

FALL PROTECTION

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G11.1 Definitions - Anchor and anchorage

Issued consequential to April 1, 2013 Regulatory Amendment; Editorial Revision June 30, 2021

Regulatory excerpt

Section 11.1 of the *OHS Regulation* ("Regulation") states, in part:

"*anchor*" means a component or subsystem of a fall protection system used to connect the other parts of a fall protection system to an anchorage, and includes an anchorage connector;

"*anchorage*" means a secure connection point for a fall protection system;

Purpose of guideline

The purpose of this guideline is to clarify the application of the *Regulation* to anchors and to provide examples to help clarify use of the terms anchor, anchorage, and anchorage connector.

Anchors and anchorages

An anchor is a component or subsystem of a fall protection system and is subject to the regulatory requirements for a fall protection system. Under *Regulation* section 11.5(c), an anchor must meet and be used in accordance with an applicable standard. Refer to OHS Guidelines [G11.5-1 Equipment standards](#) and [G11.6-2 Anchor selection and use](#) for an explanation of applicable standards.

The following diagrams show examples of an anchor, anchorage, and anchorage connector.

Example of an anchor, anchorage, and anchorage connector.

Example of an anchorage, and anchorage connector.

Example of an anchorage.

G11.2-1 Calculation of fall distance when on a sloped roof

Issued August 16, 2000; Revised January 1, 2005

Regulatory excerpt

Section 11.2(1) of the *OHS Regulation* ("Regulation") states:

Unless elsewhere provided for in this Regulation, an employer must ensure that a fall protection system is used when work is being done at a place

- (a) from which a fall of 3 m (10 ft) or more may occur, or
- (b) where a fall from a height of less than 3 m involves a risk of injury greater than the risk of injury from the impact on a flat surface.

Purpose of guideline

The purpose of this guideline is to explain how to calculate the fall distance when workers are on a sloped roof.

Calculating fall difference

At a minimum, the fall distance will be the distance from the bottom edge of the roof to the next safe lower surface or ground below. The vertical distance from the worker's position to the unguarded roof edge should be added when on a roof with a slope greater than 4 vertical in 12 horizontal. [Section 20.75](#) of the *Regulation* requires a worker on a roof with a slope ratio of 8 vertical in 12 horizontal or greater to use personal

fall protection, or a safety net must be used; toe holds must be used if the roofing material allows for it. Refer to [OHS Guideline G20.75](#).

G11.2-2 Selecting a method of fall protection

Issued August 16, 2000; Revised January 1, 2005; Editorial Revision consequential to February 1, 2015 Regulatory Amendment; Revised December 18, 2015; Editorial Revision July 27, 2016

Regulatory excerpt

Sections 11.2(2) to (5) of the *OHS Regulation* ("Regulation") state:

- (2) The employer must ensure that guardrails meeting the requirements of Part 4 (General Conditions) or other similar means of fall restraint are used when practicable.
- (3) If subsection (2) is not practicable, the employer must ensure that another fall restraint system is used.
- (4) If subsection (3) is not practicable, the employer must ensure that one of the following is used:
 - (a) a fall arrest system;
 - (b) a rope access system that meets the requirements of Part 34.
- (5) If subsection (4) is not practicable, or will result in a hazard greater than if a fall arrest system or a rope access system was not used, the employer must ensure that work procedures are followed that are acceptable to the Board and minimize the risk of injury to a worker from a fall.

Purpose of guideline

Section 11.2 of the *Regulation* prescribes a hierarchy of controls in sections (2) to (5). This guideline explains the hierarchy of controls and gives examples of how the circumstances of the workplace affect the selection of fall protection.

Selection of fall protection method

The employer must use "guardrails ... or other similar means of fall restraint" under section (2) if it is practicable for the work process. If it is not practicable, the employer can use another fall restraint system under section (3). However, the employer cannot use a fall arrest system or a rope access system under section (4) unless it is impracticable to use any fall restraint system under sections (2) and (3). Only if it is impracticable to use a fall restraint, fall arrest, or rope access system under sections (2) to (4), or if the use of a fall arrest or rope access system will result in greater hazards, is the employer permitted under section (5) to use work procedures alone to minimize the risk of injury to a worker from a fall.

The selection of a method for fall protection under section 11.2 depends on what is practicable. Employers are expected to make a reasonable assessment and use good judgment in making this decision. What is practicable depends on the circumstances of each workplace and is a matter of assessment and judgment. The following examples cover some typical situations:

- Guardrails will generally be considered practicable in work areas where numerous workers are working at or near the edges of elevated floors and roofs on buildings or structures under construction.
- Where a roof is under repair, it may not be practicable to install guardrails because of such factors as the small number of workers involved and the short duration of the job. In this situation, it will generally be practicable to use a fall restraint system that consists of a belt or harness and a lifeline connected to a suitable anchor and rigged to prevent the worker from going beyond the unguarded edge(s).
- When a worker needs to position and fasten joists or trusses to the top plate of a wood frame structure, fall protection is required if a fall of 3 metres (10 feet) or more may occur, or if a fall from a height of less than 3 metres involves a risk of injury greater than the risk of injury from the impact on a flat surface. Generally this condition will exist along the outer side of the perimeter walls. It will normally be practicable to erect guardrails along the outer side of the wall, or to work from a single pole scaffold (with guardrails if necessary) from either side of the wall, or to use another method of fall restraint or arrest.
- It may be necessary to remove a guardrail to accommodate work. If so, under [section 4.58.1](#) of the *Regulation*, only that portion of the guardrail necessary to allow the work to be done may be removed. Workers exposed to a fall hazard must be protected by another fall protection system when the guardrail is absent. The guardrail must be replaced when the unguarded area is left unattended, and after the work is completed if the circumstances still require guardrails.
- If guardrails currently exist, an employer cannot tear them down and substitute another form of fall protection, such as a safety monitor and control zone system, simply because it will make the work easier. The fact that guardrails currently exist suggests that it is practicable to use that form of fall protection (refer to section 4.58.1 of the *Regulation*).
- A fall arrest system or rope access system will likely be practicable where there is no sizable work platform (e.g., on a bridge girder) or where it would not be cost-effective to build platforms on which guardrails or other fall restraint systems could be used because the work is of short duration and uses relatively few workers.

Some provisions outside of Part 11 of the *Regulation* that require fall protection in particular areas limit the range of choices that might otherwise exist. Notably, [section 13.33](#) of Part 13 (Ladders, Scaffolds and Temporary Work Platforms) contains specific requirements for fall protection.

Determining the fall hazard area

Section 11.2(1) of the *Regulation* requires the use of a fall protection system when work is being done at a place from which a fall of 3 metres (10 feet) may occur, or where a fall from a height of less than 3 metres involves a greater risk of injury. The place from which a fall may occur is also referred to as the "fall hazard area."

The employer is responsible for determining the fall hazard area (i.e., the safe distance from the unguarded edge). Some of the factors that the employer will need to take into consideration include, but are not limited to, the following:

- The nature of the work to be conducted
- The hazards that are present in the workplace
- Environmental conditions, such as temperature, ice, rain, or heavy winds
- Whether the work is carried out at an elevation relative to the unguarded edge (e.g., working on an air-handling unit from a ladder)
- Whether the risk is increased by the use of tools or other equipment in the work area

In the case of flat or low-sloped work surfaces (not exceeding 4 vertical to 12 horizontal or 4/12), that distance will be at least 2 metres (6.5 feet) from the unguarded edge.

G11.2-3 Defining a fall restraint versus fall arrest system

Issued August 16, 2000; Revised January 1, 2005; Editorial Revision consequential to February 1, 2015 Regulatory Amendment

Regulatory excerpt

Sections 11.2(3) to (4) of the *OHS Regulation* ("Regulation") state:

- (3) If subsection (2) is not practicable, the employer must ensure that another fall restraint system is used.
- (4) If subsection (3) is not practicable, the employer must ensure that one of the following is used:
 - (a) a fall arrest system;
 - (b) a rope access system that meets the requirements of Part 34.

Purpose of guideline

When assessing the requirement for personal fall protection where there is a relatively short potential fall distance, it is sometimes unclear if a situation should be treated as fall restraint or fall arrest. This guideline clarifies the difference between a fall restraint and a fall arrest system.

Fall restraint

Fall restraint normally means a fall protection system arranged such that a worker cannot fall lower than the surface on which the worker was supported before the fall started. For example, a personal fall restraint system for a worker on an elevated flat surface would be arranged so the worker could go up to the edge of the work surface, but not beyond the edge in the event of a slip or fall. The system, in the event of a slip or fall, would result in the worker landing on the work surface, and perhaps very close to going over the edge. Other work positioning arrangements, such as a firefighter secured to an aerial ladder, or a tree trimmer or power line technician using a climbing belt and pole strap, will normally result in the worker going through some vertical drop in the event of a slip. To allow their fall protection to be considered as fall restraint, their equipment should be arranged to limit the vertical drop as much as possible, and in no case, should the total fall distance be more than 30 centimetres (1 foot).

A fall restraint system should only be used where a worker likely can regain footing or otherwise self-rescue immediately after a slip or fall. Fall protection equipment and components that are intended only for fall restraint applications should be clearly and permanently marked to indicate such a limitation.

Fall arrest

If the equipment cannot be arranged to limit the vertical drop to 30 cm, then the personal fall protection system should be a fall arrest type, and the system will need to address the additional requirements for fall arrest. For example, [section 11.4\(1\)](#) of the *Regulation* requires workers to wear a full body harness or other harness acceptable to WorkSafeBC when using a personal fall protection system for fall arrest. Further, the anchor the worker is connected to must meet the requirements of [section 11.6\(3\)](#) of the *Regulation*.

G11.2-4 Tilt-up construction

Issued August 16, 2000; Revised January 1, 2005; Revised October 23, 2009; Revised April 13, 2011; Editorial Revision consequential to February 1, 2015 Regulatory Amendment

Regulatory excerpt

Sections 11.2(2) to (4) of the *OHS Regulation* ("Regulation") state:

- (2) The employer must ensure that guardrails meeting the requirements of Part 4 (General Conditions) or other similar means of fall restraint are used when practicable.
- (3) If subsection (2) is not practicable, the employer must ensure that another fall restraint system is used.
- (4) If subsection (3) is not practicable, the employer must ensure that one of the following is used:
 - (a) a fall arrest system;

(b) a rope access system that meets the requirements of Part 34.

Section 4.58(4) of the *Regulation* states:

Guardrails temporarily installed during the construction, demolition, maintenance or renovation of a work area must be able to withstand a load of 550 N (125 lbs.) applied perpendicular to the span in a horizontal or vertically downward direction at any point on the top rail, or be built to the criteria of subsection (5).

