

# UL Evaluation Report

**UL ER38401-01**

**Issued: January 22, 2016**

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**UL Category Code: ULEZ**

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**DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION**

**Sub-level 2: 07 40 00 - Roofing and Siding Panels**

**Sub-level 3: 07 41 00 - Roofing Panels**

**Sub-level 4: 07 41 13 - Metal Roof Panels**

**COMPANY:**

**ROSS ROOF GROUP, INC. DBA TILCOR NORTH AMERICA**

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**1. SUBJECT:**

**ANTICA, BOND, CLASSIC, CRAFTSMAN SHAKE, ROYAL, AND TUDOR METAL ROOFING  
PANELS**

**2. SCOPE OF EVALUATION:**

- 2012, 2009, and 2006 *International Building Code*® (IBC)
- 2012, 2009, and 2006 *International Residential Code*® (IRC)
- ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated June 2014
- ICC-ES Acceptance Criteria for Metal Roof Coverings (AC166), dated October 2012



### The products were evaluated for the following properties:

- Roofing Systems for Exterior Fire Exposure (ANSI/UL790, ASTM E108)
- Roof Deck Construction (ANSI/UL 580)
- Wind Uplift Resistance (ANSI/UL 1897)
- Corrosion Resistance (ASTM B117)
- Weathering Performance (ASTM G155)
- Wind Driven Rain Resistance (TAS 100)

### 3. REFERENCED DOCUMENTS

- ICC-ES:
  - ICC-ES Acceptance Criteria for Metal Roof Coverings (AC166), dated October 2012
  - ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated June 2014
- ANSI/UL:
  - ANSI/UL 580, Fifth Edition, Standard for Tests for Uplift Resistance of Roof Assemblies
  - ANSI/UL 1897, Fourth Edition, Uplift Tests for Roof Covering Systems
  - ANSI/UL790, Seventh Edition (ASTM E108-07a), Standard Test Methods for Fire Tests of Roof Coverings
- ASTM:
  - ASTM A653/A653M-08, *Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*
  - ASTM B117-11, *Standard Practice for Operating Salt Spray (Fog) Apparatus*
  - ASTM G155-05a, *Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials*
- Florida Building Code:
  - Test Protocols for the High Velocity Hurricane Zone (HVHZ) Testing Application Standard (TAS) No.100-95: *Test Procedure for Wind and Wind Driven Rain Resistance of Discontinuous Roof Systems*

### 4. USES

Antica, Bond, Classic, Craftsman Shake, Royal, and Tudor metal roofing panels are used as roof covering materials in Class A, B, or C roofing systems when installed in accordance with this report and the manufacturer's published installation instructions.

### 5. PRODUCT DESCRIPTION

Tilcor North America's roofing panels described in this report are formed stone-coated metal formed from ASTM A792 AZ150M hot-dip Commercial Steel Type B sheet. The panels are manufactured in different profile shapes and have a base metal thickness not less than 0.0165 inches (0.420 mm). The panels are metal roof coverings complying with [Section 1507.4](#) of the 2012, 2009, and 2006 IBC and [Section R905.10](#) of the 2012, 2009, and 2006 IRC. The individual profile descriptions are listed below.

#### 5.1 Antica

Antica metal roofing panels are nominally 52.4 inches long (1290 mm) by 16.3 inches (432 mm) wide, having an exposure area of 48 inches long (1220 mm) by 14.5 inches (368 mm) wide. Each tile is nominally 6.61 lbs (3.0 kg) with an installed weight of 136 lbs per square (6.65 kg/m<sup>2</sup>). Antica panels may be used in assemblies having a slope of 3:12 and greater. See [Detail Sequence 1](#).

## 5.2 Bond

Bond metal roofing panels are nominally 52.2 inches long (1325 mm) by 16.8 inches (425 mm) wide, having an exposure area of 49.8 inches (1265 mm) long by 14.5 inches (368 mm) wide. Each tile is 6.39 lbs (2.9 kg) with an installed weight of 132 lbs per square (6.5 kg/m<sup>2</sup>). Bond panels may be used in assemblies having a slope of 3:12 and greater. See [Detail Sequence 2](#).

## 5.3 Classic

Classic metal roofing panels are nominally 52.2 inches long (1325 mm) by 16.5 inches (418 mm) wide, having an exposure area of 49.7 inches (1262 mm) long by 14.5 inches (368 mm) wide. Each tile is 6.64 lbs (3 kg) with an installed weight of 132 lbs per square (6.5 kg/m<sup>2</sup>). Classic panels may be used in assemblies having a slope of 3:12 and greater. See [Detail Sequence 3](#).

## 5.4 Craftsman Shake

Craftsman Shake metal roofing panels are nominally 52.6 inches long (1335 mm) by 16.8 inches (411 mm) wide, having an exposure area of 49.6 (1260 mm) inches long by 14.5 inches (368 mm) wide. Each tile is 6.39 lbs (2.9 kg) with an installed weight of 128 lbs per square (6.26 kg/m<sup>2</sup>). Craftsman Shake panels may be used in assemblies having a slope of 3:12 and greater. See [Detail Sequence 4](#).

## 5.5 Royal

Royal metal roofing panels are nominally 52.6 inches long (1335 mm) by 16.5 inches (420 mm) wide, having an exposure area of 49.6 (1265 mm) inches long by 14.5 inches (368 mm) wide. Each tile is nominally 6.61 lbs (3 kg) with an installed weight of 132 lbs per square (6.5 kg/m<sup>2</sup>). Royal panels may be used in assemblies having a slope of 3:12 and greater. See [Detail Sequence 5](#).

