EVALUATION REPORT Number: 688

Originally Issued: 02/08/2021 Revised: 01/02/2024 Valid Through: 02/28/2025

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ANOVA Heavy Duty System and ANOVA High Wind Load System

CSI Sections:

07 42 93 Metal Soffit/Ceiling Panels
09 50 00 Ceilings
09 51 00 Acoustic Ceilings
09 53 23 Metal Acoustical Ceiling Suspension System

1.0 RECOGNITION

Innovative Architectural Solution's (IAS) suspended ceilings systems recognized in this report have been evaluated for use as suspended ceiling framing systems. The structural performance of the ANOVA Heavy Duty System and ANOVA High Wind Load System complies with the intent of the provisions of the following codes and regulations:

- 2018 International Building Code® (IBC)
- 2019 California Building Code (CBC) – attached supplement
- 2020 City of Los Angles Building Code (LABC) – attached supplement

2.0 LIMITATIONS

Use of the ANOVA Heavy Duty System and ANOVA High Wind Load System recognized in this report is subject to the following limitations:

2.1 The ANOVA Heavy Duty System and ANOVA High Wind Load System shall be installed in accordance with the applicable code, the manufacturer's published installation instructions, and this report. Where there is a conflict, the most restrictive requirements shall govern.

2.2 Special inspections shall be performed as described in Section 3.3.5.3 of this report, when required by the building official.

2.3 The systems described in this report shall not be used to brace or provide lateral support for partitions in accordance with Section 1613 of the IBC and Section 13.5.8 of ASCE/SEI 7.

2.4 Calculations of seismic forces shall consider the weight of the ceiling, W_p, and shall include the main runners, cross runners, panels, and all other components that are laterally supported by the ceilings, when applicable. W_p shall not be less than 4 psf (192 N/m2) in accordance with Section 13.5.6.1 of ASCE/SEI 7. The ANOVA Heavy Duty System and ANOVA High Wind Load System shall be designed to resist seismic design forces in accordance with Section 13.3 of ASCE/SEI 7. Calculations shall be by a registered design professional and submitted to the building official for approval.

2.5 Lighting and mechanical services shall comply with the applicable codes and outside the scope of this report.

2.6 Fire-resistance-rated construction is outside the scope of this report.

2.7 The ANOVA Heavy Duty System and ANOVA High Wind Load System recognized in this report is produced by Innovative Architectural Solutions in Mira Loma, CA.

3.0 PRODUCT USE

3.1 General: The ANOVA Heavy Duty System and ANOVA High Wind Load System use panels and stringers that are either suspended or direct-hung installations.

3.2 Design: The ANOVA Heavy Duty System and ANOVA High Wind Load System are designed for use in interior and exterior applications where the ceiling suspension system is required to resist wind loads, where applicable, and seismic forces.

3.2.1 ANOVA Heavy Duty System: The ANOVA Heavy Duty System (Figure 1) is composed of main runners, cross runners, torsions springs, spring clips, and the Heavy Duty ANOVA panel. The main runners have a classification of heavy-duty when tested in accordance with ASTM C635. The structural performance for main runners is listed in Table 1 of this report. The panels are supported to the main runners with a minimum of four clips and springs on each side of the panel.

3.2.2 ANOVA High Wind Load System: The ANOVA High Wind System (Figure 2) is composed of main runners, main runner splices, cross runners, torsion springs, clips with cam-locks, and the ANOVA High Wind Load panel. The main runners have a classification of heavy-duty when tested in accordance with ASTM C635. The structural performance for main runners is listed in Table 1 of this report. The panels are supported at the main runners with a minimum of three cam-locks per side connected to the clips on each panel. The cross runners are attached to the main runners using #10 x ¾-inch 18-8 Self drilling ITW Buildex Teks Select.

3.2.3 Connections: The connections strengths in this section have been established through testing. Section 4.1 and Section 4.2 of this report includes descriptions of these connections and components.

3.2.3.1 Main Runners and Cross Runners: The main runners and cross runner connections have strengths exceeding 180 lbs (800 N) as required by Section 3.3 of AC368.

3.2.3.2 ANOVA Heavy Duty System Connections: Torsion springs have an ultimate tension capacity of 93 lbs (414 N). The torsion spring connection with the main runners has an ultimate tension capacity of 140 lbs (623 N). The spring clip connection to the panel has an ultimate tension capacity of 475 lbs (2113 N).

