

New Installations - Equipment

WAC 296-870-700

Section Contents



IMPORTANT:

This section applies to permanent powered platform installations that meet either of the following:

- Were completed after July 23, 1990
- or**
- Have had major modifications done to an existing installation after July 23, 1990.



Definition:

A *new installation* is a permanent powered platform installation that was completed, or an existing installation that has had major modifications done, after July 23, 1990.



Note:

If the powered platform equipment meets the requirements of the edition of American National Standard Institute/American Society of Mechanical Engineers ANSI/ASME A120.1, Safety Requirements for Powered Platforms for Building Maintenance, that was in effect when the powered platform installation was completed, it will be considered to meet the requirements of this section.

YOUR RESPONSIBILITY:

To make sure equipment used with new powered platform installations meets these requirements

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New Installations - Equipment

WAC 296-870-700

Rule

WAC 296-870-70005

Design and construction

IMPORTANT:

This section applies to equipment which is part of a powered platform installation, such as platforms, stabilizing components, carriages, outriggers, davits, hoisting machines, wire ropes and electrical components.

You must

- Make sure equipment installations are designed by, or under the direction of, a registered professional engineer experienced in such design.
- Make sure the design uses a minimum live load of 250 pounds (113.6 kg) for each occupant of a suspended or supported platform.
- Make sure equipment exposed to wind when not in service is designed to withstand loads generated by winds of at least 100 miles per hour (44.7 m/s) at 30 feet (9.2 m) above grade.
- Make sure equipment exposed to wind when in service is designed to withstand loads generated by winds of at least 50 miles per hour (22.4 m/s) for all elevations.
- Make sure elevated building maintenance equipment is suspended by one of the following:
 - A carriage
 - Outriggers
 - Davits
 - An equivalent method.
- Make sure bolted connections are self-locking or otherwise secured to prevent loosening by vibration.



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Rule

WAC 296-870-70010

Carriages

You must

- Make sure each carriage work station is identified by location markings or position indicators.
- Make sure means are provided to lock out the power supply for the carriage.
- Make sure safe access to and egress from the carriage is provided from a safe surface.
- Make sure any carriage access gate is either:
 - Self-closing and self-latching
- or**
- Provided with an interlock.
- Make sure any operating area on the carriage is protected by a guardrail system.



Reference:

Guardrail system requirements are found in Suspended equipment guardrail system, WAC 296-870-70045.

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WAC 296-870-700

Rule

WAC 296-870-70015

Carriage strength and stability

You must

- Make sure roof carriage system stability is obtained by using gravity, attachment to a structural support, or a combination of gravity and structural attachment.
- Never use a material that can flow as a counterweight to achieve stability.
- Make sure the stability factor against overturning for horizontal traversing of the carriage, including wind and impact effects, isn't less than 2.
- Make sure carriages and their anchorages can resist accidental over-tensioning of the wire ropes suspending the platform. Include in the calculation the effect of 1 1/2 times the stall load of the hoist.
- Make sure all parts of the powered platform installation can withstand, without damage, the forces resulting from a load equal to the stall load of the hoist and 1/2 of the wind load.
- Make sure roof carriages which develop the required stability against overturning by using tie-down devices secured to the building have an interlock which will prevent vertical platform movement unless the tie-down is engaged.



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Rule

WAC 296-870-70020

Carriage traversing

You must

- Make sure carriages used to suspend powered platforms meet all of the following:
 - The horizontal movement of the carriage is controlled to permit it to be moved safely and to allow accurate positioning of the platform for vertical travel or storage
 - Structural stops and curbs are provided to prevent traversing of the carriage beyond its designed limits of travel
 - Powered carriages are limited to a maximum traversing speed of 50 feet per minute (0.3 m/s)
 - Manually propelled carriages on a smooth level surface require a horizontal force of not more than 100 pounds (444.8 n) per person to initiate a traversing movement.
 - Make sure traversing controls for a powered carriage meet all of the following:
 - Controls are continuous pressure weatherproof type
 - Multiple controls, if provided, only permit operation from one control station at a time
 - An emergency stop device that interrupts power to the carriage drive motors is provided on each end of the carriage.
 - Make sure the operating controls of suspended equipment is connected so that traversing the carriage isn't possible until:
 - The suspended portion of the equipment is at the uppermost designed position for traversing and free of contact with the face of the building or building guides
- and**
- All protective devices and interlocks are in the proper position to allow traversing of the carriage.

