

G11.2-6 Fall protection during stunt work

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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 a fall arrest system is used.

(5) 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.

(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*. In addition, it addresses the use of work procedures where other forms of fall protection are not practicable, as well as an alternative standard for personal fall protection equipment in stunt work.

The guideline provides information on a Vice-Presidential directive that has been issued on section [11.10](#) of the *Regulation*, dealing with the removal of personal fall protection equipment from service. It also provides information on the inspection of harnesses and other personal fall protection equipment, and criteria for removal from service.

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 *OHS 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 *OHS 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
 - o the dimensions are sufficient to ensure that the stunt person lands on it
 - o 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
 - o 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.

Alternative standard for fall protection equipment

This standard applies to the selection and use of fall protection equipment in stunt work, for falls that are planned and conducted in a controlled manner.

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.

The equipment in the fall protection system must meet at least one of the following applicable criteria:

- 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 [G1.2 "Professional engineer"](#) for further information on engineering practice.)*
- 2. The system is designed*
 - o To withstand a restraint force or an arrest force of four times the worker's weight (4 G's)*
 - o 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 is applied.*
- 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.*

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 satisfactorily addressed. Examples of such factors include swing fall hazard, exposure of the system to chemicals, alteration of equipment, lifeline abrasion, and the attachment location of the lanyard to the harness.

Documentation must be available at the work location where the stunt is to be performed which establishes that the equipment meets the applicable criteria.

Re-using equipment after it has arrested a fall

If a fall protection system has been used to arrest a fall, section [11.10](#) 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.

To address fall protection in stunt work, a Vice-Presidential directive, effective until December 31, 2007, will direct WorkSafeBC prevention officers to apply section [4.3\(1\)\(a\)\(b\)\(i\)\(ii\) \(Safe machinery and equipment\)](#) of the *Regulation*, in place of section 11.10. Section 4.3(1) states:

- (1) The employer must ensure that each tool, machine and piece of equipment in the workplace is
 - (a) capable of safely performing the functions for which it is used, and
 - (b) selected, used and operated in accordance with
 - (i) the manufacturer's recommendations and instructions, if available,
 - (ii) safe work practices, and
 - (iii) the requirements of this Regulation.

Under this requirement, equipment must, among other things, be used in accordance with manufacturer's recommendations and instructions, if available, and with safe work practices.

Safe work practices, in this case include that after each use of the harness and associated equipment in a fall arrest situation the equipment will be inspected by a qualified person for any defect.

Prevention officers will also apply section [11.9](#) of the *Regulation*, which 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.

If a defect is found in the equipment that renders it unsafe for use the equipment must be identified as removed from service, and not returned to service until it has made safe for use, as required by section 4.3(3) of the *Regulation*.

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. A log book or other similar record can be of assistance, 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 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 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 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*.