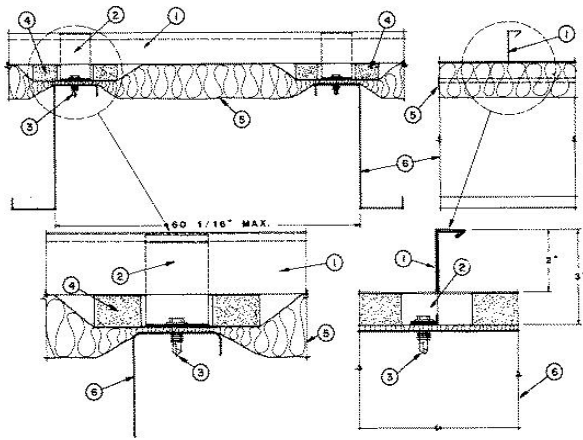


Construction No. 90
 Uplift — Class 90
 Fire Not Investigated



1. Metal Roof Deck Panels* — No. 24 MSG min gauge coated steel, max width 16 in. Panels continuous over two or more spans. End lap to occur over purlins and to include End Lap Back-up Plate (Item 2B or 2C.) Ends of panels overlapped 6 in. Side laps to be tightened and crimped with a special motorized crimping machine at a minimum 45 degree angle with crimping process to include tabs of Panel Clips (Item 2). A bead of sealing compound may be used at panel end and side laps.

METAL ROOFING SYSTEMS INC — "MRS System 2500"

2. Roof Deck Fasteners* (Panel Clips) — Two part assembly: Base, 1 in. wide approximately 1-1/4 in. long with upper segment folded over lower end of tab. Fabricated from 0.050 in. thick coated or stainless steel. Upper tab 3 in. wide, maximum tab height 3-1/2 in. with lower end formed to engage base. Fabricated from 0.023 in. thick coated or stainless steel. One piece assembly; 3 in. wide, approximately 2 in. high with two or three guide holes in base. Fabricated from No. 22 MSG coated steel. Two piece assembly; base approximately 2 in. wide, 1-11/16 in. long formed to engage upper tab. Fabricated from No. 16 MSG coated steel. Tab approximately 4-5/16 in. wide; 2-3/8 in. or 2-7/8 in. high, formed to engage base. Fabricated from No. 22 MSG coated steel. Base to have two guide holes.

3. Fasteners — (Screws) — For attaching panel clips to purlins- 1/4 - 14 by 1 in. long shoulder or stand off type, self-drilling, self-tapping, hex-head plated steel screws. One screw per clip to be used. As an alternate fastener for panel clip to purlin attachment a No. 12-14 by 1 in. long self-drilling, self-tapping, hex-head plated steel screw may be used. Fasteners used at end laps-1/4 - 10 by 1 in. long self-drilling, self-tapping, hex-head plated steel screws with 1/2 in. OD metal backed sealing washer, spaced on a 1, 3, 3-1/2, 3-1/2, 3, 1 in. pattern.

4. Thermal Spacer Block — Used over purlins. Expanded polystyrene 1 in. thick, 5 in. wide, 48 in. long with cutout to accommodate panel clips.

5. Insulation — (Optional) — Any compressible blanket type 4 in. max thickness before compression. An additional 2 in. max thickness of compressible blanket insulation may be used between purlins. The additional insulation shall not be sandwiched between the upper

flange of the Purlin and the Metal Roof Deck Panel. As an alternate method of installation, a max of 6 in. of compressible blanket insulation may be used. The insulation is to be laid over the purlins and slit along the purlins to a depth of 5 in. (1 in. above the purlin) in such a manner that no material in excess of 4 in. is sandwiched between the purlins and the Roof Deck Panels.

6. Purlins — Z-shaped, 0.056 in. min thickness steel (40,000 psi min yield strength) or min "H" series open web steel joists. Maximum spacing 60-1/4 in.

7. Building Units — * (Optional) — Prefabricated assemblies of a Skylight Panel, (Item 7B), mounted in a Perforated Metal Roof Deck Panel, (Item 1), with Flashings, (Item 7C). Assembly continuous over two spans erected in the same manner as for Metal Roof Deck Panels.

7A. Perforated Metal Roof Deck Panels — No. 24 MSG min gauge coated steel perforated in the flat portion.

7B. Plastic Skylight — * (Translucent, glass fiber reinforced plastic panel) — Thickness 0.04 in. (nom) formed to fit the Perforated Metal Roof Deck Panel, (Item 7A).

7C. Flashing — No. 20 MSG min gauge coated steel. Attached to the Building Unit to retain and flash the Plastic Skylight to the Perforated Metal Roof Deck Panel.

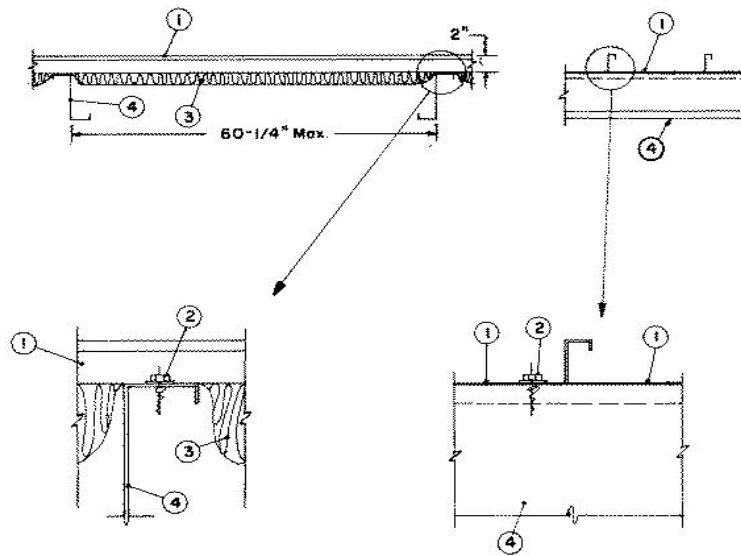
8. Insulating Units — (Optional) — Prefabricated assemblies of a Plastic Insulating Skylight Pan, (Item 8B), mounted in an Aluminum Frame, (Item 8A). Assembly spans between adjacent Purlins beneath a Building Unit only.

8A. Aluminum Frame — Extruded aluminum alloy, 0.055 in. min thickness, shop assembled.

9. Insulation Trim — No. 24 MSG min gauge coated steel. Used at the sides of the Building Unit.

10. Reinforcing Plate — (Not Shown) — Min 0.05 in. thick coated steel. Max length 15-1/2 in., width 5-1/4 in. Used at downslope end lap of Building Unit to Metal Roof Deck Panel. Refer to General Information, Roof Deck Constructions (Roofing Materials and Systems Directory) for items not evaluated.

*Bearing the UL Classification Mark



1. **Metal Roof Deck Panels*** — No. 24 MSG min gauge coated steel, 16 in. max width. Panels continuous over two or more spans. End lap to occur over purlins with panels overlapped 6 in. with lap beginning 1 in. from purlin rib and extending across purlin flange. Side joints to be crimped with a special motorized crimper to a minimum 45 degree angle. A bead of sealing compound may be used at panel end and side laps. For Morin Corp., seams may be 45°, 90°, or 180°.

METAL ROOFING SYSTEMS INC — "MRS System 2500"

2. **Fasteners** — For panel to purlin connections to be No. 12-14 by 1 in. self-drilling, self-tapping, hex-head plated steel screws with a separate 1/2 in. OD plated steel washer and a neoprene sealing washer. Spacing to be 16 in. OC with one fastener located 2 in. from the female side of each panel. Spacing at end lap to be in a 1-1/2, 3, 3-1/2, 3-1/2, 1 in. pattern beginning from the female side rib.

3. **Insulation** — (Optional) — Any compressible blanket insulation, 4 in. max thickness before compression.

3A. **(Optional)** — An additional 2 in. max thickness of compressible blanket insulation may be used between purlins. The additional insulation shall not be sandwiched between the upper flange of the purlin and the roof deck panel.

4. **Purlins** — 0.056 in. min thickness steel (40,000 psi min yield strength).

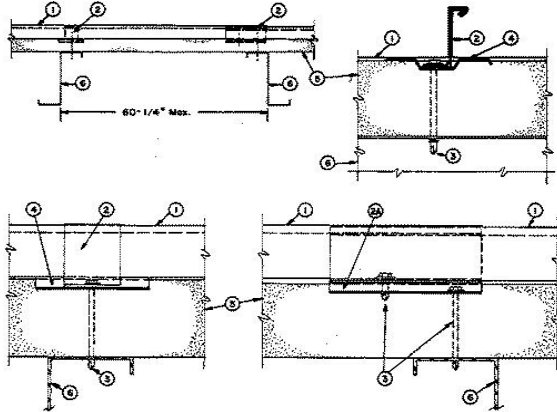
Refer to General Information, Roof Deck Constructions (Roofing Materials and Systems Directory) for items not evaluated.

