

OSSC-04 Rooftop Fall Protection and Anchorages

Ref #	Section	Issue	Possible Options/Solutions	Proposed Resolution
1	1501.2	Inappropriate or unnecessary code language	1) Remove last sentence of first paragraph that begins "The intent of this section. . . ." 2) Move this sentence to front of section as a scope introduction.	Create Scope description and insert language from last sentence of first paragraph.
2	1501.2	Reference to Section 1013 which also refers to 1607.7. Would it be necessary to also reference both sections?	1) Remove reference to Section 1013 and replace with Chapter 10 2) ???	Modify to add reference to Section 1607.7 in addition to Section 1013.
3	1501.2	Reference to walking surface in first sentence of proposed amendment and also Section 1013.1 references walking surfaces but does not define roofs as a walking surface.	1) Remove language "from the walking surface" from first sentence. 2) Consider this a non-issue as reference is to guards and not the requirements or applications for guards that are addressed in Ch 10.	Remove language "from the walking surface" from first sentence.
4	1501.2	First sentence refers to "guards as defined in Section 1013. . ." in attempt to use existing code requirements for guards. Is this best way to characterize minimum requirements for parapet height or guards for fall protection purposes?	1) Insert language for guards/guardrails consistent with that in Ch 10. 2) Accept reference as appropriate and resolution of #3 and #4 will suffice.	Keep reference to "guards" from Section 1013 and as noted in Issue 2, add reference to 1607.7.
5	1501.2	Options for design of anchorages by a RPE may be confusing. Even with addition of "by a RPE" in the sentence followed by "to be capable of sustaining a minimum of 5000 pounds," the 3 options available to engineer or owner may not provide clarity.	1) Phrase differently to identify options available to engineer and/or owner. 2) Limit options to a default and then provide exceptions. 3) Insert sentence or clause to clarify that engineering and stamped drawings from vendors RPE would meet requirements.	Move engineering requirements to new section in 1607. Live Loads with clarified language on options available to engineer. Add language to clarify vendor RPE meets requirements.
6	Table 1501.2	Elsewhere in code tables are prescriptive and not examples.	1) Remove table and reference to it. 2) Decide that table adds clarity and value.	Remove table and references to it.

Ref #	Section	Issue	Possible Options/Solutions	Proposed Resolution
7	1501.2.1	Language that refers to need for anchorages to be unobstructed may cause confusion as relates to equipment, pipe penetrations, roof vents, etc.	1) Provide clarifying language that distinguishing between building system components that would limit function of fall protection system secured to anchor.	Provide clarifying language that distinguishing between building system components that would limit function of fall protection system secured to anchor.
8	1501.2.4	Language referring to special inspections is not phrased properly.	1) Revise sentence to say ". . .and their attachment are subject in accordance with special inspection per Section 1704."	Modify language as suggested.
9	1501.2.4	Criteria for special inspection is not identified as is otherwise in 1704.	1) Add phrase to refer back to stamped drawings in 1501.2.3 for criteria.	Moving design requirements to 1607 and language to refer to drawing and calculations will provide basis for special inspection.
10	1501.2	There is no exception for buildings regulated by the OSSC that are small or have no or limited fall exposure.	1) Provide a footprint exclusion. 2) Provide an exclusion for maximum footprint with no rooftop equipment or systems that would need rooftop exposure.	Provide exclusion for roofs without mechanical or electrical equipment, designated access where building footprint is less than 1000 sq ft.
11	1501.2	Is scope of amendment limited to new construction or to include reroofing?	1) Have scope apply to any installation that would need to meet current code requirements. 2) Limit scope to new construction and exclude reroofing.	Scope to apply to new construction only.
12	1501.2	OSSC does not address maintenance and so cannot provide assurances for subsequent use of anchors.	1) Default to engineer (project or vendor) recommendations provided to owner stamped drawings and through O&M's. 2) Provide note in code that periodic or post application of dynamic load to anchor should involve inspection by qualified person.	Issue addressed in similar fashion to current code for guards with focus on initial design and construction requirements.

Proposed Code Amendment: OSSC 10-04

Revised Proposed Language:
Submitted 7/22/2009

IBC 2009, Chapter 15 Roof Assemblies and Rooftop Structures

Section 1501 GENERAL

1501.2 Rooftop Fall Protection and Anchorages

1501.2. Scope. This section prescribes personal fall protection requirements that safeguard individuals on rooftops.

1501.2.1 General. Roofs without fall protection to a lower level by parapets, guardrails or guards as defined in Section 1013 and Section 1607.7 shall have fall protection anchorage devices designed and installed in accordance with Section 1607.14.

