

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](#)

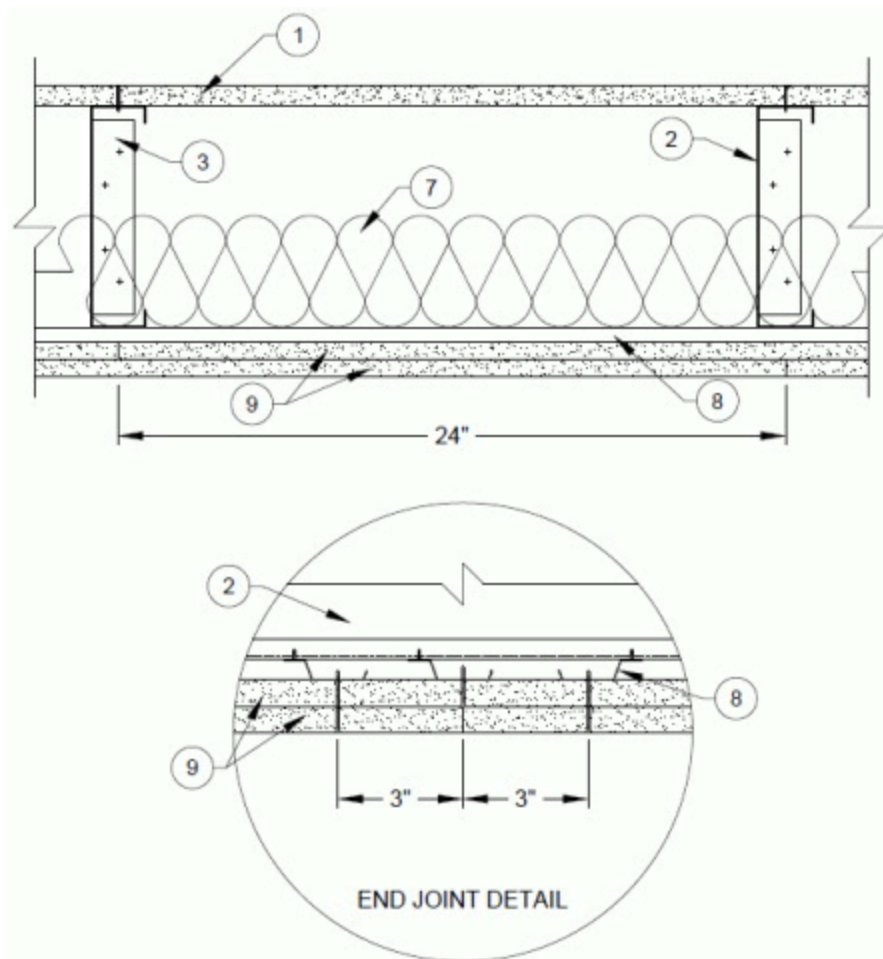
[See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada Design Criteria and Allowable Variances](#)

Design No. H511

December 26, 2023

Unrestrained Assembly Rating — 1-1/2, 2, 2-1/2 Hrs (See items 1, 7, and 9)

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



1. Flooring System —

1-1/2 Hr Rating

1A. Flooring System — Mineral and Fiber Boards* — Nom 20 mm thick. Long dimension of panels to be perpendicular to joists with end joints centered over the joists. Panels secured to joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 10-1/2 in. OC with screws located 5/8 in. from the edge at end joints, and screws located 3 in. from edge in the field. Side joints required to be tongue-and-groove.

THE PLYCEM COMPANY INC — Types Plycem Flooring, Plyrock Flooring, Plycem SX 20/20 Structural Flooring, Plystone Flooring, Entrepiso Plystone, Entrepiso Plyrock, Entrepiso Plycem, Plycem Entrepiso Alto Desempeño, Plycem High Performance Subfloor

2 Hr Rating System A

1A. Flooring System — Mineral and Fiber Boards* — Nom 20 mm thick. Long dimension of panels to be perpendicular to joists with end joints centered over the joists. Panels secured to joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 10-1/2 in. OC with screws located 5/8 in. from the edge at end joints, and screws located 3 in. from edge in the field. Side joints required to be tongue-and-groove.