- Continued -

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WAC 296-870-700

Rule



WAC 296-870-70020

Carriage traversing (continued)

You must

- Make sure unintentional traversing of the carriage is prevented by providing one of the following:
 - An automatically applied braking or locking system, or the equivalent, for power-traversed or power-assisted carriages
 - A manual or automatic braking or locking system, or the equivalent, for manually propelled carriages.

WAC 296-870-70025

Transportable outriggers

You must

- Make sure transportable outriggers are only used when all of the following are met:
 - They are used with self-powered, ground-rigged working platforms
 - The point of suspension isn't higher than 300 feet (91.5 m) above a safe surface
 - A tie-in guide stabilization system is provided.
- Make sure each outrigger is secured with a tie down to a verified anchorage on the building and meets all of the following:
 - The outrigger is tied down during the entire time it's used
 - The outrigger is tied back with a rope equivalent in strength to the suspension rope
 - The tie-back rope is installed parallel to the centerline of the outrigger
 - The anchorage has a design stability factor against overturning or upsetting of the outrigger of not less than 4.

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WAC 296-870-700

Rule

WAC 296-870-70025

Transportable outriggers (continued)

- Make sure access to and egress from the working platform is from and to a safe surface below the point of suspension.
- Make sure each outrigger has a design stability factor to prevent rollover in the event of an accidental lateral load on the outrigger of not less than 70 percent of the rated load of the hoist.
- Make sure each outrigger is designed to support an ultimate load of not less than 4 times the rated load of the hoist.
- Make sure each outrigger is located so that the suspension wire ropes for 2 point suspended working platforms are parallel.

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WAC 296-870-700

Rule

WAC 296-870-70030

Davits

You must

- Make sure all davit installations are designed and installed to have a stability factor against overturning of not less than 4.
- Make sure access to and egress from the working platform of roof rigged davit systems:
 - Is from a safe surface

and

 - Doesn't require persons to climb over a building parapet or guardrail.
- Make sure the working platform of a roof rigged davit system has wheels, casters, or a carriage for traversing horizontally.
- Make sure ground rigged davit systems meet all of the following:
 - The point of suspension isn't higher than 300 feet (91.5 m) above a safe surface
 - A tie-in guide stabilization system is provided
 - Access to and egress from the working platform is from a safe surface below the point of suspension.
- Make sure a rotating davit of a ground rigged davit system requires a horizontal force of 40 pounds (177.9 n) or less per person to initiate a rotating movement.
- Make sure a transportable davit or part of a davit weighing more than 80 pounds (36 kg) has means provided for its transport that keep the center of gravity of the davit at or below 36 inches (914 mm) above the safe surface during transport.
- Make sure a transportable davit is provided with a pivoting socket or base that allows the davit to be removed or inserted:
 - At a position of not more than 35 degrees above the horizontal

and

 - With the complete davit inboard of the building face.
- Make sure means are provided to lock a transportable davit to its socket or base before it's used to suspend the platform.



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WAC 296-870-700

Rule

WAC 296-870-70035

Hoisting machines

You must

- Make sure suspended or supported equipment is raised or lowered only by a hoisting machine.
- Make sure each hoisting machine is all of the following:
 - Powered only by air, electric, or hydraulic sources
 - Capable of raising or lowering 125 percent of the rated load of the hoist
 - Able to arrest any overspeed descent of the load.
- Make sure the stall load of any hoist motor isn't more than 3 times its rated load.
- Make sure any component of a hoisting machine that needs to be lubricated for protection or proper functioning has means provided to apply the lubricant.
- Make sure winding drums, traction drums and sheaves, and directional sheaves used in conjunction with hoisting machines are compatible with, and sized for, the wire rope used.
- Make sure each winding drum:
 - Has a positive means to attach the wire rope to the drum

and

 - The attachment can develop at least 4 times the rated load of the hoist.
- Make sure each hoisting machine is provided with a primary brake that's all of the following:
 - Capable of stopping and holding not less than 125 percent of the lifting capacity of the hoist
 - Directly connected to the drive train of the hoisting machine without using belts, chains, clutches, or set screw type devices
 - Automatically set when power to the prime mover is interrupted.

