

Restrained Assembly Ratings — 1, 1-1/2 And 2 Hr.

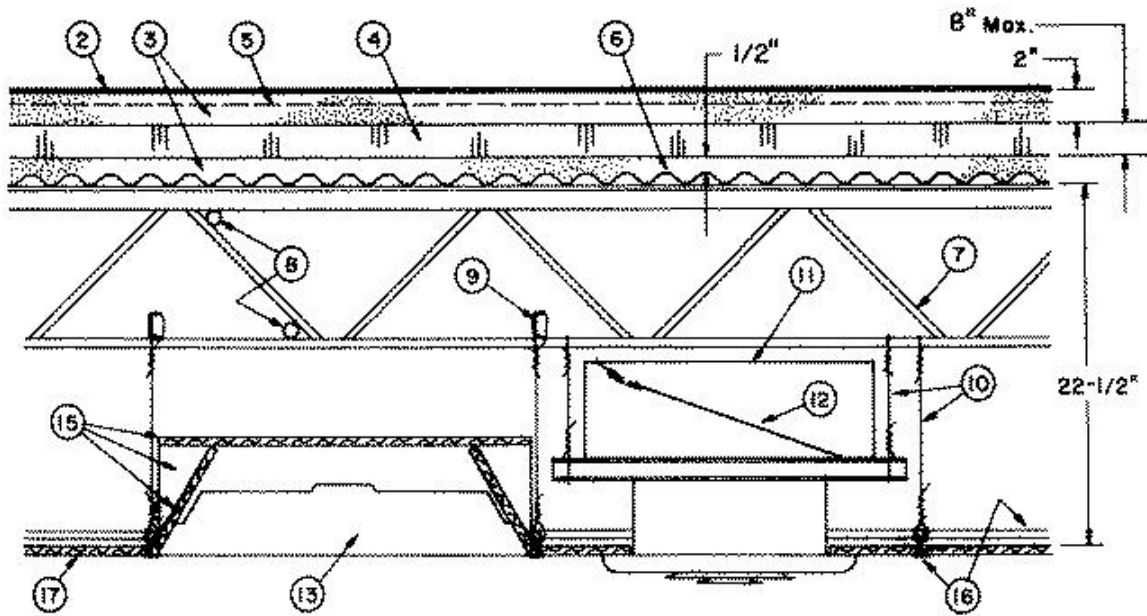
(See Items 5, 11, 12, 16, 16B and 17)

Unrestrained Assembly Ratings — 1, 1-1/2 And 2 Hr.

(See Items 5, 11, 12, 16, 16B and 17)

Unrestrained Beam Ratings — 1, 1-1/2 And 2 Hr.

(See Items 5, 11, 12, 16, 16B and 17)



1. **Beam** — (Not shown) — W6X12, min size. As alternate to steel beam, **Joist girders** — (Not shown) — 20 in. min depth and 13 lb/lin ft min weight.

2. **Roof Covering*** — Consisting of hot mopped or cold application materials compatible with insulation(s) described herein which provide Class A, B or C coverings. See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).

2A. **In lieu of Item 2, roof covering consisting of single-ply Roofing Membrane*** — that is either ballasted, adhered or mechanically attached as permitted under the respective manufacturer's Classification. See Fire Resistance Directory-Roofing Membranes (CHCI).

3. **Roof Topping** — May consist of one of the following:

A) **Cellular Concrete — Roof Topping Mixture*** — Foam concentrate mixed with water and Portland cement per manufacturer's specifications. Cast dry density and 28 day compressive strength of min 190 psi as determined in accordance with ASTM C495-66. Min thickness of cellular concrete topping between top of deck and bottom of foamed plastic may be reduced to 1/8 in. when 2 in. or more of foamed plastic is used.

CELCORE INC — Cast dry density of 31 (+ or -) 3.0 pcf.

CELLULAR CONCRETE L L C — Cast dry density 37 (+ or -) 3.0 pcf.

ELASTIZELL CORP OF AMERICA — Type II. Mix #1 of cast dry density 39 (+ or -) 3.0 pcf, Mix #2 of cast dry density 40 (+ or -) 3.0 pcf, Mix #3 of cast dry density 47 (+ or -) 3.0 pcf.

LITE-CRETE INC — Cast dry density of 29 (+ or -) 3.0 pcf.

