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RST-09999 (August 2003)

RESERVE SUPPORT TEAM GUIDE SPECIFICATIONS

Latest change indicated by CHG tags

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SECTION 09999

METAL INTERIOR PANEL
08/03

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NOTE: This guide specification covers the requirements for both factory color and mill finish Non-Structural Metal Roofing.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents**, including their organization designation and telephone number, is on the Internet.**

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR)**.**

Use of electronic communication is encouraged.

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PART 1 GENERAL

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NOTE: This guide specification will be used in the preparation of project specifications for non-structural metal roofing (sometimes referred to as architectural metal roofing) applied to a solid substrate (roof deck) with an appropriate underlayment.

Non-structural metal roofing is a system of metal roof panels normally installed on slopes greater than 3 in 12 over an appropriate waterproof underlayment attached directly to a solid substrate with hidden anchor clips, generally spaced at 300 to 450 mm (12 to 18 inches) on center along the seams. Inward and outward imposed loads are transferred to, and resisted by, the substrate. These panels are limited to widths no greater than 400 mm (16 inches). The panels are not capable of spanning between structural supports without benefit of

substrate materials such as wood, metal, or concrete decks. The panels serve primarily as an aesthetic water shedding covering, like shingles, and should not be thought of as a waterproof membrane. Requirements for the substrates are not included in this specification.

Metal roofing manufacturers offer a variety of different profiles for non-structural metal roofing with vertical side laps or standing seams. Some of the more common industry terms for the side laps are: "Snap-Seam," "Snap-Lok," "Lok-Seam," "Batten-Seam," "Snap-Batten Seam". All are attached directly or by hidden anchor clips fastened to a solid substrate such as plywood or metal decking. There are a limited number of manufacturers that still provide a non-structural metal roofing panel with exposed fasteners; however, the hidden clip fastener is the most common.

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1.1 REFERENCES

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NOTE: Issue (date) of references included in project specifications need not be more current than provided by the latest change (Notice) to this guide specification.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 463/A 463M	(1996; Rev. A) Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A 653/A 653M	(1996) Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 792/A 792M	(1996) Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process
ASTM B 209	(1996) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 209M	(1995) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM C 1177/C 1177M	(1996) Glass Mat Gypsum Substrate for Use as Sheathing

ASTM C 1289	(1998) Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM C 518	(1991) Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM C 612	(1993) Mineral Fiber Block and Board Thermal Insulation
ASTM C 991	(1998) Flexible Glass Fiber Insulation for Pre-Engineered Metal Buildings
ASTM D 1308	(1987; R 1998) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
ASTM D 1654	(1992) Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D 2244	(1993) Calculation of Color Differences from Instrumentally Measured Color Coordinates
ASTM D 2247	(1994) Water Resistance of Coatings in 100 Percent Relative Humidity
ASTM D 226	(1997) Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 2794	(1993) Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D 3359	(1995; Rev. A) Measuring Adhesion by Tape Test
ASTM D 4214	(1989) Evaluating Degree of Chalking of Exterior Paint Films
ASTM D 4397	(1996) Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM D 522	(1993) Mandrel Bend Test of Attached Organic Coatings
ASTM D 523	(1989; R 1994) Specular Gloss
ASTM D 5894	(1996) Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)

ASTM D 610	(1995) Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D 714	(1987; R 1994) Evaluating Degree of Blistering of Paints
ASTM D 968	(1993) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM E 84	(1981) Surface Burning Characteristics of Building Materials
ASTM E 96	(1995) Water Vapor Transmission of Materials
ASTM G 154	(2000; Rev A, E1 2001) Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

1.2 SUBMITTALS

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NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

Indicate submittal classification in the blank space following the name of the item requiring the submittal by using "G" when the submittal requires Government approval. Submittals not classified as "G" will show on the submittal register as "Information Only". For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

Manufacturer products listed in this specification are referenced to establish a standard of quality. When the specific product listed is submitted by the Contractor that submittal will be considered 'For Information Only'. When an equal to that named in this specification is submitted, it shall be 'For Government Approval'(G). The following manufacturer products are specifically mentioned in this specification:

IMETCO PERM-LOC C Standing Seam
2070 Steel Drive
Tucker, GA 30084-5832
(800) 646-3826
www.imetco.com

SD-02 Shop Drawings

Metal Panel; **G, RE**

a. Drawings consisting of catalog cuts, flashing details, erection drawings, shop coating and finishing specifications, and other data as necessary to clearly describe materials, sizes, layouts, construction details, fasteners, and erection. Drawings shall be provided by the metal panel manufacturer.

