TEXAS DEPARTMENT OF INSURANCE

Engineering Services Program / MC 103-3A 333 Guadalupe Street P.O. Box 149104 Austin, Texas 78714-9104
Phone No. (512) 322-2212 Fax No. (512) 463-6693

PRODUCT EVALUATION Effective July 1, 2014
RC-28

*The following product has been evaluated for compliance with the wind loads specified in the **International Residential Code (IRC)** and the **International Building Code (IBC)**. This product shall be subject to reevaluation **June 2018**.*

This product evaluation is not an endorsement of this product or a recommendation that this product be used. The Texas Department of Insurance has not authorized the use of any information contained in the product evaluation for advertising, or other commercial or promotional purpose.

This product evaluation is intended for use by those individuals who are following the design wind load criteria in Chapter 3 of the IRC and Section 1609 of the IBC. The design loads determined for the building or structure shall not exceed the design load rating specified for the products shown in the limitations section of this product evaluation. This product evaluation does not relieve a Texas licensed engineer of his responsibilities as outlined in the Texas Insurance Code, the Texas Administrative Code, and the Texas Engineering Practice Act.

TILE BOND™ Roof Tile Adhesive manufactured by

The Dow Chemical Company
1605 Joseph Drive
200 Larkin Center
Midland, Michagan 48674
Telephone: (413) 552-1017

will be acceptable as an adhesive for adhering concrete and clay roofing tiles to roof underlayments on roof decks of structures located in designated catastrophe areas along the Texas Gulf Coast when installed in accordance with the TILE BOND™ Roof Tile Adhesive Operating Instructions and Maintenance Booklet, Form No. 179-04057, published February 2014 by The Dow Chemical Company, and this product evaluation report.

PRODUCT DESCRIPTION

TILE BOND™ Roof Tile Adhesive is a single component, pre-mixed, polyurethane foam roof tile adhesive for adhering concrete and clay roofing tiles to roof underlayment systems. TILE BOND™ Roof Tile Adhesive is available in a 28 oz can for smaller projects/repairs or in a 23 lb container for larger projects.

GENERAL REQUIREMENTS

Roofing tiles: Concrete and clay roofing tiles shall be installed in accordance with this product evaluation report and in accordance with the TILE BOND™ Roof Tile Adhesive Operating Instructions and Maintenance Booklet, Form No. 179-04057, published February 2014 by The Dow Chemical Company. General installation requirements for the roofing tiles shall be as specified in the roofing tile manufacturer's installation instructions. Where differences occur between the TILE BOND™ Roof Tile Adhesive Operating Instructions and Maintenance Booklet and this evaluation report, the requirements in this product evaluation report shall govern.

Licensed applicators: Installation of the TILE BOND™ Roof Tile Adhesive shall be by qualified applicators approved and licensed by The Dow Chemical Company.

Tile dimension limitations: The Flat/Low profile, Medium profile, High profile, and Two-Piece Barrel roofing tiles shall be between 12 and 21 inches in length. The exposed width of the roofing tiles shall be

between 8 and 15 inches. The maximum thickness of the tail of the roofing tiles shall not exceed 1 3/8 inch. Each roofing tile shall have at least 2/3 of the tile's area free of adhesive contact.

Roof tile profile classifications: Roofing tile profiles shall be classified as one of the following:

Flat/Low profile: Flat/Low profile tiles are defined as tiles having a rise equal to or less than 1/2 inch and a rise-to-width ratio of less than or equal to 1.5.

Medium profile: Medium profile tiles are defined as tiles having a rise greater than 1/2 inch and a rise-to-width ratio of less than or equal to 1:5.

High/Barrel profile: High/Barrel profile tiles are defined as those tiles having a rise to width ratio greater than 1.5.

Roof height limitations: Roofing tiles adhered with the TILE BOND™ Roof Tile Adhesive shall only be installed on buildings with mean roof heights that do not exceed the limitations specified in Table 5 and Table 6 of this product evaluation report. For buildings with a mean roof height greater than 60 feet, the roofing tiles and their adhesive attachment method shall be designed to withstand the aerodynamic wind uplift moment determined in accordance with Section 1609.5.3 of the IBC and the attachment of the underlayment system to the roof deck shall be designed to resist the wind loads determined from Section 1609.1.1 of the IBC.

