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22.1 Definitions

(1) In this Part

"caisson" means a casing sunk or constructed below ground or water level;

"cut" means the series of loaded and unloaded holes that are drilled in a face to serve as the location for initiating a blast;

"dump" or *"tip"* means an accumulation of rock fragments or other unconsolidated material formed by pushing or dropping the loose material over the crest and allowing it to come to rest without further handling;

"face" means any part of an underground working where excavating is in progress or was last done;

"gassy underground working" means any underground working in which there exists, or is likely to exist, an atmosphere containing more than 10% of the lower explosive limit (LEL) of naturally-occurring flammable gases or vapours, or any other gas or vapour emanating from the ground surrounding the working in concentrations exceeding the exposure limits listed in this Regulation;

"percussion drill" means an air or hydraulic-driven drill that breaks by impact;

"portable switch" means a movable track resting on top of a regular track upon which a train car may be diverted for passing;

"probe hole" means a borehole drilled ahead of or at an angle to the heading being worked to probe for conditions that lie ahead or around the underground working;

"qualified person" means a person who is

(a) qualified because of knowledge, training and experience to design, organize, supervise and perform the duties for which the person is appointed,

(b) familiar with the requirements that apply to the duties for which the person is appointed, and

(c) capable of identifying any potential or actual danger to health or safety in the workplace;

"raise climber" means a mechanical powered work platform, temporary or permanent, controlled from the cage underneath the platform, used to provide access to the face of a raise or other working area;

"underground working" includes any adit, tunnel, underground excavation, chamber, caisson, raise, shaft, winze or natural entry;

"underground working supervisor" means, in relation to an underground working, a person appointed under section 22.12(2) as an underground working supervisor for the underground working.

(2) Unless a contrary intention appears, the definitions in section 21.1 apply to this Part.

[Amended by B.C. Reg. 9/2017, effective May 1, 2017.]
[Amended by B.C. Reg. 207/2021, effective December 1, 2021.]

22.2 Application

(1) This Part applies to any underground working which is not a mine within the meaning of the *Mines Act*, or the *Health, Safety and Reclamation Code for Mines in British Columbia,* and which a worker will be required or permitted to enter.

(2) Generally, this Part does not apply to horizontal underground workings that are less than 5 m (16 ft) in length or to permanent facilities in their final structural condition as certified by a professional engineer.

22.3 Work methods

In any underground working, work methods and operations must be in accordance with

(a) standard engineering practices for the type of work being performed,

(b) the requirements of this Part, and all other applicable requirements of this Regulation, and

(c) any additional requirements prescribed by the Board.

22.4 New or unusual situations

(1) If an employer proposes to use methods or equipment which are new or not in accordance with standard practices for underground workings, the employer must, before starting work, submit details of the proposed methods and equipment to the Board for review and acceptance.

(2) A description of the means to ensure the health and safety of workers by engineering or other methods must be part of the submission.

22.5 Preconstruction meeting

(1) Before commencing an underground working, the owner, or if the owner engages another person to be the prime contractor, then that person, must meet with designated officers to review the requirements of this Regulation and other information pertinent to the underground working.

(2) If more than one prime contractor is employed on the project, the owner must attend the pre-construction meeting.

22.6 Notice of project

(1) No later than 30 days before commencing an underground project, written notification of the project must be given to the Board by the owner or another person engaged by the owner to be the prime contractor, except that if there is more than one prime contractor employed on the project the notice must be given by the owner.

(2) The notification must include

(a) the name of the project,

(b) the address or location of the project referenced to the nearest town and public highway,

(c) the name and address of the owner and of any other person engaged to be the prime contractor, and of the bonding company, if appropriate,

(d) the name of the person in charge of the project,

(e) a brief description of the project including

(i) the type of underground working,

(ii) the mining method,

(iii) the type, number of units, and engine horsepower (watts) of the mining equipment,

(iv) the starting date and approximate duration of the project,

(v) the approximate peak labour force, and

(vi) the proposed hours of work,

(f) the details of proposed temporary or permanent ground support, including the proposed timing of such support, and whether the owner or another person engaged to be the prime contractor will be responsible for its design and installation,

(g) the plans, drawings and fan specifications for the ventilation systems that will be used during construction, and

(h) a report produced by a professional engineer or professional geoscientist that provides

(i) a description of the geological hazards associated with the work,

(ii) drawings showing profiles, transverse sections and plans for the proposed underground workings, including the potential for encountering gassy ground, explosive dusts, rock falls, running ground or rock bursts, and

(iii) a detailed statement from the owner or another person engaged to be the prime contractor as to how geological hazards will be dealt with.

(3) Any hazards discovered during the work which were not included in the report required by subsection (2)(h) must be reported immediately to the Board.

[Amended by B.C. Reg. 253/2001, effective January 28, 2002.]
[Amended by B.C. Reg. 258/2008, effective January 1, 2009.]

22.7 Underground record

(1) The employer must ensure that a daily log titled "The Underground Record" is provided and that appropriate information is recorded in it.

(2) Required entries in the Underground Record include

(a) daily atmospheric tests with the date, time and location, concentrations of contaminants, and any unusual finding and action taken,

(b) communication system examinations and any action taken,

(c) ground control examinations and any action taken,

(d) any incident required to be reported by the OHS provisions of the *Workers Compensation Act* or by this Regulation, and

(e) records of

(i) rescue proficiency drills,

(ii) maintenance of self-contained breathing apparatus,

(iii) ventilation test results, and

(iv) calibration and maintenance of testing equipment.

(3) Each record must be clear as to who made the entry, and signed by the worker making the entry as a true record of the conditions found.

(4) The Underground Record must be read and countersigned by the corresponding supervisor on the oncoming shift, and any unusual or hazardous conditions must be discussed with the workers coming on shift before they are permitted to work in the areas indicated in the record.

(5) The employer must ensure that the Underground Record is

(a) kept at the jobsite for the duration of the project,

(b) available for inspection by an officer, and

(c) retained for 5 years after completion of the project.

[Amended by B.C. Reg. 279/2019, effective April 6, 2020.]

22.8 Hours of work

(1) The employer must not permit the employment of a worker in an underground working for a period longer than 8 hours in any 24 hours.

(2) Subsection (1) does not apply when

(a) there are emergencies where life or property is in danger, or

(b) urgent work is essential to the continuation of the ordinary operation of an underground working, provided it is only on an infrequent basis, or to accommodate shift changes within a 24 hour period, provided there is an 8 hour rest period between shifts.

(3) Work performed pursuant to the exceptions in subsection (2) must not exceed 16 hours in any 24 hour period.

(4) If it is impractical to restrict routine underground work to a maximum of 8 hours, the employer must submit written procedures to the Board, as part of the notice of project, and must obtain prior written permission from the Board to work longer hours.

22.9 Additional first aid

In addition to the requirements of sections 3.14 to 3.21, if an underground working has progressed more than 300 m (1,000 ft) underground, a first aid attendant must be available in proximity to the main underground work area.

[Amended by B.C. Reg. 348/2003, effective March 30, 2004.]

22.10 Retroreflective devices

Underground workers must wear retroreflective devices on their clothing and hard hats.

22.11 Self-rescuers

(1) For non-gassy workings, a minimum of an approved self-rescuer of the air purifying type must be carried by the worker.

(2) For gassy workings, a minimum of a self-contained (air supply) self-rescuer capable of delivering 30 minutes of air must be immediately accessible to each worker underground.

22.12 Appointment of underground working supervisor

(1) In this section, "mine" has the same meaning as in the *Mines Act*.

(2) At every underground working, the employer performing the active excavation or rehabilitation of the underground working must appoint, as an underground working supervisor for the underground working, a person who

(a) is knowledgeable of

(i) the duties of supervisors under section 23 of the *Workers Compensation Act* and this Part, and

(ii) the requirements of this Part, and of any other provision of this Regulation, that apply to the active excavation or rehabilitation of the underground working,

(b) is qualified to supervise the active excavation or rehabilitation of the underground working, and

(c) meets the requirements of subsection (3) or (4), as the case may be.

