Part 18
Personal Protective Equipment

Highlights

- Section 229 recognizes that the face piece of a full face piece respirator can provide eye protection.
- Section 232 requires workers to wear flame resistant outerwear if they could be exposed to a flash fire or electrical equipment flashover.
- Section 233 provides several options in protective footwear. Footwear requirements are based on the hazards feet may be exposed to. External safety toecaps are permitted as an alternative to protective footwear when a medical condition prevents a worker from wearing normal protective footwear. Footwear approved to ASTM Standard F2413 is now acceptable for use in Alberta.
- Section 234 recognizes both Canadian Standards Association (CSA) and American National Standards Institute (ANSI) standards for protective headwear.
- Section 235 requires employers to ensure that a worker riding a bicycle or using in-line skates or a similar means of transport wears an approved cycling helmet.
- Section 246 requires employers to ensure that respiratory protective equipment must be approved by the National Institute for Occupational Safety and Health (NIOSH) or by another organization that sets standards and tests equipment, and is approved by a Director of Occupational Hygiene. Directors of occupational hygiene are staff members of Alberta Human Resources and Employment appointed by the Minister under Section 5 of the *OHS Act*.
- Section 247 requires that employers select respiratory protective equipment in accordance with CSA Standard Z94.4-02, *Selection, Use and Care of Respirators.*
- Section 250 requires that employers test respiratory protective equipment for fit, according to CSA Standard Z94.4-02, *Selection, Use and Care of Respirators*, or a method approved by a Director of Occupational Hygiene. Directors of occupational hygiene are staff members of Alberta Human Resources and Employment appointed by the Minister under Section 5 of the *OHS Act*.

Requirements

Section 228 Duty to use personal protective equipment

Subsection 228(1)

If the hazard assessment required by section 7 of the OHS Code indicates that PPE is required, the employer must ensure that workers wear and use the required PPE properly. Ensuring that workers have and wear their PPE is not enough. The employer must ensure that the PPE is used properly.

The OHS Code requires employers to provide PPE in a limited number of situations where, for example, there is a breathing hazard or where noise exposure limits are exceeded. This section does not require employers to provide PPE such as hard hats, safety boots, flame resistant clothing or eye protection. Where such equipment is necessary, employers must make sure that workers use it.

Regardless of who supplies the PPE, paragraph 228(1)(c) makes the employer responsible for ensuring that the PPE is in a condition to perform the function for which it was designed. Cracked eye protection, worn out safety boots and excessively dirty flame resistant overalls are examples of conditions that employers need to be aware of and either correct or have corrected.

For PPE to be effective, workers must be trained in its correct use, care, limitations and assigned maintenance. The employer is responsible for providing this training. Workers must be aware that wearing and using PPE does not eliminate the hazard. If the PPE fails, the worker will be exposed to the hazard. Workers need to understand that PPE must not be altered or removed even though they may find it uncomfortable — sometimes equipment may be uncomfortable simply because it does not fit properly.

Employers exceeding the requirements of Part 18

This Part uses language such as “If a worker’s eyes may be injured or irritated …”, “If a worker may be exposed to a flash fire …”, “If the hazard assessment identifies that protective footwear needs to …”, and “If there is a foreseeable danger of injury …”. In all cases, it is the employer’s responsibility to assess the presence and significance of the relevant hazard, determining if workers should use a particular type of personal protective equipment.

There are situations in which no foreseeable danger exists – either at a portion of the work site or at the entire work site – yet an employer still requires that workers use a particular type of personal protective equipment. In such situations the employer has usually set a blanket policy that all workers must use the personal protective equipment regardless of where workers are to on the work site and regardless of the presence or absence of the hazard.

Employers have the freedom to set and enforce such a policy as the policy does not violate the requirements of the OHS Code. Such a policy exceeds the minimum requirements of the OHS Code. The reason for an employer instituting such a policy often has to do with ease of enforcement at a work site i.e. everyone wears the personal protective equipment all the time so there is no discussion as to whether a worker should or should not be wearing it at a particular time and location at the work site.

When a worker questions the authority of the employer to set such a policy, Workplace Health and Safety confirms that the policy exceeds the requirements of the OHS Code and it is the employer's right to do so. If a worker chooses to contravene the employer's policy, the resulting situation is a personnel issue, not a safety issue.

Subsection 228(2)

Workers have several obligations. Workers must use PPE according to the training and instruction they receive. Workers must inspect PPE prior to use and not use PPE found to be in a condition that makes the PPE unsuitable for use. For example, if a worker required to use a self-contained breathing apparatus (SCBA) cannot get a good facial seal because the face piece is too small, the worker must not use the apparatus. Subsection 14(2) of the *OHS Regulation* requires workers to report this situation to the employer so that it can be corrected.

Subsection 228(3)

The use of PPE must not itself endanger the worker. Examples of such situations are:

(a) safety toecaps in place of protective footwear — a worker wearing toecaps should not be required to do much walking around the work site. The toecaps may create a tripping hazard;

(b) a poorly fitting suit worn to prevent exposure to chemicals may not seal well at the wrists and ankles; and

(c) a faceshield covered with dirt and debris may affect a worker's ability to see clearly.

Eye Protection

Section 229 Compliance with standards

Subsection 229(1)

If a worker's eyes may be injured or irritated at a work site, the employer is required to ensure that the worker wears eye protection equipment that is approved to CSA Standard Z94.3-07, *Eye and Face Protectors*, CSA Standard Z94.3-02, *Industrial Eye and Face Protectors*, or CAN/CSA-Z94.3-99, *Industrial Eye and Face Protectors*. For compliance purposes, at least one component of an assembled product or system must bear the mark or label of a nationally accredited testing organization such as CSA, UL, SEI, etc. For example, if the mark or label appears on the frame, then the entire product is approved; if the mark or label appears on an earpiece, then the entire product is approved.

The CSA Standard sets minimum performance requirements for the testing of industrial eye and face protection. This includes testing for impact resistance, ignition/flammability, visibility, field of view and other characteristics. With the exception of subsections 229(2.3) and 229(3), eye and face protectors meeting the requirements of the 1989 or 2003 editions of ANSI Standard Z87.1, *Occupational and Educational Eye and Face Protection*, are not recognized by the OHS Code.

The employer is not required to pay for and provide eye protection equipment. However, the employer is required to ensure that a worker wears such equipment if a worker's eyes may be injured or irritated at a work site. The employer is also required to ensure that the eye protection equipment selected is appropriate to the work being done and the hazard(s) involved.

Situations can arise in which the eyes are exposed to multiple hazards all at the same time. When this happens, protection must be provided against the highest level of each hazard. For example, if the work involves both flying particles and the possibility of an acid splash, using spectacles is not good enough. At a minimum, Class 2B goggles must be used. The following paragraphs describe the CSA Classes of protective equipment available and Table 18.1 recommends the type of protective equipment that should be used based on the hazard.

For more information

📖 *Protective Eyewear: A User's Guide*. CSA Special Publication Z94.3.1-02. Canadian Standards Association, February 2002.

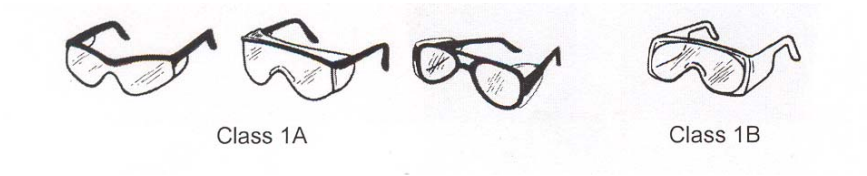
CSA classification of eye and face protectors

The CSA Standards classify eye and face protection into seven classes as follow:

Class 1 — Spectacles (see Figure 18.1)

- Class 1A spectacles for impact protection with side protection
- Class 1B spectacles for impact and radiation protection with side protection

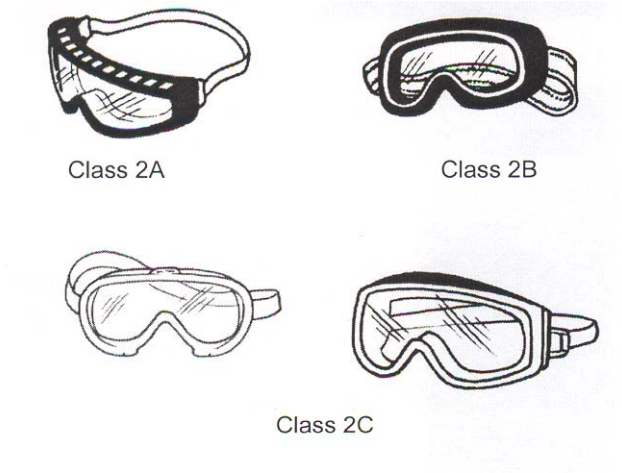
Figure 18.1 Spectacles



Class 2 — Goggles (see Figure 18.2)

- Class 2A goggles for impact protection with direct ventilation
- Class 2B goggles for impact, dust and splash protection; non-ventilated and indirectly ventilated
- Class 2C goggles are Class 2A or 2B goggles with radiation protection

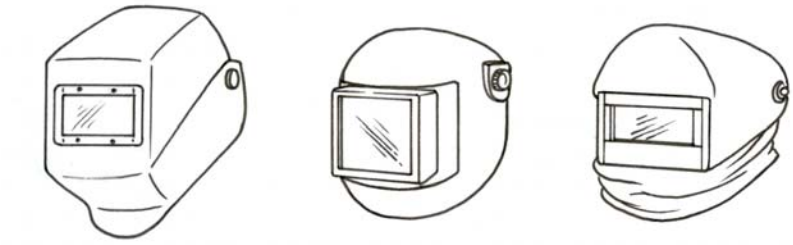
Figure 18.2 Goggles



Class 3 — Welding helmets (see Figure 18.3)

- This Class includes a variety of configurations

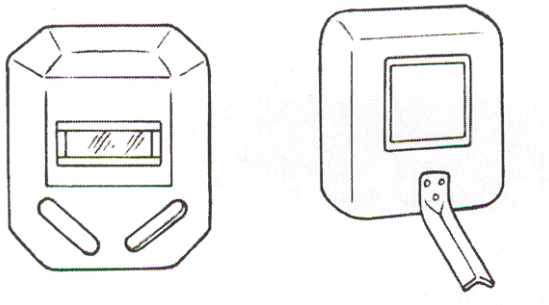
Figure 18.3 Welding helmets



Class 4— Welding hand shields (see Figure 18.4)

- This Class includes a variety of configurations

Figure 18.4 Welding hand shields



Class 5— Non-rigid helmets (hoods) (see Figure 18.5)

