

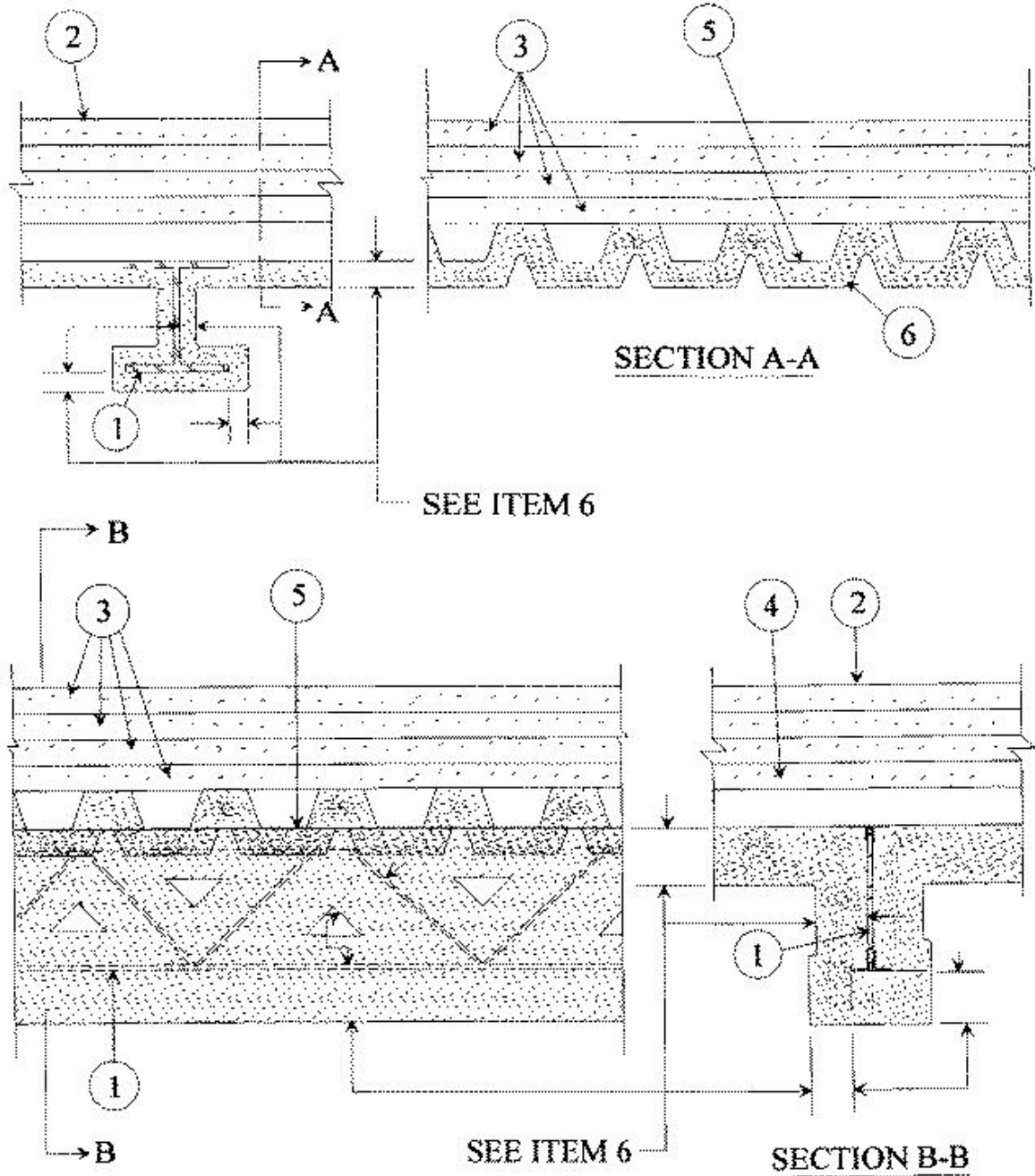
UL Design No. P741

January 04, 2007

Restrained Assembly Ratings — 1, 1-1/2 or 2 Hr (See Items 6 and 6A)
Unrestrained Assembly Ratings — 0, 1, 1-1/2 or 2 Hr (See Items 6 and 6A)
Unrestrained Beam Ratings — 1, 1-1/2 or 2 Hr (See Items 6 and 6A)

Restricted Load Condition — See Item 1

Load Restricted for Canadian Applications — See Guide [BXUV7](#)



1. Beam — Min W6x16 or Steel Joist - Min 10K1. Max tensile stress of 24 KSI.

2. Roof Covering* — Consisting of hot mopped or cold application bituminous 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).

