicular Traffic**

55. In a construction site where an employees' safety is likely to be endangered by vehicular traffic, the employer shall place or install flagmen, warning sign, barrier, or lane control devices. If necessary, the employer may make a request in writing to the concerned authorities to control such traffic.
56. The employer shall ensure that all drivers and vehicles used at construction site comply with the requirements of the Road Safety and Transport Authority.

### **Protection against Collapse of Structures**

57. All temporary structures shall be properly supported using guys rope, stays, and other fixtures necessary for stability during construction.

58. Where construction work will likely reduce the stability of an existing or adjacent building, shoring shall be undertaken to prevent the collapse or fall of any part of the structure.

### **Illumination**

59. The employer shall ensure that sufficient illumination is provided at the worksite, passageways, stairways and landing in accordance with “Schedule III: Illumination Levels”, Regulation on Occupational Health, Safety and Welfare, 2022.

### **Stacking and Storage of Materials**

60. The employer shall ensure that:
- (1) all building materials are stored or stacked in a safe and orderly manner to avoid obstruction of any passageway or place of work;
  - (2) material piles are stored or stacked in such a manner as to ensure stability;
  - (3) material or equipment is not stored up on any floor, platform and permanent or temporary structure in such quantity as to exceed its safe bearing capacity;
  - (4) material or equipment is not stored or placed so close to any edge of a floor or platform that may endanger the safety of persons below or working in the vicinity;
  - (5) lumber structural steel and similar building materials shall be properly stored and secured against

collapsing or tripping. Cross pieces shall be used in a pile of lumber more than 1 m high;

- (6) pipes and reinforcing steels shall be stacked in racks or frames supported to prevent movement;
- (7) gangways and platforms shall not be used as storage for materials and tools.

### **Disposal of Debris**

61. The employer shall ensure that at a construction site:

- (1) debris are handled and disposed by a method which does not cause danger to the safety of a person;
- (2) debris are not allowed to accumulate so as to constitute a hazard;
- (3) debris are kept sufficiently moist to bring down the dust within the permissible limit;
- (4) debris are not thrown inside or outside from any height of such construction work; and
- (5) on completion of work, leftover building material, articles or other substances or debris are disposed of as soon as possible to avoid any hazard to any traffic or person.

### **Safe Means of Access**

62. Adequate safe access and egress shall be provided and maintained to and from every place where work is undertaken.

## **Storage of Cylinders**

63. Compressed gas cylinders shall be stored in upright positions protected against heat and overturning and when not in use, the control valves shall be covered by protective caps screwed in proper positions.

## **Penalty**

64. An employer who contravenes any Section of this Chapter shall pay a fine for each contravention as follows:
- (1) First instance: Ninety (90) times the Daily National Minimum Wage.
  - (2) Second instance: One Hundred and Eighty (180) times the Daily National Minimum Wage.
  - (3) Third and repeated instances: Three Hundred and Sixty (360) times the Daily National Minimum Wage.

## **Chapter 4**

### **Health and Welfare**

#### **Health**

##### **Dangerous and Harmful Environment**

65. When dust, gases and fumes which are hazardous to the safety and health of employees are present in a confined space or excavation, or tunnel, all measures shall be taken either by exhaust ventilation or by other means to free the area of such contaminant.
66. An Internal combustion engine shall only be operated in an excavation when provision is made to ensure that exhaust gases and fumes are rendered harmless or discharge to a point away from excavation.

##### **Dust, Gases, Fumes, etc.**

67. An employer shall prevent concentration of dust, gases or fumes by providing suitable means to control their concentration within the permissible limit prescribed in “Regulation on Occupational Health, Safety and Welfare 2022” so that they may not cause injury or pose health hazards to a worker at a construction work.
68. When harmful dusts, gases and fumes are present in an excavation to such a degree hazardous to the safety and health of the employees, all measures shall be taken either by exhaust ventilation or by other means to free the area of such contaminants.

## **Corrosive Substances**

69. The employer shall ensure that corrosive substances, including alkalis and acids, are stored, and used in such a manner that it does not endanger the safety of employees and other persons.
70. Suitable personal protective equipment shall be provided by the employer for handling the corrosive substances mentioned in Section 69 and an immediate remedial measure shall be taken in case of any spillage.

## **Welfare**

71. In every workplace where an employer provides a canteen, sanitary conveniences, lunch room, washing facilities and changing rooms shall be in accordance with the Regulation on Occupational Health, Safety and Welfare, 2022.

## **Drinking Water**

72. Every construction site shall have access to sufficient supply of safe drinking water.

## **Temporary Living Accommodation**

73. If the employer were to provide living accommodation for the employees at site or near the construction sites, the living accommodation should be constructed at the safest place where there is no risk of flooding, landslide, collapse, falling boulders and other elements in accordance to Schedule III appended to this Regulation.

## **Medical Facilities**

### **Medical Examination of Construction Employees**

74. The employer shall ensure at a construction site that:
- (1) a construction worker who is employed for work involving such inherent risk or hazards is medically examined once in 6 months by a qualified medical professional;
  - (2) every operator of a crane, winch or other lifting appliance, transport equipment or vehicle, is medically examined before employing, after illness or injury, if it appears that the illness or injury might have affected their fitness and, thereafter, once in every 2 years up to the age of 40 and thereafter once in a year, by a qualified medical professional;
  - (3) no construction employees will be charged for the medical examination referred to in Sections 74(1) and 74(2) and the cost of examination shall be borne by the employer; and
  - (4) record of the medical examination referred to in Sections 74(1) and 74(2) are kept in a register which shall be maintained as per guidelines prescribed by the Ministry of Health and shall be available to the Labour Inspector for inspection on demand.

### **Occupational Health Room**

75. The employer shall ensure that a construction site:

- (1) where 200 employees are employed at the site, there is an occupational room or an arrangement with a nearby hospital for providing necessary emergency medical services to the construction employees;
- (2) in case where more than 200 employees are employed, there is an occupational health room with effective communication system and that such a room is in the overall charge of a qualified medical professional and a nurse; and
- (3) the occupational health room referred to in Sections 75(1) and 75(2) is equipped with the articles mentioned in schedule X appended to the “Regulation on Occupational Health, Safety and Welfare, 2022” or recommended by the qualified medical professional in writing.

### **Ambulance Van**

76. The employer shall ensure at a construction site that:

- (1) an ambulance van with basic lifesaving equipment is provided at a site employing more than 200 employees; and
- (2) an arrangement is made with a nearby hospital for such an ambulance van to provide emergency services to the construction sites employing less than 200 employees.

## **Notice of Poisoning or Occupational Diseases**

77. The employer shall ensure at a construction site that when a worker contracts any disease specified in Schedule XV appended to the “Regulation on Occupational, Health, Safety and Welfare, 2022” the same will be intimated immediately to the Chief Labour Administrator in accordance with the provisions laid out in the said Regulation.

## **First Aid Box**

78. The employer shall ensure at a construction site that a sufficient number of first aid boxes or cupboards are provided and maintained for providing first aid to the employees in accordance with the provisions contained in Schedule X appended to the “Regulation on Occupational, Health, Safety and Welfare, 2022”.

## **First Aider**

79. In every workplace, the employer shall appoint a First Aider in accordance with “Regulation on Occupational, Health, Safety and Welfare, 2022”

## **Emergency Care Services or Emergency Treatment**

80. The employer shall ensure at a construction site that essential lifesaving aids and appliances required to handle the following injuries are provided and properly maintained under the supervision of a qualified medical professional:

- (1) head injuries and spinal injuries;
- (2) bleedings;
- (3) fractures and dislocations of bones and joints;
- (4) crush injuries;
- (5) shock, including electric shock;
- (6) dehydration due to any cause;
- (7) snake bite, insect bite, scorpion and bee stings;
- (8) burns, including chemical burn;
- (9) bends or divers' paralysis;
- (10) other surgical, gynecological, obstetric, or pediatric emergencies;
- (11) drowning; and
- (12) sunstroke and frostbite to building employees.

## **Penalty**

81. An employer who contravenes Sections 65 to 70, 72 to 78 and 80 of this Chapter shall pay a fine for each contravention as follows:
- (1) First instance: Ninety (90) times the Daily National Minimum Wage.
  - (2) Second instance: One Hundred and Eighty (180) times the Daily National Minimum Wage.
  - (3) Third and repeated instances: Three Hundred and Sixty (360) times the Daily National Minimum Wage.

## Chapter 5

### Excavation and Tunnelling Works

For the purpose of this chapter:

A Rest Shelter is a protected area equipped with breathing air and communication equipment that can be used as protective shelter during emergency situations inside a tunnel. In long tunnels, shelter places for employees shall be provided at suitable intervals during hauling operations.

#### General Requirements

#### Notification of Excavation and Tunnelling Work

82. Prior to the commencement of any excavation or tunnelling work, the employer shall within 30 days inform in writing of the detailed layout plans, method of construction, machines, and equipment to be used as specified in Schedule I appended to this Regulation of such excavation or tunnelling work to the Chief Labour Administrator.

