



BXUV.D998 - FIRE-RESISTANCE RATINGS - CAN/ULC-S101 CERTIFIED FOR CANADA

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. D998

July 25, 2019

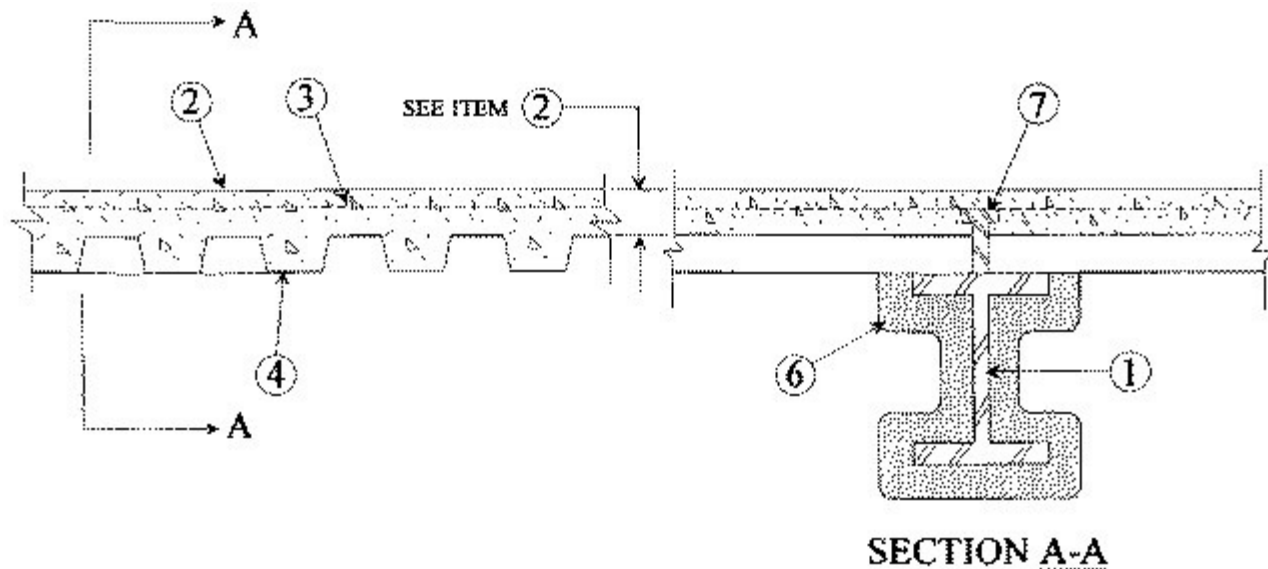
Restrained Assembly Ratings — 2 and 3 Hr.

Unrestrained Assembly Ratings — 0, 1, 1-1/2, and 2 Hr. (See Items 4 & 6)

Unrestrained Beam Ratings — 1, 1-1/2, and 2 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.**



1. **Beam** — W8X28, W8x24 or W6x12, min size, see Items 6 and 6A.

2. **Normal Weight or Lightweight Concrete** — Normal weight concrete, carbonate or siliceous aggregate, 3500 psi compressive strength, vibrated. Lightweight concrete, expanded shale or slate aggregate by rotary-kiln method or expanded clay aggregate by rotary-kiln or sintered-grate method, 3000 psi compressive strength, vibrated, 4 to 7 per cent entrained air.

Restrained Assembly Rating Hr	Concrete (Type)	Concrete Unit Weight pcf	Concrete Thkns In.
2	Normal Weight	147-153	4-1/2
3	Normal Weight	147-153	5-1/4
2	Lightweight	107-113	3-1/4
2	Lightweight	107-116	3-1/4*
2	Lightweight	114-120	3-1/2
3	Lightweight	107-113	4-3/16
3	Lightweight	114-120	4-7/16

*With 2 and 3 in. deep steel floor units only.

3. **Welded Wire Fabric** — 6x6 10/10 SWG.

3A. **Negative Reinforcement** — (Not Shown) - Optional - For floor spans with concrete cast continuous over the supporting beams. Deformed bars designed to resist the support moments of the concrete slab in accordance with the latest ACI Building Code Specifications.

4. **Steel Floor and Form Units*** — Composite 1-1/2, 1-5/8, 2 or 3 in. deep galv units or 4-1/2 in. deep non-composite galv units. Fluted units may be phos/ptd. Min gauges are 22 MSG for fluted and 20/20 for cellular and partial cellular. The following combinations of units may be used:

(1) All 24, 26, 28 or 36 in. wide cellular or partial cellular.

(2) All fluted.

(3) One or two 3 in. deep, 12 in. wide, 18/18 MSG min cellular alternating with 3 in. deep fluted or other cellular.

