



# TEST REPORT

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**Report Number:** 2916-20002 **Project Number:** 33768

**Report Issued:** June 15, 2020

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**Code/Standard:** AAMA 711-13, *Voluntary Specification for Self-Adhering Flashing Used for Installation of Exterior Wall Fenestration Products.*

**Product(s) Tested:** Maxell Exterior Tape No. 9940

**Test Date(s):** From March 2, 2020 through June 15, 2020

**Conclusion:** The material COMPLIED with all requirements outlined in AAMA711-13, for a Type A Product and Level 3 class.

Prepared & Submitted By:

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Sanjay "Jay" Mishra  
Vice President of Building Product Testing

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*All testing and samples preparation for this report was performed under the continuous, direct supervision of IAPMO Institute of Building Technology (IBT), unless otherwise stated. The observations, test results and conclusions in this report apply only to the specific samples tested and are not indicative of the quality or performance of similar or identical products. The statement of compliance, if stated, is based on the test results compared to the standard specifications without considering measurement uncertainty. Only the Client shown above is authorized to copy or distribute the report, and then only in its entirety. Any use of the IAPMO IBT name for the sale or advertisement of the tested material, product or service must first be approved in writing by IAPMO IBT.*

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## Table of Contents

1.0	INTRODUCTION .....	3
2.0	TEST SAMPLES .....	4
3.0	TEST SPECIMEN CONDITIONING .....	4
4.0	AAMA 711 DEFINITIONS .....	4
5.0	TEST PROCEDURES & RESULTS.....	4
5.1	Tensile Strength, ASTM D5034-09(2017).....	5
5.2	Nail Sealability, ASTM D19700-13.....	5
5.3	Peel Adhesion, ASTM D3330-04 (2010) .....	7
5.4	Accelerated Aging with Ultraviolet Light Exposure, ASTM G154-12a .....	9
5.5	Elevated Temperature Exposure, AAMA 711-13 .....	9
5.6	Thermal Cycling, AAMA 711-13 .....	10
5.7	Cold Temperature Pliability, D1970-13.....	10
5.8	Water Immersion, AAMA 711-13.....	11
5.9	Resistance to Peeling, AAMA 711-13.....	11
5.10	Specific Gravity (Relative Density), D792-13.....	13

### APPENDIX

Sampling Declaration (1 page)

## 1.0 INTRODUCTION

The following tests were conducted on the referenced material at the request of Maxell Ltd.

#	Test	Standard	Test Conditions
1	Tensile Strength	AAMA 711, Section 5.1: Tensile Strength, ASTM D5034	Control samples
2	Water Penetration Resistance (Nail Sealability)	AAMA 711, Section 5.2: Water Penetration Around Nails: D1970. 24 hours and after thermal cycling	AAMA 711 test procedure * Control and post thermal cycling samples
3	Peel Adhesion	AAMA 711, Section 5.3 and ASTM D3330-04 (Method F)	[5 substrates: Plywood, OSB, Aluminum, Vinyl and Dens Glass Gold]. Aged samples are only on aluminum.
			* Control (5.3)
			* UV per G154 for 14 days (5.4)
			* Elevated Temperature, 122 F for 7 days (5.5)
			* Elevated Temperature, 149 F for 7 days (5.5)
			* Elevated Temperature, 176 F for 7 days (5.5)
			* Thermal cycling, 10 cycles (5.6)
			* Water immersion, 7 days (5.8)
4	Accelerated Aging with UV Exposure	AAMA 711, Section 5.4 and ASTM G154	Cycle 1 of G154. 14 days (336 hours), using UVA lamps.
5	Elevated Temperature Exposure	AAMA 711, Section 5.5	Test @ 50 °C (122 °F) (Level 1) for 7 days Test @ 65 °C (149 °F) (Level 2) for 7 days Test @ 80 °C (176 °F) (Level 3) for 7 days
6	Thermal Cycling	AAMA 711, Section 5.6	Peel adhesion and nail sealability samples
7	Resistance to Peeling from itself	AAMA 711, Section 5.9 and Annex 2	Test @ 50 °C (122 °F) (Level 1) Test @ 65 °C (149 °F) (Level 2) Test @ 80 °C (176 °F) (Level 3)
9	Specific gravity	ASTM D792	Control [not referenced in AAMA 711]

## **2.0 TEST SAMPLES**

The Maxell Exterior Tape No. 9940 was submitted by Maxell LTD and received at the IAPMO IBT lab in Ontario, CA on February 27, 2020. The material was received in good condition and did not appear to be tampered with. No independent sampling was done by IAPMO IBT. See sampling declaration letter in the appendix for details.

