

BXUV.G229 -

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. G229

August 29, 2019

Restrained Assembly Ratings — 1-1/2, 2 or 3 Hr.

(See Items 1, 2A, 5A, 5B, 5C, 5D, 12, 12E, 12F, 12G, 13, 15 and 16)

Unrestrained Assembly Ratings — 1-1/2, 2 or 3 Hr.

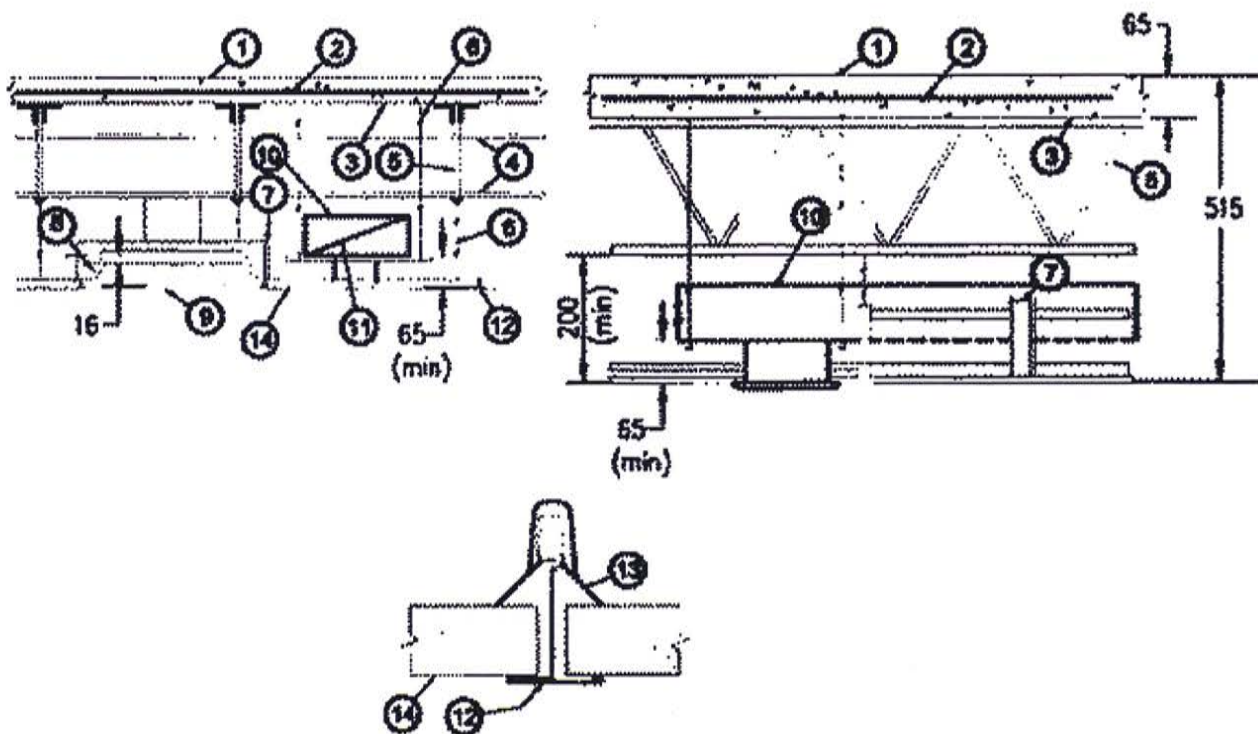
(See Items 1, 2A, 5A, 5B, 5C, 5D, 12, 12E, 12F, 12G, 13, 15 and 16)

Unrestrained Beam Ratings — 1-1/2, 2 and 3 Hr.

(See Items 2A, 12, 12E, 12F, 12G, 13 and 16)

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.**



Beam — W8x24, min size. As alternate to steel beam, **Joist girders** (Not shown) — 20 in. min depth and 13 lb/lin ft min weight.