THE PLYCEM COMPANY INC — Types Plycem Flooring, Plyrock Flooring, Plycem SX 20/20 Structural Flooring, Plystone Flooring, Entrepiso Plystone, Entrepiso Plyrock, Entrepiso Plycem, Plycem Entrepiso Alto Desempeño, Plycem High Performance Subfloor

1B. Cementitious Backer Unit* (Not Shown) — Min 1/2 in. thick, 4 ft by 4 ft gypsum board underlayment, Classified as to Surface Burning Characteristics. Bonded and attached to Mineral and Fiber Boards (Item 1A) with a mortar applied with a 1/4 in. by 1/4 in. notched trowel, and 1-1/4 in. long coarse thread screws spaced max 8 in. OC. Joints between items 1A and 1B staggered a min of 6 in.

NATIONAL GYPSUM CO — Type PermaBase

System B

1A. Flooring System — Mineral and Fiber Boards* — Nom 20 mm thick. Long dimension of panels to be perpendicular to joists with end joints centered over the joists. Panels secured to joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws

spaced a max of 10-1/2 in. OC with screws located 5/8 in. from the edge at end joints, and screws located 3 in. from edge in the field. Side joints required to be tongue-and-groove.

THE PLYCEM COMPANY INC — Types Plycem Flooring, Plyrock Flooring, Plycem SX 20/20 Structural Flooring, Plystone Flooring, Entrepiso Plystone, Entrepiso Plyrock, Entrepiso Plycem, Plycem Entrepiso Alto Desempeño, Plycem High Performance Subfloor

1B. Floor Topping Mixture* — (Not shown) - Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1500 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

MAXXON CORP — Type Maxxon Standard and Maxxon High Strength

1C. Floor Mat Materials* — Optional - Not Shown — Floor mat material loose laid over the crests of the steel deck. Flutes of the steel deck to be filled with Floor Topping Mixture* prior to the application of the Floor Mat Materials*. Refer to manufacturer's instructions regarding minimum thickness of floor topping over each floor mat material.

MAXXON CORP — Type Encapsulated Sound Mat

System C

1A. Flooring System — Mineral and Fiber Boards* — Nom 20 mm thick. Long dimension of panels to be perpendicular to joists with end joints centered over the joists. Panels secured to joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 10-1/2 in. OC with screws located 5/8 in. from the edge at end joints, and screws located 3 in. from edge in the field. Side joints required to be tongue-and-groove.

THE PLYCEM COMPANY INC — Types Plycem Flooring, Plyrock Flooring, Plycem SX 20/20 Structural Flooring, Plystone Flooring, Entrepiso Plystone, Entrepiso Plyrock, Entrepiso Plycem, Plycem Entrepiso Alto Desempeño, Plycem High Performance Subfloor

1B. Gypsum Board* — (Not shown) - Nom 6 by 22-1/2 by 5/8 in. thick pieces of gypsum board centered under subfloor joints (item 1A) and fastened with staples spaced 7 in. OC along each edge. Staples formed of 16 SWG (0.062 in. thick) steel with 1-1/8 in. legs and 1/2 in. crown, driven flush with gypsum board batten strips

UNITED STATES GYPSUM CO — Type C, ULIX

System D

1A. Flooring System — Mineral and Fiber Boards* — Nom 20 mm thick. Long dimension of panels to be perpendicular to joists with end joints centered over the joists. Panels secured to joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 10-1/2 in. OC with screws located 5/8 in. from the edge at end joints, and screws located 3 in. from edge in the field. Side joints required to be tongue-and-groove.

THE PLYCEM COMPANY INC — Types Plycem Flooring, Plyrock Flooring, Plycem SX 20/20 Structural Flooring, Plystone Flooring, Entrepiso Plystone, Entrepiso Plyrock, Entrepiso Plycem, Plycem Entrepiso Alto Desempeño, Plycem High Performance Subfloor

1B. Vapor Barrier — (Optional) - Commercial asphalt saturated felt, 0.030 in. thick.

Vapor Barrier — (Optional) - Nom 0.010 in. thick commercial rosin-sized building paper.

1C. Finish Flooring - Floor Topping Mixture* — Min 3/4 in. thickness of any Floor Topping Mixture bearing the UL Classification Marking as to Fire Resistance. See Floor- and Roof-Topping Mixtures (CCOX) category for names of Classified Companies.

1D. Floor Mat Materials* — (Optional, Not Shown) - Floor mat material loose laid over the subfloor. Refer to manufacturer's instructions regarding the minimum thickness of floor topping over each floor mat material.

Freudenberg Performance Materials LP — EnkaSonic® by Colbond a member of the Low & Bonar group Types 125, 250, 250 Plus, 400, 400 Plus, 750, and 750 Plus.