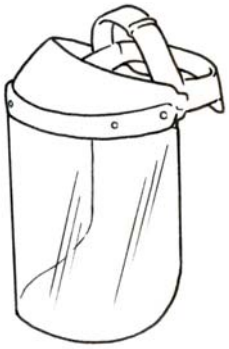
- Class 5A non-rigid helmets have an impact-resistant window
- Class 5B non-rigid helmets are intended for dust, splash and abrasive materials protection
- Class 5C non-rigid helmets have radiation protection
- Class 5D non-rigid helmets are intended for high-heat applications

Figure 18.5 Non-rigid helmet (hood)

Class 6— Faceshields (see Figure 18.6)

- Class 6A faceshields offer impact and splash protection
- Class 6B faceshields offer radiation protection
- Class 6C faceshields are intended for high-heat applications

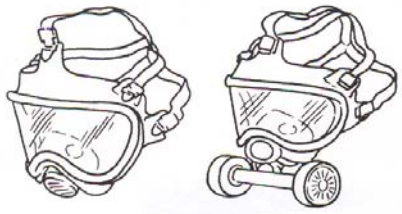
Figure 18.6 Faceshields



Class 7 — Respirator facepieces (see Figure 18.7)

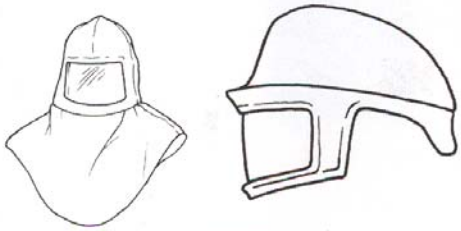
- Class 7A respirator facepieces offer impact and splash protection
- Class 7B respirator facepieces are Class 7A respirator facepieces with radiation protection
- Class 7C respirator facepieces have loose-fitting hoods or helmets
- Class 7D respirator facepieces are Class 7C respirator facepieces with radiation protection

Figure 18.7 Respirator facepieces



Class 7A

Class 7B



Class 7C

Class 7D

Table 18.1 Hazards and recommended eye and face protectors

Nature of hazard	Typical hazardous activities	Spect-acles Class 1		Goggles Class 2			Welding helmet Class 3	Welding hand shields Class 4	Non-rigid hoods Class 5				Faceshields Class 6		
		A	B	A	B	C			A	B	C	D	A	B	C
Flying objects	Chipping, scaling, stonework, drilling, grinding, buffing, polishing, etc; hammer mills, crushing, heavy sawing, planing; wire and strip handling; hammering, unpacking, nailing; punch press, lathe work, etc.	✓		✓	✓				✓	✓			✓		
Flying particles, dust, wind, etc.	Woodworking, sanding; light metalworking and machining; exposure to dust and wind; resistance welding (no radiation exposure); sand cement, aggregate handling; painting; concrete work, plastering; material batching and mixing	✓		✓	✓				✓	✓			✓		
Heat, sparks, and splash from molten materials	Babbiting, casting, pouring molten metal; brazing, soldering, spot welding, stud welding; hot dipping operations		✓			✓					✓	✓		✓	✓

Nature of hazard	Typical hazardous activities	Spect-acles Class 1		Goggles Class 2			Welding helmet Class 3	Welding hand shields Class 4	Non-rigid hoods Class 5				Faceshields Class 6		
		A	B	A	B	C			A	B	C	D	A	B	C
Acid splash; chemical burns	Acid and alkali handling; degreasing, pickling and plating operations; glass breakage; chemical spray; liquid bitumen handling				✓					✓			✓		
Abrasive blasting materials	Sand blasting; shot blasting; shotcreting				✓				✓				✓		
Glare, stray light	Reflection, bright sun, and lights; reflected welding flash; photographic copying	✓		✓	✓				✓	✓			✓		
Optical radiation that can injure the eyes (where moderate reduction of optical radiation is required)	Torch cutting, welding, brazing, furnace work; metal pouring, spot welding, photographic copying		✓			✓					✓			✓	
Optical radiation that can injure the eyes (where large reduction of optical radiation is required)	Electric arc welding; heavy gas cutting; plasma spraying and cutting; inert gas shielded arc welding; atomic hydrogen welding						✓	✓							

Source: Based on Table A.1 of CSA Standard Z94.3-02 *Eye and Face Protectors*

Subsection 229(2)

Even if prescription eyewear is made with "impact resistant" plastic lenses, the eyewear still does not protect the eyes like safety eyewear. Some of the differences between safety and prescription eyewear are:

(a) safety eyewear must meet the impact strength requirements of the CSA Standards listed — able to withstand the impact of a 6.4 millimeter diameter steel ball travelling at 46.5 metres/second. Prescription eyewear is not subjected to such a test;

(b) safety eyewear frames must be manufactured so that when struck by an object, the lenses cannot be pushed through the back of the frame into the wearer's face. Prescription eyewear may not have this feature; and

(c) safety eyewear must have side protection, meet safety standard dimension requirements, and be tested as a complete protector. Prescription eyewear may not meet these requirements.

For those who need it, prescription safety eyewear is available from optometrists. Such eyewear meets the requirements of the referenced CSA Standards by using certified lenses and frames. Acceptable prescription safety eyewear has the following characteristics:

(a) lenses are etched or marked with the manufacturer's identification; and

(b) frames are marked with the manufacturer's trademark and the mark or label of the nationally accredited testing organization that evaluated and approved the eyewear to one of the listed CSA Standards.

Subsections 229(2.1) and 229(2.2)

These subsections recognize that in some cases, prescription safety eyewear must be used that has treated safety glass lenses rather than plastic lenses. For example, a work environment may contain an atmosphere that could be corrosive to a plastic lens. Where this is the case, the lenses made of glass must meet the requirements of at least one of the listed ANSI standards. The ANSI standards are referenced because the use of glass lenses is not recognized by CSA's protective eyewear standards.

Prescription safety eyewear having bifocal, trifocal or progressive i.e. a range of focal lengths from near to far distances, glass lenses has limited impact resistance. As a result, glass lenses must not be used where there is a danger of impact, i.e. there is a probability that the lens can be struck by some object, unless they are worn behind eye protection equipment approved to at least one of the CSA standards listed in subsection 229(1).

Subsection 229(2.3)

Practically speaking, prescription safety eyewear sometimes uses ANSI-compliant frames with CSA-compliant lenses. This subsection acknowledges this situation and allows it.

Subsection 229(3)

Situations may arise in which a full face piece respirator is required and the work also requires the eyes and face to be protected from debris, flying particles and dust. In the past, the performance of such work required the use of *both* a respirator and approved protective eyewear. This approach often reduced the ability of workers to see properly and was cumbersome.

The referenced editions of CSA Standard Z94.3 include impact testing of respirator face pieces, eliminating the need for additional protective eyewear. However at the time of release of the OHS Code, CSA does not yet have a certification program in place to test respirator face pieces to the new requirements. Until a certification program is in place, respirator face pieces meeting the faceshield impact requirements of section 9 of the referenced editions of ANSI Standard Z87.1, *Practice for Occupational Health and Educational Eye and Face Protection*, are considered acceptable. It is understood that CSA will have a certification program in place in the near future.

Section 230 Contact lenses

Opinions about the safety of contact lenses at the workplace vary widely. The critical point is that contact lenses are not intended to be used as protective devices. They are not a substitute for personal protective equipment. If eye and face protection is required for certain work operations, then all workers, including contact lens wearers, must wear the proper protective devices. The arguments against wearing contact lenses are that

(a) dusts or chemicals can be trapped behind the lens and cause irritation or damage to the cornea,

(b) gases and vapours can irritate the eyes and cause excessive watering, and

(c) chemical splashes may do more harm when contact lenses are worn. If lens removal is delayed, first aid treatment may not be as effective and, as a result, the eye's exposure time to the chemical may be increased.

However, the opposite may be true as well. Contact lenses may prevent some substances from reaching the eye, minimizing or even preventing an injury. Both situations have been documented.

If wearing contact lenses poses a hazard to the worker's eyes during work activities, this section requires the employer to advise the worker of the hazards and the alternatives available to contact lenses. Additional information about contact lens use at the workplace is described in the materials referenced below.

For more information

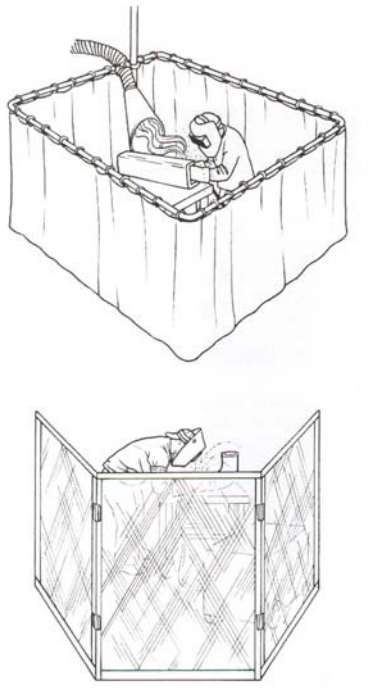
http://employment.alberta.ca/documents/WHS/WHS-PUB_mg001.pdf
Guideline for the Use of Contact Lenses in Industry

http://employment.alberta.ca/documents/WHS/WHS-PUB_eyeinja.pdf
Eye Injury Prevention in Industry

Section 231 Electric arc welding

A worker performing electric arc welding is responsible for ensuring that all workers in the area are protected from exposure to the radiation created by the arc. Workers in the area can be protected if they wear appropriate eye protection or the arc welding is done behind a screen as shown in Figure 18.8.

Figure 18.8 Examples of protective screens used in arc welding



Section 232 Flame resistant clothing

Flash fires and explosions are common hazards at a variety of Alberta workplaces. These hazards are present in work areas where flammable materials are present, handled, processed, or stored. In the petrochemical industry, for example, flash fires can occur at well head sites, collection points, compressor stations, refineries, and petrochemical and plastics plants. In such areas, the potential exists for developing an explosive atmosphere capable of injuring or killing workers and causing extensive property damage.

Industrial flash fires and explosions result from the accidental release and ignition of flammable fuels or chemicals. The size and duration of the flame that results from this ignition is determined by the amount of fuel available, the efficiency of combustion, and the environmental and physical characteristics of the site of the flash fire or explosion. The temperatures attained by flash fires have been estimated to range from 550 to 1050^{O}C, although higher temperatures are believed to occur. Even the lowest estimated temperature exceeds the temperature at which most regular clothing fabrics burst into flames.

If a worker may be exposed to a flash fire or electrical equipment flashover i.e. arc flash, the employer must ensure that the worker wears flame resistant outerwear and uses other protective equipment appropriate to the hazard. The employer is not required to pay for and provide flame resistant outerwear. However, the employer is required to ensure that a worker wears this equipment if there is a danger of a flash fire or flashover.

