ICC-ES Evaluation Report

ESR-3098

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This report is subject to re-examination in one year.

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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 31 16—Metal Shingles
Section: 07 41 13—Metal Roof Panels

REPORT HOLDER:

METRO ROOF PRODUCTS
3093 INDUSTRY STREET
OCEANSIDE, CALIFORNIA 92054
(760) 435-9842
www.smartroofs.com

EVALUATION SUBJECT:

METRO AND STEELROCK COATED STEEL ROOFING PANELS: DIRECT-TO-DECK

ADDITIONAL LISTEE:

STEELROCK ROOF PRODUCTS
2436 EAST CHAPMAN, SUITE 24
FULLERTON, CALIFORNIA 92381

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 2006 *International Residential Code*® (IRC)

Properties evaluated:

- Weather resistance
- Fire classification
- Wind uplift resistance

2.0 USES

The Metro and SteelROCK roofing panels described in this report are recognized for use as Class A roof coverings on new and over existing roofs, when installed in accordance with this report.

3.0 DESCRIPTION

3.1 General:

The roofing panels are formed from sheet steel complying with ASTM A 792, Grade 33, with an AZ 50 class, hot-dipped aluminum–zinc alloy coating. The coated metal thickness is 0.017 inch (0.43 mm). On the exposed surface, colored stone granules are embedded in an acrylic resin base coating, followed by an application of a clear acrylic glaze. The installed weight of the steel roofing panels is 1.3 psf (6.3 kg/m^2). See Figure 1 for panel profiles.

Various accessory elements are provided for ridges, gables and trims.

3.1.1 Metro Tile, Metro Shake, Metro Settler, and SteelROCK Pacific Tile: The panels are 16 inches wide by 52 inches long (406 mm by 1320 mm), and have an installed exposure of 14$^1/_2$ inches by 50 inches (368 mm by 1270 mm). The leading edge of each panel is turned down approximately 1 inch (25 mm), and the back edge of the panels is bent up and horizontally back 1$^1/_2$ inches (38 mm) to create an overlapping edge for weather protection. Panel side laps are 2 inches (51 mm). The panels are formed with a series of stamped modules to simulate different tile profiles or the look of aged wood shakes.

3.1.2 Metro Roman Tile: The panel is 16 inches wide by 51 inches long (406 mm by 1295 mm), with an installed exposure of 14$^1/_2$ inches by 49$^1/_2$ inches (368 mm-by-1257 mm). The leading edge of each panel is turned down approximately 1 inch (25 mm), and the back edge of the panel is bent up and horizontally back 1$^1/_2$ inches (38 mm) to create an overlapping edge for weather protection. Panel side laps are 1$^1/_2$ inches (38 mm). The panels are formed with stamped modules to simulate a series of S-shaped tiles.

3.1.3 SteelROCK Pacific Roman Villa Tile: The panel is 16 inches wide by 48 inches long (406 mm by 1219 mm), and has an installed exposure of 14$^1/_2$ inches by 47$^1/_2$ inches (368 mm by 1207 mm). The leading edge of each panel is turned down approximately 1 inch (25 mm), and the back edge of the panel is bent up and horizontally back 1$^1/_2$ inches (38 mm) to create an overlapping edge for weather protection. Panel side laps are 1$^1/_2$ inches (38 mm). The panels are formed with stamped modules to simulate a series of interlocking tiles.

3.1.4 SteelROCK Pacific Shake: The panel is 16 inches wide by 49$^1/_2$ inches long (406 mm by 1257 mm), and has an installed exposure of 14$^1/_2$ inches by 47$^1/_2$ inches (368 mm by 1207 mm). The leading edge of each panel is turned down approximately 1 inch (25 mm), and the back edge of the panel is bent up and horizontally back 1$^1/_2$ inches (38 mm) to create an overlapping edge for weather protection. Panel side laps are 2 inches (51 mm). The panels are formed with impressions to simulate a series of aged wood shakes.

