



**UNITED NATIONS / DOT  
PERFORMANCE CERTIFICATION**

**4G DESIGN QUALIFICATION**

**4 x 1 Gallon Round 150 Gram Plastic Bottle with 38-439 Neck Finish and Two Case Sealing Mechanisms:**

- #1) Taped Top and Bottom Flaps**
- #2) Taped Top and Glued Bottom Flaps**

**TEST REPORT #: 09-7088(REV 1)**



**4G / Y25.8 / S / \*\*  
USA / +CC6016**

\*\* Insert year the packaging is manufactured

**TESTING PERFORMED FOR:**

**PUREPAK TECHNOLOGY CORPORATIONS**

324 South Braken Lane Suite 3  
Chandler, AZ 85224

**ATTN: Mike Dodd**

**TESTING PERFORMED BY:**

**TEN-E Packaging Services, Inc.**

1666 County Road 74  
Newport, MN 55055

**Phone:** (651) 459-0671

**Fax:** (651) 459-1430

**TEN-E Packaging Services, Inc.**

326 N. Corona Avenue  
Ontario, CA 91764

**Phone:** (909) 937-1260

**Fax:** (909) 937-1262

Issued Date: May 27, 2009  
Revision Date: May 27, 2009



**TABLE OF CONTENTS**

**Section I: CERTIFICATION..... 3**

**Sections II & V: PACKAGING DESCRIPTION / COMPONENT DRAWINGS ..... 4**

**Section III: TEST PROCEDURES AND RESULTS ..... 8**

*DROP TESTS Taped Top and Bottom Flaps ..... 8*

*DROP TESTS Taped Top and Glued Bottom Flaps ..... 9*

*STACKING & STACKING STABILITY TESTS Taped Top and Bottom Flaps ..... 10*

*STACKING TESTS Taped Top and Glued Bottom Flaps ..... 11*

*PRESSURE DIFFERENTIAL TEST ..... 12*

*REPETITIVE SHOCK VIBRATION TESTS Taped Top and Bottom Flaps..... 13*

*REPETITIVE SHOCK VIBRATION TESTS Taped Top and Glued Bottom Flaps..... 14*

*COBB WATER ABSORPTION TESTS..... 15*

*REGULATORY AND INDUSTRY STANDARD REFERENCES ..... 16*

**Section IV: MATHEMATICAL CALCULATIONS..... 17**

**NOTES AND COMMENTS**

**Note for Rev 1:** Report 09-7088 issued on May 27, 2009 has been updated as of May 27, 2009. Overall height quality control audit information of the bottle on page 6 has been updated per client’s request under this revision

**SECTION I: CERTIFICATION**

**Design Qualification of the PurePak Technology Corporation**


**4 x 1 Gallon Round 150 Gram Plastic Bottle with 38-439 Neck Finish and Two Case Sealing Mechanisms:**

**#1) Taped Top and Bottom Flaps**

**#2) Taped Top and Glued Bottom Flaps**

TEN-E PACKAGING SERVICES, INC. certifies that the PurePak Technology Corporation packaging referenced above has passed the standards of the DEPARTMENT OF TRANSPORTATION'S TITLE 49 CFR; Performance Oriented Packaging Standards, Section 178. This package is also certified under IMDG, ICAO/IATA Regulations and the UN Recommendations on the Transport of Dangerous Goods. It is the responsibility of the end user to determine authorization for use under these regulations. The use of other packaging methods or components other than those documented in this report may render this certification invalid.