Commentary about clothing and PPE for arc flash protection

Readers will note that while this section requires workers to wear and use appropriate flame resistant (FR) outerwear and other PPE for protection against arc flash events, the section does not specify compliance with a particular standard or standards. In particular, CSA Standard Z462-08, *Workplace electrical safety,* is not referenced.

CSA Standard Z462, which is based on a similar U.S. Standard NFPA 70E, *Standard for Electrical Safety in the Workplace,* was published at the end of December, 2008. As such, it was published *after* most of the requirements of the 2009 edition of the OHS Code were finalized. Furthermore, Workplace Health and Safety did not receive any requests from industry to reference the standard during the time that the standard and the OHS Code were being prepared.

Despite the fact that CSA Standard Z462 is not referenced in the OHS Code, this section does require that an employer ensure that workers who may be exposed to an arc flash wear FR outerwear and use other PPE appropriate to the hazard. In determining the rating of the outerwear and which PPE is appropriate, some employers are using Z462 as a source of guidance information. Readers need to recall that FR clothing and other arc flash PPE are only required if the equipment being worked on is energized. If the equipment is isolated and de-energized, this safety equipment is unnecessary.

It has come to the attention of Workplace Health and Safety that for some employers, Z462 is becoming the standard of choice, an industry best practice. As a consequence, other employers may feel that they have an obligation to follow the standard as an indication of their being duly diligent. If it is used, employers should review the scope of Z462 to ensure that the standard is applied correctly.

An employer can chose to use Z462 for guidance, or any other standard or information source that the employer considers appropriate; a listing of other standards relevant to arc flash protection are shown below. The OHS Code does not specify which standard or information source the employer must use.

For more information

- 🕮 ASTM Standard F1506-08, *Standard Performance Specification for Textile Material for Wearing Apparel for Use by Electrical Workers Exposed to Momentary Electric Arc and Related Thermal Hazards*
- 🕮 ASTM Standard F1891-06, *Standard Specification for Arc and Flame Resistant Rainwear*
- 🕮 CSA Standard Z462-08, *Workplace Electrical Safety*
- 🕮 ULC Standard CAN/ULC-61482-1-06, *Live working – Flame resistant materials for clothing for thermal protection of workers – Thermal hazards of an electrical arc – Part 1: Test methods*
- 🕮 IEC Standard 61482-1-1: 2009, *Protective clothing against the thermal hazards of an electrical arc – Part 1 – 1: Test methods – Method 1: Determination of the arc rating (APV or EBT50) of flame resistant materials for clothing*
- 🕮 IEC Standard 61482-2: 2009, *Live working – Protective clothing against the thermal hazards of an electric arc – Part 2: Requirements*

Subsection 232(2)

Workers who have survived flash fires and explosions and were not wearing flame resistant outerwear have suffered terribly painful and disfiguring burns. However, in general, they do not suffer the most serious burns on their uncovered head and hands. Instead, the areas that *are* covered by their regular clothing and *not* protected by flame resistant outerwear are the most severely burned. The burning clothing, in contact with the skin and burning long after the flame has retreated, causes the most severe burns. Clothing that melts without burning can also cause significant damage as it must often be peeled away from the damaged skin and tissues that remain beneath the melted clothing.

To reduce the possibility of clothing melting to the skin or burning, the clothing workers wear beneath their flame resistant outerwear must be made of flame resistant fabrics or natural fibres. Examples of appropriate natural fibres include wool, cotton, and silk. The worker is responsible for ensuring this is done. Readers should refer to the manufacturer's specifications that accompany the flame resistant outerwear for more information.

For more information

- http://employment.alberta.ca/documents/WHS/WHS-PUB_ppe005.pdf Appropriate Workwear for Flash Fire and Explosion Hazards
- CGSB Standard CAN/CGSB-155.20-2000 *Workwear for Protection Against Hydrocarbon Flash Fire,* Canadian General Standards Board (CGSB)
- CGSB Standard CAN/CGSB-155.21-2000 *Recommended Practices for the Provision and Use of Workwear for Protection Against Hydrocarbon Flash Fire*, Canadian General Standards Board (CGSB)

Foot Protection

Section 233 Footwear

Subsection 233(1)

The employer is not required to pay for and provide safety footwear. However, the employer is required to assess the hazards (see section 7 of the OHS Code) that the worker's feet will be exposed to and determine if there is a danger of injury to the worker's feet. The employer is also required to ensure that the protective footwear selected is appropriate to the work being done and the hazard(s) involved.

The employer must determine the appropriate protection required for the feet based on the work assigned to each worker. In doing so, the following factors should be considered: the potential for slipping, uneven terrain, abrasion, ankle protection and foot support, the potential for crushing injuries, temperature extremes, exposure to corrosive substances, puncture hazards, electrical shock and any other recognizable hazard.

The assessment must consider the work procedures and conditions present at the workplace. An employer may change the work procedures and workplace conditions to reduce or remove the risk. For example, an employer may limit the number of workers doing tasks that could cause foot injury. Or the employer may change the way the tasks are done. Protective footwear need only be worn while a worker is exposed to the hazard that requires it. When determining the requirements for appropriate protective footwear, worker training and supervision are not an acceptable substitute for protective footwear.

The hazard assessment to determine appropriate footwear will result in persons or activities being placed into one of three categories:

Category 1

The hazards present require footwear approved to

(a) CSA Standard Z195-02, *Protective Footwear*, or

(b) ASTM Standard F2413-05, *Specifications for Performance Requirements for Protective Footwear*.

Because safety footwear is only approved to the specific hazards listed in the standards, the employer must be aware of hazards to which workers are exposed and against which the footwear provides protection.

If a hazard requires metatarsal protection, i.e. protection to the top surface of the foot, metatarsal protectors must be an integral part of the footwear. This form of protection is typically required in foundries and heavy manufacturing where steel plate, beams or rails are handled, but it is not normally required in construction. Metatarsal protectors that only attach to the laces or are only strapped in place do not meet the requirements of the referenced CSA standard. Such protectors must not be used because there is no assurance that they will be properly supported by the toecap.

Category 2

Some hazards are present that require foot protection but not necessarily to the level of category 1. For example, it is unlikely that a lifeguard at a beach needs footwear with safety toe protection. It is much more likely that the lifeguard needs footwear offering protection against cuts from objects on the beach.

Hazards for which protection may be required include slipping, uneven terrain, abrasion, ankle protection and foot support, temperature extremes and corrosive substances. CSA Guideline Z195.1-02, *Guideline on Selection, Care, and Use of Protective Footwear*, helps employers assess hazards and select the most appropriate protective footwear for the situation.

Category 3

There are no hazards of foot injury for which specific protective footwear is necessary. This situation applies to most workers in an office setting.

Footwear suggestions for certain types of workers

The following situations serve as examples of the types of footwear workers should wear. Because circumstances at workplaces can vary significantly, these recommendations are general and may need to be altered. For example, an employer may arrange the work in a manner that eliminates all hazards of foot injury and therefore the need for protective footwear.

Example 1: A worker in the construction industry, or any other similar working environment where there is risk of toe injury, should wear approved safety footwear with Grade 1 toe protection (see Table 18.2 for information about the grades of toe protection available.)

Example 2: A worker in the construction industry, or any other industry with a possibility of sole puncture, should wear footwear with protective sole plates.

Example 3: A worker in any industry with a potential for electric shock, for example an electrician or powerline technician, should wear footwear with dielectric protective soles, in addition to any other protective features required by the circumstances of the work.

Example 4: A worker using high pressure washing or cutting equipment should wear footwear or footwear cover devices that protect the whole top area of the foot from accidental contact with the washing or cutting stream. Conventional safety toe and metatarsal protectors do not cover a sufficient portion of the worker's foot to protect the foot during this type of work.

Because conventional protective footwear does not offer sufficient protection against this hazard, alternative footwear appropriate to the hazard must be used. Subsection 233(3) allows the use of protective footwear that is not approved to the listed standards.

Example 5: A worker in a warehouse should wear safety footwear with Grade 1 toe protection.

Example 6: A worker in a retail store environment using pallet jacks, forklifts or other rolling equipment should wear footwear with Grade 1 toe protection.

There are activities and work environments where a heavy work shoe or boot, or a specific protective feature, might normally be required but wearing such footwear could endanger the worker or damage the work environment. These exceptions apply while the worker is performing the particular job function. When the worker is performing other job functions or walking through surrounding hazards, the worker must wear footwear appropriate to those job functions or hazards. The following practices are generally recognized as being acceptable to Alberta Employment and Immigration:

Example 7: A roofer applying asphalt shingles or similar materials that can be damaged by heavy work boots will generally wear light, soft-soled footwear such as running shoes.

Example 8: A carpet layer or similar finishing trade that requires a worker to constantly kneel down will generally not wear safety-toed footwear.

Example 9: A worker climbing or walking on skeletal steel structures will generally not wear safety-toed footwear because such footwear offers limited grip on steel surfaces. However, the worker should wear substantial footwear having leather uppers reaching past the ankles to provide ankle support and abrasion resistance.

Example 10: A worker in the logging industry walking on logs or on steep sidehills or uneven ground will generally not wear safety-toed footwear. Subsection 233(3) should be applied since the principle hazard is slipping, a hazard not addressed by the standards listed in subsection 233(2). Substantial footwear having leather uppers and a heavily lugged sole is usually a better choice.

For more information

📖 *Guideline on Selection, Care, and Use of Protective Footwear*, CSD Special Publication Z195.1-02. Canadian Standards Association, February 2002.

Subsection 233(2)

Footwear approved to the listed standards offers protection against a limited number of hazards. If workers are exposed to one or more of these hazards, and the hazard assessment shows these to be the principle or only hazards needing to be protected against, then footwear approved to the listed standards must be used. For compliance purposes, the footwear must bear the mark or label of a nationally accredited testing organization such as CSA, UL, SEI, etc.

However, as described in Examples 4 and 10 of the explanation to subsection 233(1), if the principle hazard or hazards differ from those addressed by the standards, alternative, unapproved footwear appropriate to the hazards must be used. The employer should be able to explain the reason(s) for selecting unapproved footwear based on the hazards that workers are exposed to.

Footwear approved to the standards offers, alone or in combination,

(1) toe protection,

(2) a puncture resistant sole,

(3) metatarsal protection (protection to the top part of the foot),

(4) electrical protection, and

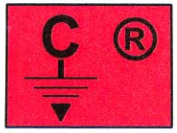
(5) chainsaw protection.

