

Design No. D743  
December 04, 2002

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

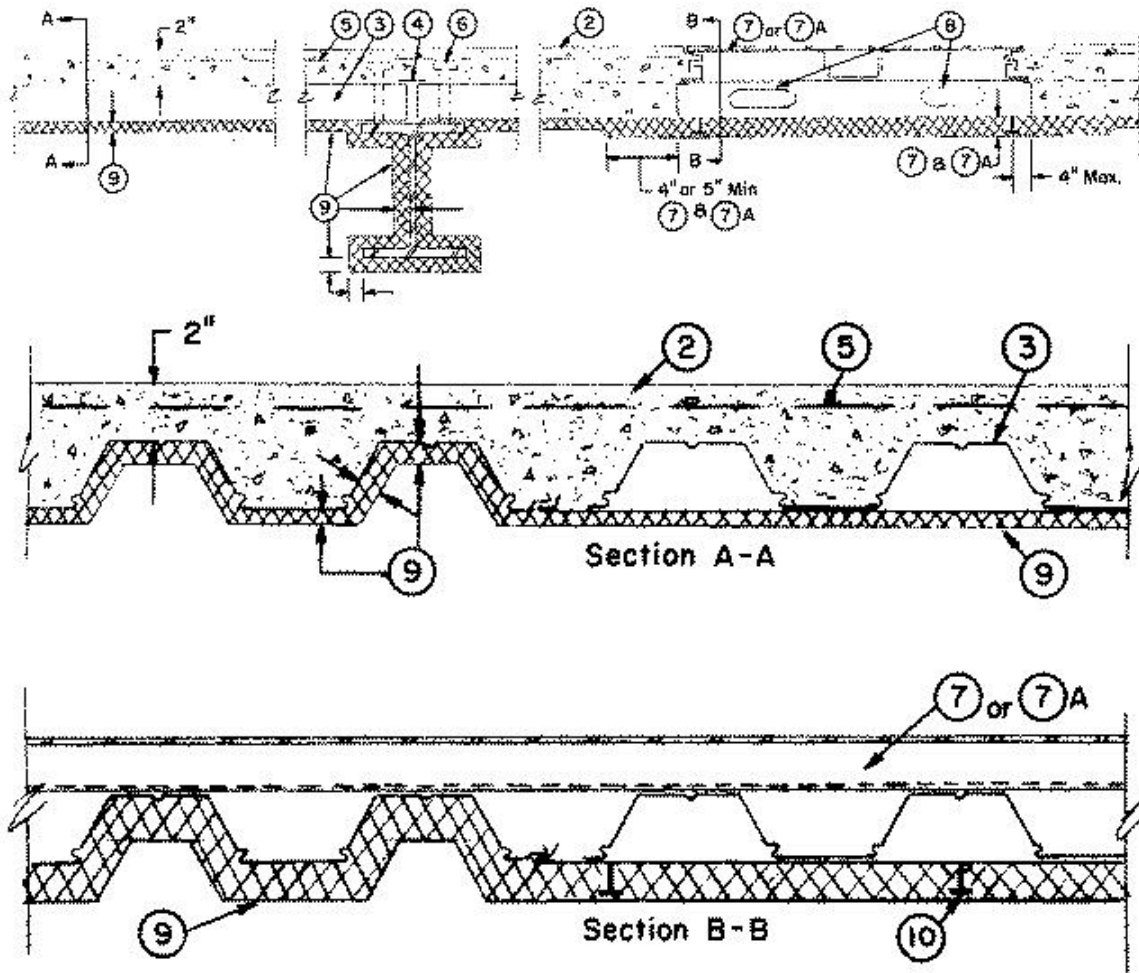
(See Items 1, 3A, 5A, 7A, 9, 9A, 9B, 10)