#### Safety Precaution

83. An employer responsible for a construction site shall ensure that adequate precautions are taken while undertaking any excavation, earthwork, shaft, underground or tunnelling works to:

- (1) protect the employees against danger from a fall or dislodgement of earth, rock or other material by suitable shoring or otherwise;

- (2) guard against the dangers arising from fall of materials or objects or the inrush of water, mud, sand or other material that may flow into the excavation, shaft, earthworks, underground works or tunnel;
  - (3) secure adequate ventilation at all workstations so as to maintain an atmosphere fit for respiration and to limit any fumes, gases, vapours, dust or other impurities to levels which are dangerous or injurious to health;
  - (4) guard against the occurrence of fire or flooding, enable persons at work to reach safety in the event of fire or an inrush of water or materials;
  - (5) avoid risk to persons at work arising from possible underground dangers such as underground cables or other distribution or transmission systems, the circulation of fluids or the presence of pockets of gas, by undertaking appropriate investigations to locate them before excavation begins; and
  - (6) provide a safe means of access to and egress from each place of work.
84. In any construction sites where underground or tunnel work are carried out, the employer shall maintain a check-in and check-out procedure to determine an accurate count of the number of employees in the event of a workplace emergency.

## **Compressed Air Environment**

### **Safe System of Work**

85. No employee shall enter, work, or leave the compressed air environment in the worksite except in accordance with a safe system of work which, so far reasonably practicable, is safe and without risk to health.

### **Warning Signs and Notices**

86. Warning signs and notices shall be displayed at the entrance to warn persons against unauthorised entry into the compressed air environment.
87. The notice shall also inform persons of:
- (1) the danger of not undergoing proper compression and decompression;
  - (2) fire and explosion hazards; and
  - (3) the evacuation procedure in case of a workplace emergency.

### **Plant and Ancillary Equipment**

88. Every plant and ancillary equipment in the worksite shall be:
- (1) of appropriate design and construction;
  - (2) of sufficient capacity;
  - (3) safe and without risk to health; and
  - (4) adequately maintained.

89. No oxy-acetylene shall be used in the compressed air environment.

### **Supply of Air**

90. There shall be an adequate supply of compressed air to a working chamber in a worksite.

91. A reserve supply of compressed air shall be always made available for every man-lock and medical lock located in a worksite.

92. The air intake for all air compressors of the air supply shall be located, at a place where there are no fumes, exhaust gases or other air contaminants.

93. Instrumentation or gauges indicating the pressure in a working chamber in a worksite shall be provided near the air compressor.

94. In any worksite with a compressed air environment:

- (1) all high- and low-pressure air supply lines shall be equipped with check valves;
- (2) low pressure air shall be maintained and regulated automatically; and
- (3) low pressure air shall be provided with manually operated control valves.

95. The total capacity of the low-pressure air compressors shall be sufficient to maintain the pressure in the air locks and working chambers in a worksite to cater to workplace emergencies.

96. The concentrations of toxic airborne contaminants in a compressed air environment in a worksite shall not exceed the permissible exposure levels in parts per million specified in the “Regulation on Occupational Health, Safety and Welfare, 2022”.

### **Temperature and Humidity**

97. The temperature in any working chamber, man-lock or medical lock in a worksite shall not exceed 29°C and the relative humidity shall not exceed 85%.
98. A wet and dry bulb thermometer, in good working order, shall be provided in every working chamber in a worksite.
99. A lock attendant shall be appointed to record the readings of the thermometer.

### **Means of Communication**

100. Effective and reliable means of communication, such as a telephone network, shall be maintained at all times and such means of communication shall connect the following locations:
- (1) the working chamber at the face of an excavation;
  - (2) the working chamber side of the man-lock near the door;
  - (3) the interior of each chamber of the man-lock;
  - (4) the man and medical lock attendants’ station;

- (5) the compressor plant; and
- (6) the first-aid station.

### **Appointment of Competent Person for Compressed Air Works**

101. The employer shall appoint a competent person as a gauge attendant who shall always be in control of the air supply plant and be in attendance when any person is employed in a compressed air environment.

### **Conditions for Persons Working in Compressed Air Environment**

102. Every person who is employed in a compressed air environment in the worksite shall not spend more than 12 consecutive hours in the work site.
103. A person who has never worked in a compressed air environment before shall not be employed in compressed air work in the worksite unless they are accompanied by a person who had previously worked in a compressed air environment.
104. A person, who has not carried out any work in a compressed air environment for more than 14 consecutive days, shall not carry out such work in a compressed air environment exceeding one bar for more than 4 hours in one day.
105. The total period of time in a day which the person, referred to Section 102, spends in a compressed air

environment shall not in any subsequent day be increased by more than one hour on each subsequent day.

106. No person shall carry out any work in a compressed air environment at a pressure exceeding 3.5 bars except in a workplace emergency.
107. No person suffering from a cold, chest infection, sore throat or ear ache shall carry out any work in a compressed air environment unless the person has been medically examined and certified fit by a qualified medical professional.
108. For the purpose of this Regulation, the period of time a person spends in a compressed air environment shall include the time spent by the person in the man-lock for compression and decompression.

### **Condition for Multiple Entries in Compressed Air Environment**

109. No person, who has undergone 3 decompressions from a pressure exceeding one bar in any 24-hour period preceding the time he is to enter a compressed air environment, shall carry out any work in compressed air except for the purpose of carrying out rescue work.
110. Section 109 shall not apply to any person who supervises the works in a compressed air environment or who is engaged in maintenance work in a compressed air environment provided that:
  - (1) such person is not involved on more than 5 occasions in a 24-hour period;

- (2) such involvement is not for more than 30 minutes on any one occasion;
- (3) there is an interval of not less than 1½ hours between each such involvement; and
- (4) the pressure does not exceed 2 bars.

### **Prohibitions of Alcohol and Smoking**

111. Where work in a compressed air environment in a worksite is carried out:
- (1) no person shall consume alcohol or smoke while at work in the compressed air environment;
  - (2) no person shall carry cigarettes, cigarette lighters, matches or other sources of ignition into the compressed air environment; and
  - (3) no person who has consumed alcohol shall be allowed to undergo compression in any lock at the worksite.

### **Man-locks**

112. Where work is carried out in any compressed air tunnel in a worksite, a suitably constructed and equipped man-lock shall be provided for each tunnel.
113. The man-lock shall be sufficiently strong to withstand any air pressure, internal or external, to which the structure may be subjected whilst in use and in a workplace emergency.
114. The man-lock shall be of adequate size to accommodate all persons likely to use the lock at any one time.

115. The man-lock shall be maintained in working order and in a clean state at all times.
116. Provision shall be made to enable any person inside the man- lock or working chamber to control the doors of the man-lock or working chamber in order to leave the man-lock or working chamber in the case of a workplace emergency.
117. Except in the case of a workplace emergency, no person shall operate the controls for the opening and closing of the doors of the man-lock and working chamber unless he/she has been authorized by the lock attendant.
118. A notice which can be easily read and understood by any person employed to work in the man-lock shall be displayed in each man-lock to indicate:
  - (1) the precautions to be taken during compression or decompression and after decompression; and
  - (2) the maximum number of persons who may be accommodated in the man-lock.

### **Compression and Decompression Procedure and use of Man-lock**

119. Except in a workplace emergency, compression of a person before entering a working chamber in a worksite and decompression of a person leaving a working chamber in a worksite shall be carried out only in a man-lock.

120. In a workplace emergency, a medical lock may be used at a worksite for the compression and decompression of persons and a records of such use and particulars of the workplace emergency shall be made and produced for inspection by a Labour Inspector.
121. Compression and decompression of persons working in a compressed air environment in a worksite shall be carried out in accordance with the guidelines under this Regulation.
122. A man-lock at a worksite shall not be used for any purpose other than for the compression or decompression of persons.

### **Medical Locks**

123. Subject to Section 121, where persons are employed in a working chamber in a worksite at a pressure exceeding one bar, a suitably constructed and equipped medical lock shall be provided and maintained.
124. Where more than 100 persons are employed in a compressed air environment in a worksite exceeding one bar, a medical lock shall be provided for every 100 persons or less.
125. In a worksite, every medical lock shall be:
  - (1) situated as near as possible to the man-lock;
  - (2) of an appropriate size and shall comprise at least 2 compartments so that one of the compartments can be entered into whilst the other is under pressure;

- (3) equipped with such facilities and medicines in readiness for use at any time; and
  - (4) maintained in working order and in a clean state at all times, including any ancillary equipment in the medical lock.
126. A medical lock in a worksite where work in a compressed air environment is carried out shall not be used for any purpose other than:
- (1) for therapeutic purpose; and
  - (2) for the training and testing of persons for fitness to work in a compressed air environment.

### **Man-lock and Medical Lock Attendants**

127. Every man-lock and medical lock in a worksite where work in a compressed air environment is carried out shall be under the charge of a lock attendant.
128. No person shall be employed as a man-lock or medical lock attendant in such a worksite for more than 12 consecutive hours in any period of 24 hours.
129. No person shall be employed as a man-lock or medical lock attendant in a worksite where work in a compressed air environment is carried out unless they have:
- (1) been certified to be medically fit by a medical practitioner;
  - (2) been trained in first-aid; and

- (3) received adequate training to familiarize themselves with the hazards associated with compression, decompression and compressed air illness and with the keeping of records.
130. Each man-lock attendant station in a worksite shall be provided with a first-aid box.