Subsection 233(3)

Conventional protective footwear offers protection against a limited number of hazards (see explanation above). If such footwear does not offer adequate protection because the worker is likely to be exposed to a hazard other than one of those referred to in subsection 233(2), then the use of unapproved footwear is permitted. The employer must ensure that this unapproved footwear is appropriate to the hazard. The employer should be able to explain the reason(s) for selecting unapproved footwear based on the hazards that workers are exposed to.

Table 18.2 Protective footwear markings

Outside Labels	Location	Criteria	Intended Application
	The label will appear on the outer side or on the tongue of the right shoe.	Green triangle indicates sole puncture protection with a Grade 1 protective toe to withstand impacts up to 125 joules. Comparable to a 10 kg weight dropped 1.3 metres.	For any industry, especially construction, where sharp objects (such as nails) are present, heavy work environments.
	The label will appear on the outer side or the tongue of the right shoe.	Yellow triangle indicates sole puncture protection with a Grade 2 protective toe to withstand impacts up to 90 joules. Comparable to a 10 kg weight dropped 0.9 metres.	For light industrial work environments requiring puncture protection, as well as toe protection.
	The label will appear on the outer side or on the tongue of the right shoe.	White rectangle with orange Greek letter Omega indicates soles that provide resistance to electrical shock.	For any industry where accidental contact with live electrical conductors can occur. *Warning: Electrical Shock Resistance deteriorates with wear and in a wet environment.*
	The label will appear on the outer side or on the tongue of the right shoe.	Yellow rectangle with green “SD” and grounding symbol indicates soles are static dissipative.	For any industry where a static discharge can create a hazard for worker or equipment.

	The label will appear on the outer side or on the tongue of the right shoe.	Red rectangle with black “C” and grounding symbol indicates soles are electrically conductive.	For any industry where static discharge may create a hazard of explosion.
	The label will appear on the outer side or on the tongue of the right shoe.	White label with green fir tree symbol indicates chain saw protective footwear.	For forestry workers and others exposed to hand-held chain saws or other cutting tools.

Source: CSA Special Publication Z195.1-02 Guideline on Selection, Care, and Use of Protective Footwear

Note: The ® appearing on the labels represents the mark or label of the nationally accredited testing organization that evaluated and approved the footwear.

Subsection 233(4)

The use of safety toecaps as an alternative to approved protective footwear is limited by several conditions:

(a) the affected worker must be able to provide the employer with a medical certificate, signed by a physician, indicating that the worker is unable, for medical reasons, to wear approved footwear;

(b) the safety toecaps must, at a minimum, meet the impact force test requirements for footwear of CSA Standard Z195-02, Protective Footwear or ASTM Standard F2413-05, Specification for Performance Requirements for Protective Footwear. The impact force required is based on the type of foot hazard the worker is exposed to. For example, if the worker needs Grade 1 protection, then the toecap must be able to withstand the impact force required by Grade 1 foot protection. The purpose of the toecaps is to provide impact protection. Toecaps are not an acceptable replacement for, for example, protective footwear offering chain saw protection;

(c) safety toecaps are not suitable replacements for integral metatarsal protectors. If the worker is exposed to metatarsals hazards, then safety toecaps cannot be used;

(d) safety toecaps do not have soles capable of providing protection against sharp objects penetrating the soles of shoes with which the toecaps are being used. If the worker is exposed to sole penetration hazards, then safety toecaps cannot be used; and

(e) safety toecaps may present a tripping hazard, an electrical safety hazard if made of conductive materials, etc. The employer must take these factors into consideration when determining if safety toecaps can be used as a safe and effective alternative to approved protective footwear.

Subsection 233(5)

No explanation required.

Head Protection

Section 234 Industrial headwear

Subsection 234(1)

The OHS Code does not require all workers under all circumstances to wear industrial protective headwear i.e. hard hats. Only if there is a foreseeable danger of injury to a worker's head at a work site is industrial protective headwear required. The decision to require workers to use industrial protective headwear should be based on the results of the hazard assessment required by section 7 of the OHS Code.

For compliance purposes, industrial protective headwear intended for use where there is a significant possibility of lateral impact to the head must meet the requirements of CSA Standard CAN/CSA-Z94.1-05, *Industrial Protective Headwear,* or ANSI Standard Z89.1-2003, *American National Standard for Industrial Head Protection,* for Type II head protection. The headwear must be of the appropriate Class for the type of work being performed.

Industrial safety headwear has traditionally been designed and tested to provide protection from an impact directed more or less downward onto the top of the head. The 1992 edition of CSA Standard Z94.1 introduced a new requirement for protection of the head from an impact landing on the side of the head. This was in response to injury studies that indicated a significant incidence of injury due to people being struck on the side of the head by objects, even when wearing safety headwear. According to the Standard, a lateral impact occurs when an object strikes the headwear from any direction other than directly above. All protective headwear that meets the requirements of this Standard provides lateral impact protection.

The 1997 edition of the referenced ANSI standard added requirements specific to lateral impact, creating a new Type II category for head protection.

CSA Standard

CSA Standard Z94.1-05, *Industrial Protective Headwear*, applies to headwear intended to protect the heads of industrial workers. The Standard defines the areas of the head that are to be protected and includes basic performance requirements for impact protection, object penetration, stability and dielectric properties (the ability of a material to resist the passage of electric current).

The Standard divides protective headwear into three Classes according to its intended use:

(a) *Class G (General Use)* — this Class is intended to provide workers with protection against impact and penetration. This headwear is non-conducting and must pass the 2200 V dielectric-strength test specified for Class G headwear. Although this class of protective headwear is manufactured from non-conducting materials, it must never be considered to be part of a protective system against electric shock. This protective headwear provides limited protection against electric shock following accidental contact between the headwear and exposed energized electrical sources.

(b) *Class E (Electrical Trades)* — this Class is intended to provide workers with protection against impact and penetration. This headwear is non-conducting and must pass the 20,000 V dielectric-strength test specified for Class E headwear. Although this class of protective headwear is manufactured from high grade non-conducting material, it must never be used as a primary barrier in a protective system designed to prevent contact with live electrical apparatus. This headwear provides improved protection against electric shock following accidental contact between the headwear and exposed energized electrical sources.

(c) *Class C (Conducting Headwear)* — this Class is intended to provide the user with protection against impact and penetration only.

Protective headwear meeting the CSA requirements may have a brim around the entire circumference of the shell or have a partial brim with a peak.

ANSI Standard Z89.1-2003

Type II helmets that meet the 1997 or 2003 editions of ANSI Standard Z89.1, *American National Standard for Industrial Head Protection*, may also be used at the workplace. The ANSI Standard applies to protective helmets intended to provide limited protection for the head against impact, flying particles, electric shock or any combination of these hazards.

The Standard divides protective helmets into two types and three classes according to their intended use. Type I helmets are intended to reduce the force of impact resulting from a blow only to the top of the head. Type II helmets are intended to reduce the force of impact resulting from a blow that may be received off-centre or to the top of the head. The three classes are as follows:

(a) *Class G (General)* — this Class is intended to reduce the danger of contact exposure to low voltage conductors and must pass the 2200 V dielectric-strength test specified for Class G helmets. These helmets are used in mining, construction, shipbuilding, tunnelling, lumbering and manufacturing.

(b) *Class E (Electrical)* — this Class is intended to reduce the danger of contact exposure to high voltage conductors and must pass the 20,000 V dielectric-strength test specified for Class E helmets. This Class of headwear is used extensively by electrical workers.

(c) *Class C (Conductive – no electrical protection)* — this Class is designed specifically for lightweight comfort and impact protection. This Class is usually manufactured from aluminum and offers no dielectric protection. Class C helmets are used in certain construction and manufacturing occupations, oil fields, refineries and chemical plants where there is no danger from electrical hazards or corrosion. They are also used on occasions where there is a possibility of bumping the head against a fixed object.

ANSI types and classes are combined to provide products classified as Type I, Class G or Type II, Class E, etc. Helmets meeting the ANSI requirements may have a brim around the entire circumference of the helmet shell or have a partial brim with a peak.

Class of headwear to be worn

An electrician working only on "residential type" circuits of 240 volts or less may wear headwear classified by CSA as Class G or E, or classified by ANSI as Class A or B. Headwear having one of these classifications has a dielectric-strength test rating of 2200 volts. While this upper voltage limit around residential type circuits may seem conservative, it takes into account the effects of accumulated dirt on the headwear and wear and tear of the headwear material.

Electrical utility workers, electricians and other workers who work on circuits having voltages exceeding 240 volts must use headwear classified by CSA and ANSI as Class E. Headwear having this classification has a dielectric test rating of 20,000 V.

Workers who are not exposed to energized electrical equipment in the normal course of their work may use headwear of any Class, including headwear classified by CSA and ANSI as Class C (Conductive). If workers receive special training and are given work assignments requiring work near exposed energized electrical sources, they must have and wear headwear with the appropriate dielectric rating. For example, workers assigned to clean and paint utility poles may be exposed to electrical hazards and should therefore wear electrically protective headwear.

Protective headwear use

Industrial headwear is designed to absorb some of the energy of a blow through partial destruction of its component parts. Headwear that has experienced a severe impact should be replaced even though it may not appear to be damaged. Unless permitted by the manufacturer, headwear must not be painted or cleaned with solvents, and the adhesive used on decals applied to the headwear must not interact with the headwear material to reduce its strength.

For maximum head protection, the headwear's shell and suspension should be checked according to the manufacturer's instructions before each use. If the shell or linings are found to have a crack, dent, or hole, or if the suspension is torn or broken, the headwear should either be discarded or the particular part replaced with an identical part from the original manufacturer.

Unless permitted by the manufacturer, headwear users should not carry or wear anything inside their protective headwear. A cap or object may contain metal parts that reduces the dielectric protection provided by the headwear. A clearance distance must be maintained between the wearer's head and the headwear's shell for the protection system to work properly. A cap or other object may limit this clearance. Products such as fabric winter liners or cotton sunshades are designed to work in conjunction with the headwear and their use is acceptable.

Unless permitted in the manufacturer's written instructions for use, protective headwear must not be worn backwards. All headwear is tested while in its intended forward-facing direction. Very few models of headwear have undergone testing in both the forwards- and backwards-facing directions. Those products that have been tested and passed testing in both directions have usually required their suspension system to be reversed. In this case, only the shell of the headwear is backwards — the brow pad of the headband sits against the forehead and the extended nape strap is at the base of the skull.

Subsection 234(1.1)

A small utility vehicle is a small vehicle designated for off-road use, equipped with a bench-type seat and a steering wheel, and designed to transport more than one person. There are a variety of manufacturers and they are known by a variety of trade name including Polaris Ranger, Pug Back Forty, Bobcat Toolcat, John Deere Gator, Kawasaki Mule, Toro Twister and CubCadet Volunteer.