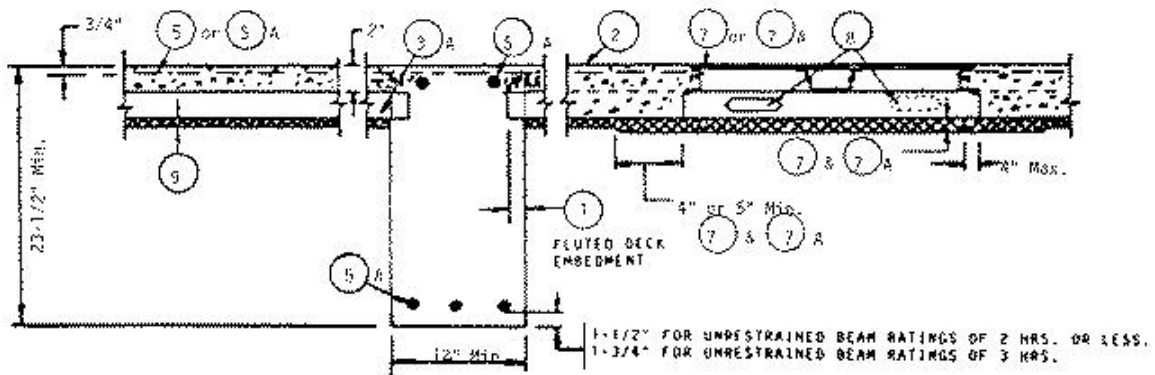
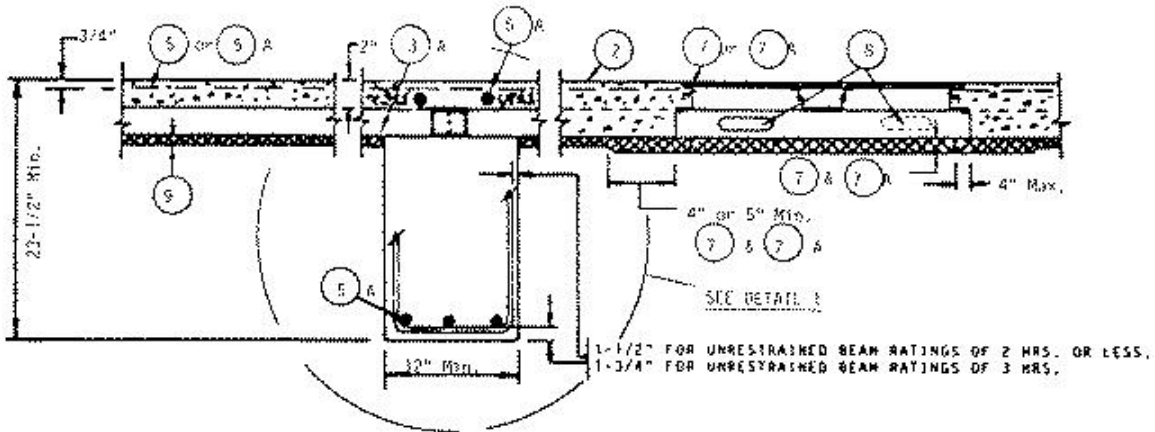
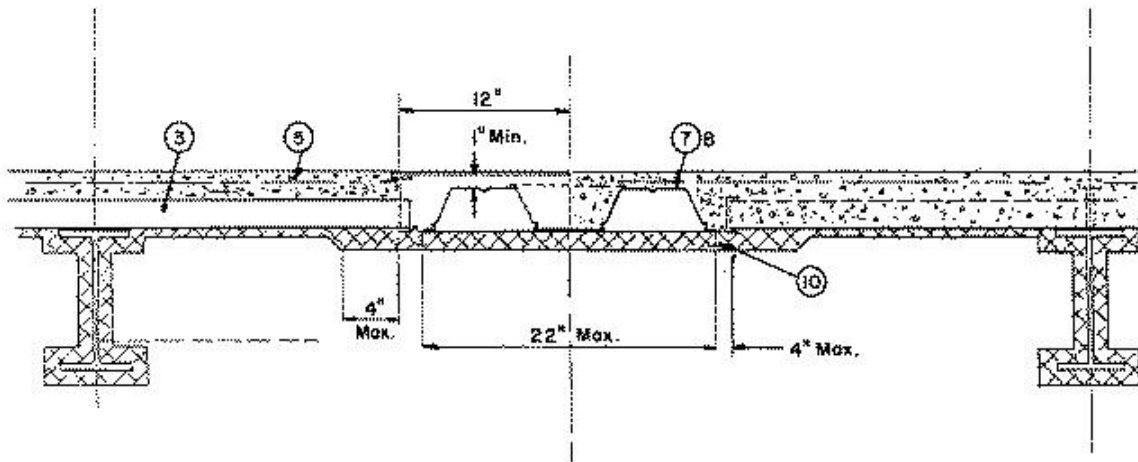
Unrestrained Assembly Ratings — 1, 1-1/2, 2 and 3 Hr.