Section 4.58(4.1) of the *Regulation* states:

If part or all of the top rail or a midrail of a guardrail that is temporarily installed during the construction, demolition, maintenance or renovation of a work area is made of fibre rope, wire rope, chain or other non-rigid material, that part of the guardrail must meet the requirements of *WorkSafeBC Standard - Guardrails using rope or other non-rigid material*, as set out in [Schedule 4-A](#) to this Part.

Section 4.54 of the *Regulation* provides the following definitions:

"guard" means a protective barrier around an opening in a floor or along the open sides of stairs or a ramp, landing, balcony, mezzanine, raised walkway or any other area to prevent a fall to a lower level, or inadvertent entry into a dangerous area;

"guardrail" means a guard consisting of a top rail 102 cm to 112 cm (40 in to 44 in) above the work surface, and a midrail located approximately midway between the underside of the top rail and the top of the toeboard, if one is provided, or the work surface if no toeboard is provided.

Purpose of guideline

The purpose of this guideline is to explain the process for converting a perimeter horizontal lifeline at a tilt-up construction site into a temporary guardrail system.

Use of wire rope guardrail

Once the roof deck is in place, a perimeter horizontal lifeline at a tilt-up construction site may be converted into a guardrail system by adding a suitable rope at midrail level. [Section 4.58\(4.1\)](#) of the *Regulation* specifies that guardrails made of fibre or wire rope temporarily installed during the construction, demolition, or renovation of a work area must meet the requirements of *WorkSafeBC Standard - Guardrails using rope or other non-rigid material* ([Schedule 4-A](#)).

Note that while it may be permissible to use a horizontal lifeline system as the basis for a wire or fibre rope guardrail system if modified according to the criteria set out in *WorkSafeBC Standard - Guardrails using rope or other non-rigid material*, as set out in [Schedule 4-A](#), it is not the case that a system designed as a rope guardrail can readily be converted and used for the purposes of a horizontal lifeline. The strength requirements for rope guardrail systems are far lower than those for horizontal lifelines.

G11.2-5 Fall protection in agriculture

Issued January 1, 2005; Editorial Revision consequential to February 1, 2015 Regulatory Amendment

Regulatory excerpt

Section 11.2 of the *OHS Regulation* ("Regulation") states:

- (1) Unless elsewhere provided for in this Regulation, an employer must ensure that a fall protection system is used when work is being done at a place
 - (a) from which a fall of 3 m (10 ft) or more may occur, or
 - (b) where a fall from a height of less than 3 m involves a risk of injury greater than the risk of injury from the impact on a flat surface.
- (2) The employer must ensure that guardrails meeting the requirements of Part 4 (General Conditions) or other similar means of fall restraint are used when practicable.
- (3) If subsection (2) is not practicable, the employer must ensure that another fall restraint system is used.
- (4) If subsection (3) is not practicable, the employer must ensure that one of the following is used:
 - (a) a fall arrest system;
 - (b) a rope access system that meets the requirements of Part 34.
- (5) If subsection (4) is not practicable, or will result in a hazard greater than if a fall arrest system or a rope access system was not used, the employer must ensure that work procedures are followed that are acceptable to the Board and minimize the risk of injury to a worker from a fall.
- (6) Before a worker is allowed into an area where a risk of falling exists, the employer must ensure that the worker is instructed in the

fall protection system for the area and the procedures to be followed.

(7) A worker must use the fall protection system provided by the employer.

Purpose of guideline

There are several circumstances in agriculture, for example in greenhouse, dairy, and some other animal husbandry operations, which may present some unique challenges for fall protection. This guideline describes the application of the fall protection hierarchy in those circumstances.

Fall protection hierarchy

In greenhouse operations, equipment designed to provide fall protection for use on roofs during work activities such as repairing, glazing, and cleaning greenhouse glass may provide a practicable means of hazard control. The use of such equipment is increasingly common in this sector.

In the dairy and some other animal husbandry sectors, haylofts may be an area of concern. In some cases it may be feasible to use guardrails, particularly along edges that are not in use. Another option that may be appropriate is a system of retractable netting to provide fall restraint next to the work area, which is drawn into place when workers are on the loft. If such systems are not practicable in a workplace, personal fall restraint or fall arrest systems may be feasible.

In circumstances where systems of fall restraint or fall arrest, or rope access are not practicable, or a system of fall arrest or rope access will result in a hazard greater than if the system is not used, a further option provided by the fall protection requirements is the use of other acceptable work procedures that will minimize the potential for a worker to fall. Refer to the OHS Guidelines for [G11.2\(5\)](#) for more information on the use of control zones, safety monitors and other procedures.

G11.2(5)-1 Safety monitor system as a work procedure acceptable to WorkSafeBC

Issued August 16, 2000; Revised January 1, 2005; Revised December 2, 2011; Editorial Revision consequential to February 1, 2015 Regulatory Amendment; Revised December 18, 2015

Regulatory excerpt

Section 11.2(5) of the *OHS Regulation* ("*Regulation*") states:

If subsection (4) is not practicable, or will result in a hazard greater than if a fall arrest system or a rope access system was not used, the employer must ensure that work procedures are followed that are acceptable to the Board and minimize the risk of injury to a worker from a fall.

Purpose of guideline

This guideline describes the use of a safety monitor system as an acceptable work procedure under section 11.2(5).

Control zones and safety monitors

Section 11.2 of the *Regulation* prescribes a hierarchy of fall protection controls in sections (2) to (5). A safety monitor system may be used as the means of fall protection under section 11.2(5) where it is not practicable to use a method of fall restraint, fall arrest, or rope access; or where the use of a fall arrest or rope access system will result in a greater hazard.

In this guideline the following definitions apply:

- "Control zone" means the area between an unguarded edge of a building or structure and a safe distance of at least 2 metres (6.5 feet).
- "Safety monitor system" means a system in which a trained worker is designated to monitor work activities in a control zone to ensure that work is done in a manner that minimizes the potential for a worker to fall.

The safety monitor system is intended for level or low-sloped work surfaces. It is not to be used on a working surface where the slope of that surface exceeds 4 vertical to 12 horizontal (4/12), for skeletal structure work, or for scaffold erection and removal. If workers will at all times remain further from the unguarded edge than the width of the control zone, no safety monitor or other fall protection system is required.

Width of the control zone

The width of a control zone is to be at least 2 metres (6.5 feet), with additional distance if any of the following conditions exist:

- The working surface is slippery or sloped
- The work is carried out at an elevation relative to the unguarded edge (e.g., working on an air-handling unit from a ladder)
- The risk is increased by the use of tools or other equipment near the control zone
- The risk is increased by environmental conditions such as ice, rain, or heavy winds

Raised warning line

A line defining the control zone is to be established along the internal edge of the control zone by a raised warning line or other equally effective means at all times during such work. For example, an acceptable raised warning line includes a line with both of the following:

- A high-visibility material, or a line flagged or clearly marked with high-visibility materials at intervals not exceeding 2 metres (6.5 feet).
- Rigged and maintained to be between 0.85 metres and 1.15 metres (34 and 45 inches) above the working surface.

For clarification purposes, a raised warning line is only required when the safety monitor system will be used as the means of fall protection under

section 11.2(5). A raised warning line is not required when other methods of fall protection are used, such as fall restraint. However, an employer may choose to use a raised warning line to increase the workers' awareness of the fall hazard area.

Safety monitor

Only workers directly required for the work at hand will be inside the control zone. The role of the safety monitor is to ensure that the work activity in the control zone is performed in accordance with the fall protection plan and in a manner that minimizes the potential for a worker to fall. A safety monitor will:

- Be experienced in the work overseen and trained in the role of safety monitor
- Be present at all times when a worker is in the control zone
- Have complete authority over the work as it relates to the prevention of falls
- Engage in no other duties while acting as the safety monitor
- Be positioned to have a clear and continuous view of the work

Also, a safety monitor will:

- Be able to have normal voice communication with the workers being protected
- Monitor no more than eight workers
- Be instantly distinguishable from other workers

The written fall protection plan for the workplace (required by section [11.3](#)) will specify the name of each safety monitor.

On a narrow roof, such as one less than 12 metres (40 feet) wide, an employer may proceed with a safety monitor system without using a raised warning line by declaring the entire work surface the control zone. This will be specifically noted in the fall protection plan. The safety monitor will be positioned in a safe location and have a clear view of the work.

G11.2(5)-2 Fall protection and structural concrete block construction

Issued March 28, 2002; Revised January 1, 2005

Regulatory excerpt

Section 11.2(5) of the *OHS Regulation* ("Regulation") states:

If subsection (4) is not practicable, or will result in a hazard greater than if a fall arrest system or a rope access system was not used, the employer must ensure that work procedures are followed that are acceptable to the Board and minimize the risk of injury to a worker from a fall.

Purpose of guideline

The purpose of this guideline is to outline an acceptable work procedure under section 11.2(5) for structural concrete block construction when fall restraint or fall arrest systems or rope access systems are not practicable.

Masonry construction

The use of guardrails or other fall protection is practicable for most masonry construction, but is impracticable in some situations during the placement of structural concrete block during wall construction. Structural masonry is the use of 200 mm (8 inches) or wider concrete block or structural clay brick laid and reinforced as stand-alone walls. Typical applications are for warehouses, schools, or commercial buildings, with wall heights generally of 3 to 7 metres (10 to 23 feet), occasionally reaching 9 metres (30 feet).

Generally masonry work more than 1.5 metres (5 feet) above ground or floor level is done from a scaffold work platform. For platform heights of less than 3 metres (10 feet), guardrails or other fall protection is not required. Work off platforms 3 metres or more high requires fall protection. This is generally provided on the backside and ends of the work platform through use of guardrails. If the masonry or block is being laid against an existing building wall, there is no forward fall hazard, so no guardrails need to be on the front or working side of the work platform. However, if the structural wall is a stand-alone wall, there is no "front wall" or barrier immediately behind the new wall. As the wall construction progresses beyond 3 metres in such cases, section 11.2 of the *Regulation* requires fall protection measures be taken. It is not practicable to have guardrails and support posts in the same workspace where the structural masonry units are being laid. This guideline describes work practices acceptable in these circumstances.

For the first 3 courses of block (approximately 60 centimetres or 24 inches) above the level of the work platform, a personal fall restraint system is to be used by workers laying block and working on the forward edge of the work platform. After the completion of at least 3 courses of block being laid, the worker(s) laying block may remove the personal fall protection and continue laying block with the newly laid block wall being considered as effective fall protection for masons working at the front or working face of the work platform.

