



BXUV.S728

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. S728

June 19, 2014

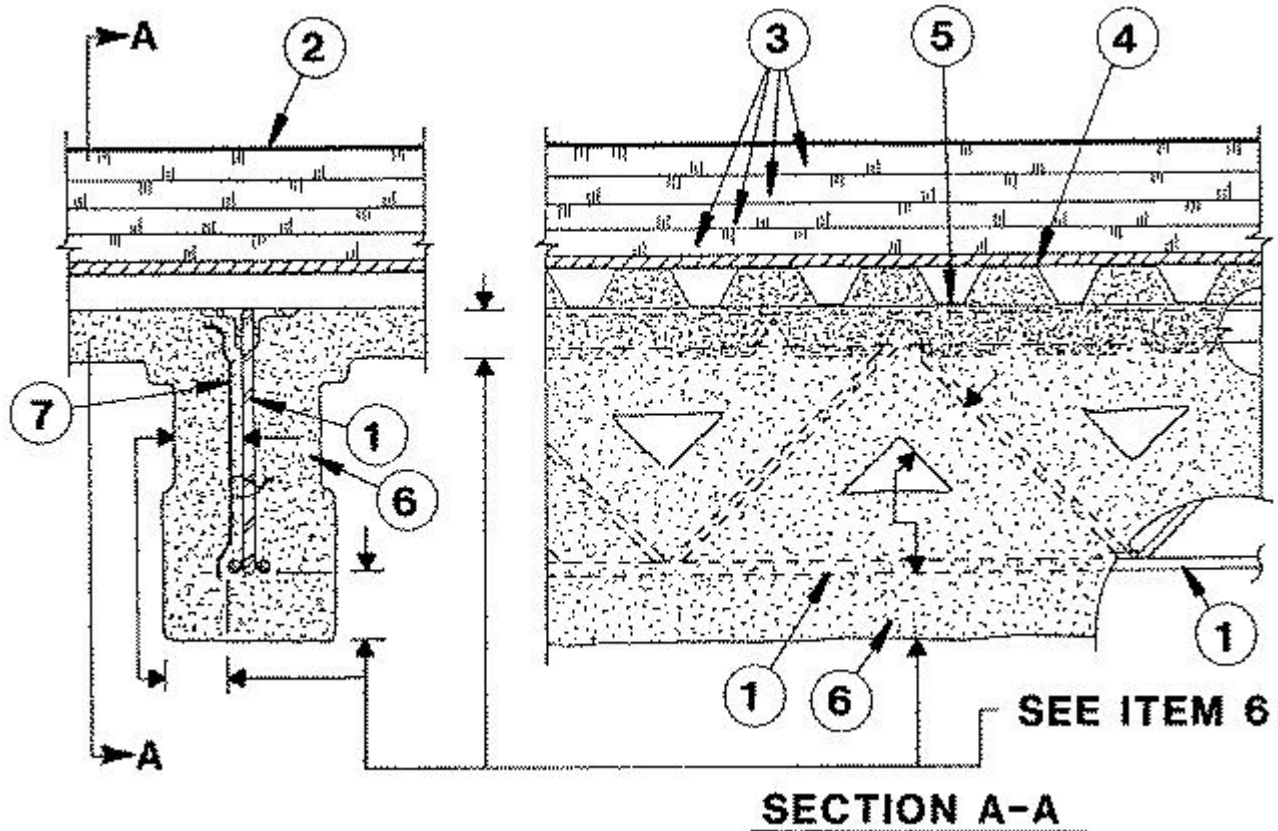
Restrained Beam Rating — 1, 1-1/2, 2 and 3 h (See Item 6)

Unrestrained Beam Rating — 1, 1-1/2, 2 and 3 h (See Item 6)

