UL Product iQ™

BXUV.G531 - Fire-resistance Ratings - ANSI/UL 263

PANEL REY®
Drywall Solutions

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

Design No. G531

February 12, 2021

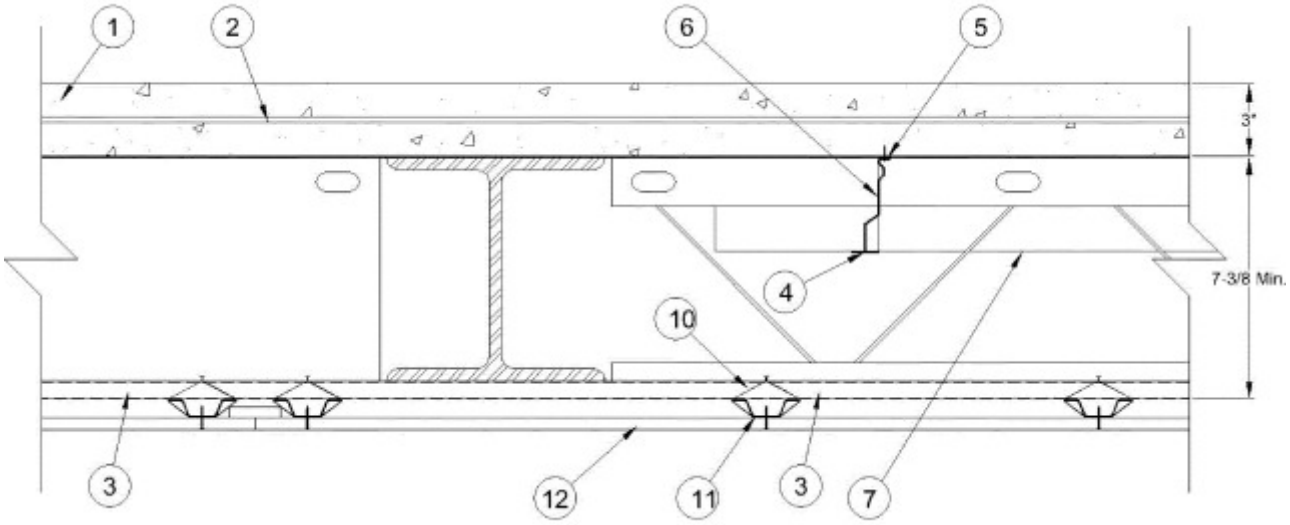
Restrained Assembly Ratings — 1, 1-1/2 or 2 Hr (See Items 1, 12A, 15 and 16)

Unrestrained Assembly Ratings — 1, 1-1/2 or 2 Hr (See Items 1, 12A, 15 and 16)

Unrestrained Beam Rating — 1-1/2 or 2 Hr. (See Items 12A, 15)