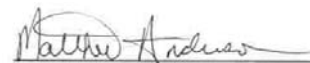
**SUMMARY OF PERFORMANCE TESTS**

UN /DOT TEST	CFR REFERENCE	TEST LEVEL	TEST CONTENTS	TEST COMPLETED	TEST RESULTS
Drop #1	178.603	1.6m	Methanol /Water	May 1, 2009	PASS
Drop #2	178.603	1.6m	Methanol /Water	May 1, 2009	PASS
Stacking #1	178.606	635.0 Kg – 24 Hrs.	Water	May 1, 2009	PASS
Stacking #2	178.606	249.4 Kg – 24 Hrs.	Water	April 30, 2009	PASS
Pressure	173.27	100kPa – 30 Min.	Water	May 7, 2009	PASS
Vibration #1	178.608	3.6 Hz – 1 Hr.	Water	April 30, 2009	PASS
Vibration #2	178.608	3.6 Hz – 1 Hr.	Water	May 1, 2009	PASS
Cobb	178.516	30 minutes	---	May 1, 2009	PASS
<b>TEST REPORT NUMBERS:</b>			<b>09-7088</b>		
<b>UN MARKING: (CFR 49 - 178.503)</b>			 4G / Y25.8 / S / ** USA / +CC6016		
<b>PACKAGING IDENTIFICATION CODE:</b>			4G - Fiberboard Box (178.516)		
<b>PERFORMANCE STANDARD:</b>			Y (Packaging meets Packing Group II and III tests)		
<b>AUTHORIZED GROSS MASS:</b>			25.8 Kg (56.8 Lbs.)		
<b>"S" DESIGNATION:</b>			Denotes Inner Packagings		
<b>YEAR OF MANUFACTURE:</b>			**Insert year the packaging is manufactured		
<b>STATE AUTHORIZING THE MARK:</b>			USA		
<b>PACKAGING CERTIFICATION AGENCY:</b>			(+CC) TEN-E Packaging Services, Inc. (Ontario, CA)		
<b>THIRD PARTY PACKAGE IDENTIFICATION:</b>			+CC6016		
<b>PERIODIC RETEST DATE:</b>			May 7, 2011		

ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY THAT THE PACKAGING TESTED IS MERCHANTABLE OR FIT FOR A PARTICULAR PURPOSE, ARE DISCLAIMED. In no event shall TEN-E Packaging Services, Inc. liability exceed the total amount paid by PurePak Technology Corporation for services rendered. In the event of future changes to the above referenced test standard, it is the responsibility of PurePak Technology Corporation to determine whether additional testing or updating of past testing is necessary to verify that the packaging we have tested remains in compliance with those standards.

**MANUFACTURER:**

**PurePak Technology Corporation**  
**324 South Braken Lane Suite 3**  
**Chandler, AZ 85224**



Matthew Anderson  
 Packaging Engineer  
 TEN-E Packaging Services, Inc.  
 326 North Corona Avenue  
 Ontario, CA 91764

**SECTIONS II & V: PACKAGING DESCRIPTION / COMPONENT DRAWINGS**

**4 x 1 Gallon Round 150 Gram Plastic Bottle with 38-439 Neck Finish and Taped Top and Bottom Flaps**

ASSEMBLY DRAWING	TEST LEVELS	
	Certification Type: Design Qualification	
	Packaging Code Designation: 4G	
	Packing Group: II	
	Specific Gravity: 1.6	
	Internal Pressure: 100 kPa	
	<b>TEST SAMPLE PREPARATION</b> (Refer to Section IV)	
	Overall Packaging Tare Weight: 1,558 Grams	
	Inner Packaging Fill Capacity (98% Maximum Capacity):	
	Methanol/Water 3,679 Grams	
	Water 3,793 Grams	
	Package Test Weight:	
	Methanol/Water 16.2 Kg (35.7 Lbs.)	
	Water 16.7 Kg (36.8 Lbs.)	
	Authorized Package Gross Mass: 25.8 Kg (56.8 Lbs.)	
	<b>CLOSING METHODS – INNER PACKAGING</b>	
	Application Torque 45 In-Lbs.	
	Equipment: Kaps All Electronic Torque Tester #701	
	<b>CLOSING METHODS – SHIPPER</b>	
	<b>Top Flaps:</b>	
	Type: 3M #375 Pressure Sensitive Tape	
Width: 48 mm (2")		
Overlap: 2" Minimum		
Tape Pattern: Center Seam		
Inner Flaps: Meet		
Outer Flaps: Meet		
<b>Bottom Flaps:</b>		
Type: 3M #375 Pressure Sensitive Tape		
Width: 48 mm (2")		
Overlap: 2" Minimum		
Tape Pattern: Center Seam		
Inner Flaps: Meet		
Outer Flaps: Meet		

