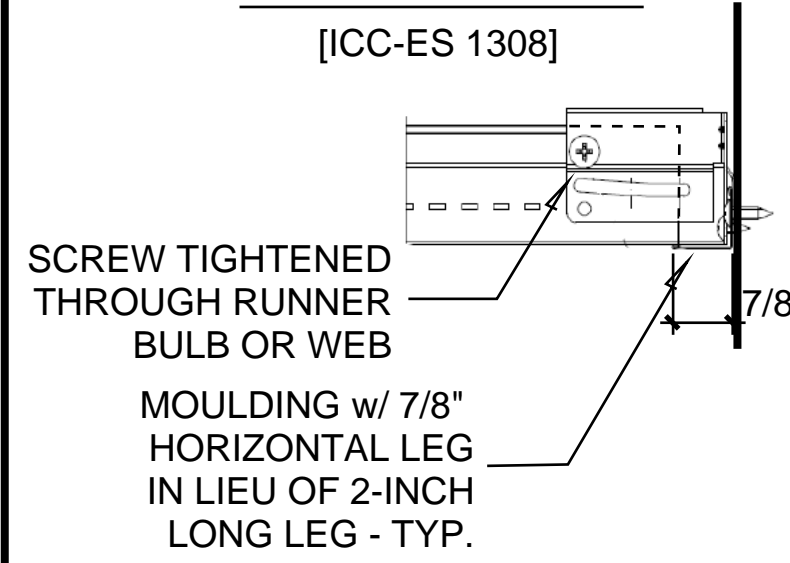
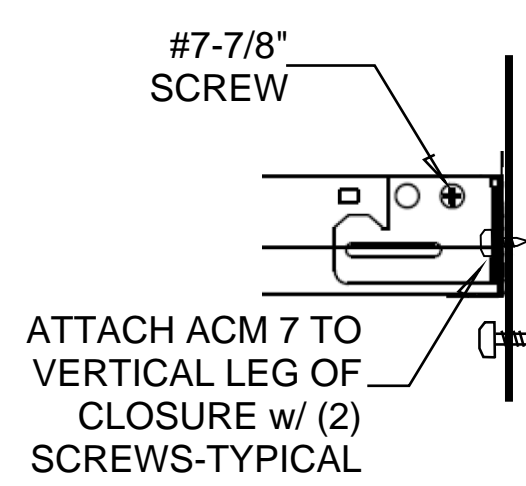


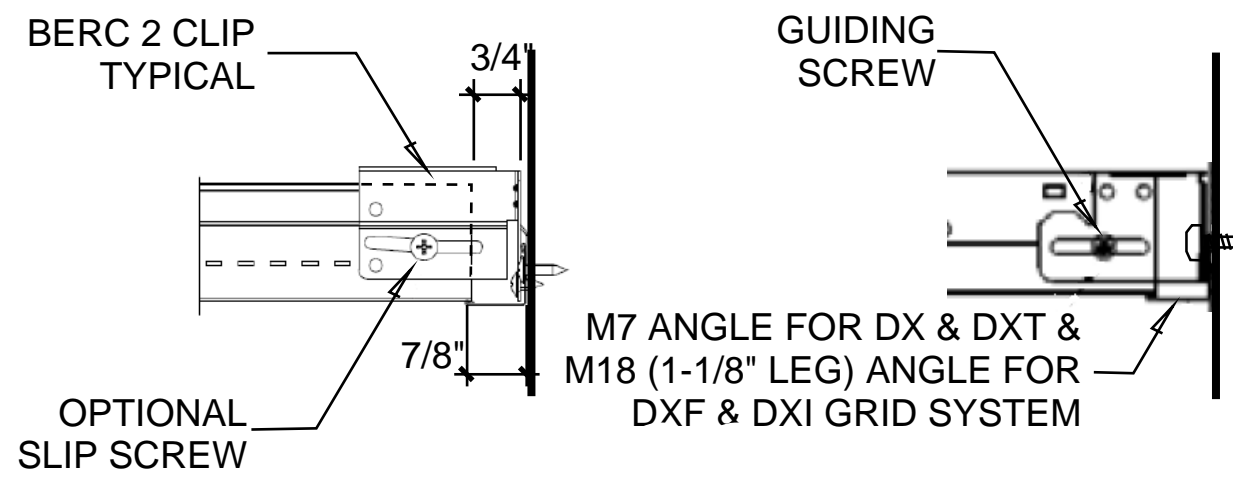
WORTHINGTON ARMSTRONG VENTURE (WAVE) BERC 2 OPTION
[ICC-ES 1308]