1. Normal-Weight Concrete — Carbonate or siliceous aggregate, 150 + or- 3 pcf unit weight, 3000 psi compressive strength.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Concrete Thkns In.
1-1/2	1-1/2	2
2	2	2-1/2
3	3	3-1/4

2. Welded Wire Fabric — 6x6 - W1.4xW1.4.

2A. Fiber Reinforcement* — As an alternate to Item 2, for 1-1/2 and 2 hr assembly and beam ratings only. Engineered Synthetic or Steel fibers added to concrete mix to control shrinkage cracks in concrete.

See **Fiber Reinforcement** (CBXQ) Category for rate that fibers are added to concrete mix and names of manufacturers. The floor assembly with the fiber reinforcement must still meet its structural capacity requirements.

BEKAERT CORP — Type Dramix Steel Fibers

FABPRO ORIENTED POLYMERS INC — Types Monofilament / Multifilament Polypropylene, Fibrillated Polypropylene

FIBERCON INTERNATIONAL INC — Types Fibercon Manufactured Steel Fibers, Matrix CS Steel Fibers, Matrix W2.9 Hybrid Fibers

FORTA CORP — Types Econo-Mono, Mighty-Mono, Stucco-Bond, Econo-Net, Cast-Master, Super-Net, Ultra-Net

GCP APPLIED TECHNOLOGIES INC — Types Strux 90/40 and 75/32

PROPEX OPERATING COMPANY L L C — Types Novocon Steel Fibers , Novocon XR Steel Fibers, Novomesh 850, Fibermesh 150, Fibermesh 300, Fibermesh 650, Enduro Mirage, and Enduro Prime.

3. **Metal Lath** — 3/8 in. rib, 3.4 lb/sq yd expanded steel; tied to each joist at every other rib with 13 SWG 2-5/8 in. long lath clips. Selvage overlap wire-tied midway between joists with 18 SWG galv steel wire. As an alternate, the form material for the concrete may be corrugated steel deck 9/16 in. deep of 28 MSG (or heavier) galv steel welded to supports 15 in. OC using welding washers. When corrugated steel deck is substituted for metal lath, the concrete thickness shall be measured from the surface of the concrete to the top of the steel deck corrugations.

4. **Bridging — Steel Bars** — 3/8 in. diam, welded to the top and bottom chord of each joist.

5. **Steel Joists** — Type 10J2 or 10K1, min size; spaced 24 in. OC, welded to end supports.

5A. **(Not Shown)** — As an alternate to Items 2, 3, 4 and 5, the following components may be used:

(1) **Welded Wire Fabric** — Min. 6 x 6 — W2.0 x W2.0

(2) **Structural Steel Members*** — Hambro joists, min nom depth 10 in., when hanger wires are suspended from joists' bottom chord, max spacing 49-1/4 in. O.C. greater joist spacing may be used when hanger clips (Item 6A) is used.

HAMBRO STRUCTURAL SYSTEMS, DIV OF CANAM STEEL CORP — Types D500LH, D-500. As alternates to the D500 joists, mini joists designated TC and RTC may be used for max spans of 5 ft 0 in. and 8 ft 0 in. respectively. The concrete is cast on removable plywood forms. Min concrete slab thickness for use with Item 5A:

Restrained or Unrestrained Assembly Rating Hr	Concrete Thkns In.
1-1/2	2-1/2
2	3
3	4

5B. **(Not Shown)** — As an alternate to items 2, 3, 4, 5 and 5A., the following components may be used:

(1) **Welded Wire Fabric** — Reinforcement as per ACI latest Specification disregarding the steel deck.

(2) **Structural Steel Members*** — Vescom composite joists, min nom. depth 10 in., When ceiling hanger wires are suspended from bottom chord of joists, max joist spacing is 48 in. OC. Greater joist spacings may be used when hanger clips (Item 6A) are used for ceiling hanger wires.

