

## G8.22 Footwear

Issued August 1, 1999

### **Regulatory excerpt**

Section 8.22(1) of the *OHS Regulation* ("Regulation") states:

A worker's footwear must be of a design, construction, and material appropriate to the protection required.

The employer must determine the appropriate protection required for the feet and ankles based on the work assigned to each worker, and ensure each worker wears appropriate footwear.

Section 8.22(2) of the *Regulation* states "To determine appropriate protection under section (1) the following factors must be considered: slipping, uneven terrain, abrasion, ankle protection and foot support, crushing potential, temperature extremes, corrosive substances, puncture hazards, electrical shock and any other recognizable hazard."

The assessment is based on whatever work procedures and arrangements exist in the workplace at any time. An employer may change the work procedures and arrangements to reduce or remove the risk. For example, an employer may limit the number of workers doing tasks that cause a risk of 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 risk that requires it.

When determining the requirements for appropriate protective footwear, an employer should not consider training and supervision as a substitute for protective footwear.

The risk assessment to determine appropriate footwear will result in persons or activities being placed into 1 of 3 categories:

1. The hazards present require "safety footwear". Because safety footwear is only certified with respect to certain features to protect from specific types of hazard, regard must be had to whether there should be additional requirements to cover all hazards of a worker's job.
2. There are some hazards present that require footwear to provide protection, but not necessarily protection to the level of "certified safety footwear". For example, a lifeguard at a beach likely will not need to wear footwear with safety toe protection, but needs to wear footwear that will protect against cuts from objects on a beach where there is a risk from such objects.
3. There are no hazards of foot injury for which specific requirements are necessary. For example, this will be the case for most office workers.

## G8.22(2.1) High heels and healthy footwear

Issued April 28, 2017

### **Regulatory excerpt**

Section 8.22(2.1) of the *OHS Regulation* ("Regulation") states:

An employer must not require a worker to wear footwear that does not comply with subsection (1).

Section 8.22 of the *Regulation* states, in part:

(1) A worker's footwear must be of a design, construction, and material appropriate to the protection required and that allows the worker to safely perform the worker's work.

(2) To determine appropriate footwear under subsection (1), the following factors must be considered:

- (a) slipping;
- (b) tripping;
- (c) uneven terrain;
- (d) abrasion;
- (e) ankle protection and foot support;
- (f) potential for musculoskeletal injury;
- (g) crushing potential;
- (h) temperature extremes;
- (i) corrosive substances;
- (j) puncture hazards;

(k) electrical shock;

(l) any other recognizable hazard.

### **Purpose of guideline**

This guideline provides clarification of the section 8.22(2.1) requirement that an employer must not require a worker to wear footwear that does not comply with section 8.22(1).

### **High heels**

Under section 8.22(1), footwear must both allow the workers to perform their work safely and provide the protection required for the particular environment. In order to determine whether certain footwear is appropriate within the meaning of section 8.22(1), the factors listed in section 8.22(2) must be considered.

Walking in high heels (typically > 1.5 inches high) has been shown to significantly reduce ankle muscle movement as well as balance control. High heels have also been shown to result in musculoskeletal injury, particularly ankle and foot sprains and strains. High heels are therefore not appropriate with consideration to the factors of ankle protection and foot support, potential for musculoskeletal injury, and slipping, tripping, and uneven terrain. Where any of those hazards are present, high heels will not allow the workers to safely perform their work.

OHS Guideline [G8.22 Footwear](#) explains that the risk assessment employers must make to determine what constitutes appropriate footwear is based on the work assigned to each worker and on the work procedures and arrangements that exist in the workplace at any given time. The risk assessment should also consider the workplace floor and stair surfaces and whether there may be liquids or items on them that could be slip and trip hazards.

As an example, hospitality workers (e.g., servers, hosts, bus-people, and bartenders in bars, clubs, restaurants, or other hospitality venues) walk on different surfaces, including slippery surfaces and stairs, often while carrying food and drinks. With consideration to the factors referred to in section 8.22(2)(a), (b), (c), (e), and (f), high heels would not be appropriate footwear. A dress code requiring hospitality workers to wear high heels while serving, bussing, or hosting would violate section 8.22(2.1).

### **Healthy footwear**

Section 8.22(2.1) is not intended to interfere with a worker's choice of footwear where there are no hazards of foot or ankle injury or potential for musculoskeletal injury (such as office or other predominantly sedentary work) as in the third risk category described in OHS Guideline *G8.22 Footwear*.

In deciding whether certain footwear is appropriate, consideration should be given to factors that promote foot and musculoskeletal health. Questions to ask include: Does the toe box allow for normal foot function and natural toe positioning, or does it squeeze toes together unnaturally? Does this footwear distribute body weight over the whole foot, or does it place more weight on the forefoot? Does the heel make sufficient contact with the walking surface to provide a stable base for good musculoskeletal alignment and balance, or does it detract from them? If the answer to the first part of any of these questions is "no" and the answer to the second part is "yes," that footwear is likely not appropriate for the worker's work.

### **G8.22(3) Specific safety protective features**

Issued August 1, 1999; Editorial Revision April 2005; Revised September 22, 2015

### **Regulatory excerpt**

Section 8.22(3) of the *OHS Regulation* ("Regulation") states:

If a determination has been made that safety protective footwear is required to have toe protection, metatarsal protection, puncture resistant soles, dielectric protection or any combination of these, the footwear must meet the requirements of:

- (a) *CSA Standard CAN/CSA-Z195-M92, Protective Footwear*,
- (b) *ANSI Standard Z41-1991, American National Standard for Personal Protection - Protective Footwear*,
- (c) *British Safety Institution Standard BS EN 345:1993 Specification for Safety Footwear for Professional Use*, or
- (d) *British Safety Institution Standard BS EN 346:1993 Specification for Protective Footwear for Professional Use*.

Section 8.3(2) of the *Regulation* states:

If the use of personal protective equipment creates hazards equal to or greater than those its use is intended to prevent, alternative personal protective equipment must be used or other appropriate measures must be taken.

### **Purpose of guideline**

This guideline explains the grades of safety footwear. It also provides guidance on the selection of appropriate footwear for stated hazards.

### **Grades of safety footwear**

The levels of footwear certified by the Canadian Standards Association (CSA) as meeting *CAN/CSA Z195-M92* are set out in the following table.

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Grade	1	2	3
Internal CSA label colour denoting only grade of toe protection	Green	Yellow	Red
External triangular CSA patch colour denoting sole plate puncture protection with toe protection	Green	Yellow	Red
External rectangular patch colour with Greek letter omega ( $\Omega$ ) in orange denoting only electrical shock resistant soles	White	White	White
External rectangular patch colour with green "SD" notation and an electrical grounding symbol, denoting static dissipate footwear	Fluorescent Yellow	Fluorescent Yellow	Fluorescent Yellow
Protective Toecap Impact Resistance, joules (ft*lb)	125 (93)	90 (65)	60 (45)

The degree of protection to the toe based on the table above is approximately as follows:

Grade 1 - Dropping a 30 pound weight from 3 feet onto toe

Grade 2 - Dropping a 20 pound weight from 3 feet onto toe

Grade 3 - Dropping a 15 pound weight from 3 feet onto toe

Sole plate puncture protection is only available in CSA certified footwear in combination with toe protection. All sole plates are designed to withstand the same puncture force using a pointed tester, and the colour of the external triangular patch varies only with the grade of toe protection. The external triangular patch may be positioned in any conspicuous location on the right footwear upper. The top of the tongue is an acceptable patch location; provided the patch is visible when the footwear is laced up.

Section [4.4\(2\)\(a\)](#) permits the reliance on other standards which are acceptable to WorkSafeBC.

The following American National Standards Institute (ANSI) and British Standards Institution (BSI) Standard Impact and Compression classification combinations are acceptable substitutes for the named CSA Grades:

CSA Grade	Equivalent ANSI Classifications	Equivalent BSI Designations
1	I/75 combined with C/75 <sup>1</sup>	Safety General, Heavy Duty, or Clog; Safety Footwear with toe impact energy protection levels of either 120 joules, 160 joules, or 200 joules (88, 118, or 148 ft. lb)
2	I/50 or higher, combined with C/50 or higher <sup>2</sup>	Protective Footwear with toe impact energy protection levels of 80 joules (59 ft. lb.)
3	I/30 or higher, combined with C/30 or higher <sup>3</sup>	Protective Footwear with toe impact energy protection levels of 40 joules (30 ft. lb)

NOTES:

<sup>1</sup> This is any of the safety footwear meeting British Standard BS 1870: Part 1:1988, Safety Footwear, Part 1. Specification for safety footwear other than all-rubber and all-plastics moulded types, as amended.

<sup>2</sup> This is protective footwear meeting British Standard BS 4972 Specification for Women's Protective Footwear, as amended.

<sup>3</sup> This is protective footwear meeting British Standard BS 4972 Specification for Women's Protective Footwear, as amended.

### Safety footwear considerations

External strap-on or glue-on "safety toecaps" do **not** meet any recognized safety standard and should not be used as an alternative to recognized safety footwear. Strap-on toecaps may be used to provide additional protection over the top of CSA Grade 1 safety footwear. Strap-on toecaps are not suitable replacements for integral metatarsal protectors.

Slip-on rubber type footwear with integral safety toecaps, which slip on over existing footwear, and have evidence of independent testing proving that they meet the impact criteria of *CSA Standard Z195*, may be used.

If a hazard requires metatarsal protectors, the metatarsal protectors should 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 the construction industry.) Metatarsal protectors that only attach to the laces or are only strapped in place do not meet the *CSA Standard Z195* and should not be used because there is no assurance the metatarsal protector is properly supported by the toecap.

There are activities and work environments where, although the dangers of injury to the worker do not require the specific protective footwear meeting the requirements of one of the standards referred to in section 8.22(3), appropriate footwear must be worn to prevent injury to the worker. Section 8.22(2) specifies some of the hazards for which protection may be required, such as slipping, uneven terrain, abrasion, ankle protection, and foot support, temperature extremes, and corrosive substances. The footwear standards, such as the *CSA Standard CAN/CSA-Z195-M92*, do not provide performance requirements to guide the selection or assessment of footwear for protection from these hazards. The

employer must assess each worker's exposure to these dangers and ensure the worker's footwear is of a type and construction that minimizes, as far as is practicable, the risk of injury to the worker. Refer also to OHS Guideline [G8.22 Footwear](#).

In addition to the appropriate approved safety devices for metatarsal, sole penetration and toe protection, the following criteria need to be considered in the selection of "appropriate" footwear:

1. If the possibility of ankle cuts or abrasion exists, the footwear should be at least 13 cm (about 5 inches) high and provide adequate protection from cuts and abrasion. (The height of footwear is the measurement from the top of the sole at the arch to the top of the upper.)
2. For walking on uneven surfaces, footwear should provide adequate ankle support and be worn tight fitting around the ankle to provide sufficient ankle support. Appropriate footwear would generally be lace-up boots. Cowboy style and rubber boots would not provide sufficient ankle support on uneven surfaces. Lace-up style 20 cm (8 inch) leather-upper winter boots generally provide sufficient ankle support on uneven surfaces.
3. Athletic shoes are acceptable for occupational use provided the style and construction provides protection from the hazards to which the worker will be exposed. For example, mesh-type covering over the toe area would not be appropriate in a laboratory where there is danger of chemicals dropping onto the foot. Low cut uppers will not be appropriate if there is danger of abrasion to the ankle.

Guidelines for certain types of workers are as follows:

1. A worker in the construction industry, or any other similar working environment where there is risk of toe injury, should wear safety footwear with CSA Grade 1 toe protection.
2. A worker in the construction industry, or any other industry with a possibility of sole punctures, should wear footwear with protective sole plates.
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.
4. A worker using high pressure washing or cutting equipment should wear footwear or footwear cover devices which 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.
5. A worker in a warehouse should wear safety footwear with CSA Grade 1 toe protection.
6. A worker in a retail store environment using pallet jacks, forklifts, or other rolling equipment should wear footwear with CSA Grade 1 toe protection.

The circumstances at a particular workplace may justify a variation from the above recommendations. For example, an employer may arrange the work in a manner that eliminates all hazards of foot injury.

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. In this circumstance, section 8.3(2) of the *Regulation* requires that alternative personal protective equipment be used or that other appropriate measures be taken to adequately control the hazard.

The following measures/practices are generally recognized as being acceptable to WorkSafeBC:

1. A carpet layer or similar finishing trade requiring a worker to constantly kneel down will generally not wear safety-toed footwear.
2. A worker (steel erector) climbing or walking on steel will generally not wear safety-toed footwear. However, the worker should wear substantial footwear having leather uppers reaching past the ankle.
3. A worker in the logging industry walking on logs, steep sidehills, or uneven ground will generally not wear safety-toed footwear, although safety-toed footwear will be necessary when using tools such as axes or chain saws. Note that section 8.23(2) of the *Regulation* requires "Caulked or other equally effective footwear must be worn by workers who are required to walk on logs, poles, pilings or other round timbers."

In addition to the above, a worker exposed to an environment requiring rubber boots extending above the ankle for protection from chemicals, water or other liquids, is not expected to have tight fitting leather uppers if walking on uneven surfaces.

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 the hazard.

#### G8.22(3)-1 Footwear – Alternate standards

Issued September 28, 2007; Revised June 14, 2013

#### **Regulatory excerpt**

Section 8.22 of the *OHS Regulation* ("*Regulation*") states in part:

- (1) A worker's footwear must be of a design, construction, and material appropriate to the protection required.
- (2) To determine appropriate protection under subsection (1) the following factors must be considered: slipping, uneven terrain, abrasion, ankle protection and foot support, crushing potential, temperature extremes, corrosive substances, puncture hazards, electrical shock and any other recognizable hazard.
- (3) If a determination has been made that safety protective footwear is required to have toe protection, metatarsal protection,

puncture resistant soles, dielectric protection or any combination of these, the footwear must meet the requirements of:

- (a) *CSA Standard CAN/CSA-Z195-M92, Protective Footwear*;
- (b) *ANSI Standard Z41-1991, American National Standard for Personal Protection - Protective Footwear*;
- (c) *British Safety Institution Standard BS EN 345:1993 Specification for Safety Footwear for Professional Use, or*
- (d) *British Safety Institution Standard BS EN 346:1993 Specification for Protective Footwear for Professional Use.*

Section 4.4(2)(a) of the *Regulation* states:

When this Regulation requires a person to comply with

- (a) a publication, code or standard of the Board or another agency, the person may, as an alternative, comply with another publication, code or standard acceptable to the Board.

### **Purpose of guideline**

The purpose of this guideline is to specify, in the case of section 8.22(3) of the *Regulation*, alternate standards acceptable to WorkSafeBC.