*Bearing the UL Classification Mark

Construction No. 180

Uplift — Class 90

Fire Not Investigated



1. **Metal Roof Deck Panels** — * — No. 24 MSG min gauge coated steel, 16 in. max width. Panels continuous over two or more spans. End lap to occur over purlins and to include End Lap Back-Up Plate (Item 2A or 2B). Ends of panels overlapped 6 in. beginning 1 in. from purlin web and extending across purlin upper flange. Side laps to be tightened and crimped with special motorized crimping machine to a minimum 45 degree angle with crimping process to include tabs of panel clips (Item 2). A bead of sealing compound may be used at panel laps and side joints. For Morin Corp., seams may be 45°, 90°, or 180°.

METAL ROOFING SYSTEMS INC — "MRS System 2500"

2. **Roof Deck Fasteners* (Panel Clips)** — Two part assembly: Base, 1 in. wide approximately 1-1/4 in. long with upper segment folded over lower end of tab. Fabricated from 0.050 in. thick coated or stainless steel. Upper tab 3 in. wide, maximum tab height 3-1/2 in. with lower end formed to engage base. Fabricated from 0.023 in. thick coated or stainless steel.

Spacing for clip to be 5 ft 0-1/16 in. OC with clips located over purlins (Item 6).

3. **Fasteners (Screws)** — For attaching panel clips to purlins-to be 1/4-14 shoulder or stand-off type; self-drilling, self-tapping, hex-head, plated steel screws. Fastener length to vary with thickness of insulation and to be min of 3/4 in. longer than nom thickness of rigid insulation. One fastener per clip to be used at each purlin. As an alternate fastener for panel clip to purlin attachment, a No. 12-14 self-drilling, self-tapping, hex-head plated steel screw may be used. Same length detail as for 1/4-14 screws to apply. Fasteners used at end laps to be 1/4-10 by 1 in. long self-drilling, self-tapping, hex-head plated steel screws with 1/2 in. OD metal backed sealing washers. Spaced in a 1, 3, 3-1/2, 3-1/2, 3, 1 in. pattern.

For Building Unit-to-Panel side lap connections — No. 18-9 by 1 in. long self-drilling, self-tapping, hex-head plated steel screws with a separate 1/2 in. OD plated steel washer and a neoprene sealing washer. One fastener required at each end and one at midspan of each rib of the Building Units.

For Reinforcing Plate-to-Building Unit end lap connection — No. 18-9 by 1 in. long self-drilling, self-tapping, hex-head plated steel screws with a separate 1/2 in. OD. plated steel washer and a neoprene sealing washer.

4. **Roof Deck Fastener * (Bearing Clip)** — No. 18 MSG min gauge coated steel; 3 in. wide by 3-1/4 in. long with 3/8 in. legs. Used under Panel Clips (Item 2) over purlins and rigid insulation. Three 1/4 in. dia guide holes located in base.

5. **Foamed Plastic*(Rigid insulation)** — Rigid type. Supplied in 4 ft wide sheets. Min thickness 1 in., max thickness 3 in. Butt joints to occur over purlins.

6. **Purlins** — 0.056 in. min thickness steel (min yield strength 40,000 psi) or min "H" series open web steel joists. Maximum spacing 60-1/4 in.

7. **Building Units** — * — (Optional) — Prefabricated assemblies of a Skylight Panel, (Item 7B), mounted in a Perforated Metal Roof Deck Panel, (Item 7A), with Flashings, (Item 7C). Assembly continuous over two spans erected in the same manner as Metal Roof Deck Panels.

8. **Insulating Units** — (Optional) — Prefabricated assemblies of a Plastic Insulating Skylight Pan, (Item 8B), mounted in an Aluminum Frame, (Item 8A). Assembly spans between adjacent purlins beneath a Building Unit only.

9. **Insulation Trim** — No. 24 MSG min gauge coated steel. Used at the sides of the Building Unit.

10. **Reinforcing Plate** — Min 0.05 in. thickness coated steel. Max length 15-1/2 in., width 5-1/4 in. Used at downslope end lap of Building Unit to Metal Roof Deck Panel.

Refer to General Information, Roof Deck Constructions (Roofing Materials and Systems Directory) for items not evaluated.

11. **Liner Panel** — (Optional) — The following liner panel types may be used:

- A. No. 27 MSG min coated steel; .7 in. deep with major ribs having a 2 in. wide crest and spaced 8 in. O.C. cover width 32 in. Panel to be installed with major ribs down. (Min. yield strength to be 40,000 psi.)
- B. No. 29 MSG min coated steel; 9/16 in. deep with ribs having a 3/4 in. wide crest and spaced 2.667 in. O.C. (Min. yield strength to be 80,000 psi.)
- C. 0.018 in. min thickness aluminum (3105 H 194 alloy). 9/16 in. deep with ribs having a 3/4 in. wide crest and spaced 2.667 in. O.C. (Min. yield strength 30,000 psi)

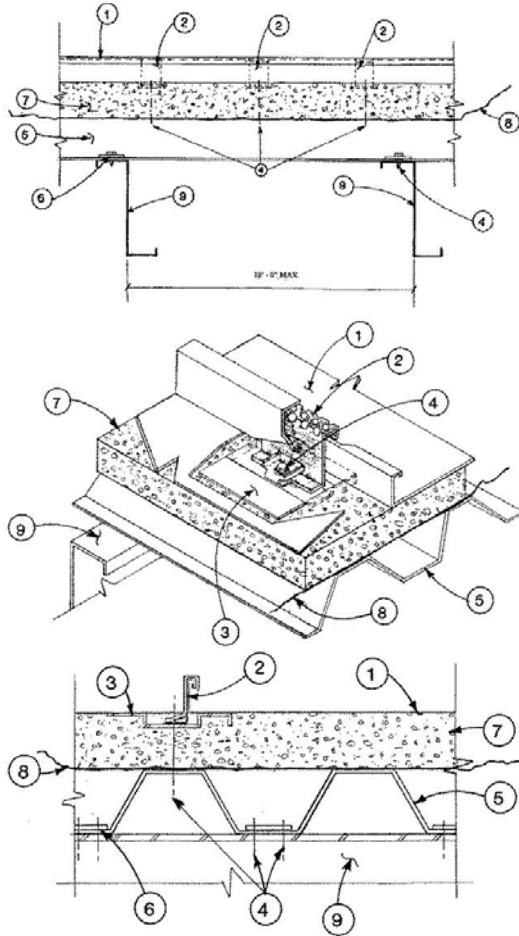
All types to have adjacent widths overlapped min. of one corrugation at sides. End laps to be located over purlins with min. overlap to be 3 in. Liner panels to be fastened to purlins using No. 18-9 by 1 in. self-drilling, self-tapping, hex-head plated steel screws with an optional 1/2 in. O.D. plated steel washer and a neoprene sealing washer. Fasteners to be located one at each side lap and one in the approximate center of each panel width.

Refer to General Information, Roof Deck Constructions (Roofing Materials and Systems Directory) for items not evaluated.

*Bearing the UL Classification Mark

Construction No. 238

Uplift — Class 90
Fire Not Investigated



1. **Metal Roof Deck Panels*** — No. 24 MSG min coated steel. Panels 16 in. wide, 2 in. high at side ribs. Panels continuous over two or more spans. End laps to occur near panel clip locations and to include end lap back up plate (Item 2A). Ends of panels overlapped 6 in. Side laps to be tightened and crimped with a special motorized crimping machine at a maximum 45 degree angle unless indicated in the individual panels in this item. Crimping process to include tabs of panel clips (Item 2). A bead of sealing compound may be used at panel end laps and side joints.

METAL ROOFING SYSTEMS INC — "MRS System 2500"

2. **Roof Deck Fasteners (Panel Clips)** — Two part assembly: Base, 1 in. wide approximately 1-1/4 in. long with upper segment folded over lower end of tab. Fabricated from 0.050 in. thick coated or stainless steel. Upper tab 3 in. wide, maximum tab height 3-1/2 in. with lower end formed to engage base. Fabricated from 0.023 in. thick coated or stainless steel.

2A. **Roof Deck Fasteners (End Lap Back-Up Plate)** — (Not Shown) — No. 18 MSG min gauge coated steel. Max length 48 in., width 6-1/2 in.

2B. **Roof Deck Fasteners** — (Panel Clips) - Two types, both two piece assemblies. Type 330 base approximately

1.88 in. by 1.70 in.; Type 330B base approximately 1.11 in. by 2.00 in. Both types fabricated from No. 16 MSG coated steel and formed to fold over upper tab. Type 330 upper tab 4.30 in. wide and 2.91 in. high max. Type 330B upper tab 4.30 in. wide and 3.34 in. high max. Both types formed to engage base. Clips spaced 48 in. maximum.

3. **Roof Deck Fastener* (Bearing Clip)** — No. 18 MSG min gauge coated steel; 3 in. wide by 3-1/4 in. long with 3/8 in. legs. Used under Panel Clips (Item 2) over purlins and rigid insulation. Three 1/4 in. dia guide holes located in base.