3.2.3.3 ANOVA High Wind Load System Connections: The Cam-lock connection has an ultimate tension capacity of 560 lbs (2491 N). The cam-lock connection to the panel has an ultimate tension capacity of 1126 lbs (5 kN). The cross runner connection to the main runner has a ultimate tension capacity of 1,234 lbs (5.49 KN). The main runner splice connection has an ultimate tension and compression capacity of 4,189 lbs (18.63 KN).

3.2.4 Vertical Rigid Bracing: Vertical rigid bracing members shall be designed by a registered design professional to resist the applicable seismic, wind and dead loads in accordance with ASCE/SEI 7 and Chapter 16 of the IBC. Calculations shall be by a registered design professional and submitted to the building official for approval. Vertical rigid bracing members used in exterior conditions shall be corrosion resistant and approved by the building official.

3.2.5 Exterior Installations: The system shall be designed for wind loads. The design shall be limited by the maximum spans, lengths, and allowable loads in Table 1 of this report. The design shall include analysis using the ultimate strengths defined in Section 3.2.3 of this report, as applicable. Design provisions shall be provided by IAS to an approved registered design professional. Documentation shall be by an approved registered design professional and provided to the building official for approval.

3.3 Installation:

3.3.1 General Installation: The suspended ceilings systems recognized in this report shall be designed and installed in accordance with Section 13.5.6 of ASCE/SEI 7 and Section 808 of the IBC. Documentation of the design and installation shall be provided to the building official by an approved registered design professional.

Vertical hanging wires used in the installation of the ANOVA Heavy Duty System shall comply with the requirements of ASTM C635 and shall be spaced no greater than 48 inches at cross runner and main runner intersections. Wire shall have a minimum allowable load of 100 lbs (444.82 N). Vertical hanging wires used in exterior conditions shall be corrosion resistant and approved by the building official.

Main runners and cross runners shall intersect at angles no greater than or less than 90 degrees.

3.3.2 Main Runners: The main runners shall have maximum spacing of 24 inches (50.8 mm).

3.3.3 Cross Runners: The cross runners shall have maximum spacing of 48 inches (101.6 mm) for the ANOVA Heavy Duty System and 54 inches (1372 mm) for the ANOVA High Wind System.

3.3.4 Installation and Design in Seismic Categories:

3.3.4.1 Installation and Design in Seismic Category C: The installation and design of the system shall be in accordance with ASTM C635, ASTM C636, and ASTM E580, Section 4 – Seismic Design Category C as required by Section 13.5.6.2.1 of ASCE/SEI 7.

3.3.4.2 Installation and Design in Seismic Categories D, E, and F: The installation and design of the system shall be in accordance with ASTM C635, ASTM C636, and ASTM E580, Section 5 – Seismic Design Categories D, E, and F as required by Section 13.5.6.2.2 of ASCE/SEI 7.

Vertical Rigid Bracing used in the ANOVA High Wind Load System shall be designed to limit relative lateral deflections to 0.25 inches (6.33 mm) at the connection of the system. The vertical rigid bracing shall be no farther than 12 feet on center in each direction with the first point with 6 feet (1.83 m) of each (3.66 m) wall.

For installations where the ceiling area exceeds 2,500 square feet (232.26 m^2), a seismic separation joint or a full heigh partition that breaks the ceiling up into areas exceeding 2500 square feet (232.26 m^2) shall be provided per Section 13.5.6.2.2B of ASCE/SEI 7.

3.3.4.3 Special Inspections: The registered design professional in responsible charge shall prepare a statement of special inspections, when special inspections are required, in accordance with Section 1704.3 of the IBC.

3.3.4.4 Partitions: Partitions shall be laterally braced to the building structure in accordance with Section 13.5.8 of ASCE/SEI 7.

4.0 PRODUCT DESCRIPTION

4.1 ANOVA Heavy Duty System:

4.1.1 ANOVA Panel: The ANOVA Heavy Duty panel is manufactured from 0.038-inch (0.9652 mm) thick 3003H14

aluminum with a maximum size of 2 feet (50.8 mm) by 8 feet (2.44 m) with 1 ¼-inch (31.75 mm) flanges.

