



NYC Department of Buildings
280 Broadway, New York, NY 10007
Robert D. LiMandri, Acting Commissioner
(212) 566-5000, TTY: (212) 566-4769

Report of Materials and Equipment Acceptance Division

Pursuant to Administrative Code Section 27-131, the following equipment or material has been found acceptable for use subject to the terms and conditions contained herein.

MEA 57-08-M

Manufacturer: Grace Construction Products, 62 Whittemore, Cambridge, MA 02140

Trade Name(s): Monokote

Product: Fire-rated spray-applied fireproofing product
MEA Index #310-30 – Fire Protection

Pertinent Code Section(s): 27-323, 27-324

Prescribed Test(s): RS 5-2 (ASTM E119)

Laboratory: Underwriters Laboratories, Inc.

Test Report(s): UL File R4339, dated December 21, 2007 and UL Fire Resistance Designs, D779, D925, N779, N782, P732, S734, S735 and X772.

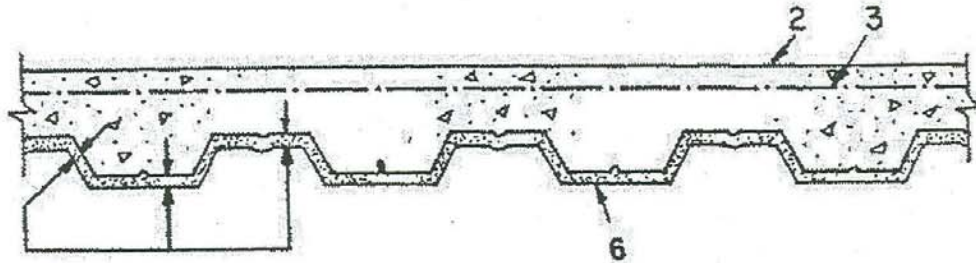
Description: High-density (**Z-146**, **Z-146PC** and **Z-146T**) and Ultra high-density (**Z-156**, **Z-156PC** and **Z-156T**) spray-applied fireproofing products for application to structural steel and concrete surfaces per UL Designs, D779, D925, N779, N782, P732, S734, S735 and X772.

Restrained Assembly Ratings — 1, 1-1/2, 2, 3 & 4 H

Unrestrained Assembly Ratings — 1, 1-1/2, 2, 3 & 4 H

Unrestrained Beam Ratings — 1, 1-1/2, 2, 3 & 4 H

Restricted Load Condition — See Items 1 and 6



1. **Supports** — W8 x 28 or alternate (per Section IV.6 in the front of the Fire Resistance Directory) steel beam or min 8K1 steel joists when joist substitution applied.

Note: Joists from the N series designs may be substituted for the listed beam (Item 1). When joists are substituted, the restrained rating of the joist must be equal to or greater than the restrained rating of the assembly. Additional joist substitution requirements are contained in the front of the Fire Resistance Directory.

2. **Normal Weight or Lightweight Concrete** — Normal weight concrete, carbonate or siliceous aggregate, 145 pcf plus or minus 3 pcf unit weight, 3000 psi compressive strength, vibrated. Lightweight concrete, expanded shale, clay, or slate aggregate by rotary-kiln method 102-120 pcf unit weight, 3000 psi compressive strength, vibrated, 4 to 7 percent air. Min thickness as measured to crests of steel floor and form units, 2-1/2 in.

3. **Welded Wire Fabric** — 6 x 6 - W1.4 x W1.4.

4. **Steel Floor and Form Units** — Composite 1-1/2, 2, or 3 in. deep galv units. Min gauge is 22 MSG.

5. **Shear Connectors** — (Optional) — Studs, 3/4 in. diam by 4-1/2 in. long, headed type or equivalent per AISC specification. Welded to top flange of the beam, or top chord of the joist, through the deck.

6. **Spray-Applied Fire Resistive Materials** — Applied by mixing with water and spraying to steel surfaces which must be clean and free of dirt, loose scale and oil. When steel deck is used, the area between the steel deck and the beams top flange shall be filled. Min avg and min ind density of 15/14 pcf respectively. Min avg and min ind density of 22/19 pcf respectively for Types Z-106, Z-106/G, Z-106/HY. Min avg and min ind density of 40/36 pcf respectively for Types Z-146, Z-146PC and Z-146T cementitious mixture. Min avg and min ind density of 50/45 pcf respectively for Types Z-156, Z-156T and Z-156PC. Application to steel deck requires the installation of expanded metal lath with Type Z-146, Z-146T, Z146PC, Z-156, Z-156T and Z-156PC only. For method of density determination, refer to Design Information Section.

7. **Metal Lath** — (Not Shown) — (Required with Z-146, Z-146T, Z146PC, Z-156, Z-156T and Z-156PC, otherwise optional) — Metal lath shall be 3/8 in. expanded diamond mesh, weighing 2.5 lb per sq yd. Secured to underside of steel deck with No. 12 by 3/8 in. pan head self-drilling, self-tapping screws and steel washers with an outside diam of 1/2 in. screws spaced 12 in. OC in both directions with lath edges overlapped approx 3 in.