2A. In lieu of Item 2, roof covering consisting of single-ply Roofing Membrane* that is either ballasted, adhered or mechanically attached as permitted under the respective manufacturer's Classification. See Fire Resistance Directory - Roof Membrane (CHCI).

2B. **Metal Roof Deck Panels*** — (Not shown) — In addition to or in lieu of Item 2 or 2A, the roof covering may consist of a mechanically fastened metal roof deck panel assembly. See Fire Resistance Directory — Metal Roof Deck Panels (CETW).

3. Roof Insulation — Foamed Plastic — Polyisocyanurate foamed plastic insulation boards nom 48 by 48 or 96 in., to be applied in one or more layers. Boards to be installed with end joints staggered a min of 6 in. No limit on max overall thickness.

ATLAS ROOFING CORP — AC Foam II, AC Foam III.

CARLISLE SYNTEC INCORPORATED — Types HP, HP-H, HP-N, HP-W.

THE DOW CHEMICAL CO — Types Hy-Therm AP, Hy-Therm Tapered.

FIRESTONE BUILDING PRODUCTS CO, DIV

OF BFS DIVERSIFIED PRODUCTS L L C — "ISO 95+GL", "ISO 300".

GAF MATERIALS CORP — Isotherm R.

HUNTER PANELS — H Shield.

JOHNS MANVILLE INTERNATIONAL INC — ENRGY 3, ISO-1, PSI 25.

LOADMASTER SYSTEMS INC — Loadmaster Polyisocyanurate Insulation.

RMAX INC — Multi-Max-3, Multi-Max FA-3, Ultra-Max.

STEVENS ROOFING SYSTEMS, DIV OF JPS

ELASTOMERICS CORP — "Stevens ISO 2000".

3A. **Building Units*** — Not Shown — As an alternate to Item 3, composite polyisocyanurate foamed plastic insulation board with an adhered nailing surface, nom 48 by 48 or 96 in. may be used with the following limitations. These composite building units have ventilation slots internal to the panels. The thickness of the panel depends upon the thinnest portion of the polyisocyanurate insulation. The minimum thickness shall follow table under item 6. There is no limit on the max insulation thickness.

GAF MATERIALS CORP — Type INSUL-AIR

JOHNS MANVILLE INTERNATIONAL INC — Type ISO-VENT.

3B. Building Units* — Not Shown — As an alternate to Item 3, Polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in., faced on the top surface with oriented strand board. Min thickness of the polyisocyanurate core shall follow table under item 6. No limit on max overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows. Adhesive (item 8) may be applied between the building units and/or the gypsum board (if used).

ATLAS ROOFING CORP — AC Foam Nailbase Insulation and Vented R.

THE DOW CHEMICAL CO — Hy-Therm Nail-Line.

FIRESTONE BUILDING PRODUCTS CO, DIV

OF BFS DIVERSIFIED PRODUCTS L L C — Nail Base.

MARTIN FIREPROOFING GEORGIA INC — Perform-A-Deck Nailable Roof Insulation.

3C. Roof Insulation-Mineral and Fiber Boards* — (Not Shown) - Optional, Applied in one or more layers over the Foamed Plastic (Item 3) to be applied with adhesive, asphalt or coal tar pitch (Item 9) or mechanically fastened (Item 10).

JOHNS MANVILLE INTERNATIONAL INC

3D. Building Units* — As an alternate to Item 3, polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in., faced on the top surface with oriented strand board. Min thickness of the polyisocyanurate core shall follow table under item 6. No limit on max overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows.