(3) Subject to subsection (4), a person must not be appointed as an underground working supervisor unless

(a) the person holds an underground coal mine fireboss certificate or an underground shiftboss certificate, issued under the Health, Safety and Reclamation Code for Mines in British Columbia,

(b) the person

(i) has been employed full time in underground workings for more than 5 years, including more than 2 years as a supervisor of the active excavation of an underground working other than a mine, and

(ii) holds a valid first aid certificate issued by the Board or by a person recognized by the Board,

(c) the person

(i) has been employed full time in underground workings for more than 7 years, including

(A) more than 2 years of work experience in the active excavation of underground workings, including more than 6 months of work experience in each of ground stabilization and control, underground haulage and transport and general underground servicing work, and

(B) more than 6 months being directly mentored by a supervisor of an underground working other than a mine, and

(ii) holds a valid first aid certificate issued by the Board or by a person recognized by the Board, or

(d) the person

(i) has a degree, diploma or associate diploma in engineering, or an equivalent discipline, from an educational institution accredited by a provincial, state, national or other government body,

(ii) been employed full time in underground workings for more than 3 years, including

(A) more than 2 years of work experience in the active excavation of underground workings, including more than 6 months of work experience in each of ground stabilization and control, underground haulage and transport and general underground servicing work, and

(B) more than 6 months being directly mentored by a supervisor of an underground working other than a mine, and

(iii) holds a valid first aid certificate issued by the Board or by a person recognized by the Board.

(4) In the case of a gassy underground working, a person must not be appointed as an underground working supervisor unless the person holds an underground coal mine fireboss certificate issued under Health, Safety and Reclamation Code for Mines in British Columbia.

[Enacted by B.C. Reg. 9/2017, effective May 1, 2017.]
[Amended by B.C. Reg. 279/2019, effective April 6, 2020.]

22.12.1 Role of underground working supervisor

(1) The employer must ensure that every worker involved in the active excavation or rehabilitation of an underground working is under the direct supervision of an underground working supervisor.

(2) Workers not involved in the active excavation or rehabilitation of an underground working must be under the direction of an underground working supervisor.

(3) The underground working supervisor must ensure that the work activities of employers, workers and other persons at an underground working are coordinated.

(4) The owner, or the person appointed by the owner to be the prime contractor, must ensure that employers, workers and other persons at an underground working, before entering the underground working, notify the underground working supervisor and obtain authorization to enter.

[Enacted by B.C. Reg. 9/2017, effective May 1, 2017.]

22.13 Underground worker health and safety representative

(1) In every underground working there must be a qualified underground worker safety representative on each shift who is regularly employed at the site, and is

(a) chosen by the workers, and

(b) experienced in the work being performed and is familiar with the applicable health and safety requirements.

(2) The worker representative has the right, if there is reasonable cause to believe that a hazardous condition exists, to ask for and attend the investigation of the condition, and verify that any necessary corrective actions have been taken.

(3) The worker representatives must have their names posted in a conspicuous location at the worksite.

22.14 Impaired persons

(1) If in the opinion of the supervisor a person's ability is so impaired as to endanger the person's own health and safety or the health and safety of any worker, this person may not enter, remain, or be permitted to enter or remain in any underground working.

(2) No intoxicating liquor or illegal drugs are permitted in or about an underground working.

22.15 Responsibility for ventilation

If an underground working involves the services of one or more subcontractors or their workers, the person engaged by the owner to be the prime contractor, or, if there is no one such person, then the owner, must ensure that the air in all parts of the underground working, where workers may work or travel, is free from injurious or dangerous concentrations of contaminants and contains sufficient oxygen to prevent danger to the health of anyone in the underground working.

22.16 Prior approval

(1) The design for an underground working ventilation system must have the prior written approval of the Board before installation commences.

(2) The design submitted to the Board must include

(a) the dimensions of the underground working,

(b) a list of the equipment proposed for use underground and the air flow necessary for each internal combustion engine,

(c) calculations of the system air flow requirements and pressures to be developed in the system,

(d) ductwork dimensions and specifications,

(e) the make, model, horsepower, blade settings and performance curves or tables for all fans,

(f) detailed drawings of any other devices to be installed in the ventilation system,

(g) a cross section of the portal, showing the main exhaust located so that exhausted air will not come back to the portal,

(h) the altitude of the portal,

(i) a statement of air contaminant sources expected and proposed testing points and frequency of tests, and

(j) a schedule of hours of work.

22.17 Qualified person

At every underground working, the employer must appoint a qualified person on site to be responsible for all aspects of ventilation in the underground working.

22.18 Mechanical ventilation

(1) The employer must ensure that every underground working has a mechanical ventilation system that is

(a) designed, installed, and operated in accordance with good engineering practice,

(b) maintained in good working order, and

(c) capable of supplying sufficient fresh air to the underground working.

(2) The exhaust from compressed air machines must not be considered as ventilation.

22.19 Air flow

The main ventilation system must be capable of operating on blowing or exhaust duty and be equipped with a reversing switch, which normally will operate on exhaust, and the air flow must be

(a) at least 15 cubic metres per minute for each square metre (50 cfm for each square foot) of the working face area, and

(b) where internal combustion engines are used underground, the total of the air flows specified on the engine permits.

22.20 Portal fan

The portal fan may be operated on blowing duty for an initial tunnel advance not exceeding 300 m (1 000 ft).

22.21 Auxiliary fan

The work face must be ventilated by means of an auxiliary fan system which

(a) has an air flow of at least 15 cubic metres per minute for each square metre (50 cfm for each square foot) of the working face area, but not more than 90% of the main exhaust system flow,

(b) has its inlet overlapping the inlet of the main exhaust system by at least 30 m (100 ft),

(c) discharges from within 18 m (60 ft) of the face, unless workers are absent from the face, and

(d) has an effective silencer if required by the Board.

22.22 Modifications

If any modifications are made to the ventilation system, the employer must inform the Board immediately.

22.23 Malfunction

If the ventilation system ceases to function, all contaminant producing work must stop immediately, and all engines must be shut down until ventilation is restored.

22.24 Unventilated areas

Any underground area that is not ventilated must be effectively secured to prevent the entry of workers and posted with signs to warn of the hazard.

22.25 Duct air testing

(1) Duct air velocities must be measured at least once a week and any deficiencies must be corrected.

(2) Testing must take place

(a) within 9 m (30 ft) of the main duct inlet and any branch inlets,

(b) at the auxiliary fan duct outlet,

(c) 6 m to 15 m (20 ft to 50 ft) from the portal fan, and

(d) at any other location or interval as directed by an officer.

(3) The results and observations of all testing and any corrective action taken must be recorded in the Underground Record.

22.26 Welding fumes

Fumes from welding activities underground must be controlled at the source by local exhaust ventilation.

22.27 Heating underground air

(1) Before a heating system is installed or used in an underground working, the design, specifications, and operating procedure must be submitted to the Board for approval.

(2) The heating device must be

(a) located at least 25 m (80 ft) outside an entrance to an underground working,

(b) vented to prevent flue gases from entering the underground working,

(c) equipped with an automatic fuel shutoff if the fire goes out, and

(d) manually restarted after an automatic shutdown.

22.28 Heating equipment

(1) The installation of underground heating equipment acceptable to the Board must include provisions for mounting, clearances and air supply, and must meet the applicable requirements of the following standards and codes as amended from time to time:

(a) *CSA Standard CAN/CSA-B139-M91, Installation Code for Oil Burning Equipment*;

(b) *CGA Code CAN/CGA-B149.1-M91, Natural Gas Installation Code*;

(c) *CGA Code CAN/CGA-B149.2-M91, Propane Installation Code*;

(d) *CSA Standard C22.1-94, Canadian Electrical Code, Part 1*;

(e) *CSA Standard B51-M1991, Boiler, Pressure Vessel, and Pressure Piping Code*.

(2) With the exception of embedded pipes or ducts, all parts of the heating system must be readily accessible for inspection, maintenance, repair, and cleaning.

(3) The heating system must be protected from freezing.

(4) A carbon monoxide detector, capable of detecting concentrations below 25 ppm and shutting down the heater if this level is exceeded, must be installed 15 m (50 ft) downstream from where the heated air enters the underground working.