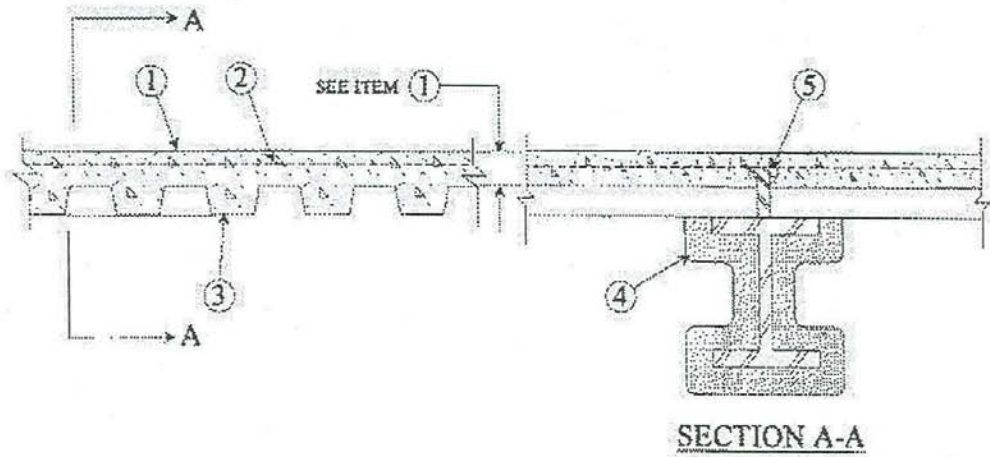
Fire Resistance Ratings - ANSI/UL 263

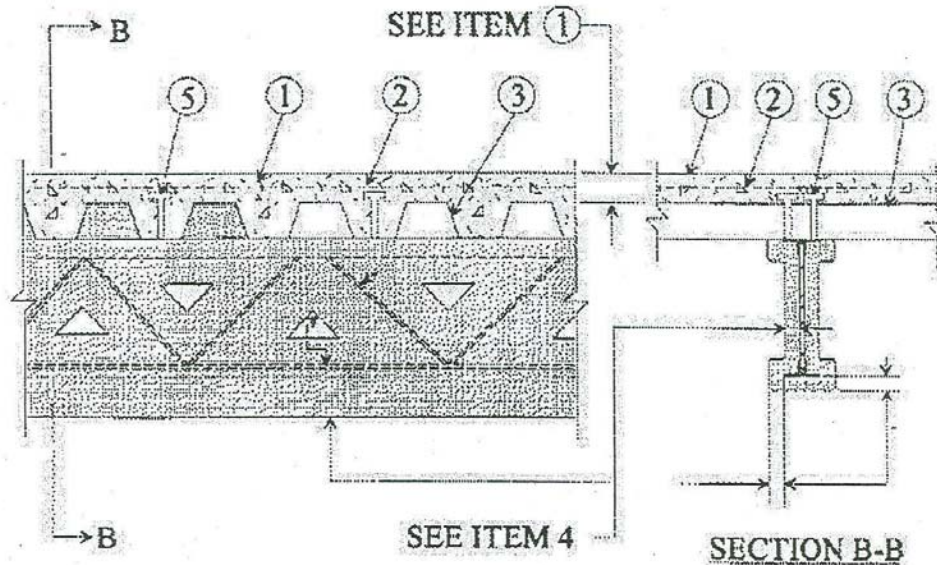
Design No. D925

Restrained Assembly Ratings — 3/4, 1, 1-1/2, 2 or 3 Hr

Unrestrained Assembly Rating — 0 Hr

Unrestrained Beam Ratings — 1, 1-1/2, 2, 3 and 4 Hr





Supports — W8x28, W12x16 or alternate (per Section IV.6 in the front of the Fire Resistance Directory) steel beam or min 8K1 steel joists when joist substitution applied.

1. Normal Weight or Lightweight Concrete — Normal weight concrete carbonate or siliceous aggregate, 3500 psi compressive strength, vibrated. Lightweight concrete, expanded shale, or slate aggregate by rotary-kiln method, or expanded clay aggregate by rotary-kiln or sintered-grate method, 3000 psi compressive strength, vibrated, 4 to 7 percent entrained air.

2. Welded Wire Fabric — 6 x 6, 10 x 10 SWG.

3. Steel Floor and Form Units* — Composite 1-1/2, 1-5/8, 2 or 3 in. deep galv units or 4-1/2 in. deep noncomposite galv units. Fluted units may be uncoated or phosphatized/painted. Min gauges are 22 MSG for fluted and 20/20 MSG for cellular units.

