

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](#)

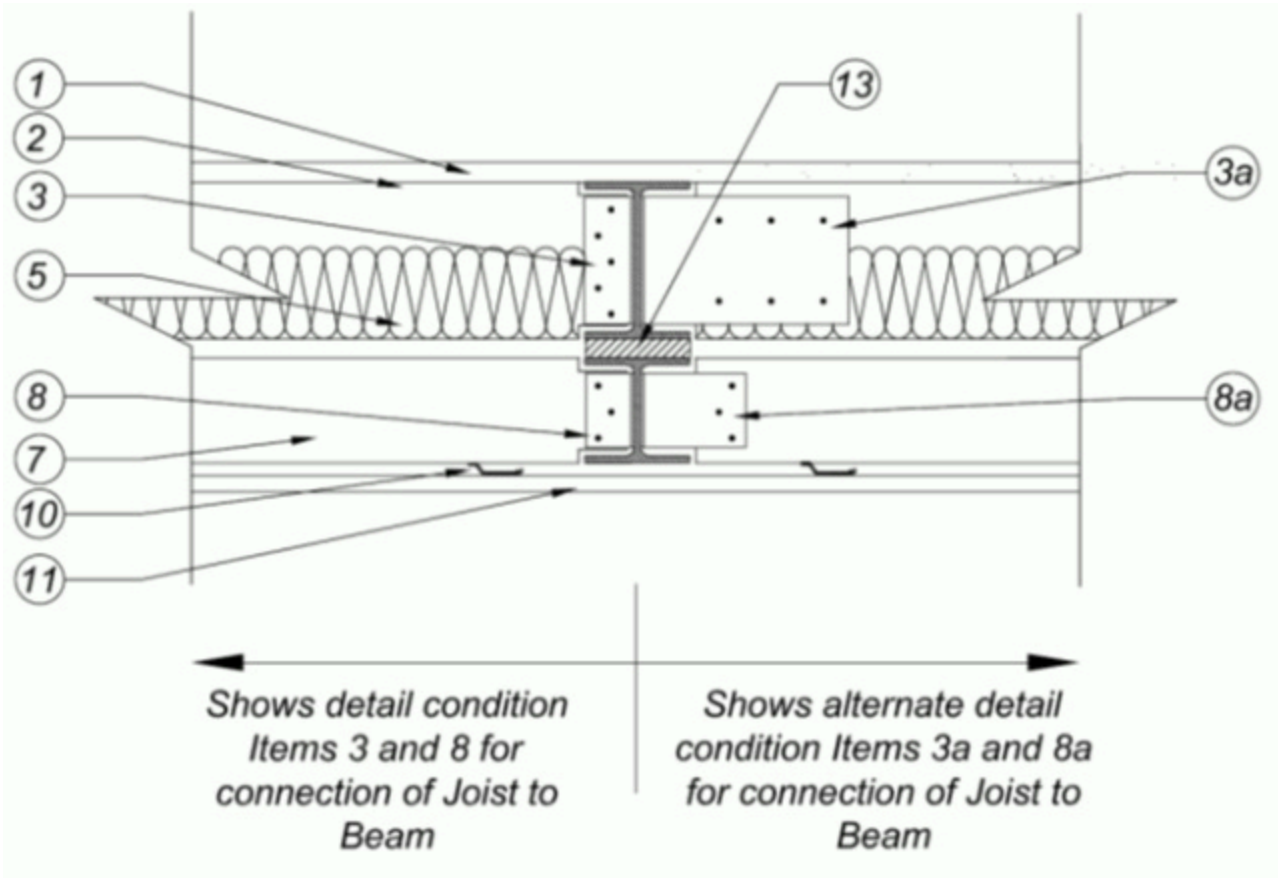
[See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada Design Criteria and Allowable Variances](#)

Design No. H501

August 05, 2020

Unrestrained Assembly Ratings - 1 and 2 Hr. (Refer to Item 5)

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



Floor Construction

Beam — W6 x 9, min size, 50 ksi steel OR min 6 in. deep Hollow Structural Sections (HSS) with 50 ksi steel, as shown below. For rectangular sections, larger dimensions oriented vertically.