Roof slope limitations: The minimum roof slope shall be 2 1/2 :12.

INSTALLATION INSTRUCTIONS

Roof Framing and Roof Deck: Roof framing members shall be in accordance with either the IRC or the IBC. The roof framing members shall be minimum 2x6 dimension lumber and shall not be spaced greater than 24 inches on center. The roof deck shall be solidly sheathed with minimum 15/32" plywood. The minimum thickness and application of the roof sheathing to the roof framing members shall be in accordance with either the IRC or the IBC to resist the required wind loads.

If the existing roof deck is a spaced board roof deck, then the spaced boards shall either be removed and replaced with or covered with minimum 15/32" plywood. The wood structural panels shall be installed over the spaced boards in accordance with either the IRC or the IBC to resist the required wind loads.

Metal drip edge: A metal drip edge shall be installed as specified in the roofing tile manufacturer's installation instructions.

Underlayment (One of the following options shall be used):

Option 1: Hot mop 30/90 underlayment:

The underlayment shall consist of a two-ply 30/90 hot mop underlayment system.

The base ply (anchor sheet) of the underlayment system shall be an ASTM D 226 Type II (No. 30) asphalt-saturated organic felt. The base ply shall be mechanically fastened to the wood roof deck with minimum 11 gauge (minimum 0.120 inch shank diameter) corrosion resistant roofing nails (smooth, ring, or screw shank) with minimum 1-5/8" inch diameter tin caps. The fasteners shall be long enough to penetrate a minimum of 1/4" through the bottom of the wood deck.

The top ply of the underlayment system shall consist of one layer of ASTM D 6380 Class M or WS, Type II (No. 90) asphalt roll roofing. The top ply shall be applied over the base ply by first adhering the top ply to the base ply with a full mopping of ASTM D 312, Type IV hot asphalt applied at 25 lbs/square +/-15%. Next, the top ply shall be backnailed to the base ply with minimum 11 gauge (minimum 0.120 inch shank diameter) corrosion resistant nails (smooth, ring, or screw shank) with minimum 1-5/8 inch

diameter tin caps. The fasteners shall be long enough to penetrate a minimum of ¼" through the bottom of the wood deck.

Underlayment (continued):

Option 2: Self-Adhering Underlayment: Self-adhering underlayment may be used in accordance with one of the following requirements:

- The self-adhering underlayment shall be listed in a current ICC-ES Evaluation Report as approved for use with TILE BOND Roof Tile adhesive, or
- Document through testing at a TDI accepted test laboratory as having met the requirements set forth in ICC-ES AC152 Section 3.4. For testing in accordance with ICC-ES AC152, Section 3.4.5, the tensile adhesion/long term aging tests shall have been completed using TILE BOND Roof Tile Adhesive with the subject self-adhering underlayment.

Attachment of 30/90 underlayment to roof deck: The required underlayment design pressure is determined using Table 1 for Exposure B conditions based on the mean roof height of the structure, the location of the structure, and the roof slope of the structure. If the structure is located in an Exposure C condition, then the required underlayment design pressure determined from Table 1 shall be multiplied by the appropriate Exposure C coefficient from Table 2.

The allowable uplift resistance for the underlayment attachment is specified in Table 3. Either Attachment Method A, B, or C from Table 3 may be used as long as the allowable uplift resistance of the underlayment attachment is greater than the required underlayment design pressure determined from Table 1 and Table 2.

Attachment of self-adhering underlayment to roof deck: The self-adhering underlayment shall be installed in accordance with the self-adhering underlayment manufacturer's published installation instructions. The minimum thickness of the roof deck shall be as specified in this evaluation report. The underlayment shall backnailed to the roof deck with minimum 11 gauge (minimum 0.120 inch shank diameter) corrosion resistant nails (smooth, ring, or screw shank) with minimum 1-5/8 inch diameter tin caps spaced 12 inches on center. The fasteners shall be long enough to penetrate a minimum of ¼" through the bottom of the wood deck.

Battens: Battens shall be installed as required by the roofing tile manufacturer. If battens are installed, then they shall be installed over the underlayment. If battens are used, then the TILE BOND™ Roof Tile Adhesive shall not be applied to the battens.