MANDOVAL LTD

MANDOVAL VERMICULITE PRODUCTS INC

SIPLAST INC — Mix #2. Cast dry density of 36 (+ or -) 3.0 pcf.

B) Vermiculite Concrete — Concrete mix consisting of 6 cu ft of **Vermiculite Aggregate*** to 94 lbs. of Portland cement and 0.5 lbs. air entraining agent.

GRACE CANADA INC

ELASTIZELL CORP OF AMERICA

SIPLAST INC

VERMICULITE PRODUCTS INC

C) Perlite Concrete — Mix consists of 6 cu ft of Perlite Aggregate* to 94 lb of Portland cement and 1-1/2 pints of air entraining agent. Thickness to be 2 in. min from the top plane of steel roof deck.

See **Perlite Aggregate (CFFX)** category in Fire Resistance Directory for names of Classified companies.

D. Cellular Concrete — Roof Topping Mixture* — Foam Concentrate mixed with water, Portland Cement and UL Classified Vermiculite Aggregate per manufacturer's application instructions. Cast dry density of 33 (+ or -) 3.0 pcf and 28-day compressive strength of min 250 psi as determined in accordance with ASTM C495-86. Min thickness of cellular concrete topping between top of deck and bottom of foamed plastic may be reduced to 1/8 in. when 2 in. or more of foamed plastic (Item 4 or 4A) is used.

CELLULAR CONCRETE L L C — Mix #3.

SIPLAST INC — Mix #3.

4. Foamed Plastic* — Nominal 24 by 48 by max 8 in. thick polystyrene foamed plastic insulation boards having a density of 2.5 pcf max, (pcf). Each insulation board shall contain six nominal 3 in. diameter holes oriented in two rows of three holes each with the holes spaced 12 in. OC, transversely, and 16 in. OC, longitudinally. As an alternate, the foamed plastic insulation boards may be omitted provided that a min roof topping mixture thickness of 2-1/2 in. is maintained, as measured from the surface of the roof topping mixture to the top of the steel form unit corrugations.

See **Foamed Plastic* (BRYX)** category in Building Materials Directory or **Foamed Plastic* (CCVW)** category in Fire Resistance Directory for list of manufacturers.

4A. Foamed Plastic* — (Optional) — For use with cellular concrete. Max thickness 8 in. and containing both hole and slot configuration.

SIPLAST INC

VERMICULITE PRODUCTS INC

4B. **Foamed Plastic*** — Nom 24 by 48 in., 48 by 48 in. or 30 by 60 in. by max 8 in. thick polystyrene foamed plastic insulation boards with holes symmetrically placed having a max density of 2.0 pcf. For use only with cellular concrete roof topping mixture.

STARRFOAM MFG INC

5. **Wire Mesh** — No. 19 SWG galv steel wire twisted to form 2 in. hexagons. In addition, straight No. 16 SWG galv steel wire woven into mesh and spaced 3 in. apart for stiffness. Mesh installed without attachment parallel to supports and overlapped 3 to 6 in. at the sides. Use of wire mesh is optional for the 1 and 1-1/2 h restrained and unrestrained assembly and unrestrained beam ratings.

5A. **Fiber Reinforcement*** — (Optional, not for use to achieve 2 hr ratings) - For use only with Roof-Topping Mixtures* manufactured by Cellular Concrete LLC. In lieu of Wire Mesh (Item 5), Fiber Reinforcement may be added to roof topping mixtures (Items 3A or 3D). See Fiber Reinforcement (CBXQ) Category for rate that fibers are added to roof topping mixture.

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

6. **Corrugated Steel Deck** — (Unclassified) — Min 9/16 in. deep, nom 30 to 36 in. wide corrugated units, min 0.016 in. thick (No. 28 gauge) galv steel. Welded to all supports with 5/16 in. puddle welds, through welding washers, with welds located at each side lap and not over 15 in. O.C. between side laps. Adjacent units overlapped along each side. Side laps of adjacent 28 MSG units welded or secured together with No. 12 by 1/2 in. long self-drilling, self-tapping steel screws midway between steel joists. Side lap fastening not required for 26 MSG or heavier steel deck; or, Classified Steel Floor and Form Units*— Noncomposite, 9/16, 3/4 or 1-1/4 in. deep, nom 30 in. wide corrugated units, min 0.016 in. thick (No. 28 gauge) galv steel. Welded to supports with 5/16 in. puddle welds, through welding washers, with welds located at each side lap and midway between side laps (15 in. OC). Adjacent units overlapped one corrugation along each side. Side laps of adjacent 28 MSG units welded or secured together with No. 12 by 1/2 in. long self-drilling, self-tapping steel screws midway between steel joists. Side lap fastening not required for 26 MSG or heavier steel deck.