### **Duties of Man-lock Attendant**

131. A man-lock attendant shall always attend a man-lock in the worksite when any person is in the man-lock or in a working chamber to which the man-lock affords direct or indirect access.
132. The man-lock attendant shall:
- (1) maintain a lock attendant's register;
  - (2) carry out the compression and decompression of persons in a compressed air environment in accordance with the approved procedures; and
  - (3) ensure that all records of pressures and other relevant information regarding conditions in the man-lock and working chamber in the worksite are accessible to the medical lock attendant at any time when the records and information are required by a medical lock attendant.

### **Duties of Medical Lock Attendant**

133. A medical lock attendant shall attend the medical lock in a worksite:

- (1) when any person is employed in a compressed air environment in the worksite at a pressure exceeding one bar;
- (2) when any person is being treated in the medical lock; and
- (3) during the period of 24 hours immediately after the last decompression of a person in a man-lock in the worksite from a pressure exceeding one bar has taken place.

### **Appointment of Medical Practitioner**

134. Where any work is carried out in a compressed air environment, a medical practitioner shall be appointed for the purpose of:
- (1) supervising medical lock attendants; and
  - (2) attending to and treating persons suffering from compressed air illness and other conditions arising from work in a compressed air environment.
135. The medical practitioner appointed under Section 134 shall:
- (1) be qualified and familiar with the problems associated with work in a compressed air environment and the medical aspects of that work; and
  - (2) performs the duties referred to in Section 134.

## **Resting Facilities and First Aid Room**

136. Where a person employed in a compressed air environment is required to remain at the worksite for one hour or more after decompression from pressures exceeding one bar, adequate and suitable resting facilities shall be provided.
137. A First Aid room shall be provided and readily available.

## **Maintenance of Records**

138. A record containing the name, identity card number, passport number, work permit number, date of birth, nationality, home address and occupation of each employee employed in a compressed air environment shall be maintained.
139. A copy of every lock attendant's maintained record shall be kept for a period of 3 years after its making.

## **Training of Personnel**

140. It shall be the duty of the employer of any person who carries out any work in a compressed air environment in a worksite; or the principal under whose direction any person carries out any work in a compressed air environment in a worksite, to ensure that the person does not carry out such work unless the person has received adequate Health and safety training to be familiarized with the hazards associated with such work and the precautions to be observed.

## **Work Supervision**

141. The employer shall appoint a qualified/competent or an experienced person to exercise over all control of operations and activities pertaining to excavation or tunnelling work.
142. The duties and responsibilities of the competent person referred to in Section 141 shall include:
  - (1) to inspect and rectify any hazardous situation relating to excavation or tunneling work;
  - (2) to take remedial measures to avoid any unsafe practice or conditions relating to excavation or tunneling work.
  - (3) to ensure that the work activities in excavation or tunneling work are carried out safely;
  - (4) to conduct inspection at least once a day in every part of an excavation over 2 m deep.

## **Illumination**

143. The employer shall ensure that all workplaces where excavation or tunnelling works are carried out shall be adequately illuminated in accordance with the “Regulation on Occupational Health, Safety and Welfare, 2022”.
144. Every employer carrying out excavation or tunnelling works shall provide emergency generators to ensure adequate illumination at all workplaces where such

excavation or tunnelling work is being carried out, in case of power failure.

## **Safety Requirements in Excavation/ Tunnelling Operations**

### **Safety Measures for Tunnelling Operation**

145. The employer shall ensure at a construction site that:

- (1) the excavated areas are made safe by use of suitably designed and installed steel sets, rock bolts or similar other safe means;
- (2) the competent person referred to in Section 141 examines and inspects the workplaces in a tunnel before the commencement of work in such tunnel, and at regular intervals thereafter, to ensure safety of the employees in such tunnel; and
- (3) the portal areas of a tunnel with loose soil, or rock, likely to cause injury to a person are adequately protected with supports.

### **Warning Signs and Notices**

146. The employer shall ensure at a construction site that suitable warning signs or notices, required for safety of employees carrying out the work of excavation and tunnelling work shall be displayed or erected at conspicuous places in accordance with the Regulation on Occupational Health, Safety and Welfare, 2022

147. Warning signs and notices regarding working with compressed air shall include:
- (1) the danger involved;
  - (2) fire and explosion hazards; and
  - (3) the workplace emergency procedures for rescue from such danger or hazards.

### **Stability of Structure**

148. The employer shall ensure that adequate safety measures are taken to ensure the stability of adjoining structures (if any) and the safety of employees while carrying out excavation or tunnelling work.
149. Shoring or timbering in excavations over 6.6 m deep and those installed to prevent the movement, collapse of an adjacent structure shall be designed by a certified engineer approved by a relevant authority.
150. No excavation in an adjacent building or structure shall be undertaken unless steps are taken to prevent danger to employees.

### **Piling, Shoring and Bracing**

151. The employer shall ensure at a construction site that:
- (1) the plank used for sheet piling in excavation or tunneling work is of sound material with adequate strength;

- (2) shoring and bracing in excavation or tunneling work are of adequate dimensions and are so placed as to be effective for their intended purposes; and
- (3) earth supported shoring or bracing used in excavation or tunneling work should withstand against a footing of sufficient area and stability to prevent the shifting of such shoring or bracing.

### **Shoring and Timbering**

- 152. The walls of every excavation over 1 m deep shall be supported by adequate shoring and timbering to prevent collapse, provided that, this shall not apply to an excavation:
  - (1) in which an employee is not required to enter for any purposes;
  - (2) cut in solid rock; and
  - (3) the walls are sloped to forty-five-degree angle from the vertical or cut to the angle of repose.
- 153. Before shoring or timbering, the walls of an excavation shall be stripped of loose rocks or other materials that might slide, roll, or fall on the employees.
- 154. Every excavation over 1 m shall be kept free of water at all times.
- 155. Timbering or support for any excavation shall be erected, added, altered or dismantled only under the direction of a qualified/competent or experienced person.

156. Timbering and other support for any excavation shall be of good construction, sound materials, and of adequate strength for the purpose for which it is used and properly maintained.
157. All struts and bracings shall be properly secured to prevent displacement.
158. Timber giving off toxic saps or substances soluble in water shall not be used for timbering.

### **Sizes and Spacing of Members**

159. Sheathing shall not be less than 5cm x 15cm in section, wales not less than 10cm x 15cm in section and struts not less than 10cm x 15cm in section; the length, section and spacing of timbering members shall be designed considering the nature of soil, depth and the surroundings.

### **Minimum Berm**

160. Excavated material, machines, heavy equipment and other construction materials shall be kept from the edge of excavation to provide a clear berm of a distance not less than one third of the depth of the excavation.
161. No vehicle or other machinery shall be driven, operated or located near the edge of an excavation at least a distance one third ( $1/3$ ) of its depth.
162. Where the disposal area is limited, a berm of reduced width of not less than 1 m may be allowed, provided the

materials being excavated are stable, the shoring is designed to carry the additional load, and barriers are provided to prevent roll back of the excavated materials.

### **Safe Access and Escape**

163. The employer shall ensure that proper ladders, staircases, or ramps are provided for safe access to and egress from excavation sites where the depth of excavation exceeds 1 m and such ladders, staircases or ramps shall comply with the Regulation on Occupational Health, Safety and Welfare, 2022.
164. Every excavation over 1 m deep shall be provided with means of escape in case of flooding or collapse of the excavation work.
165. Every excavation shall have at least one ladder in every 16.6 m of length or fraction thereof, of a length, which shall extend at least 0.83 m above the top of the excavation to provide a firm handhold when stepping on or off the ladder.

### **Trenches**

166. The employer shall ensure that a trench or excavation exceeding 1.5 m depth is barricaded to a height of no less than 1 m to prevent the fall of employees or another person.

## **Positioning and use of Machinery**

167. The employer shall ensure at a construction site that any machinery used in excavation and tunneling work is positioned and operated in such a way that such machinery does not endanger the operator of such machinery or any other person in the vicinity.

## **Clearances**

168. The employer shall ensure at a construction site that:

- (1) the minimum lateral clearance of half a meter is maintained between any part of a vehicle and any fixture or any equipment used in an excavation or tunneling work after allowing the throw or swing of such fixture or equipment; and
- (2) the overhead clearance for a vehicular drive at excavation or tunneling work is not less than 1.1 m above the seat of the driver and not less than 2 m above the platform where the driver stands.

## **Shafts**

169. The employer shall ensure at a construction site that:

- (1) the surrounding of a shaft used in excavation or tunnel work is constructed of sufficient height to protect from being washed away;
- (2) where an employee is required to enter a shaft at an excavation or tunneling work, safe means of access is provided for such entry;

- (3) every shaft at excavation or tunneling work is provided with a steel casing, concrete piping, timber shoring or other materials of adequate strength for the safety of employees working in the shaft;
- (4) such casing and bracing are provided to a shaft at an excavation or tunneling work up to the depth of such shaft;
- (5) at an excavation or tunneling work according to the appropriate design for such casing and bracing; and
- (6) a reinforced concrete raft and beam is provided around the opening of a shaft at an excavation or tunneling work if the ground surrounding such opening is unstable or unsafe.

### **Lift for Shaft**

170. The employer shall ensure at a construction site that a lift is provided for transport of construction employees and materials or articles at an excavation or tunnelling work required to descend more than 50 m in a shaft.

### **Pneumatic Tools**

171. The employer shall ensure at a construction site that supply lines to pneumatic tools used within a tunnel are fitted with water trap or safety chain or safety wire.