(4) Any blend of fluted and 24, 26, 28 or 36 in. wide cellular or partial cellular.

(5) Corrugated, nom 1-5/16 or 2 in. deep, 30 in. wide, 24 MSG min galv units with shear wires factory welded to deck corrugations. Welded to supports 12 in. OC through welding washers. For shear wire spacing of 8 in. or less the steel deck stress shall not exceed 20 KSI. For shear wire spacing greater than 8 in. OC but less than or equal to 12 in. OC steel deck stress shall not exceed 12 KSI.

ASC STEEL DECK, DIV OF ASC PROFILES L L C — 36 in. wide Types 2WH-36, 2WHS-36, 2WHF-36, 2WHF-36A, 3WxH-36, 3WxHF-36, 3WxHF-36A, 3WH-36, 3WHF-36, 3WHF-36A, BH-36, BHN-36, BHN-35-1/4, 3W-36, 3WF-36. All units may be galvanized or Prime Shield. Non-cellular decks may be vented designated with a "V" suffix to the product name. Cellular deck top and bottom sections may be riveted together (designated with "Fr") vs. arc spot welded, "F".

CANAM STEEL CORP — 24 in. wide Type P-2432 composite or 36 in. wide Type P-3623, P-3606, P-3615 and 24 in wide Type P-2432 composite, Type P-3606 and P-3615 non-composite

CANAM STEEL CORP — 12 or 24 in. wide, Types 1-1/2, 2, or 3 in. LOK-Floor and LOK-Floor Cell; 36 in. wide, Types 2 or 3 in. LOK-Floor and LOK-Floor Cell; 24, 30 or 36 in. wide, Type 1-1/2 in. B-LOK and B-LOK Cell; 24 in. wide, Types N-LOK and N-LOK Cell.

CHIA TEH CONSTRUCTION MATERIAL CO LTD — 24 or 36 in. wide Mac-Lok 3; 24 in. wide CFD-3.

DECK WEST INC — 36 in. wide Type B-DW, Inverted B-DW, BA-DW, Inverted BA-DW, 2-DW or 3-DW. Side joints of Type 2-DW and 3-DW may be fastened together with min 1 in. long No. 12 x 14 self-drilling, self-tapping steel screws 36 in. OC.

EPIC METALS CORP — 24 in. wide Types EC150, EC150 inverted, EC300, EC366, ECP150, ECP300, ECP366, Epicore A, 2.0 ECA; 30 in. wide Types ECB150, ECBR150; 36 in. wide Types EC156, EC266, ECP266.

KAM INDUSTRIES LTD, DBA CORDECK — 24 in. wide, Types 2 or 3 in. WDR.

MARLYN STEEL DECKS INC — Type 1.5 CF, 2.0 CF or 3.0 CF.

NEW MILLENNIUM BUILDING SYSTEMS L L C — 24 or 36 in. wide Types 2.0CD, 3.0CD, 2.0CFD, 3.0CFD, 3.0CFDES; 24, 30 or 36 in. wide Types 1.5CD, 1.5CDI, 1.5CDR, 1.5CFD. Fluted units may be phos/painted or galvanized.

ROOF DECK INC — 36 in. wide Types LOK-1-1/2, LOK-1-1/2R; 24 in. wide Types LOK-2, LOK-3.

VALLEY JOIST+DECK — 24 or 36 in. wide Types WVC 1-1/2 or WVC 2.

VERCO DECKING INC - A NUCOR CO — — FORMLOK™ deck types PLB, B, BR, PLN3, N3, PLN, N, PLW2, W2, PLW3, W3. Units may be galvanized, phos./ptd., or mill finish. Units may be cellular or acoustical cellular, with the suffix "CD" or "CD-AC" added to the product name, respectively. All non-cellular deck may be vented or non-vented. 12 in. wide PLW2, W2, PLW3 or W3 units may be blended with 24 or 36 in. wide PLW2, W2, PLW3 or W3 units, respectively; or Types PLN3-CD, N3-CD, PLN3.

VULCRAFT, DIV OF NUCOR CORP — 24, 30 or 36 in. wide, Type 1.5 VL, 1.5VLI, 1.5PLVLI, 1.5VLP, 1.5PLVLP; 24 or 36 in. wide, Types 2VLI, 2.0PLVLI, 3VLI, 3.0PLVLI, 2VLP, 2.0PLVLP, 3VLP, 3.0PLVLP. 36 in. wide Types 1.5 SB, 1.5 SBR; 24 or 36 in wide Types 2.0 SB, 3.0 SB, 36 in. wide Type High Strength 1.5 SBI, 36 in. wide Type High Strength 1.5 SBN; Units may be phos/ptd.