USG ACM7 OPTION
[ICC-ES 1222]



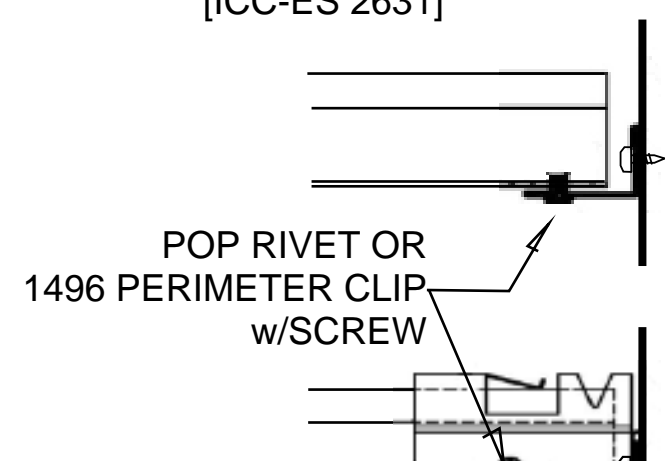
FIXED END



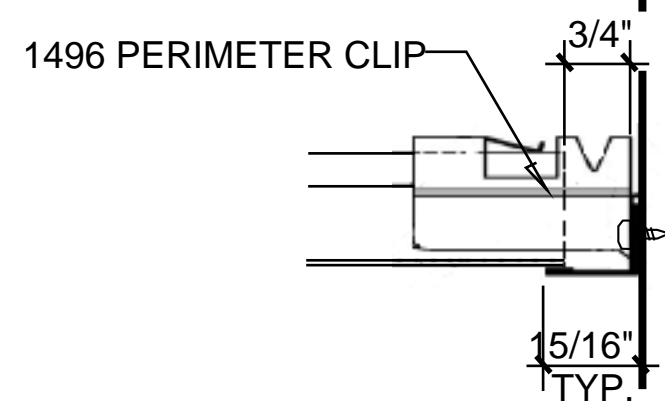
FREE END

ROCKFON CHICAGO METALLICA 1496 PERIMETER CLIP OPTION
[ICC-ES 2631]

