UL Product iQ™

BXUV.J712

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. J712

October 30, 2019

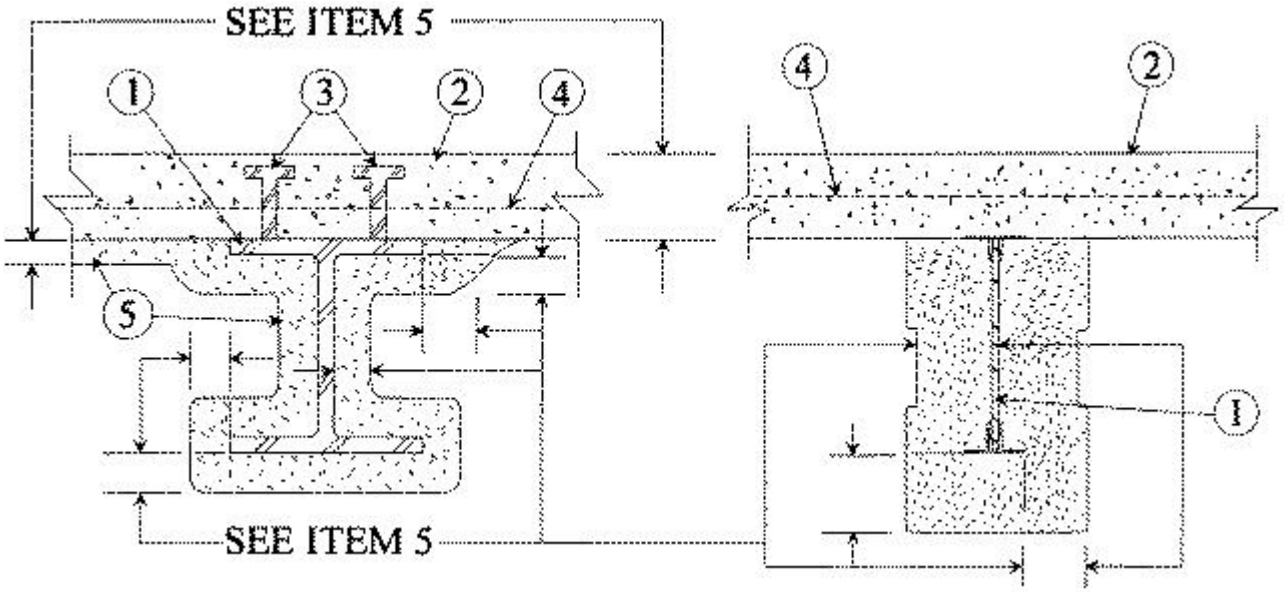
Restrained Assembly Ratings — 1-1/2, 2, 3 or 4 Hr (See Item 5)

Unrestrained Assembly Ratings — 1-1/2, 2, 3 or 4 Hr (See Item 5)

Unrestrained Beam Ratings — 1-1/2, 2, 3 or 4 Hr (See Item 5)

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 Supports —** W8x28 steel beam min size or steel joists 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. **Normal Weight Concrete —** Normal weight concrete, carbonate or siliceous aggregate, 145 + or - 3 pcf unit weight, 3500 psi compressive strength, vibrated. Thickness of the slab shall vary according to the Restrained and/or Unrestrained Assembly Rating, the type of aggregate, and the thickness of the Spray-Applied Fire Resistive Materials protection of the bottom of the slab as shown in Item 5. For ratings up to 2 h, the min concrete cover shall be 3/4 in. For the 3 and 4 h ratings, the min concrete cover shall be 1 in.

3. **Shear Connector — (Optional) —** Studs 3/4 in. in diam headed type or equivalent per AISC specifications. Welded to top flange of beam.

4. **Reinforcing Steel —** (Not shown) — Min No. 3 (3/8 in. diam) deformed bars. Min areas of reinforcing steel must be provided in accordance with the latest (ACI) Specifications.

