Laboratory Report D9840.09.09

Physical Properties and Performance Testing
of
TILE BOND™ Roof Tile Adhesive
in accordance with
FBC 1523.6.5.2.17 and TAS 110

Prepared for:
The Dow Chemical Company
1605 Joseph Drive, 200 Larkin
Midland, Michigan 48674

Date of Issuance:
September 17, 2009

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REFERENCE: 2008.D9840SC

M-D NOTIFICATION: ERD07023

SAMPLES: **TILE BOND™ Roof Tile Adhesive** is a portable one-component polyurethane foam roof tile adhesive for attaching concrete and clay roof tiles.

SAMPLE DELIVERY: The named client arranged for shipment of materials to our laboratory for testing. The TILE BOND™ samples were received 03/17/2008.

TEST DATE(S): March 2008 through August 2009

TECHNICIANS: Charles Phillips, Michael Bloom, Alex Holtkamp, Hughie Dixon

PROPERTIES:

Compressive Strength	ASTM D1621
Density	ASTM D1622
Tensile Adhesion / Long Term Aging	ASTM D1623 / AC152
Water Absorption	ASTM D2842
Water Vapor Transmission	ASTM E96
Thermal and Humid Aging	ASTM D2126
Closed Cell Content	ASTM D2856, Procedure C
Static Uplift	SSTD 11-99 / TAS 101

STANDARDS:

AC152 – Acceptance Criteria for Adhesive Attachment of Concrete or Clay Roofing Tiles, Effective June 1, 2008, ©2008, ICC Evaluation Services, Inc
ASTM D1621-04a – Standard Test Method for Compressive Properties of Rigid Cellular Plastics, ©ASTM
ASTM D1622-93(1995) – Standard Test Method for Apparent Density of Rigid Cellular Plastics, ©ASTM
ASTM D1623-78 – Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics, ©ASTM
ASTM D2126-04 – Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging, ©ASTM
ASTM D2842-04a – Standard Test Method for Water Absorption of Rigid Cellular Plastics, ©ASTM
ASTM D2856-94 – Standard Test Method for Open-cell Content of Rigid Cellular Plastics by the Air Pycnometer, © ASTM.
ASTM E96/E96M-05 – Standard Test Methods for Water Vapor Transmission of Materials, ©ASTM
TAS 101 – Test Procedure for Static Uplift Resistance of Mortar or Adhesive Set Tile Systems.

1. COMPRESSIVE STRENGTH (ASTM D1621):

1.1 Specimen Preparation:

1.1.1 Five specimens were produced with a minimum area of 4 in^2. Each specimen was conditioned for a minimum of 40 hours at 73°F and 50% relative humidity.

1.2 Procedure:

1.2.1 The dimensions of each specimen is measured to the nearest 0.1inch and recorded. The specimen is then placed in the Satec T-5000, and compressed at a rate of 0.1 inch per minute until 10% compression or yield is reached. Maximum load is recorded.

1.3 Results:

Table 1: Compressive Strength Results

Test	Result (psi)	FBC HVHZ	Pass/Fail
1	15.28	Min. 12 psi	Pass
2	13.44		
3	14.32		
4	15.41		
5	13.11		
Avg:	**14.31**		
Std. Dev.:	1.04		

2. DENSITY (ASTM D1621):

2.1 Specimen Preparation:

2.1.1 Five specimens were produced with a minimum volume of 1.0 in^3. Specimens were prepared in accordance with D1621, Section 6. Each specimen was conditioned for a minimum of 40 hours at 73°F and 50% relative humidity.

2.2 Procedure:

2.2.1 Weigh and measure specimens and calculate density.

2.3 Results:

Table 2: Density Results

Test	Result (pcf)	FBC HVHZ	Pass/Fail
1	1.88	Min. 1.6 pcf	Pass
2	1.80		
3	1.80		
4	1.98		
5	1.84		
Avg:	**1.83**		
Std. Dev.:	0.05		

3. TENSILE ADHESION (ASTM D1623 / AC152):

3.1 Specimen Preparation:

3.1.1 Specimens are prepared with the subject tile adhesive applied to each of the substrates noted in Table 3.

3.1.2 Sections of the assemblies are constructed and allowed to cure. After curing, the composite panels are cut into squares and conditioned for testing.

