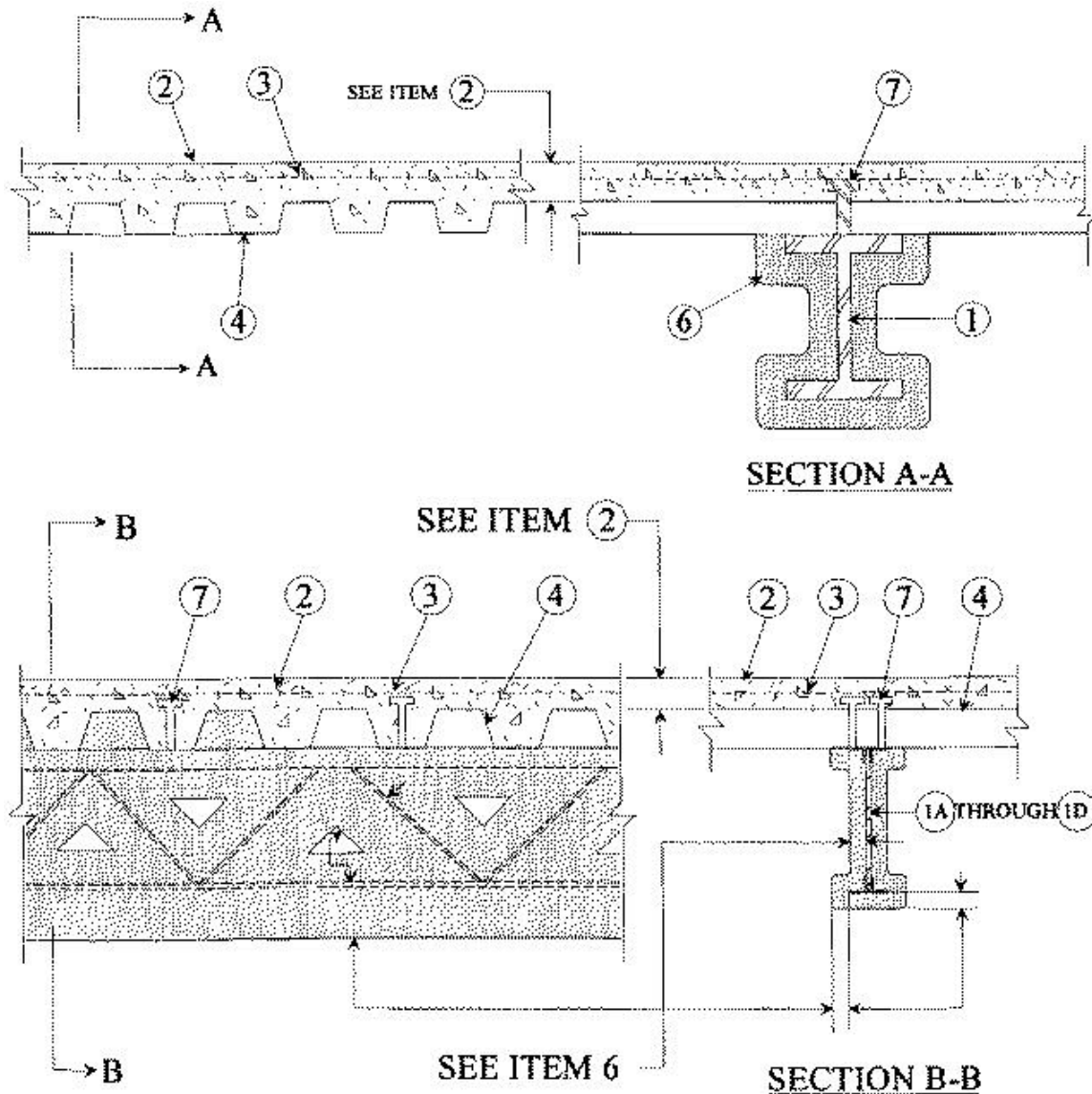


Restrained Assembly Ratings — 1, 1-1/2, 2 and 3 Hr.

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.



1. **Beam** — W12X14, W8X28 or W6x12, min size, see Items 6A through 6E.

1A. **Steel Joists** — (Not shown) — As an alternate to Item 1 — May be either uncoated or provided with a shop coat of paint. Composite or noncomposite. Welded or bolted to end supports. Designed per S.J.I. specifications for a max design stress of 30 ksi. The top chords shall consist of two angles measuring 1-1/4 by 1-1/4 by 0.127 in. thick. Bottom chords shall consist of two round bars measuring 0.566 in. in diam. or two angles measuring 1 by 1 by 0.125 in. thick. Bearing plates shall consist of two angles measuring 1-1/2 by 2 by 0.188 in. thick and 5-1/16 in. long. Web members shall consist of 0.565 in. diam bars. The min depth and weight shall be 8 in. and 4.9 lb/ft, respectively.