4.1.2 Main Runners and Cross Runners: The main runners and cross runners are HDG-30 steel and have a face width of $^{15}/_{16}$-inch (1.5875 mm), and a depth of 1½ inches (38.1 mm). The main runners have a maximum length of 12 feet (3.66 m) with slots spaced at every 6 inches (152.4 mm) to accommodate torsions springs. The cross tees have a maximum length of 2 feet (6.1 m).

4.1.3 Torsion Springs: The torsion springs (Figure 3) are manufactured from Type 302 stainless steel.

4.1.4 Spring Clips: The spring clip (Figure 3) is No. 18 gauge, Type 302 stainless steel. The clips are attached directly to the aluminum panels using two 18-8 $^{1}/_{8}$-inch (3.175 mm) diameter stainless steel pop rivets.

4.1.5 Vertical Hanging Wire and Vertical Rigid Bracing: Vertical hanging wire is installed at the maximum spacing in Table 1 of this report. Hanger wire shall comply with ASTM C636 in accordance with Section 808.1.1.1 of the IBC and ASCE/SEI 7 Section 13.5.6. The ANOVA Heavy Duty System, when used in exterior application, uses vertical hanging wire for initial installation only, vertical rigid bracing is to be used for final installation, and the design is to be provided by others in accordance with Section 3.3 of this report.

4.2 ANOVA High Wind Load System:

4.2.1 ANOVA Panel: The ANOVA High Wind Load panels (Figure 4) are manufactured from 0.063-inch thick 3003H14 aluminum with a maximum size of 2 feet (6.1 m) by 8 feet (2.44 m) with 1½ -inch flanges.

4.2.2 Main Runners: The main runners (Figure 4) are manufactured using 2x2x1/8-inch (3.175 mm), 6063-T6 Aluminum tees with maximum lengths of 13 feet. The main runners are manufactured with slots added every 6 inches (152.4 mm) to accommodate torsions springs and ½-inch (38.1 mm) diameter holes every 39 inches (990.6 mm) for the cam-lock attachment. The main runners are spaced at 2 feet (6.1 m) on center.

4.2.3 Cross Runners: The cross runners (Figure 4) are manufactured using 1x1x1/8-inch (3.175 mm), 6063-T6 Aluminum tees with a maximum length of 2 feet (6.1 m).

4.2.4 Torsion Springs: The torsion spring (Figure 4) is manufactured from Type 302 stainless steel.

4.2.5 Spring Clip: The spring clip (Figure 4) is an No. 18 gauge, Type 302 stainless steel. The clips are attached directly to the aluminum panels using two 18-8 $^{1}/_{8}$-inch (3.175 mm) diameter stainless steel pop rivets.

4.2.6 Cam-lock Clip: The cam-lock clip (Figure 4) is an 18 gauge, 1-inch (25.4 mm) by 1¼-inch (31.75 mm) Type 302 stainless steel. The clips are attached directly to the aluminum panels using two $^{1}/_{8}$-inch (3.175 mm) stainless steel pop rivets.

4.2.7 Cam-lock: The cam-lock assembly (Figure 4) includes a stainless steel receptacle clip, ¼ turn stem and a retaining washer. The receptacle clip is positioned over the flange of the main runner.

4.2.8 Main Runners Splice Connection: The splice connection (Figure 4) is a $^{1}/_{8}$-inch (3.175 mm) thick by 1-inch (25.4 mm) by 1 $^{7}/_{8}$-inch (47.625 mm) Type 5052 aluminum angle with two 18-8 stainless steel, $^{3}/_{8}$-inch (9.425 mm)- 16 x 1" (25.4 mm) bolts with 18-8 nuts and washers.

4.2.9 Vertical Hanging Wire and Vertical Rigid Bracing: The vertical hanging wire or vertical rigid bracing is installed at the maximum spacing in Table 1 of this report. Hanger wire shall comply with ASTM C635 and ASTM C636 in accordance with Section 808.1.1.1 of the IBC and ASCE/SEI 7 Section 13.5.6. The ANOVA High Wind System used in exterior application uses vertical hanging wire for initial installation only, vertical rigid bracing is to be used for final installation, and the design is to be provided by others in accordance with Section 3.3 of this report.

5.0 IDENTIFICATION

The ANOVA Heavy Duty System and ANOVA High Wind Load System are identified by the Innovative Architectural Solutions name and trademark, product name and designation, and evaluation report number (ER-688). Either IAPMO UES Mark of Conformity may also be used as shown below:

or

IAPMO UES ER-688

6.0 SUBSTANTIATING DATA

6.1 Test reports are from laboratories in compliance with ISO/IEC 17025.

6.2 Data in accordance with Acceptance Criteria for Suspended Ceiling Framing Systems (ICC-ES AC368) dated November 2019.