4. **Fasteners (screws)** — Fasteners used to attach the bearing plates to the liner panels to be No. 11 by 3-3/4 in. long self-drilling, stand-off plated steel, flat torx-head screws. Three fasteners per bearing plate used, driven into liner panel. Fasteners used to attach panel clips (Item No. 2) to the bearing plates (Item 3) to be No. 18 by 1 in. long self-drilling, self-tapping, hex-washer-head, plated steel screws. One screw used for each panel clip. Fasteners used to attach the liner panels to the purlin supports to be No. 12-14 by 1-1/4 in. self-drilling, self-tapping, hex-head, plated steel screws with a separate 5/8 in. diameter steel washer and a neoprene sealing washer. Two fasteners to be used at each support with fasteners located in every valley. Fasteners used at liner panel side laps to be the same type as liner panel screws and spaced 20 in. OC. Fasteners used at end laps to be 1/4-10 by 1 in. long self-drilling, self-tapping, hex-head, plated steel screws with 1/2 in. OD. metal backed sealing washers. Spacing to be in a 1, 3, 3-1/2, 3-1/2, 3, 1 in. pattern.

5. **Liner Panel** — The liner panel to be 3 in. deep and fabricated from No. 22 MSG min steel. Top of crests to be 5-1/2 in. wide, valleys to be 2-1/2 in. wide at top. Yield strength to be min 33,000 psi. Liner panel to be fastened to supports with screws indicated under Item 4 or with welds and weld washers of type indicated by manufacturer of liner panel. Welds to be located in every valley.

6. **Fastener Reinforcement (Bearing Plate)** — The reinforcements used with the screws attaching the liner panels to the purlins to be 0.125 in. min thick and to have an area of approximately 2 sq in.

7. **Foamed Plastic** — (Rigid Insulation) — Supplied in 4 ft wide sheets. Min thickness to be 1 in. Density to be min of 2.0 PCF or see products Classified under TJBX.

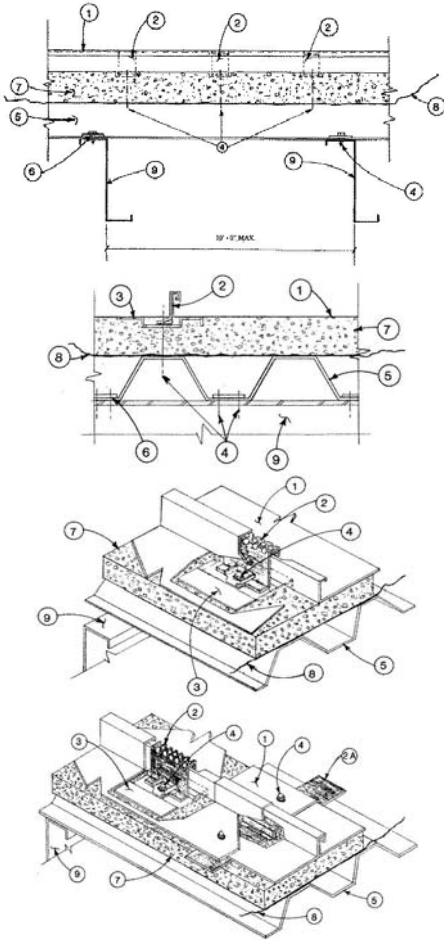
8. **Vapor Barrier** — Used between the liner panel and the foamed plastic to be a 6 mil plastic sheeting.

9. **Purlins** — No. 12 MSG min gauge steel (min yield strength 40,000 psi) or min type H open web joists.

Refer to General Information, Roof Deck Construction, (Roofing Materials and Systems Directory) for Items not evaluated.

*Bearing the UL Classification Mark

Construction No. 238A
 Uplift — Class 90
 Fire Not Investigated



1. **Metal Roof Deck Panels*** — No. 24 MSG min coated steel. Panels 16 in. wide, 2 in. high at side ribs. Panels continuous over two or more spans. End laps to occur near panel clip locations and to include end lap back-up plate (Item 2A). Ends of panels overlapped 6 in. Side laps to be tightened and crimped with a special motorized crimping machine at a maximum 45 degree angle unless indicated in the individual panels in this item. Crimping process to include tabs of panel clips (Item 2). A bead of sealing compound may be used at panel end laps and side joints.

METAL ROOFING SYSTEMS INC — "MRS System 2500"

2. **Roof Deck Fasteners* (Panel Clips)** — Two part assembly: Base, 1 in. wide approximately 1-1/4 in. long with upper segment folded over lower end of tab. Fabricated from 0.050 in. thick coated or stainless steel. Upper tab 3 in. wide, maximum tab height 3-1/2 in. with lower end formed to engage base. Fabricated from 0.023 in. thick coated or stainless steel. Clips spaced 30 in. OC.

2A. **Roof Deck Fasteners* (End Lap Back-Up Plate)** — No. 18 MSG min gauge coated steel. Max length 48 in., width 6-1/2 in.

2B. **Roof Deck Fasteners* (Panel Clips)** — (Not Shown) — Two part assembly. A base fabricated from No. 16 MSG min thick coated steel and a tab fabricated from No. 22 MSG min thick coated steel. Clips spaced 30 in. OC maximum. Clips fastened to liner panel (Item 5). Two screws used per clip. (See Item 4 for description of screws).

As an alternate the following described clip may be used: Two part assembly consisting of a base with a vertical leg 5 in. long and

either 2 in. or 3 in. high and a tapered upper tab maximum 3 in. long formed to interlock with the base. Base fabricated from No. 18 MSG coated steel and to have two 1/4 in. guide holes. Upper tab fabricated from No. 24 MSG coated steel.

2C. **Roof Deck Fasteners* (Back-Up Plates)** — (Not Shown) — Used with AEP-Span "SL-216" panels. No. 16 MSG coated steel length 10-1/2 in., width 15-3/4 in. slipped under lower panel at end-lap. Panels fastened together at end-lap using four No. 1/4 - 14 by 1-1/8 in. long self-drilling self-tapping, hex-washer-head, plated steel screws with a 5/8 OD steel washer and a sealing washer. Screws spaced 4 in. OC beginning 2 in. from ribs.

2D. **Roof Deck Fasteners* (Panel Clip)** — (Not Shown) — Two part assembly: A base fabricated from No. 16 MSG min coated steel and an upper tab fabricated from No. 22 MSG min coated steel. Clips fastened to purlins using two fasteners per clip. See Item No. 3 for description of fasteners.

2E **Roof Deck Fasteners*** — (Panel Clips) (Not Shown) — No. 22 MSG min coated steel. Clips located at panel sides. Guide Holes in bottom clip to accommodate two screw fasteners (Item 4).

3. **Roof Deck Fastener* (Bearing Clip)** — No. 18 MSG min gauge coated steel; 3 in. wide by 3-1/4 in. long with 3/8 in. legs. Used under Panel Clips (Item 2) over purlins and rigid insulation. Three 1/4 in. dia guide holes located in base.

3A. **Roof Deck Fasteners* (Bearing Plate)** — (Not Shown) — No. 18 MSG min gauge coated steel. 4 in. wide, 8 in. long used under each panel clip (Item 2B).

4. **Fasteners (Screws)** — Fasteners used to attach panel clips (Item No. 2) to the liner panels (Item No. 5) to be No. 11 by min 3-3/4 in. long self-drilling, plated steel flat Phillips head screws. One screw used for each panel clip. Fasteners used to be No. 12-14 by 1-1/4 in. self-drilling, self-tapping, hex-head, plated steel screws with a separate 5/8 in. diameter steel washer and a neoprene sealing washer. Two fasteners to be used at each support with fasteners located in every valley. Fasteners used at liner panel side laps to be the same type as liner panel screws and spaced 20 in. OC. Fasteners used at metal roof deck panel end laps to be 1/4-10 by 1 in. long self-drilling, self-tapping, hex-head, plated steel screws with 1/2 in. OD metal backed sealing washers. Spacing to be in a 1, 3, 3-1/2, 3-1/2, 2, 1 in. pattern.

5. **Liner Panel** — The liner panel to be min 1-1/2 in. deep Type A, B, F, or N Deck fabricated from No. 22 MSG min gauge steel. Yield strength to be min 33,000 psi. Liner panel to be fastened to supports with screws indicated under Item 4 or with welds and weld washers of type indicated by manufacturer of liner panel. Welds to be located in every valley.

6. **Fastener Reinforcement (Bearing Plate)** — The reinforcements used with the screws attaching the liner panels to the purlins to be 0.125 in. thick and to have an area of approximately 2 sq/in.

7. **Foamed Plastic (Rigid Insulation)** — Supplied in 4 ft wide sheets. Min thickness to be 1 in. Density to be min of 2.0 lb/cu ft or see products Classified under TJBX.

8. **Vapor Barrier** — Used between the liner panel and the foamed plastic to be a 6 mil plastic sheeting.

9. **Purlins** — No. 12 MSG min gauge steel (min yield strength 40,000 psi) or min Type H Open web joists.

Refer to General Information, Roof Deck Construction, (Roofing Materials and Systems Directory) for Items not evaluated.

*Bearing the UL Classification Mark



Construction No. 238B TGKX.238B Roof Deck Constructions

Page Bottom

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.