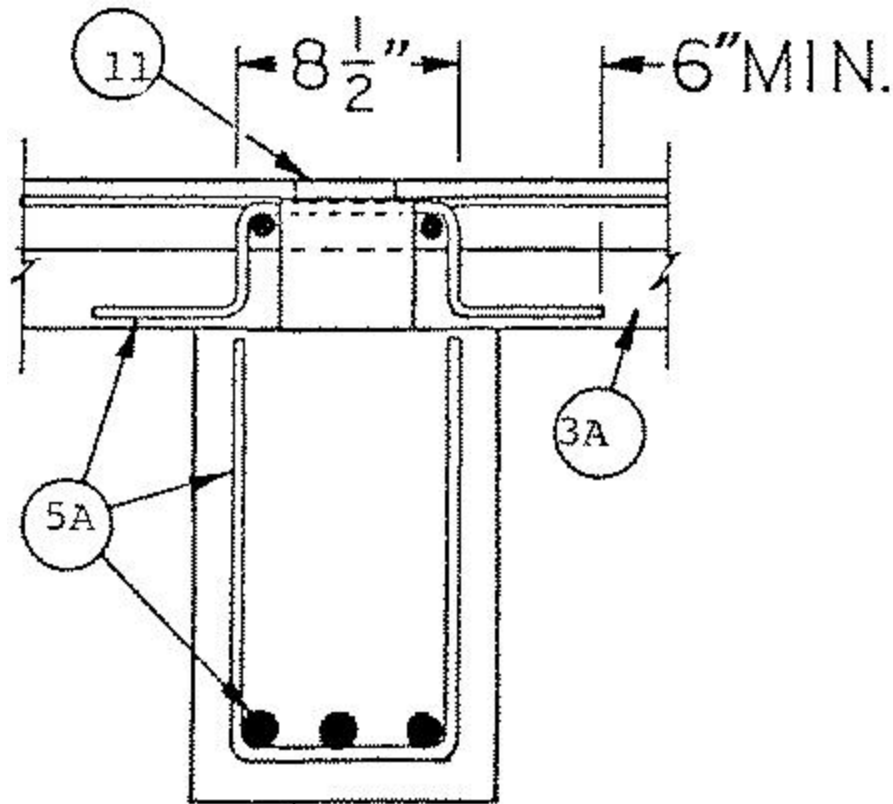
(See Items 1, 3A, 5A, 7A, 9, 9A, 9B, 10)

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

(See Items 1, 3A, 5A, 7A, 9, 10)







## DETAIL 1

1. **Beam** — W8X20 or W8X28, min size; W8x15, min size for 1 Hr Unrestrained Beam Rating with lightweight concrete only. As an alternate to steel beams, cast in place reinforced concrete beams or girders designed in accordance with the provisions of the Building Code Requirements for Reinforced Concrete (ACI 318-89), may be used as supports for the 3 in. deep floor units. See Item 3A.

Min width and depth of concrete beams shall be 12 and 23-1/2 in., respectively.