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New Installations - Equipment

WAC 296-870-700

Rule

WAC 296-870-70035

Hoisting machines (continued)

- Make sure each hoisting machine is provided with at least one independent secondary brake that's all of the following:
 - Capable of stopping and holding not less than 125 percent of the lifting capacity of the hoist
 - An automatic emergency type of brake that, if actuated during each stopping cycle, doesn't engage before the hoist is stopped by the primary brake
 - Able to stop and hold the platform within a vertical distance of 24 inches (609.6 mm) after the brake is actuated.



Reference:

Moving parts of a hoisting machine need to be enclosed or guarded as required by another chapter, Machine Safety, Chapter 296-806 WAC.



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WAC 296-870-700

Rule

WAC 296-870-70040

Suspended equipment strength and stability

You must

- Make sure each suspended unit component is:
 - Capable of supporting, without failure, at least 4 times the maximum intended live load applied or transmitted to it**and**
 - Constructed of materials that will withstand the anticipated weather conditions.



Exemption:

The strength requirement doesn't apply to suspension ropes and guardrail systems.

You must

- Make sure each suspended unit has a load rating plate that:
 - Is conspicuously located**and**
 - States the suspended unit weight and rated load.
- Make sure suspended units that don't have the suspension points at the end of the unit:
 - Are continuously stable for any position or use of the live load**and**
 - Maintain at least a 1 1/2 to 1 stability factor against unit upset.
- Make sure each suspended unit has guide rollers, guide shoes, or building face rollers that compensate for variations in building dimensions and for minor horizontal out-of-level variations of the suspended unit.

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WAC 296-870-700

Rule

WAC 296-870-70040

Suspended equipment strength and stability (continued)

- Make sure the working platform of each suspended unit is secured to the building facade by at least one of the following methods:
 - Continuous engagement to building anchors
 - Intermittent engagement to building anchors
 - Button guide engagement
 - Angulated roping and building face rollers
 - A system equivalent to continuous engagement to building anchors.



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WAC 296-870-700

Rule

WAC 296-870-70045

Suspended equipment guardrail system

You must

- Make sure each working platform of a suspended unit has a guardrail system on all sides that consists of a top guardrail, midrail, and a toeboard.
- Make sure the top guardrail is:
 - At least 38 inches (950 mm) high

and

 - Able to withstand at least a 200 pound (890 n) force in any downward or outward direction.
- Make sure the midrail is able to withstand at least a 75 pound (333 n) force in any downward or outward direction.
- Make sure material encloses the area:
 - Between the top guardrail and the toeboard on the ends and outboard side of the platform

and

 - Between the midrail and the toeboard on the inboard side of the platform.
- Make sure the material surrounding the platform is:
 - Able to withstand a load of 100 pounds (45.4 kg) applied horizontally over any area of one square foot (.09 m²)

and

 - Has openings small enough to not allow passage of life lines and potential falling objects.

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WAC 296-870-700

Rule

WAC 296-870-70045

Suspended equipment guardrail system (continued)

- Make sure toeboards are all of the following:
 - Capable of withstanding, without failure, a force of at least 50 pounds (222 n) applied at any point in a downward or horizontal direction
 - At least 4 inches (9 cm) from their top edge to the level of the platform floor
 - Securely fastened in place at the outermost edge of the platform
 - Installed so there isn't more than a one-half inch (1.3 cm) gap between the bottom of the toeboard and the platform floor
 - Solid or with openings not more than one inch (2.5 cm) in the greatest dimension.



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Rule

WAC 296-870-70050

Suspended working platforms and manned platforms used on supported equipment

You must

- Make sure the width of the working platform is:
 - At least 24 inches (610 mm)

and

 - Allows a minimum of a 12-inch (305 mm) wide passage at or past any obstruction on the platform.
- Make sure the platform has slip-resistant flooring.
- Make sure any opening in the platform is either:
 - Small enough to prevent passage of life lines, cables, and other potential falling objects

or

 - Protected by material under the opening which prevents the passage of life lines, cables, and potential falling objects.
- Make sure means are provided to store any cable suspended from above the platform to keep it from accumulating on the floor of the platform.
- Make sure means are provided to secure all tools, water tanks, and other accessories to keep them from moving or accumulating on the floor of the platform.
- Make sure flammable liquids aren't carried on the working platform.
- Make sure a type B-C portable fire extinguisher is provided and securely attached on all working platforms.