3.1.5 Metro Shingle: The Metro Shingle consists of a panel with raised and lowered sections forming a series of shingles. The front and rear edges of the panels are formed into a “C” configuration, so that the panels interlock

when overlapped. The Metro Shingle panel is $10^1/_2$ inches by 52 inches (267 mm by 1321 mm), and has an installed exposure of $9^1/_2$ inches by 50 inches (241 mm by 1270 mm). Metro Shingle side laps are 2 inches (51 mm).

3.2 Underlayment:

Underlayment must comply with, and be installed in accordance with, Section 1507.5.3 of the IBC or Section R905.4.3 of the IRC, as applicable.

4.0 DESIGN AND INSTALLATION

4.1 General:

The panels must be installed in accordance with this report, the applicable code and the manufacturer's published installation instructions. The manufacturer's installation instructions must be available at the jobsite at all times during installation.

The panels must be installed on roofs with minimum slopes of 3:12 (25-percent slope). For roof slopes less than 3:12 (25 percent slope), the panels are considered decorative and must be installed over a roof-covering system complying with the applicable code, subject to code official approval. Valley flashings must comply with IBC Section 1507.5.6 or IRC Section R905.4.6, as applicable. All other flashings must be in accordance with IBC Section 1503.2 or IRC Section R903.2.

4.2 New Construction:

4.2.1 Metro (Tile, Roman Tile, Shake and Settler) and SteelROCK (Pacific Tile, Pacific Roman Villa Tile and Pacific Shake): The panels must be installed directly on minimum $^{15}/_{32}$-inch-thick (11.9 mm) plywood, on wood structural panel sheathing or on spaced structural sheathing boards complying with the applicable code. Additional structural sheathing boards must be attached to the roof framing as required to accommodate all panel fastening locations.

To attach the first course of panels at the eave using wood battens, the battens must be fastened through the sheathing to the supporting members spaced at a maximum of 24 inches on center (610 mm), with minimum 16d, corrosion-resistant, common wire ring shank nails of sufficient length to penetrate the framing at least $^3/_4$ inch (19.1 mm). Battens are nominally 2-by-2 or 1-by-4 standard grade Douglas fir–larch or better. In lieu of using wood battens for the first course of panels, a starter metal flashing with a formed raised rib may be fastened through the sheathing to the supporting members spaced at a maximum of 24 inches on center (610 mm), with minimum 0.120-inch-diameter (3 mm), ring shank, corrosion-resistant common wire nails of sufficient length to penetrate the framing at least $^3/_4$ inch (19.1 mm). Panels placed at the first course are attached through the front downturn to the starter batten at each lap and at evenly spaced intermediate points, with a number and size of corrosion-resistant ring shank nails as indicated in Table 3. The rear section of the Tile or Shake panels is attached at the first and subsequent courses to the sheathing at each lap and at evenly spaced intermediate points, with a number and size of corrosion-resistant ring shank nails as indicated in Table 3. After the first course of panels, subsequent courses of panels are also attached through the front downturn of the panels to the sheathing at each lap and at evenly spaced intermediate points, with a number and size of corrosion-resistant ring shank nails as indicated in Table 3. No. 8 or No. 10, corrosion-resistant self-tapping screws may be substituted for wire nails to attach the panels, when installation is in accordance with Table 3.

4.2.2 Metro Shingle: The panels must be installed directly on minimum $^{15}/_{32}$-inch-thick (11.9 mm) plywood or on wood structural panel sheathing complying with the applicable code.