Fluted units shall be embedded in the concrete beams a min of 0.0139 times the clear span or 1-1/2 in., whichever is greater. The cellular units may be continuous or with a butted end joint centered over the concrete beams. For continuous floor spans, negative moment reinforcement for the slabs is required over the supporting beams.

2. **Normal Weight or Lightweight Aggregate Concrete** — Normal weight concrete, carbonate or siliceous aggregate; 150+ or -3 pcf unit weight, 3000 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; 110 +or -3 pcf unit weight, 3000 psi compressive strength, 4 to 7 percent entrained air, vibrated.

3. **Steel Floor And Form Units\*** — Composite 2 or 3 in. deep galv units. Min gauges are No. 22 MSG for fluted and No. 20/18 MSG for cellular. For spans with trench headers the allowable loading shall be based on noncomposite design. The following combination of units may be used: (1) all fluted; (2) all 24, 30 or 36 in. wide cellular; (3) any blend of fluted and 24, 30 or 36 in. wide cellular. Spacing of welds attaching units to supports shall not exceed 12 in. O.C. Adjacent units welded together 60 in. O.C. max along side joints.

**CONSOLIDATED SYSTEMS INC** — 24 or 36 in. wide Types CFD-2, CFD-3. Types CFD-2, CFD-3 units may be phos/ptd for the 1, 1-1/2 and 2 hr ratings.

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

**3A. Steel Floor and Form Units\*** — (For use with alternate cast in place concrete beams)— Composite 3 in. deep galv units. Fluted units may be uncoated. Min gauges are 20 MSG for fluted and 20/20 MSG for cellular. The ratio of blended units shall not exceed one 24 in. wide cellular unit to 36 in. wide fluted unit for the cast in place concrete frame buildings.

**4. Joint Cover** — 2 in. wide pressure-sensitive cloth tape applied following the contour of the steel floor units.

**5. Welded Wire Fabric** — 6 x 6 - W1.4 x W1.4.

**5A. Reinforcement** — Deformed bars of grade 60 steel, for use in floors supported by reinforced concrete beams or girders. Min size No. 3 bars for use as negative reinforcement or vertical stirrups for beams, girders or slabs. Min No. 5 bars for use as positive reinforcement for beams or girders. Min net concrete cover on the beam or girder bottom reinforcements, shall be 1-1/2 in. for Restrained Assembly Ratings up to 3 Hr and Unrestrained Assembly and Beam Ratings up to 2 Hr. For 3 Hr Unrestrained Assembly and Beam Ratings, 1-3/4 in. cover is required. When continuous cellular units intersect the supporting concrete beams (interrupting the beam stirrups), short pieces of additional stirrups shall be placed in the top part of the beam above the units.

**6. Shear Connector Studs — Optional** — Studs, 3/4 in. diam by 3 in. long for 2 in. deep floor units to 4 in. long for 3 in. deep floor units, headed type or equivalent per AISC Specifications. Welded to the top flange of beam through the steel floor units.

**7. Trench Header** — (Bearing the UL Listing Mark.) Constructed of steel with metal edge screeds. When the trench header is located near the supports the load carrying capacity of the span may be based on the allowable moment or shear stress of the form units at the edge of the trench away from the support, or on the allowable composite moment or shear capacity of the slab at the center of the span, whichever governs. The Spray-Applied Fire Resistive Materials thickness on floor units below this trench header shall be 7/8 in. under the valleys and flat plates and 1-1/8 in. in the crests for a max 2 Hr rating. This thickness shall extend a min of 5 in. beyond the edges of the trench header.