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WAC 296-870-700

Rule

WAC 296-870-70050

Suspended working platforms and manned platforms on supported equipment (continued)

You must

- Make sure operating controls for vertical travel of the platform are:
 - Continuous-pressure type**and**
 - Located on the platform.
- Make sure the maximum rated speed of the platform is limited to:
 - 50 feet per minute (0.3 ms) for single speed hoists**and**
 - 75 feet per minute (0.4 ms) for multispeed hoists.
- Make sure access to and egress from a working platform, except for those that land directly on a safe surface, is provided by stairs, ladders, platforms or runways.
- Make sure access gates are self-closing and self-latching.



Reference:

- Requirements for stairs, ladders, platforms and runways are found in other chapters:
 - Working Surfaces, Guarding Floors and Wall Openings, Ladders, Part J-1, in the General Safety and Health Standards, Chapter 296-24 WAC
 - Scaffolds, Chapter 296-874 WAC
 - Ladders, portable and fixed, chapter 296-876 WAC.
- Make sure a suspended platform's suspension system restricts the platform inboard to outboard roll around its longitudinal axis to not more than 15 degrees from the horizontal when moving the live load from the inboard to the outboard side of the platform.



Note:

The roll limitation doesn't apply to supported equipment.



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WAC 296-870-700

Rule

WAC 296-870-70055

Working platform fall protection

You must

- Make sure a secondary wire rope suspension system which prevents the platform from falling if the primary means of support fails is provided on:
 - Working platforms that contain overhead structures which restrict emergency egress

and

 - Single-point suspended working platforms.
- Make sure each person on the working platform is provided with a fall arrest system that:
 - Meets the requirements of Appendix C-Personal fall arrest system, WAC 296-24-88050, found in the General safety and health standards, chapter 296-24 WAC

and

 - Uses a horizontal lifeline or direct connection anchorage on platforms that contain overhead structures which restrict emergency egress.
- Make sure platforms suspended by two or more wire ropes are provided with vertical lifelines if failure of one wire rope or suspension attachment will cause the platform to upset.



Note:

Vertical lifelines aren't required for the fall arrest system if a secondary wire rope suspension is used and each person is attached to a horizontal lifeline anchored to the platform.

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WAC 296-870-700

Rule

WAC 296-870-70060

Two-and four-point suspended working platforms

IMPORTANT:

- In addition to these requirements, you also need to meet the requirements of both of the following sections in this chapter:
 - Suspended working platforms and manned platforms used on supported equipment, WAC 296-870-70050
 - Working platform fall protection, WAC 296-870-70055.

You must

- Make sure an emergency electric operating device is provided on roof powered platforms that:
 - Can be used if either the normal operating device located on the platform or the cable connected to the platform fails

and

 - Is mounted in a secured compartment near the hoisting machine.
- Make sure the secured compartment containing the emergency electric operating device:
 - Is labeled with instructions for using the emergency electric operating device

and

 - Has means for opening the compartment mounted in:
 - A break-glass receptacle near the emergency electric operating device

or

 - An equivalent secure and accessible location.



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WAC 296-870-700

Rule

WAC 296-870-70065

Ground-rigged working platforms

IMPORTANT:

- In addition to these requirements, you also need to meet the requirements of both of the following sections in this chapter:
 - Suspended working platforms and manned platforms used on supported equipment, WAC 296-870-70050
 - Working platform fall protection, WAC 296-870-70055.

You must

- Make sure, after each day's use, ground-rigged working platforms are:
 - Disconnected from the power supply within the building

and

 - Disengaged from its suspension points or secured and stored at grade.