Fascia/starter metal is installed at the eave with corrosion-resistant, $^1/_8$-inch-diameter (3.2 mm) ring shank roofing nails with $^3/_8$-inch-diameter (9.5 mm) heads, $1^3/_8$ inches (35 mm) long or of sufficient length to penetrate the decking at least $^3/_4$ inch (19.1 mm) or through the sheathing thickness, whichever is less. The roofing nails are spaced a maximum of 12 inches (205 mm) on center. Full panels are placed and fastened starting at the eave, with the front of the panel interlocking with the starter metal. The rear of each panel is fastened to the decking at each lap and evenly spaced intermediate points with the number and size of corrosion-resistant ring shank nails, or self tapping screws, indicated in Table 3. The front downturn of the shingle panel interlocks with the channel formed at the rear of an overlapped panel.

4.3 Fire Classification:

The roofing panels described in this report, when installed in accordance with Sections 4.1 and 4.2, are recognized as Class A roof assemblies under the exception to IBC Section 1505.2 and IRC Section R902.1.

4.4 Wind Resistance:

Tables 1 and 2 provide the minimum required design uplift pressure based on ASCE 7 for a roofing panel installed on a low-rise building with a mean roof height of 30 feet (9.14 m) or less. If the building does not meet the criteria in Table 1 or Table 2, or is constructed on an isolated hill, ridge, or escarpment constituting an abrupt change in the general topography (Kzt>1.00), or is in Exposure D, the minimum required design uplift pressure must be determined according to the IBC.

Table 3 indicates the maximum allowable wind uplift pressures for the roofing panels when installed in accordance with Sections 4.1 and 4.2. For use under conditions meeting the criteria in Table 1 or Table 2, the maximum allowable wind uplift pressure in Table 3 must be equal to or greater than the minimum required design uplift pressure in Table 1 or Table 2.

4.5 Live Loads:

The Metro (Tile, Roman Tile, Shake and Settler) and SteelROCK (Pacific Tile, Pacific Roman Villa Tile and Pacific Shake) roofing panels have an allowable load of 28 psf (137 kg/m^2) when applied to 1-inch-by-4-inch, minimum utility grade spruce-pine-fir spaced sheathing at $14^1/_2$ inches (369 mm) on center.

4.6 Reroofing:

With the old roof covering completely removed, all installation conditions noted in Sections 4.1 and 4.2 apply. The Metro and SteelROCK Pacific panels may also be installed over existing asphalt shingle or built-up roofing, subject to the conditions set forth here, provided the roof slope complies with Section 4.1 and the requirements of IBC Section 1510 or IRC Section R907 are met. The panels must be fastened through the existing roof to the roof sheathing in the same manner as detailed in Sections 4.2.1 and 4.2.2, with fasteners of sufficient length to penetrate the sheathing a minimum of $^3/_4$ inch (19.1 mm). New flashing must be installed over and around all existing flashing, vents, valleys and chimneys in accordance with this report and the applicable code. See Section 4.3 for fire classification.

5.0 CONDITIONS OF USE

The Metro and SteelROCK steel roofing panels described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, when the panels are manufactured, identified and installed in accordance with this report and the manufacturer's published installation instructions. In the event of conflict between this report and the manufacturer's installation instructions, this report governs.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Metal Roof Coverings (AC166), dated May 2008.

7.0 IDENTIFICATION

A tag bearing the name and address of the manufacturer (Metro Roof Products), the product name, production date code and the evaluation report number (ESR-3098) is affixed to each pallet.