CONSOLIDATED SYSTEMS INC — Types EHD, HD, S, SD.

7. **Steel Joists** — Type 10H3 or 12K1, min size. 10K1 size may be used for a limited span of 12 ft-0 in. max. As an alternate any LH Series steel joists spanning no greater than 60 ft. may be used. For spans greater than 60 ft, LH Series joists may be used provided that the deflection under their published total load shall not be greater than 1/300 of the joist span. Spaced max 6 ft OC and welded to end supports.

Note: Design load shall stress 10H3 joists to a max bending stress of 26,000 psi.

8. **Bridging** — In accordance with SJI specifications, min steel bars, 1/2 in. diam, welded to top and bottom chords of each joist.

9. **Cold Rolled Channels** — When steel joists are spaced max 4 ft OC, single cold-rolled steel channels, 1-1/2 in. deep with 9/16 in. flanges, resting on and wire-tied to top of joists bottom chord with min 18SWG galv steel wire and spaced as required to provide attachment provision for ceiling hanger wires. When steel joists are spaced more than 4 ft OC, two of the above cold-rolled steel channels placed back to back and tied together at 24 in. OC and to the bottom chord of the joists with 18SWG double strand galv steel wire and spaced max 48 in. OC, to provide attachment provision for ceiling hanger wires. As an alternate, the double cold-rolled channels, tied together at 24 in. OC, may be placed directly on and tied to the joist bottom chord with 12 SWG galv steel wire.

10. **Hanger Wire** — No. 12 SWG galv steel wire, twist-tied to lower chord of joists or cold-rolled steel channels. Hanger wires spaced 48 in. OC or at every other main runner/cross tee intersection,

whichever dim is smaller, along main runners. Hanger wires to occur at all four corners of light fixtures, at midspan of cross tees adjacent to 4 and 5 ft long light fixtures and air duct outlets, at midspan of each 5 ft long cross tee, and adjacent to each main runner splice.

11. **Air Duct** — Minimum 0.019 in. thick (No. 26 gauge) galvanized steel. Total area of duct openings not to exceed 113 sq in. per each 100 sq ft of ceiling area. Area of individual duct opening not to exceed 113 sq in. **Where permitted as described in Item No. 17**, the total area of duct openings may be increased to 576 sq in. per each 100 sq ft of ceiling area with the area of each individual duct opening not to exceed 576 sq in. Max dimension of 113 sq in. opening is 12 in. Max dimension of 576 sq in. opening is 30 in. Where air duct outlet penetrates through a suspension system member, each cut end of the suspension system member near the duct outlet must be independently supported by a hanger wire. Duct supported by 1-1/2 in. deep, minimum 0.053 in. thick (No. 16 gauge) cold-rolled steel channels adjacent to duct drops and spaced not over 48 in. OC, and suspended by No. 12 SWG galvanized steel wire.

As an alternate to the galv steel duct, air ducts fabricated from rigid Air Duct Materials* may be used in lieu of steel ducts for max 1-1/2 h assembly ratings. Total area of duct openings not to exceed 57 sq in. per each 100 sq ft of ceiling area. Area of individual duct opening not to exceed 113 sq in. Max dimension of opening 12 in. The sheet steel duct drop or outlet is positioned at the center of a 24 in. long min 0.029 in. thick (22 gauge) sheet steel duct liner. The sheet steel duct drop is insulated with a nom 1 in. thick, 5 pcf density rigid glass fiber material. The ducts are supported by min 0.053 in. thick (16 gauge) 1-1/2 in. cold-rolled steel channels suspended from the joists with 12 SWG galv hanger wire. Channels are located directly below the sheet steel duct liner, one on each side of the duct drop and are spaced between duct drops at 72 in. OC for ducts up to 36 in. wide and 48 in. OC for ducts between 36 and 60 in. wide.

CERTAINTED CORP — Rigid, Class I.

KNAUF FIBER GLASS GMBH — Rigid, Class I.