If a small utility vehicle is equipped with seat belts and rollover protection, riders are not required to wear a safety helmet. In such cases, the employer's procedures must require that riders use the seat belts.

Employers need to make sure that what looks like rollover protection is not simply part of a roof canopy. Confirm with the product manufacturer that the structure provides true rollover protection to occupants of the machine. Rollover protection devices bear a tag or decal, permanently affixed to the device, usually located on the device where it attaches to the frame of the machine.

Subsection 234(2)

If the possibility of lateral impact to the head is unlikely, the headwear can meet the requirements of

(a) CSA Standard CAN/CSA-Z94.1-05, *Industrial Protective Headwear,* or

(b) ANSI Standard Z89.1-2003, *American National Standard for Industrial Head Protection.*

In assessing the "possibility of lateral impact to the head", employers should consider the likelihood of a lateral impact occurring. Headwear providing lateral impact protection must be used if a lateral impact is foreseeable and likely based on the type of work normally performed. Examples of typical workplace situations requiring such protection include a workshop in which multiple overhead cranes are used to transport loads around the shop, workers involved in the felling of trees, workers involved in tree care operations (see Part 39) and workers involved in processes in which substantial flying objects or debris are generated.

Section 235 Bicycles and skates

Subsection 235(1)

The employer must ensure that a worker riding a bicycle, using in-line skates, or similar means of transport such as a three-wheeled cycle, skateboard, or roller skates, wears a cycling helmet approved to one of the listed bicycle helmet standards. For compliance purposes, a helmet must bear the mark or label of a nationally accredited testing organization such as CSA, UL, SEI, etc.

This section applies to workers while working, and includes bicycle couriers, workers using in-line skates at grocery stores and workers at restaurants who may use roller skates or similar means of transport.

Subsection 235(2)

Workers are often required to wear a hard hat whenever they are present at an industrial work site. At large industrial complexes, workers may use bicycles or similar conveyances in place of vehicles as a means of getting from one work area to another. To avoid the need to carry additional headwear (a bicycle helmet) and constantly switch between the hard hat and bicycle helmet, this section permits workers to wear their hard hat in place of a helmet. To do so, speeds must not exceed 20 kilometres/hour and the hard hat must be equipped with a chin strap. The worker must use the chin strap.

Some hard hats have earmuff-style hearing protectors. When placed over the ears, these protectors can actually help to keep the hard hat on the head. However, if a worker's head is jolted (as might happen during a fall from a bicycle or similar conveyance), the hard hat and earmuffs quickly fall off. A hard hat with earmuff-style hearing protection is therefore unacceptable as an alternative to a hard hat with fastened chin strap.

Section 236 All-terrain vehicles, snow vehicles, motorcycles

Subsection 236(1)

Operators of all-terrain vehicles, snow vehicles, motorized trail bikes, motorcycles or a small utility vehicle must wear protective headwear meeting the requirements of one of the listed standards.

For compliance purposes, the helmet must bear a "DOT" mark or the mark or label of a nationally accredited testing organization such as CSA, UL, SEI, etc. The presence of a "DOT" mark or an organization's mark or label proves that the helmet meets the requirements of the appropriate listed standard.

Subsection 236(2)

Headwear complying with an earlier edition of one of the listed standards may remain in service if the helmet is still in good condition. Existing helmets need not be replaced simply because they comply with an earlier edition of one of the listed standards.

Subsection 236(3)

The requirement to wear protective headwear while operating an all-terrain vehicle, snow vehicle, motorized trail bike or motorcycle does not apply if the machine is equipped with rollover protective structures meeting the requirements of section 270 and seat belts or restraining devices meeting the requirements of section 271.

Subsection 236(4)

Workers sometimes access work sites by all-terrain vehicle, snowmobile or motorcycle. An example of such a situation involves reading meters located in substations along the length of a pipeline. Workers dismount their vehicle(s), enter the substation, perform measurements, return to their vehicle(s) and move on to the next substation. At issue is the need to remove the helmet and replace it with a "hard hat" during the period that workers are in the substation.

Protective headwear meeting the requirements of subsection (1) offers impact and penetration protection equal to or better than that provided by a "hard hat". However, this headwear cannot pass the dielectric strength test to which hard hats are subjected since the metal fasteners and hardware attached to the helmet shell are capable of providing a conductive path through the helmet to the wearer.

A worker wearing headwear meeting the requirements of subsection (1) may, upon reaching the work site and beginning work tasks, continue to wear that headwear instead of industrial protective headwear i.e. a hard hat, provided that:

(1) work tasks do not expose the worker to any potential contact with exposed energized electrical sources. Where the work being performed exposes the worker to any potential contact with exposed energized electrical sources, appropriately selected protective headwear meeting the requirements of section 234 must be used; and

(2) the tasks performed at the work site are of limited duration. This condition is intended to limit the period of time during which the headwear is used in place of a hard hat. The time limitation reflects the fact that headwear intended for use with all-terrain vehicles, snow vehicles, etc. is less comfortable to wear, restricts the ability to hear and may restrict peripheral vision. Typical work tasks of limited duration include taking or recording measurements, reading meters, making process control adjustments, etc. Where the duration of the tasks being performed exceeds that of the tasks listed as typical examples, appropriate protective headwear meeting the requirements of section 234 must be worn.

Section 237 Fire fighters

Helmets used by structural and wildland firefighters have characteristics or features specific to the type of work being performed. Protective headwear meeting the requirements of the referenced NFPA standards has the required characteristics or features.

For compliance purposes, protective headwear meeting the NFPA standards must bear the mark or label of a nationally accredited testing organization such as CSA, UL, SEI, etc. Without this mark or label, the headwear is not in compliance even if the manufacturer's label and product literature states that the headwear complies with one of the referenced standards. The marking also indicates the standard that the headwear complies with.

NFPA Standard 1971 (2007 edition), *Protective Ensemble for Structural Fire Fighting*, includes headwear requirements for protection against top and lateral impact, resistance to penetration, electrical exposure, flame resistance, heat distortion and several other characteristics. The headwear must be equipped with a faceshield or goggles, or both, ear covers, and fluorescent and reflective trim.

NFPA Standard 1977 (2005 edition), *Protective Clothing and Equipment for Wildland Fire Fighting*, includes headwear requirements for protection against top impact, resistance to penetration, electrical exposure, flame resistance, heat distortion and several other characteristics. The headwear must have retroreflective markings i.e. markings that reflect light directly back to its source, and its weight is limited to 570 grams (20 ounces).

Section 238 Bump hat

Unlike industrial protective headwear, bump hats are not equipped with a shock-absorbing liner and suspension system that can absorb the energy of an object striking the headwear. Bump hats are intended for use in situations where the danger of injury is limited to striking the head against stationary objects. Examples of these situations include automotive repair operations, meat processing facilities, underwater dives in restricted spaces, servicing hard-to-reach equipment in a complex mechanical room, etc.

Section 239 Exemption from wearing headwear

To perform certain functions, workers may need to remove their protective headwear. When this is the case, the employer must ensure that an adequate alternative means of protecting the worker's head during the work process is in place. This might be a simple matter of having persons working above the worker stop work and ensure that nothing falls down during the time that the worker beneath them is without head protection.

Providing overhead protection with a solid barrier or properly designed safety net are other approaches that may protect the worker from the hazard. If the falling object hazard is still present after the work process is completed, the worker must immediately return to wearing his or her protective headwear.

Situations sometime arise in which an employer requires a worker to wear protective headwear and the worker wears a turban as part of his religious doctrine. The Safety Bulletin "Protective Headwear and Turbans" referenced below provides advice to employers and workers. The advice strikes a balance between ensuring the worker's safety while respecting their personal values, and the employer's obligation to provide a safe and healthy workplace.

For more information

http://employment.alberta.ca/documents/WHS/WHS-PUB_ppe006.pdf
Protective Headwear and Turbans

Life Jackets and Personal Flotation Devices

Section 240 Compliance with standards

Subsection 240(1)

A life jacket meeting Canadian General Standards Board (CGSB) Standard CAN/CGSB-65.7-M88 AMEND, *Lifejackets, Inherently Buoyant Type*, provides a minimum buoyant force of 93 newtons (21 pounds-force) and is often of the "keyhole" style. The colour may be bright yellow, orange or red. The life jacket is designed to provide support for the head so the face of an unconscious person is held above the water with the body inclined backwards from the vertical position. The jacket must have a permanent label identifying the

(a) standard it meets,

(b) size of the jacket,

(c) mass (weight) of the person for which the jacket is designed,

(d) name of the manufacturer,

(e) lot number,

(f) date of manufacture, and

(g) Transport Canada approval number.

Subsection 240(2)

Personal flotation devices meeting CGSB Standard CAN/CGSB-65.11-M88 AMEND, *Personal Flotation Devices*, are the most common and generally the most comfortable personal flotation device, offering up to 69 newtons (15.5 pounds-force) of buoyancy. A device meeting this Standard is *not* required to turn an unconscious person from a facedown position in the water to a position where the wearer's face is out of the water. The shell colour is bright yellow, orange or red. These devices can be either the vest or "key hole" style. The device must have a permanent label or marking identifying the

(a) standard it meets,

(b) date of manufacture,

(c) acceptable chest size,

(d) name of manufacturer, and

(e) Transport Canada approval number.

Section 241 Use of jackets and flotation devices

When workers are transported by boat, the employer must ensure that each worker wears a lifejacket. However, as permitted by subsection (3), a personal flotation device – which is generally more comfortable to wear than a lifejacket – may be worn by workers if the work is performed from a boat for an extended period of time. This use of a personal flotation device is conditional on the employer ensuring that a life jacket is readily accessible to each worker on the boat.

Limb and Body Protection

Section 242 Limb and body protection

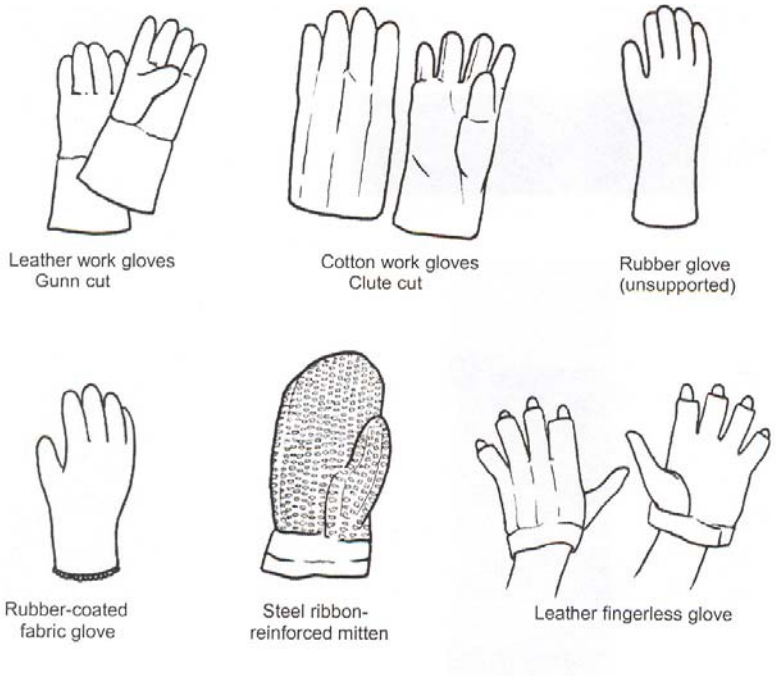
Hand and arm protection

Examples of injuries to arms and hands include burns, cuts, electrical shock, amputation and absorption of chemicals. There is a wide assortment of gloves, sleeves, and wristlets for protection against various hazards.