**4 x 1 Gallon Round 150 Gram Plastic Bottle with 38-439 Neck Finish and Taped Top and Glued Bottom Flaps**

ASSEMBLY DRAWING	TEST LEVELS
	Certification Type: Design Qualification
	Packaging Code Designation: 4G
	Packing Group: II
	Specific Gravity: 1.6
	Internal Pressure: 100 kPa
	TEST SAMPLE PREPARATION (Refer to Section IV)
	Overall Packaging Tare Weight: 1,558 Grams
	Inner Packaging Fill Capacity (98% Maximum Capacity):
	Methanol/Water 3,679 Grams
	Water 3,793 Grams
	Package Test Weight:
	Methanol/Water 16.2 Kg (35.7 Lbs.)
	Water 16.7 Kg (36.8 Lbs.)
	Authorized Package Gross Mass: 25.8 Kg (56.8 Lbs.)
	CLOSING METHODS – INNER PACKAGING
Application Torque 45 In-Lbs	
Equipment: Kaps All Electronic Tester #701	
CLOSING METHODS – SHIPPER	
Top Flaps:	
Type: 3M #375 Pressure Sensitive Tape	
Width: 48 mm (2")	
Overlap: 2" Minimum	
Tape Pattern: Center Seam	
Inner Flaps: Meet	
Outer Flaps: Meet	
Bottom Flaps:	
Type: Hot Glued; Customer Provided	
Inner Flaps: Meet	
Outer Flaps: Meet	

CLOSURE			Drawing
Manufacturer: Rexam Plastic Packaging (QIM-317-4937)			
Component Information	Specification Information	Quality Control Audit	
<b>Description:</b>	38-439 Standard Closure		
<b>Material/Pigment:</b>	Polypropylene / White	Polypropylene / White	
<b>Density:</b>		0.904 g/cc	
<b>Tare Weight:</b>	10.3 Grams	10.36 Grams	
<b>Overall Dimensions:</b>			
• <b>Height</b>	1.016" ± 0.015"	1.011"	
• <b>Diameter</b>	1.701" ± 0.015"	1.694"	
<b>Thread:</b>			
• <b>Type</b>			
• <b>Style</b>			
<b>Finish Dimensions:</b>			
• <b>T</b>	1.483" ± 0.007"	1.495"	
• <b>E</b>	1.389" ± 0.007"	1.381"	
• <b>Thread Pitch</b>			
<b>Markings (QC Audit):</b>	134		
LINER/GASKET			
Component Information	Specification Information	Quality Control Audit	
<b>Description:</b>	Polyethylene Foam Liner		
<b>Tare Weight:</b>		0.65 Grams	
<b>Thickness:</b>		0.052"	
<b>Diameter:</b>		1.374"	
PLASTIC BOTTLE			
Manufacturer: Setco: Anaheim, CA (D08-043)			
Component Information	Specification Information	Quality Control Audit	
<b>Description:</b>	1 Gallon Round Plastic Bottle		
<b>Material/Pigment:</b>	High Density Polyethylene / Natural	High Density Polyethylene / Natural	
<b>Method of Mfgr:</b>		Blow Molded	
<b>Density:</b>		0.941 g/cc	
<b>Melt Index (190/21.6):</b>		19.52 g/10 minutes	
<b>Tare Weight:</b>	150 Grams ± 6 Grams	150 Grams	
<b>Capacity:</b>			
• <b>Rated</b>	1 Gallon		
• <b>Overflow</b>	3908 cc ± 44	3,870 Grams (1.022 Gallons)	
<b>Overall Dimensions:</b>			
• <b>Diameter</b>	6.002" ± 0.080"	5.970"	
• <b>Height</b>	12.390" ± 0.090"	12-9/16"	
<b>Finish Dimensions:</b>			
• <b>T</b>	1.460" ± 0.015"	1.473"	
• <b>E</b>	1.367" ± 0.015"	1.378"	
• <b>Thread Pitch</b>		0.1651"	
<b>Wall Thickness:</b>			
• <b>Nominal</b>			
• <b>Minimum</b>		0.016"	
<b>Markings (QC Audit):</b>	80612      Z	SPI "2" HDPE Recycling Symbol	