TILE BOND™ Roof Tile Adhesive: The TILE BOND™ Roof Tile Adhesive is applied using a valve-triggered dispenser over the underlayment included with every canister. The dispensing system shall be operated in accordance with the TILE BOND Roof Tile Adhesive's Operating instructions and Maintenance Booklet.

Roofing tile installation: The roofing tiles and the underlayment system shall be clean and dry at the time of application.

The roofing tiles shall be adhered to the underlayment system using the TILE BOND™ roof tile adhesive in accordance with the published installation instructions, published by The Dow Chemical Company, and the paddy application methods provided in this product evaluation report.

The roofing tiles shall be adhered directly to the underlayment system. Horizontal battens are permitted for use in combination with the TILE BOND™ roof tile adhesive, but are not required. If battens are used, then the roofing tiles shall not be adhered to the battens. Roofing tiles shall be adhered directly to freshly applied adhesive. The roofing tile must be set within 4 minutes after the adhesive has been dispensed.

The attachment resistance of the roofing tiles as a function of roofing tile profile and paddy placement detail is shown in Table 4. Illustrations for the paddy placement details are shown in Figures 1 thru 4.

Table 5 and Table 6 specify the limitations on allowable mean roof heights for each of the paddy placement details for flat/low profile, medium profile, high profile, and two-piece barrel roofing tiles.

Paddy Applications.

Flat/Low profile roof tiles:

Paddy placement for flat/low profile roofing tiles shall be as shown in Placement Detail "A" in Figure 1 of this evaluation report. Each paddy dimension shall be 1" wide x 1" high x 8" long.

Medium profile roof tiles:

Paddy placement for medium profile roofing tiles shall be as shown in Placement Detail "B" in Figure 2 in this evaluation report. Each paddy dimension shall be 1" wide x 1" high x 8" long.

High profile roof tiles:

Paddy placement for high profile roofing tiles shall be as shown in Placement Detail "C" Figure 3 of this evaluation report. Each paddy dimension at the anchor lug shall be 4" wide x 2" high x 4" long. Each paddy dimension at the head lap shall be 1" wide x 1" high x 8" long.

Two-Piece profile roof tiles:

Paddy placement for two-piece profile roofing tiles shall be as shown in Placement Detail "D" in Figure 4 of this evaluation report. Each paddy dimension at the pan tile shall be 1.5" wide x 1.5" high x 8" long. Each paddy dimension at the cap tile shall be 1" wide x 1" high x 6" long.

Note: The TILE BOND™ Roof Tile Adhesive's Operating Instructions and Maintenance Booklet, Form No. 179-04057, published February 2014 by The Dow Chemical Company, shall be available on the job site during installation. All fasteners used shall be corrosion resistant as specified in the International Residential Code (IRC), the International Building Code (IBC), and the Texas Revisions.

Table 1
Required Underlayment Design Pressure (psf) [1]
Exposure B [2]

Gable/Hip Roofs **Roof Slope: ≥ 2 ½ :12 and ≤ 6:12**				
Mean Roof Height (ft)	Roof Pressure Zone [3]	Inland II	Inland I	Seaward
0-30	1	20	24	28
	2	35	41	48
	3	51	61	72
	2 Overhang	41	48	57
	3 Overhang	68	81	95
40	1	22	26	30
	2	38	45	53
	3	56	66	78
	2 Overhang	44	53	62
	3 Overhang	74	88	104
50	1	23	27	32
	2	40	48	56
	3	59	71	83
	2 Overhang	47	56	66
	3 Overhang	79	94	110
60	1	24	29	34
	2	42	50	59
	3	63	74	87
	2 Overhang	49	59	69
	3 Overhang	83	99	116
Gable/Hip Roofs **Roof Slope: >6:12 and ≤ 12:12**				
Mean Roof Height (ft)	Roof Pressure Zone [3]	Inland II	Inland I	Seaward
0-30	1	22	26	30
	2 & 3	25	30	36
	2 & 3 Overhang	37	44	51
40	1	24	28	33
	2 & 3	28	33	39
	2 & 3 Overhang	40	48	56
50	1	25	30	35
	2 & 3	30	35	41
	2 & 3 Overhang	43	51	60
60	1	27	32	37
	2 & 3	31	37	43
	2 & 3 Overhang	45	54	63

Note: [1] Table is based on an Importance factor of 1.0 and enclosed buildings.

