

BXUV.P740

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. P740

Restrained Assembly Ratings — 1, 1-1/2 & 2 Hr
(See Items 3, 7 & 7A)

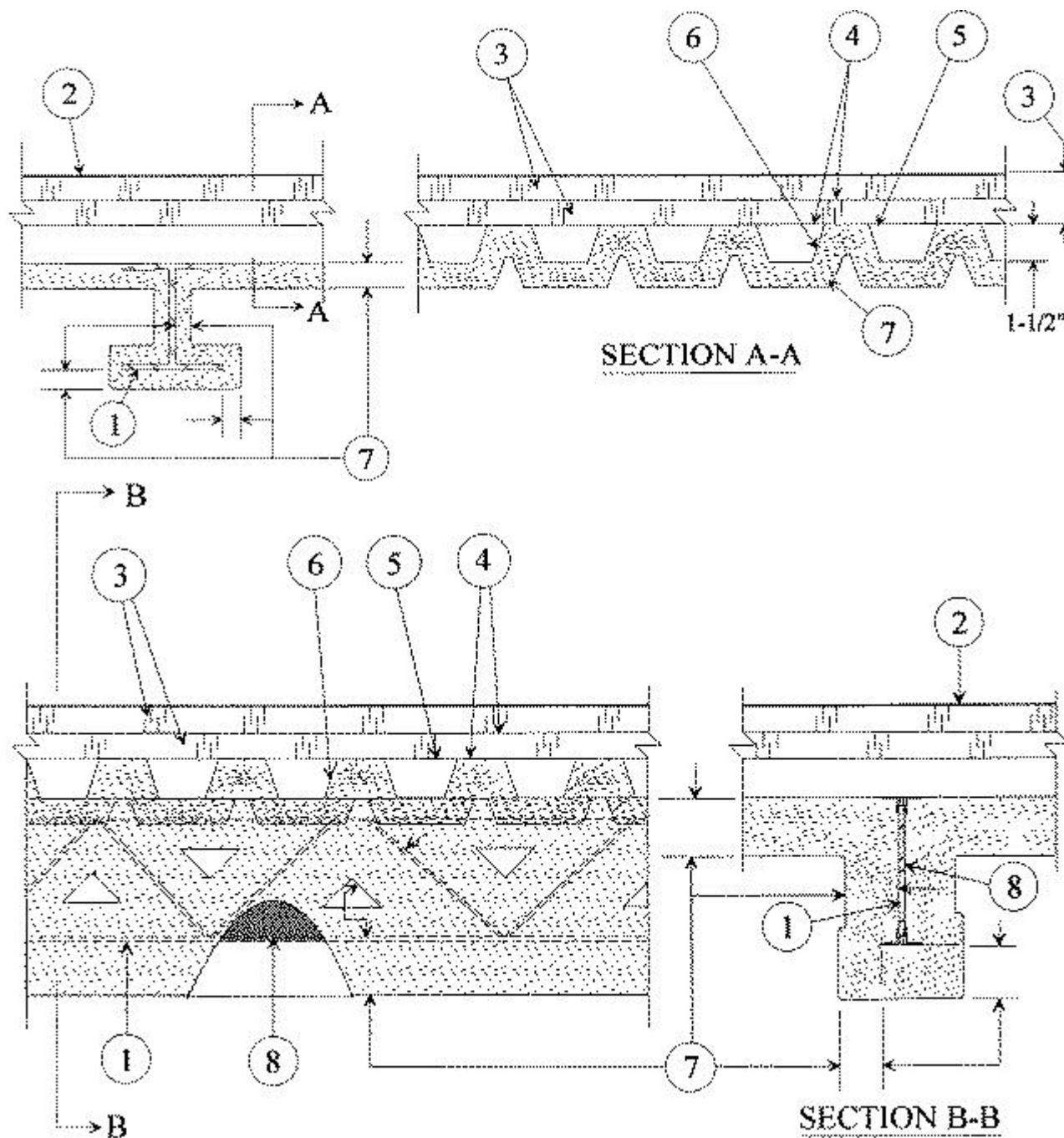
Unrestrained Assembly Ratings — 3/4, 1, 1-1/2 & 2 Hr
(See Items 7 & 7A)

Unrestrained Beam Ratings — 1, 1-1/2 & 2 Hr
See Items 7 & 7A

Restricted Load Condition — See Items 1 and 7C

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.**



1. **Beam** — W6x16 min size or steel joist 10K1 or 16K2 min size with a max tensile stress of 30,000 psi or 12K3 min size with a max tensile stress of 24,000 psi.

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).