VESCOM STRUCTURAL SYSTEMS INC — Type V

(3) **Steel Form Units** — Min 1-5/16 in. deep 24 gauge uncoated or galv corrugated steel, welded to supports 15 in. OC using welding washers.

(4) The min concrete slab topping thickness for use with Item 5B, as measured from the top plane of the steel form units, shall be as specified below:

Restrained or Unrestrained Assembly Rating Hr	Concrete Thkns In.
1-1/2	2
2	2-3/16
3	3-3/16

5C. (Not Shown) — As an alternate to Items 2, 3 and 4, the following components may be used:

(1) **Steel Floor and Form Units** — 1-1/2 in. deep, 22 gauge uncoated or galv fluted steel floor units. Steel form units min 9/16 in. deep, 28 gauge uncoated or galv. may be used. When 9/16 in. form deck is used a min of 1 in. cover above the top elevation of the top chord must be maintained and the steel form deck shall not be considered in evaluating the load carrying capacity of the floor. The steel floor and form units shall not be considered in calculating the load carrying capacity of the floor.

(2) **Welded Wire Fabric/Reinforcing Bars** — As required to develop the structural capacity of the floor in accordance with the applicable ACI specifications.

(3) **Structural Steel Members*** — Hambro joists, min nominal depth 10 in., max spacing 48 in. OC. Greater joist spacing may be used when hanger clips (Item 6A) are used for ceiling hanger wires.

HAMBRO STRUCTURAL SYSTEMS, DIV OF CANAM STEEL CORP — Type MD2000. As alternates to MD 2000 joists, mini joists designated MD and RMD may be used for 5 ft 0 in. and 8 ft 0 in., respectively

Min concrete slab thickness, as measured from the bottom of the steel floor units, with Item 5C(3) is 4 in. for all Restrained and Unrestrained Assembly Ratings.

5D. (Not Shown) — As an alternate to Items 2, 3, 4, 5, 5A, 5B and 5C, the following components may be used:

(1) **Steel Joist or Joist Girder** — Composite or noncomposite. Welded or bolted to end supports. Min 8 in. deep, spaced max 48 in. OC. Designed per S.J.I. Specifications for a max tensile stress of 30 ksi. May be either uncoated or provided with a shop coat of paint. Top and bottom chords shall each consist of two angles with a min total area of 0.521 and 0.412 sq in., respectively. Web members shall be either round bars or angles. Min area of the end diagonal web shall of 0.307 sq in. Min area of each of the first four interior diagonal webs shall be 0.277 sq in. All other interior webs shall have a min area of 0.196 sq in.

(2) **Steel Floor or Form Unit Accessories*** — Threaded shear connectors, screwed into the top chord of joist through the steel floor units. Shear connector spacing and attachment shall be as recommended by the Steel Joist or Girder manufacturer.

VULCRAFT, DIV OF NUCOR CORP — Type SHEARFLEX, for use with the ECOSPAN Composite Floor System only

(3) **Welded Wire Fabric** — Min 6x6 - W1.4xW1.4.

(4) **Steel Floor and Form Units*** — Minimum 9/16 in. deep stee form deck or 1-1/2 to 3 in. deep composite or non-composite fluted or cellular units, welded to joist 12 in. OC. Min gauge is 28 MSG. Adjacent units button-punched, welded or screwed together 36 in. OC max along side joints. The concrete thickness shall be measured to the top plane of the steel deck.

VERCO DECKING INC - A NUCOR CO — Deck types PLB, HSB, Shallow or Deep VERCOR; FORMLOK™ deck types PLB, B, BR, PLW2, W2, PLW3, W3. Units are min 24 in. wide and may be galvanized, phos./ptd., or mill finish. Units may be cellular or acoustical cellular, with the suffix "CD" or "CD-AC" added to the product name, respectively.