Employers need to determine the type and style of hand protection their workers need. Work activities should be studied to determine how much finger dexterity is needed to safely do the work, the duration, frequency, and degree of exposure to hazards, and the physical stresses that will be applied. The protection selected must be appropriate to the type of hazard.

Workers must be trained to understand the limitations of the protective equipment they are using. Figure 18.9 shows examples of protective gloves and other hand wear.

Figure 18.9 Examples of protective gloves and other hand wear



Torso protection

Exposure to heat, splashes from hot metal and liquids, impacts, cuts, acids, and radiation can injure the torso. A variety of protective clothing is available such as vests, jackets, aprons, coveralls and full body suits.

Heat-resistant materials such as leather are often used in protective clothing to guard against dry heat and flame. Rubber and rubberized fabrics, neoprene and plastic offer protection against some acids and chemicals. The manufacturer's specifications and selection guides should be consulted for information about the effectiveness of specific materials against specific chemicals.

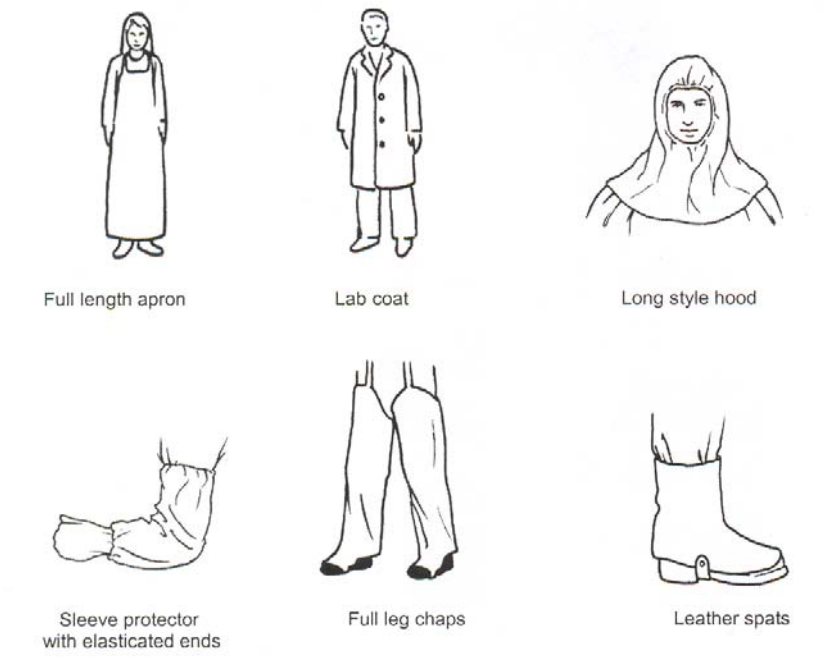
Disposable suits of plastic-like or other similar synthetic materials are particularly important for protection from dusty materials or materials that can splash. If the substance is extremely toxic, a completely enclosed chemical suit may be necessary. The clothing should be inspected to ensure proper fit and function for continued protection. Figure 18.10 includes examples of torso protection.

Foot and leg protection

To protect the feet and legs from falling or rolling objects, sharp objects, molten metal, hot surfaces, and wet slippery surfaces, workers must use protective footwear meeting the requirements of section 233. Appropriate footguards, boots, leggings and chaps protect the legs and feet from molten metal or welding sparks.

Aluminum alloy, fibreglass, or galvanized steel footguards can be worn over work shoes, although they may catch on objects and cause workers to trip. Heat-resistant soled shoes protect against hot surfaces like those found in the roofing, paving, and hot metal industries. See Figure 18.10 for examples of foot and leg protection.

Figure 18.10 Examples of torso and foot and leg protection



Section 243 Skin protection

If a worker must handle substances that may damage the skin on contact or be absorbed through the skin, the employer is responsible for making sure that the worker uses effective and appropriate protective clothing or equipment. The performance characteristics of gloves must match the specific hazard(s) that workers will encounter e.g. exposure to chemicals, heat or flames. For example,

for protection against chemical hazards, the toxic properties of the chemical(s) must be known, particularly the ability of the chemical(s) to pass through the skin and affect the worker.

Respiratory Protective Equipment

Section 244 Respiratory dangers

Subsection 244(1) Need for hazard assessment

If a worker is or may be exposed to one or more of the listed conditions i.e. (1) exposure to an airborne contaminant (usually a chemical) exceeding the contaminant's OEL; (2) an oxygen deficient atmosphere; or (3) exposure to an airborne biohazardous material, the employer must assess the work site to determine if workers need to use respiratory protective equipment. Subsection (2) lists the factors that the employer must consider when doing this assessment.

Subsection 244(2) Factors to consider

This subsection lists the factors to be considered when performing the hazard assessment required by subsection (1). In previous editions of the OHS Code, the inclusion of biohazardous materials was implied. This edition of the OHS Code explicitly requires the employer to take into account the nature and exposure circumstances of airborne biohazardous materials.

Examples of situations in which workers may require respiratory protection against exposure to airborne biohazardous materials include

(a) sewage plant workers exposed to aerosols created during effluent processing or during equipment maintenance,

(b) laboratory workers exposed to aerosols while handling biohazardous materials,

(c) health care workers exposed to airborne biohazardous materials,

(d) rendering plant workers exposed to aerosols created during materials processing,

(e) workers involved in renovations removing mouldy building materials, and

(f) workers stirring up dusts containing waste products from animals such as birds, bats and mice. These contaminated dusts may contain materials that could cause disease in humans.

The OHS Code defines a "biohazardous" material as a pathogenic organism, including a bloodborne pathogen, that, because of its known or reasonably believed ability to cause disease in humans, would be classified as Risk Group

2, 3 or 4 as defined by the Public Health Agency of Canada, or any material contaminated with such an organism.

Subsections 244(3) and 244(4) Nature and exposure circumstances of airborne biohazardous materials

Many factors affect the nature and exposure circumstances of a worker's exposure to an airborne biohazardous material. These include

(a) the type of biological agent,

(b) the route of transmission,

(c) the pathogenicity of the agent,

(d) concentration of the agent,

(e) size of airborne particles,

(f) duration of exposure,

(g) work activity, and

(h) work practices and procedures for which exposure to biohazardous material is possible.

Item (e), size of airborne particles, deserves additional discussion. Droplets are relatively large particles which, because of their size and mass, travel a short distance through air, usually no further than 2 metres. Most droplets land on inanimate objects and do not pose a respiratory hazard.

Inhalable infectious airborne particles that remain aloft because of their small size and low mass do present a potential respiratory hazard to workers. These particles may be generated during coughing and sneezing, during some medical procedures, and by the aerosolization of liquids and stirring up of dusts containing biohazardous materials.

The presence of an airborne biohazardous material is not, of itself, sufficient to cause illness in an exposed worker. The pathogenicity of the material, the exposure concentration, the health status of the exposed worker and the presence of a respiratory route of transmission need to be evaluated.

The following factors should be considered when determining the need for respiratory protective equipment:

(a) Who is potentially exposed to the biohazardous material as part of their work?

(b) What are the potential sources and routes of transmission to workers?

(c) Which job tasks increase the potential for worker exposure to biohazardous material at the workplace?

(d) Can the biohazardous material be spread to workers through airborne transmission?

Subsection 244(3) Provide and ensure availability

Based on the employer's assessment required by subsection (1), the employer is responsible for providing workers with the appropriate respiratory protective equipment. The employer must also ensure that the equipment is available to workers who need to use it.

Paragraph (b) explicitly deals with airborne biohazardous materials. The OHS Code relies on CSA Standard Z94.4-02, *Selection, Use and Care of Respirators*, for establishing the criteria to be used by employers to select respirators. Unfortunately, the CSA Standard does not specify selection criteria for biohazardous materials, hence the need for paragraph (b) and its cross-reference to section 247 and the CSA Standard.

Paragraph (b) specifically requires that respiratory protection be provided and made available when the effects of worker exposure to airborne biohazardous materials are unknown i.e. the health effects and mechanism of transmission have not yet been characterized, and no procedures are in place to effectively limit exposure. Unknown exposure effects include adverse health effects such as an acute or chronic illness, acute or chronic disease, or death.

This approach to respiratory protection is based on the principle that precautions need to be taken until sufficient information is available to indicate that different precautions are acceptable or necessary. The worker's "exposure circumstances" may influence the type of respiratory protection required.

A worker's "exposure circumstances" may be such that respiratory protective equipment is unnecessary because exposure is effectively limited through the use of one or more of the control strategies listed in subsection (3.1), or other equally effective strategies. Readers are directed to the previous explanation dealing with the *Nature and exposure circumstances of airborne biohazardous materials* for additional discussion regarding "exposure circumstances".

Subsection 244(3.1) Procedures to limit exposure

If the employer has developed and implemented procedures and safe work practices that effectively limit exposure to the biohazardous material, respiratory protective equipment is not required. Examples of how exposure can be effectively limited include

(a) containment of the source biohazardous material to prevent airborne spread,

(b) collection of airborne materials at their source of generation i.e. local exhaust system or laboratory fume hood that redirects airborne materials away from workers,

(c) isolating workers from the biohazardous material by distance, time or a combination of both,

(d) dust suppression equipment and wetting, and

(e) isolation or negative pressure containment rooms, etc.

The employer must be able to demonstrate that exposure to airborne biohazardous material has been effectively limited.

Subsection 244 (4) Worker responsibility

The worker is required to use the appropriate respiratory protective equipment provided by the employer.