A. In lieu of Item 1, 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).

B. **Metal Roof Deck Panels (Not shown)** — In addition to or in lieu of Item 1 or 1A, the roof covering may consist of a mechanically fastened metal roof deck panel assembly. See Fire Resistance Directory — Metal Roof Deck Panels (CETW).

3. **Roof Insulation** —

A. **Mineral and Fiber Boards*** — To be applied in one or more layers with or without adhesive applied between vapor barrier and roof deck units, vapor barrier and board, and each layer of board. When more than one layer is required, each layer of board to be offset in both directions from layer below a min of 6 in. in order to lap all joints. Min thickness is 2 in. when Item 1A or 1B is used. Min thickness is 1 in. otherwise.

GAF — GAFTMP Perlite.

JOHNS MANVILLE

ROCKWOOL — MonoBoard™, MonoBoard™ Plus, "MonoBoard Plus S", TopRock® DD, TopRock® DD Plus or TopRock DD Plus S.

SOPREMA INC — SopraRock® DD and SopraRock® DD Plus.

B. Gypsum Board — (Classified or Unclassified, not shown) 5/8 in. thick gypsum wall board min weight 2.0 psf may be used to obtain various Unrestrained and Restrained Assembly Ratings as described in Item 6. Installed perpendicular to the steel roof deck with joints staggered and occurring over the crests of the roof deck. Secured to the roof deck with adhesive (Item 3) or with asphalt applied to a min of 50 percent of the crest surface at a rate of 12 to 16 lb per 100 sq ft or with mechanical fasteners. If mechanical fasteners are used the end of the fastener shall be covered with a min 1/2 in. of Spray-Applied Fire Resistive Materials.

4. Adhesive* — Optional — Adhesive may be used to attach each layer of roof insulation. The adhesive may be applied in 1/2 in. wide ribbons approximately 6 in. O.C. at 0.4 gal per 100 sq ft. In lieu of adhesive, the first layer of roof insulation may be secured with asphalt applied to a min of 50 percent of the crests 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.

5. Sheathing Material* — Optional. Vinyl film or paper scrim vapor barrier applied with adhesive or laid loosely on the steel roof deck overlapped approximately 2 in. at sides.

5A. Sheathing Material* — (Optional) — A self-adhered rubberized asphalt roofing underlayment membrane which may be placed on top of the gypsum wallboard (Item 2B) or on roof insulation (Item 2 or any nonpolystyrene foamed plastic insulation covered as an alternate to Item 2).

GCP APPLIED TECHNOLOGIES INC — Grace Ice & Water Shield

6. Steel Roof Deck — (Unclassified) Min 1-1/2 in. deep, 18 in. wide, galvanized fluted steel deck. Flutes 6 in. O.C., crest width ranging from 3-1/2 to 5 in. min gauge is No. 22 MSG. Ends over lapped at supports min 1-1/2 in. and welded to supports approximately 12 in. O.C. Adjacent units button-punched or welded together 36 in. O.C. along side joints. **Classified Steel Floor and Form Units*** — Noncomposite 1-1/2 in. deep and 18 in. wide, galvanized fluted steel deck. Min gauge is No. 22 MSG. Ends overlapped at supports minimum 1-1/2 in. and welded to supports min 12 in. O.C. Adjacent units button-punched or welded together a midspan along side joints.

ASC STEEL DECK, DIV OF ASC PROFILES L L C — Types BH-36, BHN-36, BHN-35-1/4, DGB-36, B-36, BN-36, BN-35-1/4, NH-32, NHN-32, DGN-32, N-32 and NN-32. All units may be galvanized or Prime Shield™.

CANAM GROUP INC — Type P-3606 or P-3615; 36 in. wide Types 1.5B, 1.5BI

CANAM STEEL CORP — Type P-3606 or P-3615

CANAM STEEL CORP — Type N

MARLYN STEEL DECKS INC — Types B, F, N, NV.

NEW MILLENNIUM BUILDING SYSTEMS L L C — 18 to 36 in. wide Types B, BD, BI, F, FD, N, ND, NW32, and NW32I. Units may be phos/painted or galvanized.

ROOF DECK INC — Type A, B-1, B-2 or F

VERCO DECKING INC - A NUCOR CO — Deck types PLB, HSB, PLN3, HSN3, PLN, N; FORMLOK™ deck types PLB, B, PLN3, N3, PLN, N. Units may be galvanized or phos./ptd.

VULCRAFT, DIV OF NUCOR CORP — Types 1.5B, 1.5BI, 1.5PLB, 1.5F, 3N, 3NI, 3.0PLN, 3NL-32, 3NI-32, 3PLN-32. Units may be ptd/ptd; Types BW, B High Strength, BW High Strength, N. Units may be ptd/ptd.