## 5.6 Tudor

Tudor metal roofing panels are nominally 52.4 inches long (1335 mm) by 16.7 inches (425 mm) wide, having an exposure area of 49.8 (1265 mm) inches long by 14.5 inches (368 mm) wide. Each tile is nominally 6.61 lbs (3.0 kg) with an installed weight of 132 lbs per square (6.5 kg/m<sup>2</sup>). Tudor panels may be used in assemblies having a slope of 3:12 and greater. See [Detail Sequence 6](#).

**Fire Classification:** Tilcor North America's metal roofing panels covered under this report have been tested for fire classifications Class A, B, and C in accordance with ANSI/UL790 (ASTM E108) and qualify for use under [Section 1505.1](#) of the 2012, 2009 and 2006 IBC and [Section R902.1](#) of the 2012, 2009 and 2006 IRC. Refer to [Table 1](#).

**Wind Resistance:** Roofing assemblies shall be designed to resist the design wind load pressures for components and cladding in accordance with [Section 1609.5](#) and [Section 1504.3](#) of the 2012, 2009 and 2006 IBC and [Section R905.1](#) of the 2012, 2009 and 2006 IRC.

**Wind Uplift Resistance:** Tilcor North America's metal roofing panels covered under this report have been tested for wind uplift resistance in accordance with ANSI/UL 580/1897 complying with [Section 1504.3.2](#) of the 2012, 2009, and 2006 IBC. Refer to [Table 2](#).

**Wind Driven Rain Resistance:** Tilcor North America's metal roofing panels covered under this report have been tested for wind driven rain resistance in accordance with Test Application Standard (TAS) 100. [Table 3](#) provides additional installation details for trim and edge treatments.

**Physical Properties:** Tilcor North America's metal roofing panels covered under this report have been tested for the following performance requirements for metal panel roof systems.

- **Accelerated Weathering:** Tilcor North America's metal roofing panels covered under this report have passed the criteria for accelerated weathering in accordance with [Section 1504.6](#) of the IBC.
- **Corrosion Resistance:** Tilcor North America's metal roofing panels complying with [Section 1507.4.3](#) of the 2012, 2009, and 2006 IBC and [Section 905.10.3](#) of the 2012, 2009, and 2006 IRC covered under this report have been tested for resistance to corrosion in accordance with ASTM B117.

## 6. INSTALLATION

### 6.1 General

Tilcor North America's metal roofing panels must be installed in accordance with [Section 1507.4](#) of the 2012, 2009 and 2006 IBC or [Section R905.6](#) of the 2012, 2009 and 2006 IRC, except as noted in this report, and the manufacturer's published installation instructions. The manufacturer's published installation instructions must be available at all times on the jobsite during installation. The metal roofing panels must be attached to the decked sheathing in a manner that will secure the panels in place.

### 6.2 Slope

Products covered in this report are intended for roof decks having slopes of 3:12 or greater. Roof decks having slopes less than 3:12 are considered decorative, and require a permanent roofing membrane. Installation of Tilcor North America's metal roofing panels covered in this report are to be installed in accordance with [Section 1507.4.2](#) of the 2012, 2009, and 2006 IBC and [Section R905.10.2](#) of the 2012, 2009, and 2006 IRC.

### 6.3 Roof Deck

Roof decking is to be as described in [Section 1507.4.1](#) of the 2012, 2009, 2006 IBC and [Section R905.10.1](#) of the 2012, 2009, and 2006 IRC. The minimum required sheathing is to be  $\frac{15}{32}$  inch plywood decking, or  $\frac{7}{16}$  inch OSB. The sheathing must be structurally sound and adequately fastened to resist wind loads for components and cladding as specified in [Section 1609](#) of the 2012, 2009, and 2006 IBC and [Section R301.6](#) of the 2012, 2009, and 2006 IRC.

### 6.4 Battens and Counter Battens

Wood battens must be nominal 2X2 standard grade Douglas Fir-Larch or better. Steel battens must be minimum 26 gauge [0.0179 in. (0.4275 mm)] hat-shaped sections with a minimum 1- $\frac{1}{2}$  inch (38 mm) height. Counter-battens must be nominal 1X4 standard grade Douglas Fir-Larch or better. Battens and Counter Battens must be adequately fastened to resist wind loads.

### 6.5 Underlayment

An ice barrier must be installed along the eaves in locations historically prone to ice in accordance with [Section 1507.7.4](#) of the 2012, 2009 and 2006 IBC and [Section R905.5.3.1](#) of the 2012, 2009, and 2006 IRC. In addition to the ice barrier, an underlayment must be installed over the entire roof deck in accordance with [Section 1507.7.3](#) of the 2012, 2009, and 2006 IBC and [Section R905.6.3](#) of the 2012, 2009, and 2006 IRC.

Underlayments installed on roofs in locations prone to high winds must be installed in accordance with [Section 1507.4.5](#) of the 2012 IBC.

## 6.6 Flashing

Flashing materials are to be installed in accordance with [Section 1503.2](#) and [Section 1507.7.7](#) of the 2012, 2009, and 2006 IBC and [Section R903.2](#) and [Section R905.6.6](#) of the 2012, 2009, and 2006, as applicable.

## 6.7 Roofing Panels

Installation of the metal roofing can begin at the eave or ridge. Fascia metal is installed and fastened to the batten. The first course panels will cover the nails, and are nailed along the head check into the batten. The nose of the panels on the second course will cover the nails. Subsequent courses are to be installed in accordance with the manufacturer's instructions. Begin installing panels on the first full course down from the ridge by nailing through the head check. The second course down is installed by lifting the nose of the panel above and sliding into place.