JOHNS MANVILLE INTERNATIONAL INC — Nailboard.

3E. Building Units* — As an alternate to Item 3, polyisocyanurate foamed plastic insulation boards faced on the underside (or both sides) with mineral fiber board. Min thickness of the polyisocyanurate core shall follow table under item 6. No limit on max overall thickness. Boards to be installed with end joints staggered a min of 6 in. adjacent rows. Adhesive (Item 8) may be applied between the building units and/or the gypsum board (if used).

FIRESTONE BUILDING PRODUCTS CO, DIV

OF BFS DIVERSIFIED PRODUCTS L L C — "ISO 95+ Composite"

JOHNS MANVILLE INTERNATIONAL INC — Fesco-Foam.

3F. Building Units* — As an alternate to Item 3, polyisocyanurate foamed plastic insulation boards faced on the underside with wood fiber board. Min thickness of the polyisocyanurate core shall follow table under item 6. No limit on max overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows.

FIRESTONE BUILDING PRODUCTS CO, DIV

OF BFS DIVERSIFIED PRODUCTS L L C — "ISO 95+ Composite".

JOHNS MANVILLE INTERNATIONAL INC — ENRGY-2 Plus.

3G. Building Units* — As an alternate to Item 3, polyisocyanurate foamed plastic insulation boards, nom 48 by 48 or 96 in., faced on the top surface with gypsum board. Min thickness of the polyisocyanurate core shall follow table under item 6. No limit on overall thickness. Boards to be installed with end joints staggered a min of 6 in. in adjacent rows. Adhesive (Item 8) may be applied between the building units and/or the gypsum board (if used).

JOHNS MANVILLE INTERNATIONAL INC — ENRGY 2 Gypsum Composite.

3H. Roof Insulation - Mineral and Fiber Boards* — As an alternate to Item 3, to be applied in one or more layers with or without adhesive. When more than one layer is required, each layer of board to be offset in both directions from layer below a min of 6 in. in order to lap all joints. Min thickness is 2 in. when Item 2 or 2A is used. Min thickness is 1 in. otherwise.

BMCA INSULATION PRODUCTS INC — Permalite

FIBREX INSULATIONS INC — FBX Baseboard and FBX Capboard.

GAF MATERIALS CORP — GARTEMP Perlite.

JOHNS MANVILLE INTERNATIONAL INC

ROXUL INC — Toprock.

3I. Roof Insulation - Foamed Plastic* — (Not Shown) As an alternate to Item 3 through 3H, polystyrene foamed plastic insulation boards, applied in one or more layers over gypsum wallboard. Min. thickness is 1.0 in. with no max overall thickness. Max density 2.5 pcf. When applied in more than one layer, each layer to be offset in both directions from layer below a min. of 6 in. in order to lap all joints. Boards secured to gypsum wallboard (if used) with asphalt glaze coat or adhesive (Item 8). Adhesive and/or asphalt glaze coat may be omitted when Item 2A is used. See Foamed Plastic (BRYX) category in the Building Materials Directory or Foamed Plastic (CCVW) category in the Fire Resistance Directory of for names of manufacturers.

4. Gypsum Board — (Not Shown) — (Classified or Unclassified) — May be used to obtain various Restrained or Unrestrained Assembly Ratings as described in Item 6. Supplied in sheets nom 4 by 8 or 12 ft by 5/8 in. thick. Min weight 2.2 psf. Applied perpendicular to steel roof deck direction with end joints staggered 2 ft in adjacent rows. End joints to occur over crests of steel roof units. See **Gypsum Board (CKNX)** category for names of manufacturers.

5. Steel Roof Deck — (Unclassified) — Min 1-1/2 in. deep and 36 in. wide galv fluted steel deck. Min gauge is No. 22 MSG. Ends overlapped at supports a min 2 in. and welded to supports 6 in. OC. Sidelaps button-punched together 24 in. OC at midspan. As an alternate to button-punching, adjacent units may be welded or fastened with 1/2 in. long hex head, self-drilling, self-tapping steel screws, 24 in. OC at midspan.

