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WVTR test results – VCI films

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From: Cortec Laboratories, Inc.
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Project #: 17-227-1916

Results reported and approved by:

Robert T. Kean

Robert T. Kean, Ph.D.
Laboratory Manager

Background: VCI film competitor Propagroup claims that they have the best WVTR (Water Vapor Transmission) for VCI films. The test request was submitted to test WVTR for Cortec films (manufactured by Interface) and see how it compares with Propagroup's film. Test method DIN 53122-1 was specified for testing (23°C, 85% RH). However, this is not a method normally run in the US. In discussion with the testing lab, it was determined that the Cup method of ASTM E96 was equivalent to DIN 53122-1. The test method was approved by Interface and testing initiated.

Sample Received:
Five film samples were received Nov. 3, 2017, all in good condition. They were identified as follows:
Cortec:
80 micron
100 micron
150 micron
Competitor (Propak):
75 micron
100 micron
The Cortec films are all identified as having a coex (coextruded) 3 layer construction. The structure of the Propak films was not specified.

Method:
Test methods: Water Vapor Transmission (WVTR) ASTM E96 Cup method, 23°C, 85% Relative Humidity[+]

[+]Testing conducted by:
Mocon Laboratories, 7500 Mendelssohn Ave. N. Minneapolis, MN 55428.

Procedure:

Samples were tested in triplicate per Method ASTM E96 Cup method, 23°C, 85% Relative Humidity.
Test samples were returned after WVTR testing. Thickness was measured by caliper (in 3 places for each test piece), to get an average thickness per test piece. The Average Measured Thickness below represents an average of the 3 test pieces (for each sample).

Results:
See attached certificates of analysis for individual test results. A summary is included in the table below:

	Listed	Avg. Measured	WVTR ($g/m^2 \cdot day$)		
Company	Thickness (μ)	Thickness (μ)	Avg	Median	Std. Dev.
Cortec	80	91	1.59	1.67	0.14
Cortec	100	98	2.14	1.86	0.50
Cortec	150	99	1.57	1.58	0.03
Propak	75	73	2.84	2.94	0.76
Propak	100	93	2.17	2.01	0.39

Interpretations: The measured thickness values are reasonably consistent with the listed thickness values, except for the Cortec sample identified as 150 micron (µ) thickness; which appears to also be a 100 µ film. For the WVTR results, both the Average and Median values are reported. For small data sets, the Median values are often more indicative of a typical value as they are less susceptible to measurement outliers.

The most direct WVTR comparison is between the Cortec and Propak films at 100 µ thicknesses. The data shows that the Cortec films are equal to or better than the Propak film within the variability of the test. The 80 µ Cortec film also shows better WVTR than the both of the Propak samples; with the Average Measured Thickness actually being comparable to the "100 µ" Propak sample.

Typically, the WVTR properties of comparable films (same composition and manufacturing process) should be inversely proportional to thickness; especially with monolayer films. Thus, the WVTR of a 200 µ film would be expected to be approximately ½ that of a 100 µ film. That relationship is approximately followed when comparing the WVTR results for the Propak 75 µ and 100 µ films. However, with coextruded (Coex) films, interfacial effects at the layer boundaries can also significantly influence the observed WVTR values. These interfacial effects are further a function of the composition of the layers as well as processing effects (degree of orientation, polymer crystallinity and crystal structure, etc.) This may account for some of the differences observed between the 3 Cortec films as well as the overall lower WVTR values for the Cortec films compared to the Propak films.

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MOCON Laboratory
7500 Mendelssohn Ave. N | Minneapolis, MN 55428 | USA

ASTM E96 Water Vapor Transmission Rate Results Report

MOCON Job Number 446433-1 **PO#:** 104788

Cortec Corporation-Main
Attn: Pam Rue
4119 White Bear Parkway, St. Paul, MN 55110

Test Conditions:

Test Gas	**Water Vapor**	Test Temperature	23.0 °C	73.4 °F
Test Gas Concentration	85% RH			

Test Results:

Sample Identification	Mocon ID	Water Vapor Transmission Rate		Steady State or Test Duration*
		Replicate	g/(m²·day)	
Coretc 80µ Film	9352.001	A	1.67	Steady State
		B	1.67	Steady State
		C	1.43	Steady State
Cortec VCi Film 100µ	9352.002	A	2.72	Steady State
		B	1.84	Steady State
		C	1.86	Steady State
Cortec VCi Film 150µ	9352.003	A	1.58	Steady State
		B	1.54	Steady State
		C	1.59	Steady State
Competitor: Propack VCi Film 75µ	9352.004	A	2.03	Steady State
		B	2.94	Steady State
		C	3.55	Steady State
Competitor: Propack VCi Film 100µ	9352.005	A	2.01	Steady State
		B	1.89	Steady State
		C	2.62	Steady State

Note: Above sample was analyzed using ASTM E96 Cup Test Method. *If Steady State has not been reached, then the transient data point (normally at 120 hours unless additional time has been purchased) will be reported. To

End of Report

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convert the above results to 100in²/day, divide the above values by 15.5. The results relate only to the specific items tested.

Remarks: All samples were analyzed with a test area of 28.8 cm^2.

Date: 10/26/2018

Test Operator: CSkagerly Date: 10/26/18 Authorized by: Date: 10/29/18
Carrie Skagerberg Joel Fischer, Lab Manager

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End of Report

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