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**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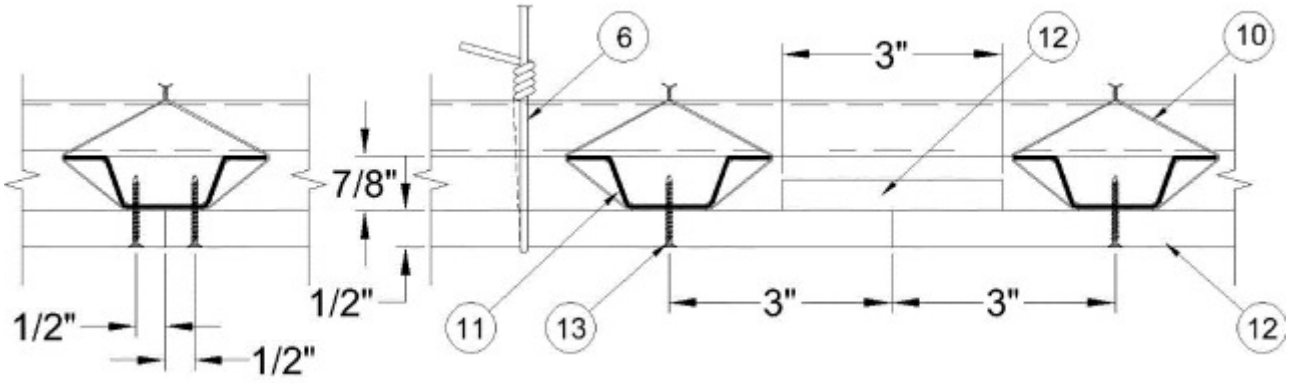
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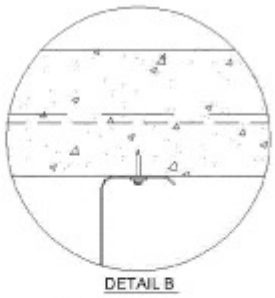
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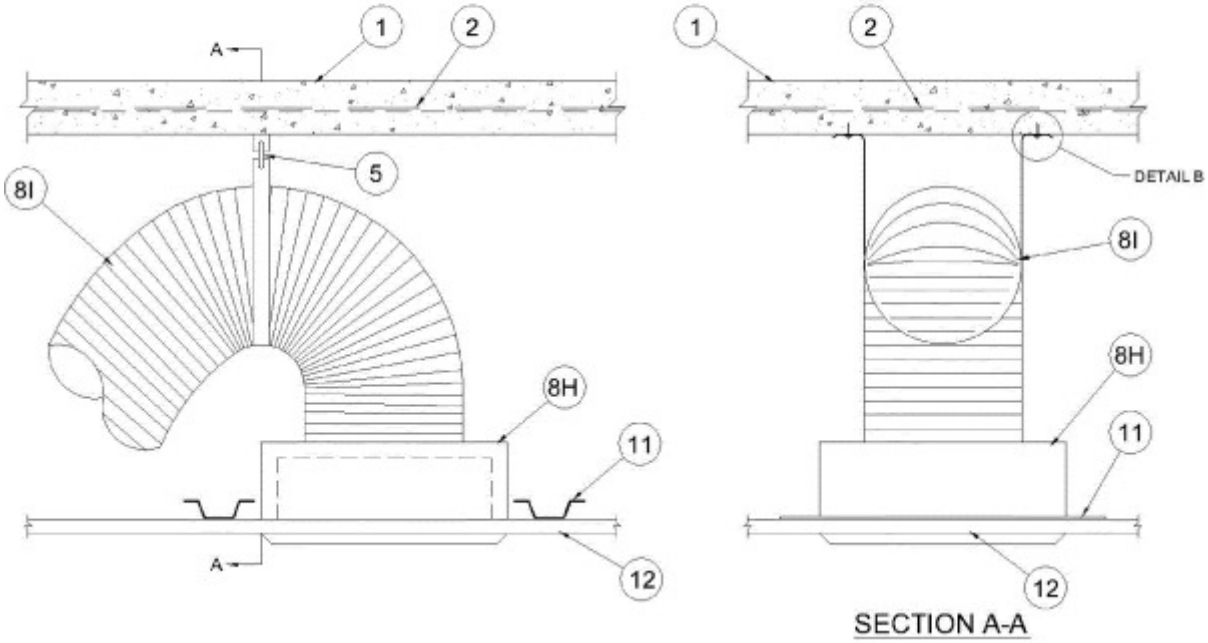
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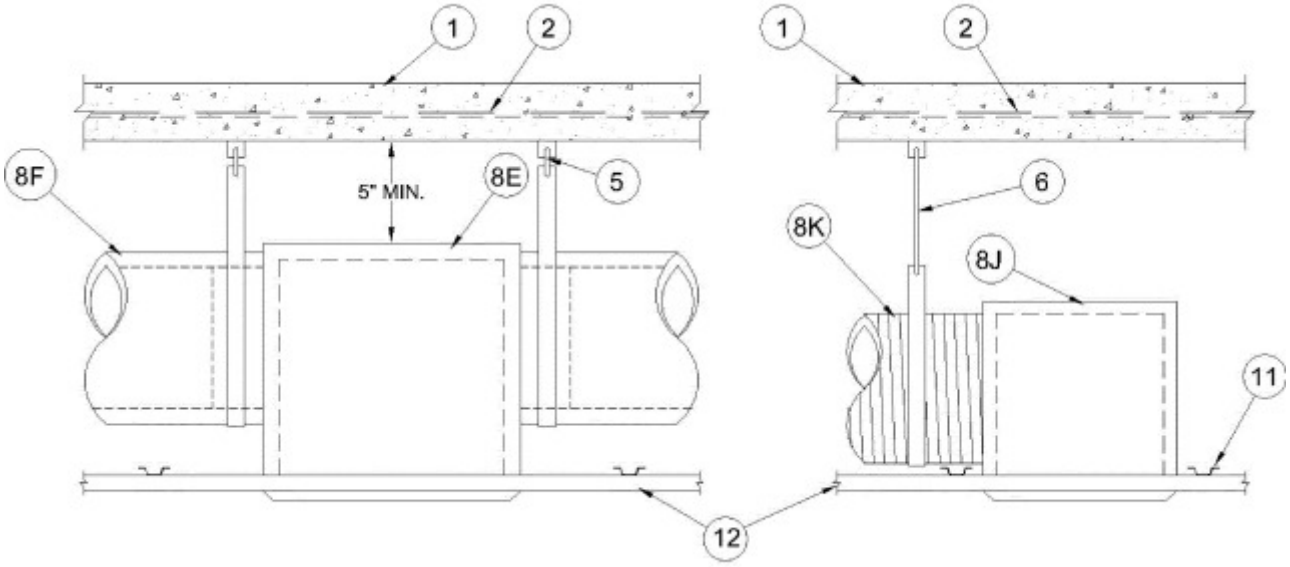
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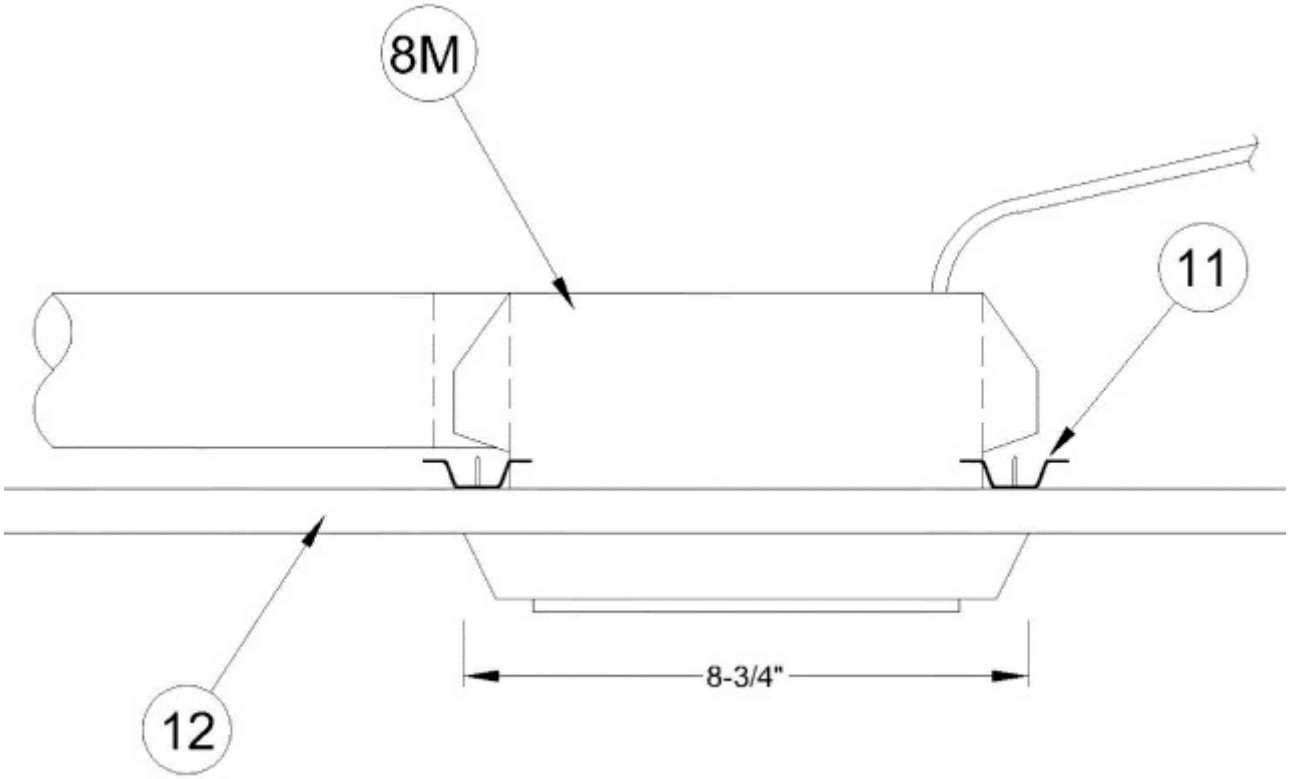
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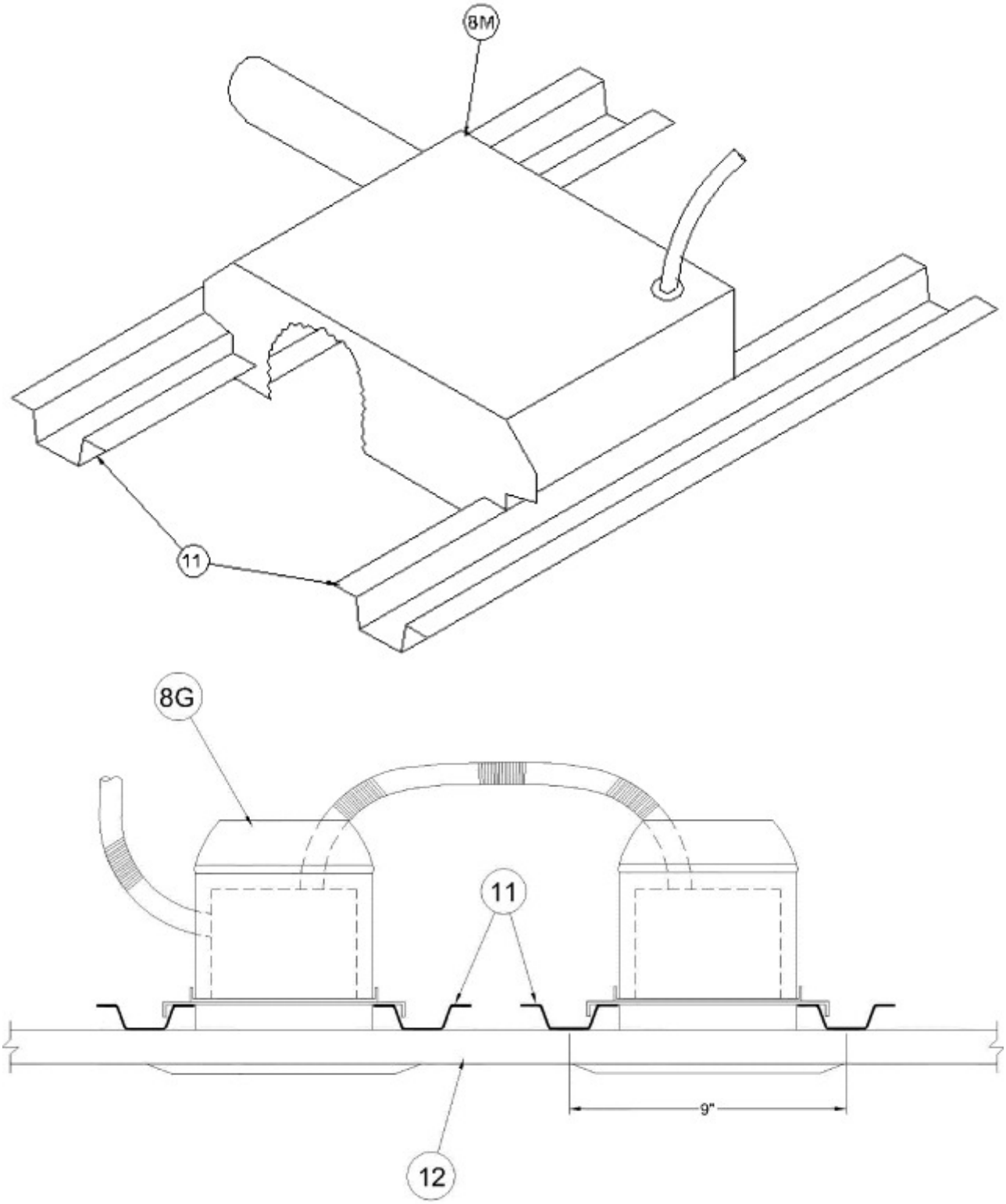