Spacing of welds attaching units to supports shall be 12 in. OC for 12, 24, 36 in. wide units, four welds per sheet for 30 in. wide units. 6 in. OC for 18 in. wide and Sec. 12 units. Unless specified otherwise for specific units types, adjacent units button-punched or welded together 36 in. OC along side joints. For **3 Hr Rating**, units with overlapping type side joints welded together 24 in. OC max.

When a superimposed load of 250 PSF is desired the spacing of welds or button-punches shall not exceed 24 in. OC along side joints.

Alternate Construction — Noncomposite units of the same type listed above may be used provided allowable loading is calculated on the basis of noncomposite design.

The Unrestrained Assembly Rating is equal to the Unrestrained Beam Rating (See Item 6) for a max 2 Hr and is limited to the following units and limitations:

- (a) 1-1/2, 2 and 3 in. deep, 24 in. wide, 22 MSG or thicker fluted with clear spans not more than 7 ft, 8 in.
- (b) 1-1/2, 2 and 3 in. deep, 24 in. wide, 20 MSG or thicker fluted with clear spans not more than 8 ft, 8 in.
- (c) 1-1/2 and 2 in. deep, 24 in. wide, 16 MSG or thicker fluted and 18/18 MSG or thicker cellular with clear spans not more than 9 ft, 11 in.
- (d) 3 in. deep, 36 in. wide, 18 MSG or thicker fluted and 24 in. wide, 20/18 MSG or thicker cellular with clear spans not more than 13 ft, 2 in.

For assemblies utilizing 3-1/4 in. lightweight concrete topping with a max Restrained Assembly Rating of 2 Hr, the Unrestrained Assembly Rating is equal to the Unrestrained Beam Rating (See Item 6) and is limited to the following floor units and spans:

- (a) 1-1/2, 2 and 3 in. deep, 24 or 36 in. wide, 22 MSG fluted and 20/20 MSG cellular with clear spans not more than 9 ft, 6 in.
- (b) 2 and 3 in. deep, 24 or 36 in. wide, 20 MSG fluted and 20/20 MSG cellular with clear spans not more than 10 ft, 0 in.
- (c) 3 in. deep, 24 in. wide, 20 MSG fluted and 20/20 MSG cellular with clear spans not more than 13 ft, 2 in.

5. **Joint Cover** — (Use with fluted units optional — Not Shown) — 2 in. wide cloth adhesive tape applied following the contour of the units.

6. **Mastic and Intumescent Coatings*** — For use with fluted steel floor and form units only. Min. size W8x24 or W6x12 beams shall be primed with a phenolic modified alkyd primer at a thickness of 1 mil. Coating spray or brush applied in accordance with the manufacturer's instructions at the min dry thickness as shown in the table below. The thickness shown below includes the 1 mil of primer. Flutes above beam to be completely filled with minimum 6 pcf mineral wool insulation, or the top flange of the beam to be protected with the same thickness of coating as required on the beam.

Minimum Dry Thickness mils	Minimum Dry Thickness mm	Beam Size	Unrestrained Beam Rating Hr	Restrained Assembly Rating Hr
53	1.34	W8x24	1	2
95	2.41	W8x24	1-1/2	3
73	1.83	W6x12	1	2
123	3.10	W6x12	1-1/2	3

ALBI MFG, DIV OF STANCHEM INC — Type Albi Clad TF+. Investigated for Interior General Purpose

6A. **Mastic and Intumescent Coatings*** — As an alternate to Item 6. For use with normal weight concrete. Min. size W8x28 beams shall be primed with a phenolic modified alkyd primer at a thickness of 1 mil. Coating spray or brush

applied in accordance with the manufacturer's instructions at the min dry thickness as shown in the table below. The thickness shown below includes the 1 mil of primer. The top surface of the top flange where fluted units are used must be protected with the coating material at the same min dry thickness at a min distance of 1 in. (25 mm) inward from the flange tip on both sides of the beam. Mineral wool insulation optional above top surface of the beam.

Minimum Dry Thickness mils	Minimum Dry Thickness mm	Steel Floor Units	Unrestrained Beam Rating Hr	Restrained Assembly Rating Hr
103	2.62	Fluted or Cellular	1-1/2	2
179	4.55	Cellular	1-1/2	3
341	8.67	Cellular	2	3

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7. **Shear Connector Studs** — Optional — Studs, 3/4 in. diam by 3 in. long, for 1-1/2 in. deep form units to 5-1/4 in. long for 3 in. deep form units, headed type or equivalent per AISC specifications. Welded to the top flange of the beam through the steel form units.

8. **Electrical Inserts** — (Not Shown) — Classified as "Outlet Boxes and Fittings Classified for Fire Resistance*."