SHIPPER		
Manufacturer: Sound Packaging: Chandler, AZ		
Component Information	Specification Information	Quality Control Audit
Description:	Regular Slotted Container	
Material/Flute (Inner to Outer):		Double Wall Mottled White Corrugated Fiberboard; B/C-Flute
Basis Weight (Outer to Inner) Lbs./MSF:		42.1/26.2/42.7/25.3/41.9
Combined Wt. of Facings:		126.7
Tare Weight:		825 Grams
Overall Dimensions	Inside	Outside
• Length	12-1/2"	13"
• Width	12-1/2"	12-3/4"
• Height	12-1/2"	13-7/8"
Board Caliper (Nominal):		0.262"
Manufacturer's Joint:		Inside Glued, 1-3/8" Lap
Markings (QC Audit):	12 1/4 x 12 1/4 x 12 1/2 Sound Packaging, LLC	
BOX CERTIFICATE		
Drawing	Component Information	Quality Control Audit
	(A) Corrugated Manufacturer:	Sound Packaging
	(B) Structure:	Double Wall
	(C) Bursting Test	275 Lbs. Per Sq Inch
	(D) Min comb Wt Facings:	110 Lbs. Per M Sq Ft
	(E) Size Limit:	95"
	(F) Gross Wt Lt:	100 Lbs.
	(G) Location:	Chandler, AZ







**SECTION III: TEST PROCEDURES AND RESULTS**

**DROP TESTS**

**Taped Top and Bottom Flaps**







TEST INFORMATION	CRITERIA FOR PASSING THE TEST
<p><b>TEST CONTENTS:</b> Methanol/Water Solution (0.97 SG)</p> <p><b>SAMPLE PREPARATION:</b> Refer to Section II</p> <p><b>CONDITIONING:</b> -18°C (0°F), Chamber #201</p> <p><b>TEST CONTENTS TEMP.:</b> -18°C (-0.76°F)</p> <p><b>DROP HEIGHT:</b> 1.6 Meters (63") (Refer to Section IV)</p> <p><b>TEST EQUIPMENT:</b> L.A.B. Accu Drop 160 #301</p>	<ul style="list-style-type: none"> <li>• For packaging containing liquid, each packaging does not leak.</li> <li>• There can be no damage to the outer packaging likely to adversely affect safety during transport and there is no leakage of the filling substance from the inner packaging.</li> <li>• Any discharge from a closure is slight and ceases immediately after impact with no further leakage.</li> </ul> <p>(§178.603)</p>

**DROP ORIENTATIONS & TEST RESULTS**

Sample #1: Flat on Bottom	Sample #2: Flat on Top	Sample #3: Flat on Long Side
		
<p><b>PASS:</b> No leakage or damage.</p>	<p><b>PASS:</b> No leakage. Slight deformation to bottles on impact.</p>	<p><b>PASS:</b> No leakage or damage.</p>
Sample #4: Flat on Short Side	Sample #5: Bottom Corner	*Sample #1: Top Corner
		
<p><b>PASS:</b> No leakage or damage.</p>	<p><b>PASS:</b> No leakage. Slight deformation to shipper on impact.</p>	<p><b>PASS:</b> No leakage. Slight deformation to shipper on impact.</p>

\*Sample used for Flat on Bottom Drop is also used for the Top Corner Drop

DROP TESTS		Taped Top and Glued Bottom Flaps
TEST INFORMATION		CRITERIA FOR PASSING THE TEST
<p><b>TEST CONTENTS:</b> Methanol/Water Solution (0.97 SG)</p> <p><b>SAMPLE PREPARATION:</b> Refer to Section II</p> <p><b>CONDITIONING:</b> -18°C (0°F), Chamber #201</p> <p><b>TEST CONTENTS TEMP.:</b> -18°C (-0.76°F)</p> <p><b>DROP HEIGHT:</b> 1.6 Meters (63") (Refer to Section IV)</p> <p><b>TEST EQUIPMENT:</b> L.A.B. Accu Drop 160 #301</p>	<ul style="list-style-type: none"> <li>For packaging containing liquid, each packaging does not leak.</li> <li>There can be no damage to the outer packaging likely to adversely affect safety during transport and there is no leakage of the filling substance from the inner packaging.</li> <li>Any discharge from a closure is slight and ceases immediately after impact with no further leakage.</li> </ul> <p style="text-align: right;">(\$178.603)</p>	