(5) Pipelines with gas pressures in excess of 3.5 kPa (0.5 psi) must not be located within 15 m (50 ft) of an underground working.

(6) Pressure regulating stations must be clearly marked and protected from physical damage.

(7) Propane storage tanks must be located so that any leak will not enter an underground working.

(8) A vibration switch that will shut down the heater at prescribed vibration limits must be mounted on the fan cage.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

22.29 Other heating devices

The following heating devices must not be located in an underground working or within 25 m (80 ft) of the portal:

(a) an open flame heater;

(b) a liquefied petroleum gas or natural gas heater;

(c) a heater, torch or burner using fuel with a flash point of less than 40°C (104°F).

22.30 Atmospheric testing

(1) The employer must ensure that tests of the underground atmosphere are conducted to ensure that an oxygen deficient atmosphere does not exist, that a worker's exposure to air contaminants does not exceed the exposure limits in Part 5 (Chemical and Biological Substances), and that a worker's exposure to respirable combustible dust (RCD) does not exceed its exposure limit, which is 1.5 mg/m^3, based on an 8-hour time weighted average.

(2) Tests must be conducted by a qualified person using equipment, devices and methods acceptable to the Board.

(3) Calibrations of testing equipment must be recorded in the Underground Record.

(4) Test results must be recorded and signed in the Underground Record by the qualified person doing the testing, and must be readily available for review by affected workers.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

22.31 Testing during construction

During construction or excavation of an underground working the employer must ensure that atmospheric tests are made for carbon monoxide, nitrogen dioxide, combustible gases and oxygen content

(a) if the ventilation has been interrupted for more than one hour,

(b) at least every 4 hours while an internal combustion engine is operating,

(c) after blasting has taken place,

(d) after a fire or other unusual occurrence causing atmospheric contamination, or

(e) as directed by an officer.

22.32 Additional tests

(1) If the presence of a flammable or toxic gas is suspected or encountered, the employer must ensure that additional tests are made as required.

(2) When a worker has reasonable cause to believe that a hazardous atmosphere may exist, the worker may request that tests be made to determine the level of contaminants.

(3) The supervisor or employer receiving such a request must forthwith investigate, ensure that appropriate testing is conducted and recorded, and that any unsafe atmospheric condition is rectified.

(4) The employer must ensure that only workers qualified to conduct testing and workers necessary to assist them enter an underground working, until it is declared safe.

22.33 Radioactivity survey

(1) When excavation commences, the employer must ensure that a survey is conducted to determine if significant levels of ionizing radiation are present at the underground working.

(2) If results of the survey indicate that significant levels of ionizing radiation are present, the employer must establish a radiation protection program.

(3) If the initial survey does not indicate the presence of significant levels of ionizing radiation, the underground working must be resurveyed every 30 days as the excavation work proceeds.

22.34 Electrical installations

Electrical equipment and wiring in an underground working must meet the requirements of *CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines*.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

22.35 Communications

(1) An effective radio or telephone communication system must be maintained between the surface and underground work areas including refuge and first aid stations and at least every 600 m (2 000 ft).

(2) The communication system must have an independent power supply.

(3) Removal or failure of one communication device must not render the remainder of the communication system inoperative.

22.36 Illumination

(1) The employer must ensure that the minimum illumination measured 1 m (39 in) above the floor or ground level in an underground working is

(a) 22 lux (2 foot candles) in a tunnel, shaft, incline, and haulage way, and

(b) 54 lux (5 foot candles) at a working face or other area of high activity.

(2) The employer must ensure that an emergency lighting system or apparatus is available for every worker in an underground working so that they may exit safely.

(3) Broken or defective lights must be replaced without delay.

(4) A lower level of illumination, such as provided by an electric cap lamp, may be accepted for underground repair or inspection work of short duration.

22.37 Cap lamps

(1) Cap lamps must be kept in the worker's possession at all times while underground.

(2) All newly purchased cap lamps, and after January 1, 1999 all cap lamps, must be capable of providing a peak illumination of at least 1 500 lux (150 foot candles) 1.2 m (48 in) from the light source, throughout the work shift.

22.38 Maintenance

The employer must establish a procedure for assessing and maintaining cap lamps or equivalent portable lighting system.

22.39 Auxiliary lighting

If a worker is required to assess ground conditions in an underground working, at a distance greater than the effective range of a cap lamp, auxiliary lighting must be provided to safely carry out the assessment.

22.40 Battery charging stations

The employer must ensure that battery charging stations are

(a) effectively ventilated, and

(b) posted with "No Smoking" and "Fire Hazard" signs.

(c) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

22.41 Pipelines

The employer must ensure that air, water or discharge pipelines are

(a) hung or secured from suitable hangers, and

(b) located so that they are protected from moving equipment.

22.42 Water control

(1) If the accumulation of water might affect the stability of the working or otherwise endanger workers, the employer must ensure that a suitable system is installed to remove the water.

(2) Adequate drainage must be installed on all roadways and haulage ways.

22.43 Dams

If there may be a danger to workers from structures for storing water in an underground working, the plans and specifications must be submitted to the Board for approval before construction begins.

22.44 Transportation of workers

The employer must ensure that

(a) workers are not transported in the box of a haulage, pickup or service truck, or in the bucket of a piece of mobile equipment, unless it is specifically designed for that purpose,

(b) workers do not board or leave any vehicle while it is in motion, and

(c) when transporting workers, underground crew vehicles are clearly identified for that purpose.

22.45 Transportation of workers by rail

(1) The employer must ensure that any railway type conveyance used to transport workers is

(a) pulled when transporting workers,

(b) provided with overhead and side protection, and

(c) equipped with handrails, a non-slip floor, and an emergency exit if the conveyance is fully enclosed.

(2) A minimum clearance of 30 cm (1 ft) must be maintained between the head of a worker travelling on the track haulage vehicle and the roof of the roadway or any obstruction.

(3) Prior written acceptance of the Board must be obtained before transporting workers on an incline or slope in an underground working by means of track haulage.

(4) Workers must not ride on the exterior of a car, locomotive or train in an underground working.

(5) Passenger cars hauled by mechanical means must have

(a) a clearance of not less than 15 cm (6 in) above the roof of the car, and

(b) safety chains connected between the cars and between the first car and the locomotive, in addition to the normal couplings or drawbar.

22.46 Shaft conveyances

(1) Workers may only ride in an appropriate, designated shaft conveyance.

(2) When shaft sinking, workers must not ride on the rim of the bucket, or on material or equipment in the bucket.

(3) Suitable safety staging must be installed for transporting workers in buckets over 107 cm (42 in) deep, at a level not less than 107 cm (42 in) below the rim.

22.47 Procedures

The employer must ensure that

(a) appropriate written emergency procedures are established and are readily available at the worksite, and address

(i) communication and emergency warning procedures,

(ii) evacuation and personnel count procedures,

(iii) fire fighting and rescue procedures,

(iv) ventilation procedures,

(v) location of emergency equipment and procedures for use, and

(vi) other relevant information,

(b) notices giving direction for immediate action in an emergency are posted in conspicuous places,

(c) each person is instructed in the emergency procedures before commencing work in an underground working, and

(d) a designated worker on each shift is responsible for implementing the emergency procedures.

22.48 Coordination

The employer must designate an emergency response coordinator with full authority to implement the emergency procedures.

22.49 Evacuation procedure

A test of the evacuation procedure must be done within 3 months of commencing the project, and at least annually thereafter.

22.50 Refuge stations

(1) A refuge station must be provided within 500 m (1 640 ft) of the main underground work area, which is

(a) large enough to accommodate all workers underground,

(b) supplied with drinking water and compressed air tanks or cylinders,

(c) equipped with a communication system to the surface,

(d) capable of being sealed to prevent the entry of gases,

(e) provided with a plan of the underground working which shows all exits,

(f) maintained in sanitary condition, and

(g) equipped with emergency lighting.

(2) When unusual conditions warrant, such as gassy underground workings, additional refuge stations may be required by the Board.