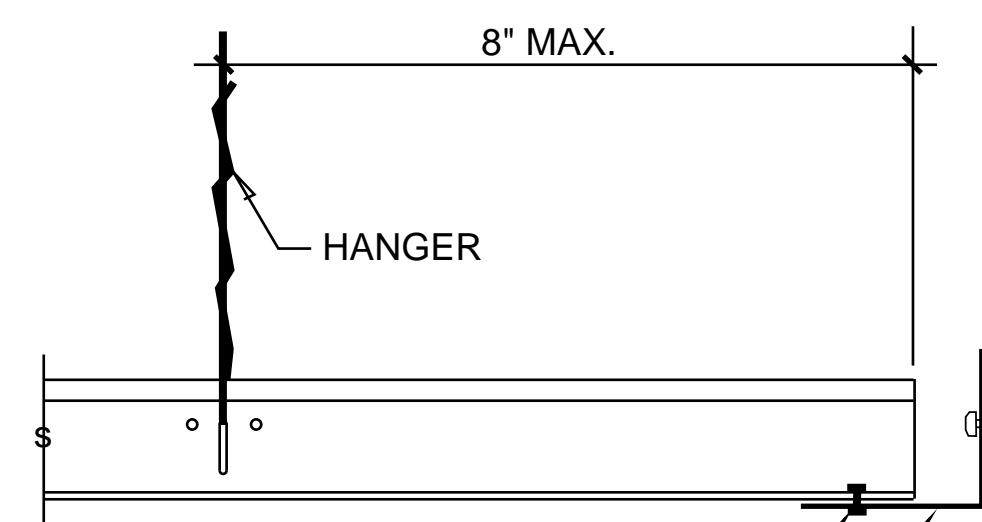
FIXED ENDS



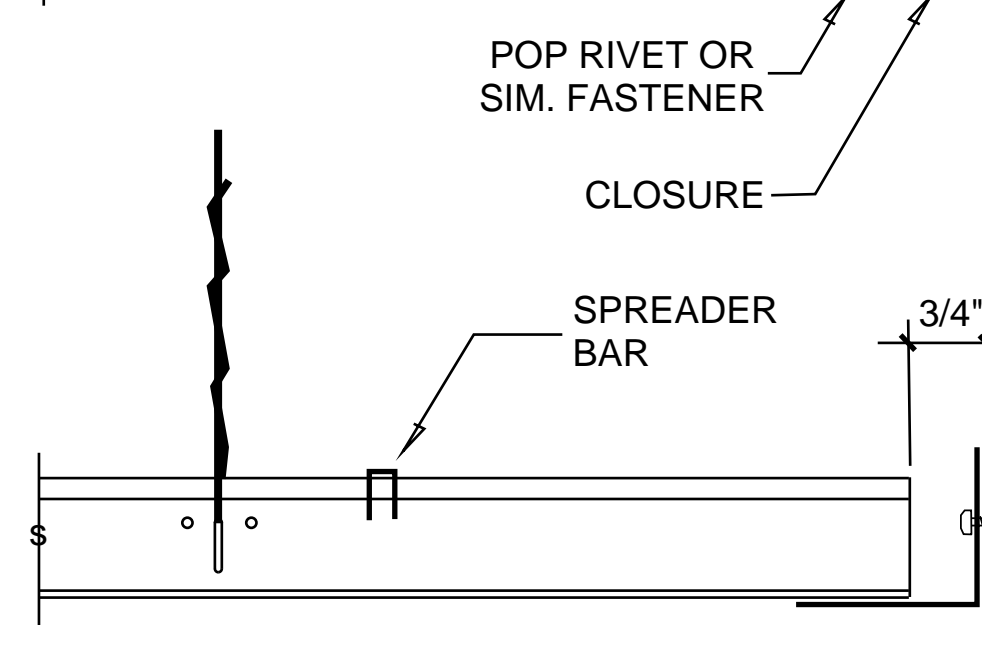
FREE ENDS



FIXED ENDS



FREE ENDS



PERIMETER DETAILS

13. **Light Fixtures** [ASTM E580, 5.3]. Light fixtures in conjunction with suspended acoustical or lay-in panel ceiling systems shall be shown to comply with the provisions of ASTM E580, 5.3.
 - 13a. **Attachment of Light Fixture to Grid** [ASTM E580, 5.3.1]. Attach light fixture securely to grid system with minimum two (2) fasteners or attachment devices that is capable of resisting 100-percent of the load acting in any direction.
 - 13b. **Surface-Mounted Light Fixtures** [ASTM E580, 5.3.2]. Where applicable, surface-mounted light fixtures shall be attached to the ceiling suspension system with positive clamping devices that completely surrounds the supporting members. Safety wires shall be attached between the clamping device and the adjacent ceiling hanger or the structure above. In no case shall the fixture exceed the design carrying capacity of the supporting members.
 - 13c. **Supplemental Hangers** [ASTM E580, 5.3.3]. At the intersection of two cross-runners that support the light fixtures, provide supplemental hangers attached to the structure above where the carrying capacity of the cross-runners are less than 16 plf.
 - 13d. **Safety Wire Requirement for Light Fixtures Weighing Less than 10 pounds** [ASTM E580, 5.3.4]. Provide at least one No. 12 gauge safety wire (may be slack) attached directly to the light fixture and to the structure above.
 - 13e. **Safety Wire Requirement for Light Fixtures Weighing 10 pounds to Less Than 56 Pounds** [ASTM E580, 5.3.4]. Provide at least three (3) No. 12 gauge safety wires (may be slack) attached directly to the light fixture and to the structure above.
 - 13f. **Light Fixtures Weighing 56 Pounds or More** [ASTM E580, 5.3.5]. Suspend light fixtures weighing more than 56 pounds directly from the structure above.
 - 13g. **Pendant Hung Light Fixtures** [ASTM E580, 5.3.7]. Hang pendant light fixtures directly from the structure above with minimum No. 9 gauge wire or alternate support that is conspicuously shown and detailed on the approved construction drawings, taking into consideration the seismic provisions of ASCE 7, 13.5.1 for architectural components.
14. **Air Terminals and Other Services** [ASTM E580, 5.4]. The installation of air terminals and other services with suspended acoustical or lay-in panel ceiling systems shall be shown to comply with the provisions of ASTM E580, 5.4.