7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research completed by IAPMO Uniform Evaluation Service on Innovative Architectural Solution's ANOVA Heavy Duty System and ANOVA High Wind Load System to assess conformance to the codes shown in Section 1.0 of this report and serves as documentation of the product certification. Products are manufactured at locations noted in Section 2.7 of this report under a quality control program with periodic inspection under the supervision of IAPMO UES.

For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org

TABLE 1 – Structural Performance of Load Carrying Runners[1]

System	Member	Duty Classification[2]	Span Length[3] (inches)	Allowable Uniform Load per ASTM C635[4] (lb/ft)	Allowable Uniform Load[5] (lb/ft)	Uniform Load at L/60[6] (lb/ft)
ANOVA Heavy Duty	Main Runner	Heavy	24	84	84	168
ANOVA Heavy Duty		Heavy	30	56	56	112
ANOVA Heavy Duty		Heavy	48	18	23	46
ANOVA High Wind Load		Heavy	54	29	63	127

[1] Cross runners used with main runners are not designed to carry load.
[2] Classification determined in accordance with Section 4 of ASTM C635. Member meets or exceeds a design load of 16 lbs/ft.
[3] Span length is maximum unsupported length between vertical hangers.
[4] Determined in accordance with ASTM C635, allowable uniform load is the lesser of the ultimate load from testing divided by a safety factor of 2 or the load at a deflection of L/360.
[5] Allowable uniform loads used for the determination of structural performance for exterior use only, determined by ultimate load in testing divided by a safety factor of 2.
[6] Deflection limitations per Table 1604.3, item h, of the IBC for serviceability performance for exterior use only.
[7] For exterior applications, a reduction in span length with higher allowable loads is acceptable. Additional analysis and design shall be provided in accordance with Section 3.2.5 of this report.