5A. Steel Roof Deck — (Unclassified) — Min 1-1/2 in. deep and 36 in. wide galv fluted steel deck. Min gauge is No. 22 MSG. Ends overlapped at supports a min 1-1/2 in. and welded to supports 12 in. OC and at side laps. Side laps fastened with 1/2 in. long hex head, self-drilling, self-tapping steel screws spaced a max of 36 in. OC. **Classified Steel Floor and Form Units*** Noncomposite 1-1/2 to 3 in. deep, 24 to 36 in. wide, min 22 MSG galvanized steel fluted units. Ends overlapped at supports a min 1-1/2 in. and welded to supports 12 in. OC and at side laps. Side laps fastened with 3/4 in. long No. 12 self-drilling, self-tapping steel screws at 36 in. OC.

As alternate to screw fasteners adjacent units may be button-punched or welded together 36 in. OC along side joints.

CANAM STEEL CORP — Type P-3606 or P-3615

UNITED STEEL DECK INC — Types B, BI, F, NS and NI. Units may be ptd/ptd.

VULCRAFT, DIV OF NUCOR CORP — Galv Types 1.5B, 1.5BI, 1.5F, 3N and 3NI, ptd/ptd units may be used for ratings up to 2 h.

VERCO DECKING INC - A NUCOR CO — Types PLB, PLB Formlok, HSB, PLN, PLN Formlok, N, N Formlok, and B Formlok. Units may be ptd/ptd.

WHEELING-PITTSBURGH STEEL CORP, DIV

OF WHEELING CORRUGATING CO — Type BW, F, High Strength B, High Strength BW, or N. Types BW, F, High Strength B, High Strength BW, N units may be ptd/ptd.

6. Spray-Applied Resistive Material* — 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. Steel deck surface must be "spatter" coated with Type DK2 Spray-Applied Fire Resistive Materials prior to application of spray-applied resistive material. Spray-applied resistive materials applied in accordance with the manufacturer's 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 spatter coat is included in the total final thickness of the protection material.

Restrained Assembly Rating	Unrestrained Assembly Rating	Unrestrained Beam Rating	On Beam	On 10K1 Joist	On 10K1 Joist at 4ft or less OC
1	0**	1	3/8, 1/2	11/16	5/8
1	1	1	3/8, 1/2	11/16	5/8
1	1	1	3/8, 1/2	11/16	5/8
1	1	1	3/8, 1/2	11/16	5/8
1	1	1	3/8, 1/2	11/16	5/8
1-1/2	1	1	3/8, 1/2	11/16	5/8
1-1/2	1	1	3/8, 1/2	11/16	5/8
1-1/2	1	1	3/8, 1/2	11/16	5/8
1-1/2	1	1	3/8, 1/2	11/16	5/8

1-1/2	1-1/2	1-1/2	5/8,13/16	1-3/16	1
1-1/2	1-1/2	1-1/2	5/8,13/16	1-3/16	1
1-1/2	1-1/2	1-1/2	5/8,13/16	1-3/16	1
1-1/2	1-1/2	1-1/2	5/8,13/16	1-3/16	1
2	1	1	3/8, 1/2	1-3/8	1-3/8
2	1	1	3/8, 1/2	1-3/8	1-3/8
2	1	1	3/8, 1/2	1-3/8	1-3/8
2	1	1	3/8, 1/2	1-3/8	1-3/8
2	2	2	7/8,1-1/8	1-1/2	1-3/8
2	2	2	7/8,1-1/8	1-1/2	1-3/8
2	2	2	7/8,1-1/8	1-1/2	1-3/8
2	2	2	7/8,1-1/8	1-1/2	1-3/8

For beams, the second thickness provided in the table above is applicable when the thickness applied to the beam lower flange edges is reduced by one-half.