### **Background**

*Regulation* section 8.22(1) specifies that a worker's footwear must be of a design, construction, and material appropriate to the protection required. *Regulation* section 8.22(2) specifies the factors that must be considered to determine footwear protection appropriate to the protection required.

### **Acceptable standards**

When a determination has been made that safety protective footwear is required to have toe protection, metatarsal protection, puncture resistant soles, dielectric protection, or any combination of these factors, the footwear must meet the requirements of a standard listed in section 8.22(3) of the *Regulation*.

As safety footwear is manufactured and certified to the edition of the standard in place at the time of manufacture, WorkSafeBC has reviewed the current versions of these standards, as well as new footwear standards. It has determined that in addition to those listed in section 8.22(3), WorkSafeBC will accept under that provision the following standards for footwear for the factors addressed by the standard:

- *CSA Standard Z195-02, Protective Footwear*
- *ANSI Standard Z41-1999, American National Standard for Personal Protection - Protective Footwear*
- *ASTM Standard F 2413-05, Specification for Performance Requirements for Foot Protection*
- *ASTM Standard F 2413-11, Specification for Performance Requirements for Foot Protection*
- *ASTM Standard F 1818-04, Specification for Foot Protection for Chain Saw Users*
- *ISO Standard 20345:2004(E), Personal Protective Equipment - Safety Footwear*
- *ISO Standard 20346:2004(E), Personal Protective Equipment - Protective Footwear*

### **G8.24 High visibility apparel**

Issued August 1, 1999; Editorial Revision April 2005

Section 8.24 of the *OHS Regulation* requires a worker exposed to the hazard of moving vehicles to wear high visibility apparel appropriate to the hazard. To determine the nature of the hazard, it is necessary to consider the speed of the moving vehicles, as well as the duties and the work location of the worker relative to the vehicles or mobile equipment.

Section 8.24(2) requires a worker exposed to the hazard of vehicles travelling at speeds in excess of 30 km/h (20 mph) to wear high visibility apparel meeting the Type 1 or Type 2 criteria of [WCB Standard 2-1997, High Visibility Garment](#). For example, this section applies to a worker on a highway construction project with "public" traffic or workplace vehicles passing by at a speed greater than 30 kph, and to ambulance attendants treating an injured person at an unsecured vehicle accident scene. (An unsecured accident scene is one where the workers are not protected from moving traffic by barricades or other effective traffic control.)

Section 8.24(3) requires a worker exposed to the hazard of mobile equipment to wear high visibility apparel meeting the Type 3 criteria of [WCB Standard 2-1997, High Visibility Garment](#). This section applies to workers potentially exposed to mobile equipment travelling at speeds less than 30 km/h. For example, this section would apply to

- a worker on a construction site assisting with the positioning, loading or unloading of dump trucks,
- a worker grading lumber on a sawmill yard where forklifts or front end loaders are used to move logs or lumber,
- a worker collecting shopping carts in a parking lot, and
- a worker on a road construction project where work takes place inside of an area protected from "public" traffic by barricades.

A basic description of Type 1, Type 2 and Type 3 high visibility apparel is provided below. A fluorescent material is one that absorbs ultraviolet light in daylight and emits it in the visible light region. This property allows the material to radiate more visible light than is incident on it, thus it appears and is brighter than a non-fluorescent material which at best can reflect all the visible light that falls on it. Visibility enhancing trim has both

fluorescent and retroreflective properties. A retroreflective material is one that reflects light back to the same direction as the source of the light.

Type 1	Vest, shirt or other similar garment, worn on the torso, with a fluorescent background and attached visibility-enhancing trim.
Type 2	Jacket, coat, coverall or other garment with a bright coloured background and attached visibility enhancing trim.
Type 3	A harness or suspender-type of garment worn on the torso, fabricated from parallel strips of contrasting colours. The harness has fluorescent and retroreflective properties.

For more detail, refer to [WCB Standard 2-1997](#).

Also, [section 4.4\(2\)\(a\)](#) permits the reliance on other standards which are acceptable to WorkSafeBC.

#### G8.24-1 Alternative standards for high visibility apparel

Issued June 6, 2006; Editorial Amendment February 3, 2010; Revised September 19, 2014; Revised June 29, 2016

#### Regulatory excerpt

Section 8.24 (High visibility apparel) of the *OHS Regulation* ("Regulation") states:

- (1) Repealed [B.C. Reg. 242/2007, effective January 1, 2007.]
- (2) A worker exposed to the hazards of vehicles travelling at speeds in excess of 30 km/h (20 mph) must wear high visibility apparel meeting the Type 1 or Type 2 criteria of [WCB Standard Personal Protective Equipment Standard 2-1997, High Visibility Garment](#).
- (3) A worker whose duties on the work site result in exposure to the hazards of mobile equipment must wear high visibility apparel meeting at least the Type 3 criteria of [WCB Standard Personal Protective Equipment Standard 2-1997, High Visibility Garment](#).

#### Purpose of guideline

This guideline provides information on alternative standards for high visibility apparel to the standard referenced in section 8.24 of the *Regulation*.

#### Authority to accept alternative standards

Section 4.4(2)(a) of the *Regulation* addresses the capability of WorkSafeBC to accept alternative standards. This provision states:

When this Regulation requires a person to comply with

- (a) a publication, code or standard of the Board or another agency, the person may, as an alternative, comply with another publication, code or standard acceptable to the Board.

#### Acceptable alternative standards to [WCB Standard Personal Protective Equipment Standard 2-1997, High Visibility Garment \(WCB PPE 2-1997\)](#)

WorkSafeBC accepts as alternative standards to WCB PPE 2-1997 (as referenced in section 8.24 of the *Regulation*), the *CSA Standard Z96-09 High-Visibility Safety Apparel* and *CSA Standard Z96-15 High-Visibility Safety Apparel*, subject to the following qualifications:

*CSA Class 1* high visibility safety apparel is an acceptable alternative to a Type 3 garment referenced in WCB PPE 2-1997.

For *CSA Class 2* high-visibility safety apparel, only the apparel that has a background material in a fluorescent orange or fluorescent yellow-green colour is considered to be an acceptable alternative to Type 1 garments referenced in WCB PPE 2-1997.

For *CSA Class 3* high-visibility safety apparel, only the apparel that has either the background material or the retro-reflective tape in a fluorescent colour\* is considered to be an acceptable alternative to Type 2 garments referenced in the WCB PPE 2-1997.

\* Note that white and grey are not available as fluorescent colours and *CSA Standard Z96-09* specifies a preference for fluorescent and contrasting colours in order to maximize conspicuity.

#### GENERAL REQUIREMENTS

G8.2(3) [Responsibility to provide](#)

G8.5 [Program](#)

G8.5(b) [Special program option for pulp and paper industry](#)

G8.10 [Personal clothing and accessories](#)

#### SAFETY HEADGEAR

G8.11(2) [Activity specific safety headgear](#)

- G8.11(2)-1 [Alternate safety headgear standards](#)
- G8.11(2)-2 [Activity specific safety headgear - Ski helmets](#)
- G8.11(3) [Protection from electrical hazards](#)
- G8.11(4) [Chin straps](#)
- G8.12/8.13 [Use of safety headgear for workers on ATVs and similar equipment in agricultural operations](#)

## EYE AND FACE PROTECTION

- G8.15(1) [Prescription safety eyewear - Alternate standards](#)
- G8.17(2) [Face protection - Alternate standards](#)

## LIMB AND BODY PROTECTION

- G8.21 [Leg protection](#)
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## FOOTWEAR

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## HIGH VISIBILITY AND DISTINGUISHING APPAREL

- G8.24 [High visibility apparel](#)
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## BUOYANCY EQUIPMENT

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- G8.27-1 [Compliance with standards](#)
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## RESPIRATORS

- G8.33-1 [Respiratory protection - Selection](#)
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- G8.33(2)-2 [Interchange of equipment components](#) [Retired]
- G8.34-1 [Protection factors](#)
- G8.34-2 [Assigned protection factors for non-powered filtering facepiece style air-purifying respirators](#)
- G8.34-3 [Maximum use concentration and IDLH](#)
- G8.34-4 [Protection factors - standard acceptable to WorkSafeBC](#)
- G8.34-5 [Assigned protection factor for helmet/hood style powered air purifying respirators](#) [Retired]
- G8.35(1) [Reference documentation for IDLH concentrations](#)
- G8.38(2) [Respiratory protection and use of contact lenses](#)
- G8.40 [Respiratory protection - Fit test](#)
- G8.40(2.1)(c) [Single-use respirators and fit test equivalency](#)
- G8.42 [Medical assessment](#)
- G8.45 [Maintenance and inspection of self-contained breathing apparatus](#)

G8.33-1 Respiratory protection - Selection

Issued August 1, 1999; Revised February 11, 2004; Editorial Revision April 2005; Editorial Revision to include February 1, 2011 regulatory amendment

### Regulatory excerpt

Section 8.33(1) of the *OHS Regulation* ("*Regulation*") states:

- (1) The employer, in consultation with the worker and the occupational health and safety committee, if any, or the worker health and

safety representative, if any, must select an appropriate respirator in accordance with *CSA Standard CAN/CSA-Z94.4-93, Selection, Use and Care of Respirators*.

### **Purpose of guideline**

The purpose of this guideline is to aid in the selection of an appropriate respirator in accordance with *CSA Standard CAN/CSA-Z94.4-93, Selection, Use and Care of Respirators* ("*CSA Standard*").

### **Selection**

*CSA Standard* states "knowledge of respiratory hazards and respiratory protection is essential to ensure appropriate selection of respirators. The respirator selection then becomes a step-by-step elimination of inappropriate respirators until only those which are appropriate remain." Section 6 of the *CSA Standard* prescribes the procedure for selecting an appropriate respirator.

To select an appropriate respirator, the employer should to ensure the selection process

- Identifies and determines the airborne concentrations of the contaminant(s) of interest
- Determines the physical<sup>1</sup>, chemical<sup>2</sup>, and toxicological properties of the contaminant(s)
- Determines the general use conditions for the respirator<sup>3</sup>
- Assesses the potential for exposure via the skin and mucous membranes of the eye
- Considers odour threshold information, as well as any warning properties<sup>4</sup> of the contaminant(s)
- Determines the exposure limit(s) for the contaminant(s) of interest<sup>5</sup>
- Identifies the IDLH concentration, as well as the lower explosive limit<sup>6</sup>
- Evaluates the potential for oxygen deficiency
- Considers any service life information available for the chemical cartridge or canister
- Determines the hazard ratio (HR)<sup>7</sup>
- Determines the protection factor (PF) for the class of respirator from [Table 8-1](#) of the *Regulation*. For a respirator to be appropriate, the PF must be greater than the HR. Refer to OHS Guideline [G8.34-1](#) for additional information regarding protection factors.

<sup>1</sup> The employer must consider the state in which the substance is likely to be encountered. That is, whether it is a gas or a vapour, a particulate, or a combination thereof.

<sup>2</sup> For example, chemical reactivity and vapour pressure.

<sup>3</sup> That is, the employer must evaluate the following: job task, duration, frequency, and physical demands of the task, the health status of the worker, as well as comfort of the respirator.

<sup>4</sup> This is particularly relevant for gases and vapours. A substance is considered to have adequate warning properties when an individual can detect the substance by persistent odour, taste, and/or irritation effects, such as irritation of the eyes or respiratory tract, in concentrations at or below the exposure limit. Warning properties can provide some indication to a worker wearing a respirator that it is not working effectively, such as a breakthrough has occurred, or the facepiece doesn't fit properly.

<sup>5</sup> Exposure limits are specified in the Table of Exposure Limits for Chemical and Biological Substances (see OHS Guideline [G5.48-1](#)). All relevant exposure limits must be considered, such as the 8-hour TWA limit, short-term exposure limit, and/or ceiling limit.

<sup>6</sup> Concentrations in excess of the lower explosive limit are considered to be IDLH concentrations.

<sup>7</sup> The hazard ratio is the airborne concentration of a substance divided by its exposure limit.

Refer to the following chart "Selecting the Right Respirator" for guidance in selecting the appropriate device. This chart is based on *CSA Standard*, clause 6, and NIOSH Publication DHHS/NIOSH 87-108 "Respirator Decision Logic."

### **Selecting the Right Respirator**



Flowchart: Selecting the Right Respirator - Part 1



## Flowchart: Selecting the Right Respirator - Part 2

### 8.33-2 Scott II and IIA SCBA regulator donning switch hazard

Issued June 14, 2002; Editorial Revision to include February 1, 2011 regulatory amendment

#### **Regulatory excerpts**

Section 8.3(1)(b) of the *OHS Regulation ("Regulation")* states in part:

Personal protective equipment must

...

(b) not in itself create a hazard to the wearer

Section 8.33(2) states:

Only a respirator which meets the requirements of a standard acceptable to the Board may be used for protection against airborne contaminants in the workplace.

#### **Purpose of guideline**

The purpose of this guideline is to provide clarification on safety concerns with the use of certain models of Scott II and IIA self-contained breathing apparatus (SCBA) regulators.

#### **Scott II and IIA SCBA regulators**

Questions have arisen regarding the safety of those models of the Scott II and IIA SCBA regulators that are provided with a paddle-shaped "on/off" (donning) switch. This switch allows the user to switch the SCBA assembly from a positive pressure (pressure demand) mode to a negative pressure (demand) mode. If the regulator is not switched back to positive pressure mode, the user can be at risk when entering immediately dangerous to life or health (IDLH) conditions. A protection factor of 50 is assigned to a SCBA that is operating in a negative pressure

(demand) mode versus that of a positive pressure (pressure demand) system that is assigned a protection factor of 10,000. A demand (negative pressure) SCBA cannot be used for entry or work in IDLH or oxygen-deficient atmospheres. Refer to [section 8.35](#) of the *Regulation*.

The donning switch is situated on the front side of the Scott II and IIA SCBA regulators. Due to its size, shape, and location, the unit may be switched inadvertently to the negative pressure or donning mode ("on" position). Furthermore, after donning the SCBA with the switch in the "on" position, the user may fail to change the unit to positive pressure mode when the facepiece is in place.

Scott stopped producing these units in 1996. Replacement parts may no longer be available.

Note: Scott SCBA equipment certified to National Fire Prevention Association (NFPA) standards, including NFPA-approved Scott II and IIA SCBA units, do not have donning switches.