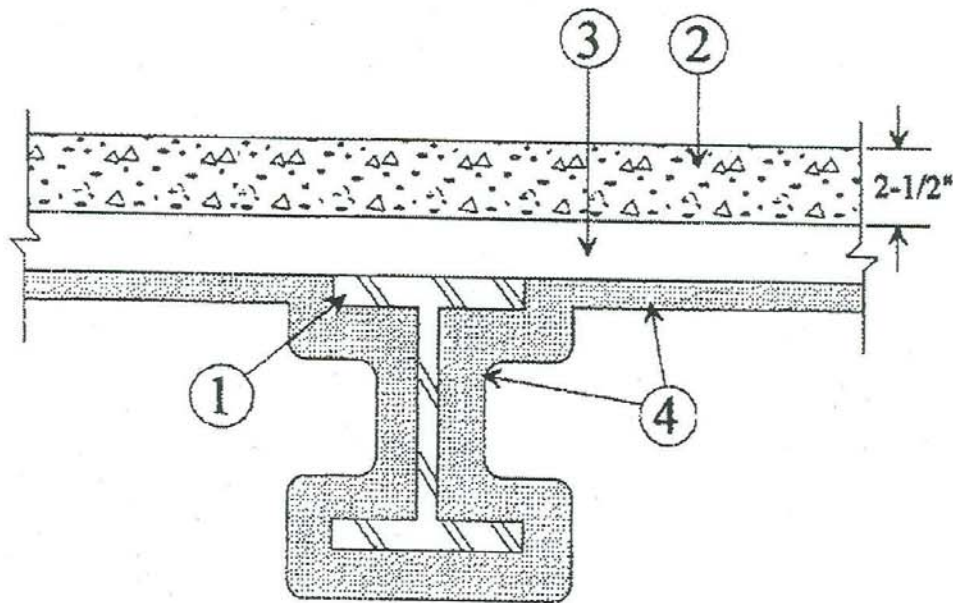
4. Spray-Applied Fire Resistive Materials — Applied by mixing with water and spraying in one or more coats to a final thickness as shown in the tables below, to steel beam surfaces which must be clean and free of dirt, loose scale and oil. Min avg and min ind density of 15/14 pcf, respectively for Types MK-6/HY, MK-6/HY Extended Set, MK-6s, RG. Min avg and min ind density of 22/19, respectively for Types Z-106, Z-106/G. For method of density determination, refer to Design Information Section.

5. Shear-Connector-Studs-Optional — Studs 3/4 in. diam by 3 in. long, for 1-1/2 in. deep form units to 5-1/4 in. long for 3 in. deep form units, headed type or equivalent per AISC specifications. Welded to the top flange of the beam through the steel form units.

6. Electrical Inserts — (Not shown) Classified as "Outlet Boxes and Fittings Classified for Fire Resistance".

Restrained Beam Ratings — 1, 1-1/2, 2, 3 & 4 Hr

Unrestrained Beam Ratings — 1, 1-1/2, 2, 3 & 4 Hr



1. **Steel Beam** — W8x28 or alternate (per Section IV.6 in the front of the Fire Resistance Directory) steel beam.

2. **Normal Weight or Lightweight Concrete** — Compressive strength, 3000 psi. For normal weight concrete either carbonate or siliceous aggregate may be used. Unit weight 148 pcf. For lightweight concrete, unit weight 110 pcf.

3. **Steel Floor and Form Units*** — Min 1/2 in. to 1-5/16 in. deep corrugated or 1-1/2 to 3 in. deep fluted type, welded to beam.

4. **Spray-Applied Fire Resistive Materials*** — Applied by mixing with water and spraying in more than one coat to beam and in one coat to steel deck to final thicknesses shown below. Steel surfaces must be clean and free of dirt, loose scale, and oil. Min avg and min ind density of 15/14 pcf, respectively. Min avg and min individual density of 22/19 pcf respectively for Types Z-106, Z-106/G, and Z-106/HY. Min avg and min individual density of 40/36 pcf respectively for Types Z-146. For method of density determination, refer to Design Information Section.

Crest areas above the beam shall be filled with Spray-Applied Fire Resistive Materials.