VULCRAFT, DIV OF NUCOR CORP — 24 through 36 in. wide, Types 0.6C, 1.0C, 1.5C, 1.5VLR, 1.5VL, 1.5VLI, 1.5PLVLI, 1.5VLP, 1.5PLVLP, 24 or 36 in. wide, Types 2VLI, 2.0PLVLI, 2VLP, 2.0PLVLP, 3VLI, 3.0PLVLI, 3VLP, 3.0PLVLP

(5) The min concrete slab topping thickness for use with Item 5D, as measured from the top plane of the steel form units, shall be as specified below:

Restrained or Unrestrained Assembly Rating Hr	Concrete Thkns In.
1-1/2	2-1/2
2	2-1/2

5E. **(Not Shown)** — As an alternate to Items 2, 3, 4, 5, 5A, 5B, 5C and 5D the following components may be used:

(1) **Steel Joist or Joist Girder** — Composite or noncomposite. Welded or bolted to end supports. Min 8 in. deep, spaced max 48 in. OC. Designed per S.J.I. Specifications for a max tensile stress of 30 ksi. May be either uncoated or provided with a shop coat of paint. Top and bottom chords shall each consist of two angles with a min total area of 0.521 and 0.412 sq in., respectively. Web members shall be either round bars or angles. Min area of the end diagonal web shall be 0.307 sq in. Min area of each of the first four interior diagonal webs shall be 0.277 sq in. All other interior webs shall have a min area of 0.196 sq in.

(2) **Shear Connector** — (Optional) — Studs, min 3/8 in. diam headed type or equivalent per A.I.S.C. specifications. Welded to the top chord of joist through the steel floor units. Stud welding, as recommended by the stud manufacturer, should be followed.

(3) **Welded Wire Fabric** — Min 6x6 - W1.4xW1.4.

(4) **Steel Floor and Form Units*** — Minimum 9/16 in. deep steel form deck or 1-1/2 to 3 in. deep composite or non-composite fluted or cellular, uncoated, painted or galv, units, welded to joist 12 in. OC. Min gauge is 28 MSG. Adjacent units button-punched, welded or screwed together 36 in. OC max along side joints. The concrete thickness shall be measured to the top plane of the steel deck.

NEW MILLENNIUM BUILDING SYSTEMS L L C — 24 through 36 in. wide, Types 0.6FD, 1.0FD, 1.5FD, 1.5CDR, 1.5CD, 1.5CDI, 2.0CD, 3.0CD

(5) The min concrete slab topping thickness for use with Item 5E, as measured from the top plane of the steel form units, shall be as specified below:

Restrained or Unrestrained Assembly Rating Hr	Concrete Thkns In.
1-1/2	2-1/2
2	2-1/2
3	3-1/4

5F. **Structural Steel Members** — (Not Shown) As an alternate to Item 5. For use up to a 2 hour rating only. Non-Composite, spaced a maximum 24 in. OC. Min. 5 in. deep structural steel channel, fabricated from two L3.5x3.5x3/8 in. angles welded together, identified as 5VS3 (Not UL Classified). The span of the structural members shall not exceed 9 ft- 6 in. The plenum depth of the assembly shall be maintained as shown.

5G. **Structural Steel Members** — (Not Shown) As an alternate to Item 5. For use up to a 2 hour rating only. Non-Composite, spaced a maximum 24 in. OC. Min. 5 in. deep structural steel member, fabricated from two C5x9 channel members welded together, identified as 5VS3 (Not UL Classified). The span of the structural members shall not exceed 9 ft-6 in. The plenum depth of the assembly shall be maintained as shown.

