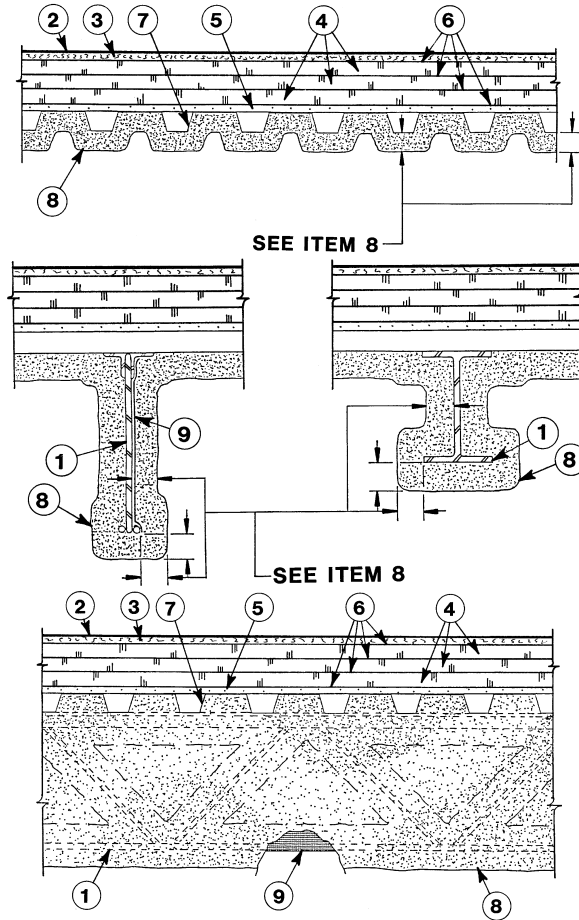


**Design No. P725**

**Restrained Assembly Rating-1, 1-1/2 or 2 H (See Item 8)**  
**Unrestrained Assembly Rating-1, 1-1/2 or 2 H (See Item 8)**  
**Unrestrained Beam Rating-1, 1-1/2 or 2 H (See Item 8)**  
**Restricted Load Condition — See Items 1 and 8B**  
**Load Restricted for Canadian Applications — See Guide BXUV7**



1. **Steel Supports** — W8X28 steel beam min size, 10K1 or 16K2 steel joists (min size) with allowable tensile stress of 30,000 psi or 12K3 steel joists (min size) with allowable tensile stress of 24,000 psi. As alternate to steel beam or steel joists, **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 bituminous materials compatible with the insulation described herein which provide Class A, B or C coverings. See Building Materials Directory - Roof Covering Materials (TEVT).
- 2A. In lieu of Item 2, roof coverings 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).
- 2B. **Metal Roof Deck Panels\*** — (Not shown) — In addition to or in lieu of Item 2 or 2A, the roof covering may consist of a mechanically fastened metal roof deck panel assembly. See Fire Resistance Directory - Metal Roof Deck Panels (CETW).
3. **Wood Fiber Board Insulation** — (Optional) — 1/2 in. thick wood fiber board insulation may be applied to roof insulation with compatible adhesive, asphalt, mechanically attached or loose laid. Joints to be offset from joints of roof insulation. Wood fiber insulation specifications as specified under the respective manufacturer's Classification for Sheathing Materials\*.
4. **Roof Insulation, Foamed Plastic\*** — Polystyrene foamed plastic insulation boards, applied in one or more layers over gypsum wallboard. Min thickness is 1.0 in. with no max overall thickness, max density 2.5 pcf. When applied in more than one layer, each layer to be offset in both directions from layer below a min. of 6 in. in order to lap all joints. Boards secured to gypsum wallboard (Item 5) with asphalt glaze coat or compatible adhesive (Item 6). Adhesive or asphalt glaze coat may be omitted when Item 2A is used. See Foamed Plastic (BRYX) category in the Building Materials Directory or Foamed Plastic (CCVW) category in the Fire Resistance Directory for names of Classified companies.
- 4A. **Foamed Plastic\*** — **As an alternate to Item 4** — Polyurethane foamed plastic roof insulation. Formed by the simultaneous spraying of two liquid components applied over the gypsum board (item 5) in accordance with the manufacturer's instructions. Minimum nominal thickness is 1.0 in. with no maximum thickness.
  - BASF CORP** —Types FE 303 2.7, FE-348, FE348-2.5, FE348-2.7, FE348-2.8, FE348-3.0, ELASTOSPRAY 81255, ELASTOSPRAY 81275, ELASTOSPRAY 81285 or ELASTOSPRAY 81305.
  - BASF CORP** —Elastospray 5100-2.0, Elastospray 5100-2.5, Elastospray 81302, Elastospray 81272, Elastospray Alpha System, Elastospray 81252.
5. **Gypsum Board (Classified or Unclassified)** — Nom 5/8 in. thick, 2.3 psf min weight, supplied in 4 ft wide sheets. Installed perpendicular to the steel roof deck with joints staggered and occurring over crests of roof deck. Secured to the deck with Adhesive (Item 6). (Note: Adhesive and/or asphalt glaze coat may be omitted when Item 2A is used).
  - ACADIA DRYWALL SUPPLIES LTD** —CKNX.R25370
  - AMERICAN GYPSUM CO** —CKNX.R14196
  - BEIJING NEW BUILDING MATERIALS PUBLIC LTD CO** —CKNX.R19374
  - CERTAINTED GYPSUM CANADA INC** —CKNX.R15187
  - CERTAINTED GYPSUM INC** —CKNX.R3660