Exceptions:

1. Buildings with a footprint less than 1000 sq. ft. and without rooftop mechanical or electrical equipment or designated access to the roof.
2. Reroofing.

Anchorage means a secure point of attachment for lifelines, lanyards or deceleration devices and when used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms. Unless designed for multiple persons, anchorages shall be designed for supporting a single person. When plan dimensions allow, anchorages must be placed at least 10 feet from the roof's edge and positioned such that no location from the roof or parapet edge is at an angle greater than 25 degrees. The spacing of additional anchors is illustrated in Figure 1501.2.1.

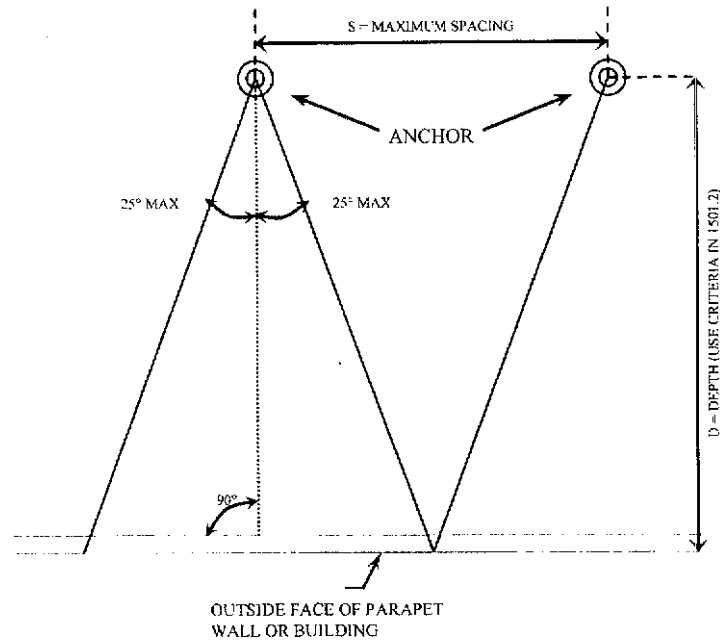
Figure 1501.2.1
Plan View of Roof Showing Anchor Spacing (S)

$$S = 2D(\tan 25\text{deg})$$

where

S = maximum spacing between anchors

D = perpendicular distance (depth) from roof edge to anchor



1501.2.2 Obstructions. Anchorages must be unobstructed and located in line with the portion of the building they are serving such that no building component would limit the function of a fall protection system. Rooftop screens and structures may support anchorages when designed and installed in accordance with Section 1607.14. They must have rounded edges so they do not damage anything attached to them.

Note: These anchorage requirements are consistent with the following standards and regulations: the American National Standards Institute (ANSI)/Specifications and Design Requirements for Active Fall Protection Systems, Z359.6, 2009; the U.S. Department of Labor's Code of Federal Regulations (CFR) for fall protection found in 29 CFR 1926.502 (d)(15), 29 CFR 1926 Subpart M, Appendix C (h); and Oregon's Administrative Rules (OAR) for fall protection found in OAR 437-002-0125.

IBC 2009, Chapter 16 STRUCTURAL DESIGN

Section 1607 LIVE LOADS

1607.14 Fall Protection Anchorages.

1607.14 Fall Protection Anchorages. Design for fall protection anchorages shall be by a registered professional engineer in accordance with ANSI Z359.6, *Specifications and Design Requirements for Active Fall Protection Systems*.

Exception:

1. Anchorage devices and systems designed by a registered professional engineer that are capable of sustaining a minimum 5000 lb. load in any direction that such load may reasonably be applied.
2. Anchorages and engineered systems designed by a registered professional engineer that reduce impact loading to the building structure may be used to the satisfaction of the building official.

1607.14.1 Materials. Anchorages that have a hidden surface must be made of non-corrosive and durable materials that will withstand impact loads.

1607.14.2 Components. Anchorage components and their attachment shall be designed by a registered professional engineer. Engineered stamped drawings and calculations, as either original or deferred submittals, are required to be part of the construction documents.

1607.14.3 Inspections. Anchorage components and their attachment are subject to *special inspections* in accordance with Section 1704 and to specifications included with construction documents provided by registered professional engineer.