Since it is possible for these units to be improperly used in the negative pressure mode, this hazard needs to be addressed. Maintenance for SCBA regulators requires a flow test every two years to maintain NIOSH approval. During this mandatory periodic maintenance, the donning switch can be removed at very little or no additional cost, without compromising NIOSH approval. The more costly and extensive upgrade to bring these units into compliance with NFPA standards is not necessary for general usage. Furthermore, parts and service are likely no longer available. As a consequence, WorkSafeBC is expecting those employers affected to take the necessary steps to remove these switches during the next scheduled maintenance (mandatory flow test). If this schedule was followed, donning switches should have been eliminated from all units in service by the end of 2002.

Removal of these parts will cause the SCBA to flow air whenever the air supply is turned on. The users will have to modify their procedures for putting on the SCBA to minimize the loss of air until the facepiece is in place. Modified units will appear almost the same as the original factory unit. The only apparent visual difference will be that the donning switch will be missing.

WorkSafeBC Prevention officers encountering Scott II or IIA SCBA regulators with donning switches will require the employer to identify all such units in use and provide for removal of the donning switch at the next scheduled maintenance. Officers should remind the employer these units should have been replaced by 2006 when the lack of parts and services would likely mean that these units no longer have NIOSH approval.

Acklands Grainger and Fleck Brothers are the authorized maintenance providers for Scott in B.C. Several providers in Alberta may also service units on behalf of employers who do work in B.C., particularly in the northeastern section of the province.

#### G8.33(1) Selection of respiratory protection - Alternate standard

Issued February 8, 2007; Editorial Revision to include February 1, 2011 regulatory amendment

#### Regulatory excerpt

Section 8.33(1) of the *OHS Regulation* ("*Regulation*") states:

- (1) The employer, in consultation with the worker and the occupational health and safety committee, if any, or the worker health and safety representative, if any, must select an appropriate respirator in accordance with *CSA Standard CAN/CSA-Z94.4-93, Selection, Use, and Care of Respirators*.

Section 4.4(2)(a) of the *Regulation* states:

- (2) When this Regulation requires a person to comply with
  - (a) a publication, code or standard of the Board or another agency, the person may, as an alternative, comply with another publication, code or standard acceptable to the Board...

#### Purpose of guideline

Section 8.33(1) of the *Regulation* requires that an appropriate respirator be selected in accordance with *CSA Standard CAN/CSA-Z94.4-93, Selection, Use, and Care of Respirators*. Section 4.4(2)(a) permits WorkSafeBC to accept another standard to be used for the selection of respiratory protection.

The purpose of this guideline is to specify, in the case of section 8.33(1) of the *Regulation*, an alternate standard acceptable to WorkSafeBC.

#### Acceptance of CSA Standard *CAN/CSA-Z94.4-02, Selection, Use, and Care of Respirators*

A person that is required to comply with the *CAN/CSA-Z94.4-93* specified in section 8.33(1), may comply with *CSA Standard CAN/CSA-Z94.4-02, Selection, Use, and Care of Respirators* as an alternative standard. (Note: For a copy of CSA Standards, contact CSA at 604-244-6652 or [www.shopCSA.ca](http://www.shopCSA.ca), or your local library.)

#### Summary of differences

*CSA Standard CAN/CSA-Z94.4-93, Selection, Use, and Care of Respirators* provides a step-by-step decision logic process to identify the correct respiratory protection options for a given hazardous exposure situation. The selection decision logic is in section 6.3.2 of the CSA Standard. Refer to OHS Guideline [G8.33-1 Respiratory protection - Selection](#).

*CSA Standard CAN/CSA-Z94.4-02, Selection, Use, and Care of Respirators* provides two methods of determining the correct respiratory protection options for a given hazardous exposure situation. One method, in section 6.3.4, is a step-by-step decision logic process, similar to the

selection process in the previous (1993) version of the standard. The other method, in section 6.3.3, uses a respirator selection flowchart to select the correct respiratory protection. The two selection methods are analogous, and will yield the same result. The 2002 edition of the CSA Standard will be most useful to persons with significant occupational hygiene expertise in the area of respiratory protection.

The 2002 revision to the standard includes consideration of the presence of airborne oil as part of the selection process for particulate filters. The potential for any oil to become airborne must be determined, and an N, R, or P particulate filter selected accordingly. Refer to OHS Guideline [G8.33\(2\)-1](#) Approved respirators.

The 2002 revision also requires calculation of a hazard ratio for each gas, vapour, and/or particulate component that poses a respiratory hazard. This is the estimated/measured airborne concentration of a substance divided by the occupational exposure limit. The highest hazard ratio from all the hazard ratios is selected, and this highest hazard ratio is used for the remainder of the selection process.

#### G8.33(2)-1 Approved respirators

Issued August 1999; Revised May 9, 2006; Editorial Revision February 1, 2008; Editorial Revision to include February 1, 2011 regulatory amendment; Revised October 23, 2012

#### Regulatory excerpt

Section 8.33(2) of the *OHS Regulation ("Regulation")* states:

Only a respirator which meets the requirements of a standard acceptable to the Board may be used for protection against airborne contaminants in the workplace.

#### Purpose of guideline

The purpose of this guideline is to identify a standard acceptable to WorkSafeBC for respirators and to provide information on the U.S. National Institute for Occupational Safety and Health (NIOSH) certification of respirators, particularly for respirators used to protect against airborne particulates. It also includes a list of approval in other jurisdictions for certain particulate respirators that are also considered acceptable to WorkSafeBC under section 8.33(2) of the *Regulation*.

"Particulates" are airborne contaminants other than gases or vapours, and include dusts, mists, fibres, pollen, spores, and aerosols contaminated with bacteria or viruses.

#### Respirators acceptable to WorkSafeBC

WorkSafeBC accepts NIOSH certification requirements for respirators as a standard acceptable to WorkSafeBC under section 8.33(2) of the *Regulation*.

The requirements for NIOSH certified respirators are found in Part 84 of Title 42 of the *U.S. Code of Federal Regulations on respiratory protective devices ("Part 84")*. Certifications in *Part 84* cover various types of respirators including non-powered air-filtering particulate respirators, chemical cartridge respirators, self-contained breathing apparatus (SCBA), airline respirators, and powered air-purifying respirators (PAPRs).

All respirators approved under *Part 84* carry a certification label bearing the emblems of NIOSH and the U.S. Department of Health and Human Services (DHHS).

#### Particulate respirators with NIOSH approvals

For non-powered, air-purifying particulate respirators the sequence of NIOSH approval numbers is "TC-84A-xxx." These respirators include particulate filtering facepiece respirators, as well as respirators with elastomeric facepieces.

Filtering facepiece respirators, in which the entire facepiece acts as the filter, cover only half the face, and are sometimes termed "disposable" respirators. Respirators with elastomeric facepieces made of silicone, thermoplastic, or rubber material are available in half or full facepiece models. In these designs one or more filters or cartridges are attached to the facepiece.

Under *Part 84*, particulate respirators are classified on the basis of their resistance to oil. Oil degrades and reduces the filtering efficiency of the filter material. NIOSH certifies the following three classes of filters: N-series (for **N**ot resistant to oil), R-series (for **R**esistant to oil), and P-series (for oil **P**roof).

Each of these three classes of filters is also certified according to its level of filter efficiency (rated as 95%, 99%, or 99.97% 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% efficient at removing particles 0.3 micrometres in diameter. In total, nine classes of filters are certified, as shown in the table below.

#### Classes of filters certified by NIOSH under *Part 84*

Filter series	Filter type	Minimum efficiency	Comments
"N" Series	N100	99.97%	May be used for any solid or non-oil containing particulate.
	N99	99%	
	N95	95%	
"R" Series	R100	99.97%	May be used for any particulate contaminant. May only be used for 1 shift

	R99 R95	99% 95%	if used for an oil-containing particulate.
"P" Series	P100 P99 P95	99.97% 99% 95%	May be used for any particulate contaminant.

**Note:** Oil aerosols include lubricants, cutting fluids, and glycerin.

All nine classes of filters, as discussed in the above table, are considered appropriate for protection against tuberculosis and other airborne biological agents. (Refer to OHS Guidelines [G6.34-1 to G6.40](#) for further information on protection against biological agents designated as a hazardous substance in [section 5.1.1.](#))

#### **Particulate respirators with approvals in jurisdictions other than NIOSH**

To be acceptable to WorkSafeBC under section 8.33(2) of the *Regulation*, respirators approved in a jurisdiction other than NIOSH in the US are expected to be equivalent to products bearing NIOSH approvals.

Particulate-filtering facepiece respirators are often used in work settings where exposures to particulates do not require a respirator with a higher protection factor. Such respirators having the following approvals in other jurisdictions are considered by the World Health Organization as equivalent to respirators with NIOSH N95 filtration capability.

- European Union: FFP2, FFP3
- Australia/New Zealand: P2 (94%), P3 (99.95%)
- China: II (95%), I (99%)
- Japan: 2nd class (95%), 3rd class (99.9%)
- Korea: 1st class (94%), Special (99.95%)

Particulate-filtering facepiece respirators with any of these approvals are considered acceptable to WorkSafeBC for protection against airborne particulates in circumstances where a respirator with a higher protection factor is not needed and the particulates are not contaminated with oil. (Refer to [Table 8-1](#) in the *Regulation* and OHS Guideline [G8.34-1](#) for information on protection factors.)

#### **G8.33(2)-2 Interchange of equipment components**

Retired November 23, 2010

This guideline has been retired since the reference to air cylinders conflicts with *Prevention Manual* [Policy Item R8.33-1](#) and the reference to air lines is a duplication of the information in [Policy Item R8.33-2](#).

#### **G8.34-1 Protection factors**

Issued as G8.34 August 1999; revised March 22, 2004, and further revised April 20, 2004; Editorial Revision to include February 1, 2010 regulatory amendment

#### **Regulatory excerpt**

Section 8.34 of the *OHS Regulation* ("*Regulation*") states:

(1) In subsection (2):

*"established 8-hour TWA limit"* means the 8-hour TWA limit set by the Board for an air contaminant, or if the Board has not set an 8-hour TWA limit for an air contaminant, the TWA limit set by ACGIH for the air contaminant;

*"established ceiling limit"* means a ceiling limit set by the Board for an air contaminant, or if the Board has not set a ceiling limit for an air contaminant, the ceiling limit set by ACGIH for the air contaminant;

*"established short-term exposure limit"* means the short-term exposure limit set by the Board for an air contaminant, or if the Board has not set a short-term exposure limit for an air contaminant, the short-term exposure limit set by ACGIH for the air contaminant.

(2) In subsection (3),

*"maximum use concentration"* means the concentration of an air contaminant calculated in one of the following ways:

(a) if an established 8-hour TWA limit applies to the air contaminant to which a worker is or might be exposed, by multiplying

(i) the established 8-hour TWA limit for the air contaminant, and

(ii) the protection factor set out in Table 8-1 that applies to the respirator type that the worker is using;

(b) if there is no established 8-hour TWA limit that applies to the air contaminant to which a worker is or might be exposed, by

multiplying

- (i) the established short-term exposure limit for that air contaminant, and
  - (ii) the protection factor set out in Table 8-1 that applies to the respirator type that the worker is using;
- (c) if there is no established 8-hour TWA limit or short-term exposure limit that applies to the air contaminant to which a worker is or might be exposed, by multiplying
- (i) the established ceiling limit for that air contaminant, and
  - (ii) the protection factor set out in Table 8-1 that applies to the respirator type that the worker is using.
- (3) The employer must ensure that a worker does not use a respirator for protection against a concentration of an air contaminant in the workplace that is greater than the maximum use concentration.
- (4) The protection factor of 1 000 set out in Table 8-1: Respirator protection factors for a hood or helmet facepiece, powered (PAPR), and equipped with a HEPA filter or a sorbent cartridge or canister or both a HEPA filter and a sorbent cartridge or canister applies only if an employer who uses or wishes to use that respirator type has evidence from the manufacturer that demonstrates that
- (a) the manufacturer has tested that type of respirator, and
  - (b) those tests demonstrate that a respirator of that type has a protection factor of at least 1 000.
- (5) The protection factor of 25 set out in Table 8-1: Respirator protection factors for a hood or helmet facepiece, powered (PAPR), and equipped with a HEPA filter or a sorbent cartridge or canister or both a HEPA filter and a sorbent cartridge or canister applies if the conditions set out in subsection (4) are not met.

#### **Purpose of guideline**

This guideline explains how the maximum use concentration is calculated and what the assigned protection factor of a respirator means.

#### **Maximum use concentration**

The maximum use concentration (MUC) is determined by multiplying the exposure limit for the air contaminant by the appropriate respirator protection factor or assigned protection factor (APF). Exposure limits are found in the Table of Exposure Limits for Chemical and Biological Substances (see OHS Guideline [G5.48-1](#)). Respirator protection factors, also known as assigned protection factors (APFs), are found in [Table 8-1](#) of the *Regulation* or may be determined by WorkSafeBC.

Always use the 8-hour time-weighted average (TWA) limit for an air contaminant, where there is one, as the exposure limit in the calculation, even if the substance has a short-term exposure limit or a ceiling limit as well. In the case where a substance has only a ceiling limit, then the ceiling limit is used.

The APF of a respirator reflects the level of protection that a properly functioning respirator would be expected to provide to a population of properly fitted and trained users. For example, an APF of 10 (half facepiece air-purifying respirator) means that a user could expect to inhale no more than one-tenth of the airborne contaminant present; an APF of 50 (full facepiece air-purifying respirator) means that a user could expect to inhale no more than one-fiftieth of the airborne contaminant.

The MUC is the maximum airborne concentration to which a particular respirator can be used by a worker. For example, if a worker wearing a respirator with an APF of 10 is exposed to an atmosphere containing a substance with an 8-hour TWA limit of, for example, 100 parts per million (ppm), the maximum airborne concentration the worker can be exposed to is 1000 ppm (10 X 100 ppm = 1000 ppm). If the worker is exposed to levels exceeding 1000 ppm, a respirator with a higher APF is required.

**It is important to note that other factors, such as the immediate danger to life or health (IDLH) concentration, will also need to be considered since the IDLH concentration may place limitations on the maximum use concentration. Refer to OHS Guideline [G8.34-3](#) for additional information on IDLH.**

**Note:** For extended workshifts where there is exposure to a substance with an 8-hour TWA, do not use modified TWA limits as determined under section 5.50 for extended work shifts. To accommodate for 10-hour, 12-hour, or other work shifts, one should consider modifying the change-out schedule for the respirator cartridge being used. Contact the respirator manufacturers for direction on recommended change-out schedules. Refer also to clause 6.3.2 of *CSA Standard Z94.4-02, Selection, Use, and Care of Respirators* for additional advice on change-out procedures, schedules, and service times.

