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10665819 CANADA INC.
TEST REPORT

SCOPE OF WORK
WATER VAPOR TRANSMISSION TEST ON A CORKSHEILD PRODUCT

REPORT NUMBER
103636641TOR-009

TEST DATE(S)
01/23/19 – 01/24/19

ISSUE DATE
01/31/19

RECORD RETENTION END DATE
01/31/24

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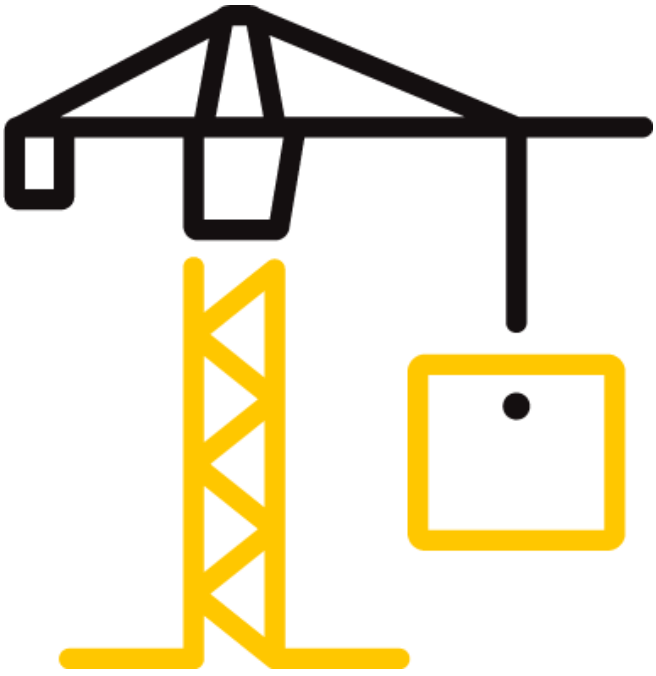

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Telephone: (905) 678-7820
Facsimile: (905) 678-7131
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TEST REPORT FOR 10665819 CANADA INC.
Report No.: 103528160TOR-002
Date: 01/31/19

REPORT ISSUED TO

10665819 CANADA INC.
Vipeq Canada
7301 East Danbro Crescent
Mississauga, ON, L5N 6P8

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by 10665819 Canada Inc., Vipeq Canada, 1800 Sunset Drive, Mississauga, ON, L5N 6P8 to perform testing in accordance with ASTM E96/E96M-16, Water Vapor Transmission of Materials. Testing was conducted at the Intertek test facility in Mississauga, Ontario.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

SECTION 2

SUMMARY OF TEST RESULTS

10665819 Canada Inc's product identified and evaluated in this report has been tested per ASTM E96/E96M-16, "*Standard Test Methods for Water Vapor Transmission of Materials*". The product test results are presented in Section 7 of this report.

For INTERTEK B&C:

COMPLETED BY:	Baljeet Chung	**REVIEWED BY:**	Baldeep Sandhu
TITLE:	Technical Analyst, Building Products	**TITLE:**	Manager, Building & Construction
SIGNATURE:		**SIGNATURE:**	
DATE:	01/31/19	**DATE:**	01/31/19

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SECTION 3
TEST METHOD(S)

The specimens were evaluated in accordance with the following standard test method:

ASTM E96/E96M-16, *Standard Test Method for Water Vapor Transmission of Materials*

SECTION 4
MATERIAL SOURCE/INSTALLATION (SAMPLE SELECTION)

The test samples provided by the client were not independently selected by an Intertek representative. Intertek was not present at the point of manufacture and has not verified the composition, manufacturing techniques or quality assurance procedures. Intertek accepts no responsibility for any inaccuracies therein

Samples were received at the Mississauga test facility on November 23, 2018.

SECTION 5
SAMPLE ASSEMBLY AND DESCRIPTION (SAMPLE SELECTION)

Six (6) Corkshield specimen with a nominal measurement of 1.55 mm by 305 mm by 305 mm (0.06 in. × 12 in. × 12 in.) each were received. Of which, four specimens were further cut to the test requirements and tested.

SECTION 6
TEST PROCEDURE

6.1 CONDITIONING

Specimens were conditioned for a minimum of 88 hours at a temperature of 23±2°C (73±3.6°F) and a relative humidity of 50±5%.