**7A. Trench Header** — Trench header (Bearing the UL Listing Mark), without the bottom pan may be used only with 3 in. deep units and with steel studs and discs (Item 10) on underside of the units. The allowable superimposed load for spans with bottomless trench shall be based on noncomposite design. This trench header, ranging in width from min 12 in. to max 36 in., consists of two cell closers which conform to the contour of the floor units, placed along the sides of the desired trench location and welded to the floor units. The side rail, consisting of extruded aluminum screeds secured to galv steel channels (min No. 18 MSG) are positioned over the cell closers, aligned and welded or riveted to the closers and floor units. A separate U-shaped channel (min No. 18 MSG) serving as the power compartment, is welded to the floor units. Steel cover plates, 1/4 in. thick shall be secured to the side rail. In bottomless trench headers wider than 18 in., each side joint of the steel floor units shall be welded or riveted together with a 1 in. long weld near the trench header centerline. For QL-GKX-24 or -30 cellular floor units only, a separate KED-PTS (UL Listed) power transition sleeve is secured to power compartment with one rivet or screw. The use of this trench requires additional protection underneath the trench. Fireproofing thickness shall be as follows:

Rating Hr	Min Spray Applied Fire Resistive Mtl Thkns In.	
	Crests	Valley
1	1 3/16	1
1 1/2	1 1/2	1 1/4
2	1 3/4	1 5/8
3*	2 1/2	2 5/16

These thickness shall extend a min of 4 in. beyond the edge of the trench header.

\*Unrestrained Assembly Rating is 2 Hr. Restrained Assembly Rating limited to use of normal weight concrete.

**7B. Feeder Duct System** — (As an alternate to Items 7 or 7A). Consists of 3 in. deep, nom 24 in. wide, 20/18 MSG Type QL-WKM or QL-WKM-E cellular steel floor unit (feeder duct) and nom 24 by 24 in. junction boxes. The valley between the two cells of the feeder duct may or may not be covered by a steel plate to form a third cell. Feeder duct installed at the same elevation and perpendicular to 2 or 3 in. deep fluted and/or cellular steel floor units which are cantilevered from support beams on one or both sides of the feeder duct. The junction boxes consisting of extruded aluminum screeds, 18 galv steel outside flute closures, 16 galv steel compartment divider and 0.21 in. thick steel cover plate are used at intersections of 2 or 3 in. cellular units and the feeder duct, where desired. Bottom tabs of the flute closures are fastened to the valleys of the 2 or 3 in. units and to the feeder duct with self-drilling tek fasteners, while the cover plate is retained in position by four latch clips, one near each corner of the plate. The height and level of the aluminum screed are adjusted by four adjustment screws, two each on opposite sides. In between the junction boxes the ends of the 2 or 3 in. fluted and/or cellular units are covered with steel end closure angles tack-welded to the top of the units.

Welded wire fabric (Item 5) extends over the feeder duct between junction boxes. The allowable superimposed load for spans with the feeder duct system shall be based on noncomposite design. Steel studs with discs (Item 10) shall be welded to the underside of the feeder duct in two rows. The spacing between rows shall not exceed 22 in. OC and the spacing of studs in each row shall not exceed 24 in. OC. The use of this feeder duct system requires additional protection underneath the feeder duct.

<b>Rating Hr</b>	<b>Min Spray Applied Fire Resistive Mtl Thkns In.</b>
1	1 1/4
1 1/2	1 1/2
2	1 3/4
3*	2 1/2

These thicknesses shall extend a min of 4 in. beyond the edges of the feeder duct.

\*Unrestrained Assembly Rating is 2 Hr Restrained Assembly Rating limited to use of normal weight concrete.