TABLE 1[1,2]—REQUIRED DESIGN UPLIFT PRESSURE, p (psf)
EXPOSURE B

MEAN ROOF HEIGHT (ft)	BASIC WIND SPEED, V (mph)							
	85		90		100		110	
	Roof Zones[3]							
	1	2 & 3	1	2 & 3	1	2 & 3	1	2 & 3
	GABLE / HIP ROOF 7° < θ ≤ 27° (≈1½:12 < θ ≤ ≈6:12°)[5]							
	Importance Factor = 1.00							
0-30	11.0	28.6	12.3	32.1	15.2	39.6	18.4	47.9
	Importance Factor = 1.15							
0-30	12.6	32.9	14.2	36.9	17.5	45.5	21.2	55.1
	HIP ROOF[4] 7° < θ ≤ 25° (≈1½:12 < θ ≤ ≈6:12°)[5]							
	Importance Factor = 1.00							
0-30	11.0	18.7	12.3	21.0	15.2	25.9	18.4	31.3
	Importance Factor = 1.15							
0-30	12.6	21.5	14.2	24.1	17.5	29.8	21.2	36.0
	MONOSLOPE ROOF 10° < θ ≤ 30° (≈2¼:12 < θ ≤ ≈7:12°)[5]							
	Importance Factor = 1.00							
0-30	14.3	31.9	16.0	35.8	19.8	44.2	24.0	53.4
	Importance Factor = 1.15							
0-30	16.4	36.7	18.4	41.1	22.8	50.8	27.6	61.5

For **SI:** 1 ft = 0.31 m; 1 psf = 4.88 kg/m^2; 1 mph = 0.44m/s.

[1]Table is based on ASCE 7.
[2]Topographic factor, K_{zt} = 1.00. To address the wind speed-up effect due to the topographic effect, either (1) Calculate the required design pressure using ASCE 7, or; (2) Multiply the required design pressure in Table 1 by K_{zt} for the building site.
[3]See Figure 6-3, ASCE-7, for Roof Zones.
[4]For a hip roof with a slope 25° < θ ≤ 27°, use the design uplift pressure for Gable/Hip Roof 7° < θ ≤ 27° for Zones 2 & 3.
[5]For roof slopes less than 3:12 (25 percent slope), the panels are considered decorative and must be installed over a roof-covering system complying with the applicable code, subject to code official approval.

TABLE 2[1, 2]—REQUIRED DESIGN UPLIFT PRESSURE, p (psf)
EXPOSURE C

Mean Roof Height (ft)	BASIC WIND SPEED, V (mph)							
	85		90		100		110	
	Roof Zones[3]							
	1	2 & 3	1	2 & 3	1	2 & 3	1	2 & 3
	GABLE / HIP ROOF 7º < θ ≤ 27º (≈1½:12 < θ ≤ ≈6:12º)[5]							
	Importance Factor = 1.00							
0-15	13.4	34.7	15.0	39.0	18.5	48.1	22.4	58.2
20	14.1	36.8	15.9	41.2	19.6	50.9	23.7	61.6
25	14.8	38.4	16.6	43.1	20.4	53.2	24.7	64.3
30	15.4	40.0	17.3	44.9	21.3	55.4	25.8	67.1
	Importance Factor = 1.15							
0-15	15.4	40.0	17.2	44.8	21.3	55.3	25.7	66.9
20	16.3	42.3	18.2	47.4	22.5	58.6	27.2	70.8
25	17.0	44.2	19.0	49.5	23.5	61.2	28.5	74.0
30	17.7	46.1	19.9	51.6	24.5	63.8	29.7	77.2
	HIP ROOF[4] 7º < θ ≤ 25º (≈1½:12 < θ ≤ ≈6:12º)[5]							
	Importance Factor = 1.00							
0-15	13.4	22.7	15.0	25.5	18.5	31.4	22.4	38.0
20	14.1	24.0	15.9	27.0	19.6	33.3	23.7	40.3
25	14.8	25.1	16.6	28.2	20.4	34.8	24.7	42.1
30	15.4	26.2	17.3	29.4	21.3	36.2	25.8	43.9
	Importance Factor = 1.15							
0-15	15.4	26.1	17.2	29.3	21.3	36.2	25.7	43.8
20	16.3	27.7	18.2	31.0	22.5	38.3	27.2	46.3
25	17.0	28.9	19.0	32.4	23.5	40.0	28.5	48.4
30	17.7	30.1	19.9	33.8	24.5	41.7	29.7	50.4
	MONOSLOPE ROOF 10º < θ ≤ 30º (≈2¼:12 < θ ≤ ≈7:12º)[5]							
	Importance Factor = 1.00							
0-15	17.4	38.8	19.5	43.4	24.0	53.6	29.1	64.9
20	18.4	41.0	20.6	46.0	25.4	56.8	30.8	68.7
25	19.2	42.8	21.5	48.0	26.6	59.3	32.2	71.8
30	20.0	44.7	22.4	50.1	27.7	61.8	33.5	74.8
	Importance Factor = 1.15							
0-15	20.0	44.6	22.4	50.0	27.6	61.7	33.4	74.6
20	21.2	47.2	23.7	52.9	29.3	65.3	35.4	79.0
25	22.1	49.3	24.8	55.2	30.6	68.2	37.0	82.5
30	23.0	51.4	25.8	57.6	31.9	71.1	38.6	86.0

