



● Compliance with International Codes
● Compliance with State Codes

ICC-ES Evaluation Report

ESR-3012

Reissued November 2021

Revised April 2022

This report is subject to renewal November 2023.

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

Section: 07 31 16—Metal Shingles

Section: 07 41 13—Metal Roof Panels

REPORT HOLDER:

WESTLAKE ROYAL ROOFING LLC

EVALUATION SUBJECT:

UNIFIED STEEL STONE COATED ROOFING BRAND: PINE-CREST SHAKE, PACIFIC TILE, COTTAGE SHINGLE AND BARREL-VAULT COATED STEEL ROOFING PANELS: INSTALLED ON BATTENS

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes:

- 2021, 2018, 2015, 2012, 2009 and 2006 *International Building Code*® (IBC)
- 2021, 2018, 2015, 2012, 2009 and 2006 *International Residential Code*® (IRC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)[†]

[†]The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

Properties evaluated:

- Weather resistance
- Fire classification
- Wind uplift resistance

1.2 Evaluation to the following green code:

- 2019 California Green Building Standards Code (CALGreen), Title 24, Part 11

Attributes verified:

- See Section 3.0

2.0 USES

The PINE-CREST Shake, PACIFIC Tile, COTTAGE Shingle and BARREL-VAULT roofing panels described in this report are used as roof coverings on new roofs 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 A792, 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/m²). See Figure 1 for panel profiles.

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

The attributes of the steel roofing panels have been verified as conforming to the requirements of 2013 CALGreen Section A5.406.1.2 for reduced maintenance. Note that decisions on compliance for those areas rest with the user of this report. The user is advised of the project-specific provisions that may be contingent upon meeting specific conditions, and the verification of those conditions is outside the scope of this report. The code may provide supplemental information as guidance.

3.1.1 PINE-CREST Shake and PACIFIC Tile: The panels are 16 inches wide by 52 inches long (406 mm by 1320 mm), and have an installed exposure of 14½ 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 1½ 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 COTTAGE Shingle: The panel is 15½ inches wide by 51 inches long (394 mm by 1296 mm), and has an installed exposure of 14¼ inches by 47½ inches (362 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 1½ inches (38 mm) to create an overlapping edge for weather protection. Panel side laps are 3 inches (76 mm). The panels are formed with impressions to simulate a series of aged wood shingles.

3.1.3 BARREL-VAULT: The panel is 45.13 inches (1114 mm) wide by 15.58 inches (396 mm) deep, and

weight 5.31 pounds (2.41 kg). 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 1½ 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 a series of S-shaped tiles.

3.2 Underlayment:

Underlayment must comply with, and be installed in accordance with, 2021 and 2018 IBC Sections 1507.1.1 and 1507.5.3, 2015, 2012, 2009 and 2006 IBC Section 1507.5.3, 2021, 2018 and 2015 IRC Sections R905.1.1 and R905.4.3 or 2012, 2009 or 2006 IRC Section R905.4.3, as applicable. For fire classified roof coverings, one or two layers of GAF VersaShield® Fire-Resistant Roof Deck Protection may be installed in accordance with Sections 4.6.2 and 4.6.3.

3.3 Battens and Counterbattens:

Wood battens must be nominally 2-by-2 standard-grade Douglas fir-larch or better. Steel battens must be hat-shaped sections with a 1½-inch (38 mm) minimum height, formed from minimum 0.017-inch-thick (0.43 mm) galvanized steel. Wood battens are limited to supports spaced a maximum of 24 inches (620 mm) on center, and steel battens must be designed to resist the design loads. Counterbattens must be nominal 1-by-4 standard-grade Douglas fir-larch or better.

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 2021, 2018, 2015, 2012 and 2009 IBC Section 1507.5.7, 2006 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 Installation – New Construction:

The panels are designed to be installed on wood or steel battens located 14½ inches (368 mm) on center over 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.

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 the minimum 6d, corrosion-resistant ring shank nails of sufficient length to penetrate the framing at least 1 inch (25.4 mm). Wood battens must be fastened to the supporting framing members with minimum 16d corrosion-resistant common nails of sufficient length to penetrate the framing at least 1 inch (25.4 mm) in the field of the roof, and two of the same minimum 16d nails at each intersection with the framing members around the

perimeter of the roof. When steel battens are used, they must be attached to supporting framing members with two No. 10 by 1½ inches long (38 mm) wood screws. When nominal 1-by-4 counterbattens are used, the counterbattens are attached with minimum 8d corrosion-resistant common nails of sufficient length to penetrate the framing at least 1 inch (25.4 mm) spaced 12 inches (305 mm) on center. The panels are fastened to battens with minimum four 6d corrosion-resistant common nails, or four No. 10 by 1½-inch (38 mm) wood screws.

4.3 Fire Classification:

4.3.1 New Construction: The steel roof covering assembly, described as follows, and installed in accordance with Sections 4.1 and 4.2, is recognized as a Class A roofing assembly in accordance with IBC Section 1505.1 and IRC Section R902.1:

1. **Deck:** Minimum 15/32-inch-thick (11.9 mm) plywood or spaced sheathing.
2. **Maximum roof slope:** Unlimited.
3. **Underlayment:** One layer of GAF VersaShield™ Fire-Resistant Roof Deck Protection ([ESR-2053](#)).
4. **Battens:** Wood or steel battens with or without wood counterbattens.
5. **Roof panel:** PINE-CREST Shake, PACIFIC Tile COTTAGE Shingle or BARREL VAULT.

4.3.2 Reroofing: Steel roofing panels installed in accordance with Section 4.6.2 are classified as Class A roof assemblies in accordance with IBC Section 1505.1 and IRC Section R902.1. Steel roofing panels installed in accordance with Section 4.6.3 are classified as Class B roof assemblies in accordance with IBC Section 1505.1 and IRC Section R902.1.

4.4 Wind Resistance:

Tables 1 through 5 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 Tables 1 through 5, or is constructed on an isolated hill, ridge, or escarpment constituting an abrupt change in the general topography ($K_{zt} > 1.00$), or is in Exposure D, the minimum required design uplift pressure must be determined according to the IBC. Table 1 is applicable to the 2021 and 2018 IBC and IRC, Table 2 and 3 are applicable to the 2015 and 2012 IBC and Tables 4 and 5 are applicable to the 2009 and 2006 IBC and the 2012, 2009 and 2006 IRC.

Table 6 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 Tables 1 through 4, the maximum allowable wind uplift pressure in Table 6 must be equal to or greater than the minimum required design uplift pressure in Tables 1 through 5. Table 6 is applicable to the 2021, 2018, 2015, 2012, 2009 and 2006 IBC and the 2018, 2015, 2012, 2009 and 2006 IRC.

4.5 Live Loads:

The PINE-CREST Shake, PACIFIC Tile COTTAGE Shingle and BARREL-VAULT roofing panels have an allowable live load of 28 psf (137 kg/m²) when applied to 1-inch-by-4-inch, minimum utility grade spruce-pine-fir spaced sheathing at 14½ inches (369 mm) on center.

4.6 Installation – Reroofing:

4.6.1 General: With the existing roof covering completely removed, all installation conditions noted in Sections 4.1 and 4.2 apply. The panels may be installed over existing spaced sheathing provided the space between boards is

filled in with lumber as necessary to provide a base for fastening. The fill lumber must be of the same thickness as the existing spaced sheathing. New flashing must be installed over and around all existing flashing, vents, valleys, and chimneys in accordance with this report and the applicable code. The system may be installed over integral gutters, provided there is a fascia board (nailed to the rafters) installed outside the gutter.

The panels may also be installed over existing wood shakes, wood shingles, asphalt shingles or built-up roofing, subject to the conditions set forth here, provided the roof slope complies with Section 4.1 and the requirements of 2021 IBC Section 1512 and 2018 IBC Section 1511, 2015, 2012, 2009 and 2006 IBC Section 1510, 2021, 2018 and 2015 IRC Section R908 or 2012, 2009 or 2006 IRC Section R907 are met. Over existing built-up roofs, all loose gravel and debris must be swept off. Blisters in the built-up plies must be cut and nailed flat. Raised perimeters, such as gravel stops, must be covered with the steel roofing panels. When installed over existing roofs, the panels must be fastened through the existing roof to the roof deck in the same manner as described in Sections 4.1 and 4.2 and as for Systems 2 or 4 in Table 6, with fasteners of sufficient length to penetrate the roof deck a minimum of 1 inch (25.4 mm).