6.2 WATER VAPOR PERMEANCE

The Water Vapor Permeance was determined as per ASTM E96/E96M-16, Standard Test Methods for Water Vapor Transmission of Materials, desiccant method. Specimens were cut to a diameter of 90.3mm. The pocket in the dish was filled with calcium chloride to within 6.4 mm (¼-in.) of the specimen. The specimens were then fitted onto the dish right above the pocket with a metallic plate leaving a 76.1mm diameter of the specimen exposed to the environment. The specimens were prepared with the product's exterior surface facing the desiccant. The assemblies were then placed in a controlled chamber operating at a temperature and relative humidity of 23±2°C and 50±5%, respectively. The assemblies were then weighed periodically

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until eight (8) data points were obtained. The water-vapor transmission was calculated as follows:

$$WVT = G/tA$$

Where:

WVT= rate of water vapor transmission, g/m²s

G= weight change, g

t= time during which G occurred

A= test area, m²

SECTION 7
TEST RESULTS

A summary of test results is shown below. A full set of test data is presented in Appendix A.

Test Result Summary	Metric units		Imperial Units	
Water Vapor Transmission	15.66	g/hr.m²	22.39	grns/hr.ft²
	375.78	g/day.m²	537.36	grns/day.ft²
Water Vapor Permeance	3046.29	ng/Pa.s.m²	53.26	perms
	0.20	per mm	840.20	per in.
Water Vapor Permeability	4.90	ng/Pa.s.m	840.20	Perm inch

SECTION 8
CONCLUSION

Intertek has conducted testing for 10665819 Canada Inc., Vipeq Canada on its' Corkshield product to determine water vapor transmission properties. Testing was conducted in accordance with ASTM E96/E96M-16, "*Standard Test Methods for Water Vapor Transmission of Materials.*"

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Date: 01/31/19

SECTION 9
APPENDIX A: TEST DATA

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Test: **Water Vapor Transmission**
Date: 2019-01-23
Client: Vipeq Canada
Product: Corkshield

Project: G103636641
Eng/Tech: B.Chung
Reviewer: Baldeep Sandhu

Test Methods: ASTM E96/E96M-15, *Test Methods for Water Vapour Transmission of Materials*
Test Procedure: Dessicant Method
Conditioning: 23 ± 2°C and relative humidity of 50 ± 5%
Equipment:
Balance: 280 01 0075 cal due Jun. 25, 2019
Test Chamber: 280 01 1216 cal due Sept 26, 2019
Digital Calipers: 280 01 0082 cal due Aug. 23, 2019
Barometer: 273-01-1165 cal due June 22, 2019

Measurement	Control	Sp. 1	Sp. 2	Sp. 3	Air Velocity Evaluation	
Thickness 1 (mm)	1.40	1.75	1.60	1.59	Initial Air Velocity	0.02 m/s
Thickness 2 (mm)	1.36	1.68	1.70	1.52	Final Air Velocity	0.02 m/s
Thickness 3 (mm)	1.32	1.58	1.70	1.61	Velocity Minimum Control Limit	0.02 m/s
Thickness 4 (mm)	1.33	1.59	1.60	1.46	Velocity Maximum Control Limit	0.3 m/s
Thickness 5 (mm)	1.44	1.66	1.54	1.57	Constants	
Desiccant Mass (g)		35.9	37.1	35.4		
Air Gap thickness (mm)	6.3	6.3	6.3	6.3	Standard Atmospheric Pressure	101325 Pa
Mask Width (mm)	14.2	14.2	14.2	14.2	Ideal Gas Constant for water	461.5 J/kg.K
Assembly height (mm)	20.2	20.2	20.2	20.2	Gas Constant for Dry Air	287.055 J/kgK
Assembly Diameter (mm)	76.1	76.1	76.1	76.1	Density of Material of Balance Weights	8000 kg/m^3

Time (mm/dd/yy hh:mm)	Temp. (°C)	RH (%)	Baro. Pressure (mm Hg)	Baro. Pressure (kPa)	Mass of Control (g)	Mass of Assembly 1 (g)	Mass of Assembly 2 (g)	Mass of Assembly 3 (g)
1-23-19 9:42	23.0	50.0	29.15	98.7	117.23	149.79	144.50	140.38
1-23-19 10:52	23.0	50.0	29.12	98.6	117.25	149.87	144.59	140.46
1-23-19 11:53	23.0	50.0	29.09	98.5	117.25	149.92	144.66	140.51
1-23-19 13:52	23.0	50.0	28.97	98.1	117.26	150.02	144.79	140.65
1-23-19 16:35	23.0	50.0	28.91	97.9	117.24	150.16	144.99	140.82
1-24-19 8:38	23.0	50.0	28.91	97.9	117.26	150.99	146.04	141.83
1-24-19 10:43	23.0	50.0	28.91	97.9	117.26	151.09	146.16	141.95
1-24-19 13:27	23.0	50.0	28.91	97.9	117.26	151.23	146.35	142.12

Elapsed Time (hours)	Density of Air (kg/m^3)
0.0	1.1610
1.2	1.1598
2.2	1.1587
4.2	1.1540
6.9	1.1516
22.9	1.1516
25.0	1.1516
27.8	1.1516