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WAC 296-870-700

Rule

WAC 296-870-70070

Intermittently stabilized working platforms

IMPORTANT:

- In addition to these requirements, you also need to meet the requirements of both of the following sections in this chapter:
 - Suspended working platforms and manned platforms used on supported equipment, WAC 296-870-70050
 - Working platform fall protection, WAC 296-870-70055.

You must

- Make sure each stabilizer tie is equipped with a “quick connect-quick disconnect” device for attachment to the building anchor that:
 - Can't be accidentally disengaged

and

 - Is resistant to adverse environmental conditions.
- Make sure the platform has a stopping device that will interrupt the hoist power supply in the event the platform contacts a stabilizer tie during its ascent.
- Make sure intermittently stabilized platforms use stabilizer ties that:
 - Allow the specific attachment length needed to obtain the predetermined angulation of the suspended wire rope

and

 - Maintain the specific attachment length at all building anchor locations.
- Make sure stabilizer ties can be attached and removed without horizontal movement of the platform.

- Continued -



New Installations - Equipment

WAC 296-870-700

Rule

WAC 296-870-70070

Intermittently stabilized working platforms (continued)

- Make sure platform-mounted equipment and suspension wire ropes:
 - Won't be damaged by the loads from the stabilizer tie or its building anchor;
and
 - Are able to withstand a load that's at least twice the ultimate strength of the stabilizer tie.
- Make sure building face rollers are placed so they don't contact exterior anchors used on the building face.
- Make sure the platform maintains continuous contact with the building face while ascending and descending.

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WAC 296-870-700

Rule

WAC 296-870-70075

Button guide stabilized working platforms

IMPORTANT:

- In addition to these requirements, you also need to meet the requirements of both of the following sections in this chapter:
 - Suspended working platforms and manned platforms used on supported equipment, WAC 296-870-70050
 - Working platform fall protection, WAC 296-870-70055.

You must

- Make sure two guide tracks are mounted on the platform and provide continuous contact with the building face.
- Make sure each guide track on the platform meets all of the following:
 - Engages a minimum of two guide buttons during any vertical travel of the platform after the initial button engagement
 - Is sufficiently maneuverable by platform occupants to permit easy engagement of the guide buttons
 - Can be easily moved into and out of its storage position on the platform.
- Make sure each guide track on the platform of a roof-rigged system has a storage position on the platform.
- Make sure load carrying components of the button guide stabilization system which transmit the load into the platform are either:
 - Able to support the weight of the platform

or

 - Are prevented by the guide track connectors or platform attachments from having the weight of the platform transmitted to the platform attachments.



New Installations - Equipment

WAC 296-870-700

Rule

WAC 296-870-70080

Supported equipment

IMPORTANT:

Manned platforms used on supported equipment need to meet all the requirements, except the inboard to outboard roll limitation, of suspended working platforms and manned platforms used on supported equipment, WAC 296-870-60050.

You must

- Make sure supported equipment uses means other than friction to maintain a vertical position relative to the face of the building.
- Make sure cog wheels or equivalent means are incorporated to provide climbing traction between the supported equipment and the building guides.
- Make sure additional guide wheels or shoes are incorporated as necessary to keep the drive wheels continuously in positive engagement with the building guides.
- Make sure that, at the point where the drive wheels enter the building guides, proper alignment is maintained using launch guide mullions that are:
 - Indexed to the building guides
 - and**
 - Retained in alignment with the building guides.

New Installations - Equipment

WAC 296-870-700

Rule



WAC 296-870-70085

Suspension wire ropes and rope connections

You must

- Make sure each specific installation uses suspension wire ropes and connections or combination cable and connections meeting the specifications recommended by the hoisting machine manufacturer.
- Make sure connections are capable of developing at least 80 percent of the rated breaking strength of the wire rope.
- Make sure each suspension rope has a design factor of at least 10.



Definition:

- The **design factor** is the ratio of the rated strength of the suspension wire rope to the rated working load. It's calculated using the following formula:

$$F=(S \times N) / W \quad \text{Where:}$$

F=Design factor

S=Manufacturer's rated strength of one suspension rope

N= Number of suspension ropes under load

W=Rated working load on all ropes at any point of travel.