If there are exposures to more than one chemical at one time (such as to a complex solvent mixture), the possibility of additive or synergistic effects should be assessed. Normally, additive and synergistic effects should be considered when profiling a worker's exposure to airborne contaminants - a requirement of *Regulation* [section 5.51](#) (see OHS Guideline [G5.51](#)). It is prudent to consider additive/synergistic effects for the respirator selection process as well. However, at this time, NIOSH, OSHA, WorkSafeBC, other agencies, as well as respirator manufacturers, have not finalized the method for incorporating additive and synergistic effects into the selection process. Until such time the methodology has been finalized, WorkSafeBC Prevention officers and persons responsible for a company's respirator program are advised to use the instructions in OHS Guideline [G8.33-1](#) or *CSA Standard Z94.4-02, Selection, Use, and Care of Respirators* for selecting the appropriate device when confronted with multi-contaminant exposures. A detailed chart is available in *CSA Standard Z94.4-02, Selection, Use, and Care of Respirators* to facilitate

the selection process. Rather than using the maximum use concentration, however, CSA uses the highest hazard ratio (HHR), which is the ratio of airborne concentration to the exposure limit, for selecting the appropriate respirator.

### Technical background information

The concept of the assigned protection factor is based on work originally conducted by the U.S. Bureau of Mines and first published in 1965 as decontamination factors. A decontamination factor was defined at the time as "the ratio of the concentration of dust, mist, fume or mist within the facepiece [relative to outside the respirator] while the respirator is being worn." The American National Standards Institute (ANSI) along with the American Industrial Hygiene Association's Respirator Committee further developed the concept, resulting in the present-day assigned protection factor (APF). The APF of a respirator reflects the level of protection that a properly functioning respirator would be expected to provide to a population of properly fitted and trained users. For example, an APF of 10 for a respirator means that a user could expect to inhale no more than one-tenth of the airborne contaminant present.

Fundamentally, the protection factor of a respirator is an expression of performance based on the ratio of two measured variables,  $C_1$  and  $C_0$  as described in NIOSH's 1987 document *NIOSH Respirator Decision Logic* (DHHS Publication No. 87-108).  $C_1$  is the measured concentration of a contaminant inside the respirator facepiece cavity, and  $C_0$  is the measured concentration of a contaminant outside the respirator facepiece. The relationship between these two variables can be expressed not only as the protection factor ( $C_0/C_1$ ) but also penetration ( $C_1/C_0$ ) or efficiency [ $(C_0/C_1)/C_0$ ]. Furthermore, the protection factor (PF) can be related to the penetration (P) and efficiency (E) as follows:

$$PF = C_0/C_1 = 1/p = 1/(1 - E)$$

Since  $C_1 \leq C_0$ , the PF will always be greater than unity.

Protection factor assessments are made exclusively on person/respirator systems while penetration and efficiency assessments are made only on component parts of the respirator system. It is important to recognize that on a person/respirator system, the measured variable  $C_1$  becomes a complicated function of many individual sources of penetration (for example, penetration of any of the following components -- air-purifying element, exhalation valve, and face seal). Also those environmental conditions that would affect penetration need to be considered (for example, high humidity, sweat, activity level of the user, and comfort level provided by the device).

#### G8.34-2 Assigned protection factors for non-powered filtering facepiece style air-purifying respirators

Issued March 22, 2004; Editorial Revision February 8, 2007

#### Regulatory excerpt

Table 8-1 of the *OHS Regulation* ("*Regulation*") states, in part:

Respirator type	Protection factor
Half-facepiece, non-powered	10

#### Purpose of guideline

This guideline provides an explanation of the assigned protection factor (PF) for non-powered filtering facepiece respirators, and provides direction for using this style of respiratory protection for protection against *Mycobacterium tuberculosis*.

#### What is the protection factor for filtering facepiece style respirators?

The 30 Code of Federal Regulations Part 42 CFR 84 was introduced in 1996. Under this requirement, dust/mist/fume non-powered, air-purifying particulate-filter respirators were categorized on the basis of filtration efficiency and on their resistance to oil.

42 CFR 84-certified non-powered, air-purifying, particulate-filtering facepiece style respirators carrying NIOSH certification TC-84A-xxx have been assigned a PF of 10, consistent with *CSA Standard Z94.4-02*, other standards, and other jurisdictions.

Respiratory devices certified under a previous Code of Federal Regulations 30 CFR 11 should no longer be available commercially. Manufacturing ceased on July 10, 1998. However, old stock may still exist and be used by workers. If used, these devices carry a PF of 5.

#### Are filtering facepiece style respirators approved for protection against *Mycobacterium tuberculosis*?

Respiratory protection equipment manufactured to an earlier standard (30 CFR 11), other than HEPA-rated filters, is not approved for protection against the organism responsible for tuberculosis. Therefore, only NIOSH TC-84A-xxx certified devices (all filter classes, including N100/99/95, R100/99/95, and P100/99/95) and NIOSH TC-11-xxx HEPA-rated filters are approved for protection against *Mycobacterium tuberculosis*.

For additional information on approved respirators see OHS Guideline [G8.33\(2\)-1](#).

#### G8.34-3 Maximum use concentration and IDLH

Issued originally as part of G8.34 August 1999; revised March 22, 2004; Editorial Revision April 4, 2007

#### Regulatory excerpt

The last row of Table 8-1 in Part 8 of the *OHS Regulation* ("*Regulation*") states:

Other factors such as warning properties, IDLH levels and cartridge/canister limitations must also be taken into account when

determining the maximum use concentration. Refer to the manufacturer's instructions and standards acceptable to the Board for further information.

### **Purpose of guideline**

The purpose of this guideline is to explain how the immediately dangerous to life or health (IDLH) concentration must be taken into account when using the maximum use concentration to select a respirator.

### **Effect of IDLH on respirator selection**

Most of the selection criteria in the applicable CSA Standard are summarized in OHS Guideline [G8.33](#). As a result of *Regulation section 8.35*, one of the most critical factors to be considered when selecting a respirator is whether the concentration is immediately dangerous to life or health (IDLH). For some substances, the IDLH concentration is very low, such as the following:

<b>Chemical Name</b>	<b>IDLH concentration (ppm)</b>
Toluene	500
Xylene	900
Chlorine	10

Depending on the type of respirator selected, the IDLH concentration may be lower than the maximum use concentration calculated using the exposure limit and the assigned protection factor. If the IDLH concentration is lower than the maximum use concentration, the selected respirator is unsuitable and another, more protective, respirator must be selected. The following example is provided using chlorine as the air contaminant:

1. A full facepiece air-purifying respirator, with an acid gas chemical cartridge, is being considered to protect against exposure to chlorine.
2. In the Table of Exposure Limits for Chemical and Biological Substances (see OHS Guideline [G5.48-1](#)), the 8-hour TWA limit for chlorine is 0.5 ppm. In [Table 8-1](#), the assigned protection factor for a full facepiece non-powered air-purifying respirator is 50.
3. The maximum use concentration in which it appears this respirator can be used to protect against exposure to chlorine calculates out to  $50 \times 0.5 \text{ ppm} = 25 \text{ ppm}$ .
4. Although it appears from the calculation in item 3 above that the respirator could be used to protect against chlorine exposure to a concentration of 25 ppm, [section 8.35](#) must also be met. The IDLH concentration for chlorine is 10 ppm. Section 8.35 does not permit an air-purifying respirator to be used in an IDLH atmosphere. Only an air-supplying or self-contained positive pressure respirator may be used for situations where the concentration is above or may go above the IDLH value. Thus a full-facepiece, air-purifying respirator with an acid gas cartridge may only be used if the maximum expected concentration of chlorine will be below 10 ppm.

For information on current IDLH concentrations, refer to OHS Guideline [G8.35\(1\)](#) or go to the NIOSH web site: <http://www.cdc.gov/niosh/idlh/intrid4.html>

#### **G8.34-4 Protection factors - standard acceptable to WorkSafeBC**

Issued May 17, 2006; Editorial Revision to include February 1, 2011 regulatory amendment

### **Regulatory excerpt**

The last row of Table 8-1 in Part 8 of the *OHS Regulation ("Regulation")* states:

Other factors such as warning properties, IDLH levels, and cartridge/canister limitations must also be taken into account when determining the maximum use concentration. Refer to the manufacturer's instructions and standards acceptable to the Board for further information.

### **Purpose of guideline**

The purpose of this guideline is to identify a standard acceptable to WorkSafeBC under the last row in [Table 8-1](#).

### **Acceptable standard**

The following standard has been determined to be acceptable to WorkSafeBC:

- *CSA Standard CAN/CSA-Z94.4-02, Selection, Use, and Care of Respirators*

#### **G8.34-5 Assigned protection factor for helmet/hood style powered air purifying respirators**

Retired on February 1, 2010

This guideline is not required after amendment of this section on February 1, 2011 to include the protection factor in OHS Regulation (refer to [OHS Regulation 8.34](#)).

#### **G8.35(1) Reference documentation for IDLH concentrations**

Issued August 1, 1999



IDLH concentrations are based on research and information gathered by NIOSH. IDLHs were originally determined for 387 substances in the mid-1970's as part of the Standards Completion Program, a joint project by NIOSH and OSHA for use in assigning respiratory protective equipment. NIOSH re-evaluated the scientific adequacy of the criteria in the early 1990's and published their findings in a 1994 document, as listed below.

For information on current IDLH concentrations, refer to

- Current edition of the "Pocket Guide to Chemical Hazards", published by NIOSH,
- "Documentation for Immediately Dangerous to Life or Health (IDLH) Concentrations" published in 1994 by NIOSH, or
- DHHS (NIOSH) Publication No. 99-115, a compact disc (CD) issued by NIOSH April 1999. It is entitled "NIOSH Pocket Guide to Chemical Hazards and Other Databases". Both documents listed above are available in this CD. This CD was provided to all Prevention occupational hygiene officers.

#### G8.38(2) Respiratory protection and use of contact lenses

Issued August 1, 1999

Section 8.38(2) of the *OHS Regulation* ("*Regulation*") states:

The employer may permit the use of contact lenses by a worker who is required to wear a full facepiece respirator if their use is not likely to adversely affect the health or safety of the worker.

Contact lenses may be worn with a full-face air-supplying respirator if:

- the employer is notified that contact lenses will be worn,
- the user puts the respirator on in an atmosphere which does not cause the eyes to be irritated or which does not cause irritating gases or vapours to be absorbed by the contact lens, and
- the wearer does not wear contact lenses if their eyes are irritated or inflamed. If use of the respirator is necessary for planned work or in the event of an emergency situation appropriate alternative corrective eyewear should be used with the respirator.

Note: If fit testing for the full facepiece respirator was done with the worker wearing contact lenses, another form of prescriptive eyewear should only be used if a fit test has confirmed an effective seal with the face using the respirator with the alternative eyewear. Section 8.38(1) of the *Regulation* requires the employer to provide specialty corrective eyewear if necessary to ensure the work can be performed safely.

#### G8.40 Respiratory protection - Fit test

Issued August 1, 1999; Editorial Revision April 4, 2007

##### **Regulatory excerpt**

Section 8.40 of the *OHS Regulation* ("*Regulation*") states, in part:

(1) A respirator which requires an effective seal with the face for proper functioning must not be issued to a worker unless a fit test demonstrates that the facepiece forms an effective seal with the wearer's face.

(2) Fit tests must be performed in accordance with procedures in *CSA Standard CAN/CSA-Z94.4-02, Selection, Use, and Care of Respirators*.

Section 8.41 of the *Regulation* states, in part:

(1) Before each use of a respirator which requires an effective seal with the face for proper functioning, a worker must perform a positive or negative pressure user seal check in accordance with *CSA Standard CAN/CSA-Z94.4-02, Selection, Use, and Care of Respirators*.

##### **Purpose of guideline**

The purpose of this guideline is to describe acceptable methods for performing qualitative and quantitative fit tests.

##### **General requirements**

Section 8.40(1) of the *Regulation* specifies that a worker must not be issued a respirator which requires an effective seal with the face for proper functioning unless a fit test demonstrates the facepiece forms an effective seal with the wearer's face.

A "fit test" is defined in *CSA Standard CAN/CSA-Z94.4-02, Selection, Use, and Care of Respirators* ("*Standard*") as "the use of a qualitative or a quantitative method to evaluate the fit of a specific make, model, and size of respirator on an individual." The *Standard* prescribes the following two general fit test methods - WorkSafeBC will accept either method:

- Qualitative fit testing (QLFT)
- Quantitative fit testing (QNFT)

The following elements of the *Standard* apply regardless of whether the fit test performed is qualitative or quantitative:

- A respirator must be fit tested while being worn by the user to demonstrate that the facepiece forms an effective seal.
- The person undergoing the fit test must be clean shaven where the facepiece seals to the skin.
- The person performing the fit test should address a number of topics with the user prior to performing the test. These topics include explanations of the test procedure, description of the test agent, and proper donning of the respirator. The topics are identified in the Appendices of the *Standard*.
- Before a fit test is carried out, the respirator wearer must perform a positive or negative pressure user seal check. The requirement for a user seal check is provided in *Regulation* section 8.41.
- For a respirator that requires a tight face-to-facepiece seal (this includes SCBA equipment), the *Standard* requires that fit testing be conducted in the pressure mode. A fit test can be conducted by temporarily converting the face piece from a positive pressure device to a negative pressure device through attachment of particulate or chemical cartridges or canisters to the end of the facepiece breathing hose or directly to the facepiece itself. Alternatively, the fit test can be conducted by using a negative pressure air-purifying respirator with identical facepiece sealing surface.
- When other personal protective equipment, such as eye, face, head, and hearing protectors, are required to be worn, they must be worn during the respirator fit tests to ensure that they are compatible with the respirators and do not break the facial seal.

For additional information, refer to the *Standard* and to the WorkSafeBC publication "[Breathe Safer.](#)"

### Qualitative fit testing (QLFT)

A qualitative fit test relies on a person's response to a test agent due to taste, smell, or irritation. Acceptable qualitative fit test methods are listed below.

Acceptable QLFT Methods

Test agent	Response based on
1. Isoamyl acetate (banana oil)	Smell
2. Saccharin solution aerosol	Taste
3. Irritant smoke	Irritation
4. Bitter aerosol	Taste

Appendix B of the *Standard* includes procedures and explanatory information for the isoamyl acetate, saccharin solution, irritant smoke, and bitter aerosol methods. Test equipment and supplies are available from safety equipment suppliers.