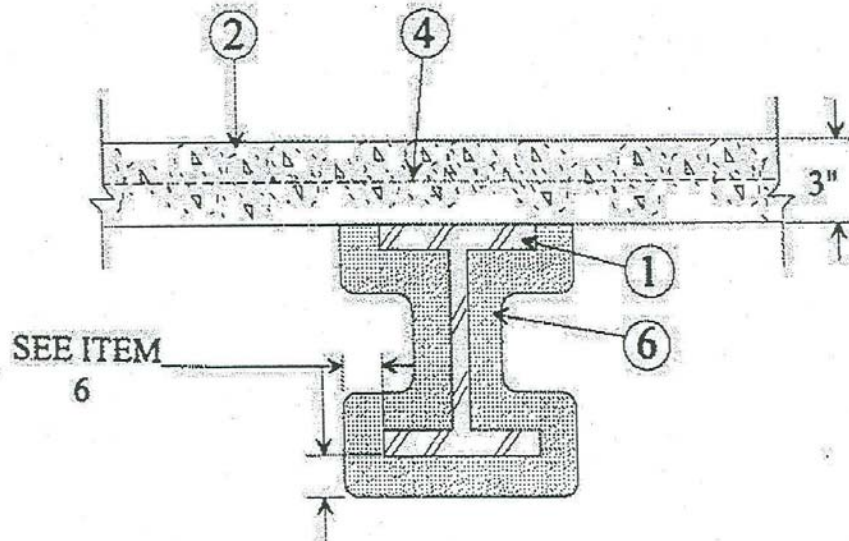
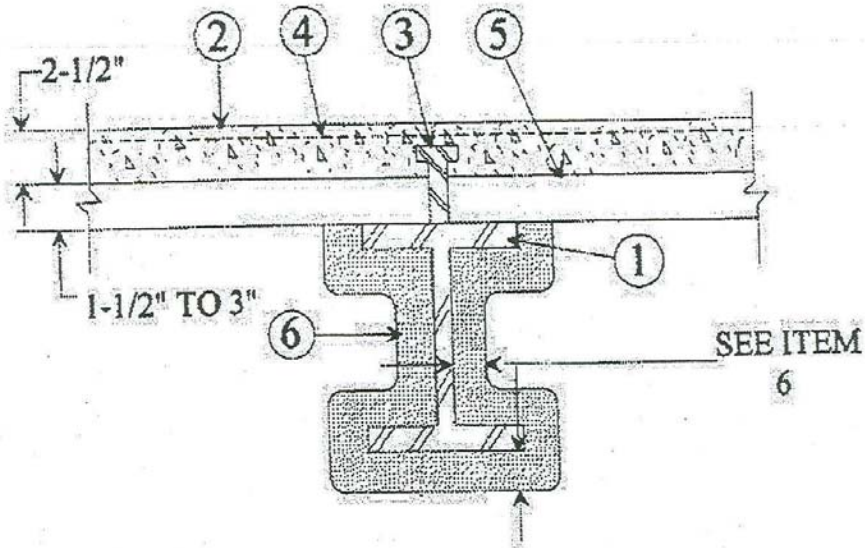
*Bearing the UL Classification Mark

Fire Resistance Ratings - ANSI/UL 263

Design No. N782

Restrained Beam Ratings — 1, 1-1/2, 2, 3 and 4 Hr

Unrestrained Beam Ratings — 1, 1-1/2, 2, 3 and 4 Hr



1. Steel Beam — W8x28 min size.

2. Normal Weight or Lightweight Concrete — Compressive strength, 3000 psi. For normal weight concrete either carbonate or siliceous aggregate may be used. Unit weight, 148 pcf. For lightweight concrete unit weight 110 pcf.

3. Shear Connector — (Optional) — Studs, 3/4 in. diam headed type or equivalent per AISC specifications. Welded to the top flange of beam through the steel floor units.

Design No. N782

4. Welded Wire Fabric — (Optional) — 6x6-10/10 SWG.

5. Steel Floor and Form Units* — 1-5/16 in. deep corrugated units; or 1-1/2 to 3 in. deep fluted units welded to beam.

6. Spray-Applied Fire Resistive Materials* — Applied by mixing with water and spraying in more than one coat to the beam to the final thicknesses shown below. When fluted or corrugated steel floor units are used, crest areas shall be filled with Spray-Applied Fire Resistive Materials above the beam. Beam surfaces must be clean and free of dirt, loose scale and oil. Min average and min ind. density of 15/14 pcf respectively. Min avg and min ind density of 22/19 pcf respectively for Types Z-106, Z-106/HY, Z-106/G. Min avg and min ind density of 40/36 pcf respectively for Types Z-146, Z-146PC and Z-146T cementitious mixture. Min avg and min ind density of 50/45 pcf respectively for Types Z-156, Z-156T and Z-156PC. For method of density determination, see Design Information Section.