SD-03 Product Data

Manufacturer Product submitted as an "or equal";**G, ED**

Acceptable Manufacturer Products; **G, ED**

SD-04 Samples

Accessories;
G, RE

One sample of each type of flashing, trim, fascia, closure, cap and similar items. Size shall be sufficient to show construction and configuration.

Metal Panels;
G, RE

One piece of each type and finish to be used, 225 mm 9 inches long, full width.

Fasteners;
G, RE

Two samples of each type to be used with statement regarding intended use. If so requested, random samples of screws, bolts, nuts, and washers as delivered to the jobsite shall be taken in the presence of the Contracting Officer and provided to the

Contracting Officer for testing to establish compliance with specified requirements.

Gaskets and Insulating Compounds;
G, RE

Two samples of each type to be used and descriptive data.

Sealant;
G, RE

One sample, approximately 0.5 kg, 1 pound, and descriptive data.

SD-07 Certificates

Metal Panels
Installation
Accessories

Certificates attesting that the panels and accessories conform to the specified requirements. Certificate for the metal panel assembly shall certify that the assembly complies with the material and fabrication requirements specified and is suitable for the installation at the indicated design slope. Certified laboratory test reports showing that the sheets to be furnished are produced under a continuing quality control program and that at least 3 representative samples of similar material to that which will be provided on this project have been previously tested and have met the quality standards specified for factory color finish.

Installer

Certification of installer.

1.3 GENERAL REQUIREMENTS

The Contractor shall furnish a commercially available metal interior panel system which satisfies the specified design and additional requirements contained herein. Metal panels, components, transitions, accessories, and assemblies shall be supplied by the same system manufacturer.

1.3.1 Metal Interior Panel System

The Metal Interior Panel System covered under this specification shall include the entire system; the metal interior panel, fasteners, connectors, panel securement components, and assemblies . The system shall be installed on a plywood substrate . In addition, the system shall consist of panel finishes, slip sheet, all accessories, components, and trim and all connections with metal panels.

1.3.2 Manufacturer

The metal panel system shall be the product of a manufacturer who has been

in the practice of manufacturing metal panels for a period of not less than 3 years .

1.3.3 Installer

The installer may be either employed by the manufacturer or be an independent installer.

1.5 PERFORMANCE REQUIREMENTS

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NOTE: The roof slope will be indicated on the contract drawings. Metal roofs must be designed to accommodate effects of ice damming and other conditions in cold climates. See TI 809-29 for guidance.

Since this is a performance specification and a wide variety in roof system configurations, fastening systems, and accessories are available, generic details of valley, expansion joints, flashing, underlayments, roof penetrations, curbs, eaves, ridges, intersection and other unique situations of the roof system will be shown on the contract drawings.

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The metal panel system supplied shall conform to the panel slope, and the underlayment. The Contractor shall furnish a commercially available metal panel system which satisfies all the specified requirements.

1.6 DELIVERY AND STORAGE

Materials shall be delivered to the site in a dry and undamaged condition and stored out of contact with the ground. Materials shall be covered with weather tight coverings and kept dry. Material shall not be covered with plastic where such covering will allow sweating and condensation. Plastic may be used as tenting with air circulation allowed. Storage conditions shall provide good air circulation and protection from surface staining.

PART 2 PRODUCTS

2.1 METAL PANELS

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NOTE: See TI 809-29 for guidance on roof slope and other requirements.