## 6.8 Hips and Ridges

Hips and ridges must be installed in accordance with Tilcor North America's published installation instructions for exposure dimension and fastener type.

## 6.9 Fasteners

Panel fasteners are minimum 2.25 inch long ring-shanked nails with 0.131 inch diameter shanks. Attachment of the roof panels must be in accordance with [Section 1507.4.4](#) of the 2012, 2009, and 2006 IBC.

## 6.10 Reroofing

Existing roof covering materials are to be completely removed, and any structurally unstable sheathing materials are to be removed and replaced prior to installation of the Tilcor North America's metal roofing panels. Installation is to be performed for new construction as described in Section 6 of this report.

## 7. CONDITIONS OF USE

### 7.1 General

The metal roofing panels described in this report comply with, or are suitable alternatives to, what is specified in those codes listed in Section 2 of this report, subject to the following conditions:

- 7.2 Materials and methods of installation must comply with this report and the manufacturer's published installation instructions. In the event of a conflict between the installation instructions and this report, this report governs.
- 7.3 Only Tilcor North America's specified fasteners shall be used in the installation of the roof covering system.
- 7.4 See the UL Online Certification Directory for Prepared Roof Covering Materials, Formed or Molded Metal, Fiber-Cement, Plastic or Fire-retardant-treated Wood ([TFXX](#)), Roof-covering Materials, Impact Resistance ([TGAM](#)), Roof Deck Constructions for Metal Roof Deck Panels ([TJPV](#)), and Roofing Systems, Uplift Resistance ([TGIK](#)).

- 7.5 Wind uplift pressures on any roof area, including edges and corner zones shall not exceed the allowable wind pressure for the roof covering installed in that particular area. The allowable wind uplift pressure for the roof assembly is based on a minimum factor of safety of 2.0 as applied in [Table 2](#). A safety factor of 2.0 must be applied to the rating for uplift resistance. The allowable wind uplift pressure is for the roof system only. The sheathing and framing to which the roofing system is attached shall be designed for the allowable wind loads in accordance with the applicable code.
- 7.6 The metal roofing panels covered under this report are produced by Ross Roof Group, Auckland, NZ, under the UL LLC Listing/Classification and Follow-Up Service Program, which includes audits in accordance with quality elements of ICC-ES Acceptance Criteria for Quality Documentation, AC10.

## 8. SUPPORTING EVIDENCE

- 8.1 Data in accordance with ICC-ES Acceptance Criteria for Metal Roof Coverings (AC166), dated October 2012.
- 8.2 Manufacturer's descriptive product literature, including installation instructions.
- 8.3 Documentation of quality system elements described in ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated June 2014.
- 8.4 UL Certification reports in accordance with ANSI/UL 790, UL 2218, UL 580, and UL 1897. See the UL Product Certification Categories (TFXX), (TGAM), (TJPV), and (TGIK), respectively.
- 8.5 Test reports in accordance with ANSI/UL 1897.

## 9. IDENTIFICATION

Tilcor North America's metal roofing panels described in this evaluation report are identified by a marking bearing the report holder's name (Ross Roof Group DBA Tilcor North America) and address, the product name, , the UL Certification Mark , and the evaluation report number UL ER38401-01. The validity of the evaluation report is contingent upon this identification appearing on the product or UL Classification Mark certificate.

## 10. USE OF UL EVALUATION REPORT

- 10.1 The approval of building products, materials, or systems is the responsibility of the applicable authorities having jurisdiction.
- 10.2 UL Evaluation Reports shall not be used in any manner that implies an endorsement of the product, material or system by UL.
- 10.3 The current status of this report, as well as a complete directory of UL Evaluation Reports may be found at UL.com via the On-Line Certifications Directory at [www.ul.com/erdirectory](http://www.ul.com/erdirectory).

**TABLE 1: FIRE RATED COMBUSTIBLE DECK ASSEMBLIES**

| System Number  | Substrate   | Insulation or Barrier Board  | Underlayment  | Unlimited Incline  |
|--|---|--|---|--|
| <b>Antica, Bond, Classic, Craftsman Shake, Royal, or Tudor</b> |   |  |   | <b>ANSI/UL 790</b>   |
| <b>1</b>   | <b>APA stamped min. <math>\frac{15}{32}</math> inch CDX plywood, min. <math>\frac{7}{16}</math> inch OSB, or min. nominal 1 inch spaced sheathing</b> | <b>None</b>  | <b>One layer of GAF "VersaShield" underlayment or one layer of GAF VersaShield Solo mechanically fastened.</b>                                    | <b>Class A</b>   |
| <b>2</b>   |   |  | <b>Minimum <math>\frac{1}{2}</math> inch thick UL Classified gypsum board or minimum <math>\frac{1}{4}</math> inch thick G-P Gypsum DensDeck®</b> | <b>Class A</b>   |
| <b>3</b>   |   |  | <b>Existing wood shake or wood shingle roof</b>   | <b>One layer of GAF "VersaShield" underlayment or one layer of GAF VersaShield Solo mechanically fastened.</b> |
| <b>4</b>   | <b>APA stamped min. <math>\frac{15}{32}</math> inch CDX plywood, min. <math>\frac{7}{16}</math> inch OSB, or min. nominal 1 inch spaced sheathing</b> | <b>Minimum 1-<math>\frac{1}{2}</math> inch thick UL Classified fiberglass foil-faced batt insulation</b> | <b>Any UL Classified underlayment</b>   | <b>Class B</b>   |
| <b>5</b>   |   | <b>None</b>  |   | <b>Class C</b>   |
| <b>6</b>   |   |  |   | <b>Existing roof covering<sup>1</sup></b>  |

<sup>1</sup>Not suitable for use over existing wood shakes or wood shingles.