Roof Deck Constructions

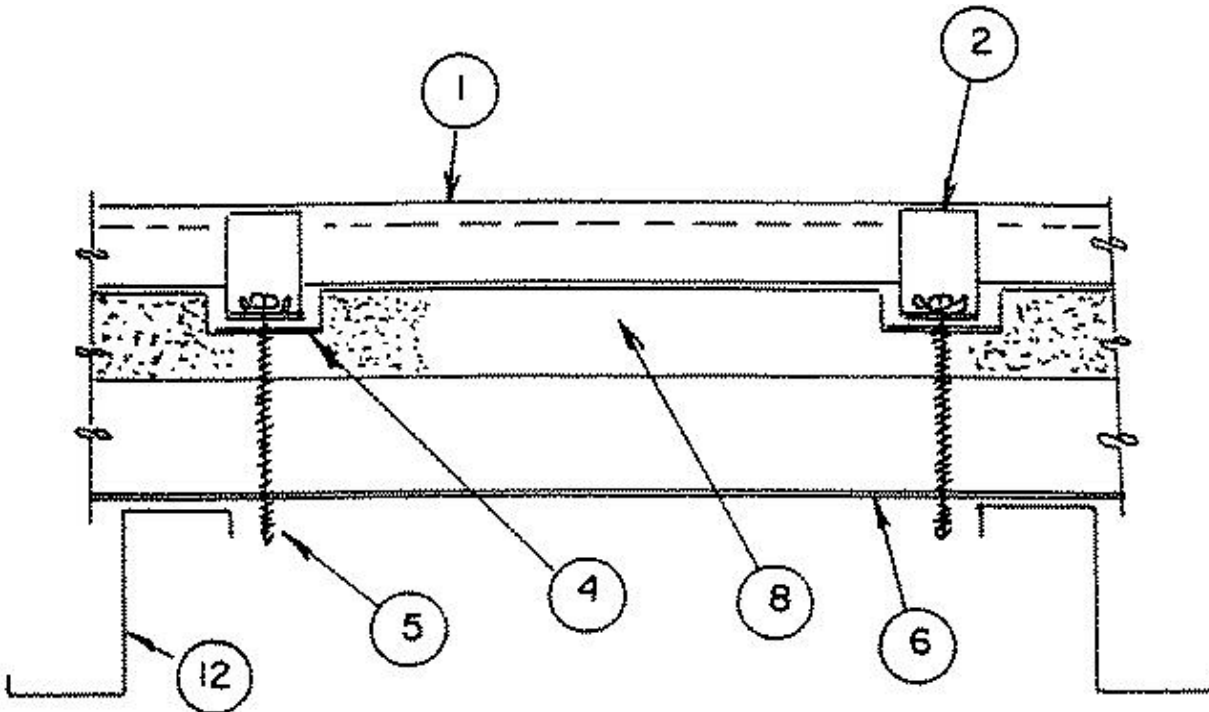
[See General Information for Roof Deck Constructions](#)

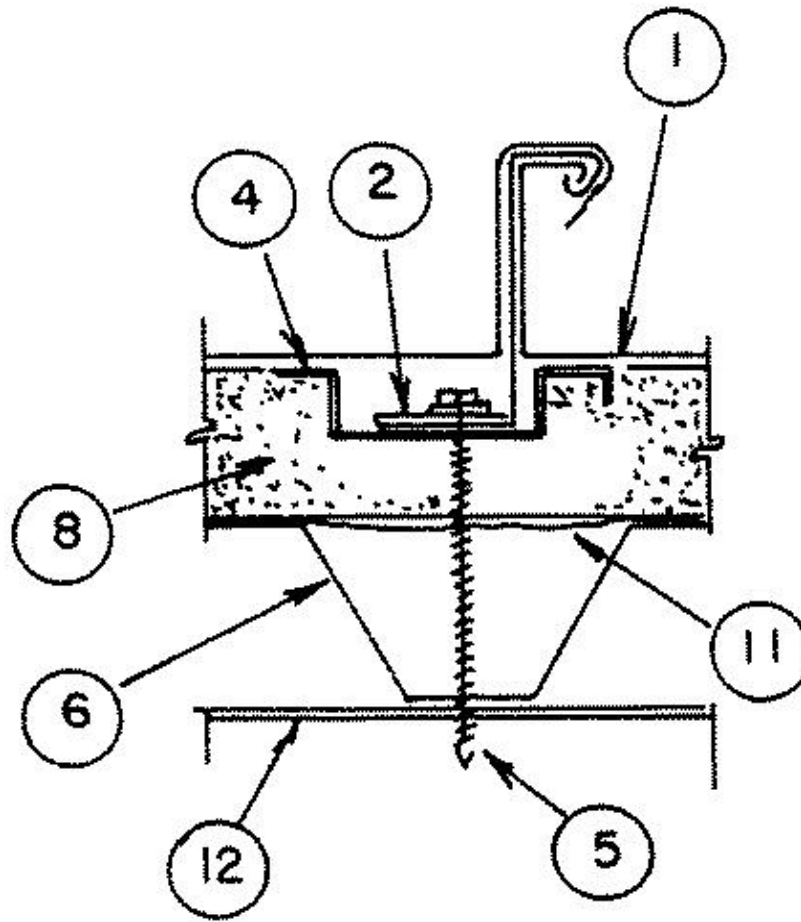
Construction No. 238B

October 09, 2013

Uplift – Class 90

Fire Not Investigated





1. **Metal Roof Deck Panels*** — No. 24 MSG min coated steel. Max panel width 16 in. and rib height 2 in. Panels continuous over two or more spans. Endlap for "BattenLok" or "Super-Lok" panels to be 6 in. and to include back up plate (Item 3). Endlap for "Master-Span" and "KA2000" panels to be 2 in. and to include back up plate (Item 3A). A bead of sealant may be used at panel ends and side joints. Side laps to be tightened and crimped with an electric crimping machine to an angle of 45 degree maximum unless indicated in the individual panels in this item. Crimping process to include the upper portion of panel clips (Items 2 or 2A).

METAL ROOFING SYSTEMS INC ([View Classification](#)) — "MRS System 2500"

2. **Roof Deck Fasteners* (Panel Clips)** — Either of the following:

Fixed Clip or Utility — One piece assembly fabricated from No. 22 MSG min steel, 3 in. wide. Floating Clip — two piece assembly with a base fabricated from No. 22 MSG min steel, 4-1/4 in. wide, and a top fabricated from No. 22 MSG steel, 4-1/4 in. wide. Clip spacing to be 48 in. O.C. max. Sealant may be used in the top of the clips.

2A. **Roof Deck Fasteners*** — (Panel Clip) — (Not Shown) — Two part assembly; A base fabricated from No. 16 MSG min coated steel and upper tab fabricated from No. 22 MSG min coated steel. Clips fastened to purlins using two fasteners per clip. See Item No. 3 for description of fasteners.

2B. **Roof Deck Fasteners* (Panel Clips)** — (Not Shown)

One piece assembly; 3 in. wide, approximately 2 in. high with two or three guide holes in base. Fabricated from No. 22 MSG coated steel.

2C. **Roof Deck Fasteners (Panel Clips)** — (Not Shown) — No. 24 MSG min gauge coated steel with a separately formed base fabricated of No. 18 MSG min gauge coated steel. One clip to be used per panel at each purlin.

3. **Endlap Back-Up Plate*** — (Not Shown) No. 16 MSG min coated steel, 15-1/2 in. wide with two 1 in. wide by 3/4 in. long tabs for sliding over end of panels.

4. **Bearing Plate** — (Optional) No. 20 MSG min coated steel, 4 in. wide by 5 in. long. Used under panel clip (Item 2, 2A, 2B and 2C) over rigid insulation (Item 8).

5. **Panel Fasteners** — (Screws) Screws used to attach the panel clips (Items 2 or 2A) to liner panel (Item 6) to be No. 14 Truss Head with No. 3 Phillips drive. Length to be a min of 1/2 in. longer than the combined thickness of the liner panel (Item 6), rigid insulation (Item 8), gypsum wallboard (Item 10) and plywood or oriented strand board (Item 10). Two screws per clip. Screws used to attach liner panel (Item 6) to purlins (Item 12) to be No. 12 x 1-1/4 in. self-drilling, Hex Head with 5/8 in. O.D. washer. Two screws to be used at each valley. Screws at liner panel side laps to be the same type as liner panel to purlin screws. Spacing to be 20 in. OC.

Screws used at endlap to be one of the following: 14 x 1 in. Type AB, Hex Washer Head self-tapping, 14 x 1-1/4 in. Hex Washer Head, self-tapping; 14 x 1 in. Type AB Phillips Stainless Steel, Self-tapping. Five screws per panel in a 1, 3, 4, 4, 3 in. pattern.

6. **Metal Deck** — No. 22 MSG min steel. Min yield strength 30 KSI. Min depth 1-1/2 in. Panel type to be A, B, F or N Deck. As an alternate metal deck, 22 MSG min steel, min yield strength 80 KSI, min depth 15/16 in. designated Type HD may be used; Liner panel to be fastened to supports with screws as indicated in Item 4 or with welds and weld washers of type indicated by manufacturer of liner panel. Welds to be located in each valley.

7. **Fastener Reinforcement** — (Not Shown) Reinforcements used with the screws attaching the liner panels to the purlins. Thickness to be 0.125 in. with an area of approx 2 sq/in.

8. **Foamed Plastic (Rigid Insulation)** — (Optional) Min thickness 1 in. Any rigid type having a minimum compressive strength of 25 psi or minimum density of 2 pcf or see products Classified under TJBX. Supplied in 4 ft wide sheets.