[2] The Exposure Category for the structure location shall be as defined in either the IRC or the IBC.

[3] The dimensions of Roof Pressure Zones 2 and 3 (perimeter and corners) shall be as defined in Figures 6-11C and 6-11D of ASCE 7-05.

Table 2

Mean Roof Height and Building Exposure Coefficients [1]

Mean Roof Height (ft)	Exposure C [2]
0-15	1.21
20	1.29
25	1.35
30	1.40
40	1.49
50	1.56
60	1.62

Note: [1] The appropriate Exposure C coefficient shall be multiplied by the required underlayment design pressure determined from Table 1.

[2] The Exposure Category for the structure location shall be as defined in either the IRC or the IBC.

Table 3
Allowable Uplift Resistance for Two-Ply Underlayment Attachment (psf)

Attachment Method (See Below)	Field (Inches o.c.)	Lap (Inches o.c.)	Backnail Cap Sheet (Inches o.c.)	Allowable Uplift Resistance (psf)			
				15/32" Plywood		19/32" Plywood	
				Smooth	Deformed [1]	Smooth	Deformed [1]
A	12	6	12	41.6	47.4	52.7	60.0
	11			43.1	49.1	54.6	62.1
	10			44.9	51.0	56.8	64.6
	9			47.0	53.5	59.5	67.7
	8			49.6	56.5	62.9	71.5
	7			53.0	60.3	67.2	76.4
	6			57.6	65.5	72.9	82.9
	5			63.9	72.7	81.0	92.0
	4			73.5	83.6	93.0	105.8
	3			89.3	101.6	113.2	128.6
B	12	6	12	49.6	56.5	62.9	71.5
	11			51.8	58.9	65.6	74.6
	10			54.4	61.9	68.9	78.3
	9			57.6	65.5	72.9	82.9
	8			61.5	70.0	78.0	88.6
	7			66.6	75.8	84.4	96.0
	6			73.5	83.6	93.0	105.8
	5			83.0	94.4	105.1	119.5
	4			97.3	110.7	123.2	140.1
	3			121.1	137.8	153.4	174.4
C	12	6	12	58.6	66.6	74.2	84.3
	11			61.4	69.9	77.8	88.5
	10			64.9	73.9	82.2	93.5
	9			69.2	78.7	87.6	99.6
	8			74.4	84.7	94.3	107.2
	7			81.3	92.4	102.9	117.0
	6			90.3	102.8	114.4	130.1
	5			103.0	117.2	130.5	148.4
	4			122.1	138.9	154.6	175.8
	3			153.9	175.1	194.9	221.6

Note: [1] Deformed shank includes either ring shank nails or screw shank nails.

Attachment Method A: Two rows of fasteners staggered in the field; one row of fasteners at the lap; and one row of fasteners at the top edge of the 90 lb cap sheet.

Attachment Method B: Three rows of fasteners staggered in the field; one row of fasteners at the lap; and one row of fasteners at the top edge of the 90 lb cap sheet.

Attachment Method C: Four rows of fasteners staggered in the field; one row of fasteners at the lap; and one row of fasteners at the top edge of the 90 lb cap sheet.

Table 4
Paddy Placement

Roof Tile Profile	Paddy Placement Detail	Attachment Resistance (ft-lb)
Low/Flat	A	57.7
Medium	B	88.3
High	C	27.8
Two-Piece	D	61.9

Table 5
Mean Roof Height Limitations for Paddy Placement Applications
Roof Slope: $\geq$ 2 ½:12 and $\leq$ 6:12