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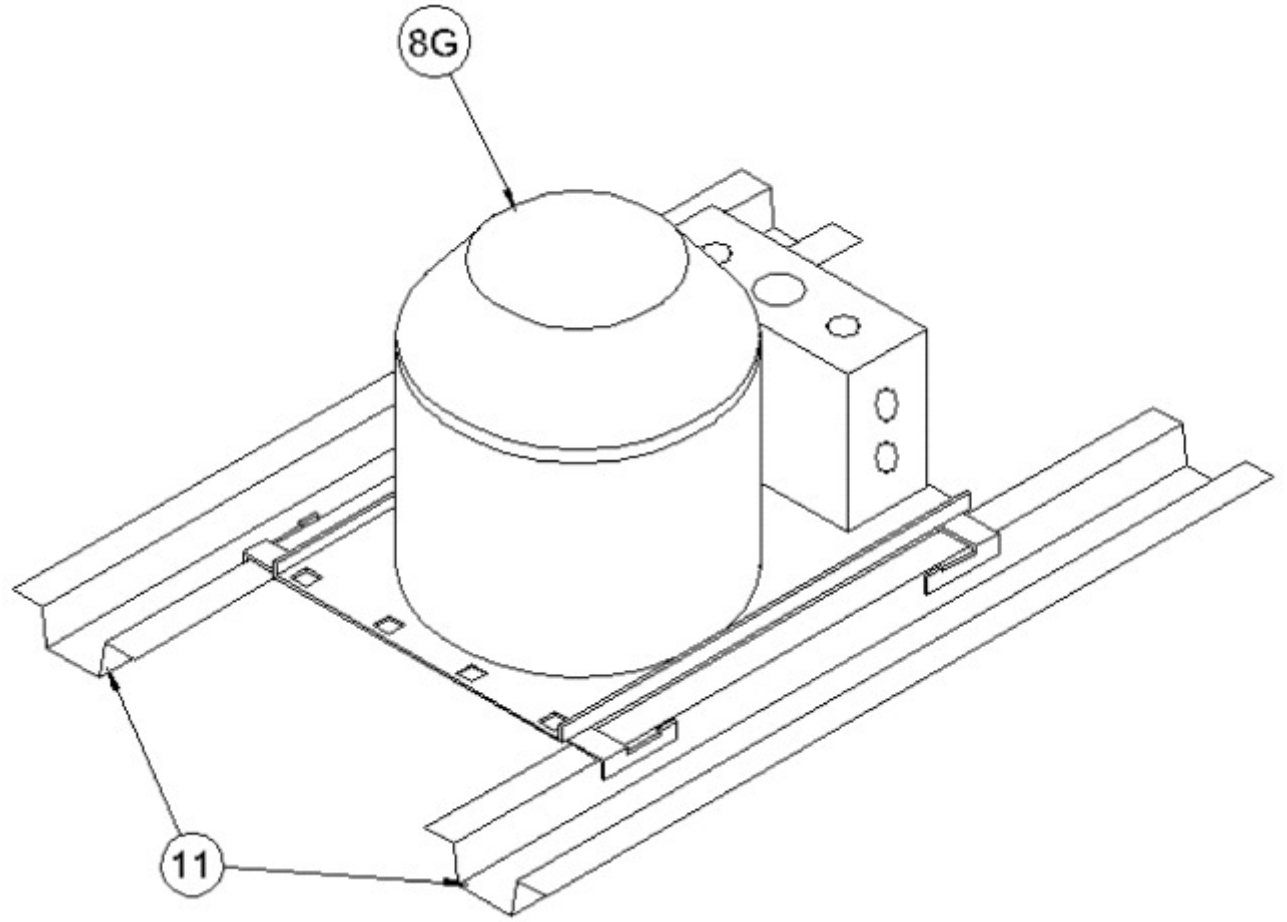
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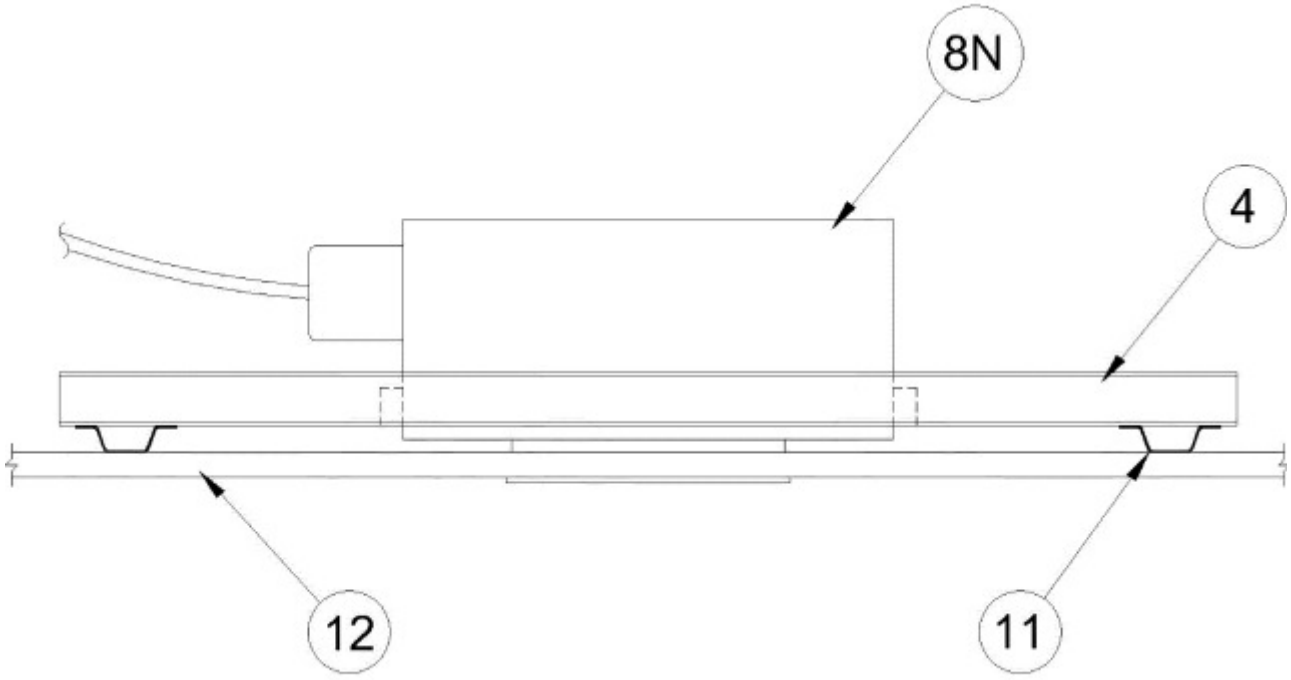
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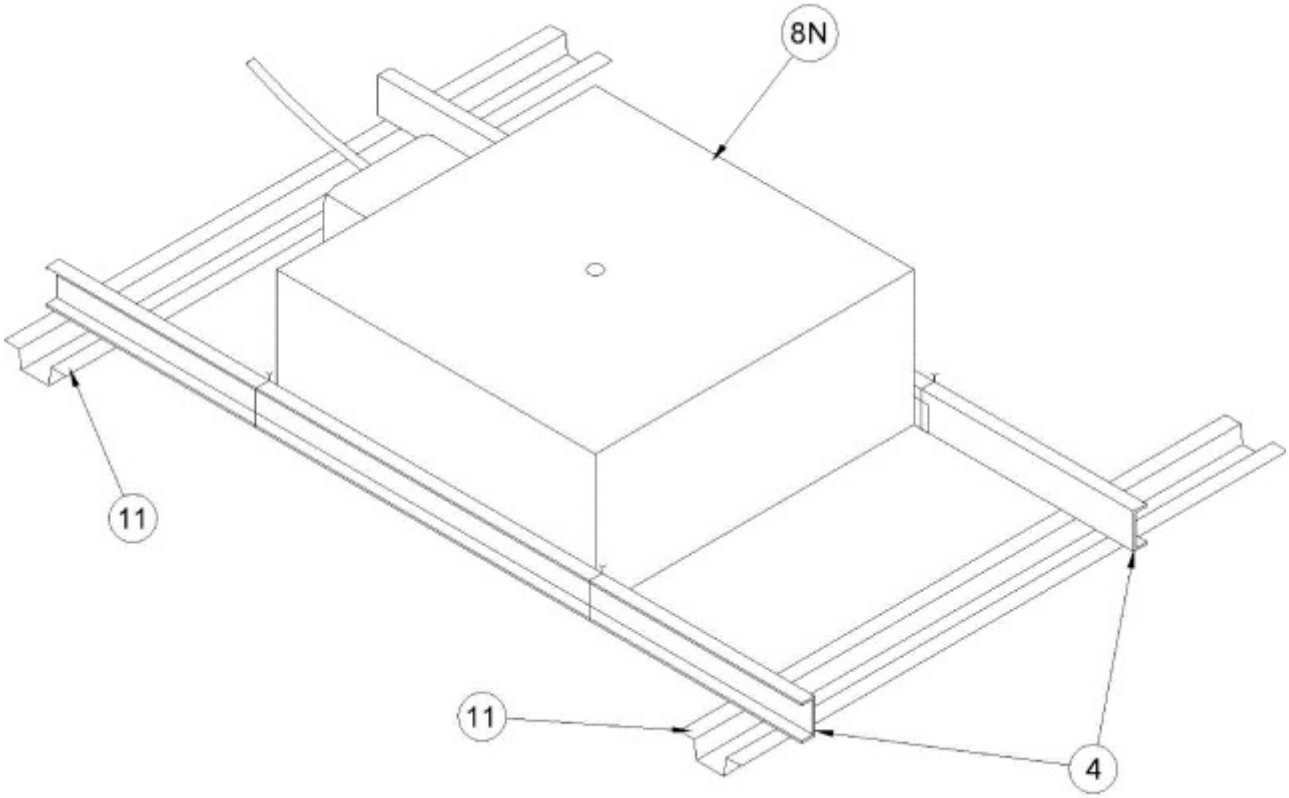
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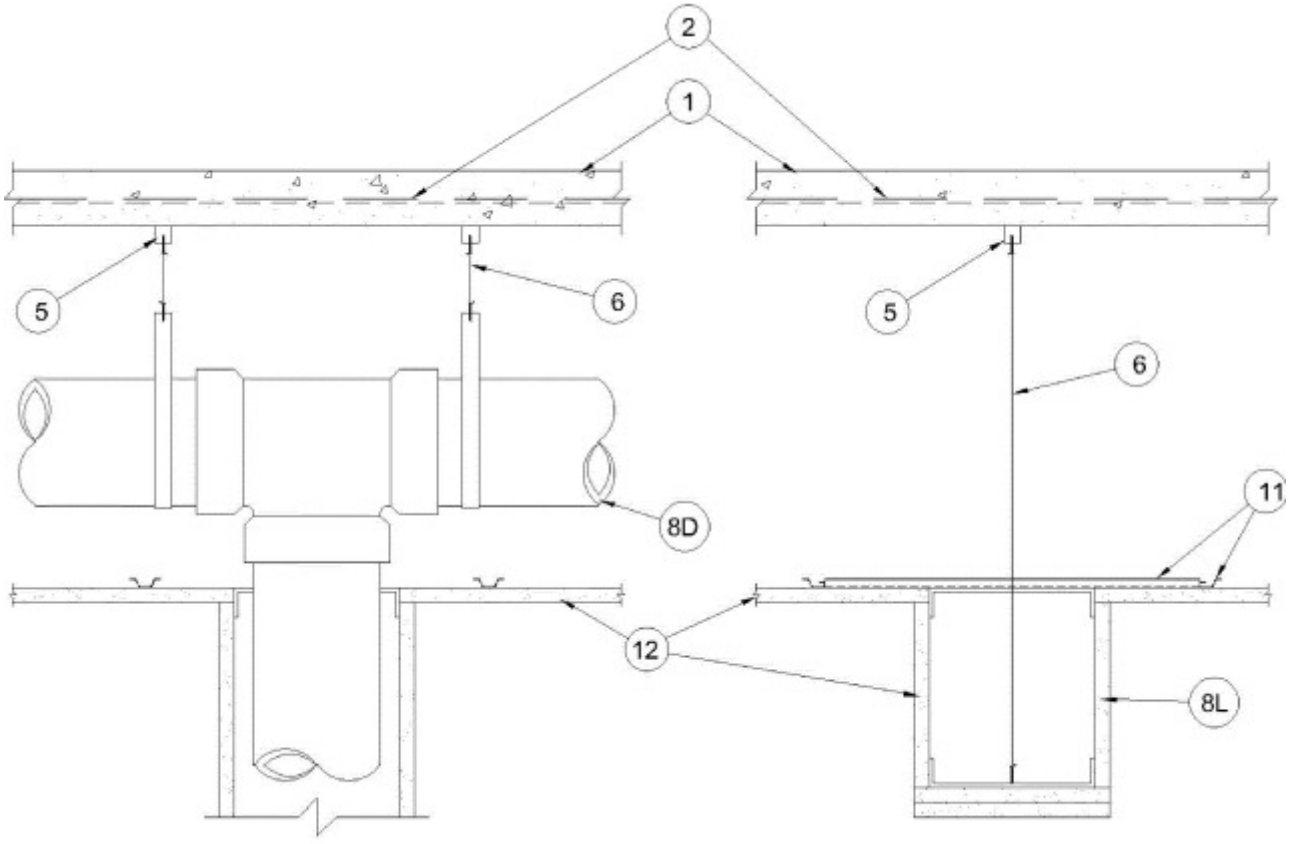
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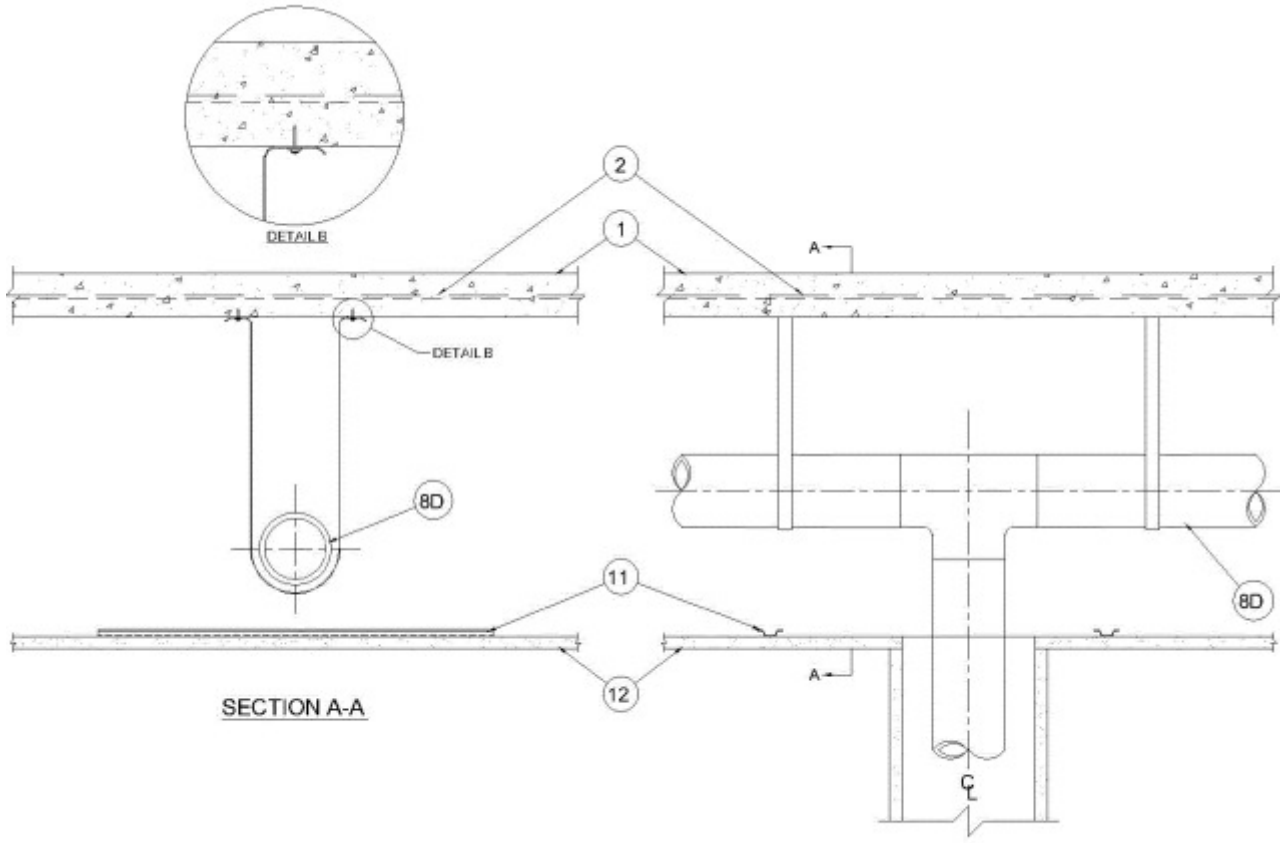
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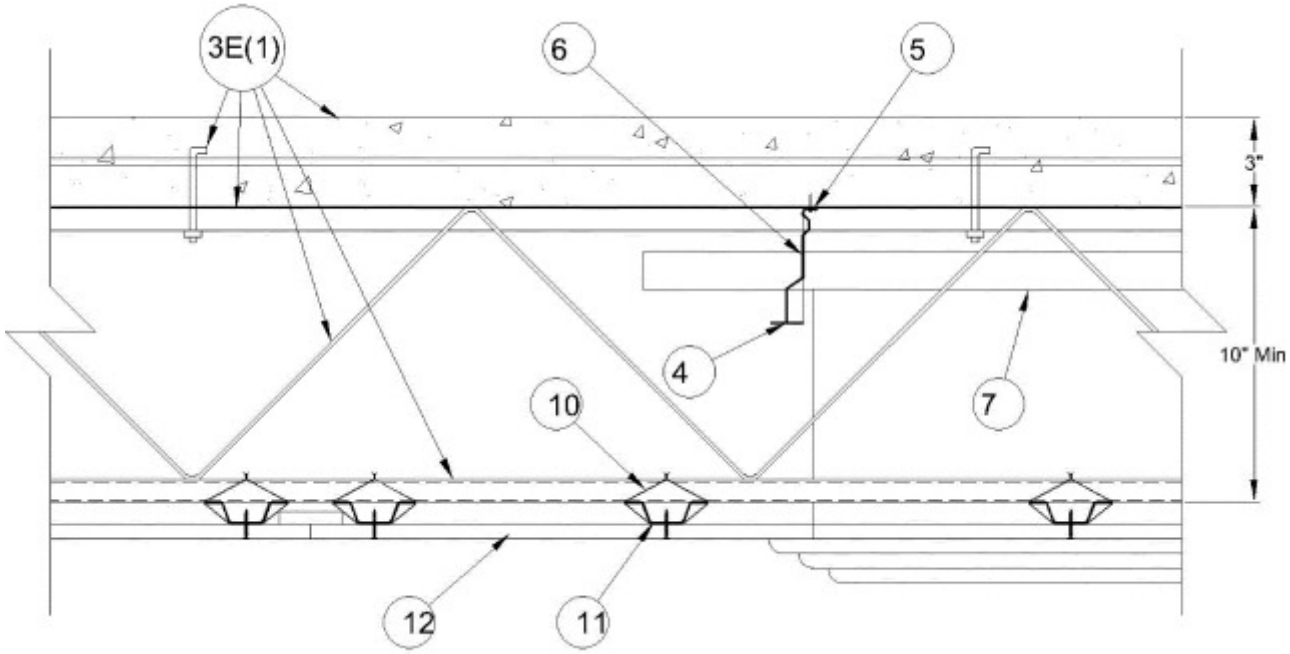
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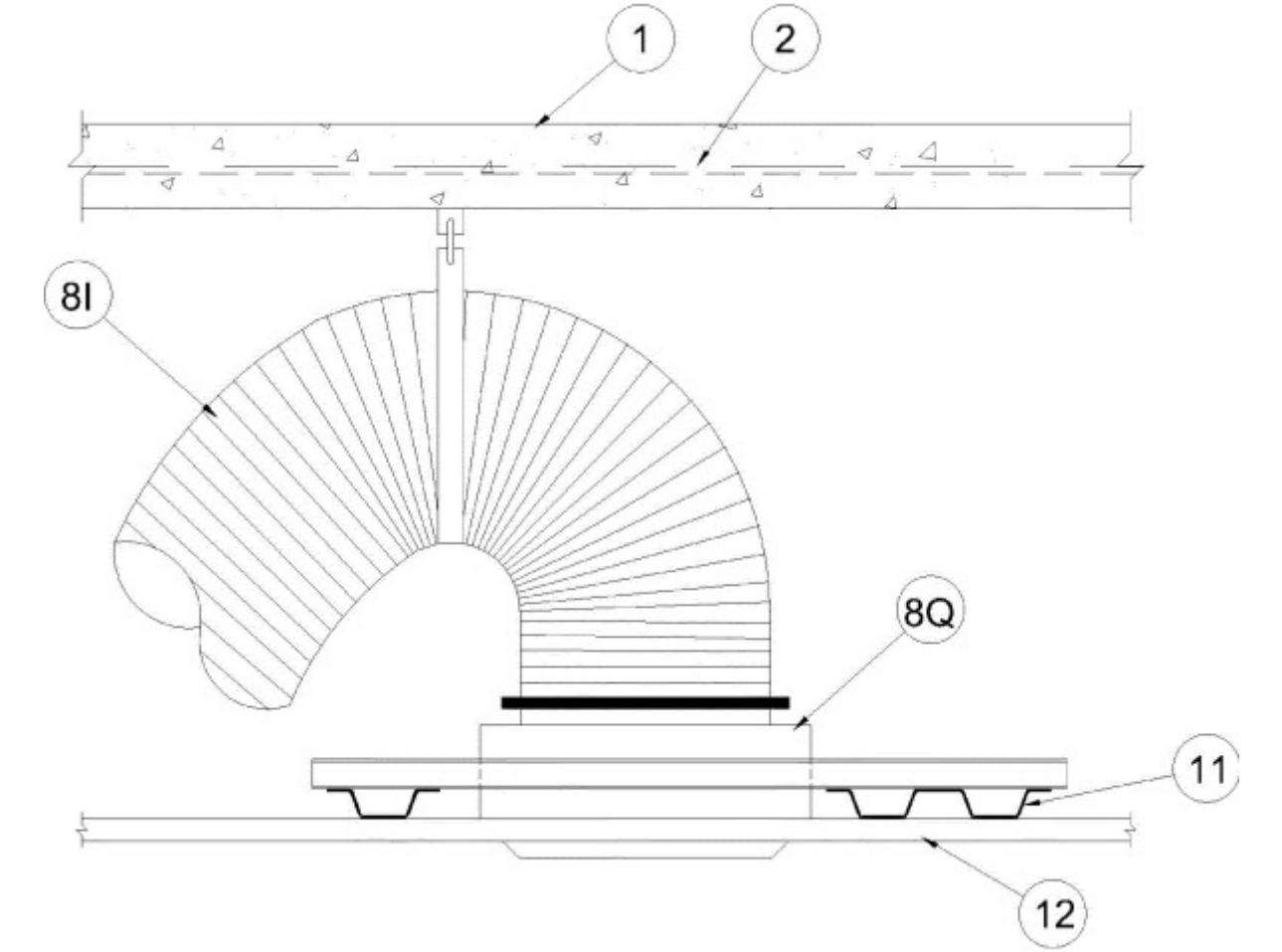