9. **Plywood or OSB** — (Optional) (Not Shown) Min APA Rated plywood, nom 3/8 in or 1/2 in. thick or oriented strand board (OSB), nom 3/8 in or 7/16 in. thick, 4 x 8 ft. Sheets to be installed on top of Foamed Plastic (Item 8) in lieu of bearing plates (Items 4 or 4A).

10. **Gypsum Board** — (Optional) (Not Shown) Any 5/8 in. thick gypsum wallboard supplied in sheets 2 x 4 to 4 x 12 ft. Applied perpendicular to steel roof deck direction with adhesive. End joints to occur over crests of steel roof deck and be staggered 2 ft in adjacent rows. As an alternate, any 1/2 in. thick gypsum board can be placed on top of the foamed plastic rigid insulation (Item 8). The total cumulative thickness of the rigid board (Item 8) and gypsum board may not exceed 4-1/2 in.

11. **Vapor Barrier** — (Optional) Used between liner panel and foamed plastic. Min 6 mil plastic sheeting.

12. **Supports (Purlins)** — Purlins used for liner panels to be cold formed steel sections. As alternates: structural steel components (hot rolled beams, channels, etc.) may be used. Min gauge and yield to depend on design considerations. Max spacing to depend on design considerations.

Refer to General Information, Roof Deck Constructions, for Items Not Evaluated.

*Bearing the UL Classification Mark

Last Updated on 2013-10-09

[Questions?](#)

[Print this page](#)

[Terms of Use](#)

[Page Top](#)

© 2013 UL LLC

When the UL Leaf Mark is on the product, or when the word "Environment" is included in the UL Mark, please search the [UL Environment database](#) for additional information regarding this product's certification.

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL's Follow-Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL's Follow-Up Service. Always look for the Mark on the product.

UL permits the reproduction of the material contained in the Online Certification Directory subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from the Online Certifications Directory with permission from UL" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "© 2013 UL LLC".



Construction No. 238C TGKX.238C Roof Deck Constructions

Page Bottom

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.

Roof Deck Constructions

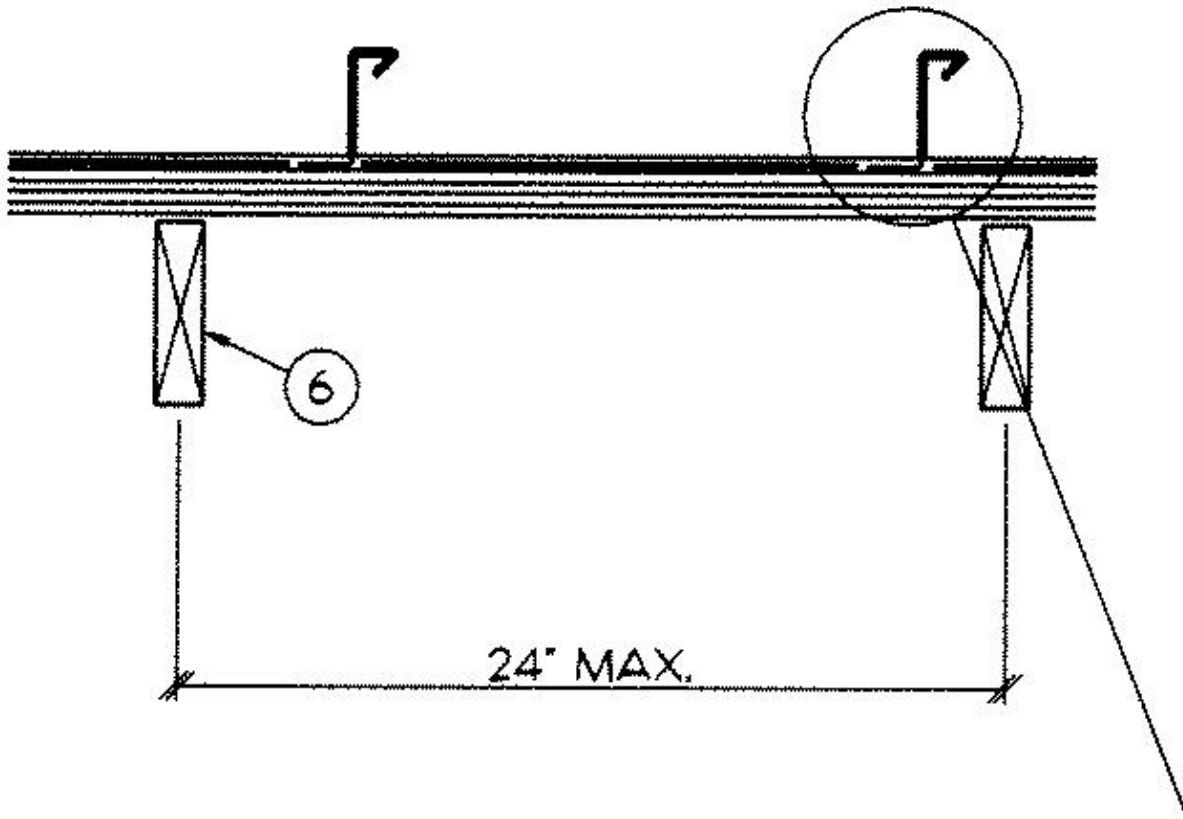
[See General Information for Roof Deck Constructions](#)

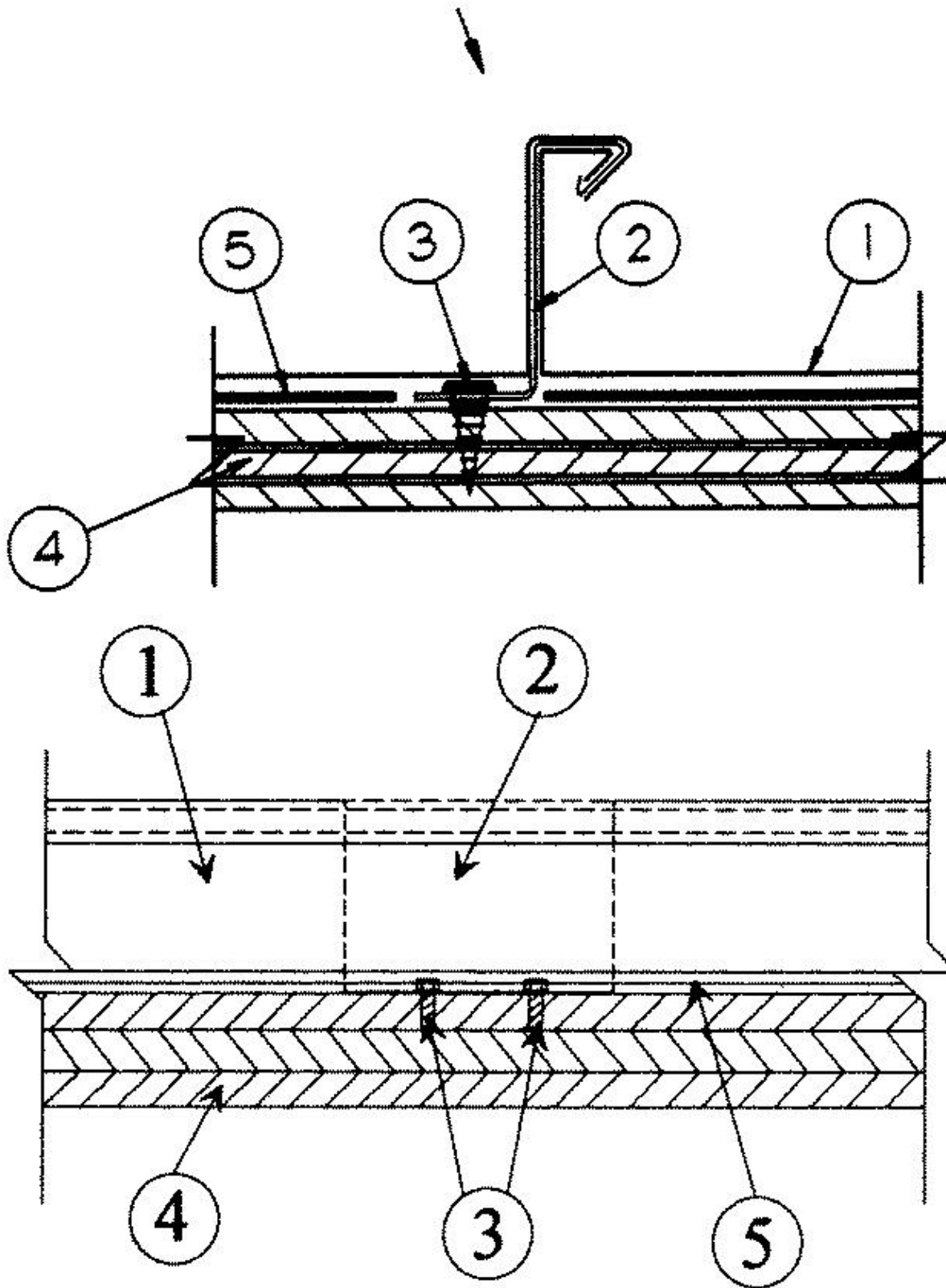
Construction No. 238C

May 14, 2013

Uplift Class 90

Fire Not Investigated





1. **Metal Roof Deck Panels*** — No. 24 MSG or No. 22 MSG min coated steel. Panels 16 in. wide, 2 in. high at side ribs. Side laps to be tightened and crimped with a special motorized crimping machine at a maximum 45 degree angle unless indicated in the individual panels in this item. Crimping process to include tabs of panel clips (Item 2). A bead of sealing compound may be used at panel side joints.