*Bearing the UL Classification Mark

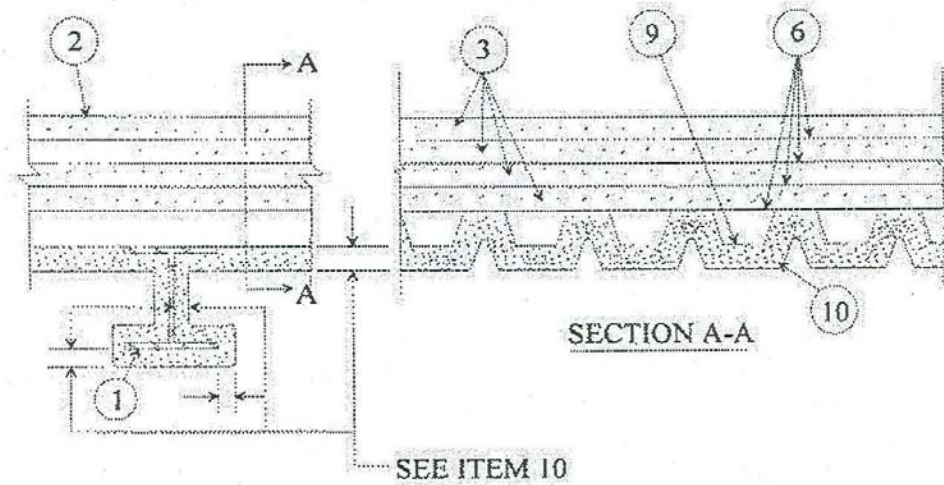
Fire Resistance Ratings - ANSI/UL 263

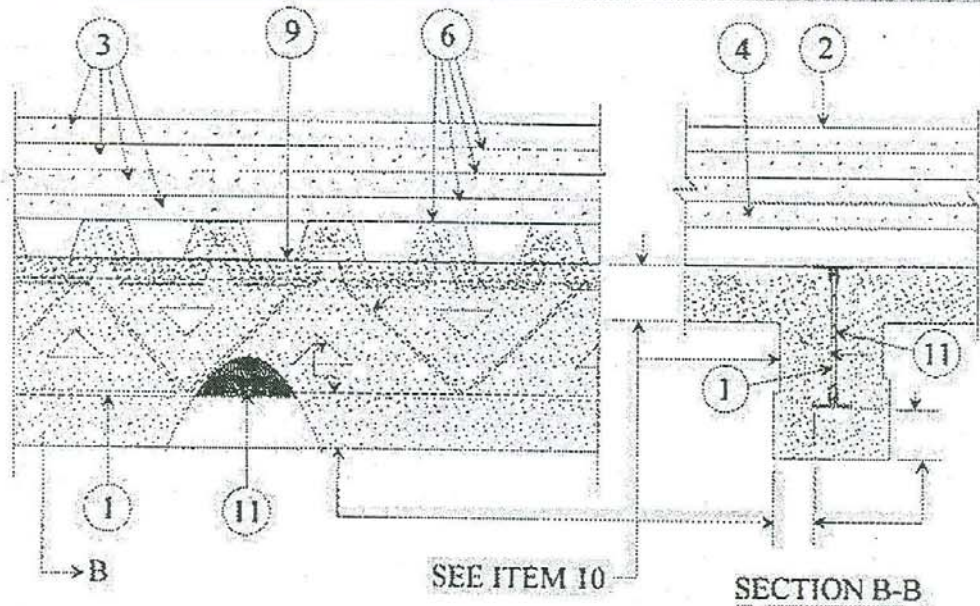
Design No. P732

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

Unrestrained Assembly Ratings — 3/4, 1, 1-1/2, 2 or 3 Hr

Unrestrained Beam Ratings — 1, 1-1/2, 2 or 3 Hr





1. **Beam** — Min W8x28 or Steel Joist — 10K1 or 16K2 min size with a max tensile stress of 30,000 psi or 12K3 or 12K5 min size with a max tensile stress of 24,000 psi.

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

3. **Roof Insulation — Foamed Plastic** — Polyisocyanurate foamed plastic insulation boards nom 48 by 48 or 96 in., to be applied in one or more layers. Boards to be installed with end joints staggered a min of 6 in. Min thickness shall be selected from the Table below. No limit on max overall thickness.

4. **Gypsum Board** — (Not shown) — (Classified or Unclassified) — May be used to obtain various Restrained or Unrestrained Assembly Ratings as described in Item 10. Supplied in sheets nom 4 by 8 or 12 ft by 5/8 in. thick. Min weight 2.2 psf. Applied perpendicular to steel roof deck direction with end joints staggered 2 ft in adjacent rows. End joints to occur over crests of steel roof units. See **Gypsum Board** (CKNX) category for names of manufacturers.

5. **Vapor Retarder — Sheathing Material*** — (Optional) — (Not shown) — Vinyl film or paper scrim vapor barrier, applied to steel roof deck or gypsum wallboard with adhesive (Item 6), hot asphalt (Item 7) or laid loosely, overlapped approx 2 in. on adjacent sheets. See **Sheathing Material** (CHIZ) category for names of manufacturers.

6. **Adhesive*** — (Optional) — The vapor retarder, the gypsum wallboard or the first layer of roof insulation may be secured with adhesive to the steel crest surfaces. Also used to attach the vapor retarder to gypsum wallboard, the first layer of insulation to vapor retarder or gypsum wallboard and each additional layer of insulation. Applied in 1/2 in. wide ribbons 6 in. OC at 0.4 gal/100 sq ft. See **Adhesives** (BYWR) category for names of manufacturers.

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7. Asphalt or Coal Tar Pitch* — (Optional) — (Not shown) — The vapor retarder, the gypsum wallboard of the first layer of roof insulation may be secured with asphalt or coal tar pitch to the steel crest surfaces at a max rate of 15 lb/100 sq ft. Also used to attach the vapor retarder to gypsum wallboard, the first layer of insulation to vapor retarder or gypsum wallboard and each additional layer of roof insulation, applied at a max rate of 25 lb/100 sq ft.