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Panels shall be steel and shall have a factory color finish. Length of sheets shall be sufficient to cover the entire length of any unbroken slope lengths that do not exceed 9 m. 30 feet. Width of sheets shall provide nominal [300] [_____] mm 13.5 inches of coverage in place, with a 7/8-inch high standing seam. Design provisions shall be made for thermal

expansion and contraction consistent with the type of system to be used. All sheets shall be either square-cut or miter-cut. The ridge cap shall be installed as recommended by the metal panel manufacturer. Height of seams at overlap of adjacent roof sheets shall be the building manufacturer's standard for the indicated metal panel slope.

2.1.1 Steel Panels

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NOTE: When a factory color finish is specified, remove last two sentences from this paragraph. AZ 50 coating is allowed for factory-color-finished and not for mill finish. Remove this paragraph when steel panels are not used in the project.

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Zinc-coated steel conforming to ASTM A 653/A 653M; aluminum-zinc alloy coated steel conforming to ASTM A 792/A 792M, AZ 50 coating; or aluminum-coated steel conforming to ASTM A 463/A 463M, Type 2, coating designation T2 65. Uncoated roof panels shall be 0.6 mm 0.024 inch thick minimum. Panels shall be within 95 percent of the nominal thickness.

2.2 ACCESSORIES

Accessories shall be compatible with the metal panel. Flashing, trim, metal closure strips, caps, and similar metal accessories shall be not less than the minimum thicknesses specified for metal panels. Exposed metal accessories shall be finished to match the panels furnished. Molded closure strips shall be bituminous-saturated fiber, closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chloride premolded to match configuration of the panels and shall not absorb or retain water.

2.3 FASTENERS

Fasteners for metal panels shall be unexposed, type and size as recommended by the manufacturer to meet the performance requirements. Fasteners for accessories shall be the manufacturer's standard. Exposed fasteners shall not be used.

2.4 FACTORY COLOR FINISH

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NOTE: Factory color finish will be specified except when the buildings are to be used for temporary purposes or where mill finish aluminum panels provide an acceptable appearance. If factory color finish is not required, document the rationale for the decision in the design analysis and remove this paragraph.

The US metal building industry offers a variety of color finishes to protect the metal panels against chemical corrosion and ultraviolet radiation; to provide long life with minimum maintenance plus

acceptable weathering and color retention; and to assure chalk, fade, and mar resistance. Some of the most widely used coatings include, but are not limited to, the following:

a. Polyvinylidene fluoride (PVF2); a nominal 0.025 mm (1 mil) thick coating modified with a proprietary resin for toughness; it may be used in most environments.

b. Silicone-modified polyester (SMP); a thermoset coating system composed of polyester resin modified by copolymerization with a functional silicone resin intermediate designed for added protection against chemical corrosion and ultraviolet radiation.

c. Plastisol (PVC); a two-coat system consisting of a polyvinyl-chloride resin dispersed in a plasticizer top-coat over a corrosion-resistant primer; it is a high-performance, thick coating designed for highly aggressive and corrosive environments with excellent resistance to common acids, alkalis, and inorganic compounds.

Most coatings may be ordered extra-thick for buildings in direct contact with salt or chemical laden air or where a premium finish would be justified. The thicker coating provides additional primer and increases the coating's corrosion and abrasion resistance, but it requires a special run by the coil coater, at least a 22 degrees C (70 degrees F) environment, and additional delivery time. Appropriate specification requirements must be added if thick film coatings are to be used.

The high cost of preventing corrosion of galvanized steel panels, together with the fact that cut edges, scratches and penetrations of the panels expose the steel substrate, warrants consideration for the use of solid aluminum which is inherently less susceptible to damaging corrosion.

Roof panels are available in several standard colors. The standard flashing material is most economical if it is the same thickness and color as the panels. If an accent color is required for the flashings the cost may go up significantly and color selection will be limited. Color other than manufacturer's standard colors will be used only when the extra cost is justified.

Energy considerations must be included in the choice of standard colors for the roof panels. White or light-colored roofing surfaces are much better at

reflecting sunlight than darker surfaces. This keeps roofs 20 to 35 degrees C (35 to 60 degrees F) cooler, which means less heat will be transferred to internal building spaces. Demonstration projects have shown that cooling energy use can be cut by as much as 40 percent when light-colored surfaces are used. Coordinate the use of light-colored roofing material with the user.