<sup>2</sup>New roof cover retains the fire classification based on the fire resistance rating of the existing roof cover system.

**TABLE 2: WIND UPLIFT RESISTANCE ROOF DECK<sup>1</sup> ASSEMBLIES**

**DIRECT TO DECK**

| System Number  | Panel Fastening <sup>2</sup>  |  | Maximum Design Pressure <sup>3</sup> |
|--|---|--|--------------------------------------|
|  | Tab Fastening   | Stitch Fastening   |                                      |
| <b>Antica, Bond, Classic, Craftsman Shake, Royal, or Tudor<sup>4</sup></b> |   |  | <b>ANSI/UL 580/1897</b>              |
| <b>1</b>   | (4) #12-8 x 1- <sup>1</sup> / <sub>4</sub> inch hex washer head screws 4 inches from either end and 15 inches O.C. in the factory tabs into the wood deck | (4) #9-16 x 1- <sup>1</sup> / <sub>2</sub> inch hex washer head screws stitch fastened 1 inch from either end and 17 inches O.C. through the nose attaching the preceding course                             | <b>-75</b>                           |
| <b>2</b>   | (7) #12-8 x 1- <sup>1</sup> / <sub>4</sub> inch hex washer head screws 4 inches from either end and 15 inches O.C. in the factory tabs into the wood deck | (7) #9-16 x 1- <sup>1</sup> / <sub>2</sub> inch hex washer head screws stitch fastened 1 inch from either end and 8- <sup>1</sup> / <sub>2</sub> inches O.C. through the nose attaching the preceding course | <b>-97.5</b>                         |

<sup>1</sup>APA stamped minimum <sup>15</sup>/<sub>32</sub> inch CDX plywood fastened on all edges and at mid-span to framing 6 inches oc with 2-<sup>3</sup>/<sub>8</sub> inch #8d annular ring shank nails.

<sup>2</sup>All fasteners must be corrosion resistant. Nails must comply with ASTM F1667. Wood screws must comply with ANSI/ASME B18.6.1. Sheet metal screws must comply with ANSI/ASME B18.6.4.

<sup>3</sup>The maximum design wind uplift pressure utilizes a safety factor of 2 to the maximum tested load achieved without failure.

<sup>4</sup>Panels applied having 14-<sup>1</sup>/<sub>2</sub> inch exposure and an approximate 3 inch adjacent overlap.

**TABLE 2: WIND UPLIFT RESISTANCE ROOF DECK<sup>1</sup> ASSEMBLIES****BATTEN SYSTEMS**

| <b>System Number</b>   | <b>Batten<sup>2</sup> Attachment</b>  | <b>Panel Fastening<sup>3</sup></b>  | <b>Maximum Design Pressure<sup>4</sup></b> |
|--|---|---|--|
| <b>Antica, Bond, Classic, Craftsman Shake, Royal, or Tudor<sup>5</sup></b> |   |   | <b>ANSI/UL 580/1897</b>                    |
| <b>3</b>   | <b>(1) #9 x 3-<sup>1</sup>/<sub>4</sub> inch torx bugle head screw 24 inches O.C. into wood joists</b>                  | <b>(4) 8d<sup>6</sup> x 2-<sup>1</sup>/<sub>2</sub> inch ring-shank nails 1 inch from either end and 17 inches O.C. into the nose of the panel, through the preceding course, and into the wood batten</b>                          | <b>-75</b>                                 |
| <b>4</b>   | <b>(2) #9 x 3-<sup>1</sup>/<sub>4</sub> inch torx bugle head screw 24 inches O.C. into wood joists</b>                  | <b>(7) 8d<sup>6</sup> x 2-<sup>1</sup>/<sub>2</sub> inch ring-shank nails 1 inch from either end and 8-<sup>1</sup>/<sub>2</sub> inches O.C. into the nose of the panel, through the preceding course, and into the wood batten</b> | <b>-135</b>                                |
| <b>5</b>   | <b>(1) 12d<sup>6</sup> x 3-<sup>1</sup>/<sub>4</sub> inch smooth shank framing nail 24 inches O.C. into wood joists</b> | <b>(4) 8d<sup>6</sup> x 2-<sup>1</sup>/<sub>2</sub> inch ring-shank nails 1 inch from either end and 17 inches O.C. into the nose of the panel, through the preceding course, and into the wood batten</b>                          | <b>-37.5</b>                               |

<sup>1</sup>APA stamped minimum  $\frac{15}{32}$  inch CDX plywood fastened on all edges and at mid-span to framing 6 inches oc with  $2\frac{3}{8}$  inch #8d annular ring shank nails.

<sup>2</sup>Battens are to be minimum nominal 2X2 Douglas Fir-Larch or better.

<sup>3</sup>All fasteners must be corrosion resistant. Nails must comply with ASTM F1667. Wood screws must comply with ANSI/ASME B18.6.1. Sheet metal screws must comply with ANSI/ASME B18.6.4.

<sup>4</sup>The maximum design wind uplift pressure utilizes a safety factor of 2 to the maximum tested load achieved without failure.

<sup>5</sup>Panels applied having  $14\frac{1}{2}$  inch exposure and an approximate 3 inch adjacent overlap.

<sup>6</sup>Ring shank nail diameter is 0.131 inches.