### **Means of Communication**

172. The employer shall ensure at a construction site that:

- (1) reliable and effective means of communication such as telephone or walkie-talkie are provided and are maintained in working order for arranging better and effective communication at an excavation or tunneling work at the following locations, namely:
  - (a) the working chamber of an excavation;
  - (b) intervals of 100 m along the tunnel;
  - (c) working chamber side of a man lock near the door of such man lock;
  - (d) interior of each chamber of a man lock;
  - (e) conspicuous location of a lock attendant's station;
  - (f) a compressor plant;
  - (g) a first aid station, and
  - (h) outside the portal or the top of a shaft.
  
- (2) such number of bells and whistles are made available at all times at the locations referred to in Sections 172(1)(a) to 172(1)(h) as are necessary for the safety of persons at such locations.

## **Signals**

173. The employer shall ensure at a construction site that the standard audio or video signals are used in excavation or tunnelling work and are conspicuously located or displayed near entrance to the workplace and in such other locations as may be necessary to bring such signals to notice of all employees employed in such excavation or tunnelling work.

## **Flooding**

174. The employer shall ensure at a construction site that:

- (1) watertight bulkhead doors are installed at the entrance of a tunnel to prevent flooding during a tunneling work where more than one tunnel is driven from a shaft;
- (2) all necessary measures are taken to ensure that no worker is trapped in any isolated section of a tunnel when any bulkhead door of such tunnel is closed;
- (3) where there is likelihood of flooding inside the tunnel during a tunneling work, immediate arrangements are made to pump out the water and alert the employees and other persons; and
- (4) air tight steel curtains are provided in areas prone to flooding at tunneling work and in case of descending tunnels such curtains are provided in the top half of such tunnels to ensure the retention of pockets of air for rescue purposes.

## **Permissible Exposure Limit of Chemicals**

175. The employer shall ensure at a construction site that, the working environment in a tunnel or a shaft in which employees are employed does not contain any of the hazardous substances in concentrations beyond the permissible limits as laid down in Schedule V annexed to “Regulation on Occupational Health, Safety and Welfare, 2022.”

## **Ventilation**

176. The employer shall ensure at a construction site that all working areas in a free air tunnel are provided with a ventilation system. The fresh air supplied in such a tunnel is not less than  $6\text{m}^3$  per minute for each worker employed underground and the free airflow movement inside the tunnel or underground shall not be less than  $9\text{m}^3$  per minute.

## **Air Supply Intake Point**

177. The employer shall ensure at a construction site that the air intake points for compressed air environments including underground and tunnel are located at places where such intake air does not get contaminated with dust, fumes, vapour and exhaust gases or other contaminants.

## **Breathing Apparatus**

178. The employer shall ensure at a construction site that:

- (1) suitable breathing apparatus is provided to a worker while working in compressed air environment for his use at excavation or tunneling work; and
- (2) such breathing apparatus is maintained in good working condition at all times and conforms to the relevant provisions on personal protective equipment specified in “Regulation on Occupational Health, Safety and Welfare, 2022”.

## **Emergency Generators**

179. The employer shall ensure at a construction site that:
- (1) every compressed air environment in a tunnel is provided with an emergency power supply for maintaining continued supply of compressed air; and
  - (2) the emergency power supply system is maintained and is readily available at all times at excavation or tunneling work.

## **Portable Electrical Hand Tools**

180. The employer shall ensure at a construction site that all portable electrical hand tools and inspection lamps used underground or in a confined space at an excavation or tunnelling work are operated at a voltage not exceeding 24 volts.

## **Circuit Breaker**

181. The employer shall ensure at a construction site that:
- (1) adequate numbers of differential ground fault circuit breakers are installed for every electrical distribution system used at an excavation or tunneling work. Such circuit breakers shall be in accordance to the standard set out under the Electricity Act of Bhutan, 2001; and
  - (2) no semi-enclosed fuse unit is used in underground places at an excavation or tunneling work.

## **Transformer**

182. The employer shall ensure at a construction site that no transformer is used in any section of a tunnel under compressed air unless such transformer is of the dry type and conforms to the standard set out under the Electricity Act of Bhutan, 2001.

## **Rest Shelters**

183. The employer shall ensure at a construction site that the adequate number of shelters for the safeguard of the construction employees is provided where, in the course of working, they are likely to be struck by a moving vehicle or other material handling equipment in a tunnel.

184. At the tunnelling work site, the employer shall ensure that adequate and suitable rest shelters with good ventilation and fire protection are provided for the employees to rest.

## **Hazardous Substances**

### **Inflammable Oils**

185. The employer shall ensure at a construction site that inflammable oils with the flash point below the working temperature that is likely to be encountered in a tunnel are not used in excavation or tunnelling work.

### **Storing of Oil and Fuel Underground**

186. The employer shall ensure at a construction site that all oils, greases or fuels stored underground in excavation or

tunnelling work are kept in tightly sealed containers and in fire resistant areas at safe distances away from explosive and other flammable chemicals.

### **Use of Gases Underground**

187. The employer shall ensure at a construction site that:

- (1) petrol or liquefied petroleum gas or any other flammable substances are not used, stored inside the tunnel except under the supervision and in charge of a qualified/ competent person referred to in Section 141.
- (2) after the use of the petroleum or liquefied petroleum gas, or highly inflammable substances referred to in Section 187(1), all remaining substances are removed immediately from such tunnel; and
- (3) no oxy-acetylene gas is used in a compressed air environment in excavation or tunneling work.

### **Use of Internal Combustion Engine**

188. The employer shall ensure at a construction site of a construction work that no internal combustion engine is used underground in excavation or tunnelling work unless such engine is so constructed that:

- (1) the air entering the engine is cleared before entry; and
- (2) no fumes or sparks are emitted by the engine.

189. Internal combustion engines shall only be operated in an excavation when provision is made to ensure that the exhaust gases and fumes are rendered harmless or discharged to a point away from the excavation.

## **Fire Protection in Tunneling**

### **Coupling and Hoses**

190. The employer shall ensure at a construction site that only high-pressure hydraulic hoses and couplings are used on hydraulic plants underground and such hoses and couplings are adequately protected against any possible damage in excavation or tunnelling work.

### **Hose Installation**

191. The employer shall ensure at a construction site that all hydraulic lines and plants working at a temperature exceeding seventy degrees centigrade (70°C) are protected by adequate insulation or otherwise against accidental human contact in excavation or tunnelling work.

### **Fire Resistant Hoses**

192. The employer shall ensure at a construction site that no fire hydraulic hoses other than fire resistant hydraulic hoses are used when hydraulically activated machinery and equipment is employed in the tunnels.

## **Flame-proof Equipment**

193. The employer shall ensure at a construction site that only flame proof equipment of appropriate type as per relevant national standards is used where there is a danger of flammable or explosive atmosphere being prevalent inside the tunnel.

## **Fire Fighting**

194. The employer shall ensure at a construction site that:

- (1) adequate number of water outlets are provided on excavation or tunneling work and are readily made accessible throughout the tunnel for firefighting purposes and such water outlets are maintained for effective firefighting;
- (2) an audible fire alarm is provided to warn the employees whenever a fire breaks out on an excavation or tunneling work;
- (3) adequate number and types of fire extinguishers, in accordance with the relevant provisions laid down in “Regulation on Occupational Health, Safety and Welfare, 2022” are provided and made readily available to fight any outbreak of fire at an excavation or tunneling work;
- (4) fire extinguishers with vaporizing liquids and high-pressure carbon dioxide are not used in tunnels or other confined spaces; and

- (5) clear and visible instructions and signs to be followed during occurrence of fire, are provided or displayed at a conspicuous place where excavation or tunneling work is carried out.

## **Penalty**

195. An employer who contravenes any Section of this Chapter shall pay a fine for each contravention as follows:
  - (1) First instance: Ninety (90) times the Daily National Minimum Wage.
  - (2) Second instance: One Hundred and Eighty (180) times the Daily National Minimum Wage.
  - (3) Third and repeated instances: Three Hundred and Sixty (360) times the Daily National Minimum Wage.

## Chapter 6

### Scaffoldings

For the purpose of this chapter:

**Double scaffold** means a platform supported on two rows of uprights or standards parallel to the wall of a building connected by horizontal ledgers and is independent from the building wall.

**Ledger** means flat horizontal tubes that join between the standards. Ledgers connect multiple bays. Ledgers decide the height of the working platform.

**Scaffolding system** means designed combination of components that can form a scaffold.

**Single scaffold** means a platform supported by a single row of uprights or standards tied along the wall, connected horizontally by a ledger and supporting putlogs which rests on a ledger on one side and in holes left in walls on the other.

**Soleplate/ sole board** means an item, other than a base plate, used to distribute the point load of a load bearing member to the ground or other supporting structure.

**Standard** means perpendicular tubes that transfer the weight load to the base plates. To increase the height of scaffolding, standards are connected using pins and socket joints.

**Tie-ins** means a member or assembly of members used to stabilize a scaffold from a supporting structure

**Transoms** means a horizontal structural member of a scaffold that is used to connect adjacent standards, normally in the direction of the smaller dimension of a bay.

### General Requirements

196. An employer shall ensure that all employees who work on a scaffold are trained to recognize the hazards

associated with scaffold and to understand the procedures to control and minimize those hazards.