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Panels shall have a factory applied polyvinylidene fluoride finish on the exposed side. The exterior finish shall consist of a baked-on topcoat with an appropriate prime coat. Color shall match the color indicated on the drawings. The exterior coating shall be a nominal [0.025] [0.050] mm 2 mil thickness consisting of a topcoat of not less than 0.018 mm 0.7 mil dry film thickness and the paint manufacturer's recommended primer of not less than [0.005] [0.025] mm 1.0 mil thickness. The exterior color finish shall meet the test requirements specified below.

2.4.1 Cyclic Salt Fog/UV Test

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NOTE: The results of the salt spray test will vary depending on the thickness of the coating.

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A sample of the sheets shall withstand a cyclic corrosion test for a minimum of 2016 hours in accordance with ASTM D 5894, including the scribe requirement in the test. Immediately upon removal of the panel from the test, the coating shall receive a rating of not less than 10, no blistering, as determined by ASTM D 714; 10, no rusting, as determined by ASTM D 610; and a rating of 6, over 2.0 to 3.0 mm 1/16 to 1/8 inch failure at scribe, as determined by ASTM D 1654.

2.4.2 Formability Test

When subjected to testing in accordance with ASTM D 522 Method B, 3 mm 1/8 inch diameter mandrel, the coating film shall show no evidence of fracturing to the naked eye.

2.4.3 Accelerated Weathering, Chalking Resistance and Color Change

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NOTE: Low gloss finishes have relatively poor weathering qualities. Delete the last sentence if a low gloss finish is not required by Paragraph Specular Gloss.

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A sample of the sheets shall be tested in accordance with ASTM G 154, test condition UVA-340 lamp, 4h UV at 60 degrees C followed by 4h CON at 50 degrees C for 2000 total hours. The coating shall withstand the weathering test without cracking, peeling, blistering, loss of adhesion of the

protective coating, or corrosion of the base metal. Protective coating with an adhesion rating of less than 4B when tested in accordance with ASTM D 3359, Test Method B, shall be considered as an area indicating loss of adhesion. Following the accelerated weathering test, the coating shall have a chalk rating not less than No. 8 in accordance with ASTM D 4214 test procedures, and the color change shall not exceed 5 CIE or Hunter Lab color difference (delta E) units in accordance with ASTM D 2244. For sheets required to have a low gloss finish, the chalk rating shall be not less than No. 6 and the color difference shall be not greater than 7 units.

2.4.4 Humidity Test

When subjected to a humidity cabinet test in accordance with ASTM D 2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage or corrosion.

2.4.5 Impact Resistance

Factory-painted sheet shall withstand direct and reverse impact in accordance with ASTM D 2794 13 mm 0.500 inch diameter hemispherical head indenter, equal to 6.7 times the metal thickness in mm, expressed in N-meters, 1.5 times the metal thickness in mils, expressed in inch-pounds, with no cracking.

2.4.6 Abrasion Resistance Test

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NOTE: The 70 percent polyvinylidene fluoride finish has a minimum abrasion resistance of about 65 liters per 0.025 mm (65 liters/mil) of coating thickness. The nominal 0.025 mm (1 mil) finish will withstand 50 to 60 liters of sand while the nominal 0.050 mm (2 mil) finish can be expected to withstand 80-100 liters. The results of this test are variable and offer poor repeatability. In shop drawing review, notice the difference between the specified total liters of sand and those reported.

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When subjected to the falling sand test in accordance with ASTM D 968, Method A, the coating system shall withstand a minimum of 50 liters of sand before the appearance of the base metal. The term "appearance of base metal" refers to the metallic coating on steel or the aluminum base metal.

2.4.7 Specular Gloss

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NOTE: Few manufacturers regularly produce prefinished panels meeting these low gloss requirements and such sheets are available only in limited colors. Standard 70 percent PVF2 finish, for example, has a medium gloss. Low gloss paint formulations result in reduced weathering

properties. Identify individual facilities requiring low gloss finish.