For more information

http://employment.alberta.ca/documents/WHS/WHS-PUB_ppe001.pdf
Respiratory Protective Equipment: An Employer's Guide

http://employment.alberta.ca/documents/WHS/WHS-PUB_mg005.pdf
Medical Assessment of Fitness to Wear a Respiratory

Section 245 Code of practice

Subsection 245(1)

Whenever the atmospheric concentration of a dust, vapour, mist or gas requires the use of respiratory protective equipment, a code of practice describing the selection, use and maintenance of that equipment must be developed. The person responsible for developing a code of practice should refer to the Safety Bulletin shown below. As required by section 8 of the *OHS Regulation*, the procedures contained in the code of practice must be in writing and available to workers.

For more information

http://employment.alberta.ca/documents/WHS/WHS-PUB_ppe004.pdf
Guideline for the Development of a Code of Practice for Respiratory Protective Equipment

Subsection 245(2)

Where health care workers may be exposed to airborne biohazardous material, an employer must ensure that the code of practice required by subsection (1) includes annual training. The training should include

(a) information about the airborne biohazardous materials that workers may be exposed to including their potential health effects,

(b) an explanation of why the particular respiratory protective equipment being used was chosen, including information about its capabilities and limitations and how to test for a satisfactory fit, and

(c) an explanation of how to properly put on and take off the respiratory protective equipment without contaminating oneself or other workers.

Section 246 Approval of equipment

Respiratory protective equipment must be selected, used, maintained and cared for in the proper manner. Only approved respirators may be used. Approved respirators are those that have undergone testing and have been approved

(a) by NIOSH, or

(b) by another standards setting and equipment testing organization, or combination of organizations, approved by a Director of Occupational Hygiene.

For enforcement purposes, respirators approved by an agency subject to (a) and (b) must bear the registered identifying logo or mark of the agency or organization. All NIOSH-approved respirators, respirator cartridges and filters bear a sequence of approval numbers beginning with "TC".

Employers having respiratory protective equipment approved for use by a Director of Occupational Hygiene (a member of the staff of Alberta Human Resources and Employment appointed by the Minister under section 5 of the *OHS Act*) must have in their possession written permission from the Director indicating that the equipment is acceptable.

For more information

www.cdc.gov/niosh/npptl/topics/respirators/cel/default.html
Certified Equipment List
Provided by NIOSH, the Certified Equipment List (CEL) is a database of all certified respirators and coal mine dust personal sampler units.

According to NIOSH, particulate respirators are categorized on the basis of efficiency and on their resistance to penetration by oil. Oil degrades and reduces the filtering efficiency of the filter material. NIOSH certifies the following three classes of particulate filters:

(1) N-series (not resistant to oil);

(2) R-series (resistant to oil); and

(3) P-series (oil proof).

Each of these three classes of particulate filters is also certified according to its level of filter efficiency (rated as 95 percent, 99 percent or 99.97 percent efficient) at removing particles 0.3 micrometres in diameter. For example, a filter marked N95 means that the filter is not resistant to oil and is at least 95 percent efficient at removing particles 0.3 micrometres in diameter. Nine classes of filters are certified as shown in Table 18.3.

Table 18.3 Classes of filters certified by NIOSH

Filter series	Filter type designation	Minimum efficiency (%)	Comments
"N" Series	N100 N99 N95	99.97 99 95	May be used for any solid or non-oil containing particulate.
"R" Series	R100 R99 R95	99.97 99 95	May be used for any particulate contaminant. May only be used for one shift if used for an oil-containing particulate.
"P" Series	P100 P99 P95	99.97 9995	May be used for any particulate contaminant.

For more information


www.cdc.gov/niosh/userguid.html
NIOSH Guide to the Selection and Use of Particulate Respirators

Section 247 Selection of equipment

Respiratory protective equipment must be selected in accordance with CSA Standard Z94.4-02, *Selection, Use and Care of Respirators*. There are a number of factors that need to be considered when selecting the appropriate respiratory equipment:

(a) identity of the airborne contaminants;

(b) concentration of airborne contaminants;

(c) oxygen concentration in the air;

(d) physical form of the contaminant;

(e) occupational exposure limits;

(f) length of time that the respirator will need to be worn;

(g) toxic or pathogenic properties of the contaminants;

(h) warning properties of the contaminants; and

(i) need for emergency escape.

These same factors apply whether an employer is dealing with an airborne contaminant, typically a chemical, or an airborne biohazardous material.

More details regarding the selection of respiratory protective equipment are provided in the publication shown below.

For more information

http://employment.alberta.ca/documents/WHS/WHS-PUB_ppe001.pdf
Respiratory Protective Equipment: An Employer's Guide

Section 248 Storage and use

Storage

Respirators must be stored in a clean location, preferably in a plastic bag in a locker or on a shelf. They should be stored away from sunlight, solvents and other chemicals, extreme cold or heat, and excessive moisture. Respirators must not be left out on a bench or hanging on a nail in the shop where they can gather dust and dirt or be damaged or abused.

Inspection

Regular cleaning and inspection of respirators is extremely important and must be done according to the manufacturer's specifications. Respirators need to be cleaned and inspected *daily* by routine users, and *before and after* each use by occasional users. If shared by different people, respirators must be sanitized between uses.

Prior to cleaning a respirator, each part of the respirator must be inspected. Defective parts must be replaced before the respirator is used. The face piece must be checked for cuts, tears, holes, melting, stiffening or deterioration. If the unit is damaged, it must be replaced. Headstraps must be checked for breaks, frays, tears or loss of elasticity. Cartridge sockets can be inspected by removing the cartridges. Special attention must be given to the rubber gaskets located at the bottom of the cartridge sockets. Cracks or flaws may contribute to an ineffective seal.

The cover on the exhalation valve must be removed and the rubber valve carefully examined to ensure it seals properly and has not become brittle. The edge of the valve must be examined for holes, cracks and dirt that may interfere with a proper seal. The exhalation valve is a critical component of the respirator and must be replaced if there is any doubt about its ability to function properly. The valve cover is also important and must not be damaged or fit too loosely.

Finally, the interior of the face piece and inhalation valves must be examined. Dust or dirt accumulating on inhalation valves can interfere with their operation. Inhalation valves should be soft, pliable and free of tears or cuts to the flaps.

Cleaning

Following inspection, the respirator must be cleaned according to the manufacturer's specifications. Strong detergents, hot water or household cleaners or solvents must not be used because they may damage rubber parts and face piece. A stiff bristle brush (not wire) can be used to remove dirt if necessary. The respirator can be sanitized using a weak bleach and water solution or by using appropriate wipes. The respirator should then be rinsed thoroughly in clean, warm water. This is important because detergents or cleaners that dry on the facepiece may later cause skin irritation.

The respirator can be hand-dried with a clean, lint-free cloth, or air-dried and then reassembled. The respirator should be tested to ensure all parts work properly before being used.

Maintenance

All respirator manufacturers suggest regular maintenance and parts replacement. Respirators must be maintained and inspected according to the instructions provided with each respirator. Only replacement parts approved by the manufacturer should be used. Mixing and matching of parts from one respirator brand or model to another must never be allowed. Makeshift parts for respirators must never be installed.

Section 249 Quality of breathing air

The air delivered to a person wearing a self contained breathing apparatus or remote supplied air apparatus must be as free of contaminants as possible. Contaminants may harm the person breathing the air or may damage the respiratory protective equipment being used. As a result, the employer must ensure the air is of a quality that complies with Table 1 of CSA Standard Z180.1-00 (R2005), *Compressed Breathing Air and Systems*, shown as Table 18.4.

Despite the table, the employer must also ensure that the air does not contain a substance in a concentration greater than 10 percent of its occupational exposure limit as listed in Table 2 of Schedule 1 of the OHS Code unless it is already listed in Table 1 of the CSA Standard. So, in the case of carbon monoxide, this means an allowable concentration of ≤ 5 ml/m^3 (ppm) even though 10 percent of the 25 ppm occupational exposure limit would be 2.5 ppm.

Section 250 Effective facial seal

Subsection 250(1)

Respiratory protective equipment must be fit tested in accordance with CSA Standard Z94.4-02, *Selection, Care and Use of Respirators,* or a method approved by a Director of Occupational Hygiene. Whether the fit test method is qualitative or quantitative determines the respirator's assigned protection factor. The respirator seal check — a "user seal check" — must be done prior to fit testing and before each use of the respirator. Fit testing must be done

(a) when the respirator is first issued and then at least every two years thereafter,

(b) if the respirator type changes,

(c) if conditions at the workplace change, or

(d) if the worker's facial features change e.g. scarring from an injury.

The CSA Standard requires that workers who use respirators be free from any physiological or psychological condition that may prevent them from using a respirator. In other words, the worker must not have a medical condition that, when combined with respirator use, could endanger his or her health and safety at the worksite.

Evaluation of a worker's medical fitness to wear a respirator must be done before the worker is fit tested. The evaluation should be appropriate to the level of respirator use and take into consideration

(a) the type of respirator being used,

(b) the type and concentration of contaminant the worker will be exposed to,

(c) the amount of time that the respirator must be worn, and

(d) the activities the worker must do while wearing a respirator.

The employer should develop a procedure describing how the medical assessment requirement is met. An occupational health nurse or physician can assist the employer with this.

For example, if a worker must only wear a dust mask periodically, a checklist completed with a health care professional will be sufficient. For a worker who must wear a supplied air respirator while working in a confined space, a complete medical assessment will be needed.

Table 18.4 Allowable concentrations of components for compressed breathing air (by volume, measured at 21°C (69.8° F) and 101.3 kPa (14.7 psia)

Component	Allowable concentration
Oxygen	20-22%
Nitrogen	78-80%
Carbon monoxide	≤ 5 ml/m^{3*}(ppm)
Carbon dioxide	≤ 500 ml/m^{3*}(ppm)
Methane	≤ 10 ml/m^{3*}(ppm)
Volatile non-methane hydrocarbons	≤ 5 ml/m^{3*}(ppm) as methane equivalents
Volatile halogenated hydrocarbons	≤ 5 ml/m^{3*}(ppm)
Oil, particulate, and condensate	≤ 1 mg/m^{3*}(ppm)
Water — compressed breathing air pipelines or accepted respirators at pressures less than 15.3 MPa (2216 psig)	The pressure dew point of compressed breathing air at a pressure of less than 15.3 MPa (2216 psig) must be at least 5°C (9°F) below the lowest temperature to which any part of the compressed breathing air pipeline or the accepted respirator may be exposed at any season of the year. The air delivered by an ambient air system operating at pressure at or below 103.4 kPa (15 psig) is not required to meet the pressure dew point requirement. [Refer to Table 3 of the CSA Standard for typical pressure dew point requirements from 103.4 kPa (15 psig) to 861.9 Kpa (125 psig)]
Water — cylinders and piping at or above 15.3 MPa (2216 psig)	Compressed breathing air in cylinders and piping operating at pressures equal or to greater than 15.3 MPa (2216 psig): (a) must have an atmospheric dew point not exceeding –53°C (-63°F) for a water vapour concentration not exceeding 27 ppm ± 10%; and (b) should have a pressure dew point not exceeding 5°C (9°F) below the lowest temperature to which the cylinder and piping may be exposed at any season of the year. (See Table 4 of the CSA Standard)
Odours	Any pronounced odour detected by smell in a compressed breathing air sample being analyzed is cause for failure of the sample. The source and nature of the odour must be investigated and resolved.