1B. **Steel Joists** — (Not shown) — As an alternate to Item 1 — Composite or noncomposite and welded or bolted to end supports. May be uncoated or provided with a shop coat of paint. Designed per S.J.I.

specifications for a max design stress of 30,000 psi. Top chords shall consist of two angles measuring 1-1/2 by 1-1/2 by 0.156 in. thick. Bottom chords shall consist of two round bars measuring 0.675 in. in diam. or two angles measuring 1 by 1 by 0.125 in. thick. Bearing plates shall consist of two angles measuring 2 by 2 by 0.192 in. thick and shall be min 4-15/16 in long. The second web member at each end shall consist of 0.654 in. diam round bar. All remaining web members, including the end web members, shall consist of 0.774 in. diam round bars. Bridging per S.J.I. specifications is required when noncomposite joists are used.

1C. **Steel Joists** — (Not shown) — As an alternate to Item 1 — Composite or noncomposite, welded or bolted to end supports. May be uncoated or provided with a shop coat of paint. Designed per S.J.I. specifications for a max design stress of 30,000 psi. Top chords shall consist of two angles measuring 1-1/2 by 1-1/2 by 0.156 in. thick. Bottom chord shall consist of two round bars measuring 0.675 in. in diam. or two angles measuring 1 by 1 by 0.125 in. thick. The second web member at each end shall consist of 0.654 in. diam round bar. All remaining web members, including the end web members, shall consist of 0.774 in. diam round bars. Bridging per S.J.I. specifications is required when noncomposite joists are used.

1D. **Steel Joists** — (Not shown) — As an alternate to Item 1 — May be either uncoated or provided with a shop coat of paint. Composite or noncomposite. Welded or bolted to end supports. Designed per S.J.I. specifications for a max design stress of 30 ksi. The top chords shall consist of two angles measuring 1-1/4 by 1-1/4 by 0.127 in. thick. Bottom chords shall consist of two round bars measuring 0.566 in. in diam. or two angles measuring 1 by 1 by 0.125 in. thick. Bearing plates shall conform to S.J.I. specifications. Web members shall consist of 0.565 in. diam bars. The min depth and weight shall be 8 in. and 4.9 lb/ft respectively.

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.
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 10/10 SWG.

4. **Steel Floor and Form Units*** — Composite 1-1/2, 2 or 3 in. deep 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, 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 or 36 in. wide cellular or partial cellular.

CONSOLIDATED SYSTEMS INC — 24 or 36 in. wide Types CFD-2, CFD-3; 24, 30 or 36 in. wide Type CFD-1.5; 24 in. wide Types NC. Units may be phos/ptd.

Spacing of welds attaching units to supports shall be 12 in. OC for 24, 36 in. wide units, four welds per sheet for 30 in. wide 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 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.

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, in one coat to a final thickness as shown above and 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. Use of adhesive is optional. Min avg

untamped density is 13 pcf with min ind untamped density of 11 pcf for Types II or DC/F. Min avg and min ind untamped densities of 22 and 19 pcf, respectively, for Type HP. Tamping is optional. For method of density determination, refer to Design Information Section. The thickness of the Spray-Applied Fire Resistant Materials on the Structural Members (Item 1, 1A, or 1B) shall be as follows:

Restrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Concrete Type	Protection Mtl Thkns on Structural Member In.				
			W8x28 When Deck Is All Fluted	W8x28 When Deck Is Blend or All Cellular	W12x14 When Deck Is All Fluted	Joist Item 1A When Deck Is Fluted Cellular or Blend	Joist Item 1B When Deck Is Fluted Cellular or Blend
1	1	NW	3/8,5/8**	1/2+,11/16**	9/16,15/16**	1++	—
1-1/2	1	NW	3/8,5/8**	1/2+,11/16**	9/16,15/16**	1-9/16	—
2	1	NW	3/8,5/8**	1/2+,11/16**	9/16,15/16**	2-1/16	—
2	2	NW	3/4	1-3/8+	1-1/16	2-1/16	—
2	3	NW	1-3/16	2-1/8+	1-11/16	—	3-1/4
3	1-1/2	NW	1/2	7/8*	3/4	—	3-1/4
3	2	NW	3/4	1-3/8+	1-1/16	—	3-1/4
3	3	NW	1-3/16	2-1/8+	1-11/16	—	3-1/4
1	1	LW	3/8,5/8**	1/2+,11/16**	9/16,15/16**	1-1/8++	—
1-1/2	1	LW	3/8,5/8**	1/2+,11/16**	9/16,15/16**	1-3/4	—
2	1	LW	3/8,5/8**	1/2+,11/16**	9/16,15/16**	2-1/4	—
2	2	LW	1	1-3/8+	1-7/16	2-1/4	—
2	3	LW	1-9/16+	2-1/8+	2-1/4	—	3-1/4
3	1-1/2	LW	11/16	7/8*	1	—	3-1/4
3	2	LW	1+	1-3/8+	1-7/16	—	3-1/4