Control Change (g)	Corrected Control (g)	Corrected Assembly 1 (g)	Corrected Assembly 2 (g)	Corrected Assembly 3 (g)
0.000	117.320	149.875	144.586	140.466
0.020	117.340	149.935	144.656	140.526
0.020	117.340	149.985	144.726	140.576
0.029	117.349	150.075	144.846	140.706
0.009	117.329	150.235	145.066	140.896
0.029	117.349	151.045	146.096	141.886
0.029	117.349	151.145	146.216	142.006
0.029	117.349	151.285	146.406	142.176

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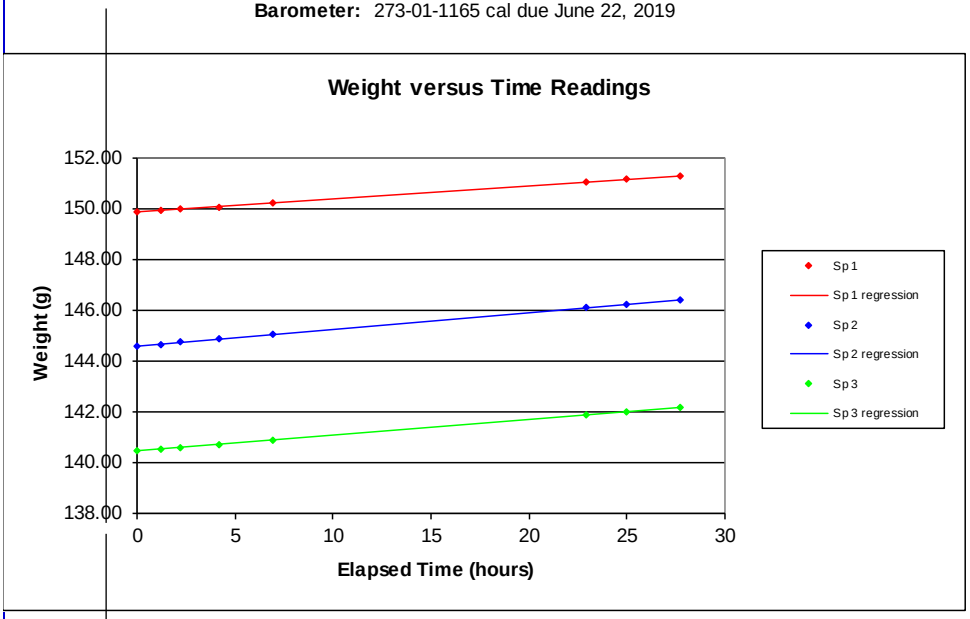
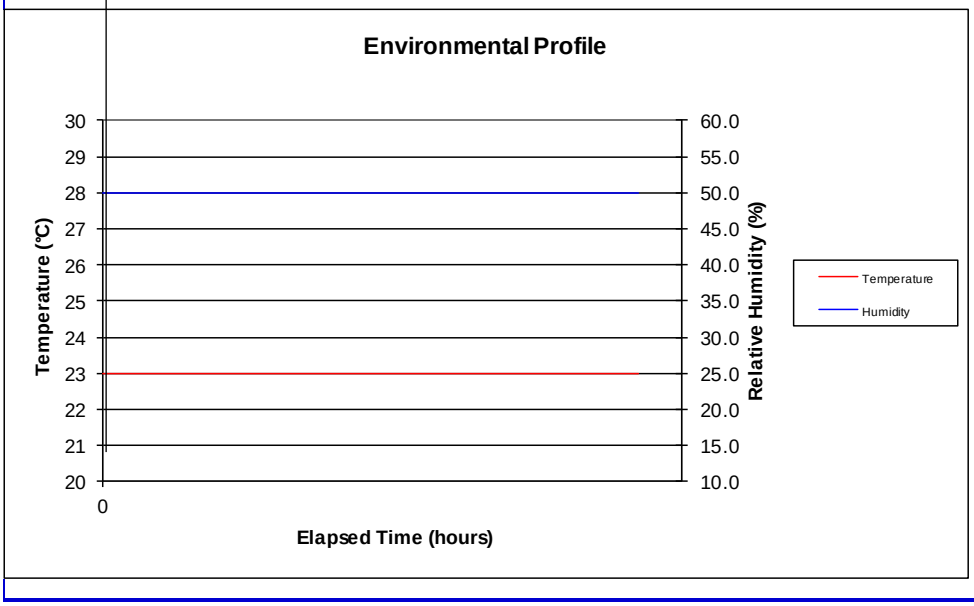
Report No.: 103528160TOR-002
Date: 01/31/19