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Contents

SECTION	PAGE
1. Scope and exceptions	9
1.1 Scope	9
1.2 Purpose & application	9
1.3 Exceptions	10
1.4 Interpretations	11
2. Definitions	11
3. Drawings and specifications	22
3.1 General	22
3.2 Sealing by a professional engineer	23
3.3 Required Information	23
4. Materials, equipment, and other design requirements	25
4.1 Composition of materials	25
4.2 Ductility of materials	25
4.3 Environmental considerations	26
4.4 Equipment	26
4.4.1 General	26
4.4.2 Compatibility	26
4.4.3 Energy absorbers	26
4.4.4 Self-retracting lanyards	28
4.4.5 Lanyards	30
4.4.6 Full-body harnesses	30
4.4.7 Fall arresters	30
4.4.8 Horizontal lifeline energy absorbers	31
4.5 Other design requirements for travel-restraint systems	31
4.6 Other design requirements for fall-arrest systems	32
4.6.1 General	32
4.6.2 Rescue	32
4.6.3 Anchorage for suspended equipment operations	32
4.6.4 Inspection of components not addressed by a manufacturer's requirements	32
5. Safety criteria	32
5.1 Specified loads	32
5.2 Strength	33
5.2.1 General	33
5.2.2 Determination of factored resistance	33
5.2.3 Determination of factored load effects	35
5.3 Swing fall	35
5.4 Forces on the worker's body	35
5.4.1 Travel-restraint systems	35
5.4.2 Fall-arrest systems	36
5.5 Clearance	36
5.5.1 Travel-restraint systems	36
5.5.2 Fall-arrest systems	36
5.6 Stability of freestanding systems	37
5.6.1 General	37
5.6.2 Manufactured products	37
5.6.2.3 Overturning of counterbalanced systems	37
5.6.2.4 Sliding of ballasted systems	38
6. Fall-protection system loads and forces	38

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ASSE Staff and TEKramer to review all sections and page numbers prior to final publishing, including cross referencing section numbers and figures within document.

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6.1	General	38
6.2	Travel-restraint systems	38
6.2.1	Maximum arrest force and maximum arrest load	38
6.2.2	Level surfaces	39
6.2.3	Sloping surfaces	39
6.3	Fall-arrest systems	39
6.3.1	Maximum arrest force and maximum arrest load	39
6.3.2	Design mass-weight of workers	39
6.3.3	Deployment force of personal energy absorbers and energy-absorbing lanyards	39
6.3.4	Deployment force of clutching self-retracting lanyards	40
6.3.5	Impact force of non-clutching self-retracting lanyards	40
6.3.6	Deployment force of horizontal lifeline energy absorbers	41
6.3.7	Multiple-worker falls	42
6.3.8	Horizontal systems	43
7.	Clearances for fall-arrest systems	44
7.1	Clearance reference	44
7.2	Required clearance	44
7.2.1	General	44
7.2.2	Free-fall distance	44
7.2.3	Deceleration distance	45
7.2.4	Stretch out	47
7.2.5	Swing-fall distance	47
7.2.6	Safety margin	47
7.2.7	Clearance for equivalent lumped-mass simulation of multiple-worker falls	47
8.	Design assumptions and analytical methods	48
8.1	Elasticity of ropes	48
8.1.1	Wire ropes	48
8.1.2	Synthetic ropes	48
8.2	Horizontal lifelines sags	48
8.3	Analytical methods	49
8.3.1	General	49
8.3.2	Dynamic analysis	49
8.3.3	Energy analysis	49
8.3.4	Static analysis	49
8.3.5	Testing and interpolation analysis	50
8.3.6	Other acceptable methods	51
9.	References	51
10.	Figures	53
Appendices		
A	(informative) – Commentary	59
B	(informative) – Bibliography	72
Tables		
6.1	Lumping factor, M	43

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AMERICAN NATIONAL STANDARD Z359.6
SPECIFICATIONS AND DESIGN REQUIREMENTS FOR ACTIVE FALL-PROTECTION SYSTEMS1.0 SCOPE, PURPOSE, APPLICATIONS,
EXCEPTIONS AND INTERPRETATIONS

1.1 Scope.

1.1.1 This Standard is intended for engineers with expertise in designing fall-protection systems. It specifies requirements for the design and performance of complete active fall-protection systems, including travel-restraint and vertical and horizontal fall-arrest systems.