Min. HSS 6 x 2 x 1/8"	Min. HSS 8 x 2 x 1/8"
Min. HSS 6 x 3 x 1/8"	Min. HSS 8 x 3 x 1/8"
Min. HSS 6 x 4 x 3/16"	Min. HSS 8 x 4 x 1/8"
Min. HSS 6 x 5 x 3/16"	Min. HSS 8 x 6 x 3/16"
Min. HSS 6 x 6 x 1/8"	Min. HSS 8 x 8 x 3/16"
Min. HSS 7 x 3 x 3/16"	Min. HSS 9 x 3 x 3/16"
Min. HSS 7 x 4 x 1/8"	Min. HSS 9 x 5 x 3/16"
Min. HSS 7 x 5 x 1/8"	Min. HSS 9 x 7 x 3/16"
Min. HSS 7 x 7 x 3/16"	Or any HSS shown above with greater wall thickness than indicated.

1. **Structural Cement-Fiber Units*** — Nom 3/4 in. thick, with tongue and grooved on long edges. Long dimension of panels to be perpendicular to joists with end joints staggered a min of 2 ft. and centered over the joists. Panels secured to steel joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 12 in. OC in the field with a screw located 1 in. and 2 in. from each edge, and 8 in. OC on the perimeter with a screw located 2 in. from each edge, located 1/2 in. from the side edges of the panel.

As an alternate to the 1-5/8" long No. 8 fastener, the following power-actuated pins may be used for min. 1/8" thick, hot-rolled floor beam and floor joist steel sections, Item 2A:

Hilti pin model X-U 32MX with a min. 0.157" shank diameter min. 1-1/4" long, DeWalt pin model 50458-PWR with a min. 0.157" shank diameter min. 1-1/4" long or Aerosmith model 5324HPG with a min. 0.145 shank diameter min. 1-1/4" long.

UNITED STATES GYPSUM CO — Types STRUCTO-CRETE, USGSP

2. **Steel Joists** — Min. 14 MSG (68 mil) corrosion-protected steel joist, min 6 in. deep, with 2 in wide flanges (600S200-68), min yield strength of 50 ksi, cold formed, designed in accordance with the 2012 edition of the Specification for the Design of Cold-Formed Steel Structural Members by the American Iron and Steel Institute (AISI). All design details including the flexural design load of the joist, shall be as specified by the steel designer and/or producer, and shall meet the requirements of all applicable local code agencies. Joists spaced max 24 in. OC. Attached to W6 x 9 beam with clip angles (Items 3, 3A) or butt weld.

2A. **Steel Joists** — (Alternate to item 2. For use only with HSS Floor Beams) - Hollow Structural Sections (HSS) with 50 ksi steel, as shown below. For rectangular sections, larger dimensions oriented vertically. All design details including the flexural design load of the joist, shall be as specified by the steel designer and/or steel fabricator, and shall meet the requirements of all applicable local code agencies. Joists shall be min 6 in. deep and spaced max. 24 in. OC. Attached to Floor Beam with butt weld.

Min. HSS 6 x 2 x 1/8"	Min. HSS 8 x 2 x 1/8"
Min. HSS 6 x 3 x 1/8"	Min. HSS 8 x 3 x 1/8"
Min. HSS 6 x 4 x 3/16"	Min. HSS 8 x 4 x 1/8"
Min. HSS 6 x 5 x 3/16"	Min. HSS 8 x 6 x 3/16"
Min. HSS 6 x 6 x 1/8"	Min. HSS 8 x 8 x 3/16"
Min. HSS 7 x 3 x 3/16"	Min. HSS 9 x 3 x 3/16"
Min. HSS 7 x 4 x 1/8"	Min. HSS 9 x 5 x 3/16"
Min. HSS 7 x 5 x 1/8"	Min. HSS 9 x 7 x 3/16"
Min. HSS 7 x 7 x 3/16"	Or any HSS shown above with greater wall thickness than indicated.

3. **Clip Angles** — For use with 6 in. deep joists (Item 2) when joists ends are cut to beam profile. Min. 16 MSG (54 mil) 1-1/2 in. x 1-1/2 in. x 5 in. high steel angles. Secured to beam with minimum five #12 self-drilling hex head screws. Secured to joist with five #10 self-drilling hex head screws. Only one clip angle per joist end.

