



# BXUV.P733

## 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. P733

March 11, 2020

**Restrained Assembly Rating — 1, 1-1/2, 2, or 3 Hr (See Item 3A)**

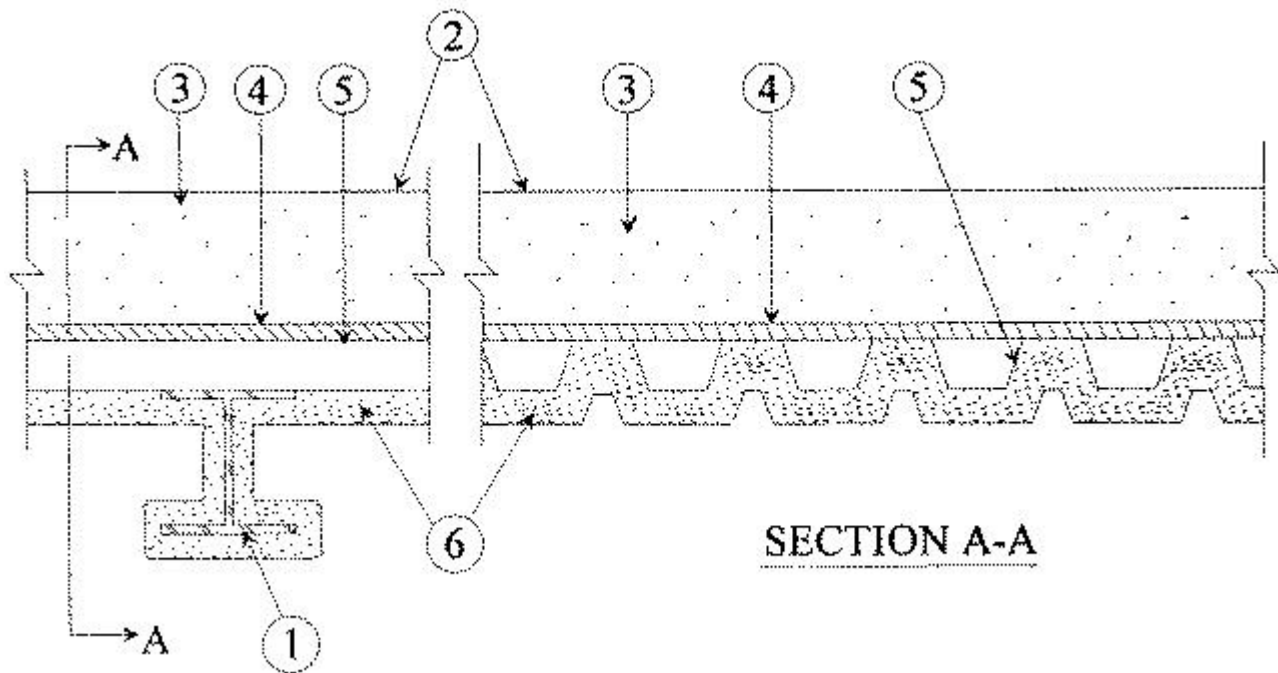
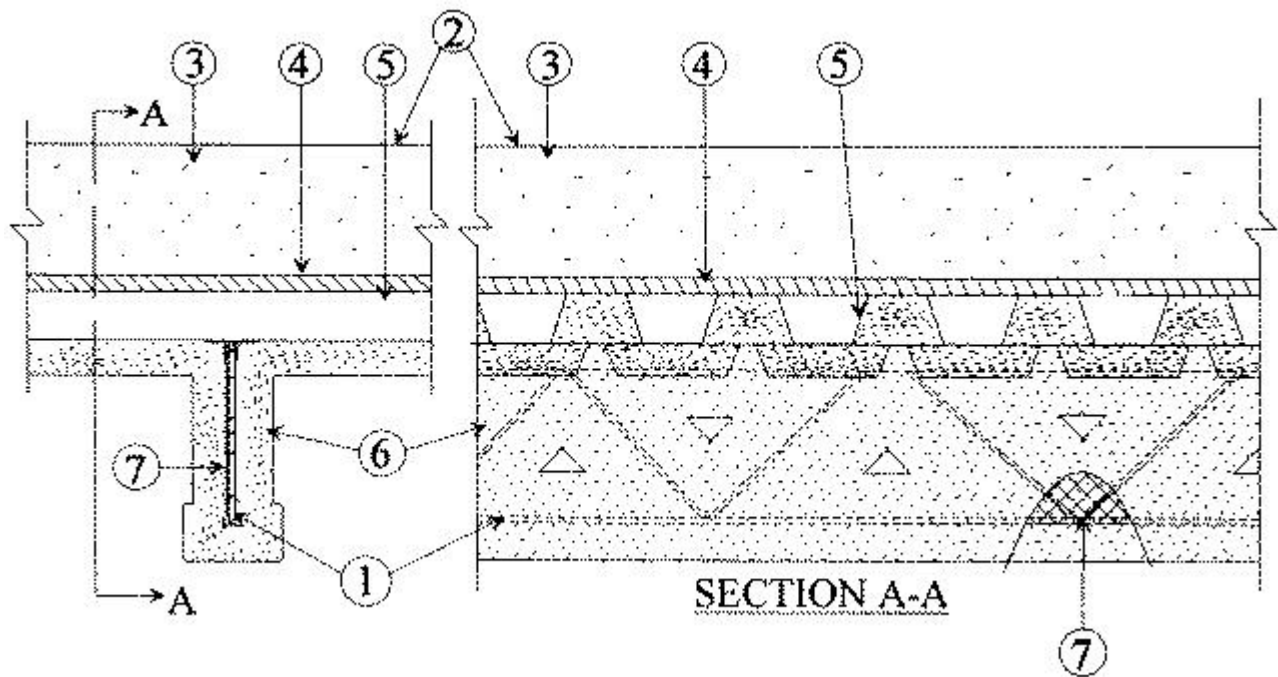
**Unrestrained Assembly Rating — 1, 1-1/2, 2, or 3 Hr (See Item 3A)**