CGC INC —CKNX.R19751  
 CONTINENTAL BUILDING PRODUCTS  
 OPERATING CO, L L C —CKNX.R18482  
 GEORGIA-PACIFIC GYPSUM L L C —CKNX.R2717  
 LOADMASTER SYSTEMS INC —CKNX.R11809  
 NATIONAL GYPSUM CO —CKNX.R3501  
 PABCO BUILDING PRODUCTS L L C, DBA  
 PABCO GYPSUM —CKNX.R7094  
 PANEL REY S A —CKNX.R21796  
 SIAM GYPSUM INDUSTRY (SARABURI) CO LTD —CKNX.R19262  
 THAI GYPSUM PRODUCTS PCL —CKNX.R27517  
 UNITED STATES GYPSUM CO —CKNX.R1319  
 USG MEXICO S A DE C V —CKNX.R16089

6. **Adhesive\*** — (Optional) — Adhesive may be applied in 1/2 in. wide ribbons approx 6 in. OC at 0.4 gal/100 sq ft. In lieu of adhesive, asphalt may be used to secure the wallboard, applied to a min 50 percent of the crest surface at a rate of 12 to 15 lb per 100 sq ft or with mechanical fasteners. If mechanical fasteners are used, the fastener shall not penetrate through the Spray-Applied Fire Resistive Materials. See Adhesives (BYWR) category for names of Classified companies.

7. **Steel Roof Deck** — Unclassified - Min 24 in. wide, 1-1/2 to 3 in. deep, galv fluted steel deck. Min 22 MSG. Flutes approx 6 in. OC, crests approx 3-1/2 in. wide, valleys approx 1-3/4 in. wide. Welded to supports 12 in. OC. Adjacent units welded 36 in. OC along side laps. Or,

**Classified Steel Floor and Form Units\*** — Noncomposite — 1-1/2 to 3 in. deep, 24 to 36 in. wide, min 22 MSG galv steel fluted units. Welded to supports 12 in. OC. Adjacent units button-punched or welded together 36 in. OC along side laps.

CANAM STEEL CORP — Type P-3606, P-3615, P-2436, P-2404, P-2403, and P-2438.

CONSOLIDATED SYSTEMS INC —Types B, BI, F, N, NI. Units may be ptd/ptd.

NEW MILLENNIUM BUILDING SYSTEMS L L C —24 to 36 in. wide Types B, BI, F; 24 in. wide Type N. Units may be phos/painted or galvanized.

ROOF DECK INC — Types B, F, N, NV .

VULCRAFT, DIV OF NUCOR CORP —Types 1.5B, 1.5BI, 1.5F, 3N, 3NI. Units may be ptd/ptd; Types BW, B High Strength, BW High Strength, N. Units may be ptd/ptd.

Note: Type Z-106 Spray-Applied Fire Resistive Materials to be used with galv steel roof units only.

8. **Spray-Applied Fire Resistive Materials\*** — Applied by mixing with water and spraying in more than one coat to a final thickness as shown on the following table to steel surfaces which must be clean and free of dirt, loose scale and oil. Min average and min ind densities of 15/14 pcf respectively. For types MK-6/ED, MK-6/CBF, MK-6/HY, MK-6/HB, MK-6S, MK-10 HB and RG, min average and min ind densities of 22/19 pcf respectively for Types Z-106, Z-106/G and Z-106/HY. For method of density determination, refer to Design Information Section.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	on Steel Deck	on W8x28 Beam
1	1	1	3/4	7/16
1-1/2	1	1	1	9/16
1-1/2	1-1/2	1-1/2	1	5/8
2	1	1	1-3/8	3/4
2	2	2	1-9/16	7/8

ARABIAN VERMICULITE INDUSTRIES —Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6/HY Extended set, MK-6/HB, MK-6S, MK-10 HB, MK-10 HB Extended Set, Z-106, Z-106/G, Z-106/HY.

GRACE KOREA INC —Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6/HY Extended set, MK-6/HB, MK-6S, MK-10 HB, MK-10 HB Extended Set, Z-106, Z-106/G, Z-106/HY.