3.2 Specimen Conditioning:

3.2.1 Control samples are conditioned at 75 ± 2°F and 50% relative humidity. Long Term Aging specimens are conditioned at 180 ± 2°F and 65% relative humidity for 7, 14, 30, 60, and 120 days. Specimens were then allowed to equilibrate at 75 ± 2°F and 50% relative humidity prior to testing.

3.3 Procedure:

3.3.1 Specimens are placed within the tensile loading device, aligned properly to central axis and load applied at a cross-head speed in accordance with D1623, Section 8. Maximum load is recorded.

3.4 Results:

Table 3A: Tensile Adhesion / Long Term Aging Results

Substrate	Test	Day-0	Day-7	Day-14	Day-30	Day-60	Day-90	Day-120
Concrete Tile	1	27.5	39.5	38.4	42.2	36.1	20.8	31.2
	2	37.5	9.5	31.1	21.9	29.9	34.2	33.1
	3	39.6	31.3	35.0	36.8	51.3	36.6	38.1
	4	31.5	35.9	38.2	33.6	19.3	37.6	21.0
	5	38.1	21.7	33.7	21.9	39.7	20.3	32.5
	Average:	**34.8**	**27.6**	**35.3**	**31.3**	**35.3**	**29.9**	**31.2**
	SD:	5.1	12.1	3.1	9.1	11.8	8.6	6.3
	Failure Mode:	cohesive	cohesive	cohesive	cohesive	cohesive	cohesive	cohesive

3.4.1 Control specimens for concrete tile met the minimum 28 psi criteria for control specimens set forth in FBC Section 1523.6.5.2.17.3. **Pass.**

Table 3B: Tensile Adhesion / Long Term Aging Results

Substrate	Test	Day-0	Day-7	Day-14	Day-30	Day-60	Day-90	Day-120
Clay Tile	1	44.9	16.4	14.8	8.0	17.1	17.0	14.0
	2	25.0	21.3	17.5	17.6	10.6	13.8	16.3
	3	39.7	13.9	12.7	17.1	17.9	14.8	15.7
	4	21.0	33.5	17.7	18.9	16.9	15.8	13.6
	5	33.5	20.3	26.8	19.5	16.3	14.5	20.4
	Average:	**32.8**	**21.1**	**17.9**	**16.2**	**15.8**	**15.2**	**16.0**
	SD:	9.9	7.6	5.4	4.7	2.9	1.2	2.7
	Failure Mode:	cohesive	cohesive	adhesive	adhesive	adhesive		adhesive