Roofs Without Overhangs							
Tile Profile	Paddy Detail	Mean Roof Height Limitation [2]					
		Inland II		Inland I		Seaward	
		Exposure B [1]	Exposure C [1]	Exposure B [1]	Exposure C [1]	Exposure B [1]	Exposure C [1]
Low/Flat	A	30 ft	N/A [3]	N/A [3]	N/A [3]	N/A [3]	N/A [3]
Medium	B	40 ft	N/A [3]	N/A [3]	N/A [3]	N/A [3]	N/A [3]
High	C	50 ft	15 ft	30 ft	N/A [3]	N/A [3]	N/A [3]
Two-Piece	D	60 ft	60 ft	60 ft	60 ft	60 ft	60 ft
Roofs With Overhangs							
Tile Profile	Paddy Detail	Mean Roof Height Limitation [2]					
		Inland II		Inland I		Seaward	
		Exposure B [1]	Exposure C [1]	Exposure B [1]	Exposure C [1]	Exposure B [1]	Exposure C [1]
Low/Flat	A	N/A [3]	N/A [3]	N/A [3]	N/A [3]	N/A [3]	N/A [3]
Medium	B	N/A [3]	N/A [3]	N/A [3]	N/A [3]	N/A [3]	N/A [3]
High	C	N/A [3]	N/A [3]	N/A [3]	N/A [3]	N/A [3]	N/A [3]
Two-Piece	D	60 ft	60 ft	60 ft	50 ft	60 ft	20 ft

Note: [1] The Exposure category for the structure location shall be as defined in either the International Residential Code or the International Building Code.

[2] Table is based on an Importance factor of 1.0

[3] N/A = Not allowable

Table 6
Mean Roof Height Limitations for Paddy Placement Applications
Roof Slope: ≥6:12 and ≤ 12:12

Roofs Without Overhangs							
Tile Profile	Paddy Detail	Mean Roof Height Limitation [2]					
		Inland II		Inland I		Seaward	
		Exposure B [1]	Exposure C [1]	Exposure B [1]	Exposure C [1]	Exposure B [1]	Exposure C [1]
Low/Flat	A	60 ft	60 ft	60 ft	30 ft	60 ft	15 ft
Medium	B	60 ft	60 ft	60 ft	40 ft	60 ft	15 ft
High	C	60 ft	60 ft	60 ft	60 ft	60 ft	30 ft
Two-Piece	D	60 ft	60 ft	60 ft	60 ft	60 ft	60 ft
Roofs With Overhangs							
Tile Profile	Paddy Detail	Mean Roof Height Limitation [2]					
		Inland II		Inland I		Seaward	
		Exposure B [1]	Exposure C [1]	Exposure B [1]	Exposure C [1]	Exposure B [1]	Exposure C [1]
Low/Flat	A	60 ft	15 ft	30 ft	N/A [3]	N/A [3]	N/A [3]
Medium	B	60 ft	15 ft	40 ft	N/A [3]	N/A [3]	N/A [3]
High	C	60 ft	30 ft	60 ft	15 ft	30 ft	N/A [3]
Two-Piece	D	60 ft	60 ft	60 ft	60 ft	60 ft	60 ft

Note: [1] The Exposure category for the structure location shall be as defined in either the International Residential Code or the International Building Code.