2. **Roof Deck Fasteners*** — (Panel Clips) — (Not Shown) — One part assembly, No. 20 MSG min. coated steel. Height, 2-5/32 in., Width, 3 in.

2A. **Roof Deck Fasteners*** — (**Panel clips**) — Used with Architectural Building Components, Inc. JSM-200 Panel, fixed clip fabricated from No. 22 MSG min coated steel. Floating clip, two part assembly; base fabricated from No. 14 MSG coated steel, clip tab fabricated from No. 22 MSG min coated steel. Sliding clip, two part assembly; base fabricated from No. 16 MSG coated steel, clip tab fabricated from No. 22 MSG coated steel. Clips spaced max. 30 in. OC along length of panel ribs.

2B. **Roof Deck Fasteners*** — (**Panel clips**) — Used with American Buildings Inc. "Loc-Seam" or "Loc-Seam 360" Metal Roof Deck Panel. Clips spaced max. 30 in. OC along length of panel ribs.

2C. **Roof Deck Fasteners*** — (Panel Clip) — (Not Shown) — Two part assembly; A base fabricated from No. 16 MSG min coated steel and upper tab fabricated from No. 22 MSG min coated steel. Clips fastened to purlins using two fasteners per clip. See Item No. 3 for description of fasteners.

2D. **Roof Deck Fasteners** — (Panel Clips) - Two types, both two piece assemblies. Type 330 base approximately 1.88 in. by 1.70 in.; Type 330B base approximately 1.11 in. by 2.00 in. Both types fabricated from No. 16 MSG coated steel and formed to fold over upper tab. Type 330 upper tab 4.30 in. wide and 2.91 in. high max. Type 330B upper tab 4.30 in. wide and 3.34 in. high max. Both types formed to engage base. Clips spaced maximum 30 in.

3. **Fasteners (screws)** — Fasteners used to attach panel clips (Items No. 2, 2A, 2B, 2C) to the plywood deck to be No. 12-8 by 1 in. long No. 1 Phillips drive, flat recess-head, steel wood screw. Two screws used per clip.

4. **Plywood Decking** — Plywood decking to be graded per PS83 specifications, 19/32 in. (nom 5/8 in.) thick, exposure 1 APA rated sheathing, span C-D 40/20 plywood, square edged. Butt ends not blocked.

5. **Underlayment (Optional)** — Type 15 or 30 organic felt. Side laps, end laps and attachment per manufacturers standard.

6. **Supports** — Spaced max of 24 in. OC. Any of the following types may be used to support the plywood decking:

- a) Nom 2 by 6 in., min No. 2 grade A.F.P.A. S-P-F Hemlock Fir, Douglas Fir or Southern Pine or equivalent.
- b) Wood trusses with a nom 2 by 4 in. upper chord of the same grade as Item a.
- c) No. 22 MSG min cold formed coated steel (min yield to be 33,000 psi).

7. **Plywood Fasteners (Not Shown)** — Fasteners used to attach the plywood deck to the supports to be as follows:

- a) For plywood-to-wood supports No. 8-18 by 1-7/8 in. long bugle-head steel screws with a No. 2 Phillips drive, a "Hi-Low" thread pattern and an "S-Point" .
- b) As an alternate to Item a, 8d by 2-1/2 in. long deformed shank common nails may be used.
- c) For plywood-to-steel supports for a steel thickness less than No. 20 MSG No. 7-19 by 1-1/4 in. long bugle-head steel screws with a No. 2 Phillips head drive "Hi-Low" threads and an "S-Point" . For a steel thickness greater than No. 20 MSG to No. 16 MSG, No. 6-20 by 1-1/4 in. long bugle-head steel screws with a No. 2 Phillips drive and an S12 (TEKS/3) ® point.

Spacing: Fastener spacing for all fastener types to be 6 in. OC at the plywood butt edges and 12 in. OC in the interior.

Refer to General Information, Roof Deck Construction (Roofing Materials and Systems Directory) for items not evaluated.

*Bearing the UL Classification Mark

Last Updated on 2013-05-14

[Questions?](#)

[Print this page](#)

[Terms of Use](#)

[Page Top](#)

© 2013 UL LLC

When the UL Leaf Mark is on the product, or when the word "Environment" is included in the UL Mark, please search the [UL Environment database](#) for additional information regarding this product's certification.

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL's Follow-Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL's Follow-Up Service. Always look for the Mark on the product.

UL permits the reproduction of the material contained in the Online Certification Directory subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from the Online Certifications Directory with permission from UL" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "© 2013 UL LLC".



Construction No. 435 TGKX.435 Roof Deck Constructions

Page Bottom

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.

Roof Deck Constructions

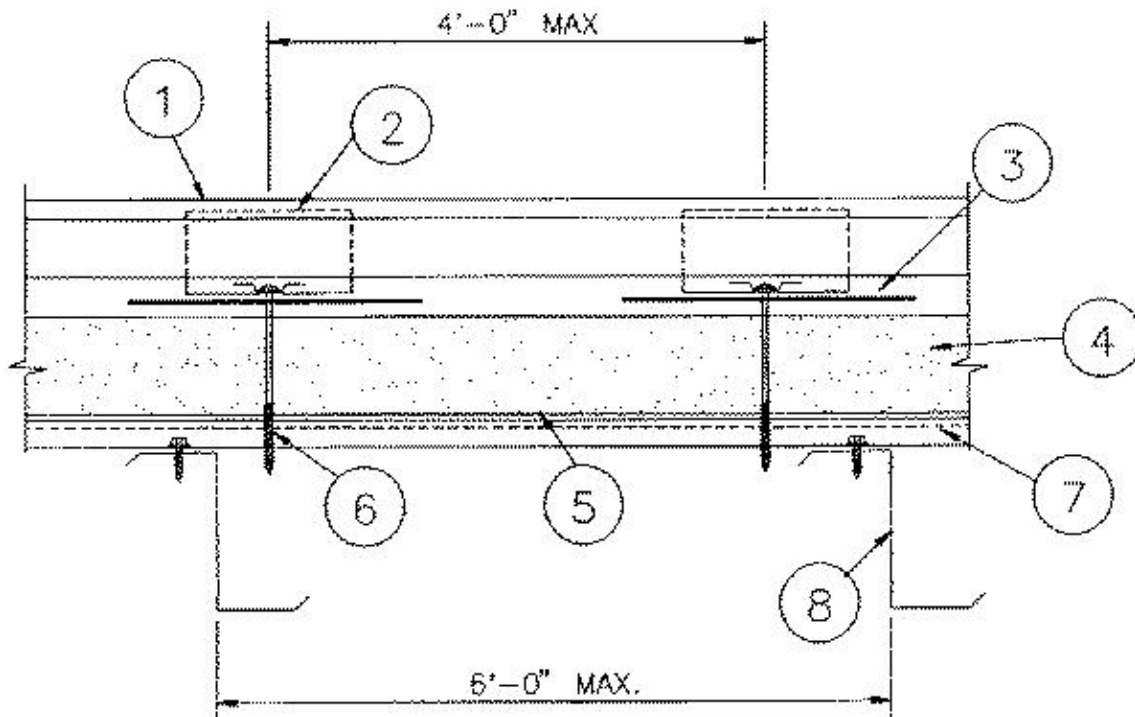
[See General Information for Roof Deck Constructions](#)