8. Mechanical Fasteners — (Optional) — (Not shown) — Mechanical screw-type fastener with metal or plastic washer designed for the purpose may be used to attach one or more layers of insulation to steel roof deck.

9. Steel Roof Deck — (Unclassified) — Min 1-1/2 in. deep and 36 in. wide galv fluted steel deck. Min gauge is No. 22 MSG. Ends overlapped at supports a min 1-1/2 in. and welded to supports 12 in. OC and at side laps. Side laps fastened with 1/2 in. long hex head, self-drilling, self-tapping steel screws spaced a max of 36 in. OC. **Classified Steel Floor and Form Units*** — Noncomposite 1-1/2 to 3 in. deep, 24 to 36 in. wide, min 22 MSG galvanized steel fluted units. Ends overlapped at supports a min 1-1/2 in. and welded to supports 12 in. OC and at side laps. Side laps fastened with 3/4 in. long No. 12 self-drilling, self-tapping steel screws at 36 in. OC. As alternate to screw fasteners adjacent units may be button-punched or welded together 36 in. OC along side joints.

10. Spray-Applied Resistive Material* — Applied by mixing with water and spraying in more than one coat to final thicknesses as shown in the illustration above and in the table below to steel surfaces which must be clean and free of dirt, loose scale and oil. Steel deck surface must be "spatter" coated with Type SK-3 Spray-Applied Fire Resistive Materials prior to application of spray-applied resistive material. Type SK-3 spray-applied resistive material applied in accordance with the manufacturer's application instructions. When steel deck is used the area between the steel deck and the beams top flange shall be filled. Min average and min individual density of 15/14 pcf, respectively. For method of density determination, see Design Information Section. Thickness of the spatter coat is included in the total final thickness of the protection material.

11. Nonmetallic Fabric Mesh — (Optional) — As an alternate to metal lath, glass fiber fabric mesh, weighing approx 2.5 oz/sq yd, polypropylene fabric mesh, weighing approx 1.25 oz/sq yd or equivalent, may be used to facilitate the spray application. The mesh is secured to one side of each joist web member. The method of attaching the mesh must be sufficient to hold the mesh and the spray applied Spray-Applied Fire Resistive Materials material in place during application until it has cured. An acceptable method to attach the mesh is by embedding the mesh in min 1/4 in. long beads of hot melted glue. The beads of glue shall be spaced a max of 12 in. OC along the top chord of the bar joist. Another method to secure the mesh is by 1-1/4 in. long by 1/2 in. wide hairpin clips formed from No. 18 SWG or heavier steel wire.

The method of attaching the mesh must be sufficient to hold the mesh and the spray applied Spray-Applied Fire Resistive Materials material in place during application until it has cured. An acceptable method to attach the mesh is by embedding the mesh in min 1/4 in. long beads of hot melted glue. The beads of glue shall be spaced a max of 12 in. OC along the top chord of the bar joist. Another method to secure the mesh is by 1-1/4 in. long by 1/2 in. wide hairpin clips formed from No. 18 SWG or heavier steel wire.

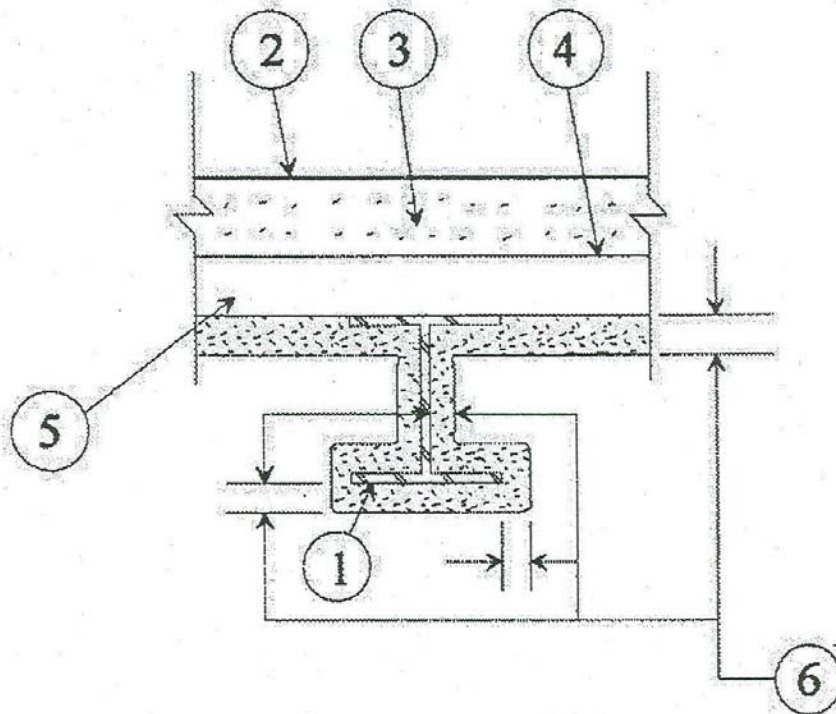
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Design No. S734

Restrained Beam Ratings — 1, 1-1/2, 2 and 3 Hr

Unrestrained Beam Ratings — 1, 1-1/2, 2, 3 and 4 Hr

Load Restricted for Canadian Applications — See Guide [BXUV7](#)



Design No. S734

1. **Steel Beam** — W6x16 or W12x19, min size.