6. **Hanger Wire** — No. 12 SWG galv steel wire twist-tied to steel joists. When the ceiling consists of nom 24 by 24 or 24 by 48 in. panels, hanger wires spaced max of 48 in OC on main runners adjacent to cross tee intersections. One hanger wire to occur at all four corners of light fixtures, at midspan of cross tees adjacent to 4 ft light fixtures and air duct outlets, and adjacent to each main runner splice. When the ceiling consists of nom 20 by 60 in. panels, hanger wires shall be spaced 40 in. O.C. along main runners, one wire shall occur at each corner of light fixtures, at midspan of all cross tees and adjacent to each main runner splice. When Type D 500 or Type V joists (Items 5A or 5B) or steel joists or joist girders (Item D) are used, the hanger wires may be tied to the joists' bottom chord or to hanger clips (Item 6A.)

6A. Hanger Clips — For use with Type D500 (Item 5A), Type V (Item 5B) joist or steel joists or joist girders (Item D), as an alternate method for support of hanger wires. Galv steel angles, 3/4 in. long 3/32 in. thick with 1-1/8 in. horizontal and 7/8 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 clip secured to underside of concrete floor (Item 5A) or through the crest of the form units into the concrete (Item 5B), using nominal 1-3/8 in. long, 0.145 in. diam shank with 0.300 in. diam head, powder-driven galv steel fastener.

7. Fixture Stabilizer — One per fixture assembly No. 16 MSG painted steel channel, formed as a yoke, secured to web at midspan of cross tee on each side of fixture. As an alternate, a vertical No. 12 SWG galv steel hanger wire located near midpoint of cross tee on each side of light fixtures may be used. The wire shall be installed with approx 1/8 in. of slack.

8. Fixture Protection* — Acoustical Material — 5/8 in. thick, cut into pieces to form a five sided enclosure, trapezoidal in cross-section, approx 1/2 in. longer and wider than the fixture with sufficient depth to provide at least 5/8 in. clearance between the top of the fixture and the enclosure. For 2 by 4 ft fixture the protection consists of a 23-3/4 by 47-3/4 in. top piece, two 6 by 47-3/4 in. side pieces, and two 4-1/2 by 23-3/4 in. end pieces. For 20 by 60 in. fixture the protection consists of a nom 20 by 60 in. top piece, two nom 6 by 60 in. side pieces, and two nom 4-1/2 by 20 in. end pieces. The top edge of each fixture protection side piece may be provided with a 1 in. deep by max 20 in. long notch near its midpoint. The pieces are held together by 8d nails spaced 8 in. O.C. min. (S)=surface perforations.

ARMSTRONG WORLD INDUSTRIES INC — Type 5/8 in P (S)

9. Fixtures, Recessed Light — (Bearing the UL Listing Mark). Recessed light fixture with steel housing, 2 by 4 ft or 20 by 60 in. size. Fixtures spaced so their area does not exceed 20 sq ft per 100 sq ft of ceiling area. Wired in conformance with the National Electrical Code. Fixtures and ballasts must be considered for these ambient temperature conditions before installation.

9A. Fixture Stabilizer+ — (Not Shown) — For use with the Type 1650 metal pans (See Item 12D); one min 0.047 in. thick (16 MSG) galv steel channel yoke per light fixture, secured to the web at midspan of cross tee on each side of fixture.

9B. Fixture Stabilizer+ — (Not Shown) — As an alternate to item 9A — Min. 0.020 in. thick (25 MSG) painted steel spacer bar formed as an angle with 1 in. legs and hemmed edges and slots perpendicular to and near the ends of the spacer bar for engaging over the bulb of the tees. Engaged over the bulb at midspan of the cross tees on each side of all light fixtures and over the bulb of the adjacent cross tee.

10. Air Duct — Min 0.029 in. thick (22 gauge) galv steel. When ceiling is composed of nom 24 by 48 in. or 20 by 60 in. lay-in panels, the total area of duct openings not to exceed 576 sq in. per each 100 sq ft of ceiling area. Area of individual duct opening not to exceed 576 sq in. with max dimension of opening 30 in. When hinged door damper is used over duct outlet and the ceiling is composed of nom 24 by 24 in. lay-in panels, the total area of duct openings not to exceed 113 sq in. per 100 sq ft of ceiling area. Area of individual duct opening not to exceed 113 sq in. with max dimension of opening 12 in. Duct supported by 1-1/2 in., 16 MSG painted steel channels spaced 48 in. OC suspended by 12 SWG galv steel wire.