DROP ORIENTATIONS & TEST RESULTS		
Sample #6: Flat on Bottom	Sample #7: Flat on Top	Sample #8: Flat on Long Side
		
<b>PASS:</b> No leakage or damage.	<b>PASS:</b> No leakage. Slight deformation to bottles on impact.	<b>PASS:</b> No leakage or damage.
Sample #9: Flat on Short Side	Sample #10: Bottom Corner	*Sample #6: Top Corner
		
<b>PASS:</b> No leakage or damage.	<b>PASS:</b> No leakage. Slight deformation to shipper on impact..	<b>PASS:</b> No leakage. Slight deformation to shipper on impact.


\*Sample used for Flat on Bottom Drop is also used for the Top Corner Drop

**STACKING & STACKING STABILITY TESTS** **Taped Top and Bottom Flaps**

TEST INFORMATION	CRITERIA FOR PASSING THE TEST
<p><b>TEST CONTENTS:</b> Water</p> <p><b>SAMPLE PREPARATION:</b> Refer to Section II</p> <p><b>CONDITIONING:</b> 73°F / 50% RH, Chamber #202</p> <p><b>TEST LOAD APPLIED:</b> 635.0 Kg (1,400.0 Lbs.) (Refer to Section IV)</p> <p><b>TEST DURATION:</b> 24 Hours</p> <p><b>TEST EQUIPMENT:</b> L.A.B. 5250 Compression System #402</p>	<ul style="list-style-type: none"> <li>There must be no leakage of the filling substance from the inner receptacle, or inner packaging.</li> <li>There can be no deterioration that could adversely affect transport safety or any distortion liable to reduce the package's strength, cause instability in stacks of packages, or cause damage to inner packagings that is likely to reduce safety in transport.</li> </ul> <p style="text-align: right;">(\$178.606)</p>

**STACKING TEST SET UP AND RESULTS**

	Sample #	Maximum Deflection After 24 Hours	Results
	11	1/16"	PASS
	12	1/16"	PASS
	13	1/16"	PASS

STACKING STABILITY TEST SET-UP	CRITERIA FOR PASSING THE TEST
 <p style="text-align: center; font-weight: bold; margin-top: 10px;">PASS</p>	<p>In guided load tests, stacking stability must be assessed after test completion.</p> <ul style="list-style-type: none"> <li>Two filled packagings of the same type must be placed on the test sample.</li> <li>The stacked packages must maintain their position for one hour.</li> </ul> <p style="text-align: right;">(\$178.606)</p>

**STACKING TESTS Taped Top and Glued Bottom Flaps**

TEST INFORMATION	CRITERIA FOR PASSING THE TEST
<p><b>TEST CONTENTS:</b> Water</p> <p><b>SAMPLE PREPARATION:</b> Refer to Section II</p> <p><b>CONDITIONING:</b> 73°F / 50% RH, Chamber #202</p> <p><b>TEST LOAD APPLIED:</b> 249.4 Kg (550 Lbs.) (Refer to Section IV)</p> <p><b>TEST DURATION:</b> 24 Hours</p> <p><b>TEST EQUIPMENT:</b> Dead Load Weights</p>	<ul style="list-style-type: none"> <li>• There must be no leakage of the filling substance from the inner receptacle, or inner packaging.</li> <li>• There can be no deterioration that could adversely affect transport safety or any distortion liable to reduce the package's strength, cause instability in stacks of packages, or cause damage to inner packagings that is likely to reduce safety in transport. (§178.606)</li> </ul>