Test:	**Water Vapor Transmission**	**Project:**	G103636641
Date:	23-Jan-19	**Eng/Tech:**	B.Chung
Client:	Vipeq Canada	**Reviewer:**	Baldeep Sandhu
Product:	Corkshield		
Orientation:	Exterior Surface facing the desiccant		
Test Methods:	ASTM E96/E96M-16, *Test Methods for Water Vapor Transmission of Materials*		
Test Procedure:	Dessicant Method		
Conditioning:	24 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 2%		
Equipment:	**Balance:** 280 01 0075 cal due Jun. 25, 2019		
	Test Chamber: 280 01 1216 cal due Sept 26, 2019		
	Digital Calipers: 280 01 0082 cal due Aug. 23, 2019		
	Barometer: 273-01-1165 cal due June 22, 2019		





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Date: 01/31/19

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Test: Water Vapor Transmission
Date: 23-Jan-19
Client: Vipeq Canada
Product: Corkshield
Orientation Exterior surface facing the desiccant
Test Methods: ASTM E96/E96M-16, *Test Methods for Water Vapour Transmission of Materials*
Test Procedure: Dessicant Method
Conditioning: Minimum 88 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%
Equipment:
Balance: 280 01 0075 cal due Jun. 25, 2019
Test Chamber: 280 01 1216 cal due Sept 26, 2019
Digital Calipers: 280 01 0082 cal due Aug. 23, 2019
Barometer: 273-01-1165 cal due June 22, 2019

Project: G103636641
Eng/Tech: B.Chung
Reviewer: Baldeep Sandhu

Measurement	Specimen		
	1	2	3
Mean Barometric Pressure (kPa)	98.19	98.19	98.19
Mean Air Temperature (°C)	23.0	23.0	23.0
Mean Saturation Vapour Pressure[1] (Pa)	2855	2855	2855
Mean Relative Humidity in chamber (%)	50.0	50.0	50.0
Relative Humidity in test dish (%)	0	0	0
Specimen Weight Change (g)	1.410	1.820	1.710
Moisture Gain of Dessicant (%)	3.9	4.9	4.8
Moisture Gain Control Limit (%)	10	10	10
Effective Test Dish Diameter (mm)	76.1	76.1	76.1
Effective Test Area (m^2)	0.0045	0.0045	0.0045
Gradient of weight/time graph (g/hour)	0.0509	0.0656	0.0621
Specimen Mean Thickness (mm)	1.65	1.63	1.55
Uncorrected Water Transmission (g/hour.m^2)	1.12E+01	1.44E+01	1.37E+01
Uncorrected Water Permeance (ng/Pa.s.m^2)	2.18E+03	2.80E+03	2.66E+03
Permeability of Still Air (ng/Pa.s.m)	2.02E+02	2.02E+02	2.02E+02
Permeance of Still Air (ng/Pa.s.m^2)	3.22E+04	3.22E+04	3.22E+04
Vapor Resistance of Still Air (m^2.s.Pa/kg)	3.10E+07	3.10E+07	3.10E+07
Surface Resistances (m^2.s.Pa./kg)	4.00E+07	4.00E+07	4.00E+07
Total Still Air and Specimen Surface (m^2.s.Pa/kg)	7.10E+07	7.10E+07	7.10E+07
Four Times Test Area Divided By Perimeter (m)	7.61E-02	7.61E-02	7.61E-02
Excess Water Transmission Due to Mask (%)	1.92	1.89	1.80
Excess Water Permeance Due to Mask (ng/Pa.s.m^2)	4.17E+01	5.29E+01	4.78E+01
Mask-corrected Water Permeance (ng/Pa.s.m^2)	2.13E+03	2.75E+03	2.61E+03
Water Vapour Transmission (g/hour.m^2)	1.29E+01	1.76E+01	1.65E+01
Water Vapour Permeance (ng/Pa.s.m^2)	2516.44	3419.60	3202.83
Water Vapour Permeance (perms)	43.99	59.78	55.99
Water Vapour Permeability (ng/Pa.s.m)	4.16	5.57	4.96
Water Vapour Permeability (Perm inch)	676.42	932.74	917.57

[1]Estimated by the Clausius-Clapeyron equation

Test Result Summary	Metric units	Imperial Units
Water Vapor Transmission	15.66 g/hr.m^2	22.39 grns/hr.ft^2
	375.78 g/day.m^2	537.36 grns/day.ft^2
Water Vapor Permeance	3046.29 ng/Pa.s.m^2	53.26 perms
	0.20 per mm	840.20 per in.
Water Vapor Permeability	4.90 ng/Pa.s.m	840.20 Perm inch

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SECTION 10
REVISION LOG

REVISION #	DATE	PAGES	REVISION
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