**TABLE 3: WIND DRIVEN RAIN RESISTANCE<sup>1</sup>**

| Roof Location/Detail   | Component Description  | Component Attachment  | Additional Detail   | Wind Driven Rain Resistance (HVHZ) |
|--|--|---|---|------------------------------------|
| <b>Antica, Bond, Classic, Craftsman Shake, Royal, or Tudor<sup>2</sup></b> |  |   |   | <b>TAS 100</b>                     |
| <b>Eave</b>  | Stone coated trim having 3- <sup>1</sup> / <sub>2</sub> inch vertical face and 1 inch fastening flange | 12d common smooth shank nail 5 inches oc into batten  | At eave/valley intersection, eave trim was mitered to allow valley metal to pass through and folded down over fascia.<br><br>First course of metal panels attached to starter batten <sup>3</sup> and through eave trim                       | <b>Pass</b>                        |
| <b>Rake<sup>3, 4, 5</sup></b>  | Pre-formed 26 ga. rake edge metal having (4) "V" folds with returns on each side                       | #10-16 X 1- <sup>1</sup> / <sub>2</sub> inch hex head fasteners 1 inch from the side between the outermost "V" fold and the return        | Roof cover panels installed into rake edge, and folded down into the drip channel   |                                    |
| <b>Valley<sup>6</sup></b>  | Pre-formed 26 ga. valley metal having (4) "V" folds with returns on each side                          | #10-16 X 1- <sup>1</sup> / <sub>2</sub> inch hex washer head fasteners 1 inch from the side between the outermost "V" fold and the return | Valley contained a 5 inch end lap , was sealed with <sup>1</sup> / <sub>2</sub> inch bead of ASTM C920 sealant, and folded to ensure wind-driven rain resistance<br><br>The 1 inch X 2-1/2 inch closure material was placed between "V" folds |                                    |

<sup>1</sup>Deck, underlayment, battens, fasteners and roof covering materials and installation methods are to comply with [Table 2](#). Minimum slope is 3:12.

<sup>2</sup>Panels applied having 14-1/2 inch exposure and an approximate 3 inch adjacent overlap.

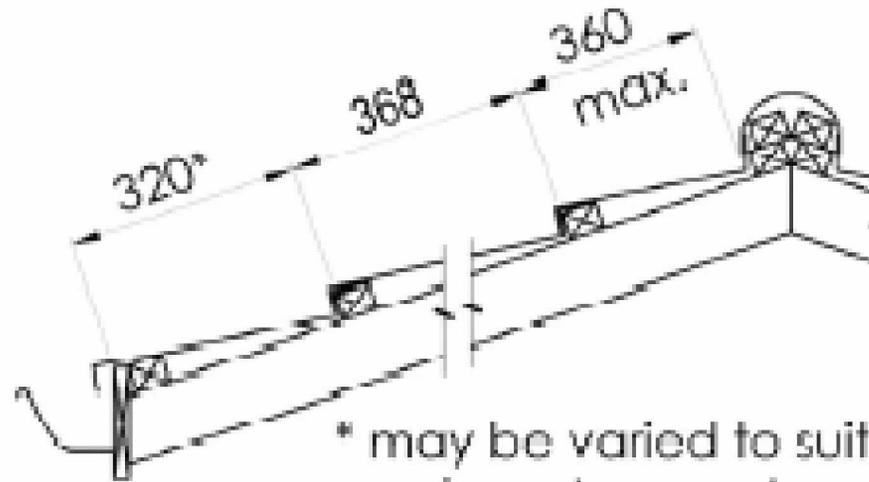
<sup>3</sup>Nominal 2X2 wood counter-batten applied parallel to rake edge and atop battens. Additional underlayment ASTM D1970 underlayment applied over mechanically fastened roofing felt in half sheet widths extending 2 inches down the fascia.

<sup>4</sup>Metal roof cover material bent over counter-batten.

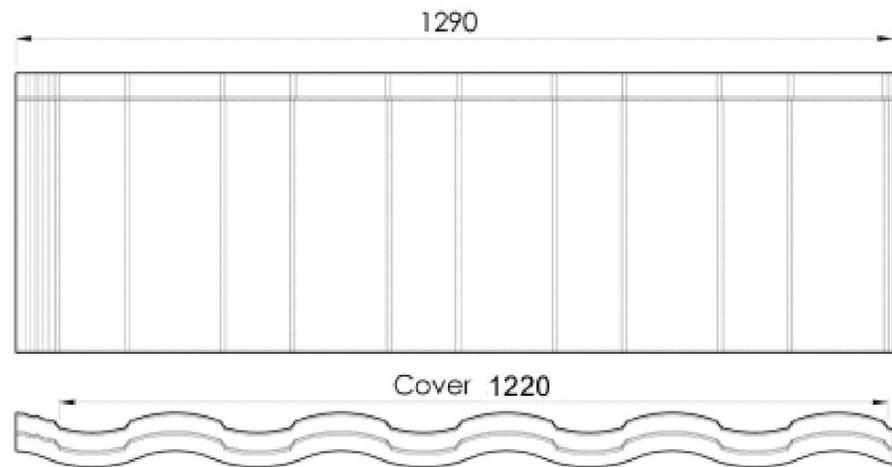
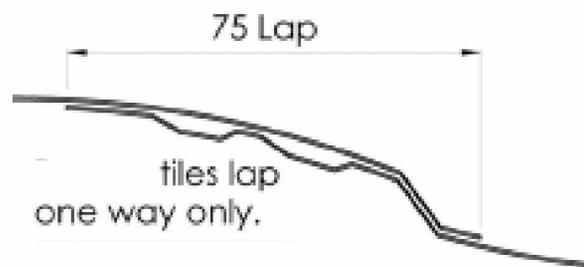
<sup>5</sup>ASTM C920 elastomeric sealant used to seal any fasteners and gaps at detail intersections.