3A. **Clip Angles (Alternate to Item 3)** — For use with 6 in. deep joists (Item 2) when joists ends are square cut. Min. 14 MSG (68 mil), 1-7/8 in. x 8 in. x 4-7/8 in. high secured to beam with minimum four #12 self-drilling hex head screws and attached to joists with minimum six #12 self-drilling hex head screws. Only one clip angle per joist end.

4. **Joist Bridging (Not Shown)** — For use with Item 2 - Installed immediately after joists are erected and before construction loads are applied. The bridging consisting of 2 in. wide flat steel strap formed from min. 16 MSG (54 mil). The structural bridging is installed perpendicular to and on the bottom flange of each joist at a maximum of 39 in. from each end of joist with one #10 self-drilling hex head steel screw per joist. Maximum spacing of bridging shall be 8 ft.

4A. **Joist Solid Blocking (Not Shown)** — For use with Item 2 - Installed immediately after joists are erected and before construction loads are applied. This blocking consists of joists (Item 2) cut to length to fit in between joist cavity, using clip angles (Items 3, 3A) to attach solid bridging to joists at each end. Solid joist blocking required at each perimeter joist cavity and at joist bridge strapping (Item 4) with maximum 8 ft. OC spacing.

5. **Insulation — Batts and Blankets*** — (When Insulation is not used the rating shall be 1 Hr.) Min. 3-1/2 in. thick glass fiber batt or mineral wool insulation installed in joist cavities and supported by hexagonal wire netting (Item 6) attached to the bottom of the joists. Any glass fiber or mineral wool batt insulation bearing the UL Classification Marking for Surface Burning Characteristics may be used. See Batts and Blankets (BKNV) category in the Building Materials Directory for names of manufacturers.

6. **Hexagonal Wire Netting** — To be used with Item 5. Min. 20 MSG attached to bottom of steel joists (Item 2 or 2A) with min. 18 MSG hanger wire wrapped around joist at 24 in. OC. Alternate Attachment Method-I - Use 1/2 in long, pan head, self-drilling screws with washers, spaced 24 in OC to attach Hexagonal Wire Netting to bottom of the Steel Joists (Item 2 or 2A). Alternate Attachment Method-II -Use 3/4 in wide, min 25 MSG steel straps to attach Hexagonal Wire Netting to bottom of Steel Joists (Item 2), metal straps screw attached parallel to the bottom of the Steel Joists or perpendicular to the Steel Joists spaced 24 in OC with 1/2 in long, self-drilling screws spaced 24 in OC.

6A. **Hexagonal Wire Netting** — As an alternate to Item 6, for use with Items 2 or 2A - Min 20 MSG, min 36 in wide, centered over the top of the joist cavity, bending Hexagonal Wire Netting over top of two adjacent flanges of steel joists to accommodate the insulation, with insulation installed between Hexagonal Wire Netting and Type USGSP (Item 1), prior to the Type USGSP (Item 1) being screw attached to the top of the steel joists.

6B. **Metal Strap** — As an alternate to Item 6 or 6A, 3/4 in wide, min 25 MSG steel straps attached perpendicular to the bottom of the steel joists (Item 2), spaced 16 in OC with 1/2 in long, self-drilling screws.

Ceiling Construction

Beam — W4 x 13, min size, 50 ksi steel OR min. 4 in. deep Hollow Structural Sections (HSS) with 50 ksi steel, as shown below. For rectangular sections, larger dimensions oriented vertically. Supported at a maximum 12 feet. OC.