**STACKING TEST SET-UP AND RESULTS**

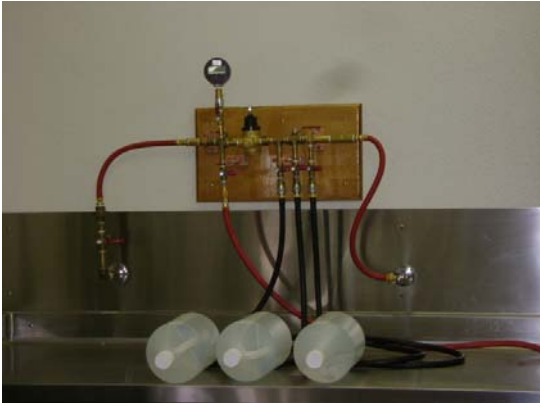


Sample #	Maximum Deflection After 24 Hours	Results
14	0"	PASS
15	0"	PASS
16	0"	PASS
<p><b>Stacking Stability:</b> Not conducted; required only for guided load tests.</p>		

**PRESSURE DIFFERENTIAL TEST**

TEST INFORMATION		CRITERIA FOR PASSING THE TEST
<b>TEST CONTENTS:</b>	Water	<ul style="list-style-type: none"> <li>• Packaging for which retention of liquid is a basic function must be capable of withstanding the pressure requirements without leakage. (§173.27)</li> </ul>
<b>FILL CAPACITY:</b>	Maximum Capacity	
<b>CLOSURE APPLICATION:</b>	Refer to Section II	
<b>CONDITIONING:</b>	Ambient	
<b>TEST PRESSURE:</b>	100kPa	
<b>TEST DURATION:</b>	30 Minutes	
<b>AREA OF PRESSURIZATION:</b>	Through the Bottom	
<b>TEST EQUIPMENT:</b>	Regulated Water Source Gauge #602	


**HYDROSTATIC PRESSURE TEST SET-UP & RESULTS**

	Sample #	Results	Comments / Observations
	1	PASS	All three samples maintained the 100kPa test pressure for 30 minutes without leakage.
	2	PASS	
	3	PASS	

**REPETITIVE SHOCK VIBRATION TESTS** **Taped Top and Bottom Flaps**

TEST INFORMATION	CRITERIA FOR PASSING THE TEST
<p><b>TEST CONTENTS:</b> Water</p> <p><b>SAMPLE PREPARATION:</b> Refer to Section II</p> <p><b>CONDITIONING:</b> 73°F / 50% RH, Chamber #202</p> <p><b>TABLE DISPLACEMENT:</b> 1"</p> <p><b>TEST FREQUENCY:</b> 3.6 Hz</p> <p><b>TEST DURATION:</b> 1 Hour</p> <p><b>TEST EQUIPMENT:</b> Vertical motion using L.A.B. Palletizer Transportation Simulator #501</p>	<p>Immediately following the period of vibration, each package must be removed from the platform, turned on its side and observed for any evidence of leakage.</p> <ul style="list-style-type: none"> <li>• A packaging passes the vibration test if there is no rupture or leakage from any of the packages.</li> <li>• No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength. (\$178.608)</li> </ul>


**VIBRATION TEST SET-UP & RESULTS**

	Sample #	Results	Comments / Observations
	11	PASS	No leakage or damage.
	12	PASS	
	13	PASS	

**REPETITIVE SHOCK VIBRATION TESTS Taped Top and Glued Bottom Flaps**

TEST INFORMATION	CRITERIA FOR PASSING THE TEST
<p><b>TEST CONTENTS:</b> Water</p> <p><b>SAMPLE PREPARATION:</b> Refer to Section II</p> <p><b>CONDITIONING:</b> 73°F / 50% RH, Chamber #202</p> <p><b>TABLE DISPLACEMENT:</b> 1”</p> <p><b>TEST FREQUENCY:</b> 3.6 Hz</p> <p><b>TEST DURATION:</b> 1 Hour</p> <p><b>TEST EQUIPMENT:</b> Vertical motion using L.A.B. Palletizer Transportation Simulator #501</p>	<p>Immediately following the period of vibration, each package must be removed from the platform, turned on its side and observed for any evidence of leakage.</p> <ul style="list-style-type: none"> <li>• A packaging passes the vibration test if there is no rupture or leakage from any of the packages.</li> <li>• No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength. (\$178.608)</li> </ul>