Table 3B (Continued): Tensile Adhesion / Long Term Aging Results								
Substrate	**Test**	**Day-0**	**Day-7**	**Day-14**	**Day-30**	**Day-60**	**Day-90**	**Day-120**
90# Mineral Surface Roll Roofing	1	18.7	24.8	25.1	27.6	22.3	17.8	25.7
	2	20.3	21.5	20.1	19.8	26.0	22.2	18.9
	3	19.7	23.5	26.2	21.6	25.5	26.7	24.1
	4	21.0	2.3	23.7	34.7	19.1	17.3	22.6
	5	24.9	22.9	22.9	22.4	16.5	21.8	30.4
	Average:	**20.9**	**19.0**	**23.6**	**25.2**	**21.9**	**21.2**	**24.3**
	SD:	2.4	9.4	2.3	6.0	4.1	3.8	4.2
	Failure Mode:	cohesive	cohesive	cohesive	cohesive	cohesive	cohesive	cohesive
Wood Batten	1	16.5	17.7	13.2	28.4	22.5	30.3	17.5
	2	21.1	29.9	25.1	28.8	25.9	23.9	16.2
	3	17.1	19.1	25.8	13.2	14.1	22.6	18.4
	4	19.1	17.0	28.9	26.0	16.6	26.6	12.9
	5	25.9	16.6	16.5	20.2	24.5	15.2	18.4
	Average:	**19.9**	**20.1**	**21.9**	**23.3**	**20.7**	**23.7**	**16.7**
	SD:	3.8	5.6	6.7	6.6	5.1	5.6	2.3
	Failure Mode:	cohesive	cohesive	cohesive	cohesive	cohesive	cohesive	cohesive
Protecto-Wrap RainProof 40	1	18.3	16.1	12.9	16.1	16.0	17.4	14.4
	2	19.2	21.6	12.5	13.5	14.0	17.0	19.1
	3	13.1	13.9	17.1	15.4	15.6	20.3	27.2
	4	27.4	13.6	15.7	25.3	16.1	17.4	15.8
	5	28.9	22.1	17.1	15.9	15.9	13.9	19.3
	Average:	**21.4**	**17.4**	**15.1**	**17.2**	**15.5**	**17.2**	**19.2**
	SD:	6.6	4.1	2.2	4.6	0.9	2.2	5.0
	Failure Mode:	cohesive	cohesive	cohesive	cohesive	cohesive	cohesive	cohesive
Grace Ice & Water Shield	1	18.1	16.8	17.7	16.8	27.1	15.0	23.3
	2	22.1	20.2	36.9	28.0	20.3	22.7	19.5
	3	17.2	25.6	11.3	16.0	39.4	15.3	11.3
	4	19.9	12.6	21.9	15.2	13.1	25.2	18.8
	5	14.2	7.2	14.5	11.8	17.0	19.0	20.4
	Average:	**18.3**	**16.5**	**20.5**	**17.6**	**23.4**	**19.4**	**18.7**
	SD:	2.9	7.1	10.0	6.2	10.3	4.5	4.5
	Failure Mode:	cohesive	cohesive	adhesive	adhesive	cohesive	cohesive	cohesive
Polyglass Polystick P	1	13.4	17.9	23.6	21.3	19.1	18.7	20.4
	2	15.2	27.3	7.7	20.5	20.9	20.4	15.4
	3	12.8	21.4	24.9	20.9	16.7	18.6	21.9
	4	16.4	21.6	10.6	27.6	17.6	21.8	22.7
	5	18.3	18.4	20.8	19.2	16.1	20.3	16.7
	Average:	**15.2**	**21.3**	**17.5**	**21.9**	**18.1**	**19.9**	**19.4**
	SD:	2.2	3.8	7.8	3.3	1.9	1.3	3.2
	Failure Mode:	cohesive	adhesive	adhesive	cohesive	cohesive	cohesive	cohesive
Polyglass Polyflex SAP	1	22.5	17.2	21.3	15.4	18.8	28.8	19.0
	2	14.8	12.1	11.8	18.1	22.9	29.8	17.3
	3	12.3	25.2	12.9	19.1	25.2	22.8	22.3
	4	14.8	9.2	19.4	15.5	19.2	16.9	17.0
	5	16.7	12.9	10.3	17.6	19.0	26.4	14.7
	Average:	**16.2**	**15.3**	**15.1**	**17.1**	**21.0**	**24.9**	**18.0**
	SD:	3.8	6.2	4.9	1.6	2.9	5.2	2.8
	Failure Mode:	cohesive	cohesive	cohesive	cohesive	cohesive	cohesive	cohesive

3.4.2 All specimens-sets met the minimum 15 psi criteria set forth in AC152.

4. WATER ABSORPTION (ASTM D2842, PROCEDURE B):

4.1 Specimen Preparation:

4.1.1 Specimens measuring 3" x 3" x ¾" thick are prepared in accordance with the referenced standard and are conditioned in an air circulating oven at 122 ± 5°F for minimum 24 hours prior to testing.

4.2 Procedure:

4.2.1 Place underwater weighing jig in the immersion tank. Immerse specimens by suitable weighted rack in the open-top immersion tank filled with distilled water at 73°F, and adjust water level such that a 2-inch head of water is atop the specimens.

4.2.3 Assemble balance atop the tank and zero the balance. Attach underwater weighing jig to the balance such that the top surface of the jig is 2-inch below the surface of the water, and weigh to the nearest 0.1 gram. Insert the specimen into the submerged jig without removing from the water, and maintaining 2-inch below the surface of the water, and weigh to the nearest 0.1 gram.

4.2.6 Cover immersion tank with low perm film and allow specimens to sit 96 hours, while maintaining 2-inch head of water.