Restrained Assembly Rating	Unrestrained Assembly Rating	Unrestrained Beam Rating	Minimum Insulation Thickness	On Deck with Gypsum Board#	On Deck with out Gypsum Board#
1	0**	1	3	N/A	13/16
1	1	1	3	3/4	1
1	1	1	2	3/4	1
1	1	1	1	1	1-1/8
1	1	1	0	1-1/2	1-1/2
1-1/2	1	1	3	1	1-1/4
1-1/2	1	1	2	1	1-5/16
1-1/2	1	1	1	1	1-9/16
1-1/2	1	1	0	2-1/8	2-1/8
1-1/2	1-1/2	1-1/2	3	1	1-1/4
1-1/2	1-1/2	1-1/2	2	1	1-5/16
1-1/2	1-1/2	1-1/2	1	1-1/2	1-9/16

1-1/2	1-1/2	1-1/2	0	2-1/8	2-1/8
2	1	1	3	1-1/4	1-9/16
2	1	1	2	1-1/4	1-3/4
2	1	1	1	2-1/16	2-1/16
2	1	1	0	2-11/16	2-11/16
2	2	2	3	1-1/4	1-9/16
2	2	2	2	1-1/4	1-3/4
2	2	2	1	2-1/16	2-1/16
2	2	2	0	2-11/16	2-3/4

#The required minimum thickness of Spray-Applied Fire Resistive Materials on the steel deck is increased by 1/16 in. for 1-1/2 hr Unrestrained Assembly Rating and 1/4 in. for 2 hr Unrestrained Assembly Rating when Item 8 is used.

**When the maximum clear span of the steel decking is 5 ft. 3 in. or less, the Unrestrained Assembly Rating is 1 hr.

SOUTHWEST FIREPROOFING PRODUCTS CO — Types DK, 4, 5, 5EF, 5GP, 5MD, 8GP, 8EF, 8MD, 9GP, 9EF, 9MD.

6A. Spray-Applied Resistive Material* — 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. Steel deck surface must be "spatter" coated with Type DK3 Spray-Applied Fire Resistive Material prior to application of spray-applied resistive material. Types 7GP and 7HD spray-applied resistive material applied in accordance with the manufacturer's application instructions. Min average and min individual density of 19/18 pcf, respectively. For method of density determination, see Design Information Section. Thickness of the spatter coat is included in the total final thickness of the protection material.

Restrained Assembly Rating	Unrestrained Assembly Rating	Unrestrained Beam Rating	On Beam	On 10K1 Joist	On 10K1 Joist at 4ft or less OC
1	0**	1	3/8, 1/2	11/16	5/8
1	1	1	3/8, 1/2	11/16	5/8
1	1	1	3/8, 1/2	11/16	5/8
1	1	1	3/8, 1/2	11/16	5/8
1	1	1	3/8, 1/2	11/16	5/8

1-1/2	1	1	3/8, 1/2	11/16	5/8
1-1/2	1	1	3/8, 1/2	11/16	5/8
1-1/2	1	1	3/8, 1/2	11/16	5/8
1-1/2	1	1	3/8, 1/2	11/16	5/8
1-1/2	1-1/2	1-1/2	5/8,13/16	1-3/16	1
1-1/2	1-1/2	1-1/2	5/8,13/16	1-3/16	1
1-1/2	1-1/2	1-1/2	5/8,13/16	1-3/16	1
1-1/2	1-1/2	1-1/2	5/8,13/16	1-3/16	1
2	1	1	3/8, 1/2	1-3/8	1-3/8
2	1	1	3/8, 1/2	1-3/8	1-3/8
2	1	1	3/8, 1/2	1-3/8	1-3/8
2	1	1	3/8, 1/2	1-3/8	1-3/8
2	2	2	7/8,1-1/8	1-1/2	1-3/8
2	2	2	7/8,1-1/8	1-1/2	1-3/8
2	2	2	7/8,1-1/8	1-1/2	1-3/8
2	2	2	7/8,1-1/8	1-1/2	1-3/8

For beams, the second thickness provided in the table above is applicable when the thickness applied to the beam lower flange edges is reduced by one-half.