W R GRACE & CO - CONN —Types MK-6/HY, MK-6/HY extended set, MK-6/HB, MK-6S, MK-10 HB, MK-10 HB Extended Set, RG, Z-106, Z-106/G, Z-106/HY.

- 8A. **Alternate Spray-Applied Fire Resistive Materials\*** — Applied by mixing with water and spraying in one or more coats to final thicknesses as shown in the table below to steel beam 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. Application to steel roof deck requires the installation of expanded metal lath. See Item 9A. Min avg and min ind density of 40/36 pcf, respectively. 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, refer to Design Information Section.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	on Steel Deck	on W8x28 Beam
1	1	1	3/4	7/16
1-1/2	1	1	1	9/16
1-1/2	1-1/2	1-1/2	1	5/8
2	1	1	1-3/8	3/4
2	2	2	1-3/8	7/8

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Joist thickness			
			10K1 more than 4 ft OC	10K1 less than 4 ft OC	16K2 more than 4 ft OC	16K2 less than 4 ft OC
1	1	1	1-1/8	1	15/16	15/16
1-1/2	1	1	1-5/16	1-5/16	1-1/4	1-3/16
1-1/2	1-1/2	1-1/2	1-5/8	1-7/16	1-1/4	1-3/16
2	1	1	1-7/16	1-7/16	1-9/16	1-1/2
2	2	2	2-3/16	1-7/8	1-9/16	1-1/2

ARABIAN VERMICULITE INDUSTRIES —Type Z-146, investigated for exterior use.

GRACE KOREA INC —Type Z-146, investigated for exterior use.

W R GRACE & CO - CONN — Types Z-146, Z-146T, Z146PC, Z-156, Z-156T and Z-156PC, investigated for exterior use.

- 8B. **Alternate Spray-Applied Fire Resistive Materials\*** — 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. For minimum and maximum density of: Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6/HY Extended set, MK-6/HB, MK-6S, Z-106, Z-106/G, Z-106/HY see Item 8; Type Z-146, investigated for exterior use, see Item 8A.

# FIRE RESISTANCE DIRECTORY - W R GRACE DESIGNS

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## FIRE-RESISTANCE RATINGS - ANSI/UL 263 (BXUV)

Restrained & Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Joist thickness 12K3** more than 4 ft OC	12K3** less than 4 ft OC
1	1	15/16	15/16
1-1/2	1-1/2	1-1/4	1-3/16
2	2	1-9/16	1-1/2

\*\*Design load shall stress the 12K3 joist to a maximum tensile strength of 24,000 psi, which represents 80% of the maximum allowable design loading. Based on the Steel Joist Institute (SJI) Publication, "Catalog of Standard Specifications and Load Tables for Steel Joists and Joist Girders" for guidance on how to increase the design loading accordingly.

**ARABIAN VERMICULITE INDUSTRIES** —Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6/HY Extended set, MK-6/HB, MK-6s, MK-10 HB, MK-10 HB Extended Set, Z-106, Z-106/G, Z-106/HY, Z-146, investigated for exterior use.

**GRACE KOREA INC** —Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6/HY Extended set, MK-6/HB, MK-6S, MK-10 HB, MK-10 HB Extended Set, Z-106, Z-106/G, Z-106/HY, Z-146, investigated for exterior use.

**W R GRACE & CO - CONN** —Types MK-6/HY, MK-6/HY extended set, MK-6/HB, MK-6S, MK-10 HB, MK-10 HB Extended Set, RG, Z-106, Z-106/G, Z-106/HY, Z-146, investigated for exterior use.

9. **Nonmetallic Fabric Mesh** — (Optional) — Glass fabric mesh, weighing approx 1.25 oz/sq yd, or equivalent, may be used to facilitate the spray 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.
- 9A. **Metal Lath** — (Not Shown) —(Required with Item 8A, 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.
- 9B. **Metal Lath** — (Not Shown) — (Required on both sides of joists with Z-146, Z-146T, Z146PC, Z-156, Z-156T and Z-156PC, otherwise optional) — As an alternate to the nonmetallic fabric mesh (Item 9), metal lath may be used to facilitate the spray application of Spray-Applied Fire Resistive Materials on steel bar joists and trusses. The diamond mesh, 3/8 in. expanded steel lath, 1.7 to 3.4 lb per sq yd is secured to one side of each steel joist with No. 18 SWG galv steel wire at each joist web and bottom chord members, spaced 15 in. OC. When used, the metal lath is to be fully covered with Spray-Applied Fire Resistive Materials with no min thickness requirements.
10. **Bridging** — (Not shown) — Min 1-1/4 by 1-1/4 by 1/8 in. thick steel angles welded to top and bottom chords of each joist. Number and spacing of bridging angles per Steel Joist Institute Specification. Bridging coated with the same thickness of Spray-Applied Fire Resistive Materials (Item 8) as the joist.

\*Bearing the UL Classification Mark