9. **Mineral and Fiberboards*** — (Optional, not shown). Applied over concrete floor with no restriction on board thickness. When mineral and fiber boards are used, the unrestrained beam rating shall be increased by a minimum of 1/2 hr. See **Mineral and Fiber Board (CERZ)** category for names of manufacturers.

10. **Foamed Plastic*** — (Optional, not shown). Consisting of polyisocyanurate or urethane roof insulations. Applied over concrete floor with no restrictions on thickness. When polyisocyanurate or urethane insulation is used, the unrestrained beam rating shall be increased by a minimum of 1/2 hr. See **Foamed Plastic (CCVW)** for list of manufacturers.

11. **Insulating Concrete** — (Optional, not shown) — Various types of insulating concrete prepared and applied as follows:

A. Vermiculite Concrete - Blend 6 to 8 cu ft of Vermiculite Aggregate* to 94 lb Portland cement and air entraining agent. Min thickness of 2 in. as measured to the top surface of the structural concrete or foamed plastic (Item 12) when it is used. See Vermiculite Aggregate (CJZZ) category for names of Classified companies.

B. Cellular Concrete-Roof Topping Mixture* - Concentrate mixed with water and Portland cement per manufacturer's specifications. Min. thickness of 2-in. as measured to the top surface of the structural concrete or foamed plastic (Item 12) when it is used. Cast dry density and 28-day min compressive strength of 190 psi as determined with ASTM C495-66.

AERIX INDUSTRIES — Cast dry density of 37 (+ or -) 3.0 pcf.

CELCORE INC — Type Celcore with cast dry density of 31 (+ or - 3.0) pcf or Type Celcore MF with cast dry density of 29 (+ or - 3.0) pcf.

ELASTIZELL CORP OF AMERICA — Type II, with a cast dry density of 39 (+ or - 3.0) pcf.

SIPLAST INC — Mix #1, Cast dry density of 32 (+ or -) 3 pcf.

SIPLAST INC — Mix #2, Cast dry density of 36 (+ or -) 3 pcf.

C. Cellular Concrete-Roof Topping Mixture* - Foam concentrate mixed with water, Portland cement and UL Classified Vermiculite Aggregate per manufacture's application instructions. Cast dry density of 33 (+ or -) 3 pcf and 28 day compressive strength of min 250 psi as determined in accordance with ASTM C495-86.

AERIX INDUSTRIES — Mix #3.

ELASTIZELL CORP OF AMERICA — Type II. Mix #1 of cast dry density 39 (+ or -) 3.0 pcf, Mix #2 of cast dry density 40 (+ or -) 3.0 pcf, Mix #3 of cast dry density 47 (+ or -) 3.0 pcf.

SIPLAST INC — Mix #3.

D. Perlite Concrete - 6 cu ft of Perlite Aggregate* to 94 lb of Portland Cement and 1-1/2 pt air entraining agent. Min thickness 2 in. as measured to the top surface of structural concrete or foamed plastic (Item 12A) when it is used.

See **Perlite Aggregate (CFFX)** in Fire Resistance Directory for names of Classified companies.

12. **Foamed Plastic*** — (Optional - Not shown) — For use only with vermiculite (Item 11A) or cellular (Item 11B) concretes-Rigid polystyrene foamed plastic insulation having slots and/or holes sandwiched between vermiculite or cellular concrete slurry which is applied to the normal or lightweight concrete surface and vermiculite or cellular concrete topping (Item 11A or 11B).

See **Foamed Plastic* (BRYX)** category in Building Materials Directory or **Foamed Plastic* (CCVW)** Category in Fire Resistance Directory for list of Classified companies.

12A. **Foamed Plastic*** — (Not Shown) — For use only with cellular or perlite concrete. Nominal 24 by 48 in. polystyrene foamed plastic insulation boards having a density of 1.0 (+ or - 0.1) pcf, encapsulated within concrete topping. Each insulation board shall contain six nominal 3 in. diameter holes oriented in two rows of three holes each with the holes spaced 12 in. OC transversely and 16 in. OC longitudinally.

See **Foamed Plastic* (BRYX)** category in Building Materials Directory or **Foamed Plastic* (CCYW)** category in Fire Resistance Directory for list of Classified companies.

13. **Roof Covering Materials*** — (Optional, not shown) — Consisting of materials compatible with insulations described herein which provide Class A, B or C coverings. See Built-Up Roof Covering Materials in Building Materials Directory.

14. **Insulated Concrete** — (Optional, not shown) — various types of insulated concrete prepared and applied in the thickness indicated.

A. **Perlite Concrete** — Mix consists of 6.2 cu ft Perlite Aggregate* to 94 lbs of Portland cement and 1-1/2 pt air entraining agent. Compressive strength 80 psi min.

See **Perlite Aggregate (CFFX)** category for names of Classified companies.

*** 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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