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## Product Guide Specification

Specifier Notes: This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, including *MasterFormat*, *SectionFormat*, and *PageFormat*, as described in *The Project Resource Manual—CSI Manual of Practice*.

The section must be carefully reviewed and edited by the Architect to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. Delete all Specifier Notes when editing this section.

Section numbers and titles are from *MasterFormat* 2016 Edition, with numbers and titles from *MasterFormat* 1995 Edition in brackets. Delete version not required.

Brackets indicate options in text to be filled in or deleted by the author; they should NOT be visible in final document.

### SECTION 07 32 21 [07320]

#### STAINLESS STEEL ROOF TILES

Specifier Notes: This section covers Millennium Forms, LLC stainless steel roof/wall tiles. Consult Millennium Forms for assistance in editing this section for the specific application.

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Stainless steel roof tiles.
- B. Underlayments.
- C. Roof ventilation

##### 1.2 RELATED SECTIONS

Specifier Notes: Edit the following list of related sections as required for the project. List other sections with work directly related to this section.

- A. Section 06 10 00 [06100] – Rough Carpentry: Roof decking
- B. Section 07 62 00 [07620] – Sheet Metal Flashing and Trim.
- C. Section 07 92 00 [07920] – Joint Sealants.

### **1.3 REFERENCES**

Specifier Notes: List standards referenced in this section, complete with designations and titles. This article does not require compliance with standards but is merely a listing of those used.

- A. ASTM A240/A240M – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2015.
- B. ASTM D226/S226M – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2009.
- C. ASTM D1970/D1970M – Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials used as Steep Roofing Underlayment for Ice Dam Protection; 2001.
- D. ASTM D4479/D4479M – Standard Specifications for Asphalt Roof Coatings – Asbestos-Free; 2000.
- E. ASTM E8/E8M – Standard Test Methods for Tension Testing of Metallic Materials; 2013.
- F. ASTM E18/E18M - Standard Test Methods for Rockwell Hardness of Metallic Materials; 2014.

### **1.4 SUBMITTALS**

- A. Comply with Section 01 33 00 [01330] – Submittal Procedures for additional information.
- B. Product Data: Submit manufacturer's product data describing product characteristics including sizes, weight, connection methods, finishes, options and accessories.

Specifier Note: Millennium Forms, LLC Light Interference Color (LIC) process is created through a prismatic separation of light on the surface of stainless steel. Light conditions, viewing angles and the standard tolerances of chemical recipes within stainless steel will create a variation in the perceived color. Additionally, each LIC color Millennium Forms, LLC offers is produced as a range of color (color range). Each tile, because of these differences, will be its own signature tile. Prior to production Millennium Forms, LLC will submit initial sample tiles in the specified color. The initial sample tiles are samples only and *may not be an exact match* to what will be provided for the project. The Project Reference photo or document is a representation of the color range that can be expected within the specified color. (“Color range” refers to the achievable: light, medium, dark range of a color.)

- C. Initial Samples: Submit one (1) [ ] full samples of each color of stainless-steel roof tiles showing natural variation and color range.
- D. Verification Samples: Submit three (3) [ ] full-piece samples of selected color of stainless-steel roof tiles showing natural variation and color range.
  - 1. One (1) sample set of tiles shall be sent to Architect, Contractor, and Subcontractor [ ] simultaneously for confirmation and approval.
- E. Specific Project Reference: Submit manufacturer photograph(s) showing design intent of expected finish range within LIC stainless steel wall panels.
- F. Manufacturer’s Certification: Submit manufacturer’s certification that materials comply with specified requirements and are suitable for intended application.
- G. Installation Instructions: Manufacturer’s written instructions including surface preparation and installation procedures.

## **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery: Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in clean, cool, dry area in accordance with manufacturer’s instructions.
- C. Handling: Protect materials during handling and installation to prevent damage.

## **1.6 WARRANTY**

- A. See Section 01 78 00 – [01780] – Closeout Submittals for additional information.
- B. Submit manufacturer’s standard limited liability warranty stating that roofing tiles will be free from manufacturing defects which adversely affect tile’s performance; Warranty Period: 25 years.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURER**

- A. Millennium Forms, LLC, 550 East Centralia Street, Elkhorn, WI 53121 Phone 262.723.7778 Fax 262.723.7629 Website www.millenniumforms.com E-mail info@millenniumforms.com
- B. Substitutions: Not allowed [See Section 01 60 00 [01600] – Product Requirements].