**Unrestrained Beam Rating — 1, 1-1/2, 2, or 3 Hr**

**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.**

**Load Restriction — See Items 1A and 6C**



**1. Steel Supports** — W6x16 steel beam (min size) or 10K1 steel joist, (min size) having the following properties: Top chords consisting of two 1-1/4 by 1-1/4 by 0.135 in. thick steel angles; Lower chord consisting of two 1 by 1 by 0.113 in. thick steel angles; Bearing plates consisting of two 1-1/4 by 1-1/4 by 0.134 in. thick steel angles, 8 in. in length; Diagonal web members consisting of 0.561 in. diam steel rods.

1A. As an alternate to Item 1, 16K2 steel joints min size with a max tensile stress of 30,000 psi or 12K3 or 12KS min size with a max tensile stress of 24,000 psi.

1B. **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 as the joist(s) — See Item 6.

**2. Roof Covering\*** — Consists of cold application, fluid applied roof coating 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 — Foamed Plastic\*** — Polyurethane foamed plastic roof insulation. Formed by the simultaneous spraying of two liquid components applied over the gypsum wallboard at a nom thickness of 1 to 5 in. in accordance with the manufacturer's instructions, unless stated otherwise below

**CARLISLE ROOF FOAM AND COATINGS** — Types SW-200, PSI-S245-25/30, "Bayseal 2.5," "Bayseal 2.7," "Premiseal 281," "Bayseal 3.0," or "Premiseal 301 may be applied at a nom thickness of 1 to 5 in. UCSC "Durazone SFC II," Bayseal 2.4," or "Bayseal 2.7P" may be applied at a nom thickness of 1 to 10 in.

**BASF CORP** — Types FE348-2.5, FE348-2.8, FE348-3.0, ELASTOSPRAY 81255, ELASTOSPRAY 81285, ELASTOSPRAY 81305, SKYTITE C1. All products except Type 303 2.7 may be applied at a nom thickness of 1 to 10 in.