**H H ROBERTSON** — 24 in. wide Type QL-WKM or QL-WKM-E.

**8. Access Openings** — As required with grommets.

**9. Spray-Applied Fire Resistive Materials** — \*Applied by mixing with water and spraying in more than one coat to a final thickness as shown above and below to steel surfaces which must be clean and free of dirt, loose scale and oil. When steel deck is used, the area between the steel deck and the beams top flange shall be filled. Min avg and min ind density of 15/14 pcf respectively. Min avg and min ind density of 22/19 pcf respectively for Types Z-106 and Z-106/G. Min avg and min ind density of 40/36 pcf respectively for Z-146. Application to steel deck requires the installation of expanded metal lath with Type Z-146 . See Item 12. For method of density determination see Design Information Section. Types 4, 5GP, 8GP, 9GP, MK-4 may be used only in general floor areas without concrete penetrations with all fluted steel floor units or blends consisting of one or more fluted units to one 24 in. wide max cellular unit, 1-1/2 or 3 in. deep, with cells spaced approx 6 and 8 in. respectively. Type Z-106 may be used only in general floor areas without concrete penetrations with all fluted steel floor units. Use of a spatter coat, Type DK, SK-1 or SK-III is required on all cellular units with flat plate on the bottom, optional on other steel surfaces. Thickness of the spatter coat is included in the total final thickness of the protection material.

Restrained Assembly Rating Hr	Min Required Unrestrained Beam Rating Hr	Min Spray Applied Fire Resistive Mtl Thkns on Beam In.				
		NW W8x20	W8x28	W8x15	LW W8x20	W8x28
1	1	1/2	1/2	5/8	5/8	5/8
1-1/2	1	1/2	1/2	5/8	5/8	5/8
1-1/2	1 1/2	3/4	3/4	—	7/8	3/4
2	1	1/2	1/2	5/8	5/8	5/8
2	2	1	7/8	—	1-1/8	1
3	3	1-7/16	1-1/4	—	1-3/4	1-9/16

Concrete Type	Min Spray Applied Fire Resistive Mtl Thkns In. General Floor Area	Restrained Assembly Rating Hr	Unrestrained Assembly Rating Hr
NW	1/2	1	1
LW	9/16	1	1
LW	3/4	1 1/2	1-1/2
NW	11/16	2	1-1/2
NW	5/8*	2	1
LW	5/8**	2	1
NW	13/16	2	2
LW	15/16	2	2
NW	1-1/4	3	3
LW	1-7/16	3	3

\*Only applicable to floors consisting of all 2 or 3 in. fluted units without trench headers or other (insert) penetrations.

\*\*Only applicable to floors consisting of 2 or 3 in. fluted and/or cellular units without trench header or other (insert) penetrations.

**ARABIAN VERMICULITE INDUSTRIES** — Type MK-5, MK-6/HY, MK-6s, SK-3, Z-106, Z-106/G, Z-146 investigated for exterior use, Sonophone 1, Sonophone 5, Sonophone 35 .

**GRACE CANADA INC** — Types MK-5, SK-1.

**GRACE KOREA INC** — Types MK-6/CBF, MK-6/ED, MK-6/HY, MK-6s, Monokote Acoustic 1, Monokote Acoustic 5, SK-3, Z-106, Z-106/G, Z-146 investigated for exterior use, Monokote Acoustic 35.

**PYROK INC** — Type LD.

**SOUTHWEST VERMICULITE CO** — Types 4, 5, 5EF, 5GP, 5MD, 8EF, 8GP, 8MD, 9EF, 9GP, 9MD, DK.

**VERMICULITE PRODUCTS INC** — Types MK-5, SK-1, VP5.

**W R GRACE & CO - CONN CONSTRUCTION PRODUCTS DIV** — Types MK-4, MK-5, MK-6/HY, MK-6s, Monokote Acoustic 1, Monokote Acoustic 5, RG, SK-3, Z-106, Z-106/G, Z-146 investigated for exterior use, Monokote Acoustic 35.

**10. Steel Stud With Discs** — The stud consists of a No. 12 SWG galv wire with one end welded to a 1-3/16 in. diam No. 28 MSG (0.020 in. thick) galv steel disc. The length of studs shall be 3/8 in. less than the thickness of the Spray-Applied Fire Resistive Materials. The total number of studs shall avg at least one stud per 236 sq in. of cellular floor units beneath the trench header. The ends of studs opposite the discs shall be welded to the cellular floor units in rows running parallel with the trench header. The distance between the outer rows and the edge of the trench header shall not exceed 4 in. The spacing between the rows shall not exceed 22 in. The spacing between studs in each row shall not exceed 24 in.