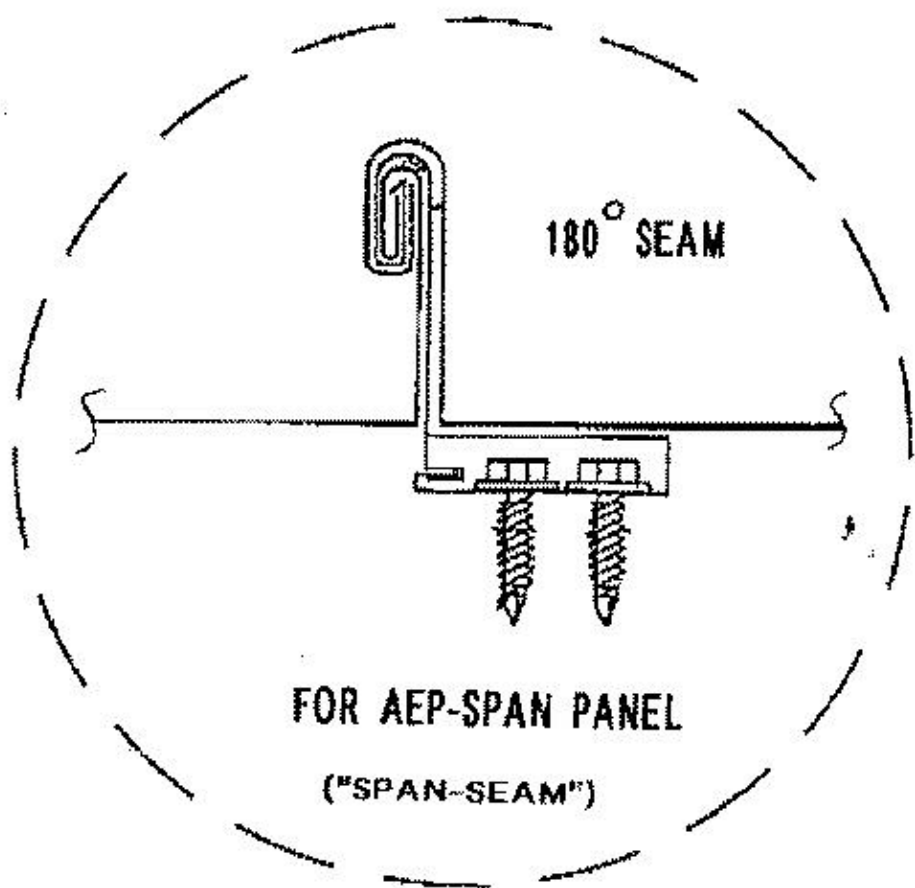
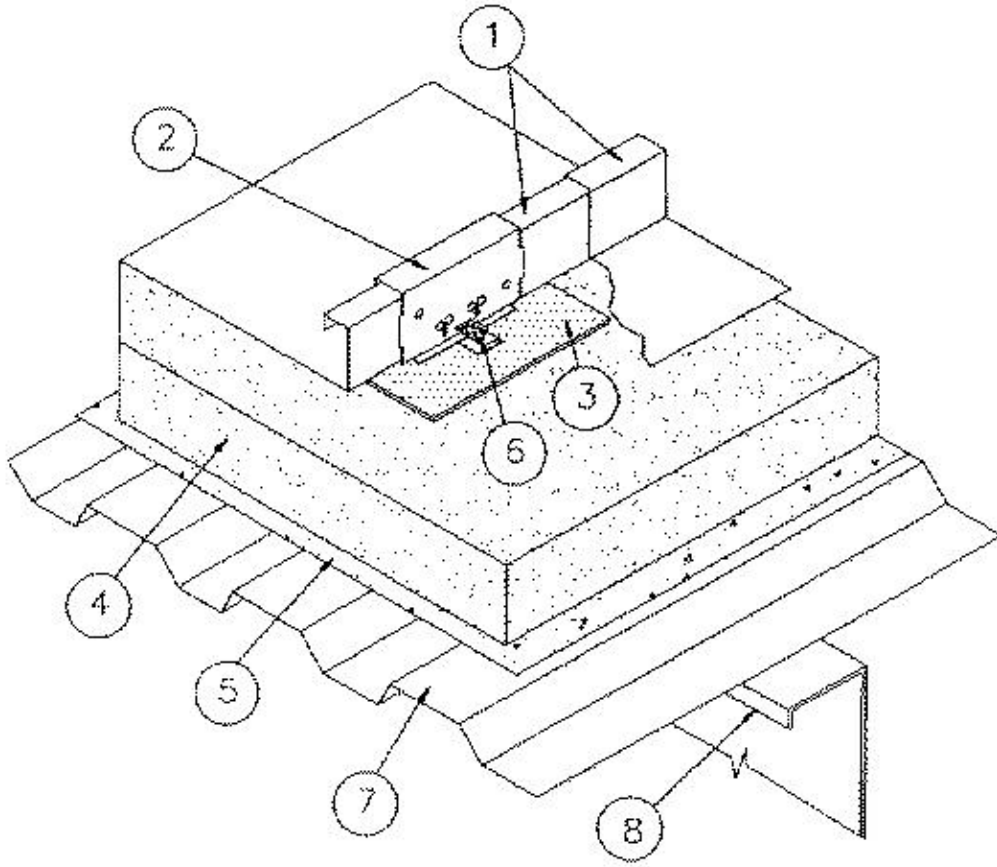
Construction No. 435

October 09, 2013

Uplift — Class 90

Fire Not Investigated





1. **Metal Roof Deck Panels*** — No. 24 MSG min. coated steel; 16 in. wide, 2 in. high at female rib. Panels continuous over two or more spans. End laps to occur near purlin supports with end lap back-up-plate (Item 2A) slipped under lower panel,

resting on purlin and with a 5 in. lap on up slope side of panel. Up slope panel to have swedged end. Sealant may be used at end lap and side ribs. Adjacent panels seamed with an electric seamer with seaming operation to include the upper tab of the panel clip (Item 2).

METAL ROOFING SYSTEMS INC ([View Classification](#)) — "MRS System 2500"

2. **Roof Deck Fasteners* (Panel Clips)** — Two part assembly; base 1-11/16 in. wide, length 1-5/8 in. Fabricated from No. 16 MSG min. steel and formed to engage lower section of tab. Tab 4-1/4 in. wide and 3-3/8 in. high formed to engage clip base and panel rib. Fabricated from No. 22 MSG min. coated steel. Spaced max of 48 in. OC.

2A. **Roof Deck Fasteners* (Back-Up Plates)** — (Not shown) — No. 16 MSG min coated steel, length 10-1/2 in., width 15-3/4 in. Slipped under lower panel at end-lap. Panels fastened together at end-lap using four No. 1/4-14 by 21-1/8 in. long self-drilling, self-tapping, hex-washer-head, plated steel screws with a 5/8 in. OD steel washer and a sealing washer. Screws spaced 4 in. OC beginning 2 in. from ribs.

2B. **Roof Deck Fasteners (Panel Clips)** — (Not Shown) — No. 24 MSG min gauge coated steel with a separately formed base fabricated of No. 18 MSG min gauge coated steel. One clip to be used per panel at each purlin.

3. **Bearing Plate** — No. 24 MSG min. coated steel, 4-5/8 in. wide, 6 in. long. Located under each panel clip (Item 2 and 2B) over rigid insulation (Item 4).

4. **Rigid Insulation** — (Optional) — Any foamed plastic Classified by UL under the TJBX category. Maximum thickness 4 in.

5. **Vapor Retarder** — One ply 30 lb felt.

6. **Fasteners (Screws)** — Fasteners used to attach panel clips (Item 2) to liner panels (Item 7) to be No. 14-13, No. 3 Phillips drive, truss head, painted steel screws. Length to penetrate liner panel min. 1/2 in. Two screws used per clip.

7. **Liner Panel** — Fabricated from No. 22 MSG min. coated steel; 1-1/2 in. deep, max pitch 6 in. (minimum yield strength 33,000 psi). Liner panels attached to structural supports with screws or welds per liner panel manufacturer's instructions for uplift loading.

8. **Supports (Purlins)** — Purlins used for liner panel supports to be cold formed sections or structural steel components (hot-rolled beams, channels, open web joists, etc.). Minimum gauge and yield to depend on design considerations for uplift loading. Maximum spacing 6 ft, 0 in. OC.

Refer to General Information, Roof Deck Constructions for items not evaluated.

*Bearing the UL Classification Mark

Last Updated on 2013-10-09

[Questions?](#)

[Print this page](#)

[Terms of Use](#)

[Page Top](#)

© 2013 UL LLC

When the UL Leaf Mark is on the product, or when the word "Environment" is included in the UL Mark, please search the [UL Environment database](#) for additional information regarding this product's certification.

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL's Follow-Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL's Follow-Up Service. Always look for the Mark on the product.

UL permits the reproduction of the material contained in the Online Certification Directory subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from the Online Certifications Directory with permission from UL" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "© 2013 UL LLC".



Construction No. 487 TGKX.487 Roof Deck Constructions

Page Bottom

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.

Roof Deck Constructions

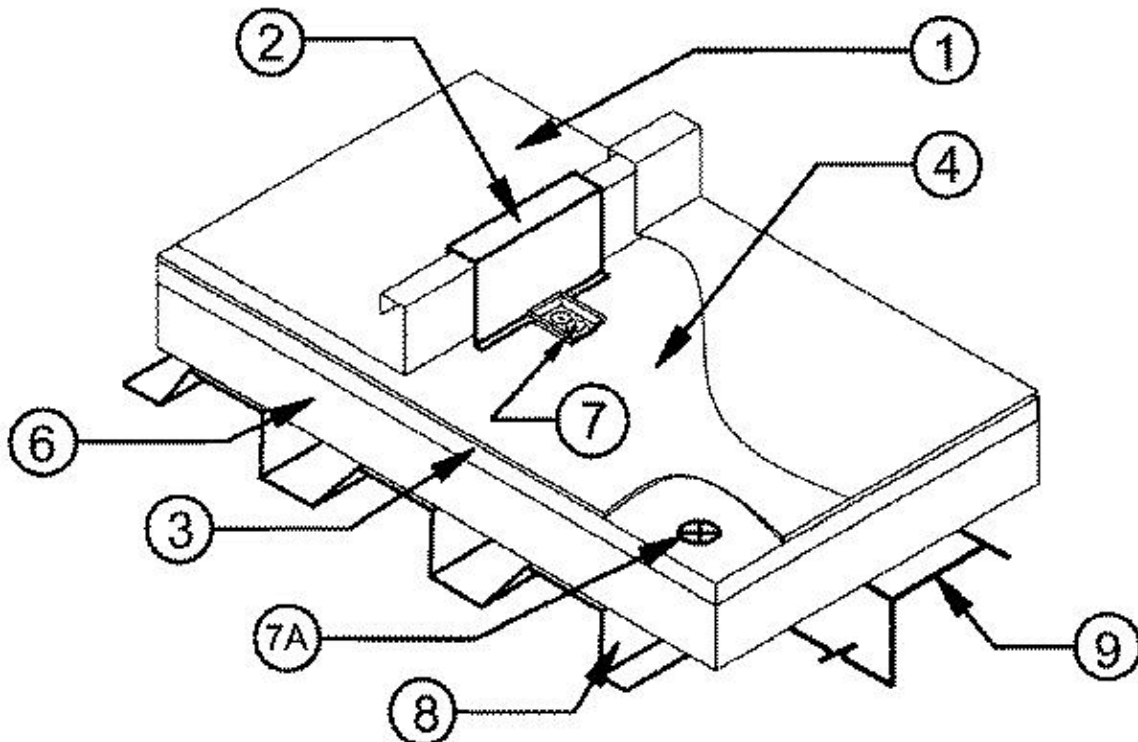
[See General Information for Roof Deck Constructions](#)