**BASF CORP** — Elastospray 5100-2.0, Elastospray 5100-2.5, Elastospray 81302, Elastospray 81272, Elastospray Alpha System, Elastospray 81252

**HENRY COMPANY L L C** — Type RT-2031, RT-2035

**NCFI POLYURETHANES** — Types 591, 692, 10-001

**SWD URETHANE CO** — Type SWD525b

**3A. Roof Insulation — Foamed Plastic\*** — Polyurethane foamed plastic roof insulation. Formed by the simultaneous spraying of two liquid components applied over the gypsum wallboard at a nom thickness of 1 to 5 in. in accordance with the manufacturer's instructions. The Rating is only applicable to Restrained and Unrestrained Assembly Ratings of 2 Hr. when 2-1/2" of Spray-Applied Fire Resistive Materials are applied to the deck (Item 6).

**LAPOLLA INDUSTRIES INC** — TYPE LPA2500H, LPA2800H, LPA3000H, LPA2500, LPA2800, LPA3000

**4. Gypsum Board\*** — **Any 5/8 in. thick UL Classified Gypsum Board that is eligible for use in Design Nos. L501, G512 or U305.** Nom. 5/8 in. thick, supplied in 4 ft wide sheets. Min weight 2.2 psf. Installed perpendicular to steel roof deck with all joints tightly butted and end joints staggered and offset from steel roof deck side lap joints.

**CABOT MANUFACTURING ULC** (View Classification) — CKNX.R25370

**AMERICAN GYPSUM CO** (View Classification) — CKNX.R14196

**BEIJING NEW BUILDING MATERIALS PUBLIC LTD CO** (View Classification) — CKNX.R19374

**CERTAINTED GYPSUM INC** (View Classification) — CKNX.R3660

**CGC INC** (View Classification) — CKNX.R19751

**CONTINENTAL BUILDING PRODUCTS OPERATING CO, L L C** (View Classification) — CKNX.R18482

**GEORGIA-PACIFIC GYPSUM L L C** (View Classification) — CKNX.R2717

**LOADMASTER SYSTEMS INC** (View Classification) — CKNX.R11809

**NATIONAL GYPSUM CO** (View Classification) — CKNX.R3501

**PABCO BUILDING PRODUCTS L L C, DBA PABCO GYPSUM** (View Classification) — CKNX.R7094

**PANEL REY S A** (View Classification) — CKNX.R21796

**SIAM GYPSUM INDUSTRY (SARABURI) CO LTD** (View Classification) — CKNX.R19262

**THAI GYPSUM PRODUCTS PCL** (View Classification) — CKNX.R27517

**UNITED STATES GYPSUM CO** (View Classification) — CKNX.R1319

**USG BORAL DRYWALL SFZ LLC** (View Classification) — CKNX.R38438

**USG MEXICO S A DE C V** (View Classification) — CKNX.R16089

5. **Steel Roof Deck** — Unclassified — Min 36 in. wide, 1-1/2 in. deep, galv fluted steel deck. Min gauge is 22 MSG. Flutes approx 6 in. OC, crests approx 3-1/2 in. wide, valleys approx 1-1/2 in. wide. Welded to supports 12 in. OC. Adjacent units welded 18 in. OC along side lap joints or mechanically fastened with Type S-10 1/2 in. long steel screws 18 in. OC. **Classified Steel Floor and Form Units\*** — Noncomposite, 1-1/2 in. deep, galv units, min gauge is 22 MSG. Welded to supports with welding washers 12 in. OC. Side lap joints of adjacent units welded or secured together with No. 12 by 1/2 in. Self-drilling, Self-tapping steel screws midway between steel joists.

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

**NEW MILLENNIUM BUILDING SYSTEMS L L C** — 36 in. wide Types B, BI. Units may be phos/painted or galvanized.

6. **Spray-Applied Fire Resistive Materials\*** — Applied by mixing with water and spraying in more than one coat to a final thickness as shown above and on the table below, to steel 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 method of density determination, refer to Design Information Section.

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	on Deck	on Beam
1	1	1	1-1/2	3/4
1-1/2	1-1/2	1-1/2	1-11/16	7/8
2	2	2	2-1/2	1-1/8
3	2*	3	2-1/2	1-1/2

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

3	3	3-1/4	2-13/16	3-1/4	2-13/16
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**ARABIAN VERMICULITE INDUSTRIES** — Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6/HB, MK-6s, MK-10 HB, MK-10 HB Extended Set.