4.2.7 Remove plastic film and zero the balance, and repeat weighing as noted above.

4.2.8 Calculate water absorption by volume in accordance with standard.

4.3 Results:

Table 4: Water Absorption by Volume Results

Test	Result (%)	FBC HVHZ	Pass/Fail
1	2.06	Max. 10%	Pass
2	2.38		
3	2.17		
Avg:	2.21		
Std. Dev.:	0.16		

5. WATER VAPOR TRANSMISSION / PERMEANCE (ASTM E96, DESICCANT METHOD):

5.1 Specimen Preparation:

5.1.1 The specimen is sealed to the open mouth of a test dish containing desiccant and placed in a test chamber. For the duration of the test, the temperature and humidity of the chamber remain constant at 73°F and 50% respectively.

5.2 Procedure:

5.2.1 The dish assemblies are periodically weighed to determine the gain of moisture weight.

5.3 Results:

Table 5: Water Vapor Permeance Results

Test	Result (perms)	FBC HVHZ	Pass/Fail
1	2.98	Max. 3.1 perms	Pass
2	3.06		
3	2.96		
Average:	3.00		
Std. Dev.:	0.06		

6. DIMENSIONAL STABILITY (ASTM D2126):

6.1 Specimen Preparation:

6.1.1 Three specimens were produced from each condition to be tested. Specimens were conditioned at 73°F and 50% relative humidity to a constant mass prior to testing.

6.2 Procedure:

6.1.2 Initial dimensions of each specimen were recorded. Each set of specimens were then conditioned for 1, 3 and 14 days at -40°F and ambient relative humidity and 158°F and 100% relative humidity. After conditioning, specimens were allowed to reach room temperature for 2 hours. Final dimensions were recorded for each specimen and percent dimensional changed calculated.

6.3 Results below are the average of three specimens per condition per duration.

Table 6: Dimensional Stability / Thermal and Humid Aging Results

Condition	Duration	Dimension	% Change	FBC HVHZ	Pass/Fail
-40°F Ambient RH	14-day	Volume	-0.47%	Max. +0.07%	Pass
158°F 100% RH	14-day	Volume	-4.05%	Max. +6%	Pass

7. CLOSED CELL CONTENT (ASTM D2856, PROCEDURE B):

7.1 Testing was subbed out to Micromeritics Analytical Services (FDA Accreditation 3003778267).

7.1.1 It should be noted there are no laboratories listed with Miami-Dade that include ASTM D2856, Procedure B in their Scope of Accreditation. Trinity|ERD selected Micromeritics Analytical Services based on their status with the Federal Drug Administration and expertise with this type of testing.

7.2 Results:

Table 7: Closed Cell Content Results

Test	Result	FBC HVHZ Criteria	Pass/Fail
1	83.6	Min. 85%	Pass
2	99.9		
3	81.2		
4	84.6		
5	81.8		
Average:	**86.3**		
Std. Dev:	7.8		

8. STATIC UPLIFT RESISTANCE (TAS 101):

8.1 Fourteen (14) specimens are prepared for each of the configurations noted below in accordance with Section 7 of TAS 101.

8.1.1 Clay tile was determined to be the critical tile type based on tensile adhesion testing noted in Section 3 herein. Specimens were prepared using clay tile, and results are extendable to concrete tile.

8.1.2
- Set 1: Low/Flat Profile
- Set 2: Medium Profile
- Set 3: High Profile
- Set 4: 2-Piece Barrel
- Set 5: Hip/Ridge Tile over 2x wood ridge board.

8.2 Procedure:

8.2.1 Specimens are tested in accordance with Section 9 of TAS 101 and calculations in accordance with Section 10 of TAS 101.

8.2.2 All specimens were tested as a 'moment based system'.

8.3 Results:

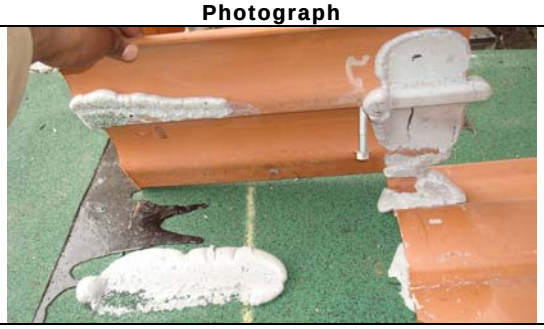
8.3.1 Results are noted in Tables 8A through 8E below.