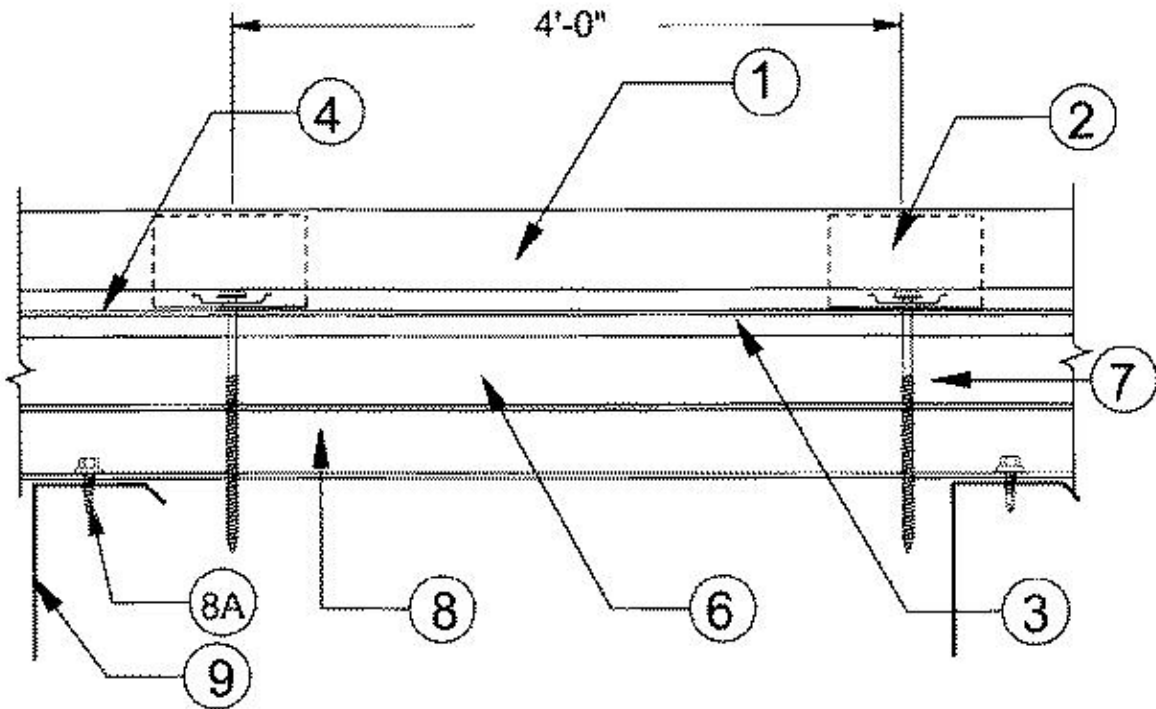
Construction No. 487

October 09, 2013

Uplift — Class 90

Fire Not Investigated





1. **Metal Roof Deck Panels*** — No. 24 MSG min coated steel, 16 in. max width. Panels continuous over two or more spans. Endlaps to occur adjacent to purlin with panels overlapped 6 in. and to include endlap back-up plate (Item 2A). A line of sealant may be used at panel ends and sidelaps. Sidelap to be tightened and crimped with an electric seaming machine to an angle of 45 degree maximum unless indicated in the individual panels in this item. Crimping process to include the upper portion of the panel clip (Item 2).

METAL ROOFING SYSTEMS INC (View Classification) — "MRS System 2500"

2. **Roof Deck Fasteners*** — To be either of the following: Fixed Clip - one piece assembly fabricated from No. 22 MSG coated steel, 3 in wide. Floating Clips - Two piece assembly with a base fabricated from No. 16 MSG min coated steel, 1-5/8 in. wide, and a top fabricated from No. 22 MSG min coated steel, 4-1/2 in. wide. Utility Clip — one piece assembly fabricated from No. 22 MSG coated steel, 3 in. wide. Clip spacing to be 4 ft, 0 in. O.C. maximum.

2A. **Endlap Back-Up Plate** — (Not Shown) — No. 16 MSG min coated steel, 15-1/2 in. wide with two 1 in. wide by 3/4 in. long tabs for sliding over end of panels.

2B. **Roof Deck Fasteners*** — (Panels) — (Not Shown) — Two part assembly; A base fabricated from No. 16 MSG min coated steel and upper tab fabricated from No. 22 MSG min coated steel. Clips fastened to purlins using two fasteners per clip. See Item No. 3 for description of fasteners.

2C. **Roof Deck Fasteners*** — (Panel Clips) — (Not Shown)

One piece assembly; 3 in. wide, approximately 2 in. high with two or three guide holes in base. Fabricated from No. 22 MSG coated steel.

One piece assembly; 3 in. wide, approximately 2-3/8 in. or 3 in. high, with three guide holes in base. Fabricated from No. 22 MSG coated steel.

Two piece assembly; base approximately 2 in. wide, 1-11/16 in. long formed to engage upper tab. Fabricated from No. 16 MSG coated steel. Tab approximately 4-5/16 in. wide; 2-3/8 in. or 2-7/8 in. high, formed to engage base. Fabricated from No. 22 MSG coated steel. Base to have two guide holes.

3. **Gypsum Board*(Mineral Board)** — Min thickness 1/2 in. Opposite side edges have a tongue and groove configuration. Butt (end) joints to be staggered and occur over steel deck crests. Wallboard installed perpendicular to steel deck corrugations.

4. **Vapor Barrier** — Single ply used between the wallboard (Item 3) and the metal roof deck panels (Item 1).

5. **Joint Tape** — (Not Shown) — 2-1/2 in. wide tape supplied by manufacturer to be used at all wallboard joints.

6. **Foamed Plastic (Rigid Insulation)** — (Optional) — Expanded polystyrene or polyisocyanurate supplied in 4 by 8 ft sheets, min thickness 13/16 in. min density 1.0 pcf. All end joints to be staggered with respect to adjacent rows. All joints to be offset from joints in mineral board (Item 3).

7. **Fasteners** — Screws used to fasten panel clips (Item 2) to steel deck (Item 8) to be No. 14 Truss head with No. 3 Phillips drive. Length to be min 1/2 in. longer than thickness of wallboard, rigid insulation and metal deck. Two screws per clip. Fasteners used at endlaps to be one of the following: 14x1 in. Type AB self-tapper; 14x1-1/4 in. Hex washer head self-driller; 14x1 Type AB Phillips stainless steel self-tapper.

7A. **Fasteners** — For attaching in wallboard to steel deck to be min 0.140 in diam threaded shank Phillips, bugle or trumpet head, self-drilling, self-tapping, corrosion resistance coated steel screws supplied by manufacturer. Screws are installed into top corrugations of steel deck through nom 3 by 3 in. corrosion resistant steel roof deck plates, spaced in a pattern as determined by the pitch of the steel deck with a min of 21 fasteners per 4 by 8 ft sheet (Item 3).

8. **Steel Deck** — Fabricated to various profiles, min yield strength 33,000 psi. Steel deck profile, thickness, support spacing and method of positioning (end and side laps) and fastening deck to supports to be per deck manufacturers requirements for uplift loading.

8A. **Deck Fasteners** — Steel deck panels to be fastened to structural supports and at laps using puddle welds with weld washers or screw fasteners per deck manufactures requirements for uplift loading.

9. **Purlins** — 16 MSG min coated steel, min yield strength 50,000 psi or Type H open web joists.

Refer to General Information, Roof Deck Constructions for Items Not Evaluated.

*Bearing the UL Classification Mark

Last Updated on 2013-10-09

[Questions?](#)

[Print this page](#)

[Terms of Use](#)

[Page Top](#)

© 2013 UL LLC

When the UL Leaf Mark is on the product, or when the word "Environment" is included in the UL Mark, please search the [UL Environment database](#) for additional information regarding this product's certification.

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL's Follow-Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL's Follow-Up Service. Always look for the Mark on the product.

UL permits the reproduction of the material contained in the Online Certification Directory subject to the following conditions: 1. The Guide Information, Assemblies, Constructions, Designs, Systems, and/or Certifications (files) must be presented in their entirety and in a non-misleading manner, without any manipulation of the data (or drawings). 2. The statement "Reprinted from the Online Certifications Directory with permission from UL" must appear adjacent to the extracted material. In addition, the reprinted material must include a copyright notice in the following format: "© 2013 UL LLC".