When installed in accordance with Sections 4.1, 4.2 and 4.3, with the existing roof covering completely removed, the fire classification is as specified in Section 4.3 of this report. When installed over existing wood shakes, wood shingles, asphalt shingles or built-up roofing, the fire classification is as specified in Sections 4.6.2 and 4.6.3.

4.6.2 Class A Fire Classification: Ridge and hip caps must be removed and the existing roof covering cut back flush with the fascia or barge cover. Nominally 1-by-4 wood counterbattens are installed parallel to the framing members at a maximum of 24 inches (610 mm) on center. Counterbattens are fastened at 12 inches (305 mm) on center with nails penetrating completely through the roof sheathing or at least 1 inch (25.4 mm) into the roof framing member. When installed over existing Class A asphalt shingles, one layer of 1/2-inch-thick (12.7 mm) gypsum board, or one layer of 1/4-inch-thick (6.3 mm) GP DensDek Roof Board, or one layer of GAF VersaShield™ Fire-Resistant Roof Deck Protection ([ESR-2053](#)) must be fastened to the counterbattens to satisfy the requirements of 2021 IBC Section 1512, 2018 and 2015 IBC Section 1511, 2012, 2009 and 2006 IBC Section 1510, 2021, 2018 and 2015 IRC Section R908 or 2012, 2009 or 2006 IRC Section R907. When installed over existing wood shakes, wood shingles or built-up roofing, one layer of 1/2-inch-thick (12.7 mm) gypsum board, or one layer of 1/4-inch-thick (6.3 mm) GP DensDek Roof Board, or two layers of GAF VersaShield™ Fire-Resistant Roof Deck Protection ([ESR-2053](#)) must be fastened to the counterbattens to satisfy the requirements of 2021 IBC Section 1512, 2018 and 2015 IBC Section 1511, 2012, 2009 and 2006 IBC Section 1510, 2018 and 2021, 2018 and 2015 IRC Section R908 or 2012, 2009 or 2006 IRC Section R907. The GAF VersaShield™ Fire-Resistant Roof Deck Protection may be placed under or over the counterbattens. Nominally, 2-by-2-inch battens, spaced 14 1/2 inches (368 mm) on center, are nailed through the cover board or GAF VersaShield™ Fire-Resistant Roof Deck Protection to the counterbattens with 16d common corrosion-resistant common nails at each batten intersection. The panels are fastened to the battens using not fewer than four 6d corrosion-resistant common nails or the equivalent, in the same manner as described in Section 4.2. Panels overlap each other by 1 inch (25.4 mm).

4.6.3 Class B Fire Classification: Ridge and hip caps must be removed and the existing roof covering cut back flush with the fascia or barge cover. Nominally, 1-by-4 wood counterbattens are installed parallel to the framing members at a maximum of 24 inches (610 mm) on center. Counterbattens are fastened at 12 inches (305 mm) on center with nails penetrating completely through the roof sheathing or at least 1 inch (25.4 mm) into the roof framing member. One layer of Type G3 mineral-surfaced cap sheet, complying with ASTM D3909 and weighing a minimum of 76 pounds per 100 square feet (34.5 kg per 9.29 m²), or one layer of GAF VersaShield™ Fire-Resistant Roof Deck Protection ([ESR-2053](#)), must be fastened to the counterbattens to satisfy the requirements of 2021 IBC Section 1512, 2018 IBC Section 1511, 2015, 2012, 2009 and 2006 IBC Section 1510, 2021, 2018 and 2015 IRC Section R908 or 2012, 2009 or 2006 IRC Section R907. Nominally, 2-by-2-inch battens, spaced 14 1/2 inches (368 mm) on center, are nailed to the counterbattens with 16d corrosion-resistant common nails at each batten intersection. The panels are fastened to the battens using not fewer than four 6d corrosion-resistant common nails or the equivalent, in the same manner as described in Section 4.2. Panels overlap each other by 1 inch (25.4 mm).

5.0 CONDITIONS OF USE

The 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, subject to the following conditions:

- 5.1** 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.
- 5.2** The steel roofing panels installed on spaced sheathing must not be used in applications subject to the 300-pound (1.3 kN) concentrated load specified in 2021 IBC Sections 1607.4 and 1607.13 and Table 1607.1 Item 27, 2018, 2015 and 2012 IBC Sections 1607.4 and 1607.12 and Table 1607.1, Item 26, and 2009 and 2006 IBC Sections 1607.4 and 1607.11 and Table 1607.1, Item 29 (2009 IBC) or Item 30 (2006 IBC).
- 5.3** The panels are manufactured in Oceanside, California under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED:

Data in accordance with the ICC-ES Acceptance Criteria for Metal Roof Coverings (AC166), dated February 2021.

7.0 IDENTIFICATION

- 7.1** A tag bearing the name and address of the manufacturer (Westlake Royal Roofing LLC), brand name (Unified Steel Stone Coated Roofing), the product name, production date code and the evaluation report number (ESR-3012) is affixed to each pallet.
- 7.2** The report holder's contact information is the following:

WESTLAKE ROYAL ROOFING LLC
7575 IRVINE CENTER DRIVE, SUITE 100
IRVINE, CALIFORNIA 92618
(801) 380-6091
www.WestlakeRoyalRoofing.com