8.3.2 Values noted as 'high' and 'low' within each table excluded from the statistical analysis.

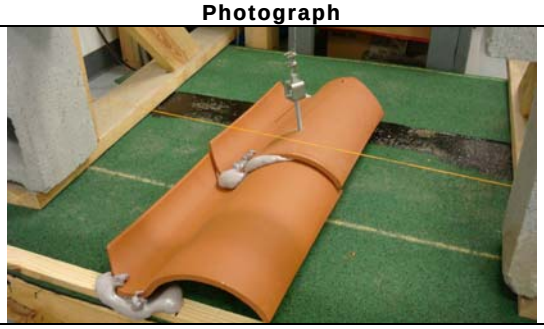
8.3.3 Determination of Minimum Characteristic Resistance Load (MCRL) includes an additional 2-to-1 margin of safety, as required for an interdependent attachment analysis.

Table 8A: Static Uplift Resistance, Set 1 – Low/Flat Profile Tile		
Set No.	**1**	**Photograph**
Substrate / Deck:	15/32" plywood	
Underlayment:	30/90 system	
Tile:	Low/Flat Profile Clay	
Weight (lbf):	4.06	
Slope (θ):	2:12 (9.5°)	
Test Tile Angle (α):	4.7°	
Moment Arm (ft):	0.90	
Attachment:	Interdependent Paddy: TILE BOND™, 1" W x 1" H x 8" L	

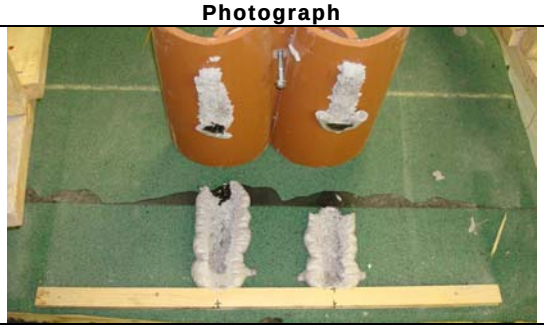
Static Uplift Results		
Test Number	**Ultimate Load (lbf)**	**Failure Mode**
Test 1:	268.6	Cohesive of Foam
Test 2:	**303.6 – high**	Cohesive of Foam
Test 3:	294.5	Cohesive of Foam
Test 4:	259.5	Cohesive of Foam
Test 5:	274.2	Cohesive of Foam
Test 6:	273.1	Cohesive of Foam
Test 7:	298.8	Cohesive of Foam
Test 8:	**229.2 – low**	Cohesive of Foam
Test 9:	262.8	Cohesive of Foam
Test 10:	258.6	Cohesive of Foam
Test 11:	245.8	Cohesive of Foam
Test 12:	240.8	Cohesive of Foam
Test 13:	253.7	Cohesive of Foam
Test 14:	269.8	Cohesive of Foam
Average:	**266.7**	
Std. Deviation:	17.4	
Minimum Characteristic Resistance Load (lbf):	F' = 64.6	
Attachment Resistance Expressed as a Moment (ft-lbf):	**M_f = 57.7**	

Table 8B: Static Uplift Resistance, Set 2 – Medium Profile Tile		
Set No.	**2**	**Photograph**
Substrate / Deck:	15/32" plywood	
Underlayment:	30/90 system	
Tile:	Medium Profile Clay	
Weight (lbf):	6.93	
Slope (θ):	2:12 (9.5°)	
Test Tile Angle (α):	2.5°	
Moment Arm (ft):	1.125	
Attachment:	Interdependent Paddy: TILE BOND™, 1" W x 1" H x 8" L	