* 1 ml/m^3 = *1 ppm by volume;* ml/m^3 = millimetres per cubic metre; ppm = parts per million; mg/m^3 = milligrams per cubic metre

Note: *The values in this Table have been chosen to ensure the quality of compressed breathing air would be comparable to that of good-quality outdoor air.*

Qualitative fit test

Qualitative fit testing consists of relatively quick and simple tests to confirm that the worker has an effective seal. This testing consists of an odourous chemical or irritant smoke test.

Chemical or irritant smoke tests involve the release of an odourous chemical inside a test chamber (enclosure head) or irritant smoke around the edges of the respirator while it is being worn. The wearer performs actions that simulate movements typically made during work activities such as talking, bending, reaching, nodding, etc. If the wearer detects the chemical or irritant smoke, the respirator must be re-adjusted or exchanged and the test repeated until no odours, tastes or smoke are detected.

Commonly used test agents include banana oil (isoamyl acetate), irritant smoke (stannic chloride or titanium tetrachloride), artificial sweetener (saccharin) and a bitter compound (Bitrex™). The respirator must be equipped with organic vapour cartridges when administering the banana oil test agent; high efficiency particulate filters must be used for the irritant smoke agent; particulate filters must be used for the saccharin and Bitrex ™ agents.

Depending on the test agent, the wearer will either detect the smell of banana, will sense irritation of the nose and throat due to the irritant smoke, taste the sweetness of the saccharin or the bitterness of the Bitrex™ if there is leakage. The person administering the test relies on the wearer's ability to smell, notice, or taste the test agent. A properly administered qualitative fit test takes a minimum of 15 to 20 minutes to do, assuming a perfect fit during the first attempt. Additional information describing fit testing can be found in CSA Standard Z94.4-02, *Selection, Use, and Care of Respirators*.

Quantitative fit test

Quantitative fit tests are more sophisticated and involve measurement of actual respirator leakage by monitoring leakage inside the face piece. Unlike qualitative fit testing, this testing does not depend on a person's sense of smell or taste to tell whether or not the face piece leaks. Portable computerized equipment accurately measures leakage of contaminant into the respirator during various test exercises.

According to CSA, when a respirator undergoes quantitative fit testing, the resulting protection factor must be at least 10 times the assigned protection factor of the respirator. If this condition is not met, the fit of the respirator is inadequate and the respirator should be readjusted or a different respirator selected and tested.

Regardless of the protection factor determined by quantitative fit testing, it is the assigned protection factor that determines the conditions under which the respirator is used. For more information about quantitative fit testing procedures, refer to CSA Standard Z94.4-02, *Selection, Use and Care of Respirators*.

Protection Factor

Respirators offer varying degrees of protection against airborne contaminants. The degree of protection is described by the concept of Protection Factor (PF). Protection factor is defined as the concentration of an airborne contaminant in the worker's breathing zone outside the respirator face piece divided by the concentration of contaminant inside the respirator face piece:

$$PF = \frac{\text{concentration of airborne contaminant outside respirator face piece}}{\text{concentration of airborne contaminant inside respirator face piece}}$$

The higher the protection factor, the greater the degree of protection provided by the respirator. The actual protection factor provided by a respirator depends on the fit of the mask to the wearer's face. This can vary with the worker's activities, facial movements and shaving habits.

Assigned protection factors have been developed for different respirators based on extensive research. These protection factors are used to select a respirator that maintains the concentration of airborne contaminant inside the face piece at an acceptable level.

For more information

http://employment.alberta.ca/documents/WHS/WHS-PUB_ppe001.pdf
Respiratory Protective Equipment: An Employer's Guide

Subsection 250(2)

A major limitation of the protection provided by a respirator is the effectiveness of the seal between the face piece and the wearer's skin. Persons who are or may be required to wear a respirator must ensure they have an effective facial seal each time they put on their respirator. This is done by performing a user seal check following the manufacturer's specifications. Two types of seal checks are commonly used:

(1) *negative pressure check* — wearing the respirator, the wearer places the palm of each hand over the cartridge assemblies or inhalation points and inhales. The facepiece should collapse slightly as one breathes in, and no inward rush of air should be felt against the wearer's face; and

(2) *positive pressure check* — wearing the respirator, the wearer places the palm of their hand over the exhalation valve and presses lightly while exhaling gently into the facepiece. The fit is satisfactory if no air escapes around the edges of the respirator.

Various factors affect the facial seal of a respirator, including:

(a) facial hair — facial hair, even a single days' growth of stubble, can seriously reduce the effectiveness of the facial seal. Whiskers lying between the sealing edge of the respirator face piece and the skin can break the seal and cause leakage. An employer must ensure that, if a worker is , or may be required to wear respiratory protective equipment and the effectiveness of the equipment depends on an effective facial seal, the worker is clean shaven where the face piece of the equipment seals to the skin of the face;

(b) respirator design — since respirators are designed and constructed differently, they tend to fit differently. A proper fit can be difficult to achieve if the face piece material is too soft or too hard, if the face piece straps are improperly adjusted, or if the wrong size of face piece is selected;

(c) headstrap tension — some respirator wearers tighten headstraps as much as possible in the belief that doing so provides a better seal and fit. The exact opposite is often the result, the shape of the face piece becoming distorted in such a way as to break the seal. Headstraps should be snug, yet comfortable, and fit testing will demonstrate just how tight or loose the straps must be;

(d) facial shapes — the sizes and shapes of human heads vary widely. High cheek bones, a narrow face, a double chin and a broad nose mean that one size and one design of respirator cannot possibly fit everyone; and

(e) other factors — facial scars, eyeglasses, wrinkles and dentures can also affect the seal obtained with certain respirators. Prescription eyeglasses cannot be worn with a full face piece respirator as the arms of the eyeglasses will break the seal. Alternatives such as eyeglass inserts should be considered for those who require prescription glasses.

Section 251 Equipment for immediate danger

The employer is responsible for ensuring that workers are adequately protected from respiratory hazards at the work site. If the employer determines that the worker must wear an air-supplying respirator due to the nature of the atmosphere in which the worker works, the employer must ensure that the appropriate respiratory protective equipment is provided.

Some air supplying respirators are designed to constantly maintain a positive pressure in the face piece. The pressure ensures that if there are any leaks in or at the seal of the face piece, contaminants cannot enter the face piece against the outward flow of air resulting from the positive pressure. These respirators are called positive pressure, pressure demand, or continuous flow respirators. Pressure demand respirators maintain a negative pressure in the face piece and air is not supplied unless the wearer inhales.

In a demand or negative pressure type regulator, air flows into the face piece when the wearer inhales. Inhaling creates a negative pressure that opens a valve, allowing air to flow i.e. air flows into the face piece only on "demand" by the wearer, hence the name. Demand type respirators cannot be used in conditions that are immediately dangerous to life and health.

Some open-circuit SCBAs can be switched from demand to pressure-demand operation. The demand mode should be used only for donning and adjusting the apparatus in order to conserve air and should be switched to "positive pressure" or "pressure demand" for actual use.

Different types of air supplied respirators are designed to provide worker protection for various periods of time. The minimum capacity must be 30 minutes – the employer's hazard assessment may indicate the need for greater capacity. The actual amount of time a worker can work wearing an air-supplied respirator depends on a number of factors such as the intensity of the work being performed i.e. light versus heavy work, environmental conditions i.e. hot and humid, and the worker's level of emotional stress.

Some vapours, gases, fumes and dusts are very irritating and harmful to the eyes. In situations where a worker is exposed to such substances, the employer must ensure that the worker is provided with full-face protection.

If workers work in an area where air to their facepieces is delivered by an air hose from another area, workers must be provided with an alternate means of respiratory protection in the event that their primary source of air fails or the delivery hose gets pinched or severed. This auxiliary supply of respirable air must be of sufficient quantity to permit workers to escape from their work areas in the event of an emergency.

Self-contained breathing apparatus must be fitted with a low-pressure alarm. This signals to the worker using the apparatus that the air supply has been depleted and the worker must leave the work area.

Section 252 Equipment — no immediate danger

This section applies when conditions at the work site are not or cannot become immediately dangerous to life or health, yet there is still a hazard to workers. The section applies if the equipment required by section 254 is not provided and

(a) the oxygen content of the atmosphere is or may be less than 19.5 percent by volume, presenting an oxygen deficient atmosphere, or

(b) the concentration of airborne contaminants exceeds or may exceed that specified by the manufacturer for air purifying respiratory equipment.

If the section applies, the employer must ensure that workers wear self-contained breathing apparatus or an air line respirator having a capacity of at least 30 minutes.

Section 253 Air purifying equipment

Adequate respiratory protection can also be provided to workers by air purification or filtration equipment if there is enough oxygen in the atmosphere and the concentration of airborne contaminants does not exceed the equipment's capacity to filter them.

For contaminants with poor warning properties i.e. a contaminant at or above its occupational exposure limit that cannot be detected by smell or nose/throat irritation, the use of an air supplied respirator is recommended. Air purifying respirators may only be used if

(a) the respirator cartridge is equipped with an end-of-life indicator, or

(b) a change-out schedule is calculated by a competent person. The change-out schedule must be based on product information from the manufacturer or estimates based on knowledge of the effectiveness of the cartridge to remove the contaminant. The method used to calculate the change-out schedule must be the one developed by the U.S. Occupational Safety and Health Administration (OSHA) [see below], or an equivalent method.

For more information


www.osha.gov/SLTC/etools/respiratory/change_schedule.html
Respirator Change Schedules - OSHA

Section 254 Emergency escape equipment

Normal operating conditions at a work site or work area may not require respiratory protective equipment to be worn. However, emergency conditions may develop that require a worker to use respiratory protective equipment while the worker evacuates the work area. This section describes the types of respiratory protective equipment considered acceptable for this purpose.

In cases like this where the employer's hazard assessment has identified that a contaminant may suddenly enter a work area, the nature of the contaminant must be known and workers in that area must be provided with appropriate protection from that contaminant.

Section 255 Abrasive blasting operations

Workers performing abrasive blasting operations must wear a protective hood that supplies air at a positive pressure of not more than 140 kilopascals (20 pounds/square inch). No minimum pressure is specified for the hood. However, a positive pressure should always be maintained in the hood to prevent dust from entering the hood and being inhaled.