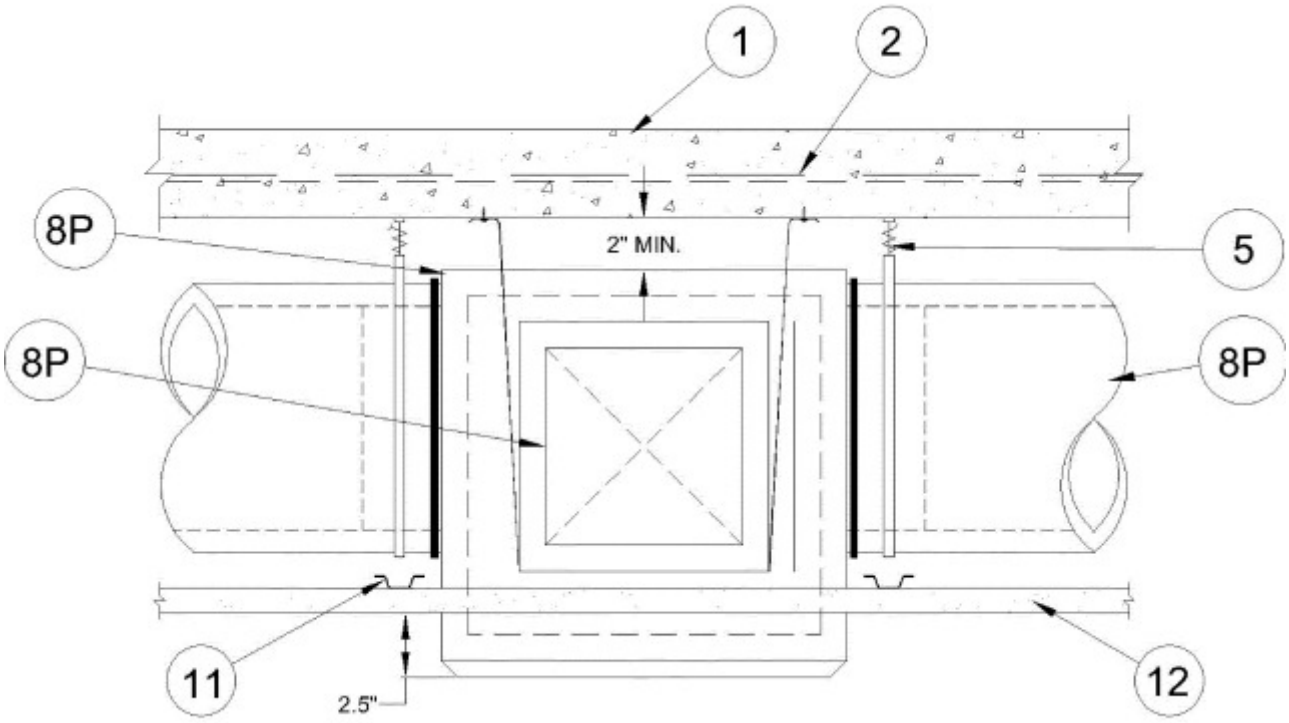

Beam — W6X9, min size.