Note that the work platform is always positioned at least 3 courses (60 centimetres) below the top of the last full course of structural masonry laid, so personal fall protection is not needed. However, if the work platforms are repositioned so that the distance from the platform surface up to the top of the last full course of masonry laid is less than 60 centimetres, personal fall protection needs to be used.

If the above procedure is to be used, a written fall protection plan for the work is required by [section 11.3\(1\)\(b\)](#) of the *Regulation*.

G11.2(5)-3 Other acceptable work procedures

Regulatory excerpts

Section 11.2(5) of the *OHS Regulation* ("*Regulation*") states:

If the use of a fall arrest system is not practicable, or will result in a hazard greater than if the system was not used, the employer must ensure that work procedures are followed that are acceptable to the Board and minimize the risk of injury to a worker from a fall.

Purpose of guideline

This guideline provides examples of typical situations where work procedures (other than control zones and safety monitors) may be used and describes some acceptable work procedures under section 11.2(5) to minimize the risk of injury to a worker from a fall. If work procedures are used under section 11.2(5) of the *Regulation*, section 11.3 requires there be a written fall protection plan for the work site.

Work procedures other than control zones and safety monitors

- **Installation or removal of fall protection equipment** (first person up/last person down rule).
- **Light duty work for short duration.** The use of a ladder may be acceptable for certain "light duty" tasks, as long as the work is completed under certain circumstances:
 - Working off of a portable ladder doing a "light duty task," such as an inspection or painting, where the ladder will be set up with its base at the same physical location for sporadic, short-term work. Some examples of sporadic short-term work include the following: inspecting exterior vents, gutters, and window seals; caulking; touch-up painting; and maintenance-type work (such as changing light bulbs). While performing the task, the worker should keep his/her centre of gravity (worker's waist) between the side rails of the ladder, and should generally have one hand available to hold on to the ladder or other support to maintain three points of contact. The ladder is not to be positioned near an edge, drop in height or floor opening that would significantly increase the potential fall distance. (Note that if the work on a ladder is likely to exceed 15 minutes at one physical location, some form of fall restraint or fall arrest protection should be used.) Where terrain and accessibility allow for other means of performing the work (e.g., a scissor lift or movable work platform), the use of other such means is to be considered prior to completing the work from a portable ladder.
 - Where work duration is approximately 15 minutes or less and the tasks are "light duty," the work may be completed from a portable ladder where use of a work platform is not practicable.
 - Work done from a ladder must be done in full compliance with Part 13 of the *Regulation* (especially Division 2 - Ladders, including [sections 13.4](#), [13.5](#), and [13.6](#)). Section 13.6(1) of the *Regulation* states that "if work cannot be done from a ladder without hazard to a worker, a work platform must be provided." If the work cannot be completed in full compliance with the requirements for safe ladder use under Part 13 a ladder must not be used for that work.
 - In circumstances where frequent ladder movement is required to complete multiple short duration tasks, each task may be considered as a separate instance of "short duration" work (e.g., light work such as touch-up painting at a residential dwelling may require multiple set-ups at various locations, and exceeding a total of 15 minutes for such a project is acceptable.)
 - The total duration of the entire job should also be considered in determining situations where other work safety measures should be used (e.g., work to be completed at a specific site over the course of several days may not be considered as "short duration," depending on the specific circumstances at the time.)
 - Employers should consider
 - The frequency with which a ladder is being used at a site (overly frequent use may indicate that other means of completing the work are more appropriate)
 - The duration of use at a site (if length of use tends toward longer periods of use, other means should be considered where practicable)
 - The overall practicability of using other work platforms to complete use (e.g., scissor lifts, boom lifts, scaffolding, etc.)
- **Roof inspection or estimation.** Provided the worker minimizes exposure to any unguarded edge as much as possible and provided other factors such as environmental conditions (e.g., wind or ice), roof slope, and surface finish do not present an undue hazard.
- **Transfers between fall protection systems.** Brief transfers between fall protection systems where the worker is protected by having a three-point contact (two feet placed firmly on a suitable supporting surface along with one hand supporting the worker, while the other hand is used to transfer a connection from one fall protection system to another).
- **Work requiring constant repositioning.** For example, during the primary connection of skeletal structures, workers employed in the initial placement of skeletal members requiring climbing and walking on the bare structure may, depending on the particulars of the work to be done, be covered by section 11.2(5). Trades with activities of this nature typically include scaffold erectors, tower erectors, blowpipe ventilation erectors, structural steel erectors, and tower crane erectors. Workers on the structure engaged in welding, bolt installing, other fitting out work, and climbing or walking on skeletal members should be able to use the fall protection methods referred to in sections 11.2(2), (3), and (4).
- **Workers on roofs engaged in a process that may damage lifelines.** For example, workers doing roofing tar work (such as hot bitumen application on flat roofs), may have to work under the protection of work procedures under section 11.2(5), such as control zones and the safety monitor system.
- **Use of the normal fall protection methods results in greater hazard.** For example, in emergencies such as the correction of an unsafe condition or in firefighting - refer to [section 31.17\(4\)](#).

Refer to [G20.75](#) Roof work - Fall protection for a description of different fall protection systems for work on roofs, according to the amount of slope, using the hierarchy in section 11.2 of the *Regulation*.

Regulatory excerpt

Section 11.2 of the *OHS Regulation* ("*Regulation*") states:

- (1) Unless elsewhere provided for in this Regulation, an employer must ensure that a fall protection system is used when work is being done at a place
 - (a) from which a fall of 3 m (10 ft) or more may occur, or
 - (b) where a fall from a height of less than 3 m involves a risk of injury greater than the risk of injury from the impact on a flat surface.
- (2) The employer must ensure that guardrails meeting the requirements of Part 4 (General Conditions) or other similar means of fall restraint are used when practicable.
- (3) If subsection (2) is not practicable, the employer must ensure that another fall restraint system is used.
- (4) If subsection (3) is not practicable, the employer must ensure that one of the following is used:
 - (a) a fall arrest system;
 - (b) a rope access system that meets the requirements of Part 34.
- (5) If subsection (4) is not practicable, or will result in a hazard greater than if a fall arrest system or a rope access system was not used, the employer must ensure that work procedures are followed that are acceptable to the Board and minimize the risk of injury to a worker from a fall.
- (6) Before a worker is allowed into an area where a risk of falling exists, the employer must ensure that the worker is instructed in the fall protection system for the area and the procedures to be followed.
- (7) A worker must use the fall protection system provided by the employer.

Purpose of guideline

The purpose of this guideline is to provide direction to employers in how the fall protection provisions are to be applied to protect workers who engage in work at heights around fixed- seating in buildings such as stadiums, arenas, and theatres.

Safe work procedures

The *Regulation* sets out requirements for fall protection under section 11.2 in a set of cascading requirements. Many fixed-seating buildings such as theatres, stadiums, and arenas contain balconies or mezzanines that are greater than 3m above a lower area. In many of these buildings, guards exist that do not meet the requirements for guards or guardrails as outlined in [Part 4](#) of the *Regulation*. Under the applicable provincial and municipal building codes, lower guards at lower heights (e.g., 30 inches, as opposed to the 40-44 inch standard guardrail requirement under [section 4.58\(1\)](#)) are allowed due to the unique purpose of the building. No such exemptions or allowances exist in the *Regulation*, and section 11.2 must be followed to protect workers.

Where the risk of a fall from a height of greater than 3m exists, a "cascading" series of safety measures and requirements must be followed.

Where practicable, the employer must ensure that a guardrail or other similar means of fall restraint is in place meeting the requirements under Part 4 of the *Regulation*. The first option for fall protection should always be a guard or guardrail where it is practicable. In some fixed-seating buildings guards/guardrails meet the *Regulation* requirements, e.g., clear plastic/glass with full guardrails that do not obstruct sightlines in the building. However, where guards or guardrails are not practicable, the employer must ensure a different fall restraint system is used. If this is not practicable, a fall arrest system must be used. Finally, where a fall arrest system is not practicable, the employer must ensure that work procedures acceptable to WorkSafeBC are in place and are followed to minimize the risk of injury to a worker from falling.

It is recognized that in some situations, e.g., arena, theatre, etc., a fall restraint or fall arrest system may not always be practicable due to the nature and use of the audience seating area of the building.

Fixed-seating areas in such buildings often have configurations (e.g., balconies) that have guards at the edge that do not meet the typical requirements for standard guardrails in other situations. This is allowed through provincial and municipal building codes so as to afford an adequate sightline for seated spectators. The result is that the guards at lower heights are installed (e.g., 30 inches, as opposed to the 40-44 inch requirement under section 4.58(1)).

In these buildings where other alternative methods of fall protection are not practicable or may create a greater hazard than not using such methods, it is the responsibility of the employer to ensure that work procedures acceptable to WorkSafeBC are in place to ensure the safety of workers. The employer must ensure that workers are adequately trained in these procedures, as required in section 11.2(6). Procedures can include instructions for working at or near edges that are guarded by a rail less than 40 inches in height, avoidance of edges where it is not necessary to be near them, and instructions about hazard awareness. The employer must be able to provide these safe work procedures in writing to a prevention officer when requested, as well as be able to provide evidence that all workers that may be exposed to a hazard have been properly trained in and are using these procedures.

Issued October 28, 2019

Regulatory excerpt

Section 11.2(6) *OHS Regulation ("Regulation")* states:

(6) Before a worker is allowed into an area where a risk of falling exists, the employer must ensure that the worker is instructed in the fall protection system for the area and the procedures to be followed.

Purpose of guideline

The purpose of this guideline is to outline some of the criteria that should be considered when determining the type of instruction that is required in order to comply with section 11.2(6) of the *Regulation*.

Instruction

The instruction must be specific to the area where the risk of falling exists and must include the particular work procedures to be used at the worksite. In order to satisfy the requirements of this section, it is not sufficient for employers to provide general instruction to workers about common forms of fall protection systems and procedures, nor is it adequate to simply have workers complete a fall protection training course. Although general instruction and/or training is beneficial in providing workers with a basic understanding of fall protection and common risks associated with working at heights, it does not ensure that workers have been adequately instructed on the specific systems and procedures to be used at a particular worksite.