<sup>6</sup>Additional underlayment ASTM D1970 underlayment applied over mechanically fastened roofing felt in full sheet widths. Metal panels bent 1-<sup>1</sup>/<sub>2</sub> inch to valley pan.

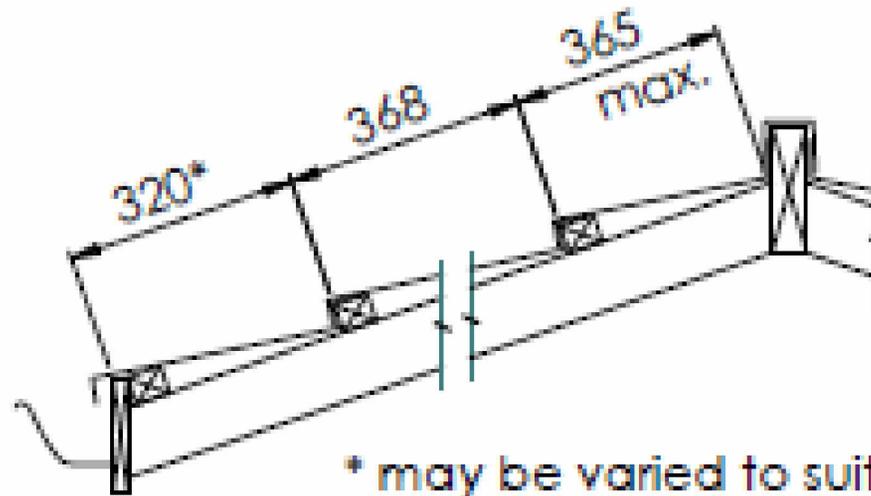
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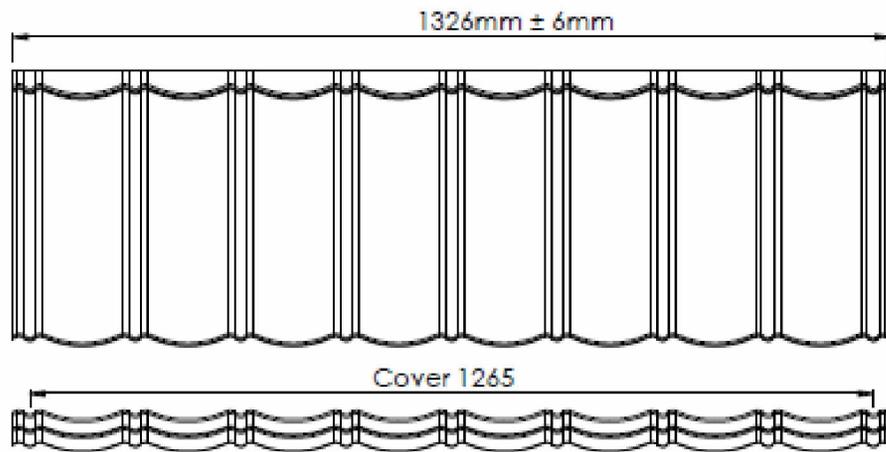
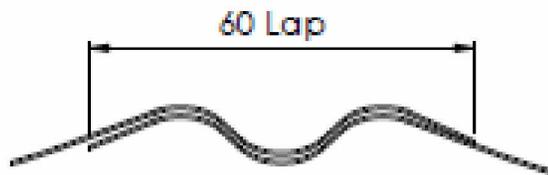
\* may be varied to suit  
rain water goods



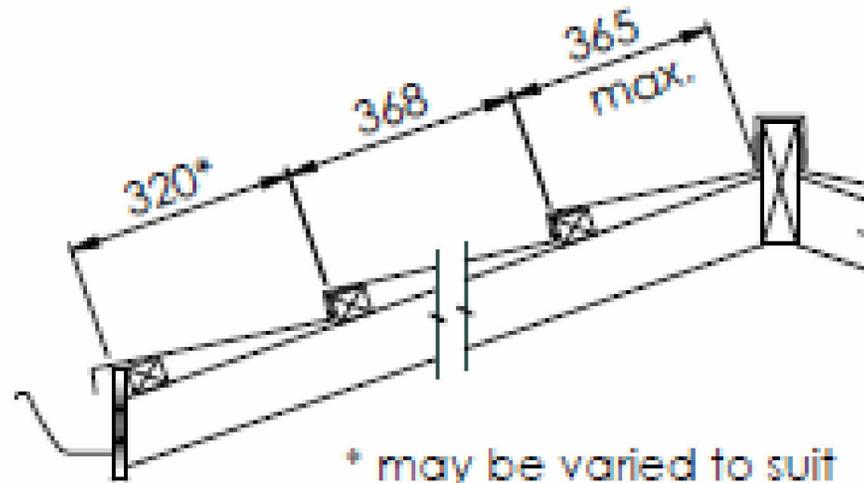
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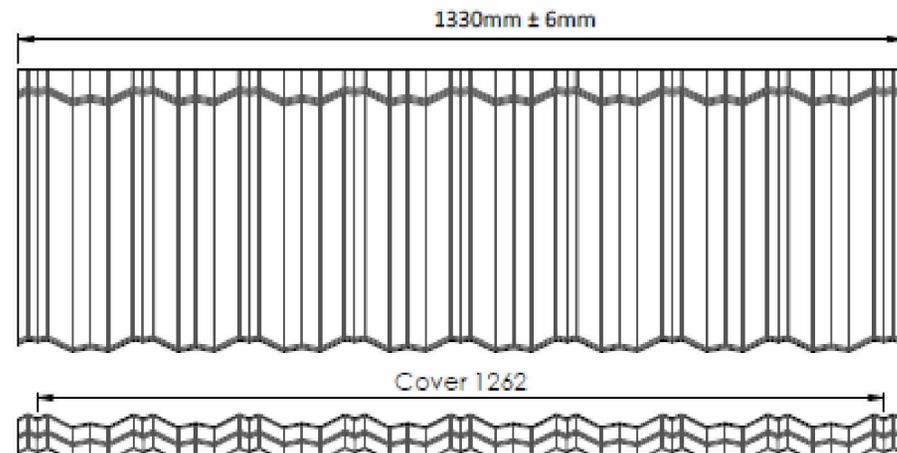
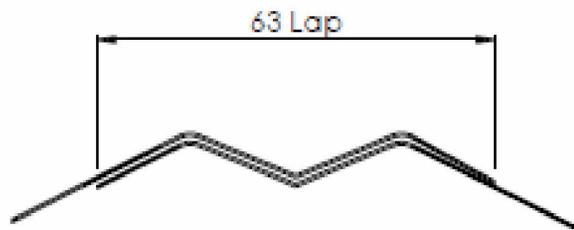
\* may be varied to suit  
rain water goods



