

## BXUV.D988

## 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. D988

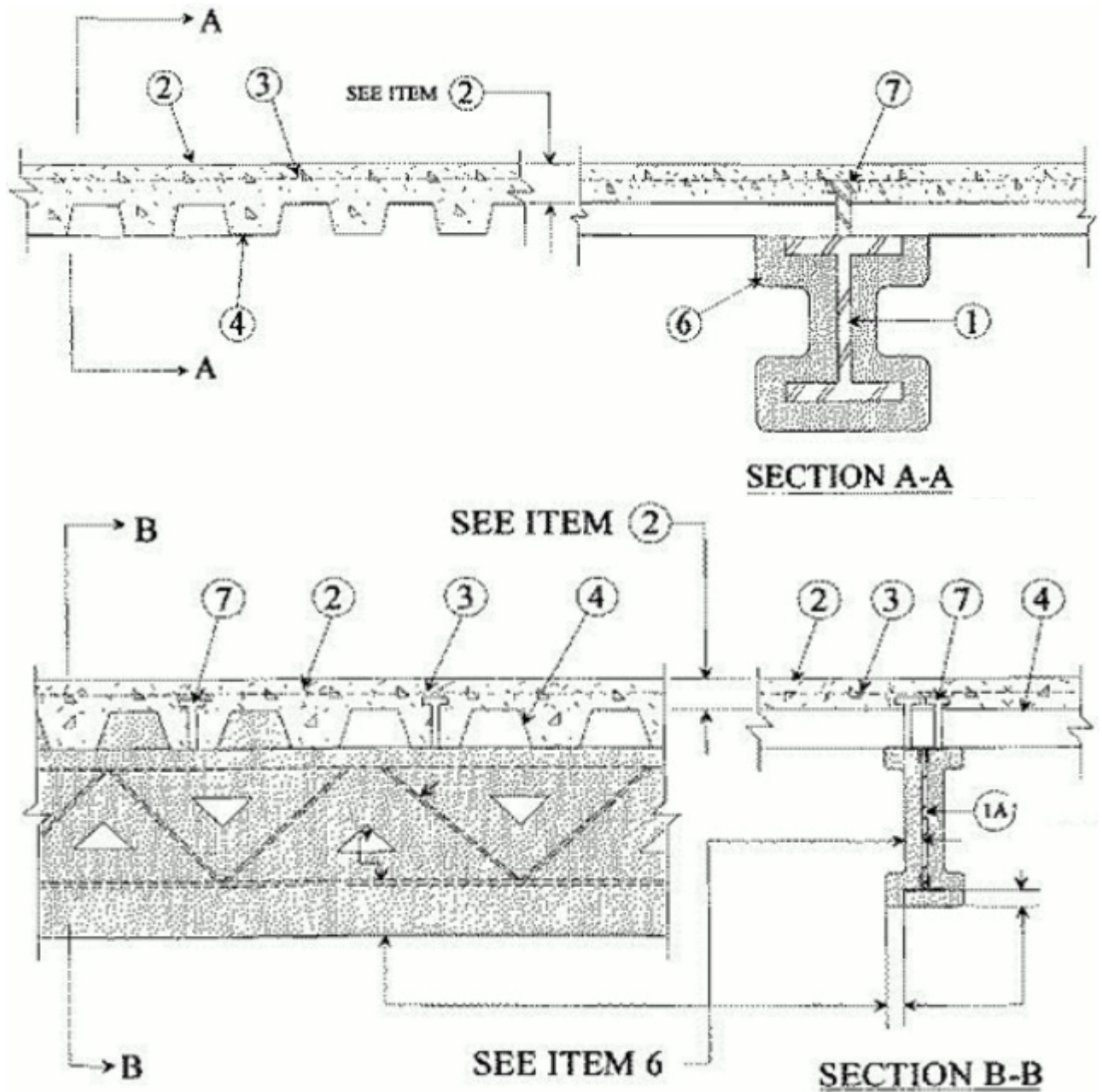
**Restrained Assembly Ratings — 1, 1-1/2, 2 and 3 Hr.**

**Unrestrained Assembly Ratings — 0, 1, 1-1/2, 2 or 3 Hr. (See Items 4 & 6)**

**Unrestrained Beam Ratings — 1, 1-1/2, 2 and 3 Hr.**

**Loading determined by Allowable Stress Design Method or Load and Resistance Factor Design Method published by the American Institute of Steel Construction, or in accordance with the relevant Limit States Design provisions of Part 4 of the National Building Code of Canada — 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, min size, see Items 6 or 6A.