Set out below is a non-exclusive list of different types of instruction that, depending on the particular fall protection system being used at a given worksite and the specific tasks assigned to a worker, may be required:

- Instruction on the type of fall protection system
- Review of manufacturer's instructions (or a professional engineer's instruction) related to the fall protection system and equipment (these instructions should be available on site for review and should include information on proper use, installation, inspection, maintenance and storage of equipment, criteria for taking the equipment out of service, etc.)
- Proper methods of donning, doffing, adjusting, and interconnecting of any personal protective equipment that is part of the fall protection system
- Proper attachment points on the equipment
- Compatibility of components of the system
- Limitations of the system
- Anchor installation (including anchorage criteria), use, attachment points, maintenance, inspection, strength, etc.
- Anchor layout
- Any procedures to be followed for the specific fall protection system and/or worksite
- Any fall protection plans (if required)
- Emergency rescue procedures

In all cases employers need to assess each particular area where a risk of falling exists and then determine what instruction is required in order to ensure workers have sufficient knowledge and understanding to protect themselves from a fall. All workers required to work in an area where a fall could occur must receive appropriate instruction before being allowed to enter the area.

G11.2-6 Fall protection during stunt work

Issued May 9, 2006; Revised February 8, 2007; Revised February 1, 2008; Revised March 11, 2009; Editorial Revision consequential to February 1, 2015 Regulatory Amendment

Regulatory excerpt

Section 11.2 (Obligation to use fall protection) of the *OHS Regulation ("Regulation")* states:

- (1) Unless elsewhere provided for in this , an employer must ensure that a fall protection system is used when work is being done at a place
 - (a) from which a fall of 3 m (10 ft) or more may occur, or
 - (b) where a fall from a height of less than 3 m involves a risk of injury greater than the risk of injury from the impact on a flat surface.
- (2) The employer must ensure that guardrails meeting the requirements of Part 4 (General Conditions) or other similar means of fall restraint are used when practicable.
- (3) If subsection (2) is not practicable, the employer must ensure that another fall restraint system is used.
- (4) If subsection (3) is not practicable, the employer must ensure that one of the following is used:
 - (a) a fall arrest system;

(b) a rope access system that meets the requirements of Part 34.

(5) If subsection (4) is not practicable, or will result in a hazard greater than if a fall arrest system or a rope access system was not used, the employer must ensure that work procedures are followed that are acceptable to the Board and minimize the risk of injury to a worker from a fall.

(6) Before a worker is allowed into an area where a risk of falling exists, the employer must ensure that the worker is instructed in the fall protection system for the area and the procedures to be followed.

(7) A worker must use the fall protection system provided by the employer.

Purpose of guideline

This guideline provides information to assist with implementing fall protection procedures for stunt work. Typically such work is done in the film sector and in other circumstances such as television and live performances.

The guideline discusses

- the application of the hierarchy of controls in section 11.2 of the *Regulation*
- criteria for acceptable work procedures where other forms of fall protection are not practicable, under section 11.2(5)
- a standard for personal fall protection equipment in stunt work that is an alternative to CSA or ANSI standards specified in section 11.5
- criteria for inspection of a personal fall protection system and removal of equipment from service under section 11.10(2) ; (3)

The guideline refers at various points to a "qualified person." For the purposes of the sectors covered by this guideline, typically the qualified person is a stunt coordinator or special effects rigger, a live performance technical director or rigging technician, or a professional engineer. The qualified person must be knowledgeable of the work, the hazards involved, and the means to control the hazards, by reason of education, training, experience or a combination of these.

Application of the hierarchy of controls

Section 11.2(2)-(5) of the *Regulation* provides a hierarchy of four types of fall protection, based on practicability. Section 1.1 of the *Regulation* defines "practicable" as "that which is reasonably capable of being done."

When applied to stunt work, there will be occasions where the use of guardrails or other means of fall restraint are practicable to use, for example in work positioning or where a stunt person is moved through space by means of a system designed to prevent falls. However, for many circumstances where a stunt involves a deliberate and planned fall these measures will not be practicable, and either a fall arrest system is required, or work procedures acceptable to WorkSafeBC.

For example, a fall arrest system would be appropriate for a stunt involving a fall over a limited distance where the fall can be designed so that arrest is the appropriate means of ensuring worker safety. Such systems would need to meet other requirements in [Part 11](#) of the *Regulation*, for example, section 11.5 on Equipment standards.

In some circumstances the production may require that a fall be unarrested so as to obtain the needed visual effect. In these cases, the fall must be designed and carried out to minimize the risk of injury to the stunt person, using procedures acceptable to WorkSafeBC, as required by section 11.2(5).

Note that [section 11.3](#) of the *Regulation* requires that wherever work is being done at a location where workers are not protected by permanent guardrails and from which a fall of 7.5 m (25 feet) or more may occur, or where work procedures are used as the means of fall protection under section 11.2(5), then a written fall protection plan must be in place before work begins.

Procedures that minimize the risk in a planned, unarrested fall - section 11.2(5)

In some circumstances, for reasons of practicability, a stunt will be planned for a fall without fall arrest. This circumstance typically arises where, for production reasons and visual effect, it is impracticable to use a system of fall arrest, or to use other measures that simulate the fall such as dummies or camera angles.

For such circumstances section 11.2(5) of the *Regulation* requires that procedures be followed that are acceptable to WorkSafeBC and which minimize the risk of injury to the stunt person.

It has been determined that acceptable procedures are those that meet at least all of the following criteria:

1. The risks to workers in the stunt are thoroughly assessed and controls adopted that minimize the risk.
2. Measures are implemented, where practicable, to minimize the height of the fall and control the rate of deceleration.
3. The fall is designed to ensure that a stunt person does not make unintended contact with a surface during a fall.
4. The area of intended contact is designed so that
 - the dimensions are sufficient to ensure that the stunt person lands on it
 - cushioning is provided to minimize any risk of injury, for example, by use of padding, collapsible boxing, air bags, safety nets or other means approved by a qualified person
 - there are no protrusions or other circumstances in the area of intended contact that create a heightened risk of injury
5. Provision is made to address any circumstance where the stunt person may, after initial contact with the intended surface, be deflected into an adjacent area.

6. Trial tests or rehearsals are done prior to the stunt using a test torso or equivalent device, and any corrections to the stunt made as necessary. Note: such tests or rehearsals are both appropriate and needed in typical stunt circumstances. Any determination otherwise in a particular case will be made only by a qualified person.
7. Stunt persons and other personnel involved with the stunt are properly trained in the use of all applicable procedures and equipment involved in the stunt.
8. Supervision is provided to ensure activities are coordinated and safety standards are met.

Standards for equipment used in a fall protection system

[Section 11.5 \(Equipment standards\)](#) of the *Regulation* requires that equipment used in a fall protection system consist of compatible and suitable components and be sufficient to support the fall restraint or arrest forces. In addition, section 11.5(c) requires that the equipment,

"...meet and be used in accordance with, an applicable CSA or ANSI standard in effect when the equipment was manufactured, subject to any modification or upgrade considered necessary by the Board."

There are circumstances in stunt work where a safety harness meeting CSA or ANSI standards is impracticable or otherwise inappropriate. For example, in the actual conduct of a stunt such a harness may be too bulky or involve points of attachment that interfere with the intended fall.

Under [section 4.4\(2\)\(a\)](#) of the *Regulation* a person may, if a standard is referenced in the *Regulation*, comply with an alternative standard where acceptable to WorkSafeBC.

For the purposes of stunt work, WorkSafeBC accepts the alternative standard set out in italics below in circumstances where the use of equipment meeting CSA or ANSI standards is impracticable. The alternative standard provides several options for determining acceptable equipment.

<i>Alternative standard for fall protection equipment</i>
<p><i>This standard applies to the selection and use of fall protection equipment in stunt work, for falls and suspended movements that are planned and conducted in a controlled manner. During a controlled fall, the maximum arrest force must not exceed four times the worker's weight.</i></p> <p><i>Prior to selection of equipment used in a system for fall restraint or fall arrest, a risk analysis must be done to determine the hazard to workers. Equipment must be selected on the basis of that analysis.</i></p> <p><i>The equipment in the fall protection system must meet at least one of the following applicable criteria:</i></p> <ol style="list-style-type: none"> <i>1. All equipment used in the system is certified as suitable for use in the manner intended in the stunt by the equipment manufacturer, the manufacturer's authorized representative, or by a professional engineer. (See OHS guideline G1.1 "Professional engineer" for further information on engineering practice.)</i> <i>2. The system is designed</i> <ul style="list-style-type: none"> <i>◦ to withstand a restraint force or an arrest force of at least four times the worker's weight (4 G's), and</i> <i>◦ so that the harness and associated components will not fail when a static force representing the lesser of either twice the restraint or peak arrest force, as applicable, or 5,000 pounds (22.2 kN) is applied.</i> <i>3. For fall arrest systems, prior to the stunt, a trial drop test (using a test torso or equivalent) is successfully performed that replicates the stunt, including the free fall distance and the worker's weight. A load cell will be used during the test to monitor the peak arrest force, and the recorded values shall not exceed four times the person's weight.</i> <p><i>The stunt must be designed so that all factors that could potentially cause the performance of the fall protection system to fail are considered and hazard, exposure of the system to chemicals, alteration of equipment, lifeline abrasion, entanglements and the attachment location of the lanyard to the harness.</i></p> <p><i>Documentation must be available at the work location where the stunt is to be performed which establishes that the equipment meets the applicable criteria.</i></p>

Re-using equipment after it has arrested a fall

If a personal fall protection system has been used to arrest a fall, [section 11.10\(1\)](#) of the *Regulation* requires that the system be removed from service, and not be returned to service until it has been inspected and recertified as safe for use by the manufacturer or its authorized agent, or by a professional engineer. Typically, the circumstances which this requirement is intended to address are accidental falls and may involve minimal shock absorption during the arrest of the fall.

In contrast, in the stunt performance sector, falls are planned and often involve the use of deceleration systems that substantially reduce arrest forces in the fall, thus reducing stresses on workers and equipment. Practicability issues are also of concern in this sector given that during normal use, a safety harness system will often be used repeatedly during a given stunt procedure.

On this basis, section 11.10(2) ; (3) provides an exemption to the recertification for personal fall protection systems designed and intended for reuse by a performer in the entertainment industry when conducting a planned fall sequence. The exemption applies only if all of the following conditions are met

- the system is designed and used in accordance with a standard acceptable to WorkSafeBC

- each use of the system is carried out in accordance with the plan for the conduct of the fall
- the peak arrest forces generated in the system during each use do not exceed the planned limits and the maximum forces allowed for the system, and
- after each use of the system, no part of it, including the anchorage, is reused until a qualified person has inspected it and determined it is in serviceable condition and safe for reuse

Note that section 11.9 of the *Regulation* also addresses inspection requirements. This provision requires that equipment used in a fall protection system be inspected by a qualified person before use on the work shift, kept free from substances and conditions that could contribute to its deterioration, and maintained in good working order.