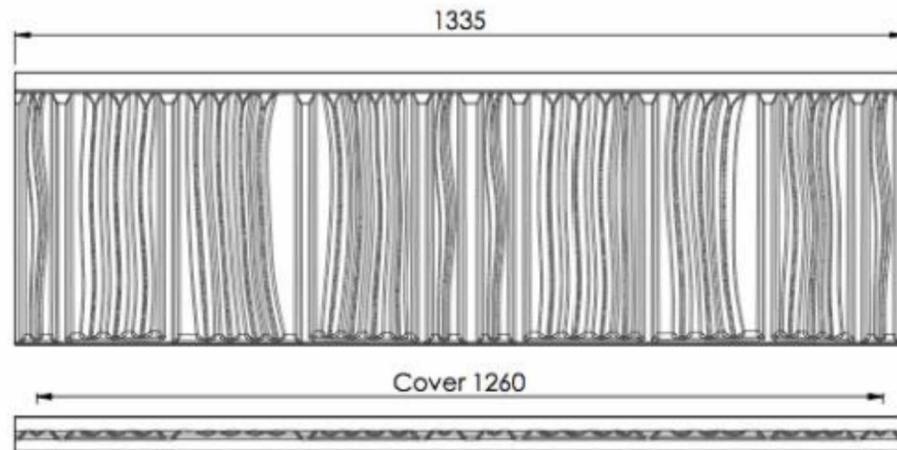
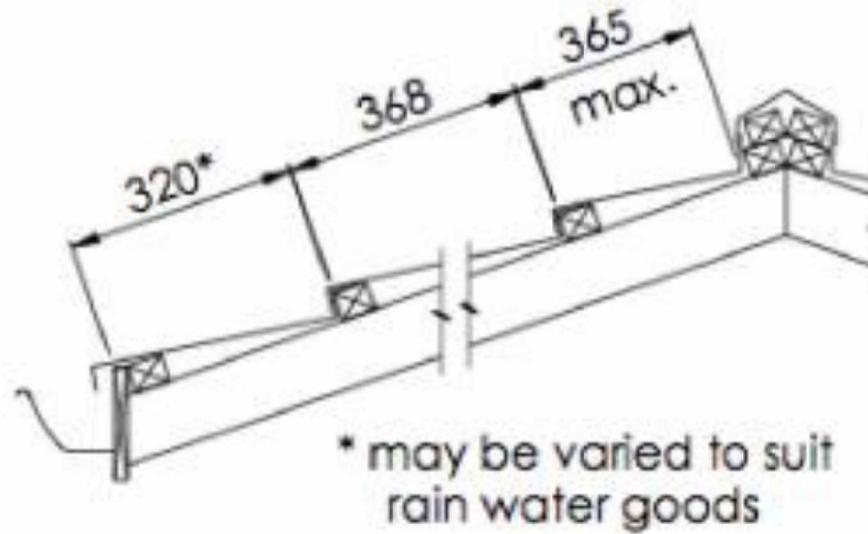
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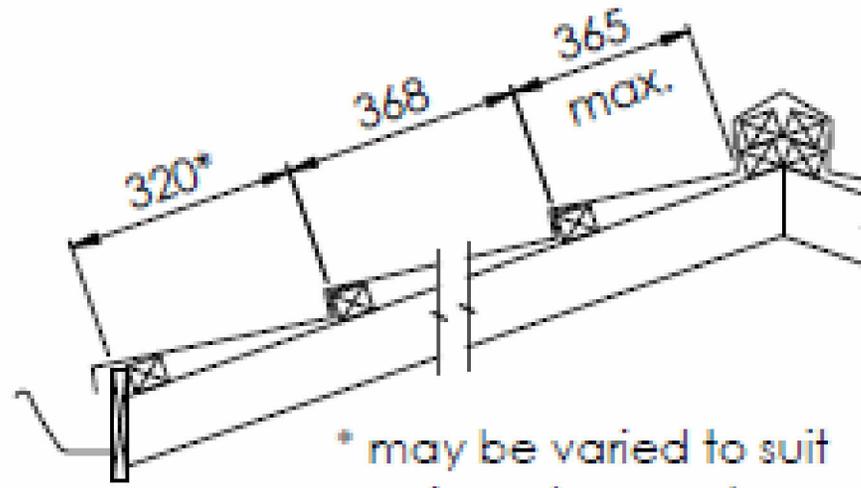
\* may be varied to suit  
rain water goods