1. **Normal Weight or Lightweight Concrete —** Normal weight concrete, carbonate or siliceous aggregate, 138 to 151 pcf unit weight, 3500 psi compressive strength. Lightweight concrete, expanded shale, clay or slate aggregate by rotary-kiln method 114 + or - 6 pcf unit weight, 3500 psi compressive strength. When lightweight concrete is used, max Unrestrained Assembly and Unrestrained Beam Ratings are 1-1/2 Hr.

Assembly Rating	Min Size & Type Joist	Wallboard End Joint Protection Required	Optional Use of Roof Insulation & Roof Covering (Items 13, 14 & 14A)	5 In. Diam Unprotected Duct Outlet Used	Type of Concrete Slab & Thkns In.
Restrained and Unrestrained 2 Hr	8 in. Type V	Yes	No	Yes at 12 in. or more from joists	NW, 2-3/16 topping over steel deck Item 3 (2)
Restrained and Un-restrained 2 Hr	6 in. Type V	Yes	Yes	No	NW, 2-3/16 topping over steel deck Item 3 (2)
Restrained and Unrestrained 2 Hr	6 in. Type V	Yes	Yes	No	NW, 2-3/16 topping over steel deck Item 3 (2)
Restrained 2 Hr and Unrestrained 1-1/2 Hr.	8 in. Type V	Yes	IRMA Systems roof covering only, Item 16A	Yes at 12 in. or more from joist	LW, 2-1/2 topping over 9/16 in. deep steel deck Item 3 (2)
Restrained and Unrestrained 1-1/2 Hr	8 in. Type V	Yes	Yes	Yes at 12 in. or more from joist	NW, 2-3/16 topping over steel deck Item 3 (2)
Restrained and Unrestrained 1-1/2 Hr	6 in. Type V	No	Yes	No	NW, 2-3/16 topping over steel deck Item 3 (2)

2. **Welded Wire Fabric —** 6 x 6 — W2.0 x W2.0 or heavier.

3. **Structural Steel Members* —**

(1). Composite steel joists, min nom depth 6 in. spaced max 52 in. OC. Joists may be also spaced as follows:

a. 6 ft, 0 in. OC max when flanked on both sides by 4 ft, 0 in. spans.

b. 6 ft, 0 in. OC max when flanked on one side by a 3 ft, 0 in. span and on the other by a 5 ft, 0 in. span.

c. 5 ft, 0 in. OC max when flanked on one side by a 5 ft, 0 in. span and on the other by a 4 ft, 0 in span.

d. 4 ft, 8 in. OC max when flanked on both sides by 4 ft, 8 in. spans.

e. 5 ft, 6 in. OC max when flanked on one side by a 4 ft, 0 in. span and on the other by a 4 ft, 6 in. span.

When joists are spaced more than 48 in. OC, the steel form units shall be 1-5/16 in. deep corrugated steel (Item 3C(2)).

VESCOM STRUCTURAL SYSTEMS INC — Type V

(2). **Steel Form Units —** (Not Shown) — 1-5/16 in. deep corrugated steel, 24 MSG min, painted or uncoated. Welded to supports 15 in. OC using welding washers.

(3). **Steel Form Units —** (Not Shown) — With 2-1/2 in. thick lightweight concrete topping, 9/16 in. deep corrugated steel, 28 MSG min, painted or uncoated. Welded to supports 15 in. OC using welding washers.

4. **Cold Rolled Channels —** Min 0.045 in. thick (18 gauge) cold-rolled steel channels, 1-1/2 in. deep with 7/16 in. flanges. When the composite steel joists are spaced more than 52 in. OC, a cold-rolled steel channel shall be suspended midway between joists, with its web vertical and with its lower flange flush with the plane at the bottom of the joists, to provide an intermediate support for the furring channels (Item 11). The cold-rolled channels are suspended from hanger clips (Item 5) using 12 SWG galv steel hanger wire spaced max 50 in. OC. Adjoining lengths of cold-rolled channel spliced together by overlapping min 12 in., face to face or back to back, and tying with three double strands of 18 SWG galv steel wire.
When it is necessary to lower the ceiling below the bottom plane of the joists, 1-1/2 in. deep, 16 gauge cold rolled steel channels shall be used for attachment of furring channels. The channels shall be installed with their web oriented vertically and suspended from the joists or from the hanger clips (Item 5) with 12 SWG or heavier gauge hanger wire at a max spacing of 48 in. OC. The spacing of the channels shall be no greater than the spacing of the joists.

5. **Hanger Clips —** Galv steel angles, 3/4 in. long with 1-3/8 in. horizontal and 1 in. vertical legs. Vertical leg provided with a 5/16 in. diam hole to accommodate hanger wire. Horizontal leg provided with a 3/16 in. diam hole for insertion of fastener. Hanger clips secured to underside of concrete slab using nom 1 1/8 in. long, 0.145 in. diam shank with 0.312 in. diam head, powder-driven galv steel fasteners.

6. **Hanger Wire —** No. 12 SWG (0.105 in. diam) galv steel wire, used to suspend cold-rolled steel channels for support of furring channels and/or air ducts.

7. **Air Duct —** Min 0.023 in. thick galv steel. For unprotected duct outlets total area of duct openings not to exceed 20 sq in. per 100 sq ft of ceiling area. Area of individual duct opening not to exceed 20 sq in. Max dimension of opening 5 in. For protected duct outlets total area of duct openings not to exceed 144 sq in. per 100 sq ft of ceiling area. Area of individual opening not to exceed 144 sq in. Max dimension of opening 12 in. The unprotected and protected duct openings shall not be installed within the same 100 sq. ft. of ceiling area. Protected duct outlets larger than 20 sq in. in area to be located 12 in. or more from the nearest joist or beam. Ducts supported by 1-1/2 in. deep, 18 MSG cold-rolled steel channels spaced not more than 48 in. OC and on each side of duct opening. Channels suspended from hanger clips by 12 SWG galv steel wire. A clearance of 4 in. required between back of ceiling membrane and bottom of duct.

7A. **Air Duct Materials* —** (Not Shown) — Optional. For the 1 h ratings with 6 in. deep or larger joists and for the 2 h ratings with 8 in. deep or larger joists, as an alternate to Air Duct (Item 7), **Rigid Air Duct Materials** may be used in accordance with their Fabrication Instructions. The duct outlet throat is positioned at the center of 24 in. long min 0.029 in. thick (22 gauge) galv steel duct liner. These ducts are supported by min 0.053 in. thick (16 gauge) cold rolled steel channels suspended from the joists' top chord by 12 SWG galv steel wire. Channels are placed directly below the steel duct liner, one on each side of the throat, and otherwise spaced 72 in. OC for ducts up to 36 in. wide, and 48 in. OC for ducts between 36 and 60 in. wide. Additional supporting channels to be installed at a distance ranging from 3 to 6 in. from the ends of each individual duct section. Min clearance of 4 in. required between back of ceiling membrane and bottom of air duct material.
JOHNS MANVILLE — Rigid, Class I.

KNAUF INSULATION LLC — Rigid, Class I.

OWENS-CORNING FIBERGLAS CORP — Rigid, Class I.

8. **Damper —** (Not Shown), Any UL Classified Ceiling Damper covered for use in 2 Hr or longer rated assemblies. To be installed in duct drop close to the back of ceiling per accompanying installation instructions.

8A. **Damper —** (Not Shown) — For use with Item 7A only. Minimum 0.020 in. thick (No. 25 gauge) galvanized steel. Protected on both surfaces with 1/16 in. ceramic fiber paper and held open with a **Fusible Link** (Bearing UL Listing Mark). Damper to overlap duct outlet 1 in. minimum.

8B. **Flexible Air Duct —** (Not Shown) — Optional (Bearing the UL Listing Mark), as an alternate to Item 7. Nom 8 in. diam consisting of 0.006 in. thick vinyl coated, glass fiber reinforced fabric over helically wound 0.077 in. diam coated spring steel wire. As an alternate, nom 6 in. diam air duct connector consisting of 0.005 in. thick vinyl coated, glass fiber reinforced fabric over helically wound 0.071 in. diam coated spring steel wire. The flexible air duct and/or duct connector is connected to galv steel sleeve (Item 8C) by means of a stainless steel hose clamp. Flexible air duct nom 8 in. diam or nom 6 in. duct connector do not require dampers or other protection at ceiling penetrations.
The flexible air duct and duct connector shall be suspended from structural steel or hanger wire anchor by means of a steel strap near the end connected to the steel sleeve (Item 8C), with the remainder of its length placed on the ceiling furring channels or supported about 1 in. or higher above the gypsum board with additional steel straps or hanger wires. The total area of the flexible air duct opening shall not exceed 50.3 sq in. per each 100 sq ft of ceiling area; max dimension of opening is 8 in. The total area of the duct connector opening shall not exceed 28.3 sq in. per each 100 sq ft of ceiling area; max dimension of opening is 6 in. As an alternate, the flexible air duct may be supported by the metal hanger straps attached directly to the bottom of the concrete slab with powder-actuated pins. Pins, nom 1 in. long, consisting of 0.145 in. diam smooth-finish galv steel shank with 1/4 in. diam head. Pins tightly inserted in 3/8 in. long gear-shaped plastic washers and driven into the slab through both ends of the strap.

8C. **Duct Outlet Sleeve —** For use with Flexible Air Duct or Duct Connector. Damper is not required when flexible air duct or duct connector is used (Item 8B) at openings in gypsum wallboard ceiling. 4 in. long sleeve made from 28 gauge galv steel for the 8 in. diam opening and from 30 gauge galv steel for the 6 in. diam opening. The sleeve shall be mounted between two 7/8 in. steel angles of 26 gauge galv steel which are placed on top and overlap the adjacent furring channels about 3 in. Each angle is tied to the two furring channels with a double strand of 18 SWG galv steel tie wire through 1/8 in. diam hole drilled in the vertical leg of the steel angles. The sleeve is attached to each of the two angles with one 3/8 in. long Tek sheet steel screw.