For roofs of structures at airfields where glare would be objectionable and may be an operational hazard, the specular gloss value should be limited to 10 or less at an angle of 85 degrees.

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Finished roof surfaces for shall have a specular gloss value of 30 plus or minus at 60 degrees when measured in accordance with ASTM D 523.

2.4.8 Pollution Resistance

Coating shall show no visual effects when covered spot tested in a 10 percent hydrochloric acid solution for 24 hours in accordance with ASTM D 1308.

2.5 UNDERLAYMENTS

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NOTE: The designer must determine the appropriate underlayments; all the types specified below could be needed on the project. High risk areas, severe weather conditions, complex roofs, or high value contents must have the higher protection capacity of a rubberized underlayment. Delete the unused types.

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2.5.1 Felt Underlayment

Felt underlayment shall be No. 30 felt in accordance with ASTM D 226, Type II.

2.5.3 Slip Sheet

Slip Sheet shall be 0.24 kg per square meter 5 pounds per 100 sf rosin sized unsaturated building paper.

2.6 INSULATION2.6.1 Rigid Board Insulation for Use Above a Roof Deck
2.6.1.3 Glass Mat Gypsum Roof Board

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NOTE: Glass mat gypsum roof board is a fire and water resistant underlayment/overlayment that can be a thermal barrier or protection board for the insulation.

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Glass mat gypsum roof board for underlayment/overlayment, thermal protection, or insulation protection shall be in accordance with ASTM C 1177/C 1177M.

2.8 SEALANT

Sealant shall be an elastomeric type containing no oil or asphalt. Exposed sealant shall be clear and shall cure to a rubberlike consistency. Sealant placed in the metal panel standing seam ribs shall be provided in accordance with the manufacturer's recommendations.

2.9 GASKETS AND INSULATING COMPOUNDS

Gaskets and insulating compounds shall be nonabsorptive and suitable for insulating contact points of incompatible materials. Insulating compounds shall be nonrunning after drying.

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall be in accordance with the manufacturer's erection instructions and drawings. Dissimilar materials which are not compatible when contacting each other shall be insulated by means of gaskets or insulating compounds. Sheets with improper or mislocated drill holes shall not be used. Exposed surfaces and edges shall be kept clean and free from sealant, metal cuttings, hazardous burrs, and other foreign material. Stained, discolored, or damaged sheets shall be removed from the site.

3.1.1 Metal Interior Panel

Side lap distances, joint sealing, and fastening and spacing of fasteners shall be in accordance with manufacturer's standard practice. End laps and exposed fasteners shall not be used. Side laps of interior panels and joints at accessories shall be sealed. Fasteners shall be driven normal to the surface. Method of applying joint sealant shall conform to the manufacturer's recommendation. Accessories shall be fastened into substrate, except as otherwise approved. Closure strips shall be provided .

3.1.2 Field Forming of Metal Panels for Unique Areas

When metal panels are formed from factory-color-finished steel coils at the project site, the same care and quality control measures that are taken in shop forming of metal panels shall be observed. Rollformer shall be operated by the metal roofing manufacturer's approved installer. In cold weather conditions, preheating of the steel coils to be field formed shall be performed as necessary just prior to the rolling operations.

3.1.3 Underlayment

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NOTE: The designer must show the extent and location of the appropriate underlayments on the drawings. The underlayments must ensure that any water penetrating below the panels will drain outside of the building envelope; the following are areas of concern: valleys and eaves are subject to damming from ice, leaves and debris causing water to back up under the metal roofing; water running down

the roofing may run up under the roofing panels on the opposite side of a valley; panel splices and penetrations.

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Underlayment types shall be installed where shown on the drawings; they shall be installed directly over the substrate. If a metal panel rests directly on the underlayments, a slip sheet shall be installed as a top layer, beneath the metal roofing panels, to prevent adhesion. All underlayments shall be installed so that successive strips overlap the next lower strip in shingle fashion. Underlayments shall be installed in accordance with the manufacturer's written instructions.

-- End of Section --