197. Every scaffold shall be constructed of sound materials and with strength for the purpose for which it is intended.
198. All materials and parts of scaffold not in use or intended for reuse shall be kept under good condition and separate from other materials unsuitable for scaffolds.
199. The employer or contractor responsible for any construction site shall take adequate steps to prevent any person on the site from falling from a height of 1.5 m or more.
200. Any employees working from a height of more than 1.5 m shall be provided with a safety belt or harness and shall also ensure that they use it correctly at all times.
201. Diagonal and cross bracing in both directions shall be installed across the entire outside face of all scaffolds.
202. The employer shall ensure that:
  - (1) employees do not work on scaffolds during storms and high winds;
  - (2) employees do not use ladders and other devices to increase working heights on platforms; and
  - (3) intermixing scaffold components from different materials are avoided.

## **Access to Scaffolding**

203. The employer shall provide a suitable means of access for working at a height of 0.6 m and above, with ramp of adequate slope and secured to the scaffold structures or provide adequate ladders or scaffold stairs for employees to use.
204. The employer shall ensure that employees maintain a safe distance from energized power lines while working on the scaffolds, during the construction and dismantling of the scaffolds.

## **Supervision and Inspection of Scaffolds**

205. Scaffolds shall be erected, added, altered, or dismantled only under the supervision of the person in charge of the construction.
206. All materials used in any scaffold shall be inspected before installation.
207. Scaffolds shall be inspected before each work shift and especially after changing weather conditions and prolonged interruptions of work.
208. Lumber with two nail holes aligned crosswise or four nail holes along its length shall not be used as horizontal load bearing members of scaffolds.

## **Strength and Stability of Scaffolds**

209. Scaffolds must be tied to a building or structure, tie-in at every third frame vertically and second frame

horizontally and must be capable of sustaining lateral loads in both tension (pull) and compression (push).

210. Every scaffold shall:
- (1) be capable of supporting twice the maximum load to which it may be subjected without exceeding the allowable unit stresses of the materials used; and
  - (2) have all standards, diagonally and horizontal bracing to prevent lateral movement, and have no splices between the points of support of horizontal members and secured to prevent lateral movement.

### **Foundation of Scaffolds**

211. The employer shall ensure that poles, legs, posts, frames, and uprights bear on base plates.
212. Every scaffold in a workplace shall be constructed, erected or installed on structures or foundations of adequate strength with firm base.
213. Where the scaffold in a workplace is to be founded on soil, the soil shall be adequately consolidated.
214. There shall be no cavity under the base plate of any standard of scaffold in a workplace.

### **Platform, Runways, Ramps and Stairs**

215. All working platforms, runway and ramps from which employees are likely to fall from a height of 1.5 m or more shall conform to the following requirement:
- (1) the platform shall be closely boarded, planked or decked, be at least 1 m wide and not have any

- opening except to allow access to that work platform;
- (2) the planks of the platform shall be cleated or otherwise secured against slipping or movement;
  - (3) for platforms with minimum width of 70 cm, the runways and ramp shall be 45 cm and if runways are used for the passage of materials, the width shall not be less than 70 cm; and
  - (4) strong guard rails up to a height of 91 cm above the working surface and toe boards of at least 20 cm in height.
216. Every platform, runway, ramp or stairs shall be kept free from any obstruction, materials, rubbish and projecting nails. When they become slippery due to the nature of work, steps shall be taken by way of sanding, cleaning or by any other means to roughen the surface.
217. The employer shall ensure that all parts and fittings are in place and secured before placing platform components on a scaffold tier.
218. Supporting members used in the construction of platforms, runways, ramps and stairs shall be securely fastened and braced. The supporting members shall be placed in a firm and rigid foundation to prevent lateral displacement.
219. The uniformly distributed minimum design load of a platform, runway, ramp or stair shall be  $650\text{kg/m}^2$ . The stress due to concentrated loads at any point in the floor

shall not exceed those caused by the uniformly distributed load used in the design. Planking used shall not be less than 3 cm thick.

220. A scaffold platform shall not project beyond its end support to a distance exceeding four (4) times the thickness of the plank, unless secured to prevent tipping.
221. All planks, platforms, runways and ramps shall be fixed and supported to prevent sagging and moving.
222. Slope of runway or ramp shall not exceed 2 in 3. When the slope of runway or ramp requires additional foothold using stepping laths, they shall:
  - (1) have a minimum section 5cm x 8cm placed at maximum intervals of 46 cm on center; and
  - (2) extend to the full width of the runway or ramp except that they may be interrupted over a width of not more than 10 cm to facilitate the passage of barrows.

### **Timber and Bamboo Scaffolds**

223. Timber or Bamboo scaffolds shall be in good condition and be sufficient to carry at least 4 times the imposed load or transmitted to the scaffold and components.
224. Timber or Bamboo scaffoldings shall be limited to a height of 20 m from the ground or base, provided that, over a height of 10 m, the scaffolding and all other installations constructed over the scaffolding shall be of standard design.

225. The overall height of a truss-out bamboo scaffold should not exceed 6 m.
226. The height of the bamboo scaffolds erected at any side should not be greater than the top most part of the building or structure by one storey.
227. The standard of the scaffold in a workplace shall be vertically erected where practicable and the span not more than 1.5 m apart.
228. The ledger of the scaffold in a workplace shall be spaced at vertical intervals of not more than 1.5 m.
229. Ledgers, standards, and putlogs shall be securely fastened by bolts, dogs, or ropes.
230. The distance between two consecutive putlogs shall be designed with due regard to anticipated load and the nature of the platform flooring. As a minimum rule, the spacing shall be as follows:
  - (1) for 3.2 cm thick planks, spacing shall not exceed 1 m; and
  - (2) for 3.8 cm thick planks spacing shall not exceed 1.5 m.

## **Steel Scaffolds**

231. Tubular Welded Frame Scaffolds when used as load bearing members of scaffolding shall be distressed at welded or bent joints and design construction approved by a relevant authority.

232. All the steel scaffolds above 10 m height must be designed by a certified engineer.
233. All steel/ tubular welded frame or systems or Tube and Clamp Scaffolds shall be erected, plumbed, and levelled with a set of ledgers, base plates, clamps, bracing, transoms, and vertical standards which should be checked with a spirit level as erection proceeds and secured to permanent structure to prevent wind uplift.
234. The standard of the scaffold in a workplace shall be vertically erected where practicable and the span not more than 2 m apart.
235. The ledger of the scaffold in a workplace shall be spaced at vertical intervals of not more than 2 m.
236. The scaffold ledgers should be connected to standards using right-angle clamps.
237. The intermediate transoms should be used when the scaffold will be supporting heavy loads or to avoid lapping planks and the tripping hazard that comes with it.

## **Other Scaffolds**

### **Mobile Scaffold**

238. The mobile scaffold shall:
  - (1) be of stable construction and weighted at the base to prevent overturning;
  - (2) be used only on firm and even surfaces;

- (3) be securely braced;
- (4) not be moved when any worker is on the scaffold;  
and
- (5) be moved only from or near the base.

### **Suspended Scaffold**

239. Suspended scaffold shall not be used unless:

- (1) the fixed support or outriggers to which it is attached are capable of supporting at least four times the maximum load to which they may be subjected without exceeding the allowable unit stresses of the material used;
- (2) the platform is at least 25 cm wide, suspension points shall not be more than 1 m apart, and provided with devices to keep the platform at a distance from the wall to allow working while in sitting position; and
- (3) When a suspended scaffold is raised or lowered, it shall have rope pulls equipped with pulley blocks, and mechanical hoisting equipment with a positive device to prevent the scaffold from falling freely.

### **Cantilever, Jib Crane, Figure and Bracket Scaffolds**

240. Every cantilever or jib crane scaffold shall be properly supported, fixed and anchored on the opposite side of the supports, have an outrigger of designed strength and properly strutted or braced to ensure rigidity and stability.

241. Figure or bracket scaffold shall not be supported or held by dogs, spikes or similar fixing devices that will pull out.

### **Skips, Brackets, Boatswain Chair**

242. Skip, bracket, basket, and boatswain chair shall not be used as substitute for a suspended scaffold unless the work is of such short duration and is under the supervision of the person responsible for the construction.

243. No skip, bracket, or basket shall be used as a suspended scaffold unless it is at least 76 cm deep, and either constructed of metal or carried by two strong bands of metal fastened around the sides and bottom.

### **Ladder Scaffolds or Ladder Jack Scaffolds**

244. A ladder scaffold shall be used only when:

- (1) the work is of such light nature and the material required for the work is light and can be hung on the ladder; and
- (2) the distance between the ladders of the scaffold is less than 3 m.

### **Trestle Scaffolds**

245. Trestle scaffolds shall not be used if the working platform is more than 5 m from the ground or floor or another surface upon which the scaffold is erected.

246. A trestle scaffold shall not be erected on a scaffold platform unless the platform is sufficiently wide for the

transport of materials, and uprights are firmly attached to the platform and braced to prevent displacement.

247. No trestle scaffold shall be erected on a suspended scaffold.

### **Outrigger Scaffold**

248. An outrigger scaffold shall have its platform within 8 cm from the wall, and shall have outrigger secured against horizontal and vertical movements.

### **Maintenance of Scaffolds**

249. All scaffolds shall be properly maintained and every part shall be kept, fixed, and secured in position to prevent displacement.
250. No partly dismantled scaffold shall be used unless it is rendered stable, strong, and safe for the purpose.
251. Damaged scaffoldings should be used only when repaired to its original strength.