22.51 Rescue workers

(1) The employer must ensure that workers holding certificates of competence in underground mine rescue valid in BC, or other similar certification acceptable to the Board, who are trained in and capable of carrying out the established emergency procedures, are available for rescue operations as follows:

(a) at least 3 workers when 6 to 10 workers are underground on shift;

(b) at least 5 workers when more than 10 workers are underground on shift;

(c) if 5 or fewer workers per shift are employed underground, or if the underground workings do not progress more than 300 m (1 000 ft), the employer must submit written rescue procedures, including details of training and availability of rescue workers, for Board approval.

(2) The names and locations of trained workers must be posted in conspicuous places.

(3) The employer must ensure that proficiency drills for workers trained in rescue work are held at least every 30 days, and are recorded in the Underground Record.

22.52 Self-contained breathing apparatus

(1) The employer must ensure that self-contained breathing apparatus (SCBA) for use in emergencies is available and located on the surface as near to the portal as is practicable, and capable of at least 2 hours operation.

(2) The employer must provide

(a) at least 4 units of SCBA when 10 or fewer workers are underground on shift, and

(b) at least 6 units of SCBA when more than 10 workers are underground on shift.

22.53 Dangerous conditions

(1) Only workers trained for emergencies may enter or remain in any underground working dangerous to life or health by virtue of fire, unplanned explosion, hazardous atmosphere or other hazardous condition, and no other work may be performed until the hazardous condition has been eliminated or controlled.

(2) Hazardous conditions described in subsection (1) must be reported to the Board.

22.54 Fire prevention and control

The employer must ensure that

(a) sufficient suitable fire extinguishers or other systems of fire control are available at any underground location where a fire may occur, and that automatic systems are installed in shops and lunch rooms,

(b) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

(c) combustible liquids with a flash point below 52°C (126°F), flammable liquids, oil and grease used in an underground working are transported and stored only in metal containers or receptacles or in portable plastic containers approved for petroleum fuels, and when stored underground, unless in an approved enclosure, are restricted to a quantity sufficient for the current day's work,

(d) any equipment repair or refueling depot is not located underground unless written permission has been obtained from the Board, and

(e) workers do not build, start, or maintain a fire in an underground working.

(f) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]
[Amended by B.C. Reg. 222/2021, effective December 1, 2021.]

22.55 Flammable gas restriction

(1) Except when needed for burning or cutting, acetylene, propane, or other volatile fuel must not be permitted underground.

(2) If volatile fuels are used for burning or cutting, the containers for the fuel must meet the requirements of the *Transportation of Dangerous Goods Act, 1992* (Canada), and may not have a capacity greater than 10 kg (22 lbs).

22.56 Equipment fire extinguishers

The employer must ensure that mobile diesel equipment used in an underground working is equipped with a fire extinguisher acceptable to the Board.

22.57 Accounting for workers

The employer must ensure that

(a) an effective tag-in method of accounting for all workers entering and leaving the underground working is established and maintained,

(b) at least one worker is on outside duty whenever any worker is underground,

(c) an effective system of checking on any worker is instituted, and

(d) trained rescue workers are identified by distinctive tags.

22.58 General requirement

The employer must ensure that any portal or collar excavation, including the slopes surrounding it, is effectively stabilized to prevent falls of material into the work area, or other effective means are employed to prevent injury to workers due to falls of material.

22.59 Structures at the entrance

Prior written acceptance must be obtained from the Board before locating any structure built of combustible material, or any hazardous material storage, within 25 m (80 ft) of an entrance to an underground working.

22.60 Projecting support system

Any support system projecting outside an underground working must be of sufficient strength to ensure that it does not break or collapse should material fall from above.

22.61 Spill control

Storage facilities for hazardous liquids must be located so that spillage will not flow towards an underground working.

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22.62 General requirement

The employer must ensure that any part of the underground working accessible to workers is effectively scaled and stabilized, or secured to prevent entry by unauthorized persons, and is periodically inspected by a qualified person to prevent the development of unsafe conditions.

22.63 During excavation

(1) The employer must ensure that any active underground working is examined and, if necessary, scaled daily or otherwise stabilized as the nature of the ground and the work being performed necessitates.

(2) The worker making the examination must, before going off shift, report to the worker's supervisor any unusual condition found that has not been corrected.

(2.1) If a supervisor receives a report of an unusual condition that has not been corrected, the supervisor must, before going off shift, make a written report of the unusual condition to the underground working supervisor.

(3) Any ground stabilization must be done by, or under the direction of a qualified person.

(4) An adequate supply of properly sized and dressed scaling bars and other equipment necessary for scaling must be provided and maintained by the employer.

(5) If a shoring set is required

(a) any loose rock or material must be scaled or adequately supported before other work is performed,

(b) the set must be designed and installed so that the bottom section is securely anchored to prevent movement,

(c) effective lateral bracing must be installed between sets to stabilize the support,

(d) the set must be completely in place and secured before other work is performed, and

(e) a damaged set that is hazardous must be repaired or replaced without delay.

[Amended by B.C. Reg. 9/2017, effective May 1, 2017.]
[Amended by B.C. Reg. 116/2022, effective August 22, 2022.]

22.64 Shotcrete

(1) The employer must ensure that shotcrete equipment is maintained in good operating condition, and that all practical measures are taken to control dust at the source during shotcreting operations.

(2) Only those workers involved in the shotcrete operation may work downwind of the operation unless sampling shows that contaminants are within exposure limits.

(3) When shotcrete is being applied

(a) the employer must ensure that any worker who may be affected by shotcrete dust is supplied with and uses appropriate personal protective equipment, and

(b) there must be a worker at the shotcrete machine capable of immediately stopping the flow of material, in communication with the nozzle worker.

22.65 Operator protection

Operators of cranes or other mobile equipment engaged in ground control activities must be protected against falling, flying, or intruding objects or material, by means of suitable cabs, screens, grills, shields, deflectors, guards or structures.

22.66 Probe holes

(1) Whenever there is the possibility of encountering excessive water, gas, or other hazard, probe holes must be drilled deep enough to identify the hazard or at least 2 rounds ahead of the round to be blasted.

(2) All probe results must be recorded in the Underground Record.

22.67 Connecting to existing workings

(1) The employer must ensure that each underground working supervisor is provided with current development plans for the underground working supervisor's assigned area of responsibility which indicate the size, inclination and length of all development openings and drill holes, and points

where openings are or will be within 8 m (25 ft) of a breakthrough.

(2) If an active heading is within 8 m (25 ft) of another underground opening or drill hole, the underground working supervisor must, before any round is fired,

(a) make a thorough examination of other underground openings, drill hole collars, or the nearest point of intersection,

(b) ensure that the heading can be safely advanced, and

(c) ensure that access to the nearest point of intersection with the other opening or drill hole is guarded.

(2.1) The underground working supervisor must ensure that all findings, and any corrective actions taken, under subsection (2) are documented in the Underground Record referred to in section 22.7.

(3) If 2 headings are expected to connect and are within 8 m (25 ft) of connecting, all work must cease in one of the headings, and all previously blasted holes must be examined for remnants of explosives.

[Amended by B.C. Reg. 9/2017, effective May 1, 2017.]

22.68 Blasting at adjacent sites

When workers are working at adjacent underground work sites, they must agree to mutually acceptable blasting times and procedures.

22.69 Inspection before abandonment

The employer must ensure that an underground working is not abandoned, nor work discontinued, until material broken in the last round has been cleared from the face of the heading, and the face examined for holes or sockets containing explosives.

22.70 Transport of explosives

(1) The transport of explosives from the magazine or other surface storage place must be arranged so that no undue delay will occur between the time the explosives leave the surface storage and the time they are properly stored or used underground.

(2) Detonators transported on a shaft conveyance must be transported separately from other explosives and materials.

(3) The hoist operator must be notified before explosives are moved on a shaft conveyance.

(4) Safety staging must be rigged inside the sinking bucket at a depth of 107 cm (42 in) from the rim, to ensure safe handling of the explosives.

[Amended by B.C. Reg. 207/2021, effective December 1, 2021.]