**TABLE 1^{1,2,3,4}—REQUIRED DESIGN UPLIFT PRESSURE, p (psf)
EXPOSURE B 2021 and 2018 IBC and IRC**

| Gable Roofs in Exposure B | | | | | | | | | | | | |
|---|-----------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|----|
| 7° < θ ≤ 20° ~ (Slope 3:12 – 4.4:12) | | | | | | | | | | | | |
| Zone | Mean Roof Height (ft) | Basic Wind Speed (mph) | | | | | | | | | | |
| | | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | | |
| 1 | 20 | 18 | 21 | 25 | 30 | 35 | 40 | 45 | 51 | 57 | | |
| | 25 | 19 | 23 | 28 | 32 | 37 | 43 | 49 | 55 | 62 | | |
| | 30 | 20 | 24 | 29 | 34 | 39 | 45 | 51 | 58 | 65 | | |
| | 40 | 22 | 26 | 31 | 37 | 42 | 49 | 55 | 63 | 70 | | |
| | 50 | 23 | 28 | 33 | 39 | 45 | 52 | 59 | 67 | 75 | | |
| 2 | 20 | 24 | 29 | 35 | 41 | 47 | 54 | 62 | 70 | 78 | | |
| | 25 | 26 | 31 | 37 | 44 | 51 | 58 | 66 | 74 | 83 | | |
| | 30 | 28 | 34 | 40 | 47 | 55 | 63 | 71 | 80 | 90 | | |
| | 40 | 29 | 35 | 42 | 49 | 57 | 65 | 74 | 84 | 94 | | |
| | 50 | 32 | 38 | 45 | 53 | 62 | 71 | 81 | 91 | 102 | | |
| 3 | 20 | 34 | 41 | 48 | 57 | 66 | 76 | 86 | 97 | 109 | | |
| | 25 | 35 | 43 | 51 | 60 | 69 | 79 | 90 | 102 | 114 | | |
| | 30 | 31 | 37 | 44 | 52 | 60 | 69 | 78 | 88 | 99 | | |
| | 40 | 33 | 40 | 48 | 56 | 65 | 74 | 85 | 96 | 107 | | |
| | 50 | 35 | 42 | 50 | 58 | 68 | 78 | 88 | 100 | 112 | | |
| 20° < θ ≤ 27° ~ (Slope 4.4:12 – 6.1:12) | 20 | 38 | 45 | 54 | 63 | 74 | 84 | 96 | 108 | 122 | | |
| | 25 | 40 | 48 | 58 | 68 | 78 | 90 | 102 | 116 | 130 | | |
| | 30 | 42 | 51 | 60 | 71 | 82 | 94 | 107 | 121 | 136 | | |
| | 40 | 31 | 37 | 44 | 52 | 60 | 69 | 78 | 88 | 99 | | |
| | 50 | 33 | 40 | 48 | 56 | 65 | 74 | 85 | 96 | 107 | | |
| Zone | Mean Roof Height (ft) | Basic Wind Speed (mph) | | | | | | | | | | |
| | | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | | |
| | | 1 | 20 | 14 | 17 | 20 | 23 | 27 | 31 | 35 | 39 | 44 |
| | | | 25 | 15 | 18 | 21 | 25 | 29 | 33 | 38 | 43 | 48 |
| | | | 30 | 15 | 19 | 22 | 26 | 30 | 35 | 39 | 44 | 50 |
| 40 | 17 | | 20 | 24 | 28 | 33 | 38 | 43 | 48 | 54 | | |
| 50 | 18 | | 22 | 26 | 30 | 35 | 40 | 46 | 51 | 58 | | |
| 2 | 20 | 19 | 23 | 27 | 32 | 37 | 42 | 48 | 54 | 60 | | |
| | 25 | 22 | 26 | 31 | 37 | 43 | 49 | 56 | 63 | 70 | | |
| | 30 | 23 | 28 | 34 | 40 | 46 | 53 | 60 | 68 | 76 | | |
| | 40 | 25 | 30 | 35 | 41 | 48 | 55 | 63 | 71 | 79 | | |
| | 50 | 27 | 32 | 38 | 45 | 52 | 60 | 68 | 77 | 86 | | |
| 3 | 20 | 28 | 34 | 41 | 48 | 56 | 64 | 73 | 82 | 92 | | |
| | 25 | 30 | 36 | 43 | 50 | 58 | 67 | 76 | 86 | 96 | | |
| | 30 | 31 | 37 | 44 | 52 | 60 | 69 | 78 | 88 | 99 | | |
| | 40 | 33 | 40 | 48 | 56 | 65 | 74 | 85 | 96 | 107 | | |
| | 50 | 35 | 42 | 50 | 58 | 68 | 78 | 88 | 100 | 112 | | |
| 27° < θ ≤ 45° ~ (Slope 6.1:12 – 12:12) | 20 | 38 | 45 | 54 | 63 | 74 | 84 | 96 | 108 | 122 | | |
| | 25 | 40 | 48 | 58 | 68 | 78 | 90 | 102 | 116 | 130 | | |
| | 30 | 42 | 51 | 60 | 71 | 82 | 94 | 107 | 121 | 136 | | |
| | 40 | 31 | 37 | 44 | 52 | 60 | 69 | 78 | 88 | 99 | | |
| | 50 | 33 | 40 | 48 | 56 | 65 | 74 | 85 | 96 | 107 | | |
| Zone | Mean Roof Height (ft) | Basic Wind Speed (mph) | | | | | | | | | | |
| | | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | | |
| | | 1 | 20 | 16 | 19 | 23 | 27 | 31 | 36 | 41 | 46 | 52 |
| | | | 25 | 17 | 21 | 25 | 29 | 34 | 39 | 44 | 50 | 56 |
| | | | 30 | 18 | 22 | 26 | 31 | 36 | 41 | 46 | 52 | 59 |
| 40 | 20 | | 24 | 28 | 33 | 39 | 44 | 50 | 57 | 64 | | |
| 50 | 21 | | 25 | 30 | 35 | 41 | 47 | 54 | 61 | 68 | | |
| 2 | 20 | 22 | 27 | 32 | 37 | 43 | 49 | 56 | 64 | 71 | | |
| | 25 | 18 | 21 | 25 | 30 | 35 | 40 | 45 | 51 | 57 | | |
| | 30 | 19 | 23 | 28 | 32 | 37 | 43 | 49 | 55 | 62 | | |
| | 40 | 20 | 24 | 29 | 34 | 39 | 45 | 51 | 58 | 65 | | |
| | 50 | 22 | 26 | 31 | 37 | 42 | 49 | 55 | 63 | 70 | | |
| 3 | 20 | 23 | 28 | 33 | 39 | 45 | 52 | 59 | 67 | 75 | | |
| | 25 | 24 | 29 | 35 | 41 | 47 | 54 | 62 | 70 | 78 | | |
| | 30 | 27 | 33 | 39 | 46 | 54 | 62 | 70 | 79 | 89 | | |
| | 40 | 30 | 36 | 43 | 50 | 58 | 67 | 76 | 86 | 96 | | |
| | 50 | 31 | 37 | 45 | 52 | 61 | 70 | 79 | 89 | 100 | | |
| 27° < θ ≤ 45° ~ (Slope 6.1:12 – 12:12) | 20 | 34 | 41 | 48 | 57 | 66 | 76 | 86 | 97 | 109 | | |
| | 25 | 36 | 43 | 52 | 60 | 70 | 80 | 92 | 103 | 116 | | |
| | 30 | 38 | 45 | 54 | 63 | 74 | 84 | 96 | 108 | 122 | | |
| | 40 | 27 | 33 | 39 | 46 | 54 | 62 | 70 | 79 | 89 | | |
| | 50 | 30 | 36 | 43 | 50 | 58 | 67 | 76 | 86 | 96 | | |

**TABLE 1^{1,2,3,4}—REQUIRED DESIGN UPLIFT PRESSURE, p (psf)
EXPOSURE B 2021 and 2018 IBC and IRC**

| Gable Roofs in Exposure C | | | | | | | | | | |
|--------------------------------------|-----------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| 7° < θ ≤ 20° ~ (Slope 3:12 – 4.4:12) | | | | | | | | | | |
| Zone | Mean Roof Height (ft) | Basic Wind Speed (mph) | | | | | | | | |
| | | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
| 1 | 20 | 26 | 31 | 37 | 43 | 50 | 58 | 66 | 74 | 83 |
| | 25 | 27 | 32 | 39 | 45 | 52 | 60 | 69 | 77 | 87 |
| | 30 | 28 | 34 | 40 | 47 | 55 | 63 | 71 | 81 | 90 |
| | 40 | 30 | 36 | 43 | 50 | 58 | 67 | 76 | 86 | 96 |
| | 50 | 31 | 38 | 45 | 52 | 61 | 70 | 79 | 90 | 101 |
| | 60 | 32 | 39 | 46 | 54 | 63 | 72 | 82 | 93 | 104 |
| 2 | 20 | 37 | 45 | 54 | 63 | 73 | 84 | 96 | 108 | 121 |
| | 25 | 39 | 47 | 56 | 66 | 77 | 88 | 100 | 113 | 127 |
| | 30 | 41 | 49 | 59 | 69 | 80 | 92 | 104 | 118 | 132 |
| | 40 | 43 | 52 | 62 | 73 | 85 | 97 | 111 | 125 | 140 |
| | 50 | 45 | 55 | 65 | 77 | 89 | 102 | 116 | 131 | 147 |
| | 60 | 47 | 57 | 68 | 79 | 92 | 106 | 120 | 136 | NA |
| 3 | 20 | 44 | 54 | 64 | 75 | 87 | 100 | 114 | 128 | 144 |
| | 25 | 46 | 56 | 67 | 78 | 91 | 104 | 119 | 134 | 150 |
| | 30 | 48 | 59 | 70 | 82 | 95 | 109 | 124 | 140 | NA |
| | 40 | 51 | 62 | 74 | 87 | 101 | 116 | 131 | 148 | NA |
| | 50 | 54 | 65 | 78 | 91 | 105 | 121 | 138 | NA | NA |
| | 60 | 56 | 68 | 80 | 94 | 109 | 126 | 143 | NA | NA |