12. **Damper** — Minimum 0.029 in. thick (No. 22 gauge) galvanized steel, sized to overlap duct opening 1 in. minimum. Protected on both sides with 1/16 in. thick ceramic fiber paper laminated to the metal and held open with a fusible link (Bearing the UL Listing Mark).

13. **Fixtures, Recessed Light** — — (Bearing the UL Listing Mark). Fluorescent lamp type, steel housing, 2 by 2 ft, 2 by 4 ft, and 20 by 60 in. size. When nom 20 by 60 in. fixtures are used, fixture stabilizers (Item No. 14) shall be used in addition to the hanger wires occurring at the midspan of the 5 ft long cross tees. When nom 2 by 2 ft fixtures are used, aggregate of fixtures not to exceed five per each 100 sq ft of ceiling area. When nom 2 by 4 ft or 20 by 60 in. fixtures are used, aggregate of fixtures not to exceed three per each 100 sq ft of ceiling area. Wired in conformance with the National Electrical Code.

13A. **Fixture, Recessed Light** — (Bearing the UL Listing Mark) — (Not Shown) — As an alternate to Item 13 for 1 and 1-1/2 hr assembly ratings only. Incandescent lamp type, steel housing, nom 6-1/2 in. diam by 7-1/2 in. high. A max of two "high hat" fixtures may be substituted for each nom 2 by 4 ft size fluorescent light fixture permitted in the ceiling (max six "high hat" fixtures per 100 sq ft of ceiling area). Each fixture provided with a nom 6-1/2 in. by 10 in. painted steel base screw-attached to the fixture with four steel screws. Short sides of the base provided with adjustable steel hanger bars for fixture support. Two lengths of cold-rolled steel channel (Item 9) are to be suspended above and parallel with the fixture hanger bars to provide hanger wire attachment points for the fixture hanger bars and to support the light fixture protection panel (Item 15A). Wired in conformance with the National Electrical Code.

14. **Fixture Stabilizer** — (Not shown) — One per 20 by 60 in. fixture assembly. No. 16 MSG painted steel channel formed as a yoke, secured to the web at midspan of 5 ft long cross tee on each side of fixture.

15. **Fixture Protection — Acoustical Materials** — * — 5/8 or 3/4 in. thick, cut to form a five sided enclosure, trapezoidal in cross-section, approx 2 in. higher than the light fixture housing. The protection consists of a top piece, two side pieces, and two end pieces. The top piece shall be

23-3/4 by 23-3/4 in., 23-3/4 by 47-3/4 in. or 19-3/4 by 59-3/4 in., dependent upon fixture size. The side pieces shall be 23-3/4, 47-3/4 or 59-3/4 in. long, dependent upon fixture size. The end pieces shall be 23-3/4 or 19-3/4 in. long, dependent upon fixture size. The height of the side and end pieces shall be sufficient to maintain the 2 in. space above the top of the fixture. The top edge of each fixture protection side piece may be provided with a 1 in. deep by max 20 in. long (max 10 in. long for nom 2 by 2 ft fixtures) notch near its midpoint. The side and top pieces are laid in place, with the top piece resting on the side piece edges, and the end pieces are held in place with three Type 8d nails spaced 8 in. OC. When fixtures are installed end to end, no end pieces are used where the fixtures abut. Instead, a min 3 in. wide by 19-3/4 or 23-3/4 in. (dependent upon fixture size) long piece is placed on top of and centered over the gap between the top pieces. (S) = Surface perforations.

ARMSTRONG WORLD INDUSTRIES INC — Type 5/8 or 3/4 in. P(S).

15A. Fixture Protection — Acoustical Material* — For use with "high hat" light fixtures (Item 13B). Nom 24 by 24 by 5/8 or 3/4 in. piece of the same acoustical material used in the ceiling (Item 17). Panel located max 1 in. above and centered over "high hat" light fixture with ends resting on cold-rolled steel channels.

16. Steel Framing Members* — 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 the ceiling is composed of nom 24 by 24 in. lay-in panels, cross tees nom 2 ft long installed perpendicular to 4 ft cross tees, midway between main runners, spaced 48 in. OC. - For nom 24 by 24 or 48 in. lay-in panels.

ARMSTRONG WORLD INDUSTRIES INC — Types AFG, AFG-A . Types AFG-LT and AFG-MX steel framing members for use with 24 by 24 in. panels . 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.