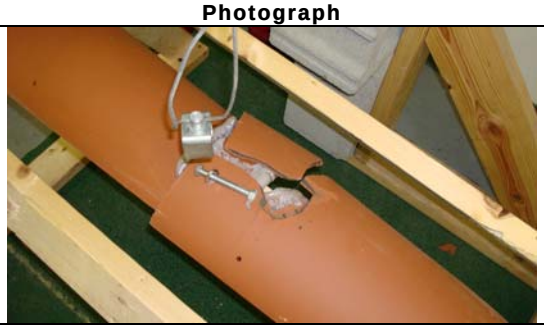
Static Uplift Results		
Test Number	**Ultimate Load (lbf)**	**Failure Mode**
Test 1:	430.0	Cohesive / adhesive of foam
Test 2:	250.5	Cohesive / adhesive of foam
Test 3:	**197.3 – Low**	Cohesive / adhesive of foam
Test 4:	323.7	Cohesive / adhesive of foam
Test 5:	207.6	Cohesive / adhesive of foam
Test 6:	371.0	Cohesive / adhesive of foam
Test 7:	234.8	Cohesive / adhesive of foam
Test 8:	286.1	Cohesive / adhesive of foam
Test 9:	313.0	Cohesive / adhesive of foam
Test 10:	442.0	Break tile
Test 11:	395.0	Cohesive / adhesive of foam
Test 12:	406.0	Cohesive / adhesive of foam
Test 13:	**452.0 – High**	Break tile
Test 14:	300.8	Cohesive / adhesive of foam
Average:	**330.0**	
Std. Deviation:	78.5	
Minimum Characteristic Resistance Load (lbf):	F' = 79.0	
Attachment Resistance Expressed as a Moment (ft-lbf):	**M_f = 88.3**	

Table 8C: Static Uplift Resistance, Set 3 – High Profile Tile		
Set No.	**3**	**Photograph**
Substrate / Deck:	15/32" plywood	
Underlayment:	30/90 system	
Tile:	High Profile Clay	
Weight (lbf):	7.8	
Slope (θ):	2:12 (9.5°)	
Test Tile Angle (α):	2.4°	
Moment Arm (ft):	1.2	
Attachment:	Interdependent Paddy: TILE BOND™, Anchor Lug: 4" W x 2" H x 4" L; Head Lap: 1" W x 1" H x 8" L	

Static Uplift Results		
Test Number	**Ultimate Load (lbf)**	**Failure Mode**
Test 1:	118.7	Cohesive of Felt and Foam
Test 2:	106.7	Cohesive of Felt and Foam
Test 3:	96.5	Cohesive of Felt and Foam
Test 4:	119.3	Cohesive of Felt and Foam
Test 5:	**95.1 – Low**	Cohesive of Felt and Foam
Test 6:	126.3	Cohesive of Felt and Foam
Test 7:	105.2	Cohesive of Felt and Foam
Test 8:	98.7	Cohesive of Felt and Foam
Test 9:	**155.5 - High**	Cohesive of Felt and Foam
Test 10:	98.7	Cohesive of Felt and Foam
Test 11:	95.1	Cohesive of Felt and Foam
Test 12:	96.7	Cohesive of Felt and Foam
Test 13:	136.3	Cohesive of Felt and Foam
Test 14:	103.5	Cohesive of Felt and Foam
Average:	**108.5**	
Std. Deviation:	13.5	
Minimum Characteristic Resistance Load (lbf):	F' = 23.2	
Attachment Resistance Expressed as a Moment (ft-lbf):	**M_f = 27.8**	

Table 8D: Static Uplift Resistance, Set 4 – 2-Piece Barrel Profile Tile		
Set No.	**4**	**Photograph**
Substrate / Deck:	15/32" plywood	
Underlayment:	30/90 system	
Tile:	2-Piece Barrel Profile Clay	
Weight (lbf):	5.75	
Slope (θ):	2:12 (9.5°)	
Test Tile Angle (α):	2.4°	
Moment Arm (ft):	1.14	
Attachment:	Interdependent Paddy: TILE BOND™, Pan Tile: 1½" W x 1½" H x 8" L; Cap Tile: 2 pads at 1" W x 1" H x 6" L	

Static Uplift Results		
Test Number	**Ultimate Load (lbf)**	**Failure Mode**
Test 1:	292.2	Cohesive of Foam
Test 2:	150.3	Cohesive of Foam
Test 3:	**112.3 – Low**	Cohesive of Foam
Test 4:	116.8	Cohesive of Foam
Test 5:	264.7	Cohesive of Foam
Test 6:	222.7	Cohesive of Foam
Test 7:	133.8	Cohesive of Foam
Test 8:	**378.0 - High**	Cohesive of Foam
Test 9:	289.3	Cohesive of Foam
Test 10:	217.5	Cohesive of Foam
Test 11:	259.5	Cohesive of Foam
Test 12:	221.3	Cohesive of Foam
Test 13:	248.8	Cohesive of Foam
Test 14:	335.7	Cohesive of Foam
Average:	**229.4**	
Std. Deviation:	67.2	
Minimum Characteristic Resistance Load (lbf):	F' = 54.5	
Attachment Resistance Expressed as a Moment (ft-lbf):	**M_f = 61.9**	