Min. HSS 4 x 4 x 1/2"	Min. HSS 7 x 4 x 3/16"
Min. HSS 4-1/2 x 4-1/2 x 1/4"	Min. HSS 7 x 5 x 3/16"
Min. HSS 5 x 3 x 5/16"	Min. HSS 7 x 7 x 3/16"
Min. HSS 5 x 4 x 1/2"	Min. HSS 8 x 2 x 3/16"
Min. HSS 5 x 5 x 1/4"	Min. HSS 8 x 3 x 3/16"
Min. HSS 5-1/2 x 5-1/2 x 3/16"	Min. HSS 8 x 4 x 3/16"
Min. HSS 6 x 2 x 1/4"	Min. HSS 8 x 6 x 3/16"
Min. HSS 6 x 3 x 1/2"	Min. HSS 8 x 8 x 3/16"
Min. HSS 6 x 4 x 3/16"	Min. HSS 9 x 3 x 3/16"
Min. HSS 6 x 5 x 3/16"	Min. HSS 9 x 5 x 3/16"
Min. HSS 6 x 6 x 3/16"	Min. HSS 9 x 7 x 3/16"
Min. HSS 7 x 3 x 3/16"	Or any HSS shown above with greater wall thickness than indicated.

7. **Steel Joists** — Min. 16 MSG (54 mil) corrosion-protected steel joist, min 4 in. deep, with 2 in wide flanges (400S200-54), min yield strength of 50 ksi, cold formed, designed in accordance with the 2012 edition of the Specification for the Design of Cold-Formed Steel Structural Members by the American Iron and Steel Institute (AISI). All design details, including the flexural design load of the joist, shall be as specified by the steel stud designer and/or producer, and shall meet the requirements of all applicable local code agencies. Joists spaced max 24 in. OC. Attached to W4 x 13 beam with clip angles (Items 8, 8A) or butt weld.

7A. **Steel Joists** — (Alternate to item 7. . For use only with HSS Ceiling Beams) Hollow Structural Sections (HSS) with 50 ksi steel, as shown below. For rectangular sections, larger dimensions oriented vertically. All design details including the flexural design load of the joist, shall be as specified by the steel designer and/or steel fabricator, and shall meet the requirements of all applicable local code agencies. Joists spaced max 24 in. OC. Attached to Ceiling Construction Beam with butt weld.

Min. HSS 2-1/2 x 2-1/2 x 3/16"	Min. HSS 6 x 3 x 1/2"
Min. HSS 3 x 3 x 1/8"	Min. HSS 6 x 4 x 3/16"
Min. HSS 3-1/2 x 3-1/2 x 1/8"	Min. HSS 6 x 5 x 3/16"
Min. HSS 4 x 2 x 1/8"	Min. HSS 7 x 3 x 3/16"
Min. HSS 4 x 3 x 1/8"	Min. HSS 7 x 4 x 3/16"
Min. HSS 4 x 4 x 1/8"	Min. HSS 7 x 5 x 3/16"
Min. HSS 4-1/2 x 4-1/2 x 1/8"	Min. HSS 7 x 7 x 3/16"
Min. HSS 5 x 2 x 1/8"	Min. HSS 8 x 2 x 1/8"
Min. HSS 5 x 3 x 1/8"	Min. HSS 8 x 3 x 1/8"
Min. HSS 5 x 4 x 3/16"	Min. HSS 8 x 4 x 1/8"
Min. HSS 5 x 5 x 1/8"	Min. HSS 8 x 6 x 3/16"
Min. HSS 5-1/2 x 5-1/2 x 1/8"	Min. HSS 8 x 8 x 3/16"
Min. HSS 6 x 2 x 1/8"	Min. HSS 9 x 3 x 3/16"
Min. HSS 6 x 3 x 1/8"	Min. HSS 9 x 5 x 3/16"
Min. HSS 6 x 4 x 3/16"	Min. HSS 9 x 7 x 3/16"
Min. HSS 6 x 5 x 3/16"	Or any HSS shown above with greater wall thickness than indicated.
Min. HSS 6 x 6 x 1/8"	

8. **Clip Angles** — For use with 4 in. deep joists (Item 7) when joists ends are cut to beam profile. Min. 16 MSG, 1-1/2 in. x 1-1/2 in. x 3 in. high steel angles. Secured to beam with minimum three #12 self-drilling hex head screws. Secured to joists with three #10 self-drilling hex head screws. Only one clip angle per joist end.