For the isoamyl acetate, saccharin solution, and bitter aerosol tests, the following applies:

- Prior to proceeding with the fit test, the worker receiving the test is subjected to a threshold-screening test without a respirator to ensure sensitivity to the selected test agent. If the worker does not respond to the selected test agent, an alternate agent or method is chosen.
- Conduct a negative or positive pressure user seal check prior to proceeding with the fit test.
- A fit test chamber is used to ensure an adequate concentration of test agent is generated and maintained for the duration of the test. For example, to perform the test with isoamyl acetate, a prescribed amount of isoamyl acetate is used to wet a prescribed amount of absorbent material in order to generate a standard concentration inside the test chamber. The chamber can be a plastic hood, available commercially, or can be created using the method described in clause B2.1.2(a) of the *Standard*.
- See Appendix B of the *Standard* for specific details.

For the irritant smoke test, the following applies:

- Only smoke tubes approved for fit testing are used, such as those based on stannic chloride.
- Check with the manufacturer of the smoke tube to determine if there is a gaseous component to the irritant smoke. If so, a combination of an organic vapour/acid gas cartridge with a N100, P100 or R100 prefilter or HEPA prefilter is used; otherwise a N100, P100, R100 or HEPA-rated filter can be used.
- The worker receiving the test is subjected to a weak concentration of the irritant smoke to ensure sensitivity to this test agent.
- Conduct a negative or positive pressure user seal check prior to proceeding with the pressure user seal test.
- A fit test chamber is not used for fit testing due to the generation of hydrogen chloride during the test.
- The test is conducted in a location with adequate ventilation to prevent general contamination of the testing area by the irritant smoke.
- See Appendix B of the *Standard* for specific details.

### Quantitative fit testing (QNFT)

The following quantitative methods are acceptable:

- Measure ambient aerosol levels and compare them with levels inside the respirator facepiece.
- Generate a known concentration of a test aerosol (such as corn oil, polydisperse sodium chloride, or polydisperse dioctylphthalate) inside a test chamber and compare the concentration of the generated aerosol with levels inside the respirator facepiece.
- Measure the volumetric leak rate of a facepiece using controlled negative pressure.

The first two QNFT methods measure the concentration of a test agent inside the respirator facepiece. The tests are conducted using electronic equipment (such as a condensation nuclei counter) capable of counting airborne particles. The third method relies on measurement of the exhaust air stream that is required to hold the sealed respirator to the face.

Unlike qualitative fit tests, quantitative tests do not depend on a person's response to a test agent.

These methods are described more fully in Appendix C of the *Standard*.

#### G8.40(2.1)(c) Single-use respirators and fit test equivalency

Issued September 30, 2009

#### Regulatory excerpt

Section 8.40 of the *OHS Regulation* ("*Regulation*") states:

(1) A respirator which requires an effective seal with the face for proper functioning must not be issued to a worker unless a fit test demonstrates that the facepiece forms an effective seal with the wearer's face.

(2) Fit tests must be performed in accordance with procedures in *CSA Standard CAN/CSA-Z94.4-02, Selection, Use, and Care of Respirators*.

(2.1) A fit test must be carried out

(a) before initial use of a respirator,

(b) at least once a year,

(c) whenever there is a change in respirator facepiece, including the brand, model, and size, and

(d) whenever changes to the user's physical condition could affect the respirator fit.

...

#### Purpose of guideline

This guideline provides information on equivalency for single-use respirators (e.g., N95 type) when manufacturers produce a respirator type with several model numbers. It also provides suggestions for achieving efficiencies in the deployment of N95 filtering facepiece respirators and fit testing of the respirators.

#### Model number differences and changes

The *Regulation* specifies that a fit test must be carried out whenever there is a change in a facepiece model. A respirator manufacturer, however, may change the model number of a respirator without making any material changes to the facepiece. This may be done for marketing or other business purposes. In addition, a manufacturer may sell different yet equivalent respirators with different model numbers based on the industries to which they are marketing.

An employer may be able to use respirators marketed for different applications if the respirators are essentially equivalent. For example, an N95 respirator sold for an industrial application can be used by health care workers under specified conditions. Health care employers do not have to restrict their respirator types to those marketed specifically to the health care industry. An advantage of using equivalent respirator types is that once a worker has been fit tested on one model, the fit test will apply to the equivalent model without further testing.

#### Accepted equivalent manufacturers' model numbers

For WorkSafeBC to consider the respirator models to be equivalent for the purpose of fit testing, the respirators will need to have been produced by the same manufacturer. Also, there will need to be a statement from the manufacturer that is available to employers stating that the respirators are identical for all practical purposes, and that the manufacturer recognizes that a fit test for one of the respirators is suitable evidence of adequate fit for the other respirator.

Where WorkSafeBC accepts equivalent respirator models for the purposes of fit testing, the manufacturer's name as well as the model numbers of the respirators will be published in this guideline. Respirators meeting these criteria at this time are set out in the following Table.

**Table of Respirator Model Equivalents**

Manufacturer	Respirator type	Manufacturer's model numbers
3M	Filtering face piece	1870, 9210

#### Maximizing use and availability of respirators

There are means of maximizing efficiencies in the use and availability of single-use respirators including the following:

- Workers keeping the respirators that were used to fit test them, rather than discarding them immediately after the fit test (provided the respirators were not damaged during the test)
- Developing and maintaining up-to-date respirator programs
- Fit testing of large groups of workers at a time
- Selecting the most practical respirator for the intended purpose (e.g., moving to reusable elastomeric types as appropriate rather than using

- single-use N95s, where workers are repeatedly entering hazardous areas during a shift)
- In order to avoid a shortage of respirators, employers should consider purchasing respirators from a number of different manufacturers. Different respirators could be used in various departments or for different cohorts of workers. If one manufacturer is unable to supply a particular make or model of respirator the employer may be able to use an alternate (workers will still have to be fit tested for the new respirator)
- Where an N95 filtering facepiece respirator is required for worker protection, any other filtering facepiece respirator that provides equal or greater protection (e.g., R95, P100) could be considered as a substitute. The requirement for fit testing would still apply to these respirators.

#### G8.42 Medical Assessment

Issued August 1999; Editorial Revision October 2004

Section 8.42 of the *OHS Regulation ("Regulation")* states:

If a worker is required to use a respirator and there is doubt about the worker's ability to use a respirator for medical reasons, the worker must be examined by a physician, and the examining physician must be provided with sufficient information to allow the physician to advise the employer of the ability of the worker to wear a respirator.

When being evaluated for medical fitness to wear a respirator, the worker needs to bring his or her respirator to the physician doing the assessment. Some guidelines for medically assessing a worker's ability to use a respirator are provided in the following references:

- *CSA Standard CAN/CSA Z94.4-93, Selection, Use and Care of Respirators* (Refer to Clause 11, in particular),
- *ANSI Standard Z88.6-1984, Physical Qualifications for Respirator Use*,
- "Respirator Decision Logic", published by NIOSH (DHHS/NIOSH Pub. No. 87-108)

For additional information, consult occupational physicians of WorkSafeBC.

#### G8.45 Maintenance and inspection of self-contained breathing apparatus

Issued May 17, 2006; Revised October 23, 2012

##### **Regulatory excerpt**

Section 8.45 (Maintenance and inspections) of the *OHS Regulation ("Regulation")* states:

- (1) Inspection of compressed air cylinders must be done in accordance with *CSA Standard CAN/CSA-Z94.4-02, Selection, Use, and Care of Respirators*.
- (2) Self-contained breathing apparatus, including regulators, must be serviced and repaired by qualified persons.
- (3) Compressed air cylinders must be hydrostatically tested in accordance with *CSA Standard CAN/CSA-B339-96, Cylinders, Spheres, and Tubes for the Transportation of Dangerous Goods*.

Section 4.4(2)(a) of the *Regulation* states:

- (3) When this Regulation requires a person to comply with
  - (a) a publication, code or standard of the Board or another agency, the person may, as an alternative, comply with another publication, code or standard acceptable to the Board...

##### **Purpose of guideline**

This guideline provides information on the application of the three sections of 8.45 of the *Regulation* on the inspection of self-contained breathing apparatus (SCBA), servicing and repair, and hydrostatic testing.

An SCBA includes a full facepiece incorporating a second stage regulator, compressed air cylinder, first stage regulator, pressure gauge, alarm, connecting tubes, harness assembly, and associated fittings. An SCBA offers one of the highest levels of respiratory protection available and is designed to provide protection in oxygen-deficient atmospheres and in situations where high or unknown concentrations of toxic air contaminants are present.

This guideline accepts the 2002 edition of CAN/CSA B339 as amended in November 2003 and February 2005 as an alternate standard under section 4.4(2)(a) of the *Regulation*.

##### **Section 8.45(1) - Inspection**

Under this requirement compressed air cylinders must be inspected in accordance with *CSA Standard CAN/CSA Z94.4-02, Selection, Use, and Care of Respirators*. Clause 10.3.3 of this standard covers inspection of SCBA cylinders, including those made of steel, aluminum, and composites. Inspections require an examination of both the exterior and interior of cylinders. Inspections must be done according to the requirements of the following:

- *CAN/CSA-B339*

- CAN/CSA-B340
- CGA C-6, C-6.1, or C-6.2 as appropriate
- Transport Canada regulations under the *Transportation of Dangerous Goods Act*
- Manufacturer's instructions

Cylinder manufacturers typically provide detailed inspection instructions.

### Internal Inspections

Internal inspections are required for all cylinders at least at the time of hydrostatic testing. Transport Canada or the manufacturer may specify more frequent internal inspections. The purpose of the internal inspection is to look for the presence of corrosion, moisture, oil, or other deposits.

Clause 10.3.3.1.5 of *CSA Z94.4-02* requires at least annual inspections of steel and aluminum cylinders over 15 years old when the cylinders are in current use. Clause 10.3.3.1.7 of *CSA Z94.4-02* requires composite cylinders to be removed from service if they are at least 15 years old.

### External Inspections

External inspections are conducted on a more frequent basis than internal inspections. Clause 10.3.3.1.2 of *CSA Z94.4-02* requires that cylinders be inspected externally after each use and before refilling. In addition cylinders for emergency use, such as emergency escape SCBA cylinders, must be inspected on a schedule to ensure readiness for the anticipated emergency use. NIOSH recommends that SCBA, including cylinders, be inspected weekly if stored.

The purposes of the external inspection include the following:

- Identifying any obvious damage to the cylinder
- Verifying that the hydrostatic test date is current

Defective equipment is to be identified as "out of service" and removed from service until repaired and replaced.

Refer to *CSA Standard CAN/CSA-Z94.4-02* clause 10.3.3 and Transport Canada for further information.

### Section 8.45(2) - Servicing and repair

This provision requires that SCBAs, including regulators and components like hose connectors, hoses, cylinders, facepieces, head straps, regulators, harness components, warning devices, and gauges are serviced and repaired by a qualified person. "Qualified," as defined by section 1.1 of the *Regulation*, means being knowledgeable of the work, the hazards involved, and the means to control the hazards, by reason of education, training, experience, or a combination thereof. For the purposes of section 8.45(2), qualified SCBA maintenance personnel will

- Be qualified through training and experience to inspect, maintain, and repair respirators in accordance with the manufacturer's written instructions
- Inspect, maintain, and repair SCBAs as required
- Ensure that maintenance tools are kept in good repair and properly calibrated
- Maintain appropriate records of maintenance and repair in accordance with section 8.44 of the *Regulation*

Only registered facilities can repair and requalify SCBA cylinders. Contact Transport Canada to locate a facility.

### Section 8.45(3) - Hydrostatic testing

This provision requires that compressed air cylinders be hydrostatically tested in accordance with *CSA Standard CAN/CSA-B339-96, Cylinders, Spheres, and Tubes for the Transportation of Dangerous Goods*. *CAN/CSA B339-02 Cylinders, Spheres, and Tubes for the Transportation of Dangerous Goods* as amended in November 2003 and February 2005 is an acceptable alternative to the 1996 edition referenced in section 8.45(3) of the *Regulation*.

*CSA Standard CAN/CSA-B339* specifies the requirements for the manufacturing, inspecting, testing, marking, requalifying, repairing, and rebuilding of cylinders, spheres, and tubes for the transportation of dangerous goods. Part 24 of this standard specifies the requirements for retesting, inspecting, reheat treatment, repairing, and rebuilding of used containers. The minimum frequency of hydrostatic testing is specified in Table 24.1 as the following:

- Every five years for aluminum and steel SCBA cylinders (TC-3AAM and TC-3ALM)
- Every three years for composite SCBA cylinders (TC-3FCM and TC-3HWM composite cylinders with an inner aluminum liner wrapped with a composite like carbon-fiber, fiberglass, or Kevlar)
- As required by special permit or exemption for any cylinder (Transport Canada issues special permits and exemptions)

Many composite cylinders have Permits for Equivalent Level of Safety (also known as equivalency certificates, special permits, or exemptions) from Transport Canada extending the hydrostatic test interval from three years to five years. These permits are conditional and may change or not be renewed in the future. Cylinders with equivalency certificates will have a "SU" number on their label. By looking up the SU number the certificate can be found on the Transport Canada website at <http://www.wapps.tc.gc.ca/saf-sec-sur/3/tdgcert-tmdcert/certificatessearch.aspx>.

For more information on Transport Canada requirements contact the Transportation of Dangerous Goods Pacific office at 604-666-3955 or [TDGPacific-TMDPacific@tc.gc.ca](mailto:TDGPacific-TMDPacific@tc.gc.ca).

This guideline does not discuss SCUBA cylinders which are subject to different requirements for inspection, maintenance and hydrostatic testing.

Issued June 18, 2008; Revised May 9, 2014

### **Regulatory excerpt**

Section 8.15(1) of the *OHS Regulation* ("Regulation") states:

Prescription safety eyewear must meet the requirements of *CSA Standard CAN/CSA-Z94.3-92, Industrial Eye and Face Protectors*.

Section 8.16 of the *Regulation* states:

Safety eyewear must be fitted with sideshields when necessary for the safety of a worker.

Section 8.3 of the *Regulation* states, in part:

- (1) Personal protective equipment must
- (b) not in itself create a hazard to the wearer,
- (2) If the use of personal protective equipment creates hazards equal to or greater than those its use is intended to prevent, alternative personal protective equipment must be used or other appropriate measures must be taken.

Section 4.4(2)(a) of the *Regulation* states:

- (2) When this Regulation requires a person to comply with
- (a) a publication, code or standard of the Board or another agency, the person may, as an alternative, comply with another publication, code or standard acceptable to the Board...

### **Purpose of guideline**

The purpose of this guideline is to specify, in the case of section 8.15(1) of the *Regulation*, alternative standards acceptable to WorkSafeBC for prescription safety eyewear.

### **Background information**

Section 8.15(1) of the *Regulation* requires that prescription safety eyewear meet *CSA Standard CAN/CSA-Z94.3-92, Industrial Eye and Face Protectors* ("1992 Standard"). The *1992 Standard* prescribes the required technical specifications for eye and face protection, including prescription safety eyewear.