### **Penalty**

252. An employer who contravenes any Section of this Chapter shall pay a fine for each contravention as follows:
- (1) First instance: Ninety (90) times the Daily National Minimum Wage.
  - (2) Second instance: One Hundred and Eighty (180) times the Daily National Minimum Wage.

(3) Third and repeated instances: Three Hundred and Sixty (360) times the Daily National Minimum Wage.

## Chapter 7

### Construction Machines and Equipment

#### Competent Person to Operate Mechanical Equipment

253. All mechanical equipment used in construction sites shall be operated only by a trained and competent employee. However, if no competent employee(s) is to operate the mechanical equipment, it shall be under the supervision of a competent person.

#### Plant and Equipment

254. The operator of a power-driven crane, shovel forklift truck, front end loader and similar machinery is exposed to overhead hazards therefore, a cab, screen or other overhead protection shall be provided.

255. When any equipment or part thereof is being dismantled or repaired and a worker may be endangered by the collapse or movement of the equipment, blocking shall be installed to prevent collapse or movement.

256. If employees are endangered by the rotation or uncontrolled motion of a load being hoisted by a crane or similar hoisting machine, one or more guide ropes or tag lines shall be used to prevent rotation on uncontrolled motion.

257. A friction type clamp used in hoisting materials shall be constructed in a manner that accidental slacking of the hoisting cable will not release the clamp.

258. When the operator of a shovel or similar machine is obstructed in the view of the path of travel of any part of the shovel or similar machine, one or more signal person shall assist the operator by:
- (1) keeping that part of the shovel or similar machine under observation when it is out of view of the operator; and
  - (2) communicating with the operator using prearranged signals or where these signals are impracticable, by an audible communication system.
259. Every lifting jack shall have its rated capacity legibly cast or stamped in plain view on the jack, and be equipped with a positive stop to prevent over travel or where a positive stop is impracticable, it shall be provided with a device indicating maximum allowable travel.
260. Where a vehicle, crane, machine, or other equipment is driven in reverse in a location where a worker or the operator may be endangered, the operation shall be directed by another worker who shall be stationed in full view of the operator and the path of travel.
261. An unattended vehicle parked on a sloping ground or adjacent to an excavation shall have its brakes applied and the wheels blocked to prevent movement.
262. A hose supplying steam or air to a hammer or a pole driver or to a drill carriage shall have attached thereto a wire, rope, or chain to prevent the hose from whipping.

263. Piles or sheet piling shall be adequately supported at all times during hoisting, phasing, removal or withdrawal. Employees who are not directly engaged in such operations shall not be allowed in the area of operation.

### **Lifting Equipment**

264. Every lifting appliance including working gears and all other plant equipment used for anchoring or fixing shall:
- (1) be of good mechanical construction, of sound material and adequate strength for the load it will carry; and
  - (2) be properly maintained and inspected by a competent person in accordance with the provisions laid down under “Regulation on Occupational Health, Safety and Welfare, 2022”.
265. Any anchoring or fixing arrangement provided in connection with a lifting appliance shall be adequate and secure to hold the imposed load.

### **Brake Controls and Safety Devices**

266. Every crane, crab and winch shall be provided with a brake to prevent the fall of the load and to control its operation when the load is lowered.
267. Every handle or lever of a lifting appliance provided for controlling its operation shall be provided with suitable locking arrangement to prevent its accidental movement.

268. Every lever or handle provided for controlling the operation of a lifting appliance shall have clear marking to indicate purpose and mode of operation.

### **Protection of Crane Driver**

269. Platform for crane drivers and signallers shall be of sufficient area, closely planked, plated, and provided with safe means of access and egress.

270. Every side of a platform more than 1.5 m high shall be provided with guardrails and toe boards.

271. The driver of every power-driven lifting appliance shall be provided with a cabin which shall:

- (1) afford protection from the weather and falling objects; and
- (2) be constructed to afford ready access to operating parts of the lifting appliance within the cabin and shall be periodically inspected and maintained.

### **Drums and Pulleys**

272. Every chain or rope that terminates at the winding drum of a lifting appliance shall be properly secured thereto and at least two turns or such chain or rope shall remain on the drum in every operating maximum end position of the appliance.

### **Cranes and Derricking Jibs**

273. When the derricking jib of a crane is operated through a clutch, there shall be an effective inter locking

arrangement between the derricking drum in such a way that the clutch cannot be operated unless the pawl is ineffective engagement with the derricking jib and the pawl cannot be disengaged unless the clutch is in effective engagement with the derricking drum. This requirement shall not apply when the derricking drum is independently driven and the mechanism driving the derricking drum is self-locking.

274. The hosting mechanism of a crane shall not be used to pull the load sideways unless it is ascertained that no undue stress is imposed on the crane structures and its stability is not endangered.

### **Crane Operation and Signalling**

275. A lifting appliance shall not be operated other than by a person trained, competent, physically fit, and authorized to operate the appliance.
276. When the operator of a lifting appliance has no clear and unrestricted view of the load for safe working, there shall be appointed one or more signal persons to give the necessary signals to the operator.
277. Every signal given for the movement or stopping of a lifting appliance shall be distinctive in character and the person to whom it is given is able to hear or see it easily.

### **Safe Working Loads**

278. Safe working loads shall be plainly marked on every lifting appliance and in case of a crane with variable

operating radius, safe load at various radii of the jib shall be marked on the jib displayed in the driver's cabin or fitted with an automatic safe load indicator.

279. In every derricking jib, the maximum radius at which the jib may be worked shall be plainly marked on it.
280. No lifting appliance shall be loaded beyond its safe working load.

### **Guy Derrick Cranes**

281. The jib of guy derrick cranes shall not be erected between the back stays of the crane.
282. Measures shall be taken to prevent the foot of the king post of any derrick crane from being lifted out of its socket.

### **Hoist**

283. Every hoist way shall be efficiently protected by enclosures and when access to the hoist is necessary, it shall be fitted with gates. Such enclosures and gates shall extend to 2.16 m except when lesser height is sufficient to prevent the fall of persons and where there is no risk of any worker coming in contact with any moving part of the hoist, but shall in no case be less than 2.16 m.

### **Marking of Safe Working Loads on Hoist**

284. The safe working load or the number of persons that can be carried in a hoist shall be plainly marked on every platform or cage of the hoist. A notice prohibiting

overloading of the hoist shall be placed on the platform or cage of the hoist.

### **Operation of Hoist**

285. Hoist for the carriage of goods and materials shall be of such construction that it is operated outside of the cage unless the doors of the cage and the enclosure are of the interlocked type.
286. Hoist for the carriage of persons shall have the doors of the cage and enclosure of hoist way of interlocked type and the cage completely covered and fitted with overrun devices.

### **Carriage of Persons by Means of Lifting Appliances**

287. No person shall be raised, lowered, or carried by a power-driven lifting appliance except:
- (1) on the driver's platform in case of a crane or a hoist;  
or
  - (2) on an approved suspended scaffold; or
  - (3) when the use of hoist or suspended scaffold is not reasonable, provided that:
    - (a) the appliance can be operated from one position only;
    - (b) the winch used is so constructed that when the control lever or switch is not held in operating position, the brake is applied

and disengages from pawl and ratchet gears; and

- (c) no person is carried except in a chair or cage, or a safe skip or other receptacle at least 1 m deep, and measures are taken to prevent the chair, cage, skip or receptacle from spinning or tipping in a manner dangerous to any occupant.

### **Test and Examination of Hoists, Chains, Ropes, and Lifting Gears**

288. Every hoist shall be tested and examined by a competent person in accordance with provisions laid down in “Regulation on Occupational Health, Safety and Welfare, 2022.”

### **Earth Moving Equipment and Vehicles**

289. The employer or the contractor shall ensure that where at a construction site, if used for the purpose of construction work, all transport vehicles, earth moving machineries and equipment, material handling machines, as set out in Schedule I of this Regulation:

- (1) are maintained in good working condition and properly used;
- (2) are inspected at least once a week by a responsible person and in case any defect is noticed in such equipment or vehicle, it is immediately taken out of use;

- (3) are equipped with effective brakes, headlights and tail lamps and are maintained in good working condition;
  - (4) are not loaded beyond their safe carrying capacity which shall be clearly marked on such trucks and other equipment;
  - (5) are not left on a slope with the engine of such vehicles or equipment running; and
  - (6) are operated only by a competent person or any person for the purpose of his/her training under the supervision of a competent person.
290. The employer or the contractor shall ensure adequate precaution such as isolating the electric supply or erecting overhead barriers of a safe height is taken when earth moving equipment or vehicles are required to operate in dangerous proximity to any live electric conductor.
291. At a construction site where transport vehicles, earth moving or materials handling machineries are used, the employer or the contractor shall ensure that:
- (1) safe and suitable access ways are provided for them; and
  - (2) traffic and pedestrian routes are so organized and controlled, including where appropriate by the provision of the traffic and pedestrian management plan, so as to secure their safe operation.
292. The employer shall ensure at a construction site that when a crane or shovel are travelling, the boom of the crane

or shovel is in the direction of such travel and the bucket or scoop attached to such crane or shovel is raised and without load, except when such travelling is downhill.

293. The employer shall ensure at a construction site that earth moving equipment and transport vehicles are equipped with a reverse horn.