11. Damper — Min 0.070 in. thick (14 gauge) galv steel. Protected on both surfaces with 1/16 in. ceramic fiber paper and held open with a **Fusible Link** (Bearing the UL Listing Mark). Damper to overlap duct outlet 1 in. min.

12. Steel Framing Members* — Main runners and cross tees in combinations listed below:

A. Main runners nom 12 ft long spaced 48 in. OC. Cross tees nom 4 ft long installed perpendicular to main runners and spaced 24 in. OC. When nom 24 by 24 in. lay-in panels are used, cross tees nom 2 ft long installed perpendicular to 4 ft cross tees midway between main runners. For 24 by 24 or 48 in. lay-in panels.

ARMSTRONG WORLD INDUSTRIES INC — Types AFG, AFG-A. When the Type AFG-A steel framing members are used, the Assembly and Beam Ratings are 2 hr max. Types AFG-MX and AFG-LT steel framing members for use with 24 by 24 in. panels. When Type AFG-MX or AFG-LT steel framing members are used, the assembly and beam ratings are 2 hr. Type GLBP (consisting of main runners, 4 ft cross tees and steel straps) for use with 24 by 48 in. Type P or PC lay-in panels

BAILEY METAL PRODUCTS LTD — Type BEF

CERTAINTEED CORP — Types FSS2-12-15, FSS4-12-15, FSS12-12-15, RS12-12-15, RS2-12-15, RS4-12-15

ROXUL USA INC. D/B/A ROCKFON — Types 250, 1250, 1850

B. Main runners - 10 or 12 ft long, spaced 4 ft OC. Cross tees - nom 4 ft long, installed perpendicular to main runners, spaced 2 ft OC. When nom 2 by 2 ft lay-in panels are used, nom 2 ft long cross tees installed perpendicular to 4 ft cross tees at midspan, spaced 4 ft OC. Border panels supported at walls by min. 0.016 in thick painted steel angle with 7/8 in legs or min. 0.016 in thick painted steel channel with a 1 by 1-9/16 by 1/2 in profile.

CGC INC — Types DXL, DXLZ, SDXL, ZXLA. When ZXLA is used, all ratings are reduced by 1 hr

USG INTERIORS LLC — Types DXL, DXLZ, SDXL, ZXLA. (When Type ZXLA is used all ratings are reduced by 1 hr)

C. Main runners nom 10 ft long, spaced 60 in. OC. Cross tees nom 5 ft long, installed perpendicular to main runners and spaced 20 in. OC. For 20 by 60 in. lay-in panels.

ROXUL USA INC. D/B/A ROCKFON — Types 250, 1250, 1850

D. Main runners nom 10 or 12 ft long, spaced 60 in. OC. Cross tees nom 5 ft long, installed perpendicular to main runners and spaced 20 in. OC. Border panels supported at walls by min. 0.016 in thick painted steel angle with 7/8 in legs or min. 0.016 in thick painted steel channel with a 1 by 1-9/16 by 1/2 in profile. For 20 by 60 in. lay-in panels.

CGC INC — Types DXL, DXLZ, SDXL

USG INTERIORS LLC — Types DXL, DXLZ, SDXL

12A. **Steel Framing Members*** — For use with metric size panels described under Item 15. Main runners nom 3000 or 3600 mm long, spaced 1200 mm OC. Cross tees - nom 1200 mm long, installed perpendicular to main runners, spaced 600 mm OC. When nom 600 by 600 mm lay-in panels are used, tees nom 600 mm long cross tees, installed perpendicular to 1200 mm cross tees at midspan, spaced 1200 mm OC. Border panels supported at walls by - steel wall angle 7/8 in legs or channel with a 1 by 1-9/16 by 1/2 profile. For 600 by 600 or 1200 mm lay-in panels.