8A. **Clip Angles (Alternate to Item 8)** — For use with 4 in. deep joists (Item 7) when joist ends are square cut. Min. 16 MSG (54 mil), 1-1/2 in. x 4 in. x 3 in. high steel angles. Secured to beam with minimum three #12 self-drilling hex head screws, attached to joists with three #10 self-drilling hex head screws. Only one clip angle per joist end.

9. **Joist Bridging (Not Shown)** — For use with Item 7 - Installed immediately after joists are erected and before construction loads are applied. The bridging consisting of 2 in. wide flat steel strap formed from min. 16 MSG (54 mil). The structural bridging is installed perpendicular to and on the bottom flange of each joist at a maximum of 42 in. from each end of joist with one #10 self-drilling hex head steel screw per joist. Maximum spacing of bridging shall be 8 ft.

9A. **Joist Solid Blocking (Not Shown)** — Consisting of joists (Item 7) cut to length to fit in between joist cavities, using clip angles (Items 8, 8A) to attach solid blocking to joists at each end. Solid joist blocking required at each perimeter joist cavity and at joist bridge strapping (Item 9) with maximum 8 ft. OC spacing.

10. **Resilient Channels** — Formed of min. 25 MSG galv. steel, 1/2 in. deep, spaced max 16 in. OC, perpendicular to ceiling joists (Item 7 or 7A). Channel splices located beneath joists and overlapped 4 in. Channels secured to each joist with one 7/16

in. long Type S-12 low profile steel screw. Two channels spaced 6 in. OC, oriented opposite each gypsum board end joint. These channels shall extend min 6 in. beyond each side edge of board.

10A. **Steel Framing Members*** — (Optional, Not Shown) — As an alternate to Item 10 — Furring channels and Steel Framing Members as described below:

a. **Furring channels** — Formed of No. 25 MSG galv steel, 2-3/8 in. wide by 7/8 in. deep, spaced 16 in. OC, perpendicular to ceiling joists (Item 7 or 7A). Channel secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap. Additional channels shall be positioned so that the distance from the end of the board to the center of the first channel is 3 in. and from the board end to the center of the next channel is 12 in.

b. **Steel Framing Members*** — Used to attach furring channels (Item a) to joists (Item 7 or 7A). Clips spaced 48 in. OC and secured to the bottom chord of joists with min 1-5/8 in. long No. 8 self-drilling, self-tapping, bugle, flat or hex head screw through the center grommet. Furring channels are friction fitted into clips. Additional clips required to hold furring channel that supports the gypsum board butt joints.

PLITEQ INC — Type Genie Clip

10B. **Alternate Steel Framing Members*** — (Optional, Not Shown) — As an alternate to Items 10 and 10A, furring channels and Steel Framing Members as described below.

a. **Furring channels** — Formed of No. 25 MSG galv steel. 2-9/16 in. or 2-23/32 in. wide by 7/8 in. deep, spaced 16 in. OC, perpendicular to joists. Channels secured to joists as described in Item b. Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap.

b. **Steel Framing Members*** — Used to attach furring channels (Item a) to the steel joists (Item 7). Clips spaced a max of 48 in. OC. RSIC-1 and RSIC-1 (2.75) clips secured to alternating joists with No. 8 x 2-1/2 in. coarse drywall screw through the center grommet. Furring channels are friction fitted into clips. RSIC-1 clips for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) clips for use with 2-23/32 in. wide furring channels. Adjoining channels are overlapped as described in Item a. As an alternate, ends of adjoining channels may be overlapped 6 in. and secured together with two self-tapping No. 6 framing screws, min. 7/16 in. long at the midpoint of the overlap, with one screw on each flange of the channel. Additional clips required to hold furring channel that supports the wallboard butt joints, as described in Item 11.