The information provided in the remainder of this guideline is intended to assist with the inspection of equipment, and determination of whether it should be removed from service.

Inspecting equipment

It is important to inspect personal fall protection equipment on an ongoing basis to ensure safety. At minimum this involves inspection before use on each work shift, and after each use to arrest a fall. It is also recommended to inspect equipment just before each use if not already covered by one of the other inspection scenarios. Such inspections are only one aspect of the overall review and monitoring of conditions and procedures for the performance of stunts.

Inspections must be done in accordance with manufacturer instructions, if available, and in conformity with any standards which apply to the equipment. Inspections should cover at least the following items:

- With harnesses, check on aspects that include the following:
 - Integrity of stitching throughout the harness, on both outer and inner surfaces
 - Signs of deformation, bunching, or deterioration of pick points on the harness
 - Signs of contact with chemicals
 - Signs of any part of the harness being cut, stretched, frayed, or otherwise damaged
 - Integrity of shackles and straps on the harness
 - Signs of exposure to high temperatures
- With other equipment such as shackles, carabiners, lines, and deceleration control devices, the examination of equipment will include the following:
 - All metal and other materials for any sign of deformation, wear, stretching, cracks, or kinking
 - All metal and other materials for any signs of corrosion or other chemical deterioration
 - All lines for wear on surfaces, and any potential or actual fraying, kinking, bird caging, heat fusion, or other damage
 - Moveable parts to ensure proper action, and the capability of all locking and other immobilizing devices to perform their function

Note: When evaluating the condition of equipment it is important to have an understanding of the circumstances of previous use, including conditions and frequency of use, and any substantial loads to which the harness was subjected. This information should be tracked in order to help ensure worker safety and to provide a means of helping to demonstrate compliance with sections 11.9 and 11.10(3)(d). A log book or other similar record can be an effective means of recording inspection information, and may have particular application to harnesses that are used on an ongoing basis. The log book provides a record which, among other things, can assist with a determination of the appropriate point of removal from service. Log book information needs to be specific to the equipment involved.

Removing equipment from service

- Harnesses should be removed from service in circumstances such as the following:
 - Any part of the harness, including stitching, has been cut, stretched, frayed or otherwise damaged
 - The harness has been exposed to temperatures above 200 degrees F (93 degrees C), or other temperature specified by the manufacturer. *Note: The specified temperature is just below the boiling point of water.*
 - The harness has been exposed to chemicals (e.g. solvents, acids, alkalis) that may affect the integrity of the harness
 - Any part of the harness has received a shock-load in excess of 1000 pounds (4.5 kilonewtons), or other maximum shock load specified by the manufacturer. *Note: a fall arrest system designed to meet the 4 G peak arrest criterion in the alternative standard in this guideline is not likely to experience a shock load exceeding 1000 pounds, except if a worker's weight exceeds 250 pounds (113 kg). Further, if the system includes a personal energy absorber (PEA), a person should not experience a peak arrest force exceeding the criterion unless the PEA fully deploys so that the lanyard extends fully and there is in an abrupt stop. Most PEAs deploy at an average force of 630 - 810 pounds (2.8 to 3.6 kN).*
 - The age of the harness exceeds manufacturer specifications. For example, one supplier has specified a maximum 2 years of use beyond the date of manufacture. *Note: If a harness exceeds a specified use life, as an alternative to removal from service, the user may wish to contact the manufacturer to see if the harness could be submitted for possible recertification.*
 - Manufacturer instructions or standards to which the equipment is manufactured would otherwise require removal
- With other equipment such as shackles, carabiners, lines, and deceleration control devices, equipment should be removed from service in circumstances such as the following:
 - Equipment with moveable parts is not capable of proper movement
 - Any locking or other immobilizing device is not capable of performing its function
 - Any metal or other material has signs of deformation, cracks, kinking, stretching or significant wear
 - Any metal or other material shows signs of corrosion or other adverse chemical deterioration
 - Lines show any sign of fraying, kinking, bird caging, or other damage. Note section 15.25 of the *Regulation* lists wire rope rejection

criteria. Those criteria are considered absolute minimums in terms of rejection.

- Manufacturer instructions or standards to which the equipment is manufactured would otherwise require removal

Any component removed from service for cause should either be disposed of in such a manner that it cannot accidentally be re-used, or must be identified in a manner that will ensure it is not used until repairs are complete and it is safe for further use, as required by section 4.3(3) of the *Regulation*.

G11.3 Fall protection plan

Issued August 16, 2000; Revised January 1, 2005; Revised consequential to April 1, 2013 Regulatory Amendment

Regulatory excerpt

Section 11.3 of the *OHS Regulation* ("Regulation") states:

- (1) The employer must have a written fall protection plan for a workplace if
 - (a) work is being done at a location where workers are not protected by permanent guardrails, and from which a fall of 7.5 m (25 ft) or more may occur, or
 - (b) section 11.2(5) applies.
- (2) The fall protection plan must be available at the workplace before work with a risk of falling begins.

Purpose of guideline

This guideline outlines what is expected in a written fall protection plan.

Elements of a written fall protection plan

The plan should specify the following:

- The fall hazards expected in each work area
- The fall protection system or systems to be used in each area
- The procedures to assemble, maintain, inspect, use, and disassemble the fall protection system or systems
- The inspection requirements for the anchors and anchorage used and the respective rejection criteria (refer to OHS Guideline [G11.10\(0.1\) Fall protection anchors - Inspection and removal from service](#))
- The procedures for rescue of a worker who has fallen and is suspended by a personal fall protection system or safety net, but is unable to self-rescue

In certain locations and situations, the employer may meet the need for rescue procedures by participating in the Industrial High Angle Rope Rescue Program discussed in OHS Guideline [G4.13\(3\)\(a\) Industrial high angle rope rescue program](#).

Where a fall protection plan may not be required by the *Regulation*, the employer must still consider the need for rescue or evacuation under [section 4.13](#).

G11.4 Belts and harnesses

Issued January 1, 2005; Editorial Revision November 29, 2022

Regulatory excerpt

Section 11.4(1) of the *OHS Regulation* ("Regulation") states:

- (1) A worker must wear a full body harness or other harness acceptable to the Board when using a personal fall protection system for fall arrest.

Purpose of guideline

The purpose of this guideline is to explain why belts should not be used as part of a fall arrest system as required by section 11.4(1) of the *Regulation*.

Belts

Belts should not be used as body support in a fall arrest system due to the possibility of death or injury from the following causes:

- Slipping out of a belt
- Abdominal injuries
- Back injuries
- Effects on the body of extended static suspension in a belt

For an additional reference refer to the WorkSafeBC booklet: [An Introduction to Personal Fall Protection Equipment](#).

Refer also to OHS Guideline [G8.3: Ensuring adequate fit of protective equipment](#).

Issued January 1, 2005; Revised consequential to April 1, 2013 Regulatory Amendment; Revised April 27, 2016

Regulatory excerpt

Section 11.5 of the *OHS Regulation* ("Regulation") states:

Equipment used for a fall protection system must

(a) consist of compatible and suitable components,

(b) be sufficient to support the fall restraint or arrest forces, and

(c) meet, and be used in accordance with, an applicable CSA or ANSI standard in effect when the equipment was manufactured, subject to any modification or upgrading considered necessary by the Board.

Purpose of guideline

This guideline lists applicable standards for fall protection systems and components.

Applicable standards

The following is a table of some standards that apply for fall protection equipment now commonly in use.

Fall Protection Equipment Standards

Standard Agency	Standard Number	Standard Title
ANSI	A10.11	Construction and Demolition Operations - Personnel and Debris Nets
ANSI	A14.3	American National Standard for Ladders - Fixed - Safety Requirements
ANSI	Z359.0	Definitions for Fall Protection and Arrest
ANSI	Z359.1	Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components
ANSI	Z359.2	Minimum Requirements for a Comprehensive Managed Fall Protection Program
ANSI	Z359.3	Safety Requirements for Positioning and Travel Restraint Systems
ANSI	Z359.4	Safety Requirements for Assisted-Rescue and Self-Rescue Systems, Subsystems and Components
ANSI	Z359.6	Specifications and Design Requirements for Active Fall Protection Systems
ANSI	Z359.12	Connecting Components for Personal Fall Arrest Systems
ANSI	Z359.13	Personal Energy Absorbers and Energy Absorbing Lanyards
ANSI	Z359.14	Safety Requirements for Self-Retracting Devices for Personal Fall Arrest and Rescue Systems
CSA	CAN/CSA-Z259.10	Full Body Harnesses
CSA	CAN/CSA-Z259.11	Shock Absorbers for Personal Fall Arrest Systems
CSA	CAN/CSA-Z259.1	Safety Belts and Lanyards*
CSA	Z259.2.1	Fall Arresters, Vertical Lifelines, and Rails
CSA	Z259.2.2	Self-Retracting Devices for Personal Fall-Arrest Systems
CSA	Z259.2.3	Descent Control Devices
CSA	Z259.2.5	Fall Arresters and Vertical Lifelines
CSA	Z259.12	Connecting Components for Personal Fall Arrest Systems (PFAS)
CSA	Z259.15	Anchorage Connectors
CSA	Z259.16	Design of Active Fall-Protection Systems

* Newer versions of this Standard are entitled "Body Belts ; Saddles for Work Positioning and Travel Restraint."

Under [section 4.4](#) of the *Regulation*, WorkSafeBC can also recognize standards other than CSA or ANSI. Contact WorkSafeBC's Prevention Practice, Quality, and Engineering department to request acceptance of other standards.

Types of equipment that do not have applicable standards still must meet the requirements of sections 11.5(a) and (b).

Applicable standards for fall protection anchors (refer to OHS Guideline [G11.6-2 Anchor selection and uses](#))

For fall protection anchors associated with suspended equipment operations, *CSA Z259.16* references *CSA Z91* and *CSA Z271*.

Applicable standards for fall protection anchors that are not associated with suspended equipment operation include *CSA Z259.16* and the *ANSI Z359* series of standards.

G11.5-2 Equipment standards - Vertical lifelines

Issued August 16, 2000; Revised January 1, 2005; Revised November 21, 2007; Revised April 1, 2013

Regulatory excerpt

Section 11.5 of the *OHS Regulation* ("Regulation") states, in part:

Equipment used for a fall protection system must

- (a) consist of compatible and suitable components,
- (b) be sufficient to support the fall restraint or arrest forces, and

...

Purpose of guideline

The purpose of this guideline is to set out some factors to be considered in determining whether vertical lifelines are suitable and compatible for the intended application, and are sufficient to support fall arrest forces that may be imposed.