2. **Roof Covering*** — Consisting of hot mopped, cold application or single-ply 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).

3. **Roof Insulation*** — Consisting of building units, foamed plastic or mineral and fiber boards, applied in one or more layers. When multiple layers are used, end and side joints shall be offset a min of 12 in. in both directions in order to lap all joints. See category for names of companies providing Classified products — Building Units (BZXX), Foamed Plastic (CCVW) or Mineral and Fiber Boards (CERZ). Roof insulation shall be compatible with roof covering materials Class A, B or C system. See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).

4. **Adhesive** — (Optional) — May be applied to steel roof deck units or between insulation layers at a max application rate of 0.4 gal/100 sq ft. See Adhesives (BYWR) category for names of manufacturers.

5. **Steel Roof Deck** — (Unclassified) — Fluted, No. 22 MSG min galv 1-1/2 in. deep with 3-1/2 in. wide flutes spaced 6 in. OC. Ends overlapped a min 1-1/2 in. and welded to supports, 12 in. OC max. Adjacent units button-punched, welded or fastened with No. 12 by 1/2 in. long self-drilling, self-tapping steel screws.

6. **Spray-Applied Fire Resistive Materials*** — Applied by mixing with water and spraying to the beam and deck surfaces to the final min thicknesses shown below. Crest areas above the beam shall be filled with the Spray-Applied Fire Resistive Materials. Surfaces must be clean and free of dirt, loose scale and oil. Min avg and min ind density of 15/14 pcf. For method of density determination see Design Information Section.

7. **Metal Lath (Not shown)** — Metal lath shall be used when applying Type Z-146, Z-146T, Z146PC, Z-156, Z-156T and Z-156PC material to the underside of the steel deck. The metal lath shall be 3/8 in. expanded diamond mesh, weighing 1.7 lb per sq yd. secured to underside of steel deck with No. 12 by 3/8 in. pan head self-drilling, self-tapping steel screws and steel washers with an outside diam of 1/2 in. Screws spaced 12 in. OC in both directions with lath edges overlapped approximately 3 in.

*Bearing the UL Classification Mark

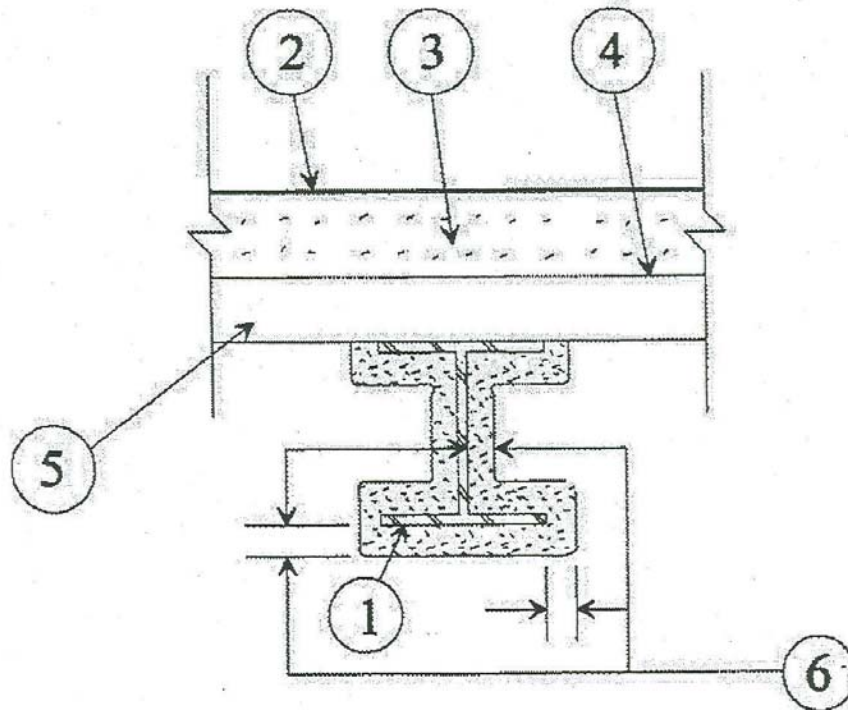
Fire Resistance Ratings - ANSI/UL 263

Design No. S735

Restrained Beam Ratings — 1, 1-1/2, 2, 3 and 4 Hr

Unrestrained Beam Ratings — 1, 1-1/2, 2, 3 and 4 Hr

Load Restricted for Canadian Applications — See Guide [BXUV7](#)



Design No. S735

1. **Steel Beam** — W6x16 or W8x28 min size.