5. **Spray-Applied Fire Resistive Materials* —** See table below for appropriate thicknesses. Prepared by mixing with water and spray-applied in one or more coats to beam surfaces or to bottom of slab which must be clean and free of dirt, loose scale and oil. Min avg and min ind densities of 15/14 pcf respectively for Types MK-6/ED, MK-6/CBF, MK-6 GF, MK-6/HY, MK-6/HB, MK-6S, MK-10 HB, MK-10 HB Extended Set and RG.For method of density determination, see Design Information Section, Sprayed Material.

Slab Thkns In		Spray Applied Fire Resistive Mtl Thkns on Slab In. Restrained or Unrestrained Assembly Rating Hr				
Carbonate Aggregate	Siliceous Aggregate	1	1-1/2	2	3	4
2-1/2	2-1/2	9/16	5/8	15/16	1-1/4	—
2-3/4	3	—	9/16	11/16	1-1/8	1-1/2
3	3-1/2	—	—	9/16	1	1-3/8
3-1/4	3-3/4	—	—	1/2	15/16	1-1/4
4	4-1/2	—	—	—	1/2	15/16
5	5-1/2	—	—	—	—	1/2

Beam Thickness

Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	full flange	1/2 flange##
1, 1-1/2 or 2	1	1	7/16	7/16+
1-1/2, 2 or 3	1-1/2	1-1/2	3/4	3/4
2, 3 or 4	2	2	1	1
3 or 4	3	3	1-5/16	1-9/16
4	4	4	1-5/8	2-1/16

##The thickness of Spray-Applied Fire Resistive Materials shown are applicable when the thickness applied to the beams's lower flange edges are reduced to one-half that shown in the table.

+Thickness applied to beam's lower flange shall be a min of 1/4 in.

			Joist thickness			
Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	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	15/16	15/16	15/16
1-1/2	1	1	1-5/16	1-5/16	1-1/2	1-3/8
1-1/2	1-1/2	1-1/2	1-5/8	1-7/16	1-1/2	1-3/8
2	1	1	1-7/16	1-7/16	2-1/16	1-7/8
2	2	2	2-3/16	1-7/8	2-1/16	1-7/8
3	3	3	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-6s, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set.

GCP KOREA INC — Types MK-6/CBF, MK-6/ED, MK-6 GF, MK-6/HY, MK-6/HB, MK-6S, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set.

GCP APPLIED TECHNOLOGIES INC — Types MK-6 GF, MK-6/HY, MK-6/HB, MK-6S, MK-10 HB, MK-10 HB Extended Set, MK-1000/HB, MK-1000/HB Extended Set, RG.

5A. **Alternate Spray-Applied Fire Resistive Materials* —** See table below for appropriate thicknesses. Prepared by mixing with water and spray-applied in one or more coats to beam surfaces or to bottom of slab which must be clean and free of dirt, loose scale and oil. Min avg and min ind densities of 22/19 pcf respectively. For method of density determination, see Design Information Section, Sprayed Material.

Slab Thkns In		Spray Applied Fire Resistive Mtl Thkns on Slab In. Restrained or Unrestrained Assembly Rating Hr				
Carbonate Aggregate	Siliceous Aggregate	1	1-1/2	2	3	4
2-1/2	2-1/2	9/16	5/8	15/16	1-1/4	—

2-3/4	3	—	9/16	11/16	1-1/8	1-1/2
3	3-1/2	—	—	9/16	1	1-3/8
3-1/4	3-3/4	—	—	1/2	15/16	1-1/4
4	4-1/2	—	—	—	1/2	15/16
5	5-1/2	—	—	—	—	1/2

			Beam Thickness	
Restrained Assembly Rating Hr	**Unrestrained Assembly Rating Hr**	**Unrestrained Beam Rating Hr**	**full flange**	**1/2 flange##**
1, 1-1/2 or 2	1	1	7/16	7/16+
1-1/2, 2 or 3	1-1/2	1-1/2	3/4	3/4
2, 3 or 4	2	2	1	1
3 or 4	3	3	1-5/16	1-9/16
4	4	4	1-5/8	2-1/16

##The thickness of Spray-Applied Fire Resistive Materials shown are applicable when the thickness applied to the beam's lower flange edges are reduced to one-half that shown in the table.

+Thickness applied to beam's lower flange shall be a min of 1/4 in.