1A. **Steel Joist** — (Not shown) — As an alternate to Item 1 Composite or noncomposite min 10k1 or min depth and weight shall be 10 in. and 4.8 lb/ft respectively. May be uncoated or provided with a shop coat of paint. Designed per S.J.I. specifications for a max design yield stress of 50, 000 psi (50 ksi). Top chords shall consist of two angles measuring 1-1/4 by 1-1/4 by 0.136 in. thick. Bottom chord shall consist of two angles measuring 1 by 1 by 0.112 in. thick, min. The first diagonal web member at each end shall consist of a min. 0.62 in. diam round bar. All remaining web members shall consist of 0.50 in. diam round bars, min. Bridging per S.J.I. specifications when noncomposite joists are used.

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, or pelletized expanded blast furnace slag aggregate, 3000 psi compressive strength, vibrated, 4 to 7 percent entrained air.

Restrained Assembly Rating Hr	Concrete (Type)	Concrete Unit Weight pcf	Concrete Thkns In.
1	Normal Weight	147-153	3-1/2
1-1/2	Normal Weight	147-153	4

2	Normal Weight	147-153	4-1/2
3	Normal Weight	147-153	5-1/4
1	Lightweight	107-113	2-1/2
1	Lightweight	107-120	2-5/8
1-1/2	Lightweight	107-113	3
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-W1.4xW1.4.

3A. **Negative Reinforcement** — (Optional, Not Shown) — Used in lieu of Item 3 and with Items 3B or 3C. 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.

3B. **Fiber Reinforcement\*** — (Not Shown) — Required with Item 3A. Engineered synthetic fibers added to concrete mix to control shrinkage cracks in concrete. Fibers added to concrete mix at rate of 1 lb of fiber for each cubic yard of concrete.

**PROPEX OPERATING COMPANY L L C** — Fibermesh 150 and Fibermesh 300

3C. **Fiber Reinforcement\*** — (Not Shown) — Required with Item 3A. Any fiber reinforcement bearing the UL Classification Marking for Fire Resistance, Classified for use in lieu of welded wire fabric.

See **Fiber Reinforcement** (CBXQ) Category for names of manufacturers.

4. **Steel Floor and Form Units\*** — Composite or non-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 units. 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** — 32 in. wide Types NH-32, NHN-32, NHF-32; 36 in. wide, Types BH-36, BHN-36, BHN-35-1/4, BHF-36, BHF-36A, 2WH-36, 2WHS-36, 2WHF-36, 2WHF-36A, 3WxH-36, 3WxHF-36, 3WxHF-36A, 3WH-36, 3WHF-36, 3WHF-36A, 3W-36, 3WF-36, DG3W-36, DG3WF-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 GROUP INC** — 24 in. wide Type P-2432 non-composite, 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; 24 or 36 in. wide Type 3 in. LOK-Floor; 36 in. wide Types 1.5B, 1.5BI, 1.5BL and 1.5BLI.

**CANAM STEEL CORP** — 24 in. wide Type P-2432 non-composite, 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 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. BL and BLC; 24 in. wide, Types NL and NLC

**KAM INDUSTRIES LTD, DBA CORDECK** — QL Types, 24 in. wide, 3 or 3 inverted, UKX, 21 or 21 inverted, 2 in. 99, 121, AKX, NKX, TKX; 24 or 30 in. wide GKX, GKXH, GKX-A; 36 in. wide 2 in. 99, AKX, WKX; 12 in. wide NKC, TKC; 12 in. wide non-composite Sec 12. Side joints of 99, 121, TKC, TKX, WKX may be welded together 60 in. OC. Side joints of 99, AKX, WKX, GKX, GKX-A, TKX may be fastened together with min 1 in. long No. 12x14 self-drilling, self-tapping steel screws 36 in. OC

**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

**DESIGN ASSISTANCE CONSTRUCTION SYSTEMS INC** — 36 in. wide Type DACS1.5CD, or 24 in. wide Type DACS2.0CD, or DACS3.0CD

**EPIC METALS CORP** — 24 in. wide Types EC150, EC150 inverted, EC300, EC366, ECP150, ECP300, ECP366, 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

**STEEL MASTERS INTERNATIONAL DEPENDABLE STEEL** — 36 in. wide Types 2WH-36, 3WH-36. Units may be phos/painted or galvanized.