2. **Roof Covering*** — Consisting of hot mopped, cold application or single-ply 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).

3. **Roof Insulation*** — Consisting of building units, foamed plastic or mineral and fiber boards, applied in one or more layers. When multiple layers are used, end and side joints shall be offset a min of 12 in. in both directions in order to lap all joints. See category for names of companies providing Classified products — Building Units (BZXX), Foamed Plastic (CCVW) or Mineral and Fiber Boards (CERZ). Roof Insulation shall be compatible with roof covering materials Class A, B or C system. See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).

4. **Adhesive** — (Optional) — May be applied to steel roof deck units or between insulation layers at a max application rate of 0.4 gal/100 sq ft. See Adhesives (BYWR) category for names of manufacturers.

5. **Steel Roof Deck** — (Unclassified) — Fluted, No. 22 MSG min galv 1-1/2 in. deep with 3-1/2 in. wide flutes spaced 6 in. OC. Ends overlapped a min 1-1/2 in. and welded to supports, 12 in. OC max. Adjacent units button-punched, welded or fastened with No. 12 by 1/2 in. long self-drilling, self-tapping steel screws.

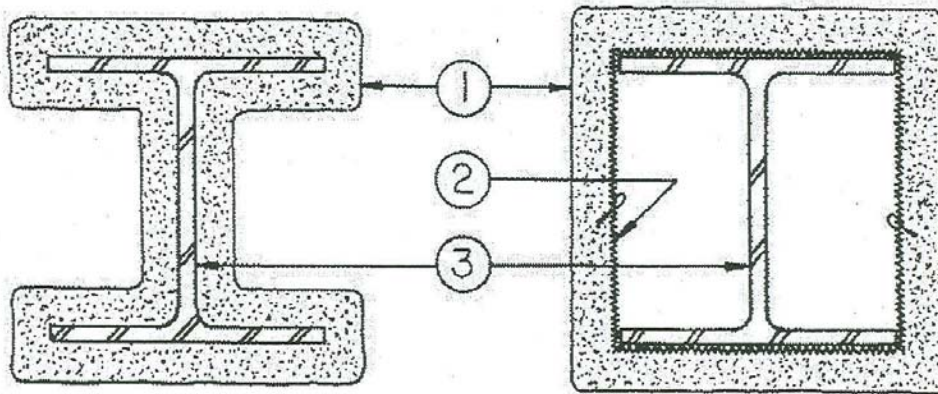
6. **Spray-Applied Fire Resistive Materials*** — Applied by mixing with water and spraying to the beam surfaces to the final min thicknesses shown below. Crest areas above the beam shall be filled with the Spray-Applied Fire Resistive Materials. Surfaces must be clean and free of dirt, loose scale and oil. Min avg and min ind density of 15/14 pcf. For method of density determination see Design Information Section.

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Fire Resistance Ratings - ANSI/UL 263

Design No. X772

Ratings — 1, 1-1/2, 2, 3 and 4 h.



1. Spray-Applied Fire Resistive Materials*

2. Metal Lath

3. Steel Column

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$$h = \frac{R}{1.05 (W/D) + 0.61}$$

h = Spray-Applied Fire Resistive Materials thickness in the range 0.25-3.875 in.

Terms and Conditions: The above-described column and beam assemblies, as having the fire-resistance ratings given above and providing the following requirements for application and protection of the sprayed-on fireproofing, are accepted on the following conditions:

1. Surfaces to receive sprayed-on fireproofing shall be cleaned of dirt, grease, oil, loose scale, paint and any extraneous material immediately prior to the application of the fireproofing.
2. All sprayed surfaces shall be permanently jacketed or otherwise protected from abrasion or displacement for the full height of the exposed columns and beams, but such protection need not extend more than 9 feet above floor level.
3. The finished fireproofing shall be sprayed to a uniform thickness, which shall not be less than the minimum thickness specified. Fire proofing may be finish troweled to required thicknesses and densities.
4. Density of the sprayed-on fireproofing shall be verified by removing a minimum of three 6-inch square sections, randomly selected from the building, subjecting them to 120 °F in an oven to constant weight, usually 24 to 48 hours at a laboratory, followed by accurate weighing, measuring and calculation of the density in pounds per cubic foot.
5. The general contractor and the owner shall provide qualified personnel to supervise the application of the sprayed-on fireproofing. They shall certify to the New York City Department of Buildings that the finished fireproofing of the completed building is in full compliance with the acceptance requirements and drawings approved by the Department of Buildings.
6. The installation of the sprayed-on fireproofing shall be subject to the controlled inspection requirements of Section 27-132 of the New York City Building Code.
7. The use of this material shall be subject to all pertinent regulations of the Department of Air Resources and the Department of Health.
8. All shipments and deliveries of the materials comprising this assembly shall be accompanied by a certificate of label certifying that the materials shipped or delivered are equivalent to those tested and accepted for use, as provided in Section 27-131 of the New York City Building Code.

Final Acceptance May 30, 2008

Examined By Steve Derkshon