Section 4.4(2)(a) permits WorkSafeBC to accept another standard as an alternative standard.

### **Acceptable alternative standards**

#### **Canadian Standards Association (CSA)**

WorkSafeBC has determined that *CSA Z94.3-07, Eye and Face Protectors* ("2007 Standard") is an acceptable alternative to the *1992 Standard* referenced in section 8.15(1) of the *Regulation*.

The *2007 Standard* is the seventh edition of *CSA Z94.3, Eye and Face Protectors*. The main changes since the fourth edition in 1992 include: improved levels of impact protection; clarification for testing and marking requirements for prescription safety eyewear; criteria for sun protection eyewear; a requirement for performance criteria and test procedures to be applied separately to prescription lenses and frames; and an allowance for ophthalmic professionals to modify prescription eyewear to fit the wearer.

For clarity purposes, *CSA Z94.3-99, Industrial Eye and Face Protectors* and *Z94.3-02, Eye and Face Protectors* are also acceptable alternatives to the *1992 Standard* referenced in section 8.15(1) of the *Regulation*.

#### **American National Standards Institute (ANSI)**

WorkSafeBC has determined that *ANSI Z87.1-2010, American National Standard Occupational and Educational Personal Eye and Face Protection Devices* is also an acceptable alternative to the *1992 Standard* referenced in section 8.15(1) of the *Regulation*.

The 2010 edition of *ANSI Z87.1, Occupational and Educational Personal Eye and Face Protection Devices* was reorganized to focus on the nature of the hazard (such as droplet and splash, impact, optical radiation, dust, fine dust, and mist). To select the appropriate eye and face protection users evaluate the specific hazards that they are exposed to in their environment, then ensure the protector chosen is marked for the hazard type. This standard requires that protectors bearing the permanent marking "Z87" shall meet all applicable requirements of the standard. Markings for lens types and use applications are required only when claims for protection against the hazard or indicated use are made by the manufacturer. This edition also attempts to harmonize with other eye and face protection standards used throughout the world.

### **Sideshields**

Section 8.16 of the *Regulation* requires safety eyewear to be fitted with sideshields when necessary for the safety of a worker. The *1992 Standard* permits sideshields to be either permanently attached or removable. In contrast, the *2007 Standard* requires side protection, such as

sideshields, to be integrated or permanently affixed to the eyewear frame. *ANSI Z87.1-2010* requires that impact rated protectors shall provide continuous lateral coverage. Pursuant to sections 8.3(1)(b) and 8.3(2) of the *Regulation*, and consistent with section 8.16, where sideshields are necessary for the safety of a worker, prescription safety eyewear may be fitted with removable sideshields.

#### G8.17(2) Face protection - Alternate standards

Issued July 9, 2009; Revised October 28, 2015

#### Regulatory excerpt

Section 8.17(2) of the *OHS Regulation* ("*Regulation*") states:

- (2) Face protectors and non-prescription safety eyewear must meet the requirements of
  - (a) *CSA Standard CAN/CSA-Z94.3-92, Industrial Eye and Face Protectors*, or
  - (b) *ANSI Standard Z87.1-1989, Practice for Occupational and Educational Eye and Face Protection*.
  - (c) Repealed. [B.C. Reg. 312/2003, effective October 29, 2003.]

Section 8.16 of the *Regulation* states:

Safety eyewear must be fitted with sideshields when necessary for the safety of a worker.

Section 8.3 of the *Regulation* states, in part:

- (1) Personal protective equipment must
  - (b) not in itself create a hazard to the wearer,
- (2) If the use of personal protective equipment creates hazards equal to or greater than those its use is intended to prevent, alternative personal protective equipment must be used or other appropriate measures must be taken.

Section 4.4(2)(a) of the *Regulation* states:

- (2) When this Regulation requires a person to comply with
  - (a) a publication, code or standard of the Board or another agency, the person may, as an alternative, comply with another publication, code or standard acceptable to the Board...

#### Purpose of guideline

The purpose of this guideline is to specify, for the purposes of section 8.17(2) of the *Regulation*, alternate standards acceptable to WorkSafeBC for face protectors and non-prescription safety eyewear.

#### Background information

Section 8.17(2) of the *Regulation* requires that face protectors and non-prescription safety eyewear meet *CSA Standard CAN/CSA-Z94.3-92, Industrial Eye and Face Protectors*, or *ANSI Standard Z87.1-1989, Practice for Occupational and Educational Eye and Face Protection*. To select the appropriate eye and face protection users evaluate the specific hazards that they are exposed to in their environment, then ensure the protector chosen provides effective protection for the hazard type.

#### Acceptable standards

Section 4.4(2)(a) permits WorkSafeBC to accept another standard as an alternative to one referred to in the *Regulation*. WorkSafeBC has determined that the following are acceptable alternate standards under section 8.17(2) of the *Regulation*:

- *CSAZ94.3-07, Eye and Face Protectors*
- *CSAZ94.3-02, Eye and Face Protectors*
- *CSAZ94.3-99, Industrial Eye and Face Protectors*
- *ANSI Z87.1-2010, American National Standard Occupational and Educational Personal Eye and Face Protection Devices*

#### Sideshields

Section 8.16 of the *Regulation* requires safety eyewear to be fitted with sideshields when necessary for the safety of a worker. *CSA-Z94.3-92* permits sideshields to be either permanently attached or removable. In contrast, *CSAZ94.3-07* requires side protection, such as sideshields, to be integrated or permanently affixed to the eyewear frame. *ANSI Z87.1-2010* requires that impact rated protectors shall provide continuous lateral coverage.

Pursuant to sections 8.3(1)(b) and 8.3(2) of the *Regulation*, and consistent with section 8.16, where sideshields are necessary for the safety of a worker, safety eyewear may be fitted with removable sideshields.

#### G8.2(3) Responsibility to provide

### **Regulatory excerpt**

Section 8.2(3) of the *OHS Regulation ("Regulation")* states:

If the personal protective equipment provided by the employer causes allergenic or other adverse health effects, the employer must provide appropriate alternative equipment or safe measures.

### **Purpose of guideline**

The purpose of this guideline is to provide an example of selecting alternative equipment if the personal protective equipment provided by the employer causes allergic or other adverse health effects.

### **Appropriate alternative equipment**

An example of selecting appropriate alternative equipment would be a worker allergic to natural rubber latex gloves, but who has work duties resulting in exposure to blood or other body fluids (a potential exposure to biological agents designated as a hazardous substance in section 5.1.1). In such a circumstance, the worker could use gloves made of vinyl, nitrile, neoprene, copolymer, or polyethylene, which would be appropriate alternatives to latex gloves for this particular exposure. See also OHS Guideline [G6.34-2](#) for more information.

If a worker has an allergenic or other adverse health effect due to the protective equipment supplied and the remedy chosen is the use of "other safe measures," such measures have to provide at least equivalent protection to the worker that the personal protective equipment normally used would provide.

### **G8.5 Program**

Issued August 1, 1999; Revised November 17, 2003; Editorial Revision to include February 1, 2011 regulatory amendment

### **Regulatory excerpt**

Section 8.5 of the *OHS Regulation ("Regulation")* states:

If personal protective equipment is required to protect against a chemical exposure or an oxygen deficient atmosphere the employer must implement an effective protective equipment program at the workplace which includes

- (a) a statement of purpose and responsibilities,
- (b) written procedures for selection, use, inspection, cleaning, maintenance and storage of protective equipment, when required,
- (c) instruction and training in the correct use and maintenance of the equipment,
- (d) for respirators, medical assessment of respirator wearers, when required,
- (e) documentation when required, and
- (f) program review.

### **Purpose of guideline**

The purpose of this guideline is to provide direction in determining if personal protective equipment is required in a chemical exposure or an oxygen-deficient atmosphere.

### **Personal Protective Equipment**

To determine if personal protective equipment is required in a workplace to protect against a chemical exposure or an oxygen-deficient atmosphere, the employer has to consider the requirements of section 5.55 of the *Regulation*. Section 5.55(1) states "If there is a risk to a worker from exposure to a harmful substance by any route of exposure, the employer must eliminate the exposure, or otherwise control it below harmful levels and below the applicable exposure limit established under section 5.48...." Options available to the employer include substitution, engineering control, administrative control, or personal protective equipment. However, section 5.55(3) states: "The use of personal protective equipment as the primary means to control exposure is permitted only when

- (a) substitution, or engineering or administrative controls are not practicable, or
- (b) additional protection is required because engineering or administrative controls are insufficient to reduce exposure below the applicable exposure limits, or
- (c) the exposure results from temporary or emergency conditions only."

For guidance in determining whether personal protective equipment is required, refer to OHS Guideline [G5.55](#).

For guidance on determining if a medical assessment of a respirator wearer is required under paragraph 8.5(d), refer to OHS Guideline [G8.42](#).



Issued August 1, 1999

### **Regulatory excerpt**

Paragraph 8.5(b) of the *OHS Regulation* ("*Regulation*") states:

If personal equipment is required to protect against a chemical exposure or an oxygen deficient atmosphere the employer must implement an effective protective equipment program at the workplace which includes... (b) written procedures for selection, use, inspection, cleaning, maintenance and storage of protective equipment, when required.

This guideline addresses a maintenance requirement for escape respirators used in the pulp and paper industry, specifically the replacement schedule for chemical cartridges used for protection against reduced sulfur gases, such as hydrogen sulfide, methyl mercaptan, dimethyl mercaptan, dimethyl sulfide and dimethyl disulfide. Escape respirators, except for workers required to ride in the pulp mill elevators, may be half facepiece respirators and mouthpiece, or biteblock respirators, and are used by mill personnel to escape to a safe area when the mill experiences a gas leak.

The performance of escape cartridges in the pulp and paper environment was assessed in a study conducted by BC Research Incorporated, and the findings were published in June 1994, in a report entitled "Life Expectancy of Cartridges for Escape Respirators: Final Report", BCRI Project No. 4-02-394. Based on the findings of this study, the following guidelines are recognized as acceptable practice by WorkSafeBC. (This guide was initially published by the Prevention Division in a letter issued October 6, 1994, to the pulp and paper industry.)

The replacement schedule for chemical cartridges for use in escape respirators, in the pulp and paper industry only, may be extended to 12 months for unused, unexposed and undamaged cartridges with the following provisos:

- A cartridge in an escape respirator is to be changed after use in an emergency involving exposure to mill gases,
- Each cartridge is to be marked to show clearly its expiry date,
- A metal type cartridge is to be inspected prior to installation for dents in the base or threads, and
- Any damaged unit is to be replaced.

Each pulp and paper mill is expected to have a comprehensive respiratory protection program, functioning as required by section 8.5. This is achieved when all workers who are, or may be, required to use a respirator are trained to an acceptable level of competency and all the elements of the program are in place covering correct use, limitations, maintenance and storage requirements for the devices selected.

For respirator use in industries other than pulp and paper mills, the employer must follow the respirator manufacturer's recommendations for cartridge replacement schedules.

### **G8.10 Personal clothing and accessories**

Issued August 1, 1999; Revised September 22, 2015

### **Regulatory excerpt**

Section 8.10(1) of the *OHS Regulation* ("*Regulation*") states:

The personal clothing of a worker must be of a type and in a condition which will not expose the worker to any unnecessary or avoidable hazards.

### **Purpose of guideline**

This guideline provides clarification and examples of the regulatory requirements for personal clothing.

### **Clarifications for personal clothing**

Under this section, the type and condition of clothing is a concern if a worker is exposed to injury from the material being handled, contact with an abrasive surface or object, or contact with a surface at a temperature that could cause a burn injury. For example, a worker handling hot tar or other material that could cause a burn through splashing, fuming, or radiant heat must wear suitable clothing covering the body and arms. A worker exposed to the abrasive action of material, such as the carrying of lumber on the shoulder or against the body, must wear appropriate clothing.

A worker may have to change or add clothing as the worker's job duties or work conditions change.

An employer may have a dress code or policy for clothing requirements during warm weather. WorkSafeBC prevention officers will not enforce an employer's policy of this type. Prevention officers will become involved in enforcement if the lack of appropriate clothing is exposing a worker to any unnecessary or avoidable hazards.

Removal of clothing during outdoor work in warm weather exposes workers to UV from the sun. Ultraviolet radiation from the sun is a "natural element," and under paragraph 8.2(1)(a) of the *Regulation*, a worker is responsible for providing any necessary clothing to protect against it. Workers and employers need to be aware of the hazard from solar radiation, and need to take measures to limit exposure, such as by use of appropriate attire and the use of sun block creams.

### **G8.21 Leg protection**

Issued August 1, 1999; Editorial Revision October 2004

An officer of the Board finding unmarked or substandard leg protective devices being used will not order them out of service. The employer is to be ordered to obtain replacement devices that meet the requirements of section 8.21 of the *OHS Regulation*, without undue delay. The officer will also get the name and address of the distributor and/or manufacturer of unmarked or substandard devices and forward it to the Engineering Section.

#### G8.21(2) Leg protection - Alternate standards

Retired February 1, 2011

This guideline is not required since the referenced alternative standards have been incorporated into *OHS Regulation* [section 8.21](#).

#### G8.21(2)-1 Leg protection - WorkSafeBC standards

Issued February 1, 2011

#### **Regulatory excerpt**

Section 8.21(2) of the *OHS Regulation* ("*Regulation*") states:

- (2) Leg protective devices referred to in subsection (1) must meet or exceed
- (a) the general requirements of section 4 of the *WorkSafeBC Standard - Leg Protective Devices*, as set out in Schedule 8-A of this Part, and
  - (b) the performance requirements of one of the following standards, using the cut-resistance testing protocol set out in that standard except as varied in subparagraph (ii):
    - (i) *WorkSafeBC Standard - Leg Protective Devices*, as set out in section 5 of Schedule 8-A of this Part, applying a threshold chain speed of 18.3 metres per second or 3 600 feet per minute;
    - (ii) *ASTM F 1414-04 Standard Test Method for Measurement of Cut Resistance to Chain Saw in Lower Body (Legs) Protective Clothing*, but applying a threshold chain speed of 16.8 metres per second or 3 300 feet per minute;
    - (iii) *ISO 11393-2 Protective clothing for users of hand-held chain-saws - Part 2: Test methods and performance requirements for leg protectors*, applying a Class 2 threshold chain speed of 24 metres per second or 4 724 feet per minute;
    - (iv) *BS EN 381-5:1995 Protective clothing for users of hand-held chain saws - Part 5: Requirements for leg protectors*, applying a Class 2 threshold chain speed of 24 metres per second or 4 724 feet per minute.