USG INTERIORS LLC — Types DXL, DXLZ, SDXL

12B. **Steel Framing Members* — Grid Adapter** — (Not Shown) — (Optional) — For use with Type 1650 metal pans (See Item 12D). Angle shaped adapter with a looped return flange; installed parallel to cross tees or main runners by engaging return flange of adapter to the flange of the cross tee or main runner. The 48 or 24 in. long adapters are intended for use with cross tees or main runners, respectively.

ROXUL USA INC. D/B/A ROCKFON — Type 1650

12C. **Steel Framing Members* — Filler Strips** — (Not Shown) — (Optional) — For use with Type 1650 metal pans. Filler strips are 0.018 to 0.024 in. thick, steel or aluminum, 13/32 or 5/8 in. deep by 3/4 in. wide, placed between the metal pans.

ROXUL USA INC. D/B/A ROCKFON — Type 1650

12D. **Steel Framing Members* — Metal Pans** — (Not Shown) — (Optional) — Channel-shaped metal pans in various colors and finishes, installed perpendicular to cross tees or main runners and spaced 4 or 6 in. O.C. The flange edges of the metal pans engage and interlock with the vertical tabs of the corresponding grid adapters with tabs 4 or 6 in. O.C. (See Item 12B).

End laps joints of the metal pans shall occur adjacent to main runners or cross tees. The metal pans shall each be supported by at least two main runners or cross tees.

ROXUL USA INC. D/B/A ROCKFON — Type 1650

12E. Steel Framing Members* — 9/16 in. wide narrow flange grid may be used as an alternate to 15/16 in. wide flange grid systems. Main runners, nom 12 ft long spaced 4 ft OC. Cross tees, nom 4 ft long, installed perpendicular to main runners and spaced 2 ft OC. Cross tees, nom 2 ft long, installed perpendicular to 4 ft cross tees and spaced 4 ft OC. For use with Type P, nom 24 by 24 in. square edge or tegular edge lay-in panels. Grid modules containing light fixtures must employ a fixture centering clip at each corner. The 24 gauge electrogalvanized steel clip is nested on the flange of the intersecting grid tees, has two 1-7/16 in. high legs with their sides perpendicular to each other and a U-shaped return at the top of each leg for engaging over the bulb of the intersecting grid tees. When 9/16 in. wide flange grid is used, max Assembly and Beam Ratings are limited to max of 2 hr.

ARMSTRONG WORLD INDUSTRIES INC — Type FSLK

12F. Steel Framing Members* — 9/16 in. wide narrow flange grid may be used as an alternate to 15/16 in. wide flange grid systems. Main runners, nom 12 ft long, spaced 4 ft OC. Cross tees, nom 4 ft long, installed perpendicular to main runners and spaced 2 ft OC. Cross tees, nom 2 ft long, installed perpendicular to 4 ft cross tees and spaced 4 ft OC. For use with Type P, nom 24 by 24 in. square edge lay-in panels.

ROXUL USA INC. D/B/A ROCKFON — Type 4050 for 1-1/2 hr assembly and beam ratings only

12G. Steel Framing Members* — Main Runners, nom 10 or 12 ft long, spaced 4 ft OC. Cross tees, nom 4 ft long, installed perpendicular to main runners and spaced 2 ft OC. When nom 2 by 2 ft lay-in panels are used, nom 2 ft long cross tees installed perpendicular to 4 ft cross tees at midspan, spaced 4 ft OC. For use with Type P, nom 24 in. by 24 in. square edge lay-in panels. When Type DXLT steel framing members are used the assembly and beam ratings are 1-1/2 hr.