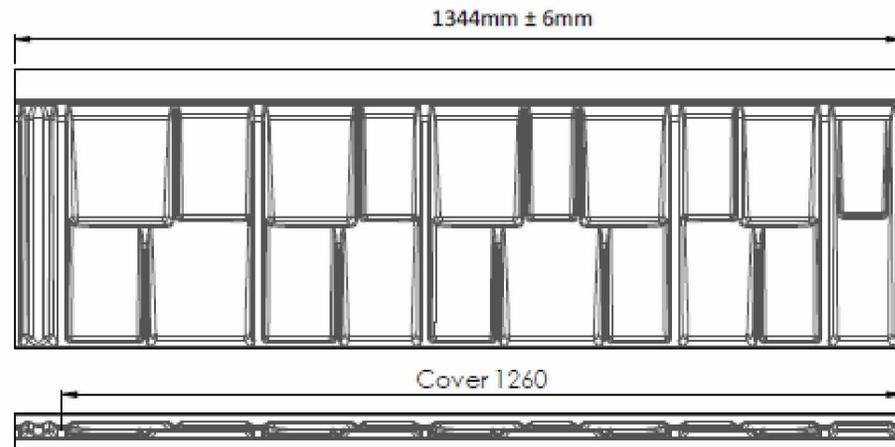
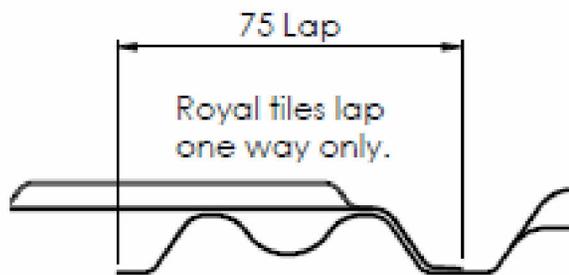
**Detail Sequence 4**



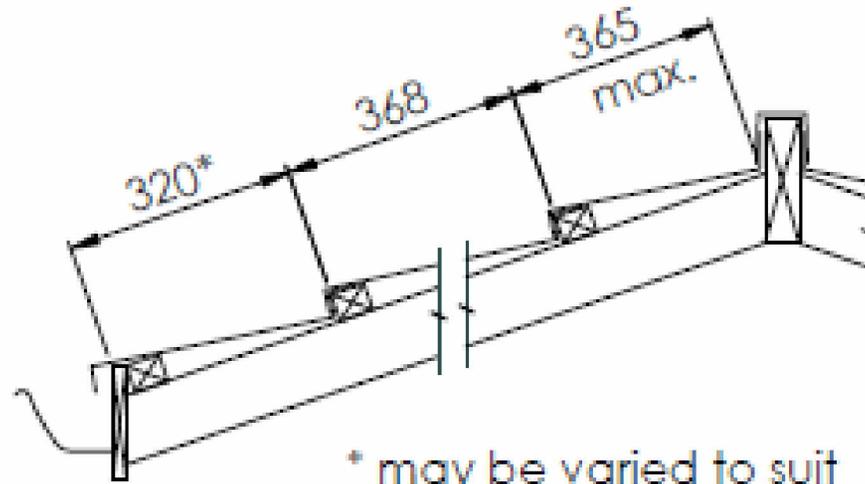
**Detail Sequence 5**



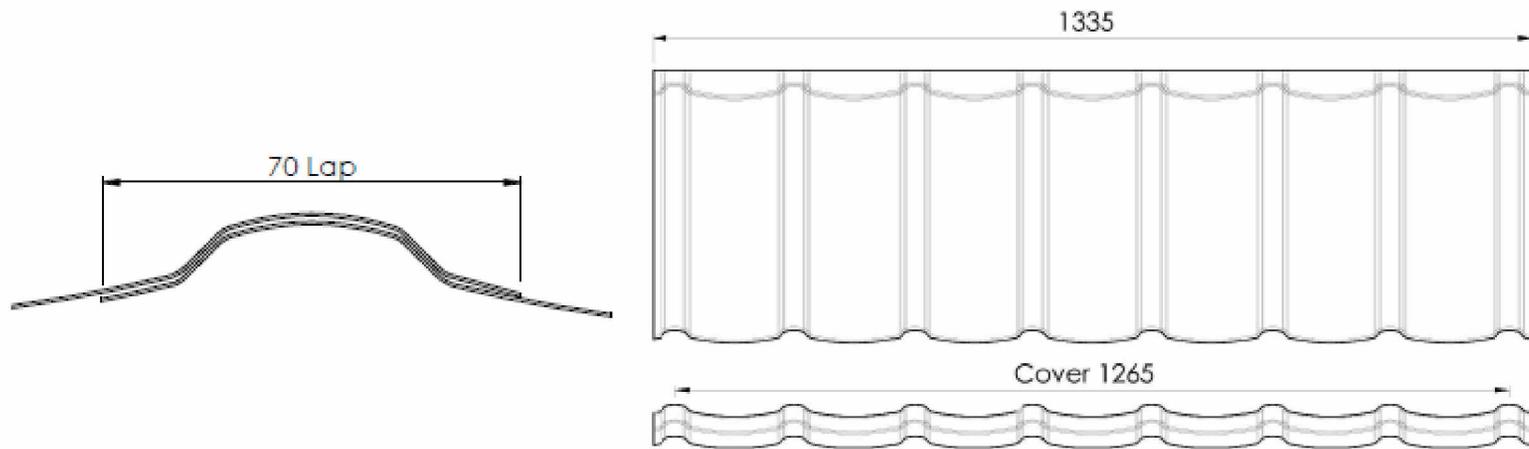
\* may be varied to suit rain water goods



**Detail Sequence 6**



\* may be varied to suit  
rain water goods



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