For **SI:** 1 ft = 0.31 m; 1 psf = 4.88 kg/m^2; 1 mph = 0.44m/s.

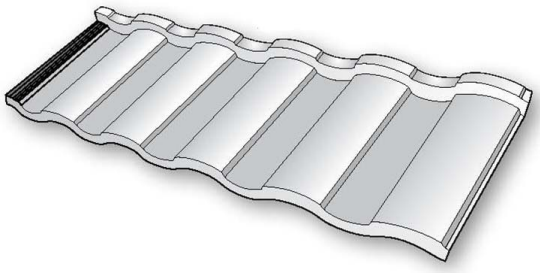
[1]Table is based on ASCE 7.
[2]Topographic factor, K_{zt} = 1.00. To address the wind speed-up effect due to the topographic effect, either (1) Calculate the required design pressure using ASCE 7, or; (2) Multiply the required design pressure in Table 2 by K_{zt} for the building site.
[3]See Figure 6-3, ASCE-7, for Roof Zones.
[4]For a hip roof with a slope 25º < θ ≤ 27º, use the design uplift pressure for Gable/Hip Roof 7º < θ ≤ 27º for Zones 2 & 3.
[5]For roof slopes less than 3:12 (25 percent slope), the panels are considered decorative and must be installed over a roof-covering system complying with the applicable code, subject to code official approval.

TABLE 3—MAXIMUM ALLOWABLE WIND UPLIFT PRESSURES ON METRO AND STEELROCK ROOFING PANELS

SYSTEM NO.	SUBSTRATE	ROOFING PANEL	PANEL FASTENING	ALLOWABLE WIND UPLIFT PRESSURE (psf)
1	Minimum $^{15}/_{32}$-inch-thick plywood	Metro (Tile, Roman Tile, Shake and Settler) and SteelROCK (Pacific Tile, Pacific Roman Villa Tile and Pacific Shake)	Five 8d x 2-inch-long, galvanized ring shank nails at front downturn of each panel, and five 8d x 2-inch-long, galvanized ring shank nails at backshelf per full panel width	48
2	Minimum $^{15}/_{32}$-inch-thick plywood	Metro (Tile, Roman Tile, Shake and Settler) and SteelROCK (Pacific Tile, Pacific Roman Villa Tile and Pacific Shake)	Six No. 10 x 2-inch-long screws at front downturn of each panel, and six No. 10 x 2-inch-long screws at backshelf per full panel width. Screws at backshelf to be fastened through sheathing to the rafters, the rest to be fastened through sheathing and evenly spaced between rafters	105
3	Minimum $^{15}/_{32}$-inch-thick plywood	Metro (Tile, Roman Tile, Shake and Settler) and SteelROCK (Pacific Tile, Pacific Roman Villa Tile and Pacific Shake)	Six No. 10 x 2-inch-long, screws at front downturn of each panel, and six No. 10 x 2-inch-long screws at backshelf per full panel width	124
4	1 x 4 spaced sheathing boards	Metro (Tile, Roman Tile, Shake and Settler) and SteelROCK (Pacific Tile, Pacific Roman Villa Tile and Pacific Shake)	Six 8d x 2-inch-long, galvanized ring shank nails at front downturn of each panel, and six 8d x 2-inch-long, galvanized ring shank nails at backshelf per full panel width	50
5	1 x 4 spaced sheathing boards	Metro (Tile, Roman Tile, Shake and Settler) and SteelROCK (Pacific Tile, Pacific Roman Villa Tile and Pacific Shake)	Eight No. 8 x 2-inch-long screws at front downturn of each panel, and eight No. 8 x 2-inch-long screws at backshelf per full panel width	85
6	Minimum $^{15}/_{32}$-inch-thick plywood	Metro Shingle	Four 8d x 1-inch-long, galvanized ring shank nails at backshelf of each panel	45
7	Minimum $^{15}/_{32}$-inch-thick plywood	Metro Shingle	Six No. 10 x 1-inch-long, screws through the back shelf of each panel	72
8	Minimum $^{15}/_{32}$-inch-thick plywood	Metro Shingle	Eight No. 10 screws through the back shelf of each panel, min. 2 inches long at rafters and min. 1 inch long between rafters	115