Selecting vertical lifelines

Factors to be considered when selecting vertical lifelines include the following:

- Compatibility with the other fall protection system components.
- Only one worker is to be attached to a lifeline, unless the vertical lifeline is used as part of a ladder safety device on a fixed ladder.
- The lifeline is to have a breaking strength specified by the manufacturer of at least 27 kN (6,000 lbs).
- The lifeline is to be free of knots or splices except at its termination. A termination knot or splice should not reduce the breaking strength of the lifeline to less than 22 kN (5,000 lbs).
- The lifeline and any related components are to be selected so that the resulting lifeline system minimizes the swing-fall hazard.
- A vertical lifeline is to extend to within 1.2 metres (4 feet) of ground level or other safe lower surface to which the worker might descend or fall. The intent is to ensure that a worker on a suspended stage, such as a swing stage or boatswain's chair, can be secured to a lifeline through the full range of travel of the staging unit.

Note: In some circumstances it is not practicable or safe for the lifeline to extend to within 1.2 metres of the lower landing spot. For example, if a stage is rigged over an underground parking entrance and the lower end of the rope were to come within 1.2 metres of the roadway, there would be a danger of the rope being caught by a vehicle, unless the use of the access was blocked. Blocking the access may not be practicable, in which case some means to terminate the lifeline rope at a safe distance above the danger area should be used. The stage should also be rigged to prevent it from being lowered into a zone where traffic could be a danger to the stage. A means to rescue workers also needs to be preplanned.

- Where vertical lifelines are of substantial length, particularly if more than 91 metres (300 feet), added consideration needs to be given to factors such as the elasticity of the line and the effects of wind loading. See below for more information on wind loading.

The longer the lifeline, the longer the total fall distance of a worker due to stretching of the line, with an increased risk that a worker may contact a hard surface before a fall is arrested. Use of lifelines with low elasticity will help control such risks.

Wind loading

On the issue of wind loading, *CSA Standard Z271-98, Safety Code for Suspended Elevating Platforms* and *CSA Z271-10, Safety Code for Suspended Platforms* restrict lifelines used with suspended staging to a maximum length of 150 metres (492 feet) if subject to wind conditions.

Note: Where suspension heights for swing stages, boatswain's chairs, or portable powered platforms are more than 91 metres (300 feet), section 13.32(d) of the Regulation requires certification from a professional engineer in writing. For heights over 91 metres (300 feet) WorkSafeBC recommends 30 km/h (19 mph) as the maximum wind speed in which to operate the staging. For shorter suspension heights WorkSafeBC and the industry recommend, subject to a site specific evaluation, 40 km/h (25 mph) as a maximum wind speed, or a lower speed where material being carried on the staging would create a sail effect, or a single point unit is used.

G11.5-3 Equipment standards - Lanyards

Regulatory excerpt

Section 11.5 of the *OHS Regulation* ("Regulation") states, in part:

- Equipment used for a fall protection system must
- (a) consist of compatible and suitable components,
 - (b) be sufficient to support the fall restraint or arrest forces, and

...

Purpose of guideline

The purpose of this guideline is to describe the use of shock absorbers as a component of a fall protection system and management of fall arrest where shock absorbers are not used.

Standards and the use of shock absorbers

A shock absorber is to be used with the following:

- A lanyard made of wire rope or other inelastic material in a fall arrest system
- A wire rope vertical lifeline unless the lifeline is part of a ladder safety device

When a shock absorber is used in a fall arrest system, allowance should be made for the potential increase in the total fall distance. If a shock absorber is used, a free fall of up to 2 metres (6.5 feet) is allowed, or the limit specified in the manufacturer's instructions, whichever is less.

If a synthetic fibre lanyard is used without a shock absorber, the fall arrest system should be arranged to limit the free fall of a worker to 1.2 metres (4 feet).

G11.5-4 Equipment standards - Prusik sling/Triples sliding hitch

Issued August 16, 2000; Revised January 1, 2005

Regulatory excerpt

Section 11.5 of the *OHS Regulation* ("Regulation") states, in part:

- Equipment used for a fall protection system must
- (a) consist of compatible and suitable components,
 - (b) be sufficient to support the fall restraint or arrest forces, and

...

Purpose of guideline

The purpose of this guideline is to provide criteria for assessing when a Prusik sling is a suitable and compatible part of a fall protection system and sufficient to support the fall restraint forces that may be imposed.

Prusik sling

A Prusik sling may be used in place of a rope grab if all of the following criteria are met:

- The Prusik sling is made using a piece of rope of synthetic fibre kernmantle construction, or equivalent, of at least 8 millimetre (1/3 inch) diameter, which has the ends tied together using a double fisherman's knot (also known as a grapevine knot) to create an "endless loop"
- The double fisherman's knot is tied as shown in Figure 1 below
- The rope on which the Prusik sling is used (main rope or lifeline) meets the general requirements for a vertical lifeline and has a diameter at least 2 millimetres (1/12 inch) larger than the diameter of the rope used to fashion the Prusik sling and
- The Prusik sling is tied to the main rope by means of a minimum two-wrap Prusik knot, as shown in Figure 2 below

A Prusik sling may be used for purposes other than a rope grab. For example, a Prusik sling may be used to deflect an equipment suspension line or a fall arrest line between its anchor and the drop location. This technique may be used to get the suspension or fall arrest line to approach and go over the edge at the drop location at a right angle to the face of the structure, thus reducing the risk of a swing fall. This is illustrated in Figure 3 below.

A triples sliding hitch is not to be used as part of a personal fall protection system. A triples sliding hitch is essentially a Prusik knot tied using a piece of rope that is not formed into an endless loop. It is shown in Figure 4 below.

Figure 1

Tying a Double Fisherman's Knot



Figure 2
Tying a Two-wrap Prusik Knot



Figure 3
Prusik Sling used to deflect line from Roof Anchor to drop location
Maximum angle between sling and line 120 deg.



Figure 4
Triple Sliding Hitch
The triple sliding hitch is not to be used as part of a personal fall protection system.

Figure 4 Triple Sliding Hitch



G11.5-5 Equipment standards - Double line system controlled descent devices

Issued August 16, 2000; Revised January 1, 2005

Regulatory excerpt

Section 11.5 of the *OHS Regulation* ("*Regulation*") states, in part:

Equipment used for a fall protection system must

- (a) consist of compatible and suitable components,
- (b) be sufficient to support the fall restraint or arrest forces, and

...

Purpose of guideline

The purpose of this guideline is to set out some factors to be considered in determining whether a double line system controlled descent device consists of suitable and compatible components, is sufficient to support fall arrest forces that may be imposed, and otherwise complies with the *Regulation*.

Double line system

A double line system, where both the lifeline and equipment suspension line are rigged through a common control descent device, is acceptable under sections 11.2 and 11.5 of the *Regulation* if the following system characteristics and procedures are implemented:

- To ensure free fall is minimized, the system provides fall arrest and descent control by maintaining both suspension lines at approximately the same tension during use.
- The system facilitates self-rescue with only one line functional.
- The system is used only by a worker who has been trained and has demonstrated an ability to safely use it.
- The system uses ropes of a type recommended by the manufacturer of the control descent device, or uses two nylon kernmantle ropes having a manufacturer's rated breaking strength of at least 27 kN (6,000 pounds);
- Each line is independently anchored, or alternatively the two lines are secured to one anchor and secured back to another by means of a minimum two-wrap Prusik sling.

- The descent control device is appropriate for a double line system, and automatic stopping capability ("deadman" stop feature) is provided by either a feature of the descent device or through use of a rope grab or Prusik sling.
- The worker wears a body harness meeting the requirements of the *Regulation* and of a type appropriate for the work to be done.

G11.5-6 Equipment standards - Connecting equipment

Issued January 1, 2005

Regulatory excerpt

Section 11.5 of the *OHS Regulation* ("*Regulation*") states, in part:

Equipment used for a fall protection system must

(a) consist of compatible and suitable components,

(b) be sufficient to support the fall restraint or arrest forces, and

...

Purpose of guideline

The purpose of this guideline is to set out some factors to be considered when assessing the suitability of connecting equipment under sections 11.5(a) and (b) of the *Regulation*.

Connecting equipment

The following factors are to be considered for suitability of connecting equipment under sections 11.5(a) and (b):

- A snap hook on a lanyard or lifeline is to be self-locking.
- When in use, a carabiner or similar connecting hardware is to be secured to prevent inadvertent opening.
- Carabiners, links, and rings are to have an ultimate load capacity of at least 22 kN (5,000 pounds) and are to be clearly marked with their load capacity and with a means of identifying the manufacturer.

G11.5-7 Equipment standards - Protection against abrasion or burning

Issued August 16, 2000; Revised January 1, 2005

Regulatory excerpt

Section 11.5 of the *OHS Regulation* ("*Regulation*") states, in part:

Equipment used for a fall protection system must

(a) consist of compatible and suitable components,

(b) be sufficient to support the fall restraint or arrest forces, and

...

Purpose of guideline

This guideline explains the need to protect components of fall protection systems from abrasion or burning in order for them to maintain sufficiency to support fall restraint or fall arrest forces as required by section 11.5 of the *Regulation*.

Protection of components of fall protection system

A vertical lifeline, lanyard, or safety strap should be effectively protected at points of attachment and elsewhere, as necessary, to prevent chafing or abrasion caused by contact with sharp or rough edges. When a tool is used that could sever, abrade, or burn a lifeline, lanyard, or safety strap, the lifeline, lanyard, or safety strap should be made of wire rope.

A worker working near an energized conductor or in another work area where a conductive lifeline, lanyard, or safety strap cannot be used safely need not use equipment of this type provided that two nonconductive lanyards or safety straps are used, or another effective means of fall protection is used.

G11.6-1 Anchors

Issued January 1, 2005; Editorial Revision May 17, 2006; Revised consequential to April 1, 2013 Regulatory Amendment; Editorial Revision August 15, 2023

Regulatory excerpt

Section 11.6 of the *OHS Regulation* ("*Regulation*") states:

- (1) In a temporary fall restraint system, an anchor for a personal fall protection system must have an ultimate load capacity in any

direction in which a load may be applied of at least

(a) 3.5 kN (800 lbs), or

(b) four times the weight of the worker to be connected to the system.

(2) Each personal fall protection system that is connected to an anchor must be secured to an independent attachment point.

(3) In a temporary fall arrest system, an anchor for a personal fall protection system must have an ultimate load capacity in any direction required to resist a fall of at least

(a) 22 kN (5 000 lbs), or

(b) two times the maximum arrest force.