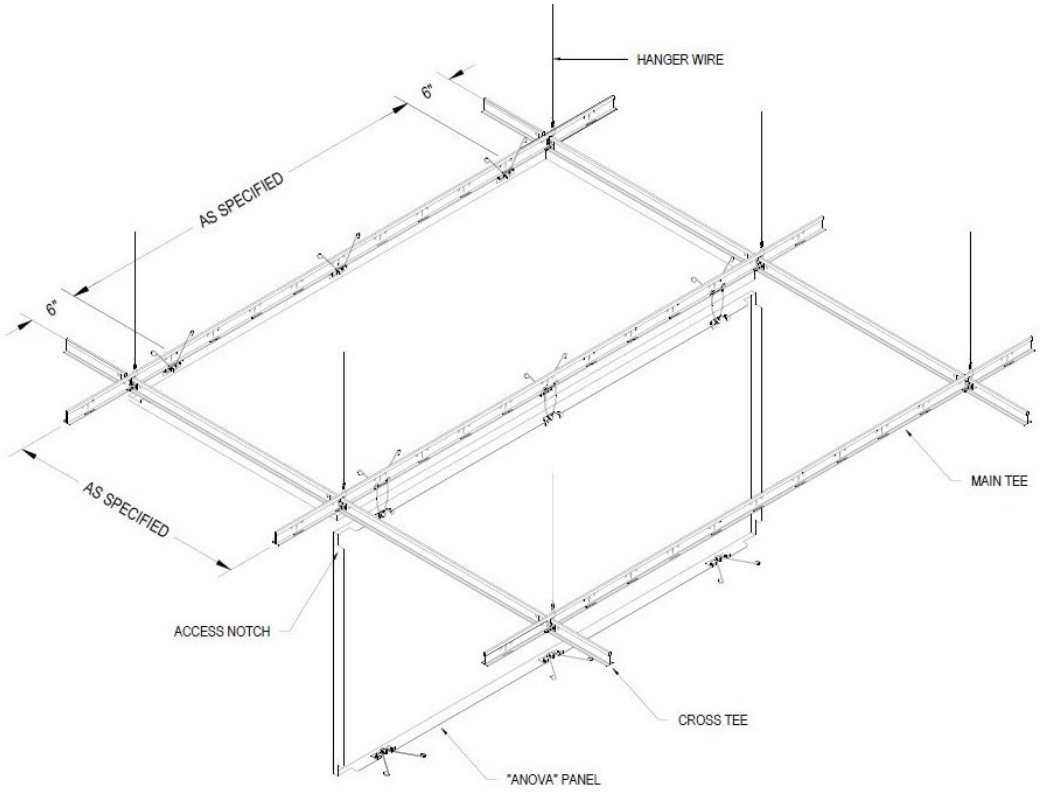

FIGURE 1 – ANOVA Heavy Duty System

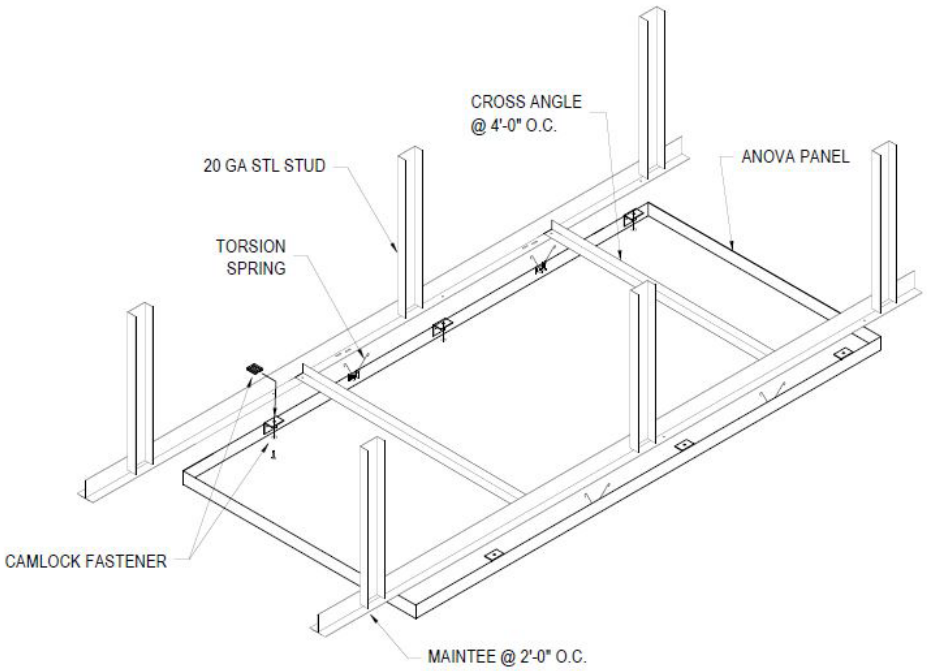

FIGURE 2 – ANOVA High Wind Load System

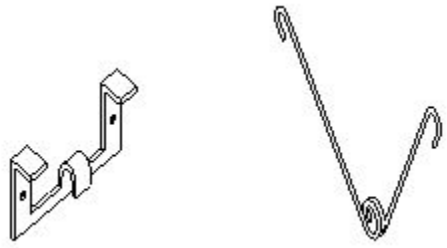

FIGURE 3 – ANOVA Heavy Duty System Components

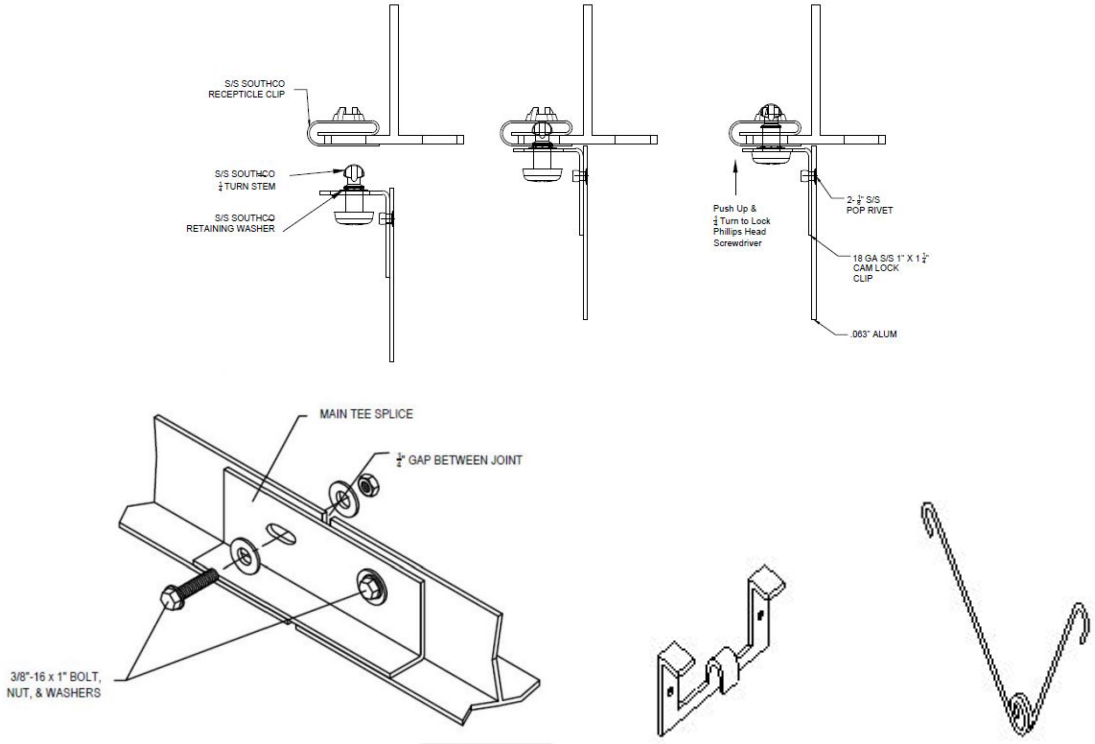

FIGURE 4 – ANOVA High Wind Load System Components

CALIFORNIA SUPPLEMENT

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09 53 23 Metal Acoustical Ceiling Suspension System

1.0 RECOGNITION

The Innovative Architectural Solution's ANOVA Heavy Duty System and ANOVA High Wind Load System as evaluated and represented in IAPMO UES Evaluation Report ER-688 and with changes as noted in this supplement is a satisfactory alternative for use in buildings built under the following codes (and regulations):

- 2019 California Building Code (CBC)

2.0 LIMITATIONS

Use of the Innovative Architectural Solution's ANOVA Heavy Duty System and ANOVA High Wind Load System, when installed, designed, and recognized in this report are subject to the limitations stated in Evaluation Report ER-688 and the following additional limitations:

2.1 The system described in this report shall not be used to brace or provide lateral support for partitions in accordance with Section 1613 of the CBC and Section 13.5.8 of ASCE/SEI 7.

2.2 All documentation that is to be prepared by a design professional and be presented for approval shall be by a California-licensed engineer.

2.3 For construction regulated by DSA or OSHPD, periodic special inspection is required in accordance with CBC Section 1705A.12.5, for the installation and fastening of ceilings in structures assigned to Seismic Design Category D, E, or F.

2.4 This supplement expires concurrently with ER-688.

CITY OF LOS ANGELES SUPPLEMENT