*May be reduced to 3/4 in. for the 1-1/2 hr Unrestrained Beam Rating when the material is sprayed 2 in. beyond the beams's top flange and no reduction in thickness is made at the tips of the bottom flange.

**This thickness applies when optional Item 12 or 13 are used over 3-1/4 in. lightweight concrete topping.

+Thickness of Spray-Applied Fire Resistant Materials may be reduced to one half of this thickness on the lower flange tips of the steel beam.

++ - When bottom chords consist of 1 by 1 by 0.125 in. thckn steel angles, the thickness of spray-applied fire resistant material shall be increased by 1/4 in. on the bottom chord only.

CIL GROUP LTD — Type D-C/F or Type II. Type EBS or Type X adhesive which may also be used as a surface sealer.

ISOLATEK INTERNATIONAL — Type D-C/F, HP, Type II, Type EBS or Type X adhesive which may also be used as a surface sealer.

6A. Spray-Applied Fire Resistive Materials* — Alternate to Item 6. See table below for appropriate thicknesses. 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. Prepared by mixing with water and spray-applied in one or more coats to beam surfaces which must be clean and free of dirt, loose scale and oil. Min average density of 17.5 pcf with min individual value of 17.0 pcf. For method of density determination, see Design Information Section, Sprayed Material.

Restrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Protection Thkns on W8x28, In.	
		When Deck Is All Fluted	When Deck Is Blend or All Cellular
1, 1-1/2, 2	1	5/16, 7/16*	5/16, 7/16*
2	2	11/16	13/16
2	3	1-1/16	1-5/16
3	1-1/2	1/2	9/16
3	2	11/16	13/16
3	3	1-1/16	1-5/16

*This thickness applies when optional Items 12, 13 are used over 3-1/4 in. lightweight concrete topping.

+ ++ - When bottom chords consist of 1 by 1 by 0.125 in. thick steel angles, the thickness of spray-applied fire resistive material shall be increased by 1/4 in. on the bottom chord only.

CIL GROUP LTD — Type 280.

ISOLATEK INTERNATIONAL — Type 280.

6B. Spray-Applied Fire Resistive Materials* — Alternate to Item 6 or 6A. Applied by mixing with water according to instructions on each bag of material. Mixture can be spray or trowel applied in one or more coats. The thickness of the mixture is dependent on the type of floor unit. See table below for appropriate thickness. 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. The steel surfaces must be clean and free of dirt, loose scale and oil. Minimum average density of 38 pcf and minimum individual density of 35 pcf for Type 800. Min avg density of 44 pcf with min ind value of 40 pcf for Type M-II. Min avg density of 44 pcf with min ind value of 42 pcf for Type TG. For method of density determination, refer to Design Information Section, Sprayed Material.

Restrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Protection Thkns on W8x28, In.	
		When Deck Is All Fluted	When Deck Is Blend or All Cellular
1, 1-1/2, 2	1	3/8, 1/2*	7/16, 9/16*
2	2	15/16	1-1/4
2	3	1-5/16	1-1/2
3	1-1/2	5/8	1
3	2	15/16	1-1/4
3	3	1-5/16	1-1/2

*This thickness applies when optional Item 12 or 13 are used over 3-1/4 in. lightweight concrete topping.

CIL GROUP LTD — Type 800. Investigated for exterior use.

ISOLATEK INTERNATIONAL — Types 800, M-II or TG. Types 800, M-II and TG Investigated for exterior use.