(4) A permanent anchor for a personal fall protection system must have an ultimate load capacity in any direction required to resist a fall of at least 22 kN (5 000 lbs).

Purpose of guideline

This guideline provides additional information for selecting anchors that are acceptable under section 11.6 of the *Regulation*.

Anchors

The *Regulation* defines an anchor as "a secure point of attachment for a lifeline or lanyard." Types of anchors under this definition include the following:

1. A device that has been purposefully manufactured and installed as an anchor to support a personal fall protection system.
2. A substantial structure, such as a beam, column or similar substantial portion of the structure, selected as a point of anchorage where no dedicated anchor device is available. These *points of anchorage* generally require some supplemental rigging, such as a sling, to allow the anchorage connector of a personal fall protection system to connect to the anchorage.

Natural anchors, such as large well-rooted trees or rock outcroppings can be acceptable points of anchorage as well if deemed by a qualified person to be able to withstand the forces that may be imposed by the fall protection system.

The actual strength of an anchor is dependent on the following:

- The design of the anchor
- The orientation of the anchor relative to the direction of loading
- The condition of the anchor
- The connection of the anchor to the supporting structure
- The adequacy of the structure to resist the imposed loading

Anchors in a temporary fall arrest system

If an employer proposes to use an anchor for a personal fall protection system in a temporary fall arrest system with an ultimate load capacity of less than 22 kN (5,000 lbs), the employer will need to be able to demonstrate that the anchor has an ultimate load capacity of two times the maximum arrest force (MAF) at the particular location. In some cases, and especially on complex fall protection systems, a professional engineer will design the system and calculate the expected MAF. WorkSafeBC considers the upper limit of an acceptable MAF to be 8 kN (1,800 lbs).

By using other methods to reduce the arrest forces in conjunction with the anchor, the employer may not need to obtain engineering advice. At work locations where that expertise is not readily available, the employer may choose to use a manufactured product that indicates on the label and within the product instructions what the MAF will be in the circumstances in which it is used. Shock absorbers are an effective way to reduce and control the MAF that can occur in the event of a fall. In the absence of advice from a professional engineer, a shock absorber should be included in a fall arrest system when connecting to an anchor that has a load capacity of less than 22 kN (5,000 lbs) but is designed to resist two times the maximum arrest force.

As the calculation of the MAF in any situation can be complex and dependent to some degree on the particular circumstances of the place where the equipment is used, simply using such a product may not suffice. A person selecting an energy absorber is to consider body weight, atmospheric conditions, and fall distance in order to make the correct choice. For additional details on selecting appropriate components of a fall protection system, refer to the applicable CSA or ANSI standard listed in OHS Guideline [G11.5-1 Equipment Standards](#).

A temporary anchor should be removed upon completion of the work for which it was intended.

G11.6-2 Anchor selection and use

Issued August 16, 2000; Revised January 1, 2005; Editorial Revision May 17, 2006; Editorial Revision August 11, 2010; Revised consequential to April 1, 2013 Regulatory Amendment; Editorial Revision April 14, 2022

Regulatory excerpt

Section 11.6 of the *OHS Regulation* ("Regulation") states:

(1) In a temporary fall restraint system, an anchor for a personal fall protection system must have an ultimate load capacity in any direction in which a load may be applied of at least

(a) 3.5 kN (800 lbs), or

(b) four times the weight of the worker to be connected to the system.

(2) Each personal fall protection system that is connected to an anchor must be secured to an independent attachment point.

(3) In a temporary fall arrest system, an anchor for a personal fall protection system must have an ultimate load capacity in any direction required to resist a fall of at least

(a) 22 kN (5 000 lbs), or

(b) two times the maximum arrest force.

(4) A permanent anchor for a personal fall protection system must have an ultimate load capacity in any direction required to resist a fall of at least 22 kN (5 000 lbs).

Purpose of guideline

This guideline describes good practice with respect to anchor (also known as an anchorage connector) design, layout, selection, and use, and lists standards for fall protection anchors.

Good practice with respect to anchor design, layout, selection, and use

The following are guidelines for good practice with respect to anchor design, layout, selection, and use:

- A permanent anchor should be made of stainless steel, hot dipped galvanized steel, or other corrosion-resistant material having similar structural properties.
- An anchor should be located so a lifeline attached to it is not deflected over a guardrail or other part of the structure which has insufficient strength to support the maximum potential load from a fall arrest. Note also OHS Guideline [G11.5-7 Protection against abrasion or burning](#) on protecting the line from abrasion.
- An anchor in concrete should be cast in place or through-bolted with a backing plate for adequate load distribution.
- An anchor mounted on concrete with drilled in fasteners (expansion or adhesive type) should use a group of at least three fasteners supporting an anchor plate, sized, and arranged so that if any one fastener in the group is assumed to be carrying no load, the remaining fasteners will have a design capacity to carry the full design load of the anchor.
- An anchor should be located on a line perpendicular to the building edge at the drop location to eliminate the swing fall hazard. Where this is not practicable, an anchor may be offset so the angle between the line perpendicular to the building edge at the drop location and the lifeline or primary single point suspension line is not greater than 25 degrees or 12.5 degrees as shown in Figures 1 and 2 below. The distance from the perpendicular line to the anchor should be less than 3 metres (10 feet), as shown in Figures 1 and 2. As an alternative, the line may be deflected using a Prusik sling, provided the sling is made and used as outlined in OHS Guideline [G11.5-4 Equipment standards - Prusik sling/Triple sliding hitch](#).
- A temporary anchor for fall arrest may be established by wrapping a wire or synthetic fibre rope around the base of an anchorage, such as the base of rooftop penthouse (refer to OHS Guideline [G11.1 Definitions - Anchor and anchorage](#)). This is illustrated in Figure 3 below. If the rope is installed so the sling angle at the point of attachment is not in excess of 120 degrees, rope with a rated breaking strength at least equal to that of the lifeline may be used. If the sling angle is in excess of 120 degrees, wire rope of sufficient strength to provide an anchor capability for the installed sling angle, of at least 22 kN (5,000 lbs), must be used. Only one fall arrest lifeline may be attached to each such independent rope wrap.
- If a lifeline is anchored to a parapet clamp on the parapet on the far side of the roof from the drop location, it may not be practicable to tie back the parapet clamp as required by [section 13.10](#). In such cases, the lifeline may be secured to a second anchor using a Prusik sling.

Independent attachment points (referred to as "connection points" in CSA standards)

Section 11.6(2) requires that each personal fall protection system that is connected to an anchor be secured to an independent attachment point. This means that each personal fall protection system must be independently secured to an anchor.

Applicable standards for fall protection anchors (refer to OHS Guideline [G11.5-1 Equipment standards](#))

Fall protection anchors associated with suspended equipment operations must meet and be used in accordance with the applicable requirements of *CAN/CSA Z271, Safety Code for Suspended Elevating Platforms* and *CSA Z91-02, Health and Safety Code for Suspended Equipment Operations*. Please also refer to [WCB Standard WPL2, Design, Construction and Use of Crane Supported Work Platforms, 2004](#), for standards on the design of lifeline anchors for personal fall protection systems for workers on platforms suspended from a crane or attached to a crane boom.

Fall protection anchors not associated with suspended equipment operations must meet and be used in accordance with the requirements of the applicable CSA or ANSI Standard. Acceptable standards from OHS Guideline [G11.5-1 Equipment standards](#) that include requirements for anchors and anchorages are as follows:

- *CSA Z259.16 Design of Active Fall-Protection Systems*
- *CSA Z259.15 Anchorage Connectors*
- *ANSI Z359.0 Definitions for Fall Protection and Arrest*

- *ANSI Z359.1 Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components*
- *ANSI Z359.2 Minimum Requirements for a Comprehensive Managed Fall Protection Program*

Figure 1 (Example plan view of lifeline anchor location)

Plan view of lifeline anchor location

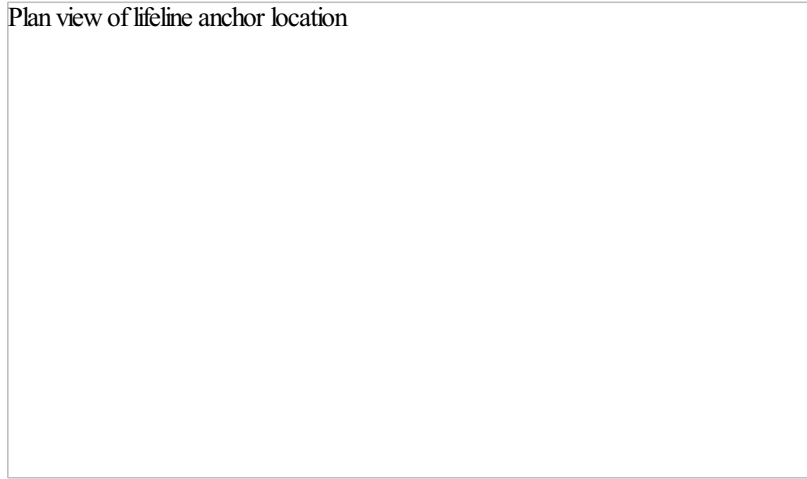
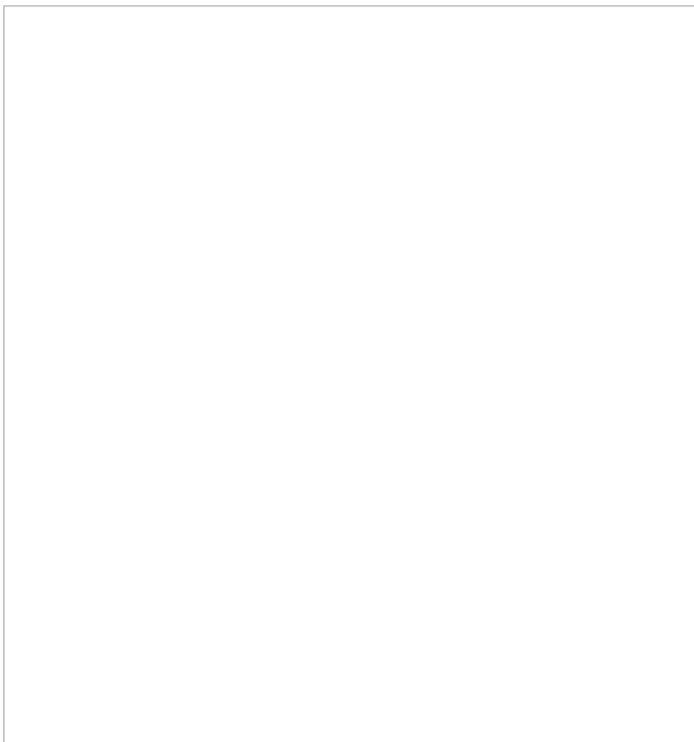


Figure 2 (Example plan view of single point suspension equipment anchor location)

Plan view of single point suspension equipment anchor location



Figure 3 (Plan view of a temporary anchor wrapped around an anchorage)



Regulatory excerpt

Section 11.6 of the *OHS Regulation* ("Regulation") states:

- (1) In a temporary fall restraint system, an anchor for a personal fall protection system must have an ultimate load capacity in any direction in which a load may be applied of at least
 - (a) 3.5 kN (800 lbs), or
 - (b) four times the weight of the worker to be connected to the system.
- (2) Each personal fall protection system that is connected to an anchor must be secured to an independent attachment point.
- (3) In a temporary fall arrest system, an anchor for a personal fall protection system must have an ultimate load capacity in any direction required to resist a fall of at least
 - (a) 22 kN (5 000 lbs), or
 - (b) two times the maximum arrest force.
- (4) A permanent anchor for a personal fall protection system must have an ultimate load capacity in any direction required to resist a fall of at least 22 kN (5 000 lbs).