**VIBRATION TEST SET-UP & RESULTS**

	Sample #	Results	Comments / Observations
	14	PASS	No leakage or damage.
	15	PASS	
	16	PASS	

**COBB WATER ABSORPTION TESTS**

TEST INFORMATION		CRITERIA FOR PASSING THE TEST
<b>SAMPLE SIZE:</b>	(5) 5" x 5" Squares	<ul style="list-style-type: none"> <li>An increase in mass greater than 155 g/m<sup>2</sup> over the 30 minute duration represents an unacceptable level of water resistance. (§178.516)</li> </ul>
<b>CONDITIONING:</b>	73°F / 50% RH, Chamber #202	
<b>WATER APPLIED:</b>	100mL / Sample	
<b>TEST DURATION:</b>	30 Minutes / Sample	
<b>TEST EQUIPMENT:</b>	UWE Analytical Balance #102 Gurley Cobb Water Absorption Apparatus	

COBB WATER ABSORPTION TEST RESULTS	
Sample #	Water Absorbed (g/m <sup>2</sup> )
1	103 g/m <sup>2</sup>
2	94 g/m <sup>2</sup>
3	99 g/m <sup>2</sup>
4	119 g/m <sup>2</sup>
5	110 g/m <sup>2</sup>
<b>AVERAGE:</b>	<b>105.0 g/m<sup>2</sup></b>
<b>RESULT</b>	<b>PASS</b>

## REGULATORY AND INDUSTRY STANDARD REFERENCES

### REGULATORY REFERENCES

TEST	49 CFR <sup>①</sup> 2008 Edition	UN <sup>②</sup> 15th Edition	IMDG <sup>③</sup> 2008 Edition	ICAO <sup>④</sup> 09-10 Edition	IATA <sup>⑤</sup> 50th Edition
<b>Drop:</b>	178.603	6.1.5.3	6.1.5.3	6; 4.3	6.3.3
<b>Stacking:</b>	178.606	6.1.5.6	6.1.5.6	6; 4.6	6.3.6
<b>Pressure:</b>	173.27(c)	4.1.1.4.1	---	4; 1.1.6	5.0.2.9
<b>Vibration:</b>	178.608	---	---	4; 1.1.1	5.0.2.7
<b>Cobb:</b>	178.516	6.1.4.12.1	6.1.4.12.1	6; 3.1.11.1	6.2.12.2

① United States Department of Transportation Code of Federal Regulations (CFR) Title 49, Transportation, Parts 100-199

② The United Nations Recommendations on the Transport of Dangerous Goods — Model Regulations. (UN – Orange Book)

③ International Maritime Dangerous Goods Code (IMDG)

④ Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO)

⑤ International Air Transport Association (IATA) Dangerous Goods Regulations

### INDUSTRY STANDARD REFERENCES

<b>Drop:</b>	ASTM <sup>⑥</sup> D5276: Standard Test Method for Drop Test of Loaded Containers by Free Fall
	ISO <sup>⑦</sup> 2248: Packaging – Complete, Filled Transport Packages – Vertical Impact Test By Dropping
<b>Stacking:</b>	ASTM <sup>⑥</sup> D4577: Standard Test Method for Compression Resistance of a Container Under Constant Load
	ISO <sup>⑦</sup> 2234: Packaging – Complete, Filled Transport Packages – Stacking Tests using Static Load
<b>Vibration:</b>	ASTM <sup>⑥</sup> D999: Standard Test Method for Vibration Testing of Shipping Containers
	ISO <sup>⑦</sup> 2247: Packaging – Complete, Filled transport Packages – Vibration Test at Fixed Low Frequency
<b>Cobb:</b>	ISO <sup>⑦</sup> 535: Paper and Board - Determination of Water Absorption - Cobb Method

⑥ American Society for Testing and Materials (ASTM)

⑦ International Organization for Standardization (ISO)

### EQUIPMENT

All inspection, measuring and test equipment that can affect product quality is calibrated and adjusted at prescribed intervals, or prior to use, and is traceable to NIST, using ANSI Z540 as an overall guide for calibration certification.