PAC INTERNATIONAL L L C — Types RSIC-1 or RSIC-1 (2.75)

10C. **Steel Framing Members*** — (Optional, Not Shown) — As an alternate to Item 10.

a. **Furring Channels** — Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 16 in. OC, perpendicular to the joists. Channels secured to Cold Rolled Channels at every intersection with a 3/4 in. TEK screw through each furring channel leg. Ends of adjoining channels overlapped 12 in. and fastened together with two double strand No. 18 SWG galv steel wire ties, one at each end of overlap, or with two 3/4 in. TEK screws in each leg of the overlap section. Two furring channels used at end joints of gypsum board (Item 11), each extending a min of 6 in. beyond both side edges of the board.

b. **Cold Rolled Channels** — 1-1/2 in. by 1/2 in., formed from No. 16 ga. galv steel, positioned vertically and parallel to joists, friction-fitted into the channel caddy on the Steel Framing Members (Item 10Cc) and secured with two 3/4 in. TEK screws. Adjoining lengths of cold rolled channels lapped min. 12 in. and secured along bottom legs with four 3/4 in. TEK screws and wire-tied together with two double strand 18 SWG galv steel wire ties, one at each end of overlap.

c. **Steel Framing Members*** — Spaced 48 in. OC. max along joist, and secured to the joist on alternating joists with two, No. 10-16 TEK screws through mounting holes on the hanger bracket.

PAC INTERNATIONAL L L C — Type RSIC-SI-CRC EZ Clip

10D. **Steel Framing Members*** — (Optional, Not Shown) — As an alternate to Item 10.

a. **Furring Channels** — Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 16 in. OC perpendicular to joists and friction fit into Steel Framing Members (Item 10Db). Ends of adjoining channels overlapped 6 in. and tied together with double strand of No. 18 SWG galv steel wire near each end of overlap or with two TEK screws along each leg of the 6 in. overlap. Two furring channels used at end joints of gypsum board (Item 11). Butt joint channels held in place by strong back channels placed upside down, on top of, and running perpendicular to primary furring channels, extending 6 in. longer than length of gypsum side joint. Strong back channels spaced maximum 48 in. OC. Strong back channels secured to every intersection of primary furring channels with four 7/16 in. pan head screws, two along each of the legs at intersections. Butt joint channels run perpendicular to strong back channels and shall be minimum 6 in. longer than length of joint, secured to strong back channels with 7/16 in. pan head screws, two along each of the legs at intersection with strong back channels.

b. **Steel Framing Members*** — Used to attach furring channels (Item 10Da) to joists. Clips spaced 48 in. OC and secured along joist webs at each furring channel intersection with min. 3/4 in. long self-drilling No. 10-16 TEK screws through each of the provided hole locations. Furring channels are friction fitted into clips.

PAC INTERNATIONAL L L C — Type RSIC-S1-1 Ultra

11. **Gypsum Board*** — One layer of nom 5/8 in. thick by 48 in. wide gypsum panels installed with long dimension perpendicular to resilient/furring channels. Gypsum panels secured to resilient/furring channels with 1 in. long Type S bugle-head screws spaced 8 in. OC, with screws located 4 in. from and on each side of the gypsum panel midspan, and 1 in. from tapered edges of the board. End joints secured to both resilient/furring channels. When **Steel Framing Members** (Item 10A or 10B) are used, the butt joints in the gypsum board shall be supported by two furring channels. The two furring channels shall be spaced approximately 3-1/2 in. OC, and be attached to underside of the joist with one RSIC-1, RSIC-1 (2.75) or Genie clip at each end of the channel.

When **Steel Framing Members** (Item 10C) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 11. Adjacent butt joints staggered minimum 48 in. OC.

When **Steel Framing Members** (Item 10D) are used, one layer of nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 11. Butt joints staggered minimum 24 in. OC.

CGC INC — Types C, IP-X2, IPC-AR, ULIX

THE SIAM GYPSUM INDUSTRY (SONGKHLA) CO — Type C

UNITED STATES GYPSUM CO — Types C, IP-X2, IPC-AR, ULIX

USG BORAL DRYWALL SFZ LLC — Type C

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

12. **Finishing System (Not Shown)** — Vinyl, dry or premixed joint compound, applied in two coats to joints and screw-heads. Nom 2 in. wide paper tape embedded in first layer of compound over all joints. As an alternate, nom 3/32 in. thick veneer plaster may be applied to the entire surface of gypsum panels.

13. **Connection Between Floor and Ceiling Construction** — Steel plate, minimum 4 in. by 4 in. by 3/4 in. thick, welded between Floor and Ceiling Beams and at four corners of the modular assembly and at intermediate structural supports space a maximum of 12 ft. OC.

*** 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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