 - 14a. **Ceiling Mounted Air Terminals and Other Services Weighing Less than 20 Pounds** [ASTM E580, 5.4.1]. Ceiling mounted air terminals and other services weighing less than 20 pounds may be supported from the grid provided that all runners that support the elements have a minimum load carrying capacity of 16 plf and that the air terminal or service is positive attached to the grid system.
 - 14b. **Ceiling Mounted Air Terminals and Other Services Weighing More than 20 Pounds but Less Than 56 Pounds** [ASTM E580, 5.4.2]. Ceiling mounted air terminals and other services weighing more than 20 pounds but less than 56 pounds shall have in addition to the requirements of ASTM E580, 5.4.1, at least two No. 12 safety wires (need not be taut) connected from the terminal or service to the structure above.
 - 14c. **Ceiling Mounted Air Terminals and Other Services Weighing 56 Pounds or More** [ASTM E580, 5.4.3]. Ceiling mounted air terminals and other services weighing 56 pounds or more shall be supported directly from the structure above by approved hangers.
15. **Partitions** [ASTM E580, 5.5 as modified by ASCE 7, 13.5.8]. Except as provided for within the exceptions of ASCE 7, 13.5.8 and which are shown with adequate detailed drawings within the approved construction drawing set, partitions shall be independently braced to the building structure as required by and in compliance with ASCE 7, 13.5.8 and ASTM E580, 5.5.
16. **Ceiling Penetrations** [ASTM E580, 5.6]. Columns, independently supported fixtures, and other similar penetrations shall be provided with perimeter and must allow required clearances by using suitable closure details.
17. **Consequential Damage/Seismic Interaction Effects** [ASTM E580, 5.7]. The design professional shall be responsible for the functional and physical interrelationship of architectural components (ceilings), their supports, and their effect on each other so that the failure of a ceiling, mechanical or electrical component does not cause the failure of an essential ceiling, mechanical or electrical component.
8. **Requirements for Counter-Sloping Hanger Wires** [ASTM C636, 2.1.4; ASTM E580, 5.2.7.3]. Counter-sloping wires in compliance with the provisions of ASTM C636, Figure 1 shall be provided where the hanger wires are more than one-in-six out-of-plumb.
9. **Obstructions** [ASTM E580, 5.2.7.4]. Where obstructions such as ducts or equipment preclude the direct suspension of the grid, a trapeze or similar device sized to resist the dead load and lateral forces shall be used.
10. **Power-Actuated Fasteners in Concrete or Steel** [ASCE 7-16, 13.4.5]. Power actuated fasteners installed in concrete or steel shall not be used for sustained tension loads or for braced applications where the structure is classified as seismic design category (SDC) D., E, or F unless approved for seismic loading.

Exceptions:

 - 10a. **Exception 1.** Power-actuated fasteners installed in concrete used for support of suspended acoustical tile or lay-in panel ceiling systems where the service load of the individual fastener does not exceed 90 lbs.
 - 10b. **Exception 2.** Power-actuated fasteners installed in steel with a maximum required force of 250 pounds.
11. **Lateral Bracing Assemblies** [ASTM E580, 5.2.5.2 and 5.2.8.3].
 - 11a. **When Lateral Bracing Assemblies are Required.** Provide lateral bracing assemblies (splayed wires and compression strut) at 12-foot o.c. in each direction and not more than 6-feet from the edge of the ceiling grid unless the ceiling area is not larger than 144 SF and are surrounded by walls as soffits as provided for within ASCE 7-16, 13.5.2.6.
 - 11b. **Bracing Wires.** Four (4) minimum No. 12 gauge wires shall be provided with each lateral bracing assembly that is splayed 90-degrees from each other and at a maximum 45-degrees from a horizontal plane. The connection to the grid shall be made with loops terminated with four (4) full 360-degree turns wrapped around itself within a maximum 1-1/2 inch length. And attached to the structure with a connection capable of resisting a 200 pound load.
 - 11c. **Compression Strut Requirements.**
 - 1) **General.** A compression strut or compression strut assembly, as well as the bracing wires shall be provided at each lateral bracing assembly.
 - 2) **Length-to-Minimum Radius of Gyration Ratio, L/r_{min} .** The maximum length-to-minimum radius of gyration ratio, L/r_{min} , shall not be shown to exceed 200.
 - 3) **Single-Stud Alternatives.**
 - a) 350S125-18 ($r_{min} = 0.423$; $L_{max} = 84$ inches = 7'-0")
 - b) 350S125-30 ($r_{min} = 0.417$; $L_{max} = 83$ inches = 6'-11")
 - c) 350S125-33 ($r_{min} = 0.415$; $L_{max} = 83$ inches = 6'-11")
 - 4) **Double Stud Assembly Alternatives**—when attached with fasteners at maximum 16 inch o.c. and arranged 'T' shaped.
 - a) (2) 350S125-18 ($r = 1.366$; $L_{max} = 273$ inches = 22'-9")
 - b) (2) 350S125-30 ($r = 1.359$; $L_{max} = 271$ inches = 22'-7")
 - 5) **Conduit Options** (per USG Seismic Technical Guide: Compression Posts)
 - a) 1/2 inch dia. EMT conduit; 0.042" wall; $L_{max} = 47$ in. = 3'-11"
 - b) 3/4 inch dia. EMT conduit; 0.049" wall; $L_{max} = 61$ in. = 5'-1"
 - c) 1 inch dia. EMT conduit; 0.057" wall; $L_{max} = 78$ in. = 6'-6"
 - d) 1-1/4 inch dia. EMT conduit; 0.065" wall; $L_{max} = 102$ in. = 8'-6"
 - e) 1-1/2 inch dia. EMT conduit; 0.065" wall; $L_{max} = 118$ in. = 9'-10"
 - f) 2 inch dia. EMT conduit; 0.065" wall; $L_{max} = 150$ in. = 12'-6"
 - 6) **Attachment to Grid.** Compression struts shall be attached to the main runner with at least (2) No. 10 sheet metal screws or (1) 1/4-inch diameter bolt.
 - 11d. **Allowance for 1-Inch Movement** [ASTM E580, 5.2.8.5]. Sprinkler heads and other penetrations through the ceiling shall have minimum 2-inch oversize adapters, rings or sleeves that allow a 1-inch free movement in any direction.
 12. **Seismic Separation Joints** [ASTM E580, 5.2.9]. On the Reflected Ceiling Plan, identify the proposed locations and detailed required requirements for seismic separation joints where the continuous ceiling area exceeds 2,500 SF and/or the long-to-short ratio of the grid exceeds 4, or provisions for a bulkhead or partition that is independently braced back to the structure. Each area shall be shown capable of allowing a 3/4-inch axial movement. Areas surrounded by partitions or bulkheads shall be provided with closure angles as required by ASTM E580, 5.2.2. Each area with a seismic separation joint, bulkhead and/or partition shall be shown with horizontal bracing as required by ASTM E580, 5.2.8.2.
1. **Codes and Standards.** Besides ASTM C635 and C636 as referenced from CBC 808.1.1.1, the acoustical tile and lay-in ceiling grid systems shall be shown in compliance with seismic provisions of ASCE 7, Chapter 13 as referenced from CBC 1613.1 and ASTM E580, Section 5 as referenced from 13.5.6.2.2 for grid systems installed in structures classified as seismic design category (SDC) D, E or F.
2. **Compliance with ICC-ES AC 156** [ASCE 7, 13.2.5]. To comply with ICC-ES AC 156 requirements of ASCE 7, 13.2.5 the following acceptable ceiling grid assemblies may be used:
 - 2a. [ICC-ES ESR 1222] **USG Interiors, LLC.** Donn and other systems
 - 2b. [ICC-ES ESR 1289] **Worthington-Armstrong Venture (WAVE).** 8900 series, 7900 series, and XL 7936 series ceiling grid systems
 - 2c. [ICC-ES ESR-1308] **Worthington-Armstrong Venture (WAVE).** Fire and non-fire rated ceiling grid components
 - 2d. [ICC-ES ESR-2631] **Roxul USA Inc. d/b/a ROCKFON:** Rockfon® Chicago Metallic™ Suspended Ceiling Framing Systems and Suspended Ceiling Systems
3. **Special Inspection Requirement.** Special inspections shall be provided for acoustical tile and lay-in ceiling grid systems as required by CBC 1705.13.2.
4. **Main- and Cross-Runners.**
 - 4a. **Load Carrying Capacity and Spacing of Main-Runners.** Main-runners shall be 'heavy duty' as required by ASTM E580, 5.1.1 with a minimum load carrying capacity of 16 plf as defined in ASTM C635. The maximum spacing of main-runners shall be 48-inches o.c.
 - 4b. **Load Carrying Capacity and Spacing of Cross-Runners.**
 - 1) The maximum spacing of cross-runners shall be 24-inches o.c.
 - 2) Cross-runners shall have a minimum load carrying capacity of 16 plf where two intersecting cross-runners support a light fixture unless the intersection is supported by a supplemental hanger as required by ASTM E580, 5.3.3.; and
 - 3) Cross-runners shall have a minimum load carrying capacity of 16 plf where supporting air terminals and other services [ASTM E580, 5.4.1].
5. **Ceiling Perimeters.**
 - 5a. **Ceiling Closures.** Unless the closure is a part of a listed assembly, ceiling grid perimeters shall have closure angles or other elements that have a 2-inch wide horizontal leg as required by ASTM E580, 5.2.2. Closures that are a part of a listed assembly is permitted as provided for within ASCE 7, 13.5.6.2.2.