22.71 Mechanical haulage

(1) When explosives are transported in underground workings by means of tracked or trackless mechanical haulage,

(a) the speed of the vehicle must not at any time exceed 6 km/h (4 mph),

(b) definite arrangements for the right of way of a vehicle carrying explosives must be made before the vehicle is moved,

(c) the explosives must be protected from trolley wires, batteries or other hazards,

(d) the vehicle must have a flashing light and reflective signs conspicuously displaying the word "EXPLOSIVES" not less than 15 cm (6 in) in height, and

(e) the vehicle engine must be shut off while loading or unloading explosives, except when needed to operate a power takeoff.

(2) Explosives must be placed in separate, suitable locked containers, or a single container where they are separated by a barrier approved under the *Explosives Act* (Canada).

[Amended by B.C. Reg. 207/2021, effective December 1, 2021.]

22.72 Transport by track haulage

(1) If mechanical track haulage is used the locomotive must pull the conveyance carrying explosives as close to the point of use as possible.

(2) When explosives are being transported by track haulage they must

(a) Repealed. [B.C. Reg. 207/2021, effective December 1, 2021.]

(b) be protected from trolley wires, batteries, or other hazards, and

(c) not be carried on the locomotive.

[Amended by B.C. Reg. 207/2021, effective December 1, 2021.]

22.73 Underground storage of explosives

(1) Explosives must not be stored underground without the prior approval of the Board.

(2) A day box in an underground working must be located in a safe stabilized area where there is no possibility of being struck by a train or mobile equipment, at least 60 m (200 ft) from any shaft, hoist room, portal, refuge station or worker assembly area, transformer vault, or combustible refuse.

(3) Repealed. [B.C. Reg. 207/2021, effective December 1, 2021.]

[Amended by B.C. Reg. 207/2021, effective December 1, 2021.]

22.74 Restriction on ignition sources

(1) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

(2) Precautions must be taken to ensure that neither heated materials nor electrical equipment come into direct contact with explosives.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

22.75 Fume class

Explosives used in underground workings must

(a) possess a Fume Class 1 rating as established by the Explosives Branch of the Department of Energy, Mines and Resources (Canada), and

(b) have prior written approval for use from the Board if not of a Fume Class 1 rating.

22.76 Blasting line

The blasting line must

(a) meet the requirements of *CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines*,

(b) be readily identifiable as blasting cable,

(c) be suspended from insulated supports, and

(d) not be located in close proximity to any electrical lighting or power line.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

22.77 Remote initiation

Where a safe means of exit can not be guaranteed, such as in a shaft or raise, a remote means of initiation must be used.

22.78 Water spray

An effective water spray (atomizer) must be activated in every development heading at the time of the blast.

22.79 Return to blasting site

(1) Written procedures for atmospheric testing and return to the blast site must be developed for each underground working.

(2) Workers must be trained in the procedures and copies must be readily available to all workers for reference.

(3) After a blast is detonated, workers must not return to the blast site until

(a) a minimum of 10 minutes has elapsed, and

(b) tests have confirmed that the concentrations of carbon monoxide or nitrogen dioxide do not exceed the exposure limits prescribed in this Regulation, the oxygen level is not less than 19.5%, and the concentrations of flammable substances are under 20% of their lower explosive limit.

(4) Testing must be carried out cautiously by a qualified person, following established safe work procedures which will prevent exposure to levels above exposure limits.

22.80 Work restriction

Before other work can take place in a blast site,

(a) all hazards must be identified and controlled,

(b) adequate dust suppression controls must be in place before mucking, and

(c) loose material must be scaled, trimmed or otherwise stabilized by the use of equipment, machines, and methods which minimize the danger of injury to workers.

[Amended by B.C. Reg. 207/2021, effective December 1, 2021.]

22.80.1 No safety fuse assembly in underground working

A safety fuse assembly must not be used in an underground working.

[Enacted by B.C. Reg. 207/2021, effective December 1, 2021.]

22.81 Dust control

(1) Mechanical excavating devices, such as tunnel boring machines and road headers, must have an effective dust control and ventilation system which maintains workers' exposure to dust below the applicable exposure limits in this Regulation.

(2) Such systems must be maintained in good working order and must be operational whenever the mechanical excavating device is working.

22.82 Work clearance

Before any work is done in the confined area at the head of a tunnel boring machine, the machine head must be retracted a full piston stroke from the face, if possible.

22.83 Elevated work

Elevated work in connection with mechanical excavating equipment must be carried out using suitable work platforms.

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22.84 Logs

(1) An inspection and maintenance log must be provided and maintained for each unit of mobile equipment used underground.

(2) The operator of any equipment must

(a) examine the equipment before using it,

(b) note any deficiencies in the vehicle log, and

(c) not operate the equipment until repairs have been made by a qualified person, and noted in the log, or a qualified person has provided assurance that it is safe to operate the equipment, and has noted the reason in the log.

(3) If no deficiencies or unsafe conditions are found, this must be noted in the log.

(4) Before operating equipment the operator must read the most recent entries in the log and if an unsafe condition has been recorded but not corrected the equipment must not be used until repairs have been made by a qualified person, or assurance is given that the equipment is not unsafe to operate and the reason noted in the log.

(5) The employer must monitor the log system to ensure that it is effective.

(6) Records must be kept in the log for all unsafe conditions reported and repairs effected to correct them.

(7) Each entry in the log must show the time and date of the entry and the name of the worker who made the entry.

22.85 Internal combustion engines

(1) Only diesel fueled internal combustion engines may be used underground.

(2) Before using a diesel engine underground the employer must first obtain permission from the Board.

(3) Diesel fuel for use underground must meet the requirements of *CGSB Standard CAN/CGSB-3.16-M88 Mining Diesel Fuel*, but flash point restrictions may be relaxed in accordance with the supplier's recommendations for cold weather conditions.

(4) All diesel fueled equipment used underground must be equipped with adequate devices to control exhaust emissions.

(5) If diesel fueled equipment used underground is fitted with an exhaust scrubber it must be of a type acceptable to the Board.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

22.86 Fire suppression

(1) All diesel powered mobile equipment used underground, capable of holding more than 25 litres (5.5 imp gal) of combustible fluids, must be fitted with a multinozzle fire suppression system in accordance with *CSA Standard CAN/CSA-M424.2-M90, Non-Rail-Bound Diesel-Powered Machines for Use in Non-Gassy Underground Mines*, which operates automatically in the event of a fire.

(2) It must be possible to manually activate the fire suppression system by means of easily accessible ground level devices from the operator's station and from each side of the machine, and the activation of the system must cause engine shutdown.

(3) If, in the opinion of the Board, sufficient danger is present, the employer must use fire-resistant fluids in diesel powered equipment.

22.87 Hoses carrying flammable liquid

(1) Hoses and lines ducting flammable or combustible liquid on mobile equipment used underground must be installed in accordance with *CSA Standard CAN/CSA-M424.2-M90, Non-Rail-Bound Diesel-Powered Machines for Use in Non-Gassy Underground Mines*.

(2) Such hoses and lines must be shielded to prevent leaks or spills from contacting hot surfaces or other ignition sources.

22.88 Operating requirements

Any diesel engine being operated in an underground working must

(a) not expose workers to respirable combustible dust (RCD) from the exhaust in excess of 1.5 mg/m^3 based on an 8-hour time weighted exposure, and

(b) not idle unnecessarily.

(c) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

22.89 Traffic control

(1) The employer must ensure that a written traffic control scheme is developed for the underground working which provides that where a worker or workers are working in proximity to track or mobile equipment, both the workers and the equipment operators are fully aware of each others' presence.

(2) If an equipment operator encounters pedestrian traffic at a location other than a safety station, the operator must stop and only proceed when the pedestrian gives permission to do so.

22.90 Clearance for mechanical haulage

(1) The employer must ensure that a clear space is provided in an underground working for safely passing workers or equipment which provides

(a) for track haulage, at least 60 cm (2 ft) clear space on one side of the tracks, free of tripping and slipping hazards, and

(b) for trackless haulage, at least 2 m (6.5 ft) total clear space, free of tripping and slipping hazards.

(2) If the minimum clear space cannot be maintained, safety stations must be excavated at least every 30 m (100 ft) to provide an avoidance space for workers.