BPB AMERICA INC — Types PAC, PCH, PCS. When the Types PAC, PCH steel framing members are used, the Assembly Ratings are 1 hr .

BAILEY METAL PRODUCTS LTD — Type BEF .

CHICAGO METALLIC CORP — Types 250, 260, 1250, 1260, 1850, 1860. When the Types 250, 260, 1260, 1860 steel framing members are used, the Assembly Ratings are 1 hr.

USG INTERIORS INC — Types DXL, DXLZ, SDXL.

16A. 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, 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. For nom 2 by 2 or 4 ft lay-in panels.

USG INTERIORS INC — Types DXL, DXLZ, SDXL.

CGC INTERIORS, DIV OF CGC INC — Types DXL, DXLZ, SDXL.

16B. 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.

ARMSTRONG WORLD INDUSTRIES INC — Type FSLK, PFSLK. Type FSLK and Type PFSLK cross tees may be used interchangeably with either Type FSLK or PFSLK main runners.

16D. **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.

BPB AMERICA INC — Type PE for 1 hr assembly and beam ratings only .

CHICAGO METALLIC CORP — Type 4050 for 1 hr assembly and beam ratings only.

17. **Acoustical Material** — * — Nom 5/8 or 3/4 in. thick lay-in panels in nom sizes and types tabulated below. Border panels supported at walls by min 0.016 in. thick (26 gauge) painted steel angle with min 7/8 in. legs; or, min 0.016 in. thick (26 gauge) painted steel channel, 1 5/8 in. deep with 7/8 in. flanges. (S) = Surface Perforations.

Nom Lay-In Panel Size In.	Acoustical Mtl Type (See Footnotes)	Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr
24x24	P	2	2	2
24x24	BF+	2	2	2
24x24	P+	2	1 1/2	1 1/2
24x24	PC	2	1 1/2	1 1/2
24x24	BF++	2	1 1/2	1 1/2
24x24	P, PC, BF+++	1 1/2	1 1/2	1 1/2
24x48 or 20x60	P+	2	2	2
24x48 or 20x60	PC	2	2	2
24x48 or 20x60	P+++	2	1 1/2	1 1/2
24x48 or 20x60	PC+	2	1 1/2	1 1/2
24x48 or 20x60	PC+++	1 1/2	1 1/2	1 1/2

+ — Hourly ratings also apply when used in conjunction with Duct Outlet Protection System A.

++ — Hourly ratings apply when used in conjunction with the larger duct outlets (576 in.² per 100 ft² of ceiling area). When the larger duct outlets are used, Duct Outlet Protection System B may also be used.

+++ — Hourly ratings apply when used in conjunction with both the larger duct outlets (576 in.sup2 per 100 ft² of ceiling area) and Duct Outlet Protection System A.

ARMSTRONG WORLD INDUSTRIES INC — Type 5/8 or 3/4 in. P(S) 24 by 24 or 48 in., or 20 by 60 in.; Type 5/8 in. PC(S) 24 by 24 or 48 in., or 20 by 60 in.; Type 3/4 BF(S) 24 by 24 in.

17A. **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

18. Speaker Assemblies 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/SOUNDOLIER, DIV OF AMERICAN TRADING & PRODUCTION CORP

See **Speaker Assemblies For Fire Resistance (CHML)** , Atlas/Soundolier, Div of American Trading & Production Corp. for specific types.

18A. Speaker Assemblies For Fire Resistance* — (Optional, Not Shown) — As an alternate to Item 18, speaker panels may be included in the ceiling when the ceiling is composed of nom 24 by 24 or 48 in. lay-in panels. 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.

ARMSTRONG WORLD INDUSTRIES INC — Model BP67XX ("XX" may be 00-99).

19. Hold Down Clips — (Not shown) — 0.015 in. thick spring steel, placed over main runners and cross tees approx 2 ft OC.

20. Roof Insulation — (Not Shown) — May only be employed when Foamed Plastic (Item 4) is not used. Rigid **Foamed Plastic*** insulation boards, 1 to 4 in. thick placed on top of roof covering. May either be embedded into asphalt glaze coat, bonded to the single-ply membrane with adhesive or loosely laid. Covered with 10 psf stone or masonry ballast. (When used, stone ballast described in Item 2A may be omitted).

THE DOW CHEMICAL CO

*Bearing the UL Classification Mark

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