The closures shall be attached to each stud or the wall, partition, or soffit that surrounds the grid.
 - 5b. **Fixed and Free Runner Ends.** Runners shall be fixed to the closure elements on two adjacent walls with pop rivets or by other means that restrict axial as well as lateral movement. At the other two adjacent walls the runners are to be allowed to move axially 3/4-inch [ASTM E580, 5.2.3], while being restricted to move laterally by a stabilizer (or spreader) bar or by other means [ASTM E580, 5.2.4]. Where stabilizer bars are to be installed, the stabilizer bar shall be installed within 8-inches of the free end.
 - 5c. **Proprietary Clips.** Proprietary clips may be used with listed closures permitted by the amendments of ASCE 7, 13.5.6.2.2 to ASTM E580, provided that the clips are designed for the use within structures with a seismic design category (SDC) of D, E or F for a 4 psf ceiling weight.

Where proprietary clips are used, the name of the clip as well as the evaluation report number shall be clearly and conspicuously identified within the approved construction drawings along with any special requirements of the assembly.
6. **Wire Specifications.** Wire Specifications [ASTM E580, 5.2.7.1]. Hanger and bracing wires for suspended ceiling systems shall be soft-annealed, galvanized, mild steel wires and in compliance with ASTM A641. Hanger and bracing wires shall be minimum No. 12-gauge for ceilings up to 4 psf.
7. **Hanger Wire Requirements.** Minimum No. 12 gauge hanger wires shall be provided within 8-inches of the terminal ends of each runner and at maximum 48-inches o.c. along each main runner. Hanger wires shall be attached to the grid with tightly wrapped sharply bent wire loops that prevent vertical and rotational movement of the grid member. Unless otherwise detailed, hanger wires shall be terminated by wrapping the wire around itself with three (3) full 360-degree turns within a distance of 3-inches. Hanger wires shall be attached to the structure above with connections that have a minimum capacity of 100 pounds.

GENERAL NOTES AND PERIMETER DETAILS FOR SUSPENDED ACOUSTICAL TILE AND LAY-IN PANEL CEILING SYSTEMS

DATE

These drawings are intended as examples only. The City of Hawthorne assumes no responsibility or liability for any errors or omissions in the contents of this sheet. Where used in whole or in part, the individual using the content shall assume all such responsibilities.