**11. Electrical Inserts** — (Not shown) — Classified as "**Outlet Boxes and Fittings Classified for Fire Resistance**" \* may be used with normal weight concrete only.

(1) Robertson Co., H. H. Inserts

**(Tapmate II, -II-EA, -II-FN, -II-EAFN; Series KEB)**

Installed per accompanying installation instructions over factory-punched holes in QL-AKX or QL-WKX floor units. Inserts are used in the pre-active, active or abandoned condition. Spacing shall be not more than one insert in each 7 1/2 sq ft of floor area with not less than 25 1/2 in. between edges of adjacent inserts. For ratings of 2 Hr max, the required Spray-Applied Fire Resistive Materials thickness on QL-AKX or QL-WKX floor units is 1 3/16 in. For 3 Hr max ratings, the required thickness below inserts shall be 1-13/16. When Tapmate II or II-EA electrical inserts are used. When Tapmate II-FN or II-EAFN electrical inserts are used, no additional thickness of Spray-Applied Fire Resistive Materials is required beyond that specified for the general floor area. For the Tapmate II or II-EA inserts, the required thickness below inserts shall be sprayed the entire width and length of floor units between supports and extend beyond the edge of inserts onto adjacent units for a horizontal width of 12 in. The holes cut in insert cover for passage of wires shall be no more than 1/8 in. larger diam than the wire. For abandonment of Tapmate inserts, see installation instructions. Abandonment requires use of KEB-PC or -PCL insert cover with no holes in it (for all Tapmate inserts), or an abandonment plate for Tapmate II only, or a KEB-PC2 or -PC2-A1 abandonment cover for Tapmate II-EA and II-EAFN only.

The Tapmate II-FN insert may use KEB-HP-1 outlet box fittings in lieu of the KEB-PC flush cover fittings.

**H H ROBERTSON** — Tapmate II, II-EA, II-FN, II-EAFN; Series KEB.

**(Tapmate IIIFN, IIIEAFN; Series KEC).**

Installed per accompanying installation instructions over factory-punched holes in QL-AKD or QL-WKD floor units. Inserts are used in the pre-active, active or abandoned condition. Spacing shall be not more than one insert in each 7 1/2 sq ft of floor area with not less than 25 1/2 in. between edges of adjacent inserts. When Tapmate III FN or III EAFN electrical inserts are used, no additional thickness of Spray-Applied Fire Resistive Materials is required beyond that specified for the general floor area. The holes cut in insert cover for passage of wires shall be no more than 1/8 in. larger diam than the wire. For abandonment of Tapmate inserts, see installation instructions.

The Tapmate III insert may use KEB-HP-1; Series KEC outlet box fittings with the same hourly rating, insert spacing and fireproofing thicknesses as specified for the Tapmate III-EAFN electrical inserts.

Abandonment of Tapmate III-FN requires use of KEC-PC insert cover with no holes in it. Abandonment of Tapmate III-EAFN requires use of KEC-PC5 insert cover with no holes in it and use of KEC-PC6 insert cover in lieu of either KEC-PC12 or -PC13 insert cover.

**H H ROBERTSON** — Tapmate II, -II-EA, -II-FN, -II-EAFN; Series KEB, Tapmate IIIFN, IIIEAFN; Series KEC.

12. **Metal Lath** — (Not Shown) —(Required with Z-146, Sonophone 35 and Monokote Acoustic 35, otherwise optional)—Metal lath shall be 3/8 in. expanded diamond mesh, weighing 2.5 lb per sq yd. Secured to underside of steel deck with No. 12 by 3/8 in. pan head self-drilling, self-tapping screws and steel washers with an outside diam of 1/2 in. screws spaced 12 in. OC in both directions with lath edges overlapped approx 3 in.

\*Bearing the UL Classification Mark

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