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

**VERCO DECKING INC - A NUCOR CO** — 24, 30 or 36 in. wide Types PLB, PLBCD, B, BCD, BR; 24 or 36 in. wide Types PLW2, PLW2CD, W2, W2CD, PLW3, PLW3CD, W3, W3CD; 24 in. wide Types PLN, PLNCD, N, NCD . 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, N3. Fluted units may be phos/ptd

**VULCRAFT, DIV OF NUCOR CORP** — 24, 30 or 36 in. wide Types 1.5VL, 1.5VLI, 1.5PLVLI, 1.5VLP, 1.5PLVLP; 24 or 36 in. wide Types 1.5VLPA, 1.5PLVLP, 2VLI, 2.0PLVLI, 2VLJ, 3VLI, 3.0PLVLI, 3VLJ, 2VLP, 2.0PLVLP, 3VLP, 3.0PLVLP. Types 1.5VL, 1.5VLI, 1.5PLVLI, 1.5VLPA, 1.5PLVLP, 2VLI, 2.0PLVLI, 2VLJ, 3VLI, 3.0PLVLI, 3VLJ units may be phos/ptd. 24 or 36 in. wide Types 2VLJ, 3VLJ units ++ may be used for max 2 hr Restrained Assembly Rating. 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.

++ Side joints of Types 2VLJ or 3VLJ units may be fastened together with No. 8-3/4 in. long self-drilling Tek screws driven diagonally from the top side through the joint of the units at 36 in. O. C. max.

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 3 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.

**4A. Steel Floor and Form Units\*** — As an alternate to Item 4. Nom 8 or 9 in. deep composite, galv steel units. Min thickness 0.0375 inch (20 MSG). Side joints of adjacent units fully overlapping, fastened together by using 1-1/4 in. long self-drilling, self-tapping steel screws driven through Shear-Bond Clips (not shown) at 13-3/4 in. OC. Steel end closures flashings (not shown) made of min 0.056 inch thick (16 MSG) galv steel, fixed to the steel work before decking is placed.

In addition to the Steel Floor and Form Units, the following components are required:

a). Welded Wire Fabric — 6 X 6 - Min wire thickness W2.9 X W2.9 slab reinforcement. As an alternate, max # 4 bars spaced 12-in. OC in both directions shall be used. When re-bars are used, the concrete slab thickness shall be increased a minimum 5/16 in.

b). Rib Reinforcement — Min. #4 rebar. Min concrete cover below the steel reinforcement shall be 1-9/16 in. Reinforcement support chairs spaced at max 41-1/2 inches OC.

The flute areas above the beam/joist are to be : (1) filled with concrete, (2) filled with Spray-Applied Fire Resistive Material or (3) the beam/joist coated with Spray-Applied Fire Resistive Material installed as described in the design to thickness required when all cellular Steel Floor and Form Units are used

See Design No. D989 for a typical illustration of the components. Consult the deck manufacturer for comprehensive load tables and design parameters referencing UL Design D989.

**BAILEY METAL PRODUCTS LTD** — Type COMSLAB™ 210 and COMSLAB™ 225, Steel End Closure Flashing

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

**6. Spray-Applied Fire Resistive Materials\*** — Applied by spraying with water to the final thicknesses shown below. Crest area shall be filled with Spray-Applied Fire Resistive Materials above the beam. Beam surfaces must be free of dirt, oil or scale. Min avg density is 13 pcf with min ind density of 11 pcf for Types DC/F, II, or II HS. Min avg and min ind densities of 22 and 19 pcf, respectively, for Type HP. For method of density determination, refer to Design Information Section. The thickness of the Spray-Applied Fire Resistive Materials on the Structural Member shall be as follows:

<b>Restrained Assembly Rating, Hr</b>	<b>Unrestrained Beam Rating, Hr</b>	<b>Concrete Type</b>	<b>Protection Mtl Thkns on Structural Member In.</b>
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			<b>W8x28 (Item 1) When Deck Is All Fluted</b>	<b>W8x28 (Item 1) When Deck Is Blend or All Cellular</b>
1	1	NW	3/8	1/2
1-1/2	1	NW	3/8	1/2
2	1	NW	3/8	1/2
2	2	NW	13/16	1-1/16
2	3	NW	1-5/16	1-11/16
3	1-1/2	NW	5/8	13/16
3	2	NW	13/16	1-1/16
3	3	NW	1-5/16	1-11/16
1	1	LW	1/2	5/8
1-1/2	1	LW	1/2	5/8
2	1	LW	1/2	5/8
2	2	LW	1-1/8	1-7/16
2	3	LW	1-3/4	2-1/4
3	1-1/2	LW	13/16	1
3	2	LW	1-1/8	1-7/16
3	3	LW	1-3/4	2-1/4

**ISOLATEK INTERNATIONAL** — Types DC/F, HP, II, or II HS. Type EBS or Type X adhesive may also be used as a surface sealer

6A. **Spray-Applied Fire Resistive Materials\*** — Alternate to Item 6. Applied by mixing with water in accordance with instructions on each bag and applied in one or more coats to a final thickness as shown in table below to steel beam surface which is free of dirt, oil or scale. When fluted steel deck is used and the fire protection thickness selected is based on all fluted deck, the area between the steel deck and the top flange of the steel beam shall be filled. When fluted steel deck is used and the steel beam is sprayed with the thicknesses applicable to cellular or blended units, the area between the steel deck and the top flange of the steel beam shall be plugged.