| Gable Roofs in Exposure C (continued) | | | | | | | | | | |
|---|-----------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| 20° < θ ≤ 27° ~ (Slope 4.4:12 – 6.1:12) | | | | | | | | | | |
| Zone | Mean Roof Height (ft) | Basic Wind Speed (mph) | | | | | | | | |
| | | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
| 1 | 20 | 20 | 24 | 28 | 33 | 39 | 44 | 51 | 57 | 64 |
| | 25 | 21 | 25 | 30 | 35 | 40 | 46 | 53 | 60 | 67 |
| | 30 | 22 | 26 | 31 | 36 | 42 | 48 | 55 | 62 | 70 |
| | 40 | 23 | 28 | 33 | 39 | 45 | 51 | 58 | 66 | 74 |
| | 50 | 24 | 29 | 34 | 40 | 47 | 54 | 61 | 69 | 78 |
| | 60 | 25 | 30 | 36 | 42 | 49 | 56 | 64 | 72 | 80 |
| 2 | 20 | 32 | 38 | 45 | 53 | 62 | 71 | 81 | 91 | 102 |
| | 25 | 33 | 40 | 47 | 56 | 65 | 74 | 84 | 95 | 107 |
| | 30 | 34 | 42 | 49 | 58 | 67 | 77 | 88 | 99 | 111 |
| | 40 | 36 | 44 | 52 | 62 | 71 | 82 | 93 | 105 | 118 |
| | 50 | 38 | 46 | 55 | 65 | 75 | 86 | 98 | 110 | 124 |
| | 60 | 40 | 48 | 57 | 67 | 78 | 89 | 101 | 114 | 128 |
| 3 | 20 | 44 | 54 | 64 | 75 | 87 | 100 | 114 | 128 | 144 |
| | 25 | 46 | 56 | 67 | 78 | 91 | 104 | 119 | 134 | 150 |
| | 30 | 48 | 59 | 70 | 82 | 95 | 109 | 124 | 140 | NA |
| | 40 | 51 | 62 | 74 | 87 | 101 | 116 | 131 | 148 | NA |
| | 50 | 54 | 65 | 78 | 91 | 105 | 121 | 138 | NA | NA |
| | 60 | 56 | 68 | 80 | 94 | 109 | 126 | 143 | NA | NA |

| 20° < θ ≤ 45° ~ (Slope 6.1:12 – 12:12) | | | | | | | | | | |
|--|-----------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Zone | Mean Roof Height (ft) | Basic Wind Speed (mph) | | | | | | | | |
| | | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
| 1 | 20 | 23 | 28 | 34 | 39 | 46 | 52 | 60 | 67 | 75 |
| | 25 | 24 | 29 | 35 | 41 | 48 | 55 | 62 | 70 | 79 |
| | 30 | 25 | 31 | 37 | 43 | 50 | 57 | 65 | 73 | 82 |
| | 40 | 27 | 33 | 39 | 45 | 53 | 61 | 69 | 78 | 87 |
| | 50 | 28 | 34 | 41 | 48 | 55 | 63 | 72 | 81 | 91 |
| | 60 | 29 | 35 | 42 | 49 | 57 | 66 | 75 | 84 | 95 |
| 2 | 20 | 26 | 31 | 37 | 43 | 50 | 58 | 66 | 74 | 83 |
| | 25 | 27 | 32 | 39 | 45 | 52 | 60 | 69 | 77 | 87 |
| | 30 | 28 | 34 | 40 | 47 | 55 | 63 | 71 | 81 | 90 |
| | 40 | 30 | 36 | 43 | 50 | 58 | 67 | 76 | 86 | 96 |
| | 50 | 31 | 38 | 45 | 52 | 61 | 70 | 79 | 90 | 101 |
| | 60 | 32 | 39 | 46 | 54 | 63 | 72 | 82 | 93 | 104 |
| 3 | 20 | 40 | 48 | 57 | 67 | 78 | 89 | 102 | 115 | 129 |
| | 25 | 42 | 50 | 60 | 70 | 81 | 93 | 106 | 120 | 134 |
| | 30 | 43 | 52 | 62 | 73 | 85 | 97 | 111 | 125 | 140 |
| | 40 | 46 | 56 | 66 | 78 | 90 | 103 | 118 | 133 | 149 |
| | 50 | 48 | 58 | 69 | 81 | 94 | 108 | 123 | 139 | NA |
| | 60 | 50 | 60 | 72 | 84 | 98 | 112 | 128 | 144 | NA |

(Continued)

**TABLE 1^{1,2,3,4}—REQUIRED DESIGN UPLIFT PRESSURE, p (psf)
EXPOSURE B 2021 and 2018 IBC and IRC**

| Hip Roofs in Exposure B | | | | | | | | | | |
|---|-----------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| 7° < θ ≤ 20° ~ (Slope 3:12 – 4.4:12) | | | | | | | | | | |
| Zone | Mean Roof Height (ft) | Basic Wind Speed (mph) | | | | | | | | |
| | | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
| 1 | 20 | 16 | 19 | 23 | 27 | 31 | 36 | 41 | 46 | 52 |
| | 25 | 17 | 21 | 25 | 29 | 34 | 39 | 44 | 50 | 56 |
| | 30 | 18 | 22 | 26 | 31 | 36 | 41 | 46 | 52 | 59 |
| | 40 | 20 | 24 | 28 | 33 | 39 | 44 | 50 | 57 | 64 |
| | 50 | 21 | 25 | 30 | 35 | 41 | 47 | 54 | 61 | 68 |
| | 60 | 22 | 27 | 32 | 37 | 43 | 49 | 56 | 64 | 71 |
| 2 | 20 | 23 | 27 | 32 | 38 | 44 | 51 | 58 | 65 | 73 |
| | 25 | 24 | 29 | 35 | 41 | 48 | 55 | 62 | 70 | 79 |
| | 30 | 25 | 31 | 37 | 43 | 50 | 57 | 65 | 73 | 82 |
| | 40 | 28 | 33 | 40 | 47 | 54 | 62 | 71 | 80 | 89 |
| | 50 | 29 | 36 | 42 | 50 | 58 | 66 | 75 | 85 | 95 |
| | 60 | 31 | 37 | 44 | 52 | 61 | 69 | 79 | 89 | 100 |
| 3 | 20 | 23 | 27 | 32 | 38 | 44 | 51 | 58 | 65 | 73 |
| | 25 | 24 | 29 | 35 | 41 | 48 | 55 | 62 | 70 | 79 |
| | 30 | 25 | 31 | 37 | 43 | 50 | 57 | 65 | 73 | 82 |
| | 40 | 28 | 33 | 40 | 47 | 54 | 62 | 71 | 80 | 89 |
| | 50 | 29 | 36 | 42 | 50 | 58 | 66 | 75 | 85 | 95 |
| | 60 | 31 | 37 | 44 | 52 | 61 | 69 | 79 | 89 | 100 |
| 20° < θ ≤ 27° ~ (Slope 4.4:12 – 6.1:12) | | | | | | | | | | |
| Zone | Mean Roof Height (ft) | Basic Wind Speed (mph) | | | | | | | | |
| | | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
| 1 | 20 | 13 | 16 | 18 | 22 | 25 | 29 | 33 | 37 | 41 |
| | 25 | 14 | 17 | 20 | 23 | 27 | 31 | 35 | 40 | 45 |
| | 30 | 14 | 18 | 21 | 24 | 28 | 33 | 37 | 42 | 47 |
| | 40 | 16 | 19 | 23 | 27 | 31 | 35 | 40 | 45 | 51 |
| | 50 | 17 | 20 | 24 | 28 | 33 | 38 | 43 | 48 | 54 |
| | 60 | 18 | 21 | 25 | 30 | 34 | 40 | 45 | 51 | 57 |
| 2 | 20 | 18 | 21 | 25 | 30 | 35 | 40 | 45 | 51 | 57 |
| | 25 | 19 | 23 | 28 | 32 | 37 | 43 | 49 | 55 | 62 |
| | 30 | 20 | 24 | 29 | 34 | 39 | 45 | 51 | 58 | 65 |
| | 40 | 22 | 26 | 31 | 37 | 42 | 49 | 55 | 63 | 70 |
| | 50 | 23 | 28 | 33 | 39 | 45 | 52 | 59 | 67 | 75 |
| | 60 | 24 | 29 | 35 | 41 | 47 | 54 | 62 | 70 | 78 |
| 3 | 20 | 18 | 21 | 25 | 30 | 35 | 40 | 45 | 51 | 57 |
| | 25 | 19 | 23 | 28 | 32 | 37 | 43 | 49 | 55 | 62 |
| | 30 | 20 | 24 | 29 | 34 | 39 | 45 | 51 | 58 | 65 |
| | 40 | 22 | 26 | 31 | 37 | 42 | 49 | 55 | 63 | 70 |
| | 50 | 23 | 28 | 33 | 39 | 45 | 52 | 59 | 67 | 75 |
| | 60 | 24 | 29 | 35 | 41 | 47 | 54 | 62 | 70 | 78 |
| Hip Roofs in Exposure B (continued) | | | | | | | | | | |
| 20° < θ ≤ 45° ~ (Slope 6.1:12 – 12:12) | | | | | | | | | | |
| Zone | Mean Roof Height (ft) | Basic Wind Speed (mph) | | | | | | | | |
| | | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
| 1 | 20 | 14 | 17 | 20 | 23 | 27 | 31 | 35 | 39 | 44 |
| | 25 | 15 | 18 | 21 | 25 | 29 | 33 | 38 | 43 | 48 |
| | 30 | 15 | 19 | 22 | 26 | 30 | 35 | 39 | 44 | 50 |
| | 40 | 17 | 20 | 24 | 28 | 33 | 38 | 43 | 48 | 54 |
| | 50 | 18 | 22 | 26 | 30 | 35 | 40 | 46 | 51 | 58 |
| | 60 | 19 | 23 | 27 | 32 | 37 | 42 | 48 | 54 | 60 |
| 2 | 20 | 24 | 29 | 35 | 41 | 47 | 54 | 62 | 70 | 78 |
| | 25 | 26 | 32 | 38 | 44 | 51 | 59 | 67 | 75 | 85 |
| | 30 | 27 | 33 | 39 | 46 | 53 | 61 | 70 | 79 | 88 |
| | 40 | 30 | 36 | 43 | 50 | 58 | 67 | 76 | 86 | 96 |
| | 50 | 32 | 38 | 45 | 53 | 62 | 71 | 81 | 91 | 102 |
| | 60 | 33 | 40 | 48 | 56 | 65 | 74 | 85 | 96 | 107 |
| 3 | 20 | 31 | 37 | 44 | 52 | 60 | 69 | 78 | 88 | 99 |
| | 25 | 33 | 40 | 48 | 56 | 65 | 74 | 85 | 96 | 107 |
| | 30 | 35 | 42 | 50 | 58 | 68 | 78 | 88 | 100 | 112 |
| | 40 | 38 | 45 | 54 | 63 | 74 | 84 | 96 | 108 | 122 |
| | 50 | 40 | 48 | 58 | 68 | 78 | 90 | 102 | 116 | 130 |
| | 60 | 42 | 51 | 60 | 71 | 82 | 94 | 107 | 121 | 136 |