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	15/16	15/16	15/16
1-1/2	1	1	1-5/16	1-5/16	1-1/2	1-3/8
1-1/2	1-1/2	1-1/2	1-5/8	1-7/16	1-1/2	1-3/8
2	1	1	1-7/16	1-7/16	2-1/16	1-7/8
2	2	2	2-3/16	1-7/8	2-1/16	1-7/8
3	3	3	3-1/4	2-13/16	3-1/4	2-13/16

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.

5B. **Alternate Spray-Applied Fire Resistive Materials* —** See table below for appropriate thicknesses. Prepared by mixing with water and spray-applied in one or more coats to beam surfaces or to bottom of slab which must be clean and free of dirt, loose scale and oil. Min avg and min ind densities 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, see Design Information Section Sprayed Material.

Slab Thkns In		Spray Applied Fire Resistive Mtl Thkns on Slab In. Restrained or Unrestrained Assembly Rating Hr				
Carbonate Aggregate	Siliceous Aggregate	1	1-1/2	2	3	4
2-1/2	2-1/2	9/16	5/8	15/16	1-1/4	—
2-3/4	3	—	9/16	11/16	1-1/8	1-1/2
3	3-1/2	—	—	9/16	1	1-3/8
3-1/4	3-3/4	—	—	1/2	15/16	1-1/4
4	4-1/2	—	—	—	1/2	15/16
5	5-1/2	—	—	—	—	1/2

			Beam Thickness	
Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	full flange	1/2 flange##
1, 1-1/2 or 2	1	1	7/16	7/16+
1-1/2, 2 or 3	1-1/2	1-1/2	3/4	3/4
2, 3 or 4	2	2	1	1
3 or 4	3	3	1-5/16	1-9/16
4	4	4	1-5/8	2-1/16

##The thickness of Spray-Applied Fire Resistive Materials shown are applicable when the thickness applied to the beam's lower flange edges are reduced to one-half that shown in the table.

+Thickness applied to beam's lower flange shall be a min of 1/4 in.

			Joist thickness			
Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr	Unrestrained Beam Rating Hr	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	15/16	15/16	15/16
1-1/2	1	1	1-5/16	1-5/16	1-1/2	1-3/8
1-1/2	1-1/2	1-1/2	1-5/8	1-7/16	1-1/2	1-3/8
2	1	1	1-7/16	1-7/16	2-1/16	1-7/8
2	2	2	2-3/16	1-7/8	2-1/16	1-7/8
3	3	3	3-1/4	2-13/16	3-1/4	2-13/16

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

GCP KOREA INC — Z-146 investigated for exterior use.

GCP APPLIED TECHNOLOGIES INC — Types Z-146, Z-146T, Z146PC, Z-156, Z-156T and Z-156PC investigated for exterior use.

5C. **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 GF, MK-6/HY, MK-6/HB, MK-6s, MK-10 HB, MK-10 HB Extended Set, see Item 5; Types Z-106, Z-106/G, Z-106/HY see Item 5A; Type Z-146 see Item 5B.

			Joist thickness		
Restrained Assembly Rating Hr	**Unrestrained Assembly Rating Hr**	**Unrestrained Beam Rating Hr**	**12K3** more than 4 ft OC**	**12K3** less than 4 ft OC**	**12K5****
1	1	1	15/16	15/16	15/16
1 1/2	1 1/2	1 1/2	1-1/2	1-3/8	1-1/2
2	2	2	2-1/16	1-7/8	2-1/16
3	3	3	3-1/4	2-13/16	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, MK-1000/HB, MK-1000/HB Extended Set. Z-106, Z-106/G, Z-106/HY, Z-146 investigated for exterior use.

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

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

6. **Metal Lath —** (Not Shown) —(Required with Z-146, otherwise optional) — Metal lath shall be 3/8 in., expanded diamond mesh, weighing 2.5 lb per sq yd. Secured to underside of slab through steel washers with an outside diam of 1/2 in. Fasteners spaced 12 in. OC in both directions with lath edges overlapped approx 3 in.

7. **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.

Last Updated on 2019-10-30

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL's Follow-Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL's Follow-Up Service. Always look for the Mark on the product.