8D. **Nonmetallic Pipes —** Optional — For the 1 h floor-ceiling ratings, as an alternate to the 5 in. diam unprotected duct outlet. Nom 2 in. and 4 in. diam Schedule 40 PVC (polyvinyl chloride) supply or drain, waste and vent piping system. PVC pipes penetrate the ceiling runner into stud cavity of steel or structural grade lumber stud sheathed with generic Unclassified gypsum wallboard partition. The PVC pipes are supported by hanger straps in conjunction with steel hanger wires suspended from hanger clips, Item 5. As an alternate the strap may be directly attached to the slab by the powder-driven galv steel fasteners described to support the flexible air duct in Item 8B. The spacing of hanger straps supporting the pipes shall not exceed 30 in. OC. Only one nom 4 in. diam PVC pipe and one nom 2 in. diam PVC pipe are allowed per 100 sq ft of ceiling area.

8E. **Heating and Air Conditioning Plenum Box Outlet —** Optional — For the 1-1/2 h ratings (1 h when combined with Item 8L), as an alternate to the 5 in. diam unprotected duct outlet. 14 by 14 in. opening penetrating the ceiling. Fabricated from pieces of min 26 MSG galv steel, attached together with lock seams and rivets. Finished box size 16 by 16 by 15 in. outside dimensions. Opposite sides of the box have 10 in. diam openings. The open bottom of the box has 1 in. wide flanges at the four sides to engage into hemmed hanger bars for attaching the box to the furring channels. Hanger bars consist of 1 in. wide plates made from No. 26 gauge galv steel, folded back to form a 5/8 in. return at the top side, for engaging the horizontal flanges at the bottom of the plenum box outlet. The four sides and top of the box shall be lined with 1 in. thick UL Classified fiberglass insulation weighing nom 5 pcf. The 10 in. diam openings on two opposing sides of the box shall be provided with nom 3 in. long collars fabricated from No. 28 gauge galv steel for connecting the box to the nom 10 in. diam flexible air ducts (Item 8F). Box and flexible air ducts suspended directly from hanger clips (Item 5) by hanger wires connected to hanger straps made from 1 in. wide, No. 26 MSG galv steel, spaced max 30 in. OC. As an alternate the strap may be directly attached to the slab by the powder-driven galv steel fasteners described to support the flexible air duct in Item 8B. Only one 14 by 14 in. outlet is allowed per 100 sq ft of ceiling area.

8F. **Flexible Air Duct —** Optional — For use with Item 8E. Bearing the UL Listing Mark. 10 in. ID, with a spirally wound steel wire helix (0.045 in. diam wire) covered with vinyl fiber. Core covered with 1 in. thick UL Classified fiberglass insulation weighing 1.0 pcf. Flexible air duct wrapped with outer jacketing consisting of aluminized vinyl film. Flexible air ducts mounted on collars of box (Item 8E), attached to collars with adjustable 10-1/2 in. diam, 9/16 in. wide hose clamp made of 0.024 in. thick stainless steel. As an alternate an adjustable 10-1/2 in. diam, 3/8 in. wide, 1/16 in. thick vinyl hose clamp may be used.

8G. **Fixtures, Recessed Light —** Optional — (Bearing the UL Listing Mark) — For the 1-1/2 h ratings (1 h when combined with Item 8L), as an alternate to the 5 in. diam unprotected duct outlet. A max of four fixtures per 100 sq ft of ceiling area. Fixture housing 6-1/2 in. diam, 7-1/2 in. high, made from painted or galv steel. Each fixture supported on a base 6-1/2 in. by 9-7/8 in., made from painted or galv steel and screw-attached to the fixture by four screws. Each fixture with trim and lens weighs 4 lb max. Short sides of the base containing tabs for engagement into adjustable hanger bars supporting the fixture. Each fixture hanger bar screw-attached at one end to the ceiling furring channel and at the other end to additional furring channel parallel to and at 9 in. from the ceiling furring channel. Fixture trim 8 in. OD with a 5-1/4 in. inside diam opening to support a 5-3/8 in. diam diffused glass lens. Each fixture may be activated with nom 1 in. diam UL Listed electrical nonmetallic tubing wired with three No. 12 AWG Type THWN copper conductor wires or a UL Listed nonmetallic sheathed cable with three No. 12 AWG Type THWN copper conductor wires.

8H. **Heating and Air Conditioning Plenum Box Outlet —** Optional — For the 2 h ratings (1-1/2 h when combined with Item 8L), as an alternate to the 5 in. diam unprotected duct outlet. 8 by 10 in. opening penetrating the ceiling. Four sides of box formed from one 5 in. wide strip of No. 28 gauge galv steel, with ends of strip overlapping 3/4 in. and fastened together with two 1/4 in. diam punches. The bottom 1 in. of the strip forming the box sides, bent 90 deg to the outside of the box forming horizontal flanges around the perimeter of the box to engage into hanger bars for supporting the box assembly. Sides of the box lined with 1 in. thick fiberglass insulation weighing nom 5 pcf. Fiberglass lining to be supported on a 1 in. wide steel plate attached at the bottom perimeter of the box's four sides. Top of the box fabricated from No. 28 gauge galv steel with 8 in. diam cutout at the center. Edges of the steel plate forming the top of the box bent down around the box's side perimeter and riveted to the four sides of the box by one rivet at the center of each side. Top of the box, except for the 8 in. cutout, also lined with 1 in. thick UL Classified fiberglass insulation, weighing 5 pcf. Top insulation lining, having 8 in. diam cutout at the center, bears along its perimeter on the 1 in. thick fiberglass lining at the box sides. The 8 in. diam cutout at the top of the box connected to a 4 in. long, 8 in. diam sleeve made from No. 28 gauge galv steel for top mounting of an 8 in. flexible air duct (Item 8I). Flexible air duct suspended by a hanger wire from hanger clip (Item 5), connected to a nom 1 in. wide, No. 26 MSG galv steel plumbing strap wrapped around the flexible air duct near its connection to the box. As an alternate the strap may be directly attached to the slab by the powder-driven galv steel fasteners described to support the flexible air duct in Item 8B.

The 8 x 10 plenum box outlet, with the fiberglass top insulation, without the steel top cover, may be used for the 1 h ratings as an alternate to the 5 in. diam unprotected duct outlet.

Only one 8 by 10 in. box outlet is allowed per 100 sq ft of ceiling area.

8I. **Flexible Air Duct —** Optional — (Bearing the UL Listing Mark) — For use with (Item 8H or Item 8O). For use with Item 8H, nom 8 in. diam, consisting of 0.005 in. thick vinyl-coated reinforced fiberglass fabric, wrapped over helically wound 0.038 in. diam coated spring steel wire. Flexible air duct attached to box sleeve with adjustable 8-1/2 in. diam, 9/16 in. wide hose clamp made from 0.024 in. thick stainless steel. As an alternate an 8-1/2 in. diam, 3/8 in. wide 1/16 in. thick vinyl hose clamp may be used. For use with Item 80, nom 9 in. diam consisting of 0.005 in. thick vinyl-coated reinforced fiberglass fabric, wrapped over helically.

8J. **Heating and Air Conditioning Plenum Box Outlet —** Optional — For the 2 h ratings (1-1/2 h when combined with Item 8L), as an alternate to the 5 in. diam unprotected duct outlet. 10 by 10 in. opening penetrating the ceiling. Box fabricated from pieces of No. 28 gauge galv sheet steel and riveted together. Finished box size: 12 by 12 by 12 in. One side of the box has 10 in. diam opening. Box top and four sides of the box except the 10 in. cutout for opening, have 1 in. thick of UL Classified fiberglass, 5 pcf. Neck at side opening consisting of 10 in. diam sleeve fabricated from 3-1/2 in. wide strip of No. 28 gauge galv steel. One end of the sleeve notched 1/8 by 3/4 in. at 5/8 in. OC along its perimeter and bent 90 deg against the fiberglass lining around the 10 in. diam opening to secure the sleeve to the box. The sleeve to be connected to a 10 in. diam, UL Listed side-mounted flexible air duct (Item 8K). Flexible air duct, at its connection the box's sleeve, to be suspended by a hanger wire from hanger clip (Item 5) connected to a nom 1 in. wide, No. 26 MSG galv steel plumbing strap wrapped around the flexible air duct. As an alternate the strap may be directly attached to the slab by the powder-driven galv steel fasteners described to support the flexible air duct in Item 8B.

Only 10 by 10 in. box outlet is allowed per 100 sq ft of ceiling area.

8K. **Flexible Air Duct —** Optional — (Bearing the UL Listing Mark) For use with Item 8J. Nom 10 in. diam consisting of 0.002 in. thick vinyl-coated reinforced fiberglass fabric, wrapped over helically wound 0.051 in. diam, coated spring steel wire. Flexible air duct attached to box sleeve with adjustable 10-1/2 in. diam, 9/16 in. wide hose clamp made from 0.024 in. thick stainless steel. As an alternate an adjustable 10-1/2 in. diam, 3/8 in. wide, 1/16 in. thick vinyl hose clamp may be used.

8L. **Ceiling Runner Penetration —** Optional — Framing consisting of either 4 or 6 in. wide steel C-channels with 2 in. flanges; or min 2 by 4 plates of structural grade lumber (Not Shown). Bottom runner suspended by hanger wires tied to a cold rolled channel running parallel to the runner. Hanger wires used for supporting the bottom runner and penetrating the top runner shall be spaced a max 12 in. OC. Top runner placed directly above, and screw-attached to web of 24 in. long pieces of furring channel, spaced at 16 in. OC. One in. long pieces of the supporting channel's web removed at both ends with the steel surfaces on both flanges bent 90 deg, for screw-attaching the supporting channels to the main ceiling furring channels. The top cold rolled channel supporting the suspended boxed partition shall be directly suspended from hanger clips, Item 5. For the 2 h ratings, only one ceiling runner penetration together with one exhaust fan. (Item 8M) are allowed per 100 sq ft of ceiling area as an alternate to the 5 in. diam unprotected duct outlet.

For the 1-1/2 h ratings only one ceiling runner penetration together with one of the following combinations are allowed per 100 sq ft of ceiling area as an alternate to the 5 in. diam unprotected duct outlet:

(a) One heating and air conditioning plenum box outlet with flexible air duct (Items 8H and 8I); or

(b) One heating and air conditioning plenum box outlet with flexible air duct (Items 8J and 8K); or

(c) One recessed light fixture (Item 8N).

For the 1 h ratings only one ceiling runner penetration together with one of the following combinations are allowed per 100 sq ft of ceiling area as an alternate to the 5 in. diam unprotected duct outlet:

(a) One recessed light fixture (Item 8G); or

(b) One heating and air conditioning plenum box outlet and flexible air duct (Items 8E and 8F).