(Continued)

**TABLE 1^{1,2,3,4}—REQUIRED DESIGN UPLIFT PRESSURE, p (psf)
EXPOSURE B 2021 and 2018 IBC and IRC**

| Hip Roofs in Exposure C | | | | | | | | | | |
|--------------------------------------|-----------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| 7° < θ ≤ 20° ~ (Slope 3:12 – 4.4:12) | | | | | | | | | | |
| Zone | Mean Roof Height (ft) | Basic Wind Speed (mph) | | | | | | | | |
| | | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
| 1 | 20 | 23 | 28 | 34 | 39 | 46 | 52 | 60 | 67 | 75 |
| | 25 | 24 | 29 | 35 | 41 | 48 | 55 | 62 | 70 | 79 |
| | 30 | 25 | 31 | 37 | 43 | 50 | 57 | 65 | 73 | 82 |
| | 40 | 27 | 33 | 39 | 45 | 53 | 61 | 69 | 78 | 87 |
| | 50 | 28 | 34 | 41 | 48 | 55 | 63 | 72 | 81 | 91 |
| | 60 | 29 | 35 | 42 | 49 | 57 | 66 | 75 | 84 | 95 |
| 2 | 20 | 33 | 40 | 47 | 55 | 64 | 74 | 84 | 94 | 106 |
| | 25 | 34 | 41 | 49 | 58 | 67 | 77 | 87 | 99 | 111 |
| | 30 | 36 | 43 | 51 | 60 | 70 | 80 | 91 | 103 | 115 |
| | 40 | 38 | 46 | 54 | 64 | 74 | 85 | 97 | 109 | 122 |
| | 50 | 40 | 48 | 57 | 67 | 78 | 89 | 101 | 114 | 128 |
| | 60 | 41 | 50 | 59 | 69 | 80 | 92 | 105 | 119 | 133 |
| 3 | 20 | 33 | 40 | 47 | 55 | 64 | 74 | 84 | 94 | 106 |
| | 25 | 34 | 41 | 49 | 58 | 67 | 77 | 87 | 99 | 111 |
| | 30 | 36 | 43 | 51 | 60 | 70 | 80 | 91 | 103 | 115 |
| | 40 | 38 | 46 | 54 | 64 | 74 | 85 | 97 | 109 | 122 |
| | 50 | 40 | 48 | 57 | 67 | 78 | 89 | 101 | 114 | 128 |
| | 60 | 41 | 50 | 59 | 69 | 80 | 92 | 105 | 119 | 133 |

| Hip Roofs in Exposure C (continued) | | | | | | | | | | |
|---|-----------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| 20° < θ ≤ 27° ~ (Slope 4.4:12 – 6.1:12) | | | | | | | | | | |
| Zone | Mean Roof Height (ft) | Basic Wind Speed (mph) | | | | | | | | |
| | | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
| 1 | 20 | 19 | 23 | 27 | 31 | 36 | 42 | 48 | 54 | 60 |
| | 25 | 19 | 24 | 28 | 33 | 38 | 44 | 50 | 56 | 63 |
| | 30 | 20 | 25 | 29 | 34 | 40 | 46 | 52 | 58 | 66 |
| | 40 | 22 | 26 | 31 | 36 | 42 | 48 | 55 | 62 | 70 |
| | 50 | 23 | 27 | 32 | 38 | 44 | 51 | 58 | 65 | 73 |
| | 60 | 23 | 28 | 34 | 39 | 46 | 53 | 60 | 67 | 76 |
| 2 | 20 | 26 | 31 | 37 | 43 | 50 | 58 | 66 | 74 | 83 |
| | 25 | 27 | 32 | 39 | 45 | 52 | 60 | 69 | 77 | 87 |
| | 30 | 28 | 34 | 40 | 47 | 55 | 63 | 71 | 81 | 90 |
| | 40 | 30 | 36 | 43 | 50 | 58 | 67 | 76 | 86 | 96 |
| | 50 | 31 | 38 | 45 | 52 | 61 | 70 | 79 | 90 | 101 |
| | 60 | 32 | 39 | 46 | 54 | 63 | 72 | 82 | 93 | 104 |
| 3 | 20 | 26 | 31 | 37 | 43 | 50 | 58 | 66 | 74 | 83 |
| | 25 | 27 | 32 | 39 | 45 | 52 | 60 | 69 | 77 | 87 |
| | 30 | 28 | 34 | 40 | 47 | 55 | 63 | 71 | 81 | 90 |
| | 40 | 30 | 36 | 43 | 50 | 58 | 67 | 76 | 86 | 96 |
| | 50 | 31 | 38 | 45 | 52 | 61 | 70 | 79 | 90 | 101 |
| | 60 | 32 | 39 | 46 | 54 | 63 | 72 | 82 | 93 | 104 |

| 20° < θ ≤ 45° ~ (Slope 6.1:12 – 12:12) | | | | | | | | | | |
|--|-----------------------|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Zone | Mean Roof Height (ft) | Basic Wind Speed (mph) | | | | | | | | |
| | | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
| 1 | 20 | 20 | 24 | 28 | 33 | 39 | 44 | 51 | 57 | 64 |
| | 25 | 21 | 25 | 30 | 35 | 40 | 46 | 53 | 60 | 67 |
| | 30 | 22 | 26 | 31 | 36 | 42 | 48 | 55 | 62 | 70 |
| | 40 | 23 | 28 | 33 | 39 | 45 | 51 | 58 | 66 | 74 |
| | 50 | 24 | 29 | 34 | 40 | 47 | 54 | 61 | 69 | 78 |
| | 60 | 25 | 30 | 36 | 42 | 49 | 56 | 64 | 72 | 80 |
| 2 | 20 | 35 | 42 | 50 | 59 | 69 | 79 | 90 | 101 | 114 |
| | 25 | 37 | 44 | 53 | 62 | 72 | 82 | 94 | 106 | 119 |
| | 30 | 38 | 46 | 55 | 64 | 75 | 86 | 98 | 110 | 124 |
| | 40 | 41 | 49 | 58 | 68 | 79 | 91 | 104 | 117 | 131 |
| | 50 | 42 | 51 | 61 | 72 | 83 | 95 | 109 | 123 | 137 |
| | 60 | 44 | 53 | 63 | 74 | 86 | 99 | 113 | 127 | 143 |
| 3 | 20 | 44 | 54 | 64 | 75 | 87 | 100 | 114 | 128 | 144 |
| | 25 | 46 | 56 | 67 | 78 | 91 | 104 | 119 | 134 | 150 |
| | 30 | 48 | 59 | 70 | 82 | 95 | 109 | 124 | 140 | NA |
| | 40 | 51 | 62 | 74 | 87 | 101 | 116 | 131 | 148 | NA |
| | 50 | 54 | 65 | 78 | 91 | 105 | 121 | 138 | NA | NA |
| | 60 | 56 | 68 | 80 | 94 | 109 | 126 | 143 | NA | NA |

For SI: 1 ft = 0.31 m; 1 psf = 4.88 kg/m²; 1 mph = 0.44 m/s.