CGC INC — Type DXLT

USG INTERIORS LLC — Type DXLT

13. Steel Framing Members* — Cross Tees — As described in Item 12 through 12G.

14. Hold-down Clips — No. 24 MSG spring steel, placed over cross tees 2 ft OC.

15. Acoustical Material* — Lay-in panels. Border panels supported at walls by min 0.016 in. thick (26 MSG) painted steel angle with 7/8 in legs; or, min 0.016 in. thick (26 MSG) painted steel channel, 1-5/8 in. deep with 1/2 in. top flange and 1 in. bottom flange. (S)=surface perforations.

Nom Tile Size	Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr
16 x 48	1-1/2 and 2 hr.	1-1/2 and 2 hr.
24 x 24	1-1/2 and 2 hr.	1-1/2 and 2 hr.
20 x 60	1-1/2 and 2 hr.	1-1/2 and 2 hr.
24 x 48	1-1/2, 2 and 3 hr.	1-1/2, 2 and 3 hr.

ARMSTRONG WORLD INDUSTRIES INC — Type 5/8 in. P (S) 24 x 24 or 48 in. or 20 by 60 in.; or 5/8 in. PC (S) 24 x 48 in

Type P Hourly ratings shown for 24 x 24 in. size panels apply to 600 x 600 mm size panels while ratings shown for 24 x 48 in. panels apply to 600 x 1200 mm size panels. These metric size panels may only be used with metric size grid described under item 12A. (S) 15 mm thick 600 x 600 or 1200 mm or PC(S) 15 mm thick 600 x 1200 mm.

15A. Acoustical Materials* — Antenna Panel — (Optional, Not Shown) — When the ceiling is composed of nom 24 by 24 in. lay-in panels, a lay-in acoustical ceiling panel with integral high frequency antennae may be included in the ceiling. Thickness, type and edge detail of antenna panel to match surrounding acoustical ceiling panels. Antenna panel to be installed in accordance with accompanying instructions. A max of one antenna panel may be used per each 100 sq ft of ceiling area.
ARMSTRONG WORLD INDUSTRIES INC

16. Speaker Assemblies Classified For Fire Resistance* — (Optional, Not Shown) — The speaker assemblies consist of speakers, speaker enclosures and their accessories. The ceiling penetration from the speaker enclosure shall not exceed 11-7/8 by 11-7/8 in. for the square speaker enclosures and 12 in. in diam for the round speaker enclosures. The speaker assemblies are installed in accordance with the installation instructions provided. A max of two 144 sq in. speaker assemblies per 100 sq ft of ceiling area is allowed.

ATLAS SOUND L P

See **Speaker Assemblies For Fire Resistance** (CHML) for specific Types.

16A. Speaker Assemblies For Fire Resistance* — (Optional, Not Shown) — As an alternate to Item 16, speaker panels may be included in the ceiling. Nom 24 by 24 in. metal-framed lay-in speaker panels installed in accordance with the accompanying installation instructions. Hanger wires are required on the main runners and on the nom 4 ft long cross tees at all four corners of the speaker panel. Each speaker panel to be covered with a nom 24 by 24 in. panel of the same acoustical material used in the ceiling. Acoustical material panel to be centered over and supported by the metal "bridge" of the speaker panel. A max of one speaker panel is allowed per 100 sq ft of ceiling area with a min center-to-center spacing of 10 ft between speaker panels.

17. Mineral and Fiber Boards* — (Optional, Not Shown) — Applied over concrete floor with no limit on overall thickness. When the insulation is used, the max Restrained and Unrestrained Assembly Ratings are 2 hr and the max Unrestrained Beam Rating is 2 hr.

See **Mineral and Fiber Board** (CERZ) category for names of manufacturers.

18. Roof Covering — (Not Shown; for use with insulation described in Item 16.) — 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.

19. Discrete Products Installed in Air-handling Spaces* — Automatic Balancing Valve/Damper (Not Shown - Optional) — For use with item 11. 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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