**2.2 STAINLESS STEEL ROOF TILES**

- A. Stainless Steel Roof Tiles:
  - 1. Description: Progressive die-stamped system individual roof/wall tiles with 4-sided interlocking design, self-aligning tab, and concealed nailing strip with 2 holes; progressive die stamped system.

Specifier Notes: Specify type of stainless steel. Type 316 has greater corrosion resistance and is typically used for marine applications. Type 316 should be specified for installations within 2 miles of seawater and salt air. Some urban applications due to high use of road salt will also require the use of Type 316. Consult others for site specific information.

Select appropriate material. Type 304 is manufacturer’s default material.

- 2. Material: ASTM A 240/A 240M, stainless steel sheet.
  - a. Type 304
  - b. Type 316
- 3. Size:
  - a. Flat Tiles: 15 by 9-5/8 inches; Exposure: 14-1/2 by 8-5/16 inches +/- 1/16 inch.
  - b. Cupped Tile: 15 by 9-5/8 inches; Exposure: 14-1/2 by 8-5/16 inches +/- 1/16 inch.
  - c. TS Tiles: 7-3/4 by 9-1/4 inches; Exposure: 7-1/4 by 8-1/8 inches.
  - d. Diamond Tile: 8-5/8 by 9-3/4 inches; Exposure: 8 by 8-3/8 inches +/-1/16 inch.
- 4. Weight: (mill tolerances apply)
  - a. Flat Tile: 0.842 lbs. per tile
  - b. Cupped Tile: 0.842 lbs. per tile
  - c. TS Tile: 0.784 lbs. per tile
  - d. Diamond Tile: 0.416 lbs. per tile
- 5. Thickness: 0.018 inch, or 26-gauge (mill tolerances apply).
- 6. Density: 0.287 lbs./cu. in.
- 7. Temper: Annealed.
- 8. Tensile Strength, ASTM E8/E8M: 90,000 psi.
- 9. Yield Strength, ASTM E8/E8M, 0.2 Percent Extension Under Load: 40,000 psi.
- 10. Elongation, ASTM E8/E8M: 55 percent in 2 Inches.
- 11. Rockwell Hardness, ASTM E18/E18M: B82.
- 12. Thermal Conductivity: 9.2 BTU/sq. ft./hr./degree F at 68 degrees F.
- 13. Recycled Content: 75 percent
- 14. Performance Ratings:
  - a. Wind: 110 mph.

Specifier Notes: Specify finish of material. Consult Millennium Forms, LLC for availability of different finishes.

Mill (2B) is a matte looking surface finish and has less reflectivity when compared to Bright finish. Bright (BA) is a mirror finish.

15. Finish:
  - a. 2B (mill)
  - b. BA (bright)

Specifier Notes: Select applicable color(s), consult Millennium Forms. Delete options NOT specified.

Light Interference Color (LIC): Is an electrochemical process to color stainless steel without the use of dyes or pigments. The process uses acids and electricity to grow a chrome oxide (chromate) layer on the stainless steel. The thickness of the chromate acts like a prism creating the changing color that is seen on the surface of the metal. As a result, each LIC color is produced as a range of color from light to dark.

16. Color:
  - a. Natural (no color)
  - b. Pewter (satin etched surface available only in 2B-Mill finish)
  - c. Bronze-LIC
  - d. Charcoal-LIC (only available in #4 polish finish)
  - e. Blue-LIC
  - f. Slate-LIC (only available in 2B-Mill finish)
  - g. Bronze/Gold-LIC
  - h. Burgundy-LIC
  - i. Purple/Blue -LIC (only available in BA-Bright finish)
  - j. Peacock-LIC
  - k. Blue/Green-LIC

## 2.3 ACCESSORIES

- A. Trim and Flashing: Same material and color as stainless steel tiles, except where otherwise noted; See Section 07 62 00 [07620] - Sheet Metal Trim and Flashing for additional fabrication requirements

Specifier Notes: Edit the following list as required.

1. Starter Strip: 2 by 2 by 120 inches; 24-gauge
2. Valley: 6-5/8 by 6-5/8 by 120 inches; 24-gauge
3. End Wall Trim: 3-1/4 by 3-1/4 by 120 inches; 24-gauge
4. Side Wall Trim: 3-1/4 by 3-1/4 by 120 inches; 24-gauge
5. Gable End Trim: 2 by 2 by 120 inches; 24-gauge
6. Continuous Ridge: 4-1/2 by 4-1/2 by 120 inches; 24-gauge; including continuous cleats.