#### **Purpose of guideline**

The purpose of this guideline is to explain the application of *WorkSafeBC* standards for leg protective devices before and after February 1, 2011.

#### **Background**

On February 1, 2011, *Regulation* section 8.21(2) was amended to refer to *WorkSafeBC* standard, [Schedule 8-A WorkSafeBC Standard - Leg Protective Devices](#). Prior to February 1, 2011, the *Regulation* referred to [WCB Standard: PPE 1, 1997 Leg Protective Devices](#). The amendment removed any reference to the 1997 standard.

#### **Application of standards**

The WorkSafeBC Policy and Regulation Division has advised that the 1997 standard for leg protection continues to apply to leg protective devices designed, tested and first manufactured prior to February 1, 2011. Therefore, product designed, tested and approved to meet the 1997 WCB standard prior to February 1, 2011 can continue to be used.

Any leg protection devices designed, tested, and first manufactured on or after February 1, 2011, must meet *Schedule 8-A WorkSafeBC Standard - Leg Protective Devices*.

#### G8.21(2)-2 Leg protection - Alternate standard

Issued May 29, 2018

#### **Regulatory excerpt**

Section 8.21(2) of the *OHS Regulation* ("*Regulation*") states:

- (2) Leg protective devices referred to in subsection (1) must meet or exceed
- (a) the general requirements of section 4 of the *WorkSafeBC Standard - Leg Protective Devices*, as set out in Schedule 8-A of this Part, and
  - (b) the performance requirements of one of the following standards, using the cut-resistance testing protocol set out in that standard except as varied in subparagraph (ii):

- (i) *WorkSafeBC Standard - Leg Protective Devices*, as set out in section 5 of Schedule 8-A of this Part, applying a threshold chain speed of 18.3 metres per second or 3 600 feet per minute;
- (ii) *ASTMF 1414-04 Standard Test Method for Measurement of Cut Resistance to Chain Saw in Lower Body (Legs) Protective Clothing*, but applying a threshold chain speed of 16.8 metres per second or 3 300 feet per minute;
- (iii) *ISO 11393-2 Protective clothing for users of hand-held chain-saws - Part 2: Test methods and performance requirements for leg protectors*, applying a Class 2 threshold chain speed of 24 metres per second or 4 724 feet per minute;
- (iv) *BS EN 381-5:1995 Protective clothing for users of hand-held chain saws - Part 5: Requirements for leg protectors*, applying a Class 2 threshold chain speed of 24 metres per second or 4 724 feet per minute.

Section 4.4(2) of the *Regulation* states:

- (2) When this Regulation requires a person to comply with
  - (a) a publication, code or standard of the Board or another agency, the person may, as an alternative, comply with another publication, code or standard acceptable to the Board...

#### **Purpose of guideline**

The purpose of this guideline is to specify, for the purposes of section 8.21(2) of the Regulation, an alternate standard acceptable to WorkSafeBC for leg protection devices.

#### **Acceptable standards**

Section 4.4(2)(a) permits WorkSafeBC to accept another standard as an alternative to one referred to in the Regulation. WorkSafeBC had determined that ASTM F1414-15 is an acceptable alternate standard under section 8.21(2), when applying a threshold chain speed of 16.8 metres per second or 3,300 feet per minute.

#### **G8.26(3) Buoyancy equipment and fall protection**

Issued August 1, 1999

Section 8.26(3) of the *OHS Regulation* ("*Regulation*") states:

A personal flotation device need not be worn when a personal fall protection system, guardrail or safety net is being used in accordance with the relevant requirements in [Part 11 \(Fall Protection\)](#) to prevent a fall into the water."

There may be circumstances where a worker generally protected from falling into the water by a fall protection system has to be temporarily unprotected. For example, a worker may have to briefly disconnect a personal fall protection system to move to a different position. This needs to be limited as much as possible by choosing a means of fall protection that minimizes the need to disconnect, for instance, using horizontal lifelines or retractable lifelines, or by using a safe work procedure covering the interval when the worker is not connected. See also OHS Guideline [G11.2](#).

#### **G8.27-1 Compliance with standards**

Issued August 1, 1999; Editorial Revision April 2005; Editorial Revision April 30, 2015

#### **Regulatory excerpt**

Section 8.27 of the *OHS Regulation* ("*Regulation*") states:

Buoyancy equipment must be labelled and otherwise meet the requirements of

- (a) *CGSB Standard CAN/CGSB-65.7-M88, Lifejackets, Inherently Buoyant Type* with a minimum buoyancy of 93 N (21 lbs),
- (b) *CGSB Standard CAN/CGSB-65.11-M88, Personal Flotation Devices* with a minimum buoyancy of 69 N (15.5 lbs),
- (c) *CGSB Standard 65-GP-14M, Lifejackets, Inherently Buoyant, Standard Type* with a minimum buoyancy of 125 N (28 lbs),  
or
- (d) *British Safety Standard BS EN 396-1994, Lifejackets and Personal Buoyancy Aids - Lifejacket 150 N*, automatically inflatable units with a minimum buoyancy of 150 N (34 lbs).

#### **Purpose of guideline**

The purpose of this guideline is to provide information about the standards adopted in section 8.27 of the *Regulation*.

#### **Standards**

A summary of information from each of these standards describing how the life jackets perform and how they are to be identified follows below.

#### **CGSB Standard CAN/CGSB-65.7-M88, Lifejackets, Inherently Buoyant Type**

A life jacket meeting this standard provides a minimum buoyant force of 93 N (21 lb.), 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 following:

- standard it meets
- size of the jacket
- mass (weight) of person the jacket is designed for
- name of the manufacturer
- lot number
- date of manufacture
- the Transport Canada approval number

***CGSB Standard CAN/CGSB-65.11-M88, Personal Flotation Devices***

This is the most common and generally the most comfortable personal flotation device, offering a minimum 69 N (15.5 lb.) buoyancy (Type I). 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 units can be either the vest or "key hole" style. The device must have a permanent label or marking identifying the following:

- standard it meets
- date of manufacture
- acceptable chest size
- name of manufacturer
- Transport Canada approval number

These flotation devices are acceptable for use *only* by a worker in situations where rescue help is readily available. Readily available in this context means the worker wearing this flotation device is within eyesight or earshot of another worker who is in a position to immediately come to the worker's aid, should he or she enter the water.

***CGSB Standard 65-GP-14M, Lifejackets, Inherently Buoyant, Standard Type***

A lifejacket meeting this standard provides a minimum 125 N (28 lb.) buoyant force. The device requires a permanent label or marking identifying the standard met.

***British Safety Standard BS EN 396-1994, Lifejackets and Personal Buoyancy Aids***

A life jacket or personal buoyancy aid meeting this standard is designed to be inflatable by blowing into the bladder, pulling a cord to puncture a gas cylinder which inflates the unit, or by automatic activation of the gas inflation system when the device is immersed in water. Acceptable units inflate and turn the wearer face up within 10 seconds of going into the water. A wearer of this type of unit is provided with at least 150 N (34 lb.) buoyancy and should float face up with the mouth considerably above the water surface.

The jacket must have a permanent label or marking confirming the unit meets the above standard. These jackets are normally worn uninflated and may be in protective covers. The jacket fits around the back of the neck and ends drape down the left and right of the front of the body. These units require strict regular maintenance to remain effective, and caution must be taken to prevent damaging the bladder.

Also, [section 4.4\(2\)\(a\)](#) of the *Regulation* permits the reliance on other standards which are acceptable to WorkSafeBC.

**G8.27-2 Alternative acceptable standard for buoyancy equipment**

Issued November 19, 2008; Revised September 21, 2012; Editorial Revision April 30, 2015; Editorial Revision August 4, 2015

**Regulatory excerpt**

Section 8.27 of the *OHS Regulation* ("Regulation") states:

Buoyancy equipment must be labelled and otherwise meet the requirements of

- (a) *CGSB Standard CAN/CGSB-65.7-M88, Lifejackets, Inherently Buoyant Type* with a minimum buoyancy of 93 N (21 lbs),
- (b) *CGSB Standard CAN/CGSB-65.11-M88, Personal Flotation Devices* with a minimum buoyancy of 69 N (15.5 lbs),
- (c) *CGSB Standard 65-GP-14M, Lifejackets, Inherently Buoyant, Standard Type* with a minimum buoyancy of 125 N (28 lbs),  
or
- (d) *British Safety Standard BS EN 396-1994, Lifejackets and Personal Buoyancy Aids - Lifejacket 150 N*, automatically inflatable units with a minimum buoyancy of 150 N (34 lbs).

Section 4.4(2)(a) of the *Regulation* states:

(2) When this Regulation requires a person to comply with

- (a) a publication, code or standard of the Board or another agency, the person may, as an alternative, comply with another publication, code or standard acceptable to the Board

### **Purpose of guideline**

Section 4.4(2)(a) of the *Regulation* provides WorkSafeBC the authority to accept alternative standards to those listed in the *Regulation*. The purpose of this guideline is to specify acceptable alternative standards under section 8.27.

### **Alternative acceptable standard to CAN/CGSB-65.7-M88**

The CAN/CGSB-65.7-2007 standard is an updated version of the *CAN/CGSB-65.7-M88 Lifejackets, Inherently Buoyant Type* standard. It is considered an acceptable alternative to the *CAN/CGSB-65.7-M88 Lifejackets, Inherently Buoyant Type* standard. However, manually inflatable units are not acceptable.

### **Alternative acceptable standard to BS EN 396-1994**

For devices sold in Canada, *ANSI/UL 1180 Fully Inflatable Recreational Personal Flotation Devices*, as updated from time to time and as modified by the Canadian addendum, is considered an acceptable alternative to *BS EN 396-1994*. These devices will be marked as meeting *ANSI/UL 1180* with the Canadian addendum. It should be noted that manually inflatable units are not acceptable.

For devices sold in the United States, devices meeting type I or type II performance requirements of *ANSI/UL 1180* without the Canadian addendum are acceptable. These devices will be marked with a United States Coast Guard (USCG) approval number. The USCG approval number will start with 160. These devices will be marked as type I or type II. Devices marked as type III are not acceptable. Only automatically inflatable units are acceptable.

In some cases, inflatable buoyancy equipment may not meet *ANSI/UL 1180* or *BS EN 396-1994*, but will meet another standard. In these cases, an application can be made to WorkSafeBC to have an alternate standard accepted.

### **G8.28 Working alone or in isolation with a hazard of drowning**

Issued August 1, 1999; Editorial Revision April 2005

Section 8.28 of the *OHS Regulation* requires that where a worker working alone is exposed to the risk of drowning, the worker must wear a lifejacket meeting the requirements of [section 8.27\(a\), \(c\), or \(d\)](#). This section applies to a worker who is not within eyesight of or within earshot of another worker in a position to immediately come to their aid, should they enter the water.

A personal flotation device of the type described under [section 8.27\(b\)](#) is not to be worn by a worker working alone or in isolation. This type of device, which provides minimum buoyancy of 15.5 lb., is not designed to turn an unconscious person face up in the water. Therefore, if a person working alone falls in the water and is rendered unconscious, the individual might float face down and drown. Further, if the water is rough, the individual's mouth might not be raised sufficiently above the water to provide adequate protection against drowning if the individual is unconscious.

### **G8.11(2) Activity specific safety headgear**

Issued August 1, 1999; Editorial Revision April 2005; Revised August 1, 2013; Editorial Revision consequential to February 1, 2015 Regulatory Amendment

### **Regulatory excerpt**

Section 8.11 of the *OHS Regulation* ("*Regulation*") states in part:

- (1) Safety headgear must be worn by a worker in any work area where there is a danger of head injury from falling, flying or thrown objects, or other harmful contacts.
- (2) Safety headgear must meet the requirements of
  - (a) *CSA Standard CAN/CSA-Z94.1-92, Industrial Protective Headwear*,
  - (b) *ANSI Standard Z89.1-1986, American National Standard for Personnel Protection — Protective Headwear for Industrial Workers Requirements*, or
  - (c) *Japanese Industrial Standard JIS T8131-1990, Industrial Safety Helmets*, for Class AB or ABE headgear.

Section 4.4(2)(a) of the *Regulation* states:

- (2) When this Regulation requires a person to comply with
  - (a) a publication, code or standard of the Board or another agency, the person may, as an alternative, comply with another publication, code or standard acceptable to the Board...

### **Purpose of guideline**

This guideline outlines alternate standards for safety headgear for specific types of activities and describes when they are applicable.

### **Acceptable standards**

WorkSafeBC accepts the following alternate standards for safety headgear designed for specific types of activity, namely:

1. *Union of International Alpine Association Standard (UIAA) Standard 106 Mountaineering and Climbing Equipment Helmets "Rock Climbers Helmets"* (for emergency rescue operations; rock scaling; silviculture operations; window washers; and workers doing boatswain chair work)

Headgear meeting this standard protects against blunt impact hazards to the head, but must not be used in place of conventional safety headgear whenever the ventilation holes may expose the worker to hazards from small rigid objects such as nails or if flame resistance is required.

2. *CAN/CSA Z262.1-M90 (R2007) "Ice Hockey Helmets"* (for on-ice activities)
3. *CAN/CSA Z611-M86 "Police Riot Helmets and Face Shield Protection"* (for crowd control/riot squad duties)

Since helmets meeting these three standards are not made or tested for dielectric properties, they are not suitable for environments where exposed energized electrical wires or equipment may be present.

This guideline and these standards do not apply to ski helmets. Please reference the following guideline: G8.11(2)-2 Activity specific safety headgear — Ski helmets.

#### G8.11(2)-1 Alternate safety headgear standards

Issued September 21, 2012

#### Regulatory excerpt

Section 8.11(2) of the *OHS Regulation* ("Regulation") states:

- (2) Safety headgear must meet the requirements of
  - (a) *CSA Standard CAN/CSA-Z94.1-92, Industrial Protective Headwear*,
  - (b) *ANSI Standard Z89.1-1986, American National Standard for Personnel Protection — Protective Headwear for Industrial Workers Requirements*, or
  - (c) *Japanese Industrial Standard JIS T8131-1990, Industrial Safety Helmets*, for Class AB or ABE headgear.

Section 4.4(2)(a) of the *Regulation* states:

- (2) When this Regulation requires a person to comply with
  - (a) a publication, code or standard of the Board or another agency, the person may, as an alternative, comply with another publication, code or standard acceptable to the Board...

#### Purpose of guideline

The purpose of this guideline is to specify alternate standards to the ones listed in section 8.11(2) of the *Regulation* for safety headgear.