Floor Mat Reinforcement — (Optional) - Refer to manufacturer's instructions regarding minimum thickness of floor topping for use with floor mat reinforcement.

Metal Lath — (Optional) — Expanded steel diamond mesh, 2.5 lb / sq yd loose laid over floor mat material.

Fiberglass Mesh Reinforcement — (Optional) — Coated non-woven glass fiber mesh grid loose laid over floor mat material.

2-1/2 Hr Rating

1A. **Flooring System — Mineral and Fiber Boards*** — Nom 20 mm thick. Long dimension of panels to be perpendicular to joists with end joints centered over the joists. Panels secured to joists with 1-5/8 in. long No. 8 self-drilling, self-countersinking steel screws spaced a max of 10-1/2 in. OC with screws located 5/8 in. from the edge at end joints, and screws located 3 in. from edge in the field. Side joints required to be tongue-and-groove.

THE PLYCEM COMPANY INC — Types Plycem Flooring, Plyrock Flooring, Plycem SX 20/20 Structural Flooring, Plystone Flooring, Entrepiso Plystone, Entrepiso Plyrock, Entrepiso Plycem, Plycem Entrepiso Alto Desempeño, Plycem High Performance Subfloor

1B. **Floor Topping Mixture*** — (Not shown) - Min 3/4 in. thickness of floor topping mixture having a min compressive strength of 1300 psi. Refer to manufacturer's instructions accompanying the material for specific mix design.

MAXXON CORP — Type Gyp-Crete 2000

2. **Steel Joists — Non-Composite Design** — Channel-shaped, min 8 in. deep with min 2 in. wide flanges and 5/8 in. long stiffening flanges. Fabricated from min No. 16 MSG galv steel. Min yield strength of 50,000 psi. Joists spaced max 24 in. OC. Supplied with appropriate rim tracks of same size and gauge.

3. **Support Clip** — Angle-shaped, 7 in. high with 1-1/2 in. and 4 in. long leg. Clips fabricated from No. 16 MSG galv steel. Clips used to fasten steel joists to joist rim track. The clip section is connected using a min of four #10 by 1/2 in. low profile head, self-drilling screw in each leg of clip at each connection.

4. **Web Stiffeners** — (Not Shown) — Channel-shaped 3-5/8 in. deep with min. 1-5/8 in. long flanges. Stiffeners fabricated from min. No. 16 MSG galv. steel. Min yield strength of steel is 50,000 psi. Stiffeners to be fastened to ends of steel joist and joist rim track using four #10 by 1/2 in. low profile head, self-drilling screws.

5. **Blocking** — (Not Shown) — Channel-shaped 6 in. deep with min 1-3/8 in. flanges and 3/8 in. long stiffening flanges. Blocking fabricated from min No. 16 MSG galv steel. Min yield strength of steel is 50,000 psi. Blocking to span two joists cavities, spaced max 12 ft OC perpendicular to the joists. Nom 4 by 4 by 4 in. long angle clips shall be used to connect web of steel joists to blocking with a min of four #10 by 1/2 in. low profile head, self-drilling screw at each connection.

6. **Bracing** — (Not Shown) — Flat steel strap 4 in. wide fabricated from No. 20 MSG galv steel located between rows of blocking (Item 5). The flat strap is connected to the bottom flanges of the steel joists with a min of one 3/4 in. self-tapping screw.

7. **Batts and Blankets*** — Glass fiber insulation, 6-1/4 in. thick, minimum density of 0.5 pcf, bearing the UL Classification Marking for Surface Burning Characteristics and/or Fire Resistance. Insulation fitted in the concealed space, draped over the resilient channels (Item 8). Butted end joints of insulation batts to be centered over furring channels
See **Batts and Blankets** (BKNV or BZJZ) Categories for names of Classified companies.

7A. **Batts and Blankets*** — (For use with 2-1/2 Hr system) — Nominal 4 in. thick, minimum 4 pcf, **mineral wool insulation**, bearing the UL Classification Marking for Surface Burning characteristics and/or Fire Resistance. Insulation fitted in the concealed space, draped over the resilient channels (Item 8). Butted end joints of insulation batts to be centered over furring channels.