6C. Spray-Applied Fire Resistive Materials* — Alternate to Items 6A, 6B or 6C. 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 is 17.5 and 16 pcf, respectively, for Types 300, 300ES, 300N and SB. Min average and min individual density of 22 and 19 pcf, respectively, for Type 400. For method of density determination, refer to Design Information Section. The thickness of the material on the Structural Members (Item 1, 1C, or 1D) shall be as follows:

Restrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Protection Mtl Thkns on Structural Members In.			
		W8x28 When Deck Is All Fluted	W8x28 When Deck Is Blend or All Cellular	W12x14 When Deck Is All Fluted	Joist (Item 1C or 1D) When Deck Is Fluted Cellular or Blend
1	1	5/16, 7/16*	5/16, 7/16*	1/2, 5/8*	9/16
1-1/2	1	5/16, 7/16*	5/16, 7/16*	1/2, 5/8*	1
2	1	5/16, 7/16*	5/16, 7/16*	1/2, 5/8*	1-3/8
2	2	11/16	13/16	1	1-3/8
2	3	1-1/16	1-5/16	1-1/2	2-1/4

3	1-1/2	1/2	9/16	3/4	2-1/4
3	2	11/16	13/16	1	2-1/4
3	3	1-1/16	1-5/16	1-1/2	2-1/4

*This thickness applies when optional Item 12 or 13 are used over 3-1/4 in. lightweight concrete topping.

CIL GROUP LTD — Type 300.

ISOLATEK INTERNATIONAL — Type 300, Type 300ES, Type 300N, Type 400 or Type SB.

6D. Mastic and Intumescent Coatings* — As an alternate to Items 6 through 6C. For use with normal weight concrete and fluted steel floor and form units only. 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. When mineral wool (Item 18) is used, the top surface of the beam need not be protected with the coating. When mineral wool (Item 18) is not used, the top surface of the top flange 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.

Minimum Dry Thickness mils	Minimum Dry Thickness mils	Minimum Dry Thickness mm	Mineral wool Insulation (Item 18)	Unrestrained Beam Rating Hr	Restrained Assembly Rating Hr
103		2.62	Optional	1-1/2	2
179		4.55	Required	2	2
341		8.67	Otional	2	2

ISOLATEK INTERNATIONAL — Type SprayFilm-WB 3. Investigated for Interior General Purpose. Type SprayFilm-WB 4, Investigated for Interior General Purpose. Type SprayFilm-WB 4, Investigated for Exterior Use with top coat as described in Item 6E.

6E. Top Coat — Type SprayFilm - TOPSEAL required for Exterior Use, applied at a minimum dry thickness of 14 mils (0.34 mm) over the intumescent material. See Classification information in the Mastic Coating (CDWZ) category, Isolatek International, for mixing requirements.

6F. Mastic and Intumescent Coatings* — As an alternate to Items 6 through 6D. For use with normal weight concrete and fluted steel floor and form units only. Min size 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 shown below. The thickness includes the 1 mil of primer.

Minimum Dry Thickness mils	Minimum Dry Thickness mm	Unrestrained Beam Rating Hr.	Restrained Assembly Rating Hr.
60	1.5	1	1

ISOLATEK INTERNATIONAL — Type SprayFilm-WB 2. Investigated Interior General Purpose.

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. **Lath Hanger** — (Not Shown) — Galv steel 6 SWG min diam spaced 27 in. O. C.
9. **Clips** — (Not Shown) — No. 24 MSG spring steel pushed on to top and bottom flanges of beam spaced 6 in. O. C. max.
10. **Metal Lath** — (Not Shown) — 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** — (Not Shown) — Classified as "Outlet Boxes and Fittings Classified for Fire Resistance".*
12. **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.
13. **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.
14. **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 15) 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. Cast dry density and 28-day min compressive strength of 190 psi as determined with ASTM C495-66.

CELCORE INC — Cast dry density of 31 (+ or - 3.0) pcf.

CELLUFOAM CONCRETE SYSTEMS, DIV OF CELLUFOAM CONCRETE OF — Cast dry density of 30 (+ or - 3.0) pcf.

CELLULAR CONCRETE L L C — Cast dry density of 37 (+ or -) 3.0 pcf.

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

LITE-CRETE INC — Cast density of 29 (+ 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.

CELLULAR CONCRETE L L C — 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 15A) when it is used.

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

15. **Foamed Plastic*** — (Optional-not shown) — For use only with vermiculite (Item 14A) or cellular (Item 14B) 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 14A). Max thickness to be 8 in.

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

15A. **Foamed Plastic*** — (Not Shown) — For use only with cellular or perlite concrete. Nominal 24 by 48 by max 8 in. thick 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.

16. **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.

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

A. **Vermiculite Concrete** — Mix consists of 6 cu ft of Vermiculite Aggregate*, 94 lbs of Portland cement and 6 oz of air entraining agent. Thickness to be 2 in min from the top plane of steel roof deck.

ELASTIZELL CORP OF AMERICA — Types MS16-U, MSV 200.

B. **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.

*Bearing the UL Classification Mark

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