(3) The safety stations must be

(a) clearly identified and marked,

(b) clean and free of obstructions,

(c) cut as close to perpendicular to the haulage way as is practicable,

(d) at least 1 m (39 in) deep, in addition to the clearance from the vehicle to the wall,

(e) at least 2 m (6.5 ft) high and at least 1.5 m (5 ft) wide, and

(f) excavated on the same side of the haulage way if more than one safety station is required.

(4) Safety stations are not required if the traffic control system prevents simultaneous movement of pedestrians and machinery.

22.91 Track haulage and mucking equipment

(1) The employer must ensure that a locomotive is equipped with

(a) a hold-to-run type of control,

(b) properly maintained headlights, front and rear,

(c) an audible warning system, which must be operated whenever the locomotive is about to move, and to warn workers if they may be endangered by movement of the locomotive,

(d) safe seating for the operator,

(e) an effective braking system, with a parking brake,

(f) non-slip material on steps and footboards,

(g) handholds for entering or leaving the operator's station, and

(h) a restraining device or door if there is a hazard to workers of falling.

(2) The employer must ensure that haulage equipment has

(a) a safety chain or other suitable restraining device between all haulage units,

(b) a positive locking device on rocker type cars to prevent accidental dumping, and

(c) a reflector and a suitable beam or flashing light to indicate the rear of the train.

(3) The employer must ensure that any track mucking equipment is provided with an operator's foot stand which is maintained in position and used when the mucking machine is being operated.

22.92 Equipment hazard area

Workers must not pass

(a) between the cars of haulage equipment at any time, or

(b) any haulage equipment that is being loaded during mucking operations unless the loading machine has finished loading the car or stopped mucking, and the operator has given permission to proceed.

22.93 Switching

(1) The employer must establish and workers must follow safe work procedures for switching cars.

(2) Fly switching is prohibited.

22.94 Derailed equipment

The employer must ensure that derailed equipment is rerailed by means of jacks or other mechanical devices designed for this purpose.

22.95 Track haulage operations

(1) The operator of a locomotive must ensure that

(a) the train is pulled rather than pushed, unless impracticable,

(b) nothing is placed on top of the locomotive unless it is adequately secured, does not extend beyond the ends or sides, nor into the cab of the locomotive, and does not obscure the operator's view,

(c) the brake is applied, the operating control is in neutral and the main switch is in the non-operating position if the locomotive is unattended, and

(d) the locomotive is operated from within the operator's position.

(2) If the operator's vision is limited when pushing muck cars or other equipment, the train must not be moved until a signal worker has been stationed in a safe position at the head of the train with an effective means of communication with the operator.

(3) If locomotives are to be operated by an automatic system or by remote control, prior written acceptance must be obtained from the Board.

22.96 Rail tracks and switches

(1) Rail tracks in use must

(a) be maintained in safe condition,

(b) have joints and fish plates installed directly over the ties,

(c) be maintained reasonably level and free of bumps, dips and obstructions, and

(d) have drainage that prevents water from covering the rails.

(2) A rail switch in which a worker's foot may be trapped must have guards at the frog, guard rail, and switch point.

(3) The employer must ensure that

(a) portable switches are covered between the rails, and

(b) switches on the main haulage line are equipped with suitable safety devices and maintained to allow the free flow of haulage equipment.

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22.97 Automated and remote control systems

(1) If trackless loading and hauling equipment is to be operated by an automatic system or by remote control, prior written acceptance must be obtained from the Board.

(2) If operated by an automatic system or remote control, loading and hauling equipment must be designed so that in the event of failure of the control system the equipment will immediately stop.

(3) Every unit of equipment that is automatically or remotely controlled must be controlled independently of any other unit of equipment so there is no interference between one unit and another.

(4) Operators of automatic or remote control equipment must be positioned in a safe area clear of the equipment's range of motion.

22.98 Clearance lights

The employer must ensure that automatic or remote control equipment is fitted with lights which indicate the width of the vehicle.

22.99 Road maintenance

The employer must ensure that haulage roads are free of holes, ruts, excessive water and loose rock, and are maintained in safe operating condition.

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22.100 General requirement

(1) The employer must ensure that waste dumps or spoil areas

(a) are provided with a safe means of entry and exit,

(b) are adequately illuminated,

(c) are operated in accordance with written safe work procedures, and

(d) have effective controls to prevent erosion.

(2) A dump or stockpile area must be examined daily by a qualified person who must communicate any dangerous or abnormal conditions to affected workers.

22.101 Dumping procedures

(1) The employer must

(a) appoint only qualified and suitably equipped persons as dump workers,

(b) where material is to be dumped from a vehicle into a bin, raise, shaft or other opening, provide and maintain a barrier capable of preventing a vehicle from inadvertently entering the bin, raise or opening, and

(c) where dumping is not allowed or dangerous, prevent dumping by barricading the entrance sufficiently to prevent access and posting a sign which reads "No Entry for Dumping Purposes".

(2) Operators are prohibited from dumping material from a haulage vehicle

(a) over a bank more than 3 m (10 ft) high, or

(b) within 3 m (10 ft) of the dump berm crest if the bank is more than 3 m (10 ft) high, except when dumping into a bin, raise, or other opening and a dump berm is in place and a dump worker is directing vehicles to the dumping position.

22.102 Reversing when dumping

The driver of a haulage truck must not

(a) where the bank is more than 3 m (10 ft) high and the dumping position is within 3 m of the dump berm crest, move the vehicle backward to the dumping position, nor begin dumping before having received verbal directions or standard visual signals as shown in Figure 22-1,

(b) operate the vehicle in reverse for a distance greater than 4 truck lengths on

(i) a dump, or

(ii) a stockpile, ramp, road, or a ramp or road that is under construction, unless the ramp or road has a positive gradient of more than 5%.

22.103 Dump worker

A qualified and suitably equipped person, who is responsible for directing traffic at a dump point, must inspect the condition of the dump site as required and report any dangerous or abnormal condition to a supervisor so that corrective action can be taken.

22.104 Track waste dump

A track waste dump must be equipped with

(a) guardrails and toeboards, meeting the requirements of Part 4 (General Conditions), on all walkways on an elevated dump,

(b) a securely anchored stop block at the end of the dump track capable of stopping a fully loaded train, and

(c) a device to prevent haulage cars from overturning or kicking back when dumping.

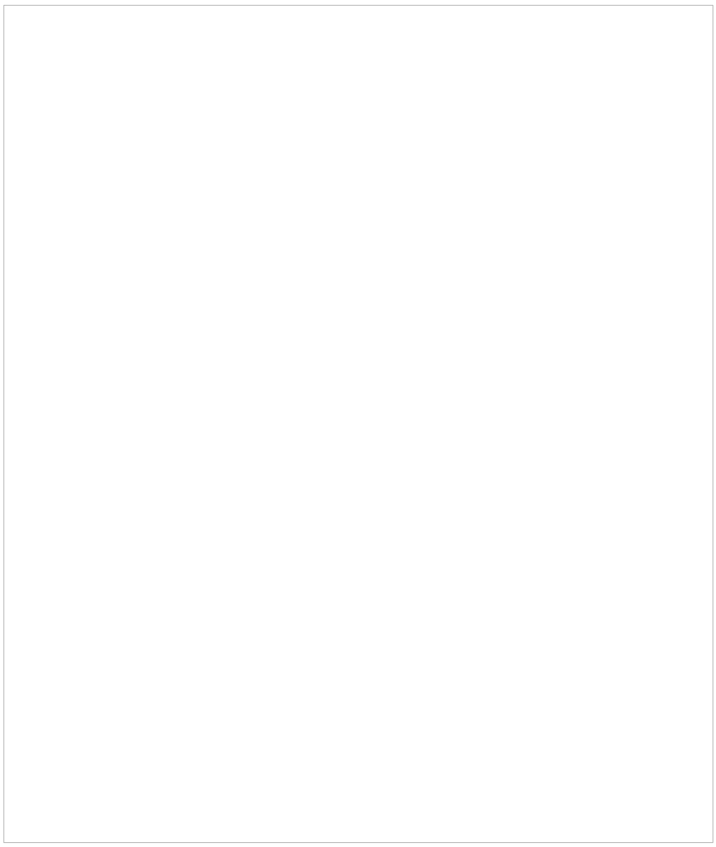
22.105 Electrical trolley systems

If an electrical trolley system is used in dumping operations

(a) equipment must be arranged to prevent inadvertent contact with energized lines, and

(b) all affected workers must be instructed in appropriate safe work procedures.