¹ Design Wind Uplift Pressure table is based on ASCE 7-16.

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 wind uplift pressure using ASCE 7-16, or; (2) Multiply the design wind uplift pressure in the Table by K_{zt} for the building site.

³ See ASCE 7-16, Figures 30.3-2B, 30.3-2D, and 30.3-5B for roof zones.

⁴For 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)
2015 and 2012 IBC**

| Category II Building Exposure B | | | | | | | | | | | |
|------------------------------------|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| V (mph) | 110 | 115 | 120 | 130 | 140 | 150 | 160 | 165 | 170 | 180 | 195 |
| Roof Style | Gable/Hip | | | | | | | | | | |
| Roof Slope | 7° < θ < 27° ~ (3:12 to 6:12) | | | | | | | | | | |
| Height | Roof Zone 1 ³ | | | | | | | | | | |
| 0-30 | 20 | 22 | 24 | 28 | 32 | 37 | 42 | 45 | 48 | 53 | 63 |
| 40 | 22 | 24 | 26 | 30 | 35 | 40 | 46 | 49 | 52 | 58 | 68 |
| 50 | 23 | 25 | 27 | 32 | 37 | 43 | 49 | 52 | 55 | 62 | N/A |
| 60 | 24 | 27 | 29 | 34 | 39 | 45 | 51 | 55 | 58 | 65 | N/A |
| Height | Roof Zone 3 ³ | | | | | | | | | | |
| 0-30 | 51 | 56 | 61 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 40 | 56 | 61 | 66 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 50 | 59 | 65 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 60 | 63 | 68 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Roof Style | Hip ⁴ | | | | | | | | | | |
| Roof Slope | 7° < θ < 25° ~ (3:12 to 5½:12) | | | | | | | | | | |
| Height | Roof Zone 1 ³ | | | | | | | | | | |
| 0-30 | 20 | 22 | 24 | 28 | 32 | 37 | 42 | 45 | 48 | 53 | 63 |
| 40 | 22 | 24 | 26 | 30 | 35 | 40 | 46 | 49 | 52 | 58 | 68 |
| 50 | 23 | 25 | 27 | 32 | 37 | 43 | 49 | 52 | 55 | 62 | N/A |
| 60 | 24 | 27 | 29 | 34 | 39 | 45 | 51 | 55 | 58 | 65 | N/A |
| Height | Roof Zone 3 ³ | | | | | | | | | | |
| 0-30 | 35 | 38 | 41 | 48 | 56 | 64 | N/A | N/A | N/A | N/A | N/A |
| 40 | 38 | 41 | 45 | 53 | 61 | 70 | N/A | N/A | N/A | N/A | N/A |
| 50 | 40 | 44 | 48 | 56 | 65 | N/A | N/A | N/A | N/A | N/A | N/A |
| 60 | 42 | 46 | 50 | 59 | 68 | N/A | N/A | N/A | N/A | N/A | N/A |
| Roof Style | Gable | | | | | | | | | | |
| Roof Slope | 27° < θ < 45° ~ (6:12 to 12:12) | | | | | | | | | | |
| Height | Roof Zone 1 ³ | | | | | | | | | | |
| 0-30 | 22 | 24 | 26 | 30 | 35 | 40 | 46 | 49 | 52 | 58 | 68 |
| 40 | 24 | 26 | 28 | 33 | 38 | 44 | 50 | 53 | 56 | 63 | N/A |
| 50 | 25 | 28 | 30 | 35 | 41 | 47 | 53 | 57 | 60 | 67 | N/A |
| 60 | 27 | 29 | 32 | 37 | 43 | 49 | 56 | 60 | 63 | N/A | N/A |
| Height | Roof Zone 3 ³ | | | | | | | | | | |
| 0-30 | 25 | 28 | 30 | 36 | 41 | 47 | 54 | 57 | 61 | 68 | N/A |
| 40 | 28 | 30 | 33 | 39 | 45 | 51 | 58 | 62 | 66 | N/A | N/A |
| 50 | 29 | 32 | 35 | 41 | 48 | 55 | 62 | 66 | 70 | N/A | N/A |
| 60 | 31 | 34 | 37 | 43 | 50 | 58 | 66 | 70 | N/A | N/A | N/A |
| Roof Style | Monoslope | | | | | | | | | | |
| Roof Slope | 10° < θ < 30° ~ (3:12 to 7:12) | | | | | | | | | | |
| Height | Roof Zone 1 ³ | | | | | | | | | | |
| 0-30 | 27 | 30 | 32 | 38 | 44 | 51 | 58 | 61 | 65 | N/A | N/A |
| 40 | 30 | 32 | 35 | 41 | 48 | 55 | 63 | 67 | N/A | N/A | N/A |
| 50 | 32 | 35 | 38 | 44 | 51 | 59 | 67 | N/A | N/A | N/A | N/A |
| 60 | 33 | 36 | 40 | 46 | 54 | 62 | 70 | N/A | N/A | N/A | N/A |
| Height | Roof Zone 3 ³ | | | | | | | | | | |
| 0-30 | 57 | 62 | 68 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 40 | 62 | 67 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 50 | 66 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 60 | 69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

For SI: 1 ft = 0.31 m; 1 psf = 4.88 kg/m²; 1 mph = 0.44 m/s.

¹ Design Wind Uplift Pressure table is based on ASCE 7-10.

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 wind uplift pressure using ASCE 7-10, or; (2) Multiply the design wind uplift pressure in the Table by K_{zt} for the building site.

³ See ASCE 7-10, Figures 30.4-2B, 30.4-2C, and 30.4-5B for roof zones.

⁴ For a hip roof with a slope of 25° < θ ≤ 27°, use the design wind uplift pressure for Gable/Hip Roof 7° < θ ≤ 27° for Zones 2 & 3.