## **3.0 TEST SPECIMEN CONDITIONING**

The material was conditioned for a minimum of 48 hours at standard laboratory conditions of  $73.4^{\circ}\text{F} \pm 1.8^{\circ}\text{F}$  ( $23 \pm 1^{\circ}\text{C}$ ) and  $50\% \pm 5\%$  relative humidity prior to conducting any testing. All testing unless noted otherwise was conducted under the same environmental conditions. All materials and consumables required for the testing were obtained by IAPMO IBT from local suppliers.

## **4.0 AAMA 711 DEFINITIONS**

Type A: Products that pass the AAMA 711 specification without the use of a primer.

Type B: Products that require a primer to pass any part of the AAMA 711 specification.

Level 1: For exposures up to  $50^{\circ}\text{C}$  ( $122^{\circ}\text{F}$ )

Level 2: For exposures up to  $65^{\circ}\text{C}$  ( $149^{\circ}\text{F}$ )

Level 3: For exposures up to  $80^{\circ}\text{C}$  ( $176^{\circ}\text{F}$ )

## **5.0 TEST PROCEDURES & RESULTS**

All tests and evaluations were conducted in accordance with the written procedures specified in the referenced standard. Deviations from the standard, if any, are clearly identified in the relevant section.

**5.1 Tensile Strength, ASTM D5034-09(2017)**

Standard: AAMA 711-13 and ASTM D5034-09 (Reapproved 2017), *Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)*

Samples: Five 4" x 6" (101.6 x 152.4 mm) samples

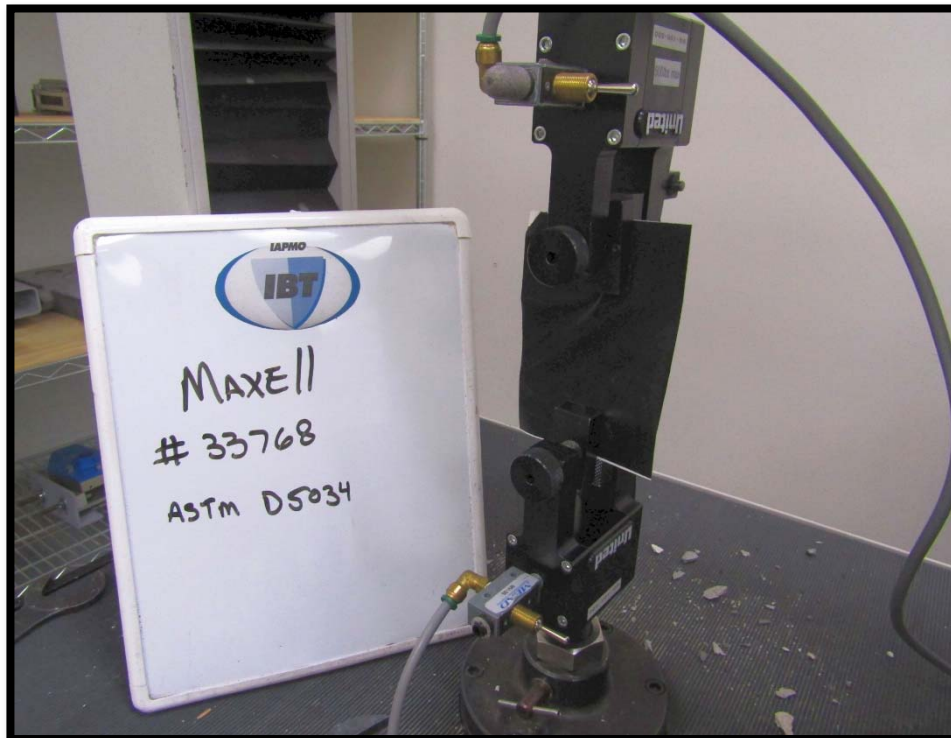
Equipment: United Universal Testing Machine (UTM) (SFM-150KN) equipped with an electronic load cell and computerized data acquisition system, Digital Calipers - Mitutoyo, 0-6", United Calibration Electronic Load Cell, 500 lbs. (2.22 kN)

Test Speed: 300 ± 10 mm/min (12 ± 0.5 in./min)

Acceptance: 0.5 N/mm (2.9 lbs/in) minimum tensile strength.