Figure 22-1: Standard hand signals for controlling mobile equipment movement



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22.106 General requirement

(1) The employer must ensure that

(a) where a timber work platform is used, the main platform bearers are securely pinned to prevent them from dislodging,

(b) ladderways and travelways used for foot traffic are maintained in good repair and clean condition,

(c) a raise in excess of 50° measured from horizontal and 15 m (50 ft) in length has separate compartments for the passage of workers and blasted material during the driving operation and, where timber is used, that it is installed to within 5 m (16 ft) of the face, and

(d) if an accessway and a skipway occupy the same compartment in a raise, the accessway is not used by workers when the skip is in motion, and a guard is installed between the accessway and skipway to prevent workers from falling into the skipway.

(2) The requirements of subsection (1) do not apply to a raise using mechanical raise equipment.

22.107 Guarding the bottom of the raise

The employer must ensure that

(a) if work is being performed in a raise, the bottom of the raise is effectively guarded to protect workers from falling objects, by a barrier and sign reading "Danger Workers Working Above",

(b) the top end of pilot holes are effectively guarded, and

(c) if a raise is within 2 rounds of breaking through to surface or another work area, a worker is guarding the area of breakthrough.

22.108 Explosives

The employer must ensure that explosives are not taken up the raise until all holes are drilled and are ready for loading.

22.109 Suspended drill platforms

The employer must ensure that a suspended drill platform

(a) complies with the requirements in Part 13 (Ladders, Scaffolds and Temporary Work Platforms) for suspended work platforms,

(b) is stabilized to prevent lateral sway or spinning while in the work position,

(c) is provided with a protective canopy that fully covers the work platform during the first access following a blast, and provides protection for workers if a section is left open for work purposes,

(d) has an effective means of two-way communication between the hoist operator and the work platform, and the communication line is protected from damage,

(e) is provided with a safe means of emergency escape, and

(f) is examined at the beginning of each shift, and has any defects corrected before use.

22.110 Raise climbers

(1) Before a raise climber is installed, the Board must be notified and, if required, the employer must submit the design drawings and technical details of the installation, including construction materials, rated load capacities, dimensions, operating controls and safety features.

(2) The materials and procedures used in the construction of a raise climber must conform to the requirements of appropriate standards of the CSA or ASTM.

(3) A raise climber must not be put into service unless a certificate is available from the manufacturer, or a professional engineer, attesting that all critical load bearing components of the complete assembly and its accessories have been inspected and non- destructively tested by approved methods.

(4) At least once a year after it has been put into service, or when ordered by the Board, any part of a raise climber installation which if it failed could endanger workers must be non-destructively tested by persons certified in accordance with *CGSB Standard CAN/CGSB-48.9712-95, Qualification and Certification of Non-destructive Testing Personnel* and a copy of the test report must be made available on site for inspection by an officer.

(5) A raise climber that has previously been in use in any place beyond the control of the present employer must not be re-installed until the inspections and tests required by subsection (3) have been carried out.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

22.111 Identification plate

Every raise climber must have a durable and legible identification plate which shows

(a) the manufacturer's name, the date of manufacture, the model number and serial number, and

(b) the maximum allowable speed and maximum allowable load ratings as certified by the manufacturer or a professional engineer.

22.112 General brake requirements

(1) Raise climbers must be equipped with at least 2 separate and independently operated service brakes, each capable of safely stopping and holding the conveyance under all rated conditions of load and speed.

(2) An automatic overspeed brake which is capable of bringing the conveyance to a safe stop under any rated load condition from a predetermined overspeed must be installed.

(3) Each brake or braking system must be capable of being independently tested.

(4) If electromechanical brakes are installed they must be activated immediately should the power supply to the climber be interrupted.

22.113 Electrically powered raise climbers

In electrically powered raise climber must have at least one service brake which automatically applies in the event of an interruption of the power supply to the climber, and in such an event, the service brake must be capable of being

(a) operated manually by workers in the climber to lower it safely under continuous control, and

(b) released manually, provided that another brake is available for workers in the climber to lower it to safety under continuous control.

22.114 Brake components

(1) Raise climber brakes must either be designed to compensate automatically for lining wear, or the means for manual adjustment must be readily accessible.

(2) Brake blocks and linings must be protected from water, oil, grease or other substances which could adversely affect them.

(3) The design of the brake system must ensure that the failure of any one component will still leave sufficient braking capacity to bring the climber to a safe stop.

22.115 Guarding

Every raise climber must have all exposed gearing, chain drives, couplings, or any moving parts which could endanger workers effectively guarded or otherwise protected.

22.116 Controls

(1) All operating controls of a raise climber must be situated in a convenient position to allow for their safe operation.

(2) An emergency switch must be provided in the cab of every electrically operated raise climber that will cut off the power to the drive motors if the main control contact fails to open, or in any other emergency.

22.117 Electric equipment

(1) All electrical equipment, including switches, connectors, wiring and cables must be designed, installed and weatherproofed to ensure the integrity of the electric components under all operating conditions.

(2) An electrically powered raise climber must not be operated at a potential of more than 750 volts, and must be protected by a ground fault system.

(3) The operating controls and electrical panels of an electrically driven raise climber must be capable of being locked out to prevent unauthorized operation.

(4) Every raise climber must be equipped with a suitable fire extinguisher.

22.118 Work platforms

(1) Repealed. [B.C. Reg. 420/2004, effective January 1, 2005.]

(2) Work platforms used during raise driving with a raise climber operating at an inclination greater than 60° from the horizontal must be fitted with substantial covers.

(3) Work platforms must be securely anchored to the raise climber guides or rails when being used by workers.

(4) Before any work is done from a work platform all brakes must be applied and the safety device attached to the guide rail.

22.119 Prohibition

No more than one raise climber conveyance may be installed in a raise unless approved by the Board.

22.120 Safety factor

The static factor of safety of all load carrying components of raise climbers and associated equipment must be no less than 5 under the maximum rated load conditions.

22.121 Bolts

(1) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

(2) Defective or damaged bolts must not be used and all exposed bolts and other components must be protected against damage from falling rock.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

22.122 Racks and pinions

(1) Only racks and pinions supplied by the manufacturer or certified by a professional engineer may be used.

(2) All permanent raise climber installations used to transport workers must be fitted with a device to continuously monitor the integrity of the rack ahead of the driving pinions, or with a braking system which operates independently of the rack.

22.123 Modification restriction

Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

22.124 Communication

(1) An effective means of communication must be provided between a raise climber conveyance and the base from which it operates.

(2) If intermediate levels or landings are served by the conveyance, the Board may require the installation of a suitable signal system.

22.125 Inspection before use

(1) After a raise climber is installed and before it is put into service, the complete installation must be inspected and tested by authorized workers who have available to them the manufacturer's or professional engineer's manual which details specifications and test procedures.

(2) A complete record of the inspection and tests required by subsection (1) and all other inspections and tests, defects, damage or problems, and repairs or maintenance done must be entered in a raise climber log, which must be maintained at the site, and made available for inspection by an officer.

(3) All entries in the log must be dated and signed by the person who carried out the work, and the supervisor in charge of the installation must check and countersign the entries at least once each week.

22.126 Limits and travel stops

(1) Whenever a raise climber is operating, the end of the track on which it travels must be fitted with a stop block to prevent the conveyance from being taken beyond the end of the track.

(2) All permanent electrically driven raise climber installations must be provided with devices which will automatically stop the conveyance at the upper and lower limits of travel.

22.127 Equipment maintenance

(1) The employer must appoint qualified persons to establish mechanical and electrical maintenance schedules for each raise climber, and to ensure that all maintenance is carried out in accordance with the manufacturer's recommendations and the requirements of this Regulation.