8M. **Exhaust Fan —** Optional — (Bearing the UL Listing Mark) — For use with Item 8L for the 2 h ratings, as an alternate to the 5 in. diam unprotected duct outlet. Frame made of painted steel measuring 7-1/2 by 7-1/8 by 3-5/8 in. Fan gross weight 3.75 lb max. The ceiling penetration from the exhaust fan shall not exceed 7-1/2 by 7-1/2 in. The installation of the exhaust fan requires additional furring channel parallel to the ceiling channel and tied to two consecutive cold rolled channels or joists bottom chord. Fan screw-attached from one side to the ceiling furring channel and from the other side to the additional furring channel with two screws at each side through holes predrilled in the fan housing. Fan wired with a UL Listed nonmetallic sheathed cable with three No. 12 AWG conductors. Fan includes a 3 in. diam exhaust steel duct fastened to the outlet with aluminum foil tape. As alternate to steel duct, a 3 in. diam aluminum, Class 1 air duct or air connector (Bearing the UL Listing Mark) may be used.

As an alternate for use with Item 8L for the 1-1/2 ratings, the size of the exhaust fan/ceiling penetration may be increased to a maximum 8 by 8 in. and the aluminum Class I air duct may be increased to a maximum 4 in. diam. Only one exhaust fan penetration and one ceiling runner penetration are allowed per 100 sq ft of ceiling area.

Alternate Exhaust Fan — Optional — (Not Shown)— (Bearing the UL Listing Mark) — For use with Item 8L for the 2 h ratings as an alternate to the 5 in. diam unprotected duct outlet. Frame made of painted steel, measuring 12 by 14 by 8-1/2 in. Fan gross weight 10 lb max. The ceiling penetration from the exhaust fan shall not exceed 12 by 14 in. The installation of the fan requires two pieces of 1-1/2 by 1-5/8 by 16 galv steel angles for supporting the fan housing. The steel angles attached to both sides of the housing with two steel screws on each side through pre-drilled holes. Angles supported on and fastened to furring channels spaced 16 in. OC which are tied to two consecutive cold-rolled channels or joists bottom chords. A 6 in. diam exhaust aluminum duct fastened to the fan outlet, inside the plenum space, with aluminum foil tape. Only one exhaust fan penetration and one ceiling runner penetration are allowed per 100 sq ft of ceiling area.

8N. **Fixture, Recessed Light —** Optional — (Bearing the UL Listing Mark) — For the 2 h ratings (1-1/2 h when combined with Item 8L), as an alternate to the 5 in. diam unprotected duct outlet. Fluorescent lighting fixture with 12 by 12 by 5-1/2 in. aluminum housing, lampholder, ballast for fluorescent lamp and nom 2-1/2 by 4 by 2-1/4 in. deep galv steel junction box attached to one side of the light housing. Penetration of light into the ceiling is 7-3/4 in. diam max. Light fixture weighs 8 lbs max. Hanger tabs of light fixture wire-tied to nom 27 in. long cold-rolled steel channels on both sides of fixture. Ends of cold-rolled channels supporting the fixture wire-tied to top surface of two consecutive ceiling furring channels using No. 18 SWG galv steel tie wire. Light fixture may be activated with a 3/4 in diam electrical nonmetallic tubing (ENMT) containing three No. 12 or No. 14 AWG Type THHN wire; or nonmetallic sheathed cable with two conductors with grounding, or 1/2 in. diam flexible metal conduit containing three No. 12 AWG Type THHN wires. Only one fixture is allowed per 100 sq ft of ceiling area.

8O. **Heating and Air Conditioning Plenum Box Outlet —** Optional — For the 2 h ratings (1-1/2 h rating when combined with Item 8L), as an alternate to the 5 in. diam unprotected duct outlet. 10 by 10 in. opening penetrating the ceiling. Outlet box

measuring 12 by 12 by 7 in. outside, fabricated from 1 in. thick UL Classified fiberglass insulation boards. Box supported from two sides with 1 in. by 1 in., 25 gauge thick galv steel angles, by adhering the angles to the box sides with aluminum duct tape. Angles supported on and screw-attached to two consecutive furring channels. Box has a 9 in. diam cutout at the top to install a steel sleeve to connect the box to a flexible air duct. Sleeve fabricated from 3-1/2 in. wide strip of 28 gauge galv steel, bent to form a 9 in. diam collar, with its bottom perimeter notched 1/8 by 3/4 in. at 5/8 in. OC and bent 90 degrees against the bottom surface of the box top. Flexible Air Duct (Item 8I) mounted on the collar of the sleeve and secured with hose clamp. The top curved part of the air duct supported with a 1 in. wide, 28 MSG galv steel strap and secured to the slab by the powder-driven fasteners described in Item B.

8P. **Heating and Air Conditioning Plenum Box Outlet —** Optional — For the 1 hr ratings as an alternate to the 5 in. diam unprotected duct outlet (item 7). Plenum box outlet 18 in. by 18 in. by 19 in. high penetrating the ceiling, with 16 by 16 in. clear opening. Sides and top of the box fabricated from Listed Air Duct, Class 1, 1 in. thick rigid fiberglass boards. The box attached from two opposite sides to 1-1/4 by 1-3/4 by 0.037 in. thick galv steel angles. The 1-3/4 in. vertical side of the steel angles adhered to the outside board of the box with a 2-1/2 in. wide continuous Listed Air Ducts and Air Connectors pressure sensitive aluminum foil duct tape. The horizontal side of the steel angle supported on, and screw-attached to two consecutive 1 in. deep, 2.5 in. wide, .020 in. thick galv furring channels with two 1/2 in. long No. 6 Type S washer screws near each of the four corners of the box. The box extends 2-1/2 in. below the gypsum wallboard ceiling, and its top has min 2 in. clearance from the bottom of the concrete slab. Two opposite sides of the box, which have 10 in. diam cutouts, also have steel sleeves built in to accommodate the flexible air ducts. The sleeves made from 3-1/2 in. wide strips, fabricated from No. 28 ga galv steel, with one of its sides notched 1/8 by 3/4 in. at 5/8 in. OC, bent 90 degree against the fiberglass side board through the cutout to secure the sleeve to the box. The 10 in. diam Listed flexible air ducts mounted on, and secured to the sleeves with nom 3/8 in. wide, 1/16 in. thick vinyl hose clamps. A 10 by 10 in. (inside) square, Listed Air Duct Materials, fabricated from 1 in. thick fiberglass board, supported from one end on a 12 by 12 in. cutout in a third side of the plenum box outlet and taped around the connected perimeter of the duct to the box outlet exterior side, with a 2-1/2 in. wide Listed pressure sensitive aluminum foil duct tape. The three air ducts are supported with 1 in. wide, 0.021 in. thick galv steel straps near the ends connected to the box. The straps placed around the bottom of ducts, secured to the bottom of the concrete slab with powder-actuated 1 in. long, 0.145 in. diam shank, with 1/4 in. diam head steel pins having a 3/8 in. diam plastic retainer washer. The ducts are draped on the furring channels. Only one 16 by 16 in. box outlet opening is allowed per 100 sq ft of ceiling area.

8Q. **Alternate Penetrating Items —** (Not Shown) — One or all of the following may be used in conjunction with 8D: ENMT (Non-metallic tubing), Romex Cable, and an additional bundle of tubing including 2 copper tubes (7/8 in. diam), non-metallic pipe (1 in. diam schedule 40 PVC), and non-metallic wire (low voltage). These items are located within the stud cavity of a gypsum wallboard rated or non-rated partition.

9. **Electrical Junction Box —** (Not Shown) — Bearing the UL Listing Mark. Max 4 in. diam steel junction box with cover plate flush with ceiling. Attached with two 3/8 in. long steel screws to a section of steel furring channel placed on top and perpendicular to ceiling furring channels (Item 11), with its ends extending about 5 in. beyond the adjacent ceiling furring channels. Electrical cable to be supported from the steel joists, cold-rolled channels (Item 4) or hanger clips. As an alternate the electrical junction box may be supported by a 2 by 4 in. wood nailer screw-attached to the furring channels using two screws per each wood nailer.

10. **Tie Wire —** No. 18 SWG (0.048 in. diam) galv steel wire, used to secure furring channels to joists or cold-rolled channels.

11. **Furring Channels —** Min 0.021 in. thick (25 gauge) galv steel, 7/8 in. high, 2-5/8 in. base width, 1-3/8 in. face width and 12 ft long. Installed perpendicular to steel joists 24 in. OC when used with Gypsum Board, Item 12 and 16 in. OC when use with Gypsum Board, Item 12A. When structural steel members from Item 3D (3) are employed, the furring channels shall be spaced 16 in. OC for the 2 hr Restrained and Unrestrained assembly rating and 24 in. OC for the 1-1/2 hr unrestrained assembly rating when wallboard in Item 12 is used. At wallboard end joints, one channel shall be located on each side and 3 in. from end joint. All channels tied to bottom chord of each joist (and each intermediate support, when used) with double strand of tie wire. At splices, channels overlapped 8 in. and tied together with double strand of tie wire near each end of overlap.

11A. **Steel Framing Members* —** Not Shown — As and alternate to Item 11. Main runners, cross tees, cross channels and wall angle as listed below:

(a) **Main Runners —** Nom 10 or 12 ft long, 15/16 in. or 1-1/2 in. wide face, spaced 4 ft OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 48 in. OC.

(b) **Cross Tees —** Nom 4 ft long, 1-1/2 in. wide face or 15/16 in. wide face installed at sides of light fixtures, installed perpendicular to the main runners, spaced 24 in. OC. Additional cross tees or cross channels used at 8 in. from each side of butted wallboard end joints. The cross tees or cross channels may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.

(c) **Cross Channels —** Nom 4 ft long, installed perpendicular to main runners, spaced 24 in. OC.

(d) **Wall Angle or Channel —** Painted or galv steel angle with 1 in. legs or channel with 1 in. legs, 1-9/16 in. deep attached to walls at perimeter of ceiling with fasteners 16 in. OC. To support steel framing member ends and for screw-attachment of the gypsum wallboard.
CGC INC — Type DGL or RX.

USG INTERIORS LLC — Type DGL or RX.

11B. **Alternate Steel Framing Members* —** (Not Shown) — As an alternate to Items 11 and 11A. Main runners nom 12 ft long, spaced 48 in. OC. Ends of main runners at walls to rest on wall angle with 1/2 in to 3/4 in. end clearance. Primary cross tees (1-1/2 in. wide across flange) or cross channels, nom 4 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional primary cross tees or cross channels required at each gypsum board end joint, 8 in. from and on each side of gypsum board end joint. The main runners, cross tees or cross channels may be riveted or screw-attached to the wall angle or channel to facilitate the ceiling installation.
ARMSTRONG WORLD INDUSTRIES INC — Type DFR-8000.