[2] Table is based on an Importance factor of 1.0

[3] Not allowable

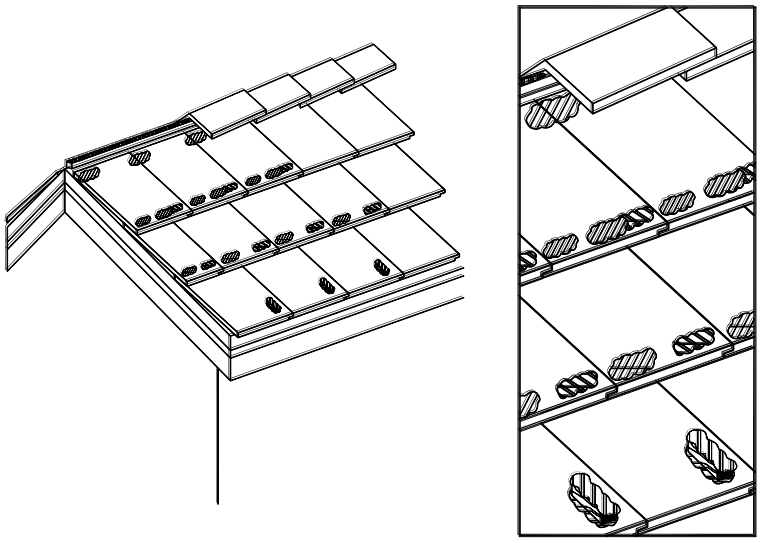

Figure 1. Placement Detail “A”
Flat/Low Profile Roofing Tile

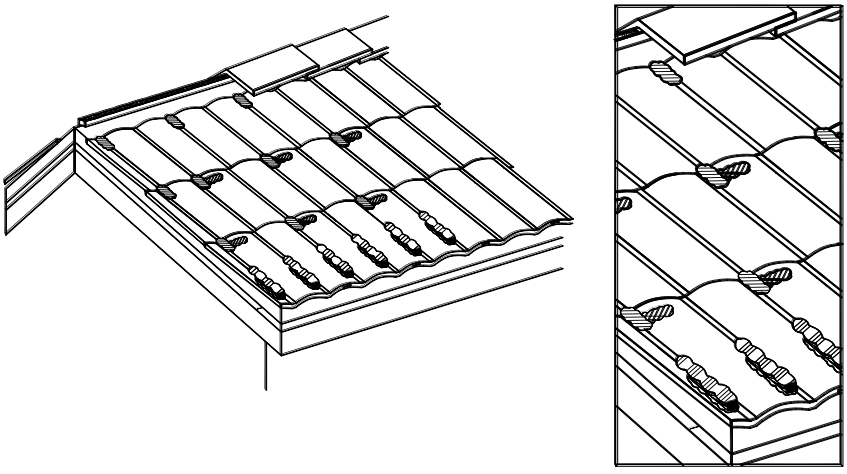

Figure 2. Placement Detail “B”
Medium Profile Roofing Tile

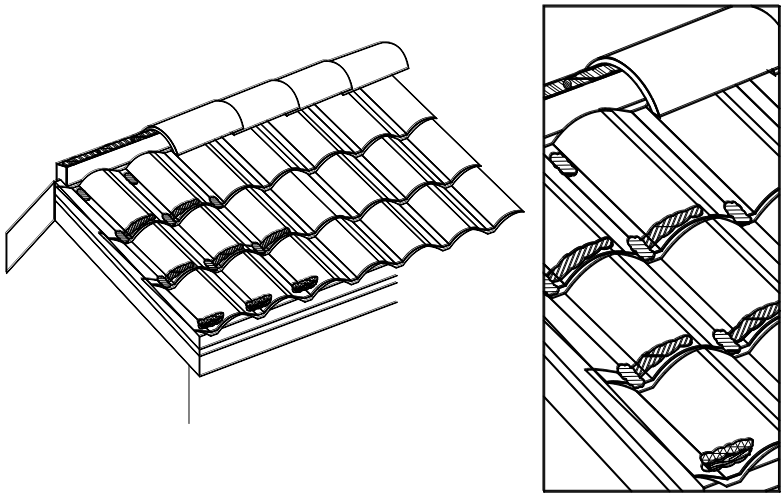

Figure 3. Placement Detail “C”
High Profile Roofing Tile

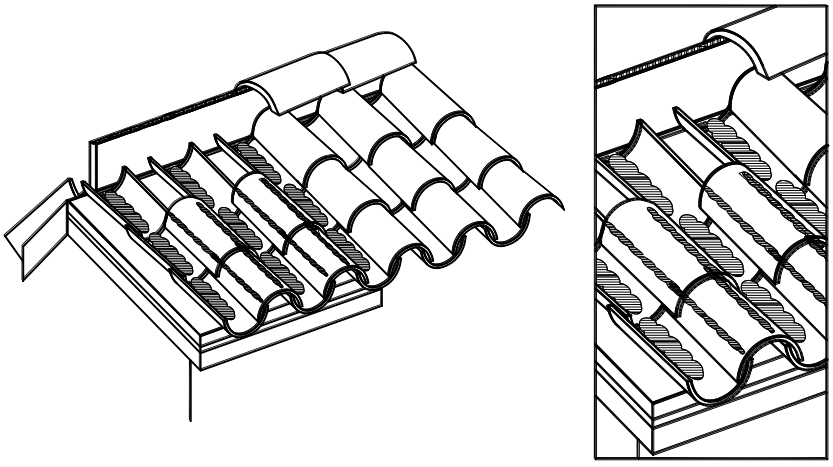

Figure 4. Placement Detail “D”
Two-Piece Profile Roofing Tile