**TABLE 3^{1,2}—REQUIRED DESIGN UPLIFT PRESSURE, p (psf)
2015 and 2012 IBC**

| Category II Building Exposure C | | | | | | | | | | | |
|------------------------------------|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| V (mph) | 110 | 115 | 120 | 130 | 140 | 150 | 160 | 165 | 170 | 180 | 195 |
| Roof Style | Gable/Hip | | | | | | | | | | |
| Roof Slope | 7° < θ < 27° ~ (3:12 to 6:12) | | | | | | | | | | |
| Height | Roof Zone 1 ³ | | | | | | | | | | |
| 0-15 | 24 | 26 | 29 | 34 | 39 | 45 | 51 | 54 | 58 | 65 | N/A |
| 20 | 26 | 28 | 31 | 36 | 42 | 48 | 54 | 58 | 61 | 69 | N/A |
| 25 | 27 | 29 | 32 | 38 | 44 | 50 | 57 | 60 | 64 | N/A | N/A |
| 30 | 28 | 31 | 33 | 39 | 45 | 52 | 59 | 63 | 67 | N/A | N/A |
| 40 | 30 | 32 | 35 | 41 | 48 | 55 | 63 | 67 | N/A | N/A | N/A |
| 50 | 31 | 34 | 37 | 43 | 50 | 58 | 66 | 70 | N/A | N/A | N/A |
| 60 | 32 | 35 | 38 | 45 | 52 | 60 | 68 | N/A | N/A | N/A | N/A |
| Height | Roof Zone 3 ³ | | | | | | | | | | |
| 0-15 | 62 | 68 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 66 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 40 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 50 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 60 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Roof Style | Hip ⁴ | | | | | | | | | | |
| Roof Slope | 7° < θ < 25° ~ (3:12 to 5½:12) | | | | | | | | | | |
| Height | Roof Zone 1 ³ | | | | | | | | | | |
| 0-15 | 24 | 26 | 29 | 34 | 39 | 45 | 51 | 54 | 58 | 65 | N/A |
| 20 | 26 | 28 | 31 | 36 | 42 | 48 | 54 | 58 | 61 | 69 | N/A |
| 25 | 27 | 29 | 32 | 38 | 44 | 50 | 57 | 60 | 64 | N/A | N/A |
| 30 | 28 | 31 | 33 | 39 | 45 | 52 | 59 | 63 | 67 | N/A | N/A |
| 40 | 30 | 32 | 35 | 41 | 48 | 55 | 63 | 67 | N/A | N/A | N/A |
| 50 | 31 | 34 | 37 | 43 | 50 | 58 | 66 | 70 | N/A | N/A | N/A |
| 60 | 32 | 35 | 38 | 45 | 52 | 60 | 68 | N/A | N/A | N/A | N/A |
| Height | Roof Zone 3 ³ | | | | | | | | | | |
| 0-15 | 42 | 46 | 50 | 59 | 68 | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | 45 | 49 | 53 | 62 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 47 | 51 | 56 | 65 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | 49 | 53 | 58 | 68 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 40 | 52 | 56 | 61 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 50 | 54 | 59 | 64 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 60 | 56 | 61 | 67 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Roof Style | Gable | | | | | | | | | | |
| Roof Slope | 27° < θ < 45° ~ (6:12 to 12:12) | | | | | | | | | | |
| Height | Roof Zone 1 ³ | | | | | | | | | | |
| 0-15 | 26 | 29 | 31 | 37 | 43 | 49 | 56 | 59 | 63 | N/A | N/A |
| 20 | 28 | 31 | 33 | 39 | 45 | 52 | 59 | 63 | 67 | N/A | N/A |
| 25 | 29 | 32 | 35 | 41 | 48 | 55 | 62 | 66 | 70 | N/A | N/A |
| 30 | 31 | 33 | 36 | 43 | 49 | 57 | 65 | 69 | N/A | N/A | N/A |
| 40 | 32 | 35 | 39 | 45 | 53 | 60 | 69 | N/A | N/A | N/A | N/A |
| 50 | 34 | 37 | 40 | 47 | 55 | 63 | N/A | N/A | N/A | N/A | N/A |
| 60 | 35 | 39 | 42 | 49 | 57 | 66 | N/A | N/A | N/A | N/A | N/A |
| Height | Roof Zone 3 ³ | | | | | | | | | | |
| 0-15 | 31 | 34 | 37 | 43 | 50 | 57 | 65 | 69 | N/A | N/A | N/A |
| 20 | 33 | 36 | 39 | 46 | 53 | 61 | 69 | N/A | N/A | N/A | N/A |
| 25 | 34 | 38 | 41 | 48 | 56 | 64 | N/A | N/A | N/A | N/A | N/A |
| 30 | 36 | 39 | 42 | 50 | 58 | 66 | N/A | N/A | N/A | N/A | N/A |
| 40 | 38 | 41 | 45 | 53 | 61 | N/A | N/A | N/A | N/A | N/A | N/A |
| 50 | 40 | 43 | 47 | 56 | 64 | N/A | N/A | N/A | N/A | N/A | N/A |
| 60 | 41 | 45 | 49 | 58 | 67 | N/A | N/A | N/A | N/A | N/A | N/A |

(Continued)

TABLE 3^{1,2}—REQUIRED DESIGN UPLIFT PRESSURE, p (psf) (Continued)
2015 and 2012 IBC

| Roof Style | Monoslope | | | | | | | | | | |
|------------|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Roof Slope | 10° < θ < 30° ~ (3:12 to 7:12) | | | | | | | | | | |
| Height | Roof Zone 1 ³ | | | | | | | | | | |
| 0-15 | 33 | 36 | 39 | 46 | 54 | 62 | 70 | N/A | N/A | N/A | N/A |
| 20 | 35 | 38 | 42 | 49 | 57 | 65 | N/A | N/A | N/A | N/A | N/A |
| 25 | 37 | 40 | 44 | 51 | 60 | 68 | N/A | N/A | N/A | N/A | N/A |
| 30 | 38 | 42 | 46 | 53 | 62 | N/A | N/A | N/A | N/A | N/A | N/A |
| 40 | 41 | 44 | 48 | 57 | 66 | N/A | N/A | N/A | N/A | N/A | N/A |
| 50 | 43 | 47 | 51 | 60 | 69 | N/A | N/A | N/A | N/A | N/A | N/A |
| 60 | 44 | 48 | 53 | 62 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Height | Roof Zone 3 ³ | | | | | | | | | | |
| 0-15 | 69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 20 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 30 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 40 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 50 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 60 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

For SI: 1 ft = 0.31 m; 1 psf = 4.88 kg/m²; 1 mph = 0.44 m/s.

¹ Design Wind Uplift Pressure table is based on ASCE 7-10.

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 wind uplift pressure using ASCE 7-10, or; (2) Multiply the design wind uplift pressure in the Table by K_{zt} for the building site.

³ See ASCE 7-10, Figures 30.4-2B, 30.4-2C, and 30.4-5B for roof zones.

⁴ For a hip roof with a slope of 25° < θ ≤ 27°, use the design wind uplift pressure for Gable/Hip Roof 7° < θ ≤ 27° for Zones 2 & 3.

TABLE 4^{1,2}—REQUIRED DESIGN UPLIFT PRESSURE, p (psf)
2009 AND 2006 IBC; 2012, 2009 AND 2006 IRC

| MEAN ROOF HEIGHT (ft) | Exposure B | | | | | | | |
|-----------------------|---|-------|------|-------|------|-------|------|-------|
| | 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/m²; 1 mph = 0.44m/s.

¹ Table is based on ASCE 7-05.

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-7-05, 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 5^{1,2}—REQUIRED DESIGN UPLIFT PRESSURE, p (psf)
2009 AND 2006 IBC; 2012, 2009 AND 2006 IRC**

| Mean Roof Height (ft) | Exposure C | | | | | | | |
|-----------------------|---|-------|------|-------|------|-------|------|-------|
| | 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 | | | | | | | |
| 0-15 | 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 | N/A |
| 25 | 17.0 | 44.2 | 19.0 | 49.5 | 23.5 | 61.2 | 28.5 | N/A |
| 30 | 17.7 | 46.1 | 19.9 | 51.6 | 24.5 | 63.8 | 29.7 | N/A |
| | HIP ROOF ⁴ 7° < θ ≤ 25° (≈1½:12 < θ ≤ ≈6:12) 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 10° < θ ≤ 30° (≈2¼:12 < θ ≤ ≈7:12) 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 | N/A |
| 30 | 20.0 | 44.7 | 22.4 | 50.1 | 27.7 | 61.8 | 33.5 | N/A |
| | Importance Factor = 1.15 | | | | | | | |
| 0-15 | 20.0 | 44.6 | 22.4 | 50.0 | 27.6 | 61.7 | 33.4 | N/A |
| 20 | 21.2 | 47.2 | 23.7 | 52.9 | 29.3 | 65.3 | 35.4 | N/A |
| 25 | 22.1 | 49.3 | 24.8 | 55.2 | 30.6 | 68.2 | 37.0 | N/A |
| 30 | 23.0 | 51.4 | 25.8 | 57.6 | 31.9 | N/A | 38.6 | N/A |

For SI: 1 ft = 0.31 m; 1 psf = 4.88 kg/m²; 1 mph = 0.44m/s.

¹ Table is based on ASCE 7-05.