11C. **Alternate Steel Framing Members* —** (Not Shown) — As an alternate to Items 11, 11A and 11B. For use in corridors or rooms having a maximum width dimension of 14 ft. Steel framing members consist of grid runners, locking angle wall molding and hanger bars. Locking angle wall molding secured to walls with steel nails or screws spaced max 24 in. OC. Slots of locking angle wall molding parallel with hanger bars to be aligned with tabbed cutouts in bottom edge of hanger bars. Hanger bars spaced max 50 in. OC and suspended with No. 12 AWG steel hanger wires spaced max 48 in. OC. Adjoining lengths of hanger bar to overlap 12 in. and to be secured together and suspended by a shared hanger wire. A min clearance of 1/4 in. shall be maintained between the ends of the hanger bars and the walls. Grid runners cut-to-length and installed perpendicular to hanger bars and spaced max 24 in. OC with additional grid runners installed 8 in. OC at gypsum board end joints. Grid runners parallel with walls to be spaced max 16 in. from wall. Ends of grid runners to rest on and engage slots of locking angle wall molding with a clearance of 3/8 in. to 1/2 in. maintained between each end of the grid runner and the wall. Bulb of grid runner to be captured by tabbed cutouts in bottom edge of hanger bars.
ARMSTRONG WORLD INDUSTRIES INC — Type DFR-8000-SS

11D. **Alternate Steel Framing Members* —** (Not Shown) — As an alternate to Items 11, 11A, 11B and 11C. Main runners nom 12 ft long, spaced 72 in. OC. Cross tees, nom 6 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional 6 ft long cross tees required at each gypsum board end joint with butted gypsum board end joints centered between cross tees spaced 8 in. OC. The main runners and cross tees may be riveted or screw-attached to the wall angle or channel to facilitate the ceiling installation.
ARMSTRONG WORLD INDUSTRIES INC — Type DFR-8000

11E. **Alternate Steel Framing Members* —** (Not Shown) — As an alternate to Items 11 through 11D - Main runners nom 12 ft long, spaced 72 in. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 48 in. OC. Cross tees, nom 6 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional 6 ft long cross tees required at each

gypsum board end joint with butted gypsum board end joints centered between cross tees spaced 8 in. OC. The main runners and cross tees may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.
USG INTERIORS LLC — Type DGL or RX

12. **Gypsum Board* —** 1/2 or 5/8 in. thick, 4 ft wide, installed with long dimension perpendicular to furring channels and side joints located away from joists. End joints in adjacent rows may be staggered or in line. Unless otherwise specified in Item 1, end joints shall be protected with a 3 in. wide strip of wallboard placed over entire length of end joint between the two furring channels. When the end joint occurs within 12 in. of the steel beam it must be protected. Screws fastening the wallboard to furring channels spaced a max 12 in. OC along each furring channel. At end joints, screws located 3 in. on each side of joint. Along side joints, screws located 3/4 in. from board edge.

When alternate **Steel Framing Members*** (Item 11C) are used, gypsum board sheets installed with long dimension (side joints) perpendicular to the grid runners with the end joints staggered min 4 ft and centered between grid runners which are spaced 8 in. OC. Prior to installation of the gypsum board sheets, backer strips consisting of nom 7-3/4 in. wide by 48 in. long pieces of gypsum board are to be laid atop the grid runner flanges and centered over each butted end joint location. The backer strips are to be secured to the flanges of the grid runners at opposite corners of the backer strip to prevent the backer strips from being uplifted during screw-attachment of the gypsum board sheets. Gypsum board fastened to grid runners with drywall screws spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. The butted end joints are to be secured to the backer strip with No. 10 by 1-1/2 in. long Type G laminating screws located 1 in. from each side of the butted end joint and spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. Joints to be covered with paper tape and joint compound.

When alternate **Steel Framing Members*** (Item 11D) are used, gypsum board sheets installed with long dimension (side joints) perpendicular to the 6 ft long cross tees with the end joints staggered min 4 ft and centered between cross tees which are spaced 8 in. OC. Gypsum board side joints may occur beneath or between main runners. Prior to installation of the gypsum board sheets, backer strips consisting of nom 7-3/4 in. wide pieces of gypsum board are to be laid atop the cross tee flanges and centered over each butted end joint location. The backer strips are to be secured to the flanges of the cross tees at opposite corners of the backer strip to prevent the backer strips from being uplifted during screw-attachment of the gypsum board sheets. Gypsum board fastened to cross tees with drywall screws spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. The butted end joints are to be secured to the backer strip with No. 10 by 1-1/2 in. long Type G laminating screws located 1 in. from each side of the butted end joint and spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. Joints to be covered with paper tape and joint compound.

When alternate **Steel Framing Members*** (Item 11E) are used, gypsum board sheets installed with long dimension (side joints) perpendicular to the 6 ft long cross tees with the end joints staggered min 4 ft and centered between cross tees which are spaced 8 in. OC. Gypsum board side joints may occur beneath or between main runners. Prior to installation of the gypsum board sheets, backer strips consisting of nom 7-3/4 in. wide pieces of gypsum board are to be laid atop the cross tee flanges and centered over each butted end joint location. The backer strips are to be secured to the flanges of the cross tees at opposite corners of the backer strip with hold down clips to prevent the backer strips from being uplifted during screw-attachment of the gypsum board sheets. Gypsum board fastened to cross tees with 1 in. drywall screws spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. The butted end joints are to be secured to the backer strip with No. 10 by 1-1/2 in. long Type G laminating screws located 1 in. from each side of the butted end joint and spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. Joints to be covered with paper tape and joint compound.

AMERICAN GYPSUM CO — Types AG-C

CABOT MANUFACTURING ULC — Type X, Type C

CERTAINTEED GYPSUM INC — Type C, Type LGFC-C/A

CGC INC — Types C, IP-X2, ULIX

GEORGIA-PACIFIC GYPSUM L L C — Types 5, DAPC, TG-C

NATIONAL GYPSUM CO — Types FSK, FSK-C, FSL, FSMR-C, FSW, FSW-C, FSW-3, FSW-8

PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM — Types C, PG-C

PANEL REY S A — Type PRC

THAI GYPSUM PRODUCTS PCL — Type FRPC, Type C

UNITED STATES GYPSUM CO — Types C, IP-X2, 5/8 Type ULIX

USG BORAL DRYWALL SFZ LLC — Type C

USG MEXICO S A DE C V — Types C, IP-X2

12A. **Gypsum Board* —** (Not Shown) — For the **1 h Restrained and Unrestrained Assembly and Beam Ratings only,** min 5/8 in. thick, 4 ft. wide boards. Installed with long dimension perpendicular to furring channels. Screws fastening wallboard to furring channels spaced 8 in. OC along each furring channel. End joints occurring between channels backed with 3 in. wide strip of wallboard over full length of joint. Joints to be covered with paper tape and joint compound.
AMERICAN GYPSUM CO — Type AG-C

BEIJING NEW BUILDING MATERIALS PUBLIC LTD CO — Type DBX-1

CABOT MANUFACTURING ULC — Type X, 5/8 Type X, Type Blueglass Exterior Sheathing

CERTAINTEED GYPSUM INC — Type C, Types LGFC6A, LGFC-C/A

CGC INC — Types SCX, IP-X1, ULIX

GEORGIA-PACIFIC GYPSUM L L C — Types 9, DAP, DGG, DS, GPFS6, TG-C, Type X, Veneer Plaster Base-Type X, Water Rated-Type X, Sheathing Type-X, Soffit-Type X, Type LWX, Veneer Plaster Base-Type LWX, Water Rated-Type LWX, Sheathing Type-LWX, Soffit-Type LWX, Type LW2X, Veneer Plaster Base - Type LW2X, Water Rated - Type LW2X, Sheathing - Type LW2X, Soffit - Type LW2X

NATIONAL GYPSUM CO — Types FSL, FSW, FSW-6, FSW-G

NATIONAL GYPSUM CO — Riyadh, Saudi Arabia — Type FR.

PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM — Types C, PG-C, PG-11, PG-9, PGS-WRS, PGI

SIAM GYPSUM INDUSTRY (SARABURI) CO LTD — Type EX-1

THAI GYPSUM PRODUCTS PCL — Type C

UNITED STATES GYPSUM CO — Type SCX, IP-X1, ULIX.

USG BORAL DRYWALL SFZ LLC — Type SCX

USG MEXICO S A DE C V — Types SCX, IP-X1

12B. **Gypsum Board* —** (Not Shown) — As an alternate to Items 12A and 13 — For the **1 h Restrained and Unrestrained Assembly and Beam Ratings only**, min 5/8 in. thick, 4 ft. wide boards. Installed with long dimension perpendicular to furring channels. No. 6, 2 in. long screws fastening wallboard to furring channels spaced 6 in. OC, starting with a 3 in. stagger along each furring channel. End joints occurring between channels backed with 3 in. wide strip of wallboard over full length of joint. Joints to be covered with paper tape and joint compound.
CERTAINTEED GYPSUM INC — Types EGRG, GlasRoc, GlasRoc-2, Easy-Lite Type X

13. **Screws, Wallboard —** Type S, self-drilling and self-tapping, 1-1/4 in. long with bugle head.

14. **Joint System —** (Optional, unless otherwise noted — Not Shown) — Paper tape embedded in joint compound over joints, and covered with two layers of compound with edges feathered out. Wallboard screw heads covered with two layers of compound.

15. **Mineral and Fiber Boards* —** (Optional, Not Shown) — Applied over concrete floor with no limit on overall thickness. When the insulation is used, the Assembly and Beam Ratings for the minimum size 8 in. deep Types D500, D510 and V Joists in table Item 1, become 1-1/2 h.
See Mineral and Fiber Board (CERZ) category for names of manufacturers.

16. **Roof Covering —** (Not Shown, for use with insulation described in Item 11) — Class A, B or C Built-Up Roof Covering Materials* — consisting only of felt and asphalt (or coal tar pitch) materials in alternate layers. See Building Materials Directory.

16A. **Roof Covering —** (Not Shown) — Optional — IRMA Roof System with Dow Chemical UL Classified extruded polystyrene foamed plastic boards, 4.1 pcf max density, and UL Classified Roofing Membrane under CHCI category.

17. **Discrete Products Installed in Air-handling Spaces* —** Automatic Balancing Valve/Damper (Not Shown - Optional) — For use with item 8. Valve/Damper to be provided with ducted installation with steel duct per damper manufacturer's instructions. Automatic Balancing Valve/Damper shall be installed within duct such that it is not directly above the ceiling radiation damper.
METAL INDUSTRIES INC — Model ABV-4, ABV-5, ABV-6

* Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

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