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1.0 RECOGNITION

The (Innovative Architectural Solution's ANOVA Heavy Duty System and ANOVA High Wind Load System as evaluated and represented in IAPMO UES Evaluation Report ER-688 and with changes as noted in this supplement is a satisfactory alternative for use in buildings built under the following codes (and regulations):

- 2020 City of Los Angeles Building Code (LABC)

2.0 LIMITATIONS

Use of the Architectural Solution's ANOVA Heavy Duty System and ANOVA High Wind Load System when installed, designed, and recognized in this report are subject to the limitations stated in ER-688 and following additional limitations:

2.1 The system described in this report shall not be used to brace or provide lateral support for partitions in accordance with Section 1613 of the CBC and Section 13.5.8 of ASCE/SEI 7.

2.2 Design loads and spans of main and cross runners shall comply with Table 1 of ER-688.

2.3 Exterior ceiling installations shall be designed to resist wind loads. The system shall be designed in accordance with Section 3.2.5 and the design professional shall be a California-licensed engineer or architect.

2.4 Hanger Wire shall be No. 12 gauge or heavier galvanized or heavier.

2.5 The building plans and specifications submitted to the Department for approval shall clearly identify all suspended ceiling systems and shall define or show all supporting details, lateral bracing, and attachments, etc.

2.6 Special requirement for means of egress shall comply with LABC Section 1613.8.1.3.

2.7 Suspended ceiling systems must comply with P/BC 2020-040.

2.8 Suspended ceiling main runners shall be labeled with the name of the manufacturer, product name, and Evaluation Report Number ER-688.

2.9 This supplement expires concurrently with ER-688.