Min average and min individual density of 15 and 14 pcf, respectively, for Types 300, 300AC, 300ES, 300HS, 300N, 3000, 3000ES, and SB. For Types 400, 400AC, and 400ES min average and min individual density of 22 and 19 pcf, respectively. Min avg density of 44 pcf with min ind value of 40 pcf for Types M-II and TG. Min avg density of 47 pcf, with min individual value of 43 pcf for Type M-II/P. For method of density determination, see Design Information Section, Sprayed Material. The thickness of the Spray-Applied Fire Resistive Material on the Structural Members shall be as follows:

<b>Restrained Assembly Rating, Hr</b>	<b>Unrestrained Beam Rating, Hr</b>	<b>Concrete Type</b>	<b>Protection Mtl Thkns on Structural Member In.</b>
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			<b>W8x28 (Item 1) When Deck Is All Fluted</b>	<b>W8x28 (Item 1) When Deck Is Blend or All Cellular</b>	<b>Joist (Item 1A) When Deck Is All Fluted</b>	<b>Joist (Item 1A) When Deck Is Blend or All Cellular</b>
1	1	NW	3/8	1/2	3/4	15/16
1-1/2	1	NW	3/8	1/2	3/4	15/16
2	1	NW	3/8	1/2	7/8	1-1/8
2	2	NW	3/4	15/16	1-9/16	1-15/16
2	3	NW	1-3/16	1-9/16	2-5/16	3
3	1-1/2	NW	9/16	11/16	1-1/2	1-15/16
3	2	NW	3/4	15/16	1-9/16	1-15/16
3	3	NW	1-3/16	1-9/16	2-5/16	3
1	1	LW	1/2	5/8	15/16	1-1/8
1-1/2	1	LW	1/2	5/8	15/16	1-3/16
2	1	LW	1/2	5/8	1-1/8	1-7/16
2	2	LW	1	1-1/4	1-7/8	2-3/8
2	3	LW	1-5/8	2-1/8	2-15/16	—
3	1-1/2	LW	3/4	15/16	1-15/16	2-1/2
3	2	LW	1	1-1/4	1-15/16	2-1/2
3	3	LW	1-5/8	2-1/8	2-15/16	—

**BERLIN CO LTD** — Types 300, 300ES, 300N, 400, or Type SB; Types M-II, TG and M-II/P

**GREENTECH ASIA PACIFIC SDN BDH** — Types 300, 300ES, 300HS, or 400; Types M-II or M-II/P

**GREENTECH THERMAL INSULATION PRODUCTS MFG CO L L C** — Types 300, 300AC, 400, or 400AC; Types M-II, TG and M-II/P

**ISOLATEK INTERNATIONAL** — Types 300, 300AC, 300ES, 300HS, 300N, SB, 400, 400AC, 400ES, 3000, or 3000ES; Types M-II, TG and M-II/P

**NEWKEM PRODUCTS CORP** — Types 300, 300ES, 300N, 400, or SB; Types M-II, TG and M-II/P

7. **Shear Connector Studs** — (Optional) — Studs, 3/4 in. diameter. Length of studs 3 in. for 1-1/2 in. deep form units to 5-1/4 in. 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. **Lath Hanger** — (Optional, Not Shown) — For use in caged beams with Items 6 or 6A, Galv steel 6 SWG min diam spaced 27 in. OC.

9. **Clips** — (Optional, Not Shown) — For use in caged beams with Items 6 or 6A, No. 24 MSG spring steel pushed on to top and bottom flanges of beam spaced 6 in. OC max.

10. **Metal Lath** — (Optional, Not Shown) — For use in caged beams with Items 6 or 6A, 3/8 in. diamond mesh or rib lath, 3.4 lbs per sq yd expanded steel attached to beam with clips spaced 6 in. OC max; or tied to lath hangers with 18 SWG galv steel wire spaced 6 in. OC max.

11. **Electrical Inserts** — (Optional, Not Shown) — Classified as "Outlet Boxes and Fittings Classified for Fire Resistance".\*

12. **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 13) 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 13 and 13A) when 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 13A) when it is used.

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

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

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

13A. **Foamed Plastic\*** — (Optional, 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.



14. **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.

15. **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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