Compliance: The material COMPLIES with the minimum requirements.

ASTM D5034	Test Results
	Machine Direction
Tensile Strength (lbs/in)	62.28
Tensile Strength (N /mm)	10.9
Ultimate Elongation (%)	37.08



*Tensile Strength Test*

## 5.2 Nail Sealability, ASTM D19700-13

**Standard:** AAMA 711-13 and ASTM D1970-13, *Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.*

**Substrate:** Sheathing: APA Grade, Exposure 1 plywood [3/8" x 12" x 12"]

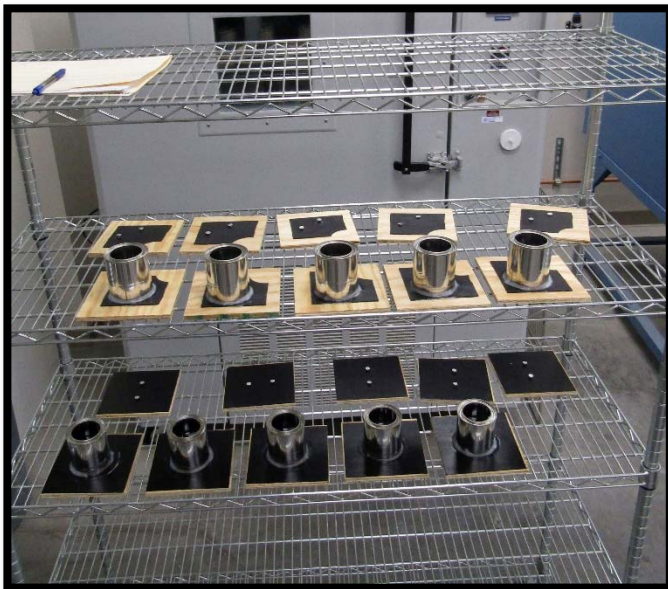
**Samples:** Five (5) samples were tested per D1970 as modified by AAMA 711-13 in each condition. Samples were tested before and after Thermal Cycling (section 5.8 of this report).

**Procedure:** Two (2) 1.25 inch (32 mm) galvanized roofing nails were centered and spaced 2 inches (51 mm) apart. Nail head was 1/8" (3.2 mm) above the surface of the board. A metal can with the bottom cut out was placed on the surface of the test specimen. Silicone sealer was applied to the outside and inside rim of the can to seal it to the surface of the plywood. The can was filled to a depth of 1.20 inches (31 mm) with distilled water. Test duration was 24 hours at a temperature of  $40 \pm 5$  °F ( $4 \pm 2$  °C). Note: Nail head never contacts the surface, it was always 1/8" above the surface.

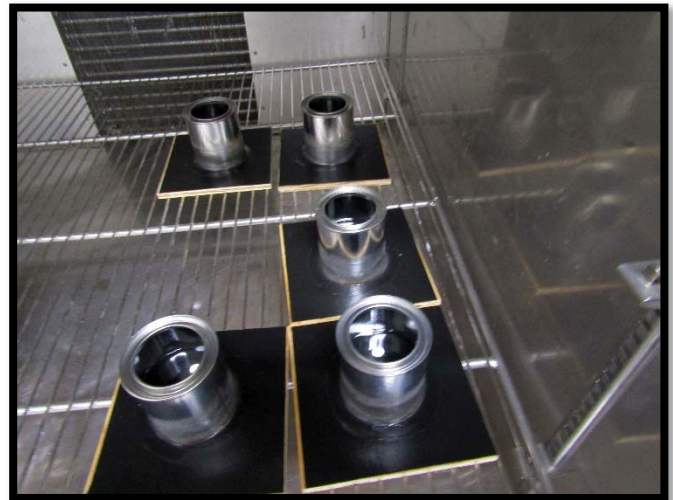
**Acceptance:** No water shall be observed in the bottom container, on the nail shanks and on the underside of the plywood after the exposure period.