Purpose of guideline

This guideline discusses the safe use of a cornice hook that functions as a portable or temporary anchor for a suspension line and parapet clamp that functions as a portable or temporary anchor for a suspension line, lifeline, or tieback line.

Guideline

A cornice hook is a device that functions as a portable or temporary anchor for a suspension line. A parapet clamp is a device that functions as a portable or temporary anchor for a suspension line, lifeline, or tieback line. As such, each hook or clamp should be designed for a minimum ultimate load of 5,000 lbs. Generally the suspension rigging for each end of a swing stage or portable powered platform has a safe working load of no less than 1,000 lbs. A factor of safety of four for ductile materials and five for brittle materials should be used, based on the breaking strength of the material.

A cornice hook should be installed so that the load from the suspended equipment acts in a vertically downward direction. A cornice hook should not be used as a lifeline or equipment tieback anchor.

A parapet clamp may be used where the load of the suspended equipment acts either vertically down (such as the suspension line for a swing stage), or horizontally (such as for a suspension rope deflected over the edge of a roof and anchored to a clamp on the opposite edge of the roof). If a parapet clamp is used to anchor a lifeline, or an equipment tieback line, a minimum ultimate strength of 5,000 lbs is required for the parapet clamp and parapet as a system, in the direction which the lifeline or tieback will apply a load. The design of a parapet clamp should anticipate usage for loads acting either downward or horizontally, and the instructions for its use should be clear on the allowable load configurations for the unit.

A cornice hook or parapet clamp can only function effectively as an anchor if it is positioned on a part of the building or structure that is structurally able to support the loads the clamp or hook will apply. If the parapet supporting a parapet clamp or cornice hook is made from cast-in-place concrete or from substantial precast elements, generally structural adequacy is not a problem. If the parapet supporting parapet clamps or cornice hooks is made from masonry wall or brick, or light wood framing finished with stucco, the load from the clamp or hook should be distributed through the use of adequate blocking. A 2x8 plank at least 4 feet long should be secured horizontally to the inside face of the parapet so the load from the hook or clamp is distributed over a length of the parapet. If a parapet is deteriorated, cracked, or shows other evidence of structural weakness, it should not be used for supporting parapet clamps or cornice hooks.

G11.7 Temporary horizontal lifelines

Issued August 16, 2000; Revised January 1, 2005; Editorial Revision May 17, 2006

Regulatory excerpt

Section 11.7 of the *OHS Regulation* ("Regulation") states:

- A temporary horizontal lifeline system may be used if the system is
- (a) manufactured for commercial distribution and installed and used in accordance with the written instructions from the manufacturer or authorized agent, and the instructions are readily available in the workplace,
 - (b) installed and used in accordance with written instructions certified by a professional engineer, and the instructions are readily available in the workplace, or

(c) designed, installed and used in a manner acceptable to the Board.

Purpose of guideline

This guideline discusses "readily available" under sections 11.7(a) and 11.7(b) and describes an acceptable temporary horizontal lifeline system for the purpose of section 11.7(c).

Readily available

Under section 11.7(a) if there are any written instructions from the manufacturer or authorized agent, the written instructions need to be readily available. Likewise, under 11.7(b), if there are any written instructions certified by a professional engineer, they must be readily available.

Design, installation, and use of temporary horizontal lifeline systems in a manner acceptable to WorkSafeBC

For the purpose of section 11.7(c), a temporary horizontal lifeline system for fall restraint is acceptable if it provides an ultimate load capacity of at least 3.5 kN (800 lbs) for each worker connected to it. "Ultimate load capacity" is determined with the design loads being applied perpendicular to the span of the line and at critical locations for sizing the components.

A temporary horizontal lifeline system used for fall arrest is acceptable under section 11.7(c) if it meets the following requirements:

- The horizontal lifeline is a minimum 12 millimetres (1/2 inch) diameter wire rope having a breaking strength specified by the manufacturer of at least 89 kN (20,000 lbs).
- The horizontal lifeline is free of splices except at the terminations.
- Connecting hardware such as shackles and turnbuckles has an ultimate load capacity of at least 71 kN (16,000 lbs).
- The span is at least 6 metres (20 feet) and not more than 18 metres (60 feet).
- End anchors have an ultimate load capacity of at least 71 kN (16,000 lbs).
- The horizontal lifeline has an unloaded sag of approximately the span length divided by 60.
- The elevation of the line at any point is at least 1 metre (39 inches) above the working surface.
- The free fall distance is limited to 1.2 metres (4 feet).
- A minimum of 3.5 metres (12 feet) of unobstructed clearance is available below the working surface.
- No more than three workers are secured to the horizontal lifeline.
- The horizontal lifeline is positioned so it does not impede the safe movement of workers.

G11.8 Requirements for engineering - Permanent horizontal lifelines

Issued January 1, 2005

Regulatory excerpt

Section 11.8 of the *OHS Regulation* ("Regulation") states:

The following types of equipment and systems, and their installation, must be certified by a professional engineer:

- (a) permanent anchors,
- (b) anchors with multiple attachment points,
- (c) permanent horizontal lifeline systems, and
- (d) support structures for safety nets.

Purpose of guideline

The purpose of this guideline is to explain the requirements for the drawings and instructions to be certified by a professional engineer with respect to a permanent horizontal lifeline system and its installation, pursuant to section 11.8(c) of the *Regulation*.

Drawings and instructions for permanent horizontal lifelines

The drawings and instructions required to be certified by a professional engineer should show the following:

- The layout in plan and elevation, including anchor locations, installation specifications, anchor design, and detailing
- Horizontal lifeline system specifications, including permissible free fall distance, clearance to obstructions below, and rope size, breaking strength, termination details, initial sag, or tension
- The number of workers permitted to connect to the lifeline, and maximum arrest force to each worker

G11.9 Inspection and maintenance - Fibre rope suspension

Issued August 1, 1999; Revised January 1, 2005

Regulatory excerpt

Section 11.9 of the *OHS Regulation* ("Regulation") states:

Equipment used in a fall protection system must be

- (a) inspected by a qualified person before use on each workshift,
- (b) kept free from substances and conditions that could contribute to its deterioration, and
- (c) maintained in good working order.

Standard excerpt

WCB Standard WPL 3-2004 states:

4. Minimum Breaking Strength

...

- (4) A rope used to suspend a boatswain's chair by other than a block and tackle must be a synthetic rope that has a minimum breaking strength of 27 kN (6,000 lbs).

Purpose of guideline

The purpose of this guideline is to outline that section 11.9 of the *Regulation* is required to ensure a fibre rope strength of 27kN is maintained before use on each workshift.

Breaking strength

A common question is why a rope strength of 27 kN is required, compared with the required anchor strength of 22 kN. The "breaking strength" of rope means the manufacturer's specified minimum (or nominal) strength of new rope under a straight pull test condition. The 5 kN difference between rope strength and anchor strength is to allow for losses in rope strength due to factors such as the rope terminations (such as knots or splices), the rope running over pulleys or other small radius surfaces, wear within generally accepted limits, and deterioration in the rope from regular use up to the time when rejection criteria dictate the rope be removed from service.

G11.10(0.1) Fall protection anchors - Inspection and removal from service

Issued consequential to April 1, 2013 Regulatory Amendment

Regulatory excerpt

Section 11.10(0.1) of the *OHS Regulation* ("*Regulation*") states:

If, at any time, a permanent anchor does not meet the requirements of section 11.5(c), the anchor must not be used until it has been inspected and recertified, by a professional engineer, as meeting the requirements of section 11.5(c).

Section 11.5(c) of the *Regulation* states:

Equipment used for a fall protection system must

- (c) meet, and be used in accordance with, an applicable CSA or ANSI standard in effect when the equipment was manufactured, subject to any modification or upgrading considered necessary by the Board.

Purpose of guideline

The purpose of this guideline is to provide guidance for inspection of fall protection anchors and when they must be removed from service.

Instructions from applicable standards

Applicable standards for inspection and removal from service of fall protection anchors include the following:

CSA Z259.15 Anchorage Connectors

CSA Z259.16 Design of Active Fall-Protection Systems

ANSI Z359.2 Minimum requirements for a Comprehensive Managed Fall Protection Program

Some useful information from the standards is reproduced in this guideline. The entire standard should be consulted for complete requirements. The standards specify that the manufacturer's instructions are to be followed, or, in the case of an engineered system, the engineer's instructions for the removal from service of fall protection anchors.

Both *CSA Z259.15* and *Z259.16* require that anchorage systems be provided with instructions for inspection, maintenance, and retirement of the system and all of its components and that employers follow the recommended frequencies and procedures for inspection and maintenance. In addition, there are specified criteria for removal of an anchorage connector from service if it has deformed from its original installed configuration. *CSA* also specifies that an anchor is not to be altered, relocated, or modified with additional anchorage connectors.

ANSI Z359.2 specifies inspections by an authorized person prior to use and at least annually by a qualified or competent person in accordance with the manufacturer's or a qualified person's instructions. In addition, this standard recommends recertification of anchorage systems at regular intervals. The design, type, location, size of structural members, the type of anchorage connector, and the environment and weather conditions dictate how often such an anchorage system should be inspected and re-certified.

ANSI Z359.2 specifies that a fall protection anchorage system is to be removed from service when any inspection reveals that it may no longer serve the required function, that it may be unsafe due to damage or wear, or if the required inspection interval has been exceeded.