#### Background information

Section 8.11(2) of the *Regulation* requires that safety headgear meet *CSA Standard CAN/CSA-Z94.1-92, Industrial Protective Headwear ("1992 CSA Standard")*, *ANSI Standard Z89.1-1986, American National Standard for Personnel Protection — Protective Headwear for Industrial Workers Requirements ("1986 ANSI Standard")*, or *Japanese Industrial Standard JIS T8131-1990, Industrial Safety Helmets*, for Class AB or ABE headgear. These three standards prescribe required technical specifications for safety headgear.

Section 4.4(2)(a) permits WorkSafeBC to accept another standard as an alternative standard.

#### Acceptable standards

WorkSafeBC has determined that *CAN/CSA Z94.1-05 Industrial protective headwear — Performance, selection, care, and use ("2005 CSA Standard")* and *ANSI/ISEA Z89.1-2009 American National Standard for Industrial Head Protection ("2009 ANSI Standard")* are acceptable alternatives to the standards referenced in section 8.11(2) of the *Regulation*.

The *2005 CSA Standard* and *2009 ANSI Standard* classify safety headgear into two types: Type 1 and Type 2. Both types are acceptable. Type 1 safety headgear provides protection from impacts and sharp objects from above. Type 2 safety headgear provides protection from impacts and sharp objects from above and the sides.

Type 2 safety headgear provides more protection where there is a possibility of objects striking the side of the head.

#### G8.11(2)-2 Activity specific safety headgear — Ski helmets

Issued August 1, 2013

#### Regulatory excerpt

Section 8.11(1) of the *OHS Regulation* ("Regulation") states:

Safety headgear must be worn by a worker in any work area where there is a danger of head injury from falling, flying or thrown objects, or other harmful contacts.

Section 8.3(2) of the *Regulation* states:

If the use of personal protective equipment creates hazards equal to or greater than those its use is intended to prevent, alternative personal protective equipment must be used or other appropriate measures must be taken.

Section 8.11(2) of the *Regulation* states:

(2) Safety headgear must meet the requirements of

(a) *CSA Standard CAN/CSA-Z94.1-92, Industrial Protective Headwear*,

(b) *ANSI Standard Z89.1-1986, American National Standard for Personnel Protection — Protective Headwear for Industrial Workers Requirements*, or

(c) *Japanese Industrial Standard JIS T8131-1990, Industrial Safety Helmets*, for Class AB or ABE headgear.

Section 4.4(2)(a) of the *Regulation* states:

(2) When this Regulation requires a person to comply with

(a) a publication, code or standard of the Board or another agency, the person may, as an alternative, comply with another publication, code or standard acceptable to the Board...

### **Purpose of guideline**

The requirement for safety headgear arises whenever there is a danger of head injury from any "harmful contacts." Work activities performed while engaging in alpine, or downhill, skiing or snowboarding present a danger of harmful contacts. These harmful contacts include possible contact with the ground, moving or stationary objects, and other persons. Accordingly, all workers engaged in sliding activities must wear safety headgear. In ski areas, examples of workers typically engaged in alpine skiing or snowboarding include ski patrollers, ski instructors, avalanche control workers, and workers transiting on skis or snowboards between work locations.

Section 8.11(2) lists standards that safety headgear must meet. In addition, section 4.4(2)(a) permits the reliance on other standards which are acceptable to WorkSafeBC. WorkSafeBC has identified the following standards for safety headgear for skiing and boarding work activities as acceptable for use by workers:

*CE-EN1077 Helmets for alpine skiers and snowboarders — Class A or Class B*

*ASTMF2040 Helmets Used for Recreational Snow Sports*

*Snell RS-98 Protective Headgear for Recreational Skiing and Snowboarding*

Where an employer can show that a particular sliding activity is performed in a way that the danger of harmful contacts is not present, workers may perform that activity without headgear. In making such a determination, the employer is required to perform a thorough risk assessment showing that the danger of harmful contacts is not present.

Employers should consider whether wearing safety headgear for a particular activity where headgear would normally be required, would itself create a hazard to the worker in the circumstances. As stated in section 8.3(2), personal protective equipment must not itself create a hazard to the wearer. For example, a worker engaged in avalanche control blasting whose ability to communicate clearly with co-workers is impaired by headgear, may need to remove it for the duration of that activity.

### **G8.11(3) Protection from electrical hazards**

Issued August 1, 1999

Section 8.11(3) of the *OHS Regulation* ("Regulation") states:

If a worker may be exposed to an electrical hazard the safety headgear must have an appropriate non-conductive rating.

Only electricians, powerline technicians (formerly known as linemen) and certified utility arborists will normally be exposed to electrical hazards, which result when exposed and energized electric wires or electrical equipment is present in the workplace. Firefighters may be exposed to electrical hazards during fire or other emergency incidents, and their headwear requirements during such activity are specified in [Part 31](#) of the *Regulation*.

The current CSA and ANSI Standards for safety headgear designate headgear as Class G (General) for a dielectric test rating, when new, of 2,200 volts. The previous edition of the CSA and ANSI Standards designated these as Class A.

The current CSA and ANSI Standards for safety headgear designate headgear as Class E (Electrical) for a dielectric test rating, when new, of

20,000 volts. The previous edition of the CSA and ANSI Standards designated these as Class B.

Both the CSA and ANSI standards warn that dielectric rated headgear is intended to reduce risks arising from accidental contact with energized electrical equipment, not to provide a primary means of insulating a worker from intentional contact with such equipment.

An electrician working only on "residential type" circuits, of 240 volts or less, may wear Class A, B, G or E rated CSA or ANSI safety headgear. This upper voltage limit for work around residential type circuits may seem conservative, but the 2,200 volt dielectric rating for these classes of headgear is achieved when testing a new sample, and the protection degrades with use and is also dependant on the cleanliness of the headgear.

Powerline technicians, electricians and any other workers who work on circuits that have the potential for voltages above 240 volts need to wear Class B or E rated CSA or ANSI headgear, or equivalent.

There is a third dielectric rating class for CSA and ANSI headgear, designated as Class C (Conductive). Any safety headgear that has had holes drilled in the shell to install accessories is considered to have lost its dielectric rating. Workers other than electricians, certified utility arborists or powerline technicians should not be exposed to energized electric wires or equipment in the normal course of their work, may wear headgear with whatever class of dielectric protection they desire. If workers receive special training and are given work assignments requiring work near exposed energized electrical sources, they must have and wear headgear with the appropriate dielectric rating. For example, workers assigned to clean and paint utility poles may be exposed to electrical hazards, and should wear electrically protective headgear.

Japan Industrial Standard — Class ABE meets the dielectric rating requirements of the *Regulation*. Electricians and powerline technicians must wear Class ABE safety headgear if it is certified to JIS. All other workers may wear Class AB or ABE rated JIS certified safety headgear.

#### G8.11(4) Chin straps

Issued August 1, 1999

Section 8.11(4) of the *OHS Regulation* ("*Regulation*") states:

Chin straps or other effective means of retention must be used on safety headgear when workers are climbing or working from a height exceeding 3 m (10 ft), or are exposed to high winds or other conditions that may cause loss of the headgear.

Industrial safety headgear has traditionally been designed and tested to provide protection from an impact directed more or less downward onto the top of the head. The CSA Standard CAN/CSA-Z94.1-92 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 a safety headgear. During the development of the *Regulation*, expert advice provided to the Personal Protective Equipment Subcommittee drew attention to the severity and high cost of head injuries, particularly the many injuries which result from an impact to the side of the head. This type of head injury will typically occur when someone falls and strikes the floor, ground or some other object. Head protection must remain in place on the head to provide any protection when the head strikes something during or at the end of a fall. This is the reason why bicycle helmets and headgear for many other sports have a chin strap. The expert advice to the regulation development process was industrial safety headgear should have a mandatory headgear retention criteria, to assist with keeping safety headgear in place during work, including the headgear remaining effectively in place during a fall. Hence, section 8.11(4) was established. This section has three main objectives:

1. To keep safety headgear in place on the wearer's head during a fall,
2. To keep safety headgear from becoming a falling object and a danger to workers working below, and
3. To ensure the worker remains protected by safety headgear while doing work tasks. (For example, a rock scaler losing his or her headgear part way down a rappel of a rock face would have to descend the rest of the way down the rock face without head protection to recover the hat or get a replacement.)

Headgear may be accidentally knocked off a worker's head in any situation. Generally speaking, a means of retention should be used when the circumstances of the work create a likelihood of the loss of the headgear. Some examples are work on a ladder or scaffold over 10 feet high, or during work in an area with high wind (either natural wind or wind created by equipment such as a helicopter). Generally it is not expected a chin strap would need to be worn by a worker on a floor or deck enclosed by guardrails.

*CSA Standard Z94.1-92* specifies a retention test for hard hats that is intended to evaluate the stability of the headgear during normal use. The standard states that the "test does not assess the ability of the headgear to remain in place during extreme conditions (e.g., windy conditions, during an impact or fall)." Therefore, headgear meeting this aspect of the CSA standard does not automatically comply with section 8.11(4). At this time, for the purposes of section 8.11(4), a chin strap system is the only effective means known to WorkSafeBC for the retention of safety headgear.

#### G8.12/8.13 Use of safety headgear for workers on ATVs and similar equipment in agricultural operations

Issued May 25, 2005

#### **Regulatory excerpt**

Section 8.12 addresses requirements for safety headgear for workers on all-terrain vehicles (ATVs), snowmobiles and motorcycles. It states:

- (1) Operators and passengers on all-terrain vehicles, snowmobiles and motorcycles must wear headgear meeting the requirements of
  - (a) *CSA Standard CAN3-D230-M85, Protective Headgear in Motor Vehicle Applications,*



(b) *British Safety Institution Standard BS5361.1976, Specification: Protective Helmets for Vehicle Users, (as amended to 1981),*

(c) *Snell Memorial Foundation 1995 Standard for Protective Headgear for Use with Motorcycles and Other Motorized Vehicles, or*

(d) *US Federal Standard for Motorcycle Helmets (Title 49 — Transportation — Part 571.218).*

(2) Headgear in good condition meeting earlier editions of a standard listed in subsection (1) may remain in service if purchased before April 15, 1998.

(3) When an all-terrain vehicle is operated within a specific location, with no significant hazard of rollover or loss of control and at a speed not exceeding 20 km/h (13 mph), safety headgear meeting the requirements of section 8.13 may be used in place of headgear specified in subsection 8.12(1).

In turn, section 8.13 addresses safety headgear requirements when riding bicycles, or using in-line skates or similar equipment. It states:

(1) A worker riding a bicycle or using in-line skates or similar means of transport must wear headgear meeting the requirements of

(a) *CSA Standard CAN/CSA-D113.2-M89, Cycling Helmets,*

(b) *Snell Memorial Foundation 1994 Standard for Protective Headgear for Use in Non-Motorized Sports, or*

(c) *Snell Memorial Foundation 1995 Standard for Protective Headgear for Use in Bicycling.*

(2) If a bicycle or similar conveyance is operated at speeds not exceeding 20 km/h (13 mph) within a specific location, safety headgear meeting the requirements of section 8.11 is acceptable when worn with a chin strap.

#### **Purpose of this guideline**

This guideline provides information on the requirements for safety headgear, under sections 8.12 and 8.13 of the *OHS Regulation ("Regulation")*, when workers use various types of small mobile equipment and other conveyances in agricultural operations. (Note that the responsibilities for providing safety headgear and other personal protective equipment are covered in section [8.2](#) of the *Regulation*).

#### **ATVs, snowmobiles and motorcycles**

These types of equipment are often used for work purposes in farming or ranching operations. Section 8.12(1) requires workers on such mobile equipment to wear head protection which meets at least one of the listed Canadian, American or British standards. These standards are common, and suppliers will typically have headgear that is compliant.

Section 8.12(2) recognizes that older helmets may in some cases meet an earlier edition of the protective standard listed in the Regulation. In addition, it should be noted that under section [4.4](#) of the Regulation, WorkSafeBC can consider other standards as well. A farmer or rancher who would like to have an alternative standard considered should contact WorkSafeBC for a review of it.

For workers on ATVs, section 8.12(3) also permits the use of helmets meeting the bicycle and other non-motorized sports helmet standards listed in section 8.13(1), if the ATV is operated at speeds not exceeding 20 km per hour (13 mph) within a specific location where there is no significant hazard of rollover.

A "specific location" is defined in the Regulation as "a yard, plant, or other clearly defined and limited area in which mobile equipment is operated, but does not include an entire municipality, district, transient forestry operation or construction site". This definition indicates a specific location would be a particular defined area of a ranch or farm in which mobile equipment is used, rather than the whole property, unless the property was relatively restricted in size. Typically, such areas might be those in the vicinity of the dwellings, outbuildings and nearby areas frequently used by mobile equipment.

A key factor is that the area must have "no significant hazard of rollover", which is defined in the Regulation as "an area in which there are no grades exceeding 10%, no operating areas with open edges, no open ramps, loading docks, ditches or other similar hazards which might cause a rollover." In the case of ranches, the slope criterion will often be a limiting factor. On farms, areas adjacent to drainage or irrigation ditches would be considered to have a significant hazard of rollover.

#### **Bicycles and similar conveyances**

Bicycles are used in some agricultural operations such as greenhouses. When using bicycles, or similar conveyances such as in-line skates, section 8.13(1) requires that the worker wear safety headgear meeting one of the standards listed. The standards are common, and suppliers will usually have headgear that is compliant.

In lower hazard circumstances, section 8.13(2) permits the use of "hard hats" with chin straps. To permit this use of a lower standard of protection, the bicycle is to be operated at speeds of not more than 20 km per hour (13 mph), within a specific location. Greenhouses are considered to be a specific location.

#### **Utility vehicles**

Sections 8.12 and 8.13 do not require the use of safety headgear while riding in utility vehicles or other such equipment not identified in the requirements. A utility vehicle typically has a steering wheel and seating that permits two persons to sit side by side, in contrast to an ATV which is

equipped with a handle bar and a straddle seating arrangement. Examples of utility vehicles include "Gators" and "Argos".

In addition to the requirements of sections 8.12 and 8.13, section [4.3\(1\)](#) of the *Regulation* requires that equipment be operated in conformity with manufacturers' instructions. If such instructions for utility vehicles require the use of safety headgear, then it is appropriate to select headgear meeting a standard listed in section 8.12. In all cases, to help ensure safety the operator should ensure the utility vehicle is operated in accordance with manufacturers' instructions, at prudent speeds, avoiding holes, debris and steep slopes.

### **Recreational use**

Sections 8.12 and 8.13 apply only to the use of conveyances for work purposes. They do not apply to the personal use of such equipment for recreational purposes. When engaged in recreational use, people must comply with protective helmet requirements of the public authority with jurisdiction. Even if safety headgear is not required, it is recommended, for the purposes of safety, that it be worn.

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