7. **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 above illustration 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. Min average and min ind density of 15/14 pcf, respectively. For method of density determination, refer to Design Information Section.

Unrestrained

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Beam Rating Hr	On Deck w/ gypsum wallboard	wo/ gypsum wallboard	on Beam
1	3/4	1	7/8	7/8	9/16
1	1	1	1-3/16	1-1/4	9/16
1-1/2	1-1/2	1-1/2	1-3/16	1-5/8	7/8
2	2	2	1-7/16	2-1/4	1-1/8

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	3/4	1	1-1/8	15/16	NR	NR
1	1	1	1-1/8	15/16	15/16	15/16
1-1/2	1-1/2	1-1/2	1-5/8	1-7/16	1-1/2	1-3/8
2	2	2	2-3/16	1-7/8	2-1/16	1-7/8

ARABIAN VERMICULITE INDUSTRIES — Types MK-6/CBF, MK-6/ED, MK-6/HY -6s.

GCP KOREA INC — Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6S.

GCP APPLIED TECHNOLOGIES INC — Types MK-6/HY, MK-6S, RG.

7A. **Alternate 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 table below to steel beam surfaces which must be clean and free of dirt, loose scale and oil. When Type Z-106/G is used, the 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 avg and min ind density of 22/19 pcf, respectively. For method of density determination, refer to Design Information Section.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Beam Rating Hr	On Deck w/ gypsum wallboard	wo/ gypsum wallboard	on Beam
1	3/4	1	7/8	7/8	9/16

1	1	1	1-3/16	1-1/4	9/16
1-1/2	1-1/2	1-1/2	1-3/16	1-5/8	7/8
2	2	2	1-7/16	2-1/4	1-1/8

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	3/4	1	1-1/8	15/16	NR	NR
1	1	1	1-1/8	15/16	15/16	15/16
1-1/2	1-1/2	1-1/2	1-5/8	1-7/16	1-1/2	1-3/8
2	2	2	2-3/16	1-7/8	2-1/16	1-7/8

ARABIAN VERMICULITE INDUSTRIES — Types Z-106, Z-106/G, Z-106/HY.

GCP KOREA INC — Types Z-106, Z-106/G, Z-106/HY.

GCP APPLIED TECHNOLOGIES INC — Types Z-106, Z-106/G, Z-106/HY.

7B. 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 8. 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 Deck		
			w/ gypsum wallboard	wo/ gypsum wallboard	on Beam
1	3/4	1	7/8	7/8	9/16
1	1	1	1-3/16	1-1/4	9/16
1-1/2	1-1/2	1-1/2	1-3/16	1-5/8	7/8
2	2	2	1-7/16	2-1/4	1-1/8

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	3/4	1	1-1/8	15/16	NR	NR

1	1	1	1-1/8	15/16	15/16	15/16
1-1/2	1-1/2	1-1/2	1-5/8	1-7/16	1-1/2	1-3/8
2	2	2	2-3/16	1-7/8	2-1/16	1-7/8

ARABIAN VERMICULITE INDUSTRIES — Type Z-146

GCP KOREA INC — Type Z-146

GCP APPLIED TECHNOLOGIES INC — Types Z-146, Z-146T, Z146PC, Z-156, Z-156T and Z-156PC

7C. **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 -6s see Item 7; Types Z-106, Z-106/G, Z-106/HY see Item 7A; Type Z-146 see Item 7B.

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	1-1/2	1-3/8
2	2	2-1/16	1-7/8

**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 -6s, Z-106, Z-106/G, Z-106/HY, Z-146.

GCP KOREA INC — Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6S, Z-106, Z-106/G, Z-106/HY, Z-146.

GCP APPLIED TECHNOLOGIES INC — Types MK-6/HY, MK-6S, RG, Z-106, Z-106/G, Z-106/HY, Z-146.

8. **Metal Lath** — (Not Shown) — (Required with Spray-Applied Materials identified in Item 7B, otherwise optional) — Metal lath shall be 3/8 in. expanded diamond mesh, weighing 3.4 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.

8A. **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). The optional use of 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 galvanized steel wire at joist web and bottom chord members, spaced 15 in. OC. max. In this application, the metal lath is to be fully covered with Spray-Applied Fire Resistive Materials with no min thickness required.

8B. **Non-Metallic Fabric Mesh** — (Optional, not shown) — As an alternate to the optional use of metal lath, glass fiber fabric mesh, weighing approximately 2.5 oz per sq yd, polypropylene fabric mesh weighing approximately 1.25 oz per 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. O.C. 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.

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

Last Updated on 2021-05-19

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