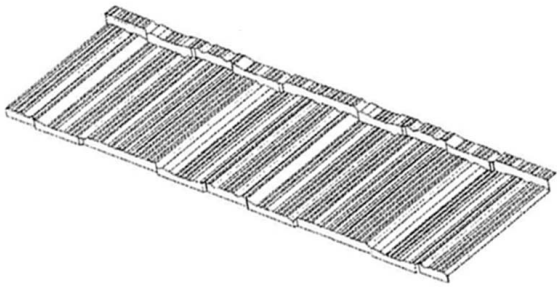
For **SI:** 1 inch = 25.4 mm; 1 psf = 4.88 kg/m^2.

Metro Tile

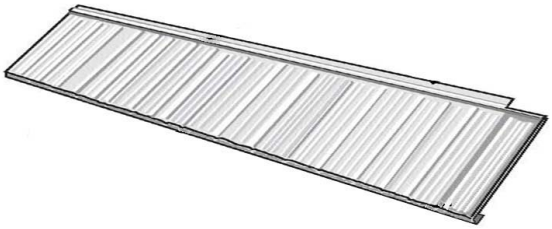


Metro Roman Tile

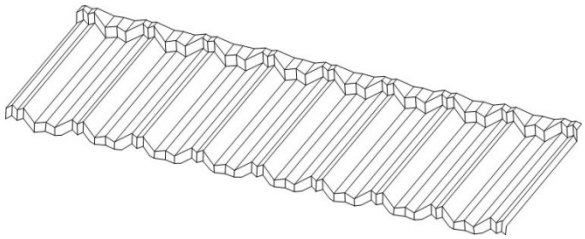
Metro Shake



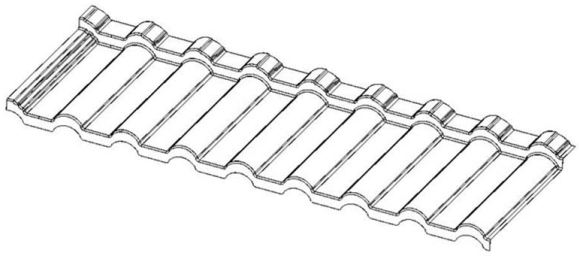
Metro Settler



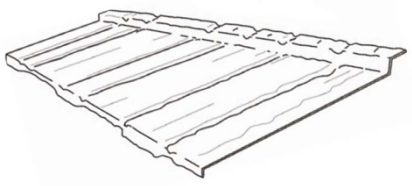
Metro Shingle



SteelROCK Pacific Tile



SteelROCK Pacific Roman Villa Tile



SteelROCK Pacific Shake

FIGURE 1—PANEL PROFILES