Specifier Notes: Choose the appropriate underlayment(s) for the project, delete the non-selected products

- B. Underlayment: Synthetic non-asphaltic sheet, non-self-adhesive sheet, complying with requirements of ASTM D 226 and D 4869
  - 1. Type: Reinforced polypropylene and/or polyolefin composite sheet
  - 2. Provide [ ] manufactured by [ ], or approved equal.
- C. Eave Protection Membrane: Self-adhered membrane roofing underlayment complying with ASTM D 1970; minimum thickness: 40 mils; with strippable release paper and slip-resistant embossed polyethylene to surface.
  - 1. Provide [ ] manufactured by [ ], or approved equal.
- D. Fasteners:
  - 1. Shingle Fasteners: Stainless steel, ring-shank roofing nails.
    - a. Minimum Length: 3d (1-1/4 inches).
  - 2. Underlayment Fasteners: Galvanized steel, ring-shank roofing nails, or staples with washers.
- E. Joint Sealants: Exterior-grade, high-temperature, silicone joint sealant. As specified in Section 07 92 00 [07920] – Joint Sealants.
- F. Bituminous Paint: Asphaltic mastic, ASTM D4479, Type I.

### **PART 3 EXECUTION**

Specifier Note: Edit each article and paragraph for specific project criteria.

#### **3.1 EXAMINATION**

- A. Examine areas to receive stainless steel roof tiles for solidness and structural stability of deck
- B. Notify Architect of conditions that would adversely affect installation.
- C. Do not begin surface preparation or installation until unacceptable conditions are corrected.
- D. Verify minimum roof slope of 3:12.
- E. Verify roof deck is solid with a minimum thickness of:
  - 1. Plywood: 1/2 inch.
  - 2. Oriented Strand Board (OSB): 1/2 inch.
- F. Inspect attic to determine if existing roof deck needs to be replaced.

#### **3.2 SURFACE PREPARATION**

- A. Prepare surfaces in accordance with manufacturer's instructions.

- B. Ensure surfaces to receive stainless steel roof tiles are smooth and even, and that there are no protruding nail heads.

### 3.3 INSTALLATION

- A. Eave Protection Membrane:
  - 1. Install eave protection membrane in accordance with manufacturer's instructions.
  - 2. Install eave protection membrane from eave edge to minimum 24 [ ] inches up-slope beyond interior face of exterior wall.
  - 3. Install eave protection membrane centered at valleys for entire length. Weather-lap joints 12 [ ] inches minimum.
- B. Overlap underlayment or eave protection membrane 4 inches minimum over eave and edge trim.

Specifier Note: Select appropriate installation process to prevent "color clumping" and ensure random color range distribution throughout project. The Random Sort option has a premium and is not the default method

- C. Install stainless steel roof tiles in accordance with manufacturer's instructions.
  - 1. Pull tiles from four to five boxes (or more) during installation to assure random variation of finish.  
\*\*\*\*\* OR \*\*\*\*\*
  - 1. Follow approved Random Sort instructions from Millennium Forms.
- D. Use specified fasteners at spacing in accordance with manufacturer's instructions.

Specifier Note: Most common source of galvanic action is from copper or galvanized sheet metal draining onto stainless steel.

- E. Prevent Electrolysis:
  - 1. Prevent dissimilar metals and corrosive nonmetallic materials from coming into direct contact with stainless steel materials.
  - 2. Do not allow water to flow from dissimilar metals to stainless steel materials.
- F. Install trim and flashing in accordance with manufacturer's instructions.
- G. Joint Sealants:
  - 1. Install joint sealants as specified in Section 07 92 00 [07920].
  - 2. Install joint sealants at overlapping flashing and exposed fastener heads.

### 3.4 PROTECTION

- A. Protect installed stainless steel roof tiles to ensure that, except for normal weathering, tiles will be without damage or deterioration at time of substantial completion.
- B. Minimize traffic over finished roof surface. Where walking on roof is absolutely necessary, wear soft-soled shoes and walk on butt of shingles to avoid denting, deformation, and other damage

**END OF SECTION**