Restricted Load Condition — See Items 1 and 6B

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. **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 cold application or single-ply 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*** — Polyisocyanurate foam insulation boards installed in one or more layer over the gypsum wallboard min thickness 1 in. with no max thickness. See Foamed Plastic* (CCVW) Category.
4. **Gypsum Board (Optional)** — Min 5/8 in. thick gypsum board supplied in 4 ft wide sheets. Installed perpendicular to the steel roof deck with joints staggered and occurring over the crests of the roof deck. Any UL Classified Gypsum Board that is eligible for use in Design Nos. L501, G512 or U305. See **Gypsum Board** (CKNX) category for names of Classified companies.
5. **Steel Roof Deck(Unclassified)** — Fluted, 24 MSG, galv, 1-1/2 in. deep with crests approximately 3-1/2 in. wide space 6 in. OC. Ends butted at the supports and welded max 12 in. OC. Adjacent units welded, button punched, or screwed together 36 in. OC max.
6. **Spray-Applied Fire Resistive Materials*** — Applied by mixing with water and spraying to the joist and deck surfaces in one or more coats to final min thickness shown below. Crest areas above the joist shall be filled with the Spray-Applied Fire Resistive Materials. Surfaces must be clean and free of dirt, oil and loose scale. Steel deck surfaces must be "spatter" coated with Type SK-III Spray-Applied Fire Resistive Materials prior to application of Spray-Applied Fire Resistive Materials. Type SK-III Spray-Applied Fire Resistive Materials applied in accordance with the manufacturer's application instructions. Min average and min individual density application instructions. Min average and min individual density of 15/14 pcf respectively. Min average and min individual density of 22/19 pcf respectively for Type Z-106 and Z-106/G. Min average and min individual density of 40/36 pcf respectively for Type Z-146. For method of density determination, see Design Information Section Thickness of the Spattercoat is included in the total final thickness of the protection material.

Unrestrained Thickness (in.)

Beam Rating	on Steel Deck	10K1 more than 4ft OC	10K1 4ft or less OC	16K2 more than 4ft OC	16K2 4ft or less OC
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1 hr	7/8	1 1/8	1	15/16	15/16
1 1/2 hr	1 3/8	1 5/8	1 7/16	1 1/2	1 3/8
2Hr	1 5/8	2 3/16	1 7/8	2 1/16	1 7/8
3 Hr	1 5/8	3 1/4	2 13/16	3 1/4	2 13/16

Restrained Thickness (in.)

Beam Rating	on Steel Deck	10K1 more than 4ft OC	10K1 4ft or less OC	16K2 more than 4ft OC	16K2 4ft or less OC
1 hr	7/8	1 1/8	1	15/16	15/16
1 1/2 hr	1 3/8	1 5/16	1 5/16	1 5/16	1 5/16
2Hr	1 5/8	1 7/16	1 7/16	1 7/16	1 7/16
3 Hr	1 5/8	3 1/4	2 13/16	3 1/4	2 13/16

ARABIAN Vermiculite Industries — Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6/HB, MK-10 HB, MK-10 HB Extended Set, MK-6s, MK-1000/HB, MK-1000/HB Extended Set, Z-106, Z-106/G, Z-146 investigated for exterior use.

GCP Korea Inc — Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6/HB, MK-10 HB, MK-10 HB Extended Set, MK-6s, MK-1000/HB, MK-1000/HB Extended Set, Z-106, Z-106/G, Z-146 investigated for exterior use.

GCP Applied Technologies Inc — Types MK-6/HY, MK-6/HB, MK-10 HB, MK-10 HB Extended Set, MK-6s, MK-1000/HB, MK-1000/HB Extended Set, RG, Z-106, Z-106/G, Z-146, investigated for exterior use.

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. Crest areas above the beam shall be filled with Spray-Applied Fire Resistive Materials. Min avg and min ind density of 22/19 pcf, respectively. For method of density determination, refer to Design Information Section.

Unrestrained Thickness (in.)

Beam Rating	on Steel Deck	10K1 more than 4ft OC	10K1 4ft or less OC	16K2 more than 4ft OC	16K2 4ft or less OC
1 hr	7/8	13/16	13/16	13/16	13/16
1 1/2 hr	1 3/8	1 3/16	1 3/16	1 3/16	1 3/16
2 hr	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8
3 hr	1 5/8	3 1/4	2 13/16	3 1/4	2 13/16

Restrained Thickness (in.)

Beam Rating	on Steel Deck	10K1 more than 4ft OC	10K1 4ft or less OC	16K2 more than 4ft OC	16K2 4ft or less OC
1 hr	7/8	13/16	13/16	13/16	13/16
1 1/2 hr	1 3/8	1 3/16	1 3/16	1 3/16	1 3/16
2Hr	1 5/8	1 7/16	1 7/16	1 7/16	1 7/16

3 Hr	1 5/8	3 1/4	2 13/16	3 1/4	2 13/16
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ARABIAN VERMICULITE INDUSTRIES — Type Z-106/HY.

GCP KOREA INC — Type Z-106/HY.