**Compliance:** The material COMPLIES with the minimum requirements.

<i>AAMA711-13 Modified ASTM D1970 Test: Nail Sealability Test</i>		<i>Results</i>
Control Samples	All (5) samples passed.	Complied
After Thermal Cycling	All (5) samples passed	Complied



*Test samples*



*Test samples inside test chamber*

### 5.3 Peel Adhesion, ASTM D3330-04 (2010)

Standard: Section 5.3 of AAMA 711 and ASTM D3330-04 (2010) *Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape*, Method F.

Substrates: Plywood APA Grade, Exposure 1 (15/32" x 4" x 12")  
 OSB, APA Grade Exposure 1, smooth side out (7/16" x 4" x 12")  
 Dens Glass Gold sheathing, (1/2" x 4" x 12")  
 Aluminum, anodized (0.5" x 4" x 12")  
 Vinyl sheet (0.5" x 4" x 12")

Equipment: United Universal Testing Machine (UTM) (SFM-150KN) equipped with an electronic load cell and computerized data acquisition system, Digital Calipers - Mitutoyo, 0-6", United Calibration Electronic Load Cell, 500 lbs. (2.22 kN)

Samples: 1" x 12" samples bonded to substrate for all peel adhesion testing except the water immersion test. (5) samples per substrate for the control condition, three (3) for all other conditions. Samples for the water immersion test were 2" x 16" samples bonded to 4"x15" Anodized Aluminum plate.

Procedure: A strip of the material was folded at a 90° angle and a 25 mm [1 in.] section was peeled prior to starting the test. The test specimen was placed horizontally in the bed of the peel test fixture and clamped to the moving jaw of the adhesion tester so that a peeling angle at 90° was maintained during the peeling of the next 75 mm [3 in.]

The speed of testing was 5.0 ± 0.2 mm/s [12 ± 0.5 in./min]. The force values obtained in the first 25 mm [1 in.] of peeling were ignored and the average force was calculated using all data points obtained during the peeling of the next 50 mm [2 in.] of the test specimen.

Acceptance: Minimum of 1.5 lbs/in (0.26 N/mm) under all test conditions.

Compliance: The material COMPLIES with the minimum requirements.

*Self-adhesive Grommet Peel Adhesion (lbf/in)*

SUBSTRATE	Control	QUV 14 days	Thermal Cycling	7 days 122 °F	7 days 149 °F	7 days 176 °F	Water 7 days
Plywood	2.711						
Vinyl	3.398						
Dens Glass Gold	5.032						
OSB	2.260						
Aluminum	3.257	4.825	4.725	4.554	4.795	3.343	
Aluminum (water immersion)	7.600						7.980



Peel adhesion test substrates



Peel adhesion test



#### 5.4 Accelerated Aging with Ultraviolet Light Exposure, ASTM G154-12a

Standard: Section 5.4 of AAMA 711-13 and ASTM G154, *Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials*

Samples: Three 1" x 12" strips of the material were adhered vertically to 4" x 12" Anodized Aluminum. The test was conducted on peel adhesion samples. The samples were conditioned for 48 hours at 73 °F ± 2 °F (23 °C ± 1 °C) and 50% ± 5% relative humidity prior to testing.

Procedure: The test samples were mounted in the specimen racks of a Q-Lab Corp. QUV/SPRAY with Solar Eye Irradiance Control test chamber. The test samples were exposed for 14 days (336 hours) to Cycle 1 of G154.

Cycle 1: Eight (8) hours of Ultra Violet exposure (UVA-340 Fluorescent lamps) at 140 °F (60 ± 3 °C) Black Panel Temperature followed by 4 hours of condensation at 122 °F (50 ± 3 °C) Black Panel Temperature. Approximate wavelength: 340 nm. Typical Irradiance: 0.89 W/m<sup>2</sup>/nm.

The peel adhesion test per section 5.3 of this report was conducted on all the test samples exposed to 14 days of UV as described above.

Observations: No other objectionable appearance such as wrinkling, distortion, blistering, expansion, shrinkage, or warpage of the material or adhesive layer was observed.

Compliance: The material COMPLIES with the minimum requirements.

#### 5.5 Elevated Temperature Exposure, AAMA 711-13

Standard: Section 5.5 of AAMA 711-13

Samples: Three 1" x 12" strips were adhered vertically to 0.5" x 4" x 12" Anodized Aluminum plates for each exposure condition.

Test samples were conditioned vertically for a minimum of 24 hours at 73 °F ± 2 °F (23 °C ± 1 °C) and 50% ± 5% prior to exposure to elevated temperature exposure.