Table 8E: Static Uplift Resistance, Set 5 – Hip & Ridge Tile		
Set No.	**5**	**Photograph**
Substrate / Deck:	2x ridge board	
Underlayment:	N/A	
Tile:	Hip & Ridge Clay	
Weight (lbf):	5.75	
Slope (θ):	0:12 (0°)	
Test Tile Angle (α):	1.6°	
Moment Arm (ft):	0.76	
Attachment:	Interdependent Paddy: TILE BOND™, To Ridge Board: 1" W x 1" H x 10" L; Head Lap: 1" W x 1" H x 4" L	

Static Uplift Results		
Test Number	**Ultimate Load (lbf)**	**Failure Mode**
Test 1:	402	Break Tile
Test 2:	**473 – High**	Break Tile
Test 3:	425	Break Tile
Test 4:	430	Break Tile
Test 5:	432	Break Tile
Test 6:	428	Break Tile
Test 7:	425	Break Tile
Test 8:	446	Break Tile
Test 9:	390	Break Tile
Test 10:	456	Break Tile
Test 11:	432	Break Tile
Test 12:	368	Break Tile
Test 13:	**294 – Low**	Break Tile
Test 14:	382	Break Tile
Average:	**418**	
Std. Deviation:	27	
Minimum Characteristic Resistance Load (lbf):	F' = 102	
Attachment Resistance Expressed as a Moment (ft-lbf):	**M_f = 77**	

9. CONCLUSIONS:

9.1 Trinity|ERD has tested TILE BOND™ Roof Tile Adhesive for physical properties in accordance with the properties set forth in Section 1523.6.5.2.17 of the Florida Building Code and Table 1, Item 3 of ICC-ES AC152 resulting in the data outlined herein.

9.1.2 TILE BOND™ met all FBC Section 1523.6.5.2.17 requirements.

9.1.3 In addition, TILE BOND™ met the minimum 15 psi criteria set forth in AC152 for use of tile adhesive over underlayments other than the codified 30/90 system. Underlayments qualified under this program are outlined in Table 3B.

9.2 Trinity|ERD has tested TILE BOND™ Roof Tile Adhesive for Overturning Moment Resistance when used to bond flat/low, medium, high, cap & pan and ridge tile profiles to the FBC codified '30/90' underlayment system in accordance with TAS 101 requirements resulting in the data outlined herein.

9.2.1 Test results yield the following Attachment Resistance Expressed as a Moment:

- Flat / Low Profile: 57.7 ft-lbf
- Medium Profile: 88.3 ft-lbf
- High Profile: 27.8 ft-lbf
- Cap & Pan Profile: 61.9 ft-lbf
- Hip & Ridge Tile: 77.0 ft-lbf

9.2.3 The critical tile type (clay) was determined based on the comparative tensile adhesion testing outlined in Section 3, and was used for testing; therefore, results are applicable to clay and concrete tiles of the above noted profiles.

9.2.4 Based on Section 3 tensile adhesion data, results are also applicable for use over underlayments of Protecto-Wrap RainProof 40, Grace Ice & Water Shield and Polyglass Polystick P or Polyflex SAP. Results would also be applicable to other roof underlayment products meeting codified requirements for the underlayment type, and meeting the minimum 15 psi adhesion criteria when tested in accordance with AC152, Table 1, Item 3.

9.2.5 The above noted resistance data includes the additional 2 to 1 margin of safety required of foam-on tile attachment where two independent paddies are used for tile placement.

Please contact our office with any questions.

Sincerely,
TRINITY | ERD

Charles Phillips
Laboratory Manager

Robert Nieminen, P.E.
Florida Reg. No. 59166
Vice President

REPORT HISTORY:

Date	Event	Notes	Authorized By:
09/15/2009	Draft to client	For client review	RN
09/17/2009	Final issued		RN