Restrained Assembly Rating	Unrestrained Assembly Rating	Unrestrained Beam Rating	Minimum Insulation Thickness	On Deck with Gypsum Board#	On Deck with out Gypsum Board#
1	0**	1	3	N/A	13/16
1	1	1	3	3/4	1
1	1	1	2	3/4	1
1	1	1	1	1	1-1/8
1	1	1	0	1-1/2	1-1/2
1-1/2	1	1	3	1	1-1/4
1-1/2	1	1	2	1	1-5/16
1-1/2	1	1	1	1	1-9/16

1-1/2	1	1	0	2-1/8	2-1/8
1-1/2	1-1/2	1-1/2	3	1	1-1/4
1-1/2	1-1/2	1-1/2	2	1	1-5/16
1-1/2	1-1/2	1-1/2	1	1-1/2	1-9/16
1-1/2	1-1/2	1-1/2	0	2-1/8	2-1/8
2	1	1	3	1-1/4	1-9/16
2	1	1	2	1-1/4	1-3/4
2	1	1	1	2-1/16	2-1/16
2	1	1	0	2-11/16	2-11/16
2	2	2	3	1-1/4	1-9/16
2	2	2	2	1-1/4	1-3/4
2	2	2	1	2-1/16	2-1/16
2	2	2	0	2-11/16	2-3/4

#The required minimum thickness of Spray-Applied Fire Resistive Materials on the steel deck is increased by 1/16 in. for 1-1/2 hr Unrestrained Assembly Rating and 1/4 in. for 2 hr Unrestrained Assembly Rating when Item 8 is used.

**When the maximum clear span of the steel decking is 5 ft. 3 in. or less, the Unrestrained Assembly Rating is 1 hr.

SOUTHWEST FIREPROOFING PRODUCTS CO — Types 7GP and 7HD.

7. Metal Lath (Optional, not shown) — Metal lath may be used to facilitate the spray application of spray-applied resistive materials on steel bar joists and trusses. The diamond mesh, 3/8 in. expanded steel lath, 1.7 to 3.4 lb/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. O.C. max. When used, the metal lath is to be fully covered with spray-applied resistive materials with no min thickness requirements.

7A. Nonmetallic Fabric Mesh (Optional, not shown) — As an alternate to metal lath, glass fiber fabric mesh, weighing approximately 2.5 oz/sq yd, polypropylene fabric mesh, weighing approximately 1.25 oz/sq yd or equivalent, may be 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 resistive materials in place during application until it has cured. An acceptable method to attach the mesh is by embedding the mesh in minimum 1/4 in. long beads of hot melted glue. The beads of glue shall be spaced a maximum of 12 in. O.C. 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.

8. Adhesive* -(Optional) — (Bearing the UL Classification Marking for Roof Systems (TGFU)) - The gypsum wallboard or the first layer of roof insulation may be secured with adhesive to the steel crest surfaces. Also used to attach the gypsum wallboard to the first layer of insulation and each additional layer of insulation. Applied at a max rate of 19.8 g/ft². When FAST 100 adhesive is used, additional **Spray-Applied Fire Resistance Materials* (CHPX)** is required on the deck for the 1-1/2 and 2 hr Unrestrained Assembly Ratings. The thickness specified for the deck shall be increased by 1/16 in. for 1-1/2 hr Unrestrained Assembly Rating and 1/4 in. for 2 hr Unrestrained Assembly Rating.

CARLISLE SYNTEC INCORPORATED — FAST 100

9. Asphalt or Coal Tar Pitch* — (Optional) - (Not shown) - The gypsum board (item 4) or the first layer of roof insulation may be secured with asphalt or coal tar pitch to the steel crest surfaces at a max rate of 15 lb/100 sq ft. Also used to attach the first layer of insulation to gypsum board (item 4) and each additional layer of roof insulation, applied at a max rate of 25 lb/100 sq ft.

10. Mechanical Fasteners - (Optional) — (Not shown) - Mechanical screw-type fastener with metal or plastic washer designed for the purpose may be used to attach one or more layers of insulation to steel roof deck.

*Bearing the UL Classification Mark