Procedure: Test samples were exposed to the conditioning temperatures noted below with the long axis vertical in a forced air circulating oven for seven (7) days without interruption.

Observations: All test samples complied with the Level 1, Level 2 and 3 Elevated Temperature Exposure test requirements. No objectionable appearance such as wrinkling, distortion, blistering, expansion, shrinkage, or warpage of the material or adhesive layer was observed.

Compliance: The material COMPLIES with the minimum requirements.

Level 1	50 °C (122 °F)	7 days	No failures observed
Level 2	65 °C (149 °F)	7 days	No failures observed
Level 3	80 °C (176 °F)	7 days	No failures observed

## 5.6 Thermal Cycling, AAMA 711-13

**Standard:** Section 5.6 of AAMA 711-13  
**Samples:** Three 1" x 12" strips were adhered vertically to 0.5" x 4" x 12" Anodized Aluminum plates.  
**Equipment:** Envirotronics Cycling Environmental Chamber with Watlow programmable controller.  
**Procedure:** All test samples were conditioned in a vertical position for a minimum of 24 hours at 73 °F ± 2 °F (23 °C ± 1 °C) and 50% ± 5% prior to the thermal cycling test.

**Cycle:** The samples were heat conditioned for eight hours at 50 °C ± 1 °C (120 °F ± 2 °F), followed immediately by the cold cycle for 16 hours at -40 °C ± 1 °C (-40 °F ± 2 °F). This cycle was repeated 10 times. The samples were then subjected to the peel adhesion test per section 5.3 of this report.

**Observations:** All test samples complied with the Thermal Cycling test requirements. No objectionable appearance such as wrinkling, distortion, blistering, expansion, shrinkage, or warpage of the material or adhesive layer was observed.

**Compliance:** The material COMPLIES with the minimum requirements.

## 5.7 Cold Temperature Pliability, D1970-13

**Standard:** Section 5.7 of AAMA 711 and ASTM D1970-13, *Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.*

**Specimens:** Ten (10) specimens were tested, five (5) in the machine direction (MD) and five (5) in the cross-machine direction (CD) under each test temperature.

**Procedure:** The test consisted of bending each sample through an angle of 180 ± 5° around a 25 mm (1 in.) ± 5 % diameter mandrel in 2 ± 1 seconds after 2 hours of exposure to the temperatures noted below.

**Conditions:** Condition 1: Specimens were conditioned at -18 °C (0 °F) for 2 hours prior to testing.  
 Condition 2: Specimens were conditioned at -29 °C (-20 °F) for 2 hours prior to testing.

**Acceptance:** No visible signs of cracking in any of the test specimens.

**Compliance:** The material COMPLIES with the minimum requirements.

Condition	Test Specimens	#1	#2	#3	#4	#5
-18 °C (0 °F)	Machine Direction	Pass	Pass	Pass	Pass	Pass
	Cross Machine Direction	Pass	Pass	Pass	Pass	Pass
-29 °C (-20 °F)	Machine Direction	Pass	Pass	Pass	Pass	Pass
	Cross Machine Direction	Pass	Pass	Pass	Pass	Pass

## 5.8 Water Immersion, AAMA 711-13

Standard: Section 5.8 of AAMA 711-13.

Samples: (5) 2" x 16" samples bonded to 0.5" x 4"x15" Anodized Aluminum plates.

Procedure: All test samples were conditioned for a minimum of 24 hours at  $73 \pm 2$  °F ( $23 \pm 1$  °C) and  $50\% \pm 5\%$  prior to the initial peel adhesion test.

After the initial peel adhesion test was conducted over one half the bond length, the test samples were immersed in tap water at  $23 \pm 1$  °C ( $73 \pm 2$  °F) for seven days and then subjected to the peel adhesion test per section 5.3 of this report on the remaining half of the bond length.

Observations: All test samples complied with the Water Immersion test requirements. No objectionable appearance such as wrinkling, distortion, blistering, expansion, shrinkage, or warpage of the material or adhesive layer was observed.

Compliance: The material **COMPLIES** with the minimum requirements.

<i>Peel Adhesion (lbf/in)</i>		
<i>Substrate</i>	<i>Prior to Water Immersion</i>	<i>Post Water Immersion</i>
Aluminum	7.60	7.98

## 5.9 Resistance to Peeling, AAMA 711-13

Standard: AAMA 711, Section 5.9 and Annex 2.