### **Penalty**

294. An employer who contravenes any Section of this Chapter shall pay a fine for each contravention as follows:

- (1) First instance: Ninety (90) times the Daily National Minimum Wage.
- (2) Second instance: One Hundred and Eighty (180) times the Daily National Minimum Wage.
- (3) Third and repeated instances: Three Hundred and Sixty (360) times the Daily National Minimum Wage.

## **Chapter 8: Demolition and Explosive**

### **Demolition**

295. When the demolition operation of any structure is over 6 m high and is likely to pose danger to a person at work, the employer or the contractor shall ensure that:
- (1) appropriate precautions, methods and written procedures are adopted, including those for the disposal of waste or residues;
  - (2) the work is planned and undertaken only under the supervision of a competent person; and
  - (3) no person except the employees who are involved in demolition enters the operation site.
296. On every demolition work, danger signs shall be posted around the structure and all doors and openings giving access to the structure shall be kept barricaded or guarded.
297. Demolition work shall not commence until all necessary steps have been taken to prevent injury to any person or damage to adjoining property, and all existing gas, electrical and other services likely to endanger a worker have been shut off or disconnected.
298. Shoring or other necessary measures shall be taken to prevent the accidental collapse of any part of the building or structure being demolished or any adjacent building or structure endangering the employees.

299. No building or any part of the structure shall be overloaded with debris or materials as to render it unsafe and hazardous to persons working there.
300. Adequate precautions shall be taken to avoid danger from any sudden twisting, springing or collapse of any steel or ironwork cut or released.
301. A truss, girder, or other structural member shall not be disconnected until it has been relieved of all loads other than its own weight, and provided with temporary supports.
302. When demolition is suspended or discontinued, all access to the remaining part of the building shall be fenced or barricaded.

### **Mechanical Demolition**

303. The demolition area where work is done by mechanical devices such as weight balls or power shovels shall:
  - (1) be barricaded for a minimum distance of 1 ½ times the height of the structure;
  - (2) not allow entrance of unauthorized persons; and
  - (3) be arranged and maintained so the mechanical devices used shall not cause any damage to adjacent structures, power lines or public roads.

### **Explosives**

304. The employer or the contractor shall, as far as reasonably practicable, ensure that all explosives used

or to be used on the site are stored, transported, used, and disposed safely and securely.

305. A competent person shall be appointed in writing to organize and supervise all works at the site involving the use of explosives and obtain confirmation in writing of acceptance of the appointment.
306. No person inexperienced in handling dynamite or other high explosives shall handle, transport, prepare or use dynamite, unless the inexperienced person works under the personal supervision of a person with experience in blasting operations.
307. A record of explosives received and used shall be properly maintained and produced upon the demand of the Labour Inspector.

## **Blasting**

308. When the blasting operation is carried out at a construction site, the employer or the contractor shall ensure that:
  - (1) no person is within, or may enter within, the identified danger zone when blasting is carried out;
  - (2) the blasting system or circuit is checked to ensure that it has been connected correctly;
  - (3) where electrical detonators are used, ensure that they have been correctly connected to the blasting system or circuit and that the blasting system is tested with an instrument suitable for the purpose;

- (4) where appropriate, ensure that electrical integrity of a blasting system or circuit is such as to make a misfire unlikely; and
  - (5) a warning signal is given and a shot is fired from a safe place.
309. Only the quantity of dynamite required for immediate use in blasting of a part of a building or other structure shall be removed from the magazine.
310. No holes shall be drilled within 6.5 m of a hole being loaded with explosives or blasting agents.
311. Provisions are made to prevent the piling of stocks of explosives directly against masonry walls, brick-lined or sand-filled metal walls and single-thickness metal walls; such protection, however, shall not interfere with proper ventilation at the interior of side and end walls.
312. When any explosive has deteriorated to an extent that it is in an unstable or dangerous condition, or if nitro-glycerine leaks from any explosives, a competent person shall immediately proceed to destroy such explosive in accordance with the procedures laid out by a relevant authority.
313. Explosives and caps recovered from the blasting misfires are disposed properly as per the procedures laid out by the relevant authority and should not be reused.
314. Smoking, matches, open flames, spark-producing devices, and firearms (except firearms carried by guards) shall not be permitted inside of or within 15 m of the

- magazines. Combustible materials shall not be stored within 15 m of the magazines.
315. No employee shall be allowed to smoke, carry matches or any other flame-producing device, or carry any firearms or loaded cartridges near explosives.
  316. Vehicles used for transporting explosives shall meet the requirements as per the existing rules of the relevant authority.
  317. Persons authorized to conduct blasting operations shall use every reasonable precaution, including but not limited to warning signals, flags, barricades, or woven wire mats to ensure the safety of the general public and workmen.
  318. Blasting operations shall be conducted during daylight hours.
  319. Appropriate warning signs are displayed against the use of mobile radio transmitters on all roads within 107 m of the blasting operations.
  320. Explosives or blasting equipment that are obviously deteriorated or damaged are not used.
  321. No explosives are abandoned.
  322. Maintain good housekeeping practices around any bin containing ammonium nitrate or blasting agent. This includes keeping weeds and other combustible materials cleared within 7.5 m of the bin. Accumulation of spilled product on the ground shall be prevented.

## **Penalty**

323. An employer who contravenes any Section of this Chapter shall pay a fine for each contravention as follows:

- (1) First instance: Ninety (90) times the Daily National Minimum Wage.
- (2) Second instance: One Hundred and Eighty (180) times the Daily National Minimum Wage.
- (3) Third and repeated instances: Three Hundred and Sixty (360) times the Daily National Minimum Wage.

## Chapter 9

### Definitions

324. For the purposes of this Regulation unless the context indicates otherwise the words, phrases and acronym are defined as follows:

**Competent person** in relation to any provisions of this Regulation means any person or an institution recognized as such by the Chief Labour Administrator for the purpose of carrying out any test, examination and inspection. Such person or Institution (employing qualified persons) who by virtue of their qualification, training and experience and facilities available at their disposal is capable to carry out the tests and examinations.

**Confined space** means any place, including any vessel, tank, container, vat, silo, hopper, pit, bund, trench, pipe, sewer, flue, well, chamber, compartment, cellar or other similar space which, by virtue of its enclosed nature creates conditions which give rise to a likelihood of accident, harm or injury of such a nature as to require emergency action due to the presence or reasonably foreseeable presence of:

- (1) flammable or explosive atmospheres;
- (2) harmful gas, fume or vapour;
- (3) free flowing solid or an increasing level of liquid;
- (4) excess of oxygen;
- (5) excessively high temperature; and
- (6) the lack or reasonably foreseeable lack of oxygen.

**Construction site** means a place where construction work is undertaken and also any area in the immediate vicinity of any such place which is used for the storage of materials or plants used or intended to be used for the purpose of construction work.

**Crane** means any appliance equipped with mechanical means of raising and lowering a load and for transporting the load while suspended; and also all chains, ropes, swivels, or other tackle (down to and including the hook), used in the operation of a crane; but does not include:

- (1) a hoist block running on a fixed rail or wire;
- (2) a stacker or conveyor whereby a load is moved by means of a belt or platform, or
- (3) an earth or mineral moving or excavating appliance not fitted with a grab.

**Guys rope** refers a rope or line fixed to the ground to secure a tent or other structure

**Health and Safety Committee** means a forum for opening communication between employees and upper management. It allows staff to address concerns related to work health and safety issues.

**Hoist** means a lifting machine, whether worked by mechanical power or not, with a carriage, platform or cage, the movement of which is restricted by a guide or guides; and also the supports, well and enclosures, and the carriage, platform or cage, and the whole of the mechanical and electrical apparatus (if any) required in connection with the operation and safety of

a hoist, but does not include a builder's lift or a tower working platform.

**Lifting appliance** means a crab, winch, pulley block or gin wheel used for raising or lowering a hoist crane, sheer legs, excavators, draglines, pile driver, or pile excavators.

**Lifting gear** means a chain sling, rope sling, ring, link, hook, shackle, swivel or eyebolt.

**Man-locks** is an airlock that allows workmen to pass in and out of spaces with differing air pressures, especially one providing access to and from a tunnel, shaft, or caisson in which the air is compressed.

**Mechanical equipment** includes any bulldozer, compactor, dumper, excavator, grader, loader, locomotive, lorry, scraper, truck and any mobile machine which is used for handling of any material on a construction site.

**Medical lock** is an air chamber comprising a steel cylinder 18 ft (5.5 m) long and about 6 ft (1.8 m) in diameter, which has airtight doors at one end and is closed at the other.

**Mobile crane** means a crane capable of traveling under its own power.

**Occupational Health and Safety Policy** is defined as the overall intentions and direction of an organization related to its OHS performance

**Plant or equipment** shall include any plant equipment gear, machinery, apparatus or appliances, or any part thereof.

**Portal areas** tunnel entrance is called a portal; tunnels may also be started from the bottom of a vertical shaft or from the end of a horizontal tunnel driven principally for construction access and called an audit.

**Prime mover** means any engine, motor, or other appliance, which provides mechanical energy derived from:

- (1) steam or electricity;
- (2) the combustion of fuel, or
- (3) any other source.

**Qualified medical professional** has the same meaning assigned to it in the “Regulation on Occupational Health, Safety and Welfare, 2022”.