**GCP KOREA INC** — Types MK-6/ED, MK-6/CBF, MK-6/HY, MK-6/HB, MK-6S, MK-10 HB, MK-10 HB Extended Set.

**GCP APPLIED TECHNOLOGIES INC** — Types MK-6/HY, MK-6/HB, MK-6S, MK-10 HB, MK-10 HB Extended Set, RG.

6A. **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 tables 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 beam's 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.

<b>Restrained Assembly Rating Hr</b>	<b>Unrestrained Assembly Rating Hr</b>	<b>Unrestrained Beam Rating Hr</b>	<b>on Deck</b>	<b>on Beam</b>
1	1	1	1-1/2	3/4
1-1/2	1-1/2	1-1/2	1-11/16	7/8
2	2	2	2-1/8	1-1/8

<b>Restrained &amp; Unrestrained Assembly Rating Hr</b>	<b>Unrestrained Beam Rating Hr</b>	<b>Joist thickness</b>			
		<b>10K1 more than 4 ft OC</b>	<b>10K1 less than 4 ft OC</b>	<b>16K2 more than 4 ft OC</b>	<b>16K2 less than 4 ft OC</b>
1	1	1-1/8	1	15/16	15/16
1-1/2	1-1/2	1-5/8	1-7/16	1-1/2	1-3/8
2	2	1-3/16	1-15/16	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.

6B. **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 7). 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.

<b>Restrained Assembly Rating Hr</b>	<b>Unrestrained Assembly Rating Hr</b>	<b>Unrestrained Beam Rating Hr</b>	<b>on Deck</b>	<b>on Beam</b>
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1	1	1	1-1/2	3/4
1-1/2	1-1/2	1-1/2	1-11/16	7/8
2	2	2	2-1/8	1-1/8

<b>Restrained &amp; Unrestrained Assembly Rating Hr</b>		<b>Joist thickness</b>			
<b>Unrestrained Beam Rating Hr</b>	<b>Unrestrained Beam Rating Hr</b>	<b>10K1 more than 4 ft OC</b>	<b>10K1 less than 4 ft OC</b>	<b>16K2 more than 4 ft OC</b>	<b>16K2 less than 4 ft OC</b>
1	1	1-1/8	1	15/16	15/16
1-1/2	1-1/2	1-5/8	1-7/16	1-1/2	1-3/8
2	2	1-3/16	1-15/16	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.

6C. **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/HB, MK-6s, MK-10 HB, MK-10 HB Extended Set see Item 6; Types Z-106, Z-106/G, Z-106/HY see Item 6A; Type Z-146 see Item 6B.

<b>Restrained &amp; Unrestrained Assembly Rating Hr</b>		<b>Joist thickness</b>		
<b>Unrestrained Beam Rating Hr</b>	<b>Unrestrained Beam Rating Hr</b>	<b>12K3** more than 4 ft OC</b>	<b>12K3** less than 4 ft OC</b>	<b>12K5**</b>
1	1	15/16	15/16	15/16
1-1/2	1-1/2	1-1/2	1-3/8	1-1/2
2	2	2-1/16	1-7/8	2-1/16
3	3	—	—	3-1/16

\*\* 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/HB, MK-6s, MK-10 HB, MK-10 HB Extended Set, Z-106, Z-106/G, Z-106/HY, Z-146.

**GCP KOREA INC** — Types MK-6/ED, MK-6/CBF, MK-6/HY, MK-6/HB, MK-6S, MK-10 HB, MK-10 HB Extended Set, Z-106, Z-106/G, Z-106/HY, Z-146.

**GCP APPLIED TECHNOLOGIES INC** — Types MK-6/HY, MK-6/HB, MK-6S, MK-10 HB, MK-10 HB Extended Set, Z-106, Z-106/G, Z-106/HY, Z-146.

7. **Metal Lath** — 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.

7A. **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) - Metal lath may be used to facilitate the spray application of Spray-Applied Fire Resistive Materials on steel bar joist 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 joist web and bottom chord members spaced 15 in. OC max. When used, the metal lath is to be fully covered with Spray-Applied Fire Resistive.

**\* 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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