Samples: Strips of the material were adhered to the smooth surface of two 24" x 24" (610 mm x 610 mm) 7/16" thick OSB pieces. The jamb piece was applied vertically on the substrate. The head piece was placed horizontally so it overlapped the jamb piece by a minimum 2" in both the horizontal and vertical directions. A total of four (4) samples were tested.

Procedure: All samples were conditioned in a horizontal position for 40 hours at  $73$  °F  $\pm 2$  °F ( $23$  °C  $\pm 1$  °C) and  $50\% \pm 5\%$  relative humidity prior to adhering the material. The test samples were placed in a forced air circulating oven oriented vertically for 24 hours at the temperatures shown in the table below, followed by a 24-hour exposure at room temperature. Samples were examined after the 24-hour room temperature exposure for signs of peeling from the substrate, buckling or rippling, edge, or corner curl.

Acceptance: No peeling, buckling, or rippling of the material. Edge curl and corner curl should be limited to allowance specified in the standard.

Compliance: The material **COMPLIES** with the minimum requirements.

<i>Level 1: 50 °C (122 °F)</i>	<i>Level 2: 65 °C (149 °F)</i>	<i>Level 3: 80 °C (176 °F)</i>
All samples passed, none of the samples showed any signs of distress or failure as described above.	All samples passed, none of the samples showed any signs of distress or failure as described above.	All samples passed, none of the samples showed any signs of distress or failure as described above.
Pass	Pass	Pass



*Samples in oven*

### 5.10 Specific Gravity (Relative Density), D792-13

Standard: ASTM D792-13, *Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement*

Samples: Five (5) samples, each 1 to maximum 50 gram.

Procedure: Condition the samples in standard laboratory atmosphere, then weigh the sample in air and weigh the sample submerged in deionized water.

Acceptance: There is no minimum requirement for this standard.

Note: This test method is NOT referenced in AAMA 711-13. This test was conducted at the request of Maxell LTD.

Sample	Weight in Air (g)	Immersed Weight (g)	Specific Gravity	Density (kg/m <sup>3</sup> )
1	4.62	0.79	1.21	1203.3
2	4.76	0.72	1.18	1175.3
3	4.56	0.74	1.19	1190.7
4	4.63	0.79	1.21	1202.7
5	4.63	0.79	1.21	1202.7
Average	4.64	0.77	<b>1.20</b>	<b>1194.9</b>

#### Calculations

Calculate the specific gravity of the plastic as follows:

$$\text{sp gr } 23/23^{\circ}\text{C} = a / (a + w - b)$$

where:

$a$  = apparent mass of specimen, without wire or sinker, in air,

$b$  = apparent mass of specimen (and of sinker, if used) completely immersed and of the wire partially immersed in liquid, and

$w$  = apparent mass of totally immersed sinker (if used) and of partially immersed wire.

Calculate the density of the plastic as follows:

$$D @ 23^{\circ}\text{C}, \text{ kg/m}^3 = \text{sp gr } 23/23^{\circ}\text{C} \times 997.5$$

**APPENDIX**  
Sampling Declaration (1 page)



Date : February 25<sup>th</sup>, 2020

Mr. Jay Mishra  
IAPMO Institute of Building Technology (IBT)  
4755 E. Philadelphia Street  
Ontario, CA 91761

Subject: Test Sample Identification

Dear Mr. Mishra:

In accordance with the requirement of the ICC-ES Acceptance Criteria for Test Reports (AC85), section 3.2, this declaration is being submitted by Maxell, Ltd.

The identification of the samples submitted for testing is as follows:

	Product Name	Part Number	Size	Shape	Color	Lot No.	Date of Manufacture	Place of Manufacture
Sample1	Exterior Tape	No.9940	6in × 66ft	Roll	Black	2421001D	January 21 2020	JAPAN
Sample2	Self-adhesive Grommet	No.7730	8.3in × 8.3in	Sheet	Black	20021701	February 17 2020	JAPAN

Note: "Self-adhesive Grommet" will be renamed "Pipe Patch" as soon as the trademark is registered.

Maxell, Ltd. is certifying that the products identified above, and submitted to IAPMO IBT for testing is/are representative of the standard manufactured product to be covered in the evaluation report.

Please feel free to call if you have any questions.

Sincerely,

Hiroyuki Enomoto,  
Deputy General Manager  
Sliontec Division