**SECTION IV: MATHEMATICAL CALCULATIONS**

**INFORMATION USED FOR CALCULATIONS**

<b>Overall Package Tare Weight (PTW):</b>	<b>1,558 Grams</b>	
<b>Overflow Capacity (OFC):</b>		<b>Methanol/Water SG</b>
Methanol/Water	<b>3,754 Grams</b>	<b>SG: 0.970</b>
Water	<b>3,870 Grams</b>	
<b>Number of Inner Packagings (# IP):</b>	<b>4</b>	
<b>Packing Group</b>	<b>II</b>	
<b>Product Specific Gravity (PSG):</b>	<b>1.6</b>	
<b>Packing Group Multiplication Factor (MF):</b>	<b>1.00</b>	
<b>Overall Height of one Package (OH):</b>	<b>13.88 Inches</b>	
<b>Stack Test-# of Samples Tested Simultaneously:</b>	<b>3</b>	

**98% OF OVERFLOW**

Overflow Capacity (OFC) x 98%

<u>OFC</u>	x	<u>98%</u>		
3,754	x	98% =	<b>3,679 Grams</b>	Methanol/Water
3,870	x	98% =	<b>3,793 Grams</b>	Water

**PACKAGE TEST WEIGHTS**

Overall Pkg Tare Weight (PTW) + (98% Overflow Capacity (OFC) x # of Inner Pkg (# IP))

<u>PTW</u>	+	<u>(98% OFC)</u>	x	<u># IP</u>	
1,558	+	3,679	<b>x</b>	4	Methanol/Water
1,558	+	3,793	<b>x</b>	4	Water
Methanol/Water:		<b>16.2</b>	<b>Kg</b>	<b>35.7</b>	<b>Lbs.</b>
Water:		<b>16.7</b>	<b>Kg</b>	<b>36.8</b>	<b>Lbs.</b>

**AUTHORIZED PACKAGE GROSS MASS CALCULATION (APGM)**

Overall Pkg Tare Weight (PTW) + (Product SG (PSG) x 98% Overflow (OFC) x # of Inner Pkg (# IP))

<u>PTW</u>	+	<u>(PSG)</u>	x	<u>98% OFC</u>	x	<u># IP</u>
1,558	+	1.6	x	3,793	x	4
		<b>25.8</b>	<b>Kg</b>	<b>56.8</b>	<b>Lbs.</b>	

DROP HEIGHT				
<b>Calculation For Product Specific Gravities Exceeding 1.2</b>				
Product Specific Gravity (PSG) x Packing Group Multiplication Factor (MF)				
<u>PSG</u>	x	<u>MF</u>	<b>Packing Group: II</b>	
1.6	x	1.00	<u>Required Drop Height</u>	<u>Actual Drop Height</u>
		<b>1.60</b>	<b>63.0 Inches</b>	<b>63 Inches</b>
		<b>Meter</b>		

STACKING TEST MINIMUM LOAD CALCULATIONS				
Number of Packages in a 3m High Stack (118 / Overall Pkg Height (OH) -1)				
118 / Overall Height of one Pkg (OH) - 1				
<u>(118</u>	/	<u>OH)</u>	-1	= <u># 3m HS</u>
118	/	13.88	-1	= 7.5
Stacking Test Load Calculation (Individual Package)				
Authorized Pkg Gross Mass (APGM) x # of Pkg in a 3m High Stack (# 3m HS)				
<u>APGM</u>	x	<u># 3m HS</u>		
25.8	x	7.5		
		<b>193.5 Kg</b>	<b>426.6 Lbs.</b>	

Stacking Test Load Calculation				
Samples x Authorized Pkg Gross Mass (APGM) x # of Pkg in a 3m High Stack (# 3m HS)				
<u>Samples</u>	x	<u>(APGM</u>	x	<u># 3m HS)</u>
3	x	25.8	x	7.5
		<b>580.5 Kg</b>	<b>1,279.8 Lbs.</b>	