E1.1.1 In most cases, the engineer should be a professional engineer. However, there are some exceptions where it is permissible per a local building code for an engineer who is not registered with a state or other governing body to perform engineering. It is strongly recommended that if this work is being performed by a consultant for a client, that the work be performed under the supervision of a professional engineer.

1.2 Purpose and Application.

1.2.1 This ~~specification-standard~~ has been developed as a consensus document to provide uniform practice in the design of active fall protection systems. The intention is to provide design criteria for routine use and not to provide specific criteria for infrequently encountered problems which occur.

1.2.2 This standard involves the application of the last option from the hierarchy of fall protection – active fall protection systems. Other options for employee protection should be considered prior to the employer selecting the use of an active fall protection system.

E1.2.2 The Z359.2 standard contains a hierarchy of fall protection (See section 5.1). The first and preferred element of the hierarchy is eliminating fall hazards.

OSHA Instruction STD 1-1.13 states that "in situations where the safeguarding [through the use of physical barriers is] not applicable because employees are exposed to falls from an elevated surface other than a predictable and regular basis, personal protective equipment as required by 29 CFR 1910.132(a) or other effective fall protection shall be provided."

Furthermore, predictable and regular was defined in this document as

- a. At least once every 2 weeks, or*
- b. For a total of 4 man-hours or more during any sequential 4-week period (e.g., 2 employees once*

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every 4 weeks for 2 hours = 4 man-hours per 4-week period).

1.3 Exceptions.

1.3.1 This Standard is not intended as a substitute for testing and certification of individual components of fall-protection equipment in accordance with applicable ANSI Z359 equipment standards.

1.3.2 This Standard does not cover the design of passive fall-protection systems such as guardrails and nets, except where such passive systems are also designed to serve as anchorage and/or anchorage connector subsystems for active fall-protection systems covered by this Standard.

1.3.3 This Standard does not cover the design of positioning systems.

1.3.4 This Standard does not cover the determination of structural strength and behavior of components or anchorages of active fall-protection systems. It does, however, establish the safety criteria once the strengths and behaviors are known. Such strengths and behaviors are determined by analytical testing or engineering methods and by AISC, ACI, NDS or other design Standards for the materials and structural systems being used. The IBC, ASCE, state and local building codes shall be referenced by the designer of active fall protection systems.

1.3.5 This Standard does not specify design or performance requirements for fall-arrest equipment or systems that have been manufactured and successfully tested in accordance with the requirements of another ANSI Z359 Standard.

1.3.6 This Standard does not supersede the requirements of applicable occupational safety and health regulations. Where the requirements in this Standard differ from legislated requirements, the most

AISC – American Institute of Steel Construction.
ACI – American Concrete Institute
NDS – National Design Standard for Wood Construction
IBC – International Building Code
ASCE – American Society of Civil Engineers

E1.3.5. Acceptance of material supplied from outside of the United States. For equipment in which an ANSI standard does not exist, engineers can consider fall arrest equipment complying with EN, CSA AU and NZ standards as acceptable alternatives after a review of the applicable foreign standard.

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conservative requirement shall be followed.

1.3.7 In ANSI Standards, "shall" is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; "should" is used to express a recommendation or that which is advised but not required; and "may" is used to express an option or that which is permissible within the limits of the standard. Notes accompanying sections do not include requirements or alternative requirements; the purpose of the e-column accompanying a section is to separate from the text explanatory or informative material. Notes to tables and figures are considered part of the table or figure and may be written as requirements. Legends to equations and figures are considered requirements.

1.4 Interpretations.

Requests for interpretations of this standard shall be in writing and addressed to the Secretariat of this standard.

2.0 DEFINITIONS

Following acceptance by ANSI, this section will be removed from this standard and incorporated into the Z359.0 prior to publication. The definitions shown with a strikethrough are consistent with the current Z359.0 definitions. The other definitions shown will be incorporated into the Z359 standard as either a new definition or modification to an existing standard.)

The following definitions apply in this Standard:

~~2.1 Activation distance~~

~~The distance that a fall arrester travels, or an SRL pays out, from the moment that the falling mass is released until the arresting force is initially applied to the mass.~~

~~2.2 Active fall protection system~~

~~A means of providing fall protection that requires workers to take specific actions, including wearing (and otherwise using) personal fall protection equipment and following prescribed procedures. Examples include travel restraint and fall arrest~~

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