(2) A mechanic must check an operating raise climber each day to ensure that it is operating safely.

(3) At least once a week, a mechanic, and for an electrically driven raise climber, an electrician, must perform routine servicing in accordance with the manufacturer's requirements and this Regulation, and inspect and test all safety and protective devices to ensure that they are working properly.

(4) Before recommencing operations after a prolonged shutdown, a full inspection of the complete installation must be made by authorized workers.

22.128 Operator's duties

(1) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

(2) The operator of a raise climber must ensure that the brakes are in safe working condition at the beginning of the shift, and that the over speed brake is tested at least once a day.

(3) Each day, before normal operations begin, the raise climber must be put through its full range of movements to ensure that all limit switches, brakes, controls, audio and visual indicators are functioning correctly.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

22.129 Reporting defects

If a worker carrying out a prescribed inspection or test on a raise climber installation finds a defect, fault, malfunction or any other condition which could affect the safe operation of the equipment, the worker must immediately notify the supervisor in charge of the installation, and the raise climber must not be used until remedial action has been taken and the supervisor authorizes a resumption of use.

22.130 Repair requirements

(1) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

(2) Repairs to a rack or pinion must only be carried out under the direction of a manufacturer's representative or a professional engineer, and the repaired components must be non-destructively tested in accordance with the requirements of section 22.110(4).

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

22.131 Emergency procedures

(1) Means must be readily available to enable workers to descend from a raise climber in the event of a power failure or other emergency.

(2) The employer must ensure that operators of raise climbers and other workers who would be involved in the emergency descent of trapped workers are trained in the use of the emergency equipment.

22.132 Maximum load

The supervisor in charge of a raise climber installation must ensure that the maximum load specified on the identification plate is never exceeded.

22.133 Riding restriction

Except for inspection purposes workers are prohibited from riding on work platforms while they are in motion.

22.134 After blast monitoring

When ascending the raise following a blast, the operator must carefully monitor the condition of the guide rail and rack ahead of the conveyance.

22.135 Transporting material

(1) Equipment or materials being carried in a raise climber conveyance must be properly secured.

(2) Only workers needed for the work to be done may be transported with explosives, steel, timber or similar material or equipment.

(3) Material or equipment must not be dropped down a raise from the conveyance.

22.136 Electrical shut off

The electrical supply to an electrically driven raise climber must be disconnected during preparation for a blast.

22.137 Cleaning

The employer must ensure that a raise climber is thoroughly cleaned at least weekly.

22.138 General requirement

Excavation of shafts and installation of hoists in an underground working must be in accordance with the applicable regulations from the *Health, Safety and Reclamation Code for Mines in British Columbia* or such other requirements as the Board may prescribe.

22.139 Shaft openings

The employer must ensure that

(a) the collar of a shaft is effectively stabilized, and

(b) the top of a shaft or opening is effectively guarded to prevent workers or material from falling into the shaft.

22.140 Access ways

The employer must ensure that ladder ways, access ways, and platforms are maintained in a safe and clean condition and kept clear of the material hoist system.

22.141 Fixed ladders

Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

22.142 General requirement

Before a worker is permitted to enter a large diameter hole (LDH)

(a) the hole must be adequately ventilated,

(b) the hole must be tested for oxygen, flammable gases and other airborne contaminants, and

(c) all in-hole electrical equipment must be grounded.

22.143 Vertical holes

The employer must ensure that, before a worker enters a vertical LDH,

(a) the collar of the hole is stabilized,

(b) a casing of adequate strength, extending at least 1 m (39 in) above the surface level, is installed,

(c) the worker entering the hole wears a fall arrest harness attached to a securely anchored lifeline, tended by a worker equipped and capable of rendering immediate assistance, and

(d) there is an effective communication system established between the hoist operator and the worker tending the lifeline.

22.144 Limiting descent

Workers entering large diameter holes must not descend more than 3 m (10 ft) below the casing of the hole unless ground conditions have been inspected and certified safe in writing by a professional engineer, and copies of the certification must be maintained at the worksite.

[Amended by B.C. Reg. 253/2001, effective January 28, 2002.]

22.145 Water in the hole

If water may be encountered in the hole, the bottom of the work platform must be fitted with flotation devices capable of positively supporting the platform and its load.

22.146 Horizontal holes

(1) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

(2) Workers must not enter a horizontal LDH unless it has a casing of sufficient strength to hold the ground.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]

22.147 Written notice

If an underground working is classified as gassy a written notice specifying the contaminant gas or vapour must be posted at a conspicuous location on the worksite.

22.148 Worker instruction

Every worker in a gassy underground working must be

(a) informed of the hazardous condition, and

(b) instructed in the necessary precautions for the gassy condition.

22.149 Atmospheric testing

In a gassy underground working additional testing for the naturally occurring gases must be conducted continuously

(a) at all faces, places of work and passageways,

(b) at the equipment operator's station,

(c) in the exhaust duct,

(d) at a probe hole during drilling,

(e) before loading explosives, and

(f) before blasting loaded holes.

22.150 Automatic alarm

Continuous explosive gas monitors must be equipped with automatic alarm systems that are set and maintained to warn workers to evacuate at 20% of the lower explosive limit (LEL), or if the gas monitor malfunctions.

22.151 Ventilation

The main ventilation system must be on an independent electrical circuit and fans must be explosion proof and non-sparking.

22.152 Ventilation malfunction

If the ventilation system malfunctions

(a) every worker must leave the underground working, and

(b) workers must not return until safe ventilation is restored, and the atmosphere tested and declared safe.

22.153 Air velocity

The air velocity in the main air duct must be measured at least once a day.

22.154 No smoking

Workers are not permitted to smoke, or to carry or keep ignition material in an underground working if flammable gas is present.

22.155 Welding and burning

For welding, burning or other spark producing operations, the employer must ensure that

(a) a hot work permit is obtained,

(b) the operations only take place in atmospheres containing less than 20% of the LEL of gases or vapours,

(c) testing for gases or vapours is done before, and continuously during work, and

(d) welding and burning operations are otherwise in compliance with this Regulation.

22.156 Prohibited metals

Objects made of or containing aluminum, magnesium, titanium or light metal alloy are prohibited in a flammable gassy underground working, except for electrical equipment within a flameproof enclosure, or circumstances where there is no possibility of friction or impact.

22.157 Flame arresters

An internal combustion engine used in a gassy underground working must be equipped with a flame arrester at the exhaust outlet.

22.158 Mechanical excavators

If a mechanical excavator is used

(a) automatic and manual gas monitoring equipment must be provided to test the atmosphere at the working face,

(b) electrical power in the heading must be automatically shut off when 20% of the LEL of a gas or vapour is reached, and

(c) a manual shut off control for the electric power in the heading must be provided at the working area, and the control must be immediately accessible to workers.

22.159 Fire resistant fluids

(1) In a gassy underground working, or in a working containing combustible dusts in sufficient quantity to present a fire or explosion hazard, fire resistant fluids meeting the requirements of *CSA Standard CAN/CSA-M423-M87 Fire Resistant Hydraulic Fluids*, category 1 or 2 must be used in hydraulic systems of more than 10 litre (2.2 imp gal) capacity on equipment in use underground.

(2) Subsection (1) does not apply to

(a) engine hydraulic valve lifters, hydraulic cooling fan drivers, lubricating systems, fuel injection systems, torque converters, transmissions, and axles, or

(b) braking systems employing totally enclosed friction elements immersed in a liquid coolant, and to braking systems with hydraulics independent of any other hydraulic system.

22.160 Combustible dusts

(1) If an underground working or portion of an underground working contains or has the potential to contain coal dust or other combustible dusts in quantities sufficient to present a fire/explosion hazard, the Board may require additional safety measures to be instituted.

(2) Such measures must meet the requirements of the applicable sections of

(a) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

(b) *CSA Standard CAN/CSA-M421-93, Use of Electricity in Mines*, and

(c) *CSA Standard CAN/CSA-M424.1-88, Flameproof Non-Rail-Bound Diesel-Powered Machines for Use in Gassy Underground Coal Mines*.

[Amended by B.C. Reg. 312/2003, effective October 29, 2003.]