GCP APPLIED TECHNOLOGIES INC — Type Z-106/HY.

6B. 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 min and max density of: Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6/HB, MK-10 HB, MK-10 HB Extended Set, MK-6s, MK-6 GF, MK-6 GF Extended Set, Z-106, Z-106/G, Z-146, MK-1000/HB, MK-1000/HB Extended Set investigated for exterior use see Item 6; Type Z-106/HY see Item 6A.

Restrained & Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Joist thickness		
		12K3** more than 4 ft OC	12K3** less than 4 ft OC	12K5**
1	1	15/16	15/16	NR
1-1/2	1-1/2	1-1/2	1-3/8	NR
2	2	2-1/16	1-7/8	NR
3	3	3-1/4	2-13/16	3-1/16

**Design load shall stress the 12K3 joist to a max tensile strength of 24,000 psi, which represents 80% of the max 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-10 HB, MK-10 HB Extended Set, MK-6s, MK-6 GF, MK-6 GF Extended Set, MK-1000/HB, MK-1000/HB Extended Set, Z-146 investigated for exterior use, Z-106, Z-106/G, Z-106/HY.

GCP KOREA INC — Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6/HB, MK-10 HB, MK-10 HB Extended Set, MK-6s, MK-6 GF, MK-6 GF Extended Set, MK-1000/HB, MK-1000/HB Extended Set, Z-146 investigated for exterior use, Z-106, Z-106/G, Z-106/HY.

GCP APPLIED TECHNOLOGIES INC — Types MK-6/HY, MK-6/HB, MK-10 HB, MK-10 HB Extended Set, MK-6s, MK-6 GF, MK-6 GF Extended Set, MK-1000/HB, MK-1000/HB Extended Set, RG, Z-146, investigated for exterior use, Z-106, Z-106/G, Z-106/HY.

6C. Spray-Applied Fire Resistive Materials* — Applied by mixing with water and spraying to the joist and deck surfaces in one or more coats to final min thickness shown below. Crest areas above the joist shall be filled with the Spray-Applied Fire Resistive Materials. Surfaces must be clean and free of dirt, oil and loose scale. Steel deck surfaces must be "spatter" coated with Type SK-III Spray-Applied Fire Resistive Materials prior to application of Spray-Applied Fire Resistive Materials. Type SK-III Spray-Applied Fire Resistive Materials applied in accordance with the manufacturer's application instructions. Min average and min individual density application instructions. Min average and min individual density of 15/14 pcf respectively. For method of density determination, see Design Information Section Thickness of the Spattercoat is included in the total final thickness of the protection material.

Unrestrained Thickness (in.)					
Beam Rating	on Steel Deck	10K1 more than 4ft OC	10K1 4ft or less OC	16K2 more than 4ft OC	16K2 4ft or less OC

1 hr	7/8	7/8	7/8	7/8	7/8
1 1/2 hr	1 3/8	1 7/16	1 7/16	1 7/16	1 3/8
2Hr	1 5/8	1 15/16	1 7/8	1 15/16	1 7/8
3 Hr	1 5/8	3 1/4	2 13/16	3 1/4	2 13/16

Restrained Thickness (in.)

Beam Rating	on Steel Deck	10K1 more than 4ft OC	10K1 4ft or less OC	16K2 more than 4ft OC	16K2 4ft or less OC
1 hr	7/8	7/8	7/8	7/8	7/8
1 1/2 hr	1 3/8	1 5/16	1 5/16	1 5/16	1 5/16
2Hr	1 5/8	1 7/16	1 7/16	1 7/16	1 7/16
3 Hr	1 5/8	3 1/4	2 13/16	3 1/4	2 13/16

ARABIAN Vermiculite Industries — Type MK-6 GF, MK-6 GF Extended Set investigated for exterior use.

GCP Korea Inc — Type MK-6 GF, MK-6 GF Extended Set investigated for exterior use.

GCP Applied Technologies Inc — Type MK-6 GF, MK-6 GF Extended Set investigated for exterior use.

7. Metal Lath — (Not Shown) — (Required on both sides of joists with Z-146, otherwise optional) — Metal lath is used 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 square yard, is secured to one side of 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 Materials with no min thickness requirements.

7A. Non-Metallic Fabric Mesh (Optional) — As an alternate 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, is 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. As acceptable method to attach the mesh is by embedding the mesh in min 1/4 in. long bead 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.

*** 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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