ROCKWOOL — Type Roxul Safe

8. **Resilient Channels** — Formed of No. 25 MSG galv. steel, 1/2 in. deep, spaced max 12 in. OC, perpendicular to joists. Channel splices located beneath joists and overlapped 4 in. Channels secured to each joist with one #10 by 1/2 in. low profile head, self-drilling screw. Two channels, spaced 3 in. from gypsum board base layer and face layer end joints.

8A. **Steel Framing Members*** — (Optional, Not Shown) — As an alternate to Item 8.

a. **Furring Channels** — Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 12 in. OC, perpendicular to 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 9), 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 8Ac) 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

8B. **Steel Framing Members*** — (Optional, Not Shown) — As an alternate to Item 8.

a. **Furring Channels** — Formed of No. 25 MSG galv steel, nominal 2-1/2 in. wide by 7/8 in. deep, spaced 12 in. OC perpendicular to joists and friction fit into Steel Framing Members (Item 8Bb). 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 9). 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 8Ba) 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

8C. **Steel Framing Members*** — (Optional, Not Shown) — As an alternate to Item 8.

a. **Furring channels** — Formed of No. 25 MSG galv steel. 2-9/16 in. in. wide by 7/8 in. deep, spaced 12 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 2). Clips spaced a max of 48 in. OC. RSIC-1 clips secured to alternating joists with No. 8 x 1-5/8 in. fine thread 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. 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.

PAC INTERNATIONAL L L C — Type RSIC-1

9. **Gypsum Board*** — **For 1-1/2 Hour Rating** — Two layers of nom 5/8 in. thick by 48 in. wide gypsum panels installed with long dimension perpendicular to resilient channels (Item 8). Base layer secured with 1 in. long Type S bugle-head screws spaced 8 in. OC with screws located 1-1/2 in. from the side joints, and 3 in. from the end joints. Face layer installed with side joints offset 24 in. from base layer, secured with 1-5/8 in. long Type S bugle-head screws spaced 8 in. OC, offset 4 in. from base layer, with screws located 1-1/2 in from the side joints, and 3 in. from the end joints. Butt joints of face layer staggered a minimum of 12 in. from butt joints of base layer. End joints secured to resilient channels as shown in end joint detail.

For 2 Hour Rating — A third layer of nom 5/8 in. thick by 48 in. wide gypsum panels installed with long dimension perpendicular to resilient channels (Item 8). Third layer installed with side joints offset 36 in. from second layer, secured with 2-1/2 in. long Type S bugle-head screws spaced 8 in. OC, offset 4 in. from second layer, with screws located 1-1/2 in from the side joints, and 3 in. from the end joints.

For 2-1/2 Hour Rating — Two layers of nom 5/8 in. thick by 48 in. wide gypsum panels installed with long dimension perpendicular to resilient channels (Item 8). Base layer secured with 1-1/4 in. long Type S bugle-head screws spaced 8 in. OC with screws located 1-1/2 in. from the side joints, and 3 in. from the end joints. Face layer installed with side joints offset 24 in. from base layer, secured with 2 in. long Type S bugle-head screws spaced 8 in. OC, offset 4 in. from base layer, with screws located 1-1/2 in from the side joints, and 3 in. from the end joints. Butt joints of face layer staggered a minimum of 12 in. from butt joints of base layer. End joints secured to resilient channels as shown in end joint detail.

UNITED STATES GYPSUM CO — Type C, ULIX

When **Steel Framing Members** (Item 8A) are used, nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 9 as per hourly ratings. Adjacent butt joints staggered minimum 48 in. OC.

When **Steel Framing Members** (Item 8B) are used, nom 5/8 in. thick, 4 ft wide gypsum board, installed as described in Item 9 as per hourly ratings. Butt joints staggered minimum 24 in. OC.

When Steel Framing Members (Item 8C) are used (**For 1-1/2 hour ratings - two layers of board**), face layer gypsum panels installed with long dimensions perpendicular to furring channels. Panels attached to the furring channels using 1 in. long Type S bugle-head steel screws spaced 8 in. OC along butted end joints and in the field of the panel. Butted end joints shall be staggered min. 2 ft within the assembly, and occur midway between the continuous furring channels. Each end of each gypsum panel shall be supported by a single length of furring channel equal to the width of the gypsum panel plus 6 in. on each end. The two support furring channels shall be spaced approximately 3-1/2 in. OC, and be attached with one clip at each end of the channel. Outer layer attached as described in item 9. (**For 2 hour rating - three layers of board**), first two layers installed as described above, third layer installed as described in Item 9.

10. **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.

*** 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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