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-7-05, 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 6—MAXIMUM ALLOWABLE WIND UPLIFT PRESSURES ON ROOFING PANELS
2021, 2018, 2015, 2012, 2009 AND 2006 IBC; 2015, 2012, 2009 AND 2006 IRC

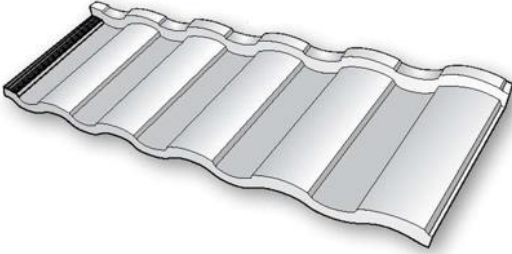
| SYSTEM NO. | SUBSTRATE | EXISTING ROOF ¹ | BATTENS ON COUNTERBATTENS OR BATTENS ON RAFTERS | FASTENING OF BATTENS AND COUNTERBATTENS OR BATTENS AND RAFTERS | ROOFING PANEL | PANEL FASTENING TO BATTEN | ALLOWABLE WIND UPLIFT PRESSURE (psf) |
|------------|---|----------------------------|---|---|---|---|--------------------------------------|
| 1 | Minimum ¹⁵ / ₃₂ -inch-thick plywood | --- | 2 x 2 wood battens on 1 x 4 wood counterbattens | Counterbattens fastened with one 16d x 3 ¹ / ₄ -inch-long steel ring-shanked nails at 12 inches o.c. into rafters through sheathing. Battens fastened with one 16d x 3 ¹ / ₄ -inch-long steel ring-shanked nail at each counterbatten intersection. | PINE-CREST Shake, COTTAGE Shingle, PACIFIC Tile or BARREL-VAULT | Four 8d x 2 ³ / ₈ -inch-long steel ring-shanked nails at back and leading edges of panel | 30 |
| 2 | Minimum ¹⁵ / ₃₂ -inch-thick plywood | Existing roof covering | 2 x 2 wood battens on 1 x 4 wood counterbattens | Counterbattens fastened with one 16d x 3 ¹ / ₄ -inch-long steel ring-shanked nails at 12 inches o.c. into rafters through sheathing. Battens fastened with one 16d x 3 ¹ / ₄ -inch-long steel ring-shanked nail at each counterbatten intersection. | PINE-CREST Shake, COTTAGE Shingle, PACIFIC Tile or BARREL-VAULT | Four 8d x 2 ³ / ₈ -inch-long steel ring-shanked nails at back and leading edges of panel | 15 |
| 3 | Minimum ¹⁵ / ₃₂ -inch-thick plywood | --- | 2 x 2 wood battens on 1 x 4 wood counterbattens | Counterbattens fastened with one 16d x 3 ¹ / ₄ -inch-long steel ring-shanked nails at 6 inches o.c. into rafters through sheathing. Battens fastened with two 16d x 3 ¹ / ₄ -inch-long steel ring-shanked nails at each counterbatten intersection. | PINE-CREST Shake, COTTAGE Shingle, PACIFIC Tile or BARREL-VAULT | Five 8d x 2 ³ / ₈ -inch-long steel ring-shanked nails at back and leading edges of panel | 70 |
| 4 | Minimum ¹⁵ / ₃₂ -inch-thick plywood | Existing roof covering | 2 x 2 wood battens on 1 x 4 wood counterbattens | Counterbattens fastened with one 16d x 3 ¹ / ₄ -inch-long steel ring-shanked nails at 6 inches o.c. into rafters through sheathing. Battens fastened with two 16d x 3 ¹ / ₄ -inch-long steel ring-shanked nails at each counterbatten intersection. | PINE-CREST Shake, COTTAGE Shingle, PACIFIC Tile or BARREL-VAULT | Five 8d x 2 ³ / ₈ -inch-long steel ring-shanked nails at back and leading edges of panel | 30 |
| 5 | Minimum ¹⁵ / ₃₂ -inch-thick plywood | --- | 2 x 2 wood battens perpendicular to rafters | Battens fastened with one No. 8-11 x 3-inch-long bugle head wood screw at the intersection of each batten and rafter. | PINE-CREST Shake, COTTAGE Shingle, PACIFIC Tile or BARREL-VAULT | Five No. 10-16 x 2-inch-long HWH wood screws spaced between 8.5 and 12 inches o.c. through the vertical leg at the headlap beginning at the center of the side lap | 83 |
| 6 | Minimum ¹⁵ / ₃₂ -inch-thick plywood | --- | 2 x 2 wood battens perpendicular to rafters | Battens fastened with one No. 8-11 x 3-inch-long bugle head wood screw at the intersection of each batten and rafter and one No. 8-11 x 3-inch-long bugle head wood screw positioned 12 inches o.c. between each rafter. | PINE-CREST Shake, COTTAGE Shingle, PACIFIC Tile or BARREL-VAULT | Ten No. 10-16 x 2-inch-long HWH wood screws spaced between 2 ³ / ₄ and 5 ¹ / ₂ inches o.c. through the vertical leg at the headlap beginning at the center of the side lap. | 150 |

For **SI**: 1 inch = 25.4 mm; 1 psf = 47.88 Pa.

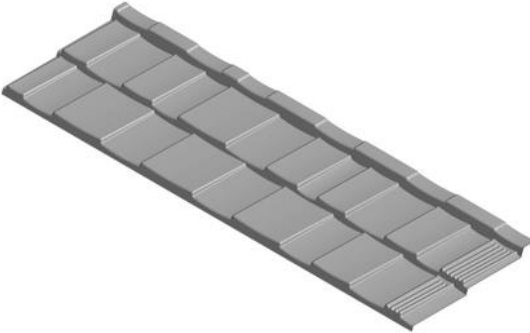
¹See Section 4.6.1 for additional conditions when installing over an existing roof covering.



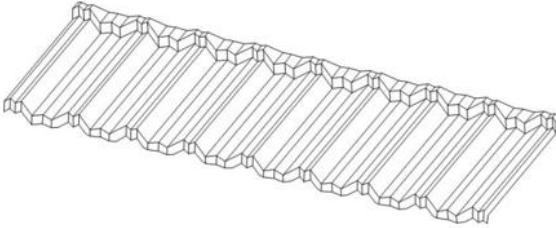
PINE-CREST Shake



BARREL-VAULT Tile



COTTAGE Shingle



PACIFIC Tile

FIGURE 1—PANEL PROFILES

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

Section: 07 31 16—Metal Shingles

Section: 07 41 13—Metal Roof Panels

REPORT HOLDER:

WESTLAKE ROYAL ROOFING LLC

EVALUATION SUBJECT:

UNIFIED STEEL STONE COATED ROOFING BRAND: PINE-CREST SHAKE, PACIFIC TILE, COTTAGE SHINGLE AND BARREL-VAULT COATED STEEL ROOFING PANELS: INSTALLED ON BATTENS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that PINE-CREST Shake, PACIFIC Tile, COTTAGE Shingle and BARREL-VAULT Coated Steel Roofing Panels: Installed on Battens, described in ICC-ES evaluation report ESR-3012, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2019 and 2016 *California Building Code* (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) and Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2019 and 2016 *California Residential Code* (CRC)

2.0 CONCLUSIONS

2.1 CBC:

The PINE-CREST Shake, PACIFIC Tile, COTTAGE Shingle and BARREL-VAULT Coated Steel Roofing Panels: Installed on Battens described in the evaluation report ESR-3012 may be used where the CBC requires a Class A roof covering complying with CBC Section 1505.1.1, a Class B roof covering complying with CBC Section 1505.1.2, or a Class C roof covering complying with CBC Section 1505.1.3, provided installation is in accordance with the 2018 and 2015 *International Building Code*® (IBC) provisions, as applicable, noted in the evaluation report.

2.1.1 OSHPD:

The applicable OSHPD Sections of the CBC are beyond the scope of this supplement.

2.1.2 DSA:

The applicable DSA Sections of the CBC are beyond the scope of this supplement.

2.2 CRC:

The PINE-CREST Shake, PACIFIC Tile, COTTAGE Shingle and BARREL-VAULT Coated Steel Roofing Panels: Installed on Battens described in the evaluation report ESR-3012 may be used where the CRC requires a Class A roof cover complying with CRC Section R902.1.1, a Class B roof covering complying with CRC Section R902.1.2, or a Class C roof covering complying with CRC Section R902.1.3, provided installation is in accordance with the 2018 and 2015 *International Residential Code*® (IRC) provisions, as applicable, noted in the evaluation report.

This supplement expires concurrently with the evaluation report, reissued November 2021 and revised April 2022.