Example:

A working platform is suspended by 4 wire ropes (N), each having a rated strength (S) of 3000 pounds. The rated working load of the platform (W) is 1000 pounds. Calculate the design factor (F) as follows:

$$F=(S \times N) / W = (3000 \times 4) / 1000 = 12000 / 1000 = 12$$

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New Installations - Equipment

WAC 296-870-700

Rule

WAC 296-870-70085

Suspension wire ropes and rope connections (continued)

You must

- Make sure the minimum grade of suspension wire rope used is improved plow steel or equivalent.
 - Make sure suspension wire ropes are sized to conform with the required design factor, but never less than 5/16 inch (7.94 mm) in diameter.
 - Make sure there isn't more than one reverse bend in 6 wire rope lays.
 - Make sure a suspension wire rope that's to be used at a specific location, and will remain at that location, has a corrosion-resistant tag that:
 - Is securely attached to one of the wire rope fastenings
- and**
- Bears the following wire rope information:
 - Diameter in inches or millimeters (mm)
 - Construction classification
 - Whether nonpreformed or preformed
 - Grade of material
 - Manufacturer's rated strength
 - Manufacturer's name
 - Month and year the ropes were installed
 - Name of the person or company which installed the ropes.
 - Make sure a new tag is installed at each wire rope renewal.

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WAC 296-870-700

Rule

WAC 296-870-70085

Suspension wire ropes and rope connections (continued)

- Make sure when resocketing the wire rope either:
 - The original tag is stamped with the date of resocketing

or

 - The original tag is retained and a supplemental tag added that shows:
 - The date of resocketing

and

 - The name of the person or company that resocketed the rope.
- Make sure winding drum type hoists contain at least three wraps of the suspension wire rope on the drum when the suspended unit has reached the lowest possible point of its vertical travel.
- Make sure traction drum and sheave type hoists use wire rope long enough to reach the lowest possible point of vertical travel of the suspended unit, and an additional length of the wire rope of at least 4 feet (1.2 m).
- Make sure suspension wire rope is never lengthened or repaired.
- Make sure babbitted fastenings are never used with suspension wire rope.



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WAC 296-870-700

Rule

WAC 296-870-70090

Control circuits, power circuits and electrical protective devices



Reference:

Unless otherwise specified in this chapter, make sure electrical wiring and equipment meet the requirements of Electrical, Part L in the General Safety and Health Standards, Chapter 296-24 WAC.

You must

- Make sure electrical runway conductor systems are:
 - Designed for use in exterior locations

and

 - Located so they don't come in contact with accumulated snow or water.
- Make sure cables are protected against damage resulting from over-tensioning or other causes.
- Make sure the control system requires the operator to follow predetermined procedures to operate suspended or supported equipment.
- Make sure the control system has:
 - Devices included to protect the equipment against electrical overloads, 3-phase reversal and phase failure

and

 - A separate method that's independent of the direction control circuit to break the power circuit in case of an emergency or malfunction.
- Make sure installations where the carriage doesn't have a stability factor of at least 4 against overturning have electrical contacts provided and connected so that the operating devices for suspended or supported equipment will only function when the carriage is located and mechanically retained at an established operating point.

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New Installations - Equipment

WAC 296-870-700

Rule

WAC 296-870-70090

Control circuits, power circuits and electrical protective devices (continued)

- Make sure the hoisting or suspension system has overload protection to prevent the equipment from operating in the "up" direction with a load greater than 125 percent of the rated load of the platform.
- Make sure an automatic detector is provided for each suspension point that will do both of the following if a suspension wire rope becomes slack:
 - Interrupt power to all hoisting motors for travel in the "down" direction**and**
 - Apply the primary brakes.



Note:

A continuous-pressure rigging-bypass switch designed for use during rigging is permitted. It can only be used during rigging.

You must

- Make sure upper and lower directional switches are provided that are designed to prevent the travel of suspended units beyond safe upward and downward levels.
- Make sure remote controlled, roof-powered manned platforms have an emergency stop switch located adjacent to each control station on the platform.
- Make sure cables which are in constant tension have overload devices which will prevent the tension in the cable from interfering with:
 - The device that limits the hoist from lifting a load greater than 125 percent of the rated load of the platform**and**
 - The platform roll limiting device required by WAC 296-870-70050, Suspended working platforms and manned platforms used on supported equipment.



Notes