**Qualified nurse** is a certified occupational health nurse who is registered with a relevant authority and have experience in community health care, ambulatory or critical care, or emergency nursing.

**Risk assessment** is a term used to describe the overall process or method where you identify hazards and risk factors that have the potential to cause harm.

**Safe drinking water** is a drinking water which is certified by a competent authority as safe for drinking.

**Safety officer** means a person who is appointed by the employer to look after the occupational health and safety aspects of the workplace.

**Safe working load** in relation to a lifting appliance or to lifting gear, means either:

- (1) the appropriate safe working load for operating the appliance or gear as specified in the current certificate of test given in the approved form by a competent examiner in respect of the appliance or gear for the purposes of this Regulation; or

- (2) where no such certificate is required, the relevant safe working load appropriate to the lifting appliance or lifting gear.

**Scaffold** means any temporary elevated platform (supported or suspended) and its supporting structure (including points of anchorage), used for supporting employees or materials or both.

**Shaft** is an underground vertical or inclined passageway. Shafts are often entered through a manhole and closed by a manhole cover.

**Sheathing** means the vertical member of shoring and timbering which directly resists pressure from the side of an excavation.

**Strut** means the transverse member of shoring and timbering which directly resists pressure from sheathing or wale.

**Wale** means the longitudinal member of shoring and timbering which directly resists pressure from sheathing.

## **List of Schedules**

### **Schedule I: List of machinery**

The list of construction equipment are as follows:

1. Earthmoving equipment
  - (1) Excavator
  - (2) Backhoe
  - (3) Loader
    - (a) Bucket loader;
    - (b) Front loader;
    - (c) front-end loader;
    - (d) Pay loader;
    - (e) Scoop;
    - (f) Shovel;
    - (g) Skip loader;
    - (h) Wheel loader;
    - (i) Skid-steer loader; and
    - (j) Crawl loader.
  - (4) Bulldozers
  - (5) Trenches
  - (6) Motor Grader
  - (7) Motor Scraper
2. Construction vehicles
  - (1) Dumper

(2) Tippers

(3) Trailers

(4) Truck

### 3. Material Handling Equipment

(1) Cranes

(2) Conveyers

(3) Forklift

(4) Hoist

(5) Concrete Mixers

### 4. Road making Machine

(1) Road Roller

(2) Road paver

(3) Hot mix plants

(4) Stone crusher

(5) Mobile Asphalt layer and finisher

(6) Road rammer

## **Schedule II: Fall Protection**

### **Unprotected sides and edges**

1. Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 ft (1.8 m) or more above a lower level shall be protected from falling using guardrail systems, safety net systems, or personal fall arrest systems.

### **Leading edges**

2. Each employee who is constructing a leading edge 6 ft (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems.
3. Each employee on a walking/working surface 6 ft (1.8 m) or more above a lower level where leading edges are under construction, but who is not engaged in the leading-edge work, shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system. If a guardrail system is chosen to provide the fall protection, and a controlled access zone has already been established for leading edge work, the control line may be used in lieu of a guardrail along the edge that parallels the leading edge.

## **Hoist areas**

4. Each employee in a hoist area shall be protected from falling 6 ft (1.8 m) or more to lower levels by guardrail systems or personal fall arrest systems. If guardrail systems, [or chain, gate, or guardrail] or portions thereof, are removed to facilitate the hoisting operation (e.g., during landing of materials), and an employee must lean through the access opening or out over the edge of the access opening (to receive or guide equipment and materials, for example), that employee shall be protected from fall hazards by a personal fall arrest system.

## **Holes**

5. Each employee on walking/working surfaces shall be protected from falling through holes (including skylights) more than 6 ft (1.8 m) above lower levels, by personal fall arrest systems, covers, or guardrail systems erected around such holes.
6. Each employee on a walking/working surface shall be protected from tripping in or stepping into or through holes (including skylights) by covers.
7. Each employee on a walking/working surface shall be protected from objects falling through holes (including skylights) by covers.

## **Formwork and reinforcing steel**

8. Each employee on the face of formwork or reinforcing steel shall be protected from falling 6 ft (1.8 m) or more to lower levels by personal fall arrest systems, safety net systems, or positioning device systems.

## **Ramps, runways, and other walkway**

9. Each employee on ramps, runways, and other walkways shall be protected from falling 6 ft (1.8 m) or more to lower levels by guardrail systems.

## **Excavations**

10. Each employee at the edge of an excavation 6 ft (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barrier;
11. Each employee at the edge of a well, pit, shaft, and similar excavation 6 ft (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers.

## **Dangerous equipment**

12. Each employee less than 6 ft (1.8 m) above dangerous equipment shall be protected from falling into or onto the dangerous equipment by guardrail systems or by equipment guards.

13. Each employee 6 ft (1.8 m) or more above dangerous equipment shall be protected from fall hazards by guardrail systems, personal fall arrest systems, or safety net systems.

### **Overhand bricklaying and related work**

14. An employee performing overhand bricklaying and related work 6 ft (1.8 m) or more above lower levels, shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or shall work in a controlled access zone.
15. Each employee reaching more than 10 inches (25 cm) below the level of the walking/working surface on which they are working shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system.

### **Roofing work on Low-slope roofs**

16. An employee engaged in roofing activities on low-slope roofs, with unprotected sides and edges 6 ft (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or a combination of warning line system and guardrail system, warning line system and safety net system, or warning line system and personal fall arrest system, or warning line system and safety monitoring system. Or, on roofs 50-ft (15.25 m) or less in, the use of

a safety monitoring system alone [i.e., without the warning line system] is permitted.

### **Steep roofs**

17. Each employee on a steep roof with unprotected sides and edges 6 ft (1.8 m) or more above lower levels shall be protected from falling by guardrail systems with toe boards, safety net systems, or personal fall arrest systems.

### **Precast concrete erection**

18. Each employee engaged in the erection of precast concrete members (including, but not limited to the erection of wall panels, columns, beams, and floor and roof "tees") and related operations such as grouting of precast concrete members, who is 6 ft (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems.
19. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan.

## **Schedule III: Temporary Living Accommodation**

### **General Provision**

When providing living accommodation to employees at construction sites, the objective should be to ensure adequate and decent accommodation and a suitable living environment for employees. The provision of accommodation to workers shall align with the objectives of Occupational Health and Safety. Therefore, it shall meet certain minimum specifications in respect of the nature and standard of the accommodation, and facilities to be made available.

The following specifications are drawn for the provision of accommodation to workers in the Bhutanese Construction Industry based on international labour standards.

1. The accommodation shall be provided and maintained for the entire contract period including any time extension if any or delays. The complete work of providing temporary living accommodation to workers at construction sites shall be treated as an item of work under Occupational Health and Safety.
2. The construction shall be durable taking into account local conditions, such as liability to earthquakes, flood and landslide.
3. The layout and the structure drawings of the temporary living accommodation shall be in accordance to the Bhutan Schedule of Rate under Occupational Health and

Safety Chapter or as specified by Ministry of Labour and Human Resources.

### **Location**

4. The temporary living accommodation for employees should be constructed at the safest place where there is no risk of flooding, landslide, collapse hazards, falling boulders and other elements.

### **Accommodation**

5. A gender friendly living accommodation should be provided.
6. Accommodation should be constructed where workers are protected against the elements (such as wind, cold, rain, heat, etc.)
7. There should be one room for every 4 employees. Adequate headroom and movement space shall be provided. The size of the room shall be at least 3.5 m<sup>2</sup> per person (refer drawing).
8. A separate kitchen shall be provided if employees cook by themselves. However, if the meals are provided by the employer, a common dining room, canteen, or mess room, located away from the sleeping areas should be provided.
9. A separate pour-flush toilet with or separate bathroom, washing facilities for male and female shall be provided. There shall be one toilet cum bathroom for every six

users. The size of the toilet shall comply with the Building Code of Bhutan/ the attached drawing.

10. The floors of each room shall be constructed of wood or concrete. Floor shall be provided with good finishes. All wooden floors shall be elevated not less than 1 ft above the ground level at all points to prevent dampness and to permit free circulation of air beneath.
11. The walls of the bed room and the kitchen must be constructed preferably with ply boards of at least 10 mm thickness (or equivalent) and CGI/ PPI Sheet for roofing. For toilets, both walls and roof shall be constructed with CGI/ PPI sheets (or equivalent).
12. There should be adequate natural light during the daytime and adequate artificial light (refer drawing).
13. Adequate ventilation to ensure sufficient movement of air in all conditions of weather and climate.

### **Health and Hygiene**

14. An adequate and convenient water supply shall be provided for drinking, cooking, bathing, and laundry purposes.
15. The accommodation should maintain good sanitation and hygiene (proper drainage system, proper waste management, good housekeeping, etc.).
16. Measures should be taken to prevent the spread of diseases, especially communicable diseases.

## **Safety at temporary accommodation site**

17. Any electricity supplied for the accommodation should abide by the Electricity Act of Bhutan, 2001.
18. There should not be any exposed live wire or unattended electrical switches & sockets in the living accommodation.
19. Every cable used for any purpose should have a plug at one end.
20. Combustible, explosive, and highly flammable materials should not be stored in the living accommodation.
21. Fire safety measures should be taken, including installing and maintaining fire equipment.
22. As far as possible, floors, walls, ceilings and equipment should be constructed to minimize health risks.