

**UNITED NATIONS / DOT  
PERFORMANCE CERTIFICATION**



**4G DESIGN QUALIFICATION**

**6 x 1 Liter Square Plastic Bottle Packaging with  
Two Neck Finish Variables**

**TEST REPORT #: 25-CA20075**

 4G / Y13.1 / S / \*\*  
USA / +CC8458

\*\*Insert the last two digits of the year of manufacture

**TESTING PERFORMED FOR:**

**PUREPAK TECHNOLOGY CORPORATION**

75 West Baseline, Road Suite D44  
Gilbert, AZ 85233

**ATTN: Michael Dodd**

**TESTING PERFORMED BY:**

**TEN-E PACKAGING SERVICES, INC.**

326 North Corona Avenue  
Ontario, CA 91764  
Phone: 909-937-1260  
Fax: 909-937-1262

May 14, 2025

**TABLE OF CONTENTS**

**SECTION I: CERTIFICATION**..... 3  
**SECTIONS II & V: PACKAGING DESCRIPTIONS / COMPONENT DRAWINGS**..... 4  
 COMPONENT INFORMATION..... 6  
**SECTION III: TEST PROCEDURES AND RESULTS** ..... 9  
 DROP TESTS Variable #1 ..... 9  
 DROP TESTS Variable #2 ..... 10  
 STACKING TEST..... 11  
 PRESSURE DIFFERENTIAL TEST Variable #1 ..... 12  
 PRESSURE DIFFERENTIAL TEST Variable #2 ..... 13  
 VIBRATION TEST Variable #1 ..... 14  
 VIBRATION TEST Variable #2 ..... 15  
 COBB WATER ABSORPTION TEST ..... 16  
**REGULATORY AND INDUSTRY STANDARD REFERENCES**..... 17  
**SECTION IV: MATHEMATICAL CALCULATIONS**..... 18

**NOTES AND COMMENTS**

This report is being issued as a design qualification due to changing the tape to seal the boxes from the previously tested periodic retest report (23-CA20057). This design will retain the +CC8458 identification.

Testing was conducted on the 6 x 1 Liter Square Plastic Bottle with the following Closure Variables:

- V#1: 38-439 Closure
- V#2: 45mm Closure

This package uses DOT-SP 14656. This special permit authorizes the manufacture, mark, sale, and use of certain combination packaging for the transportation in commerce of the hazardous materials authorized by this special permit. This special permit provides no relief from the Hazardous Materials Regulations (HMR) other than as specifically stated herein. The most recent revision supersedes all previous revisions.

**SECTION I: CERTIFICATION**

**Design Qualification of the PurePak Technology Corporation  
 6 x 1 Liter Square Plastic Bottle Packaging with Two Neck Finish Variables**

TEN-E Packaging Services, Inc. is a current DOT UN Third-Party Certification Agency under §107.403 and 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	49 CFR REFERENCE	TEST LEVEL	TEST CONTENTS	TEST COMPLETED	TEST RESULTS
Drop	178.603	1.9 m	Methanol/Water Solution	May 14, 2025	PASS
Stacking	178.606	181.4 Kg – 24 Hours	Empty	May 14, 2025	PASS
Pressure	173.27	100 kPa - 30 Minutes	Water	May 14, 2025	PASS
Vibration	178.608	3.8 Hz – 1 Hour	Water	May 12, 2025	PASS
Cobb	178.516	30 Minutes	---	May 13, 2025	PASS
<b>TEST REPORT NUMBER:</b>		25-CA20075			
<b>UN MARKING: (CFR 49 – 178.503)</b>		 4G / Y13.1 / S / ** USA / +CC8458			
<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>		13.1 Kg (28.8 Lbs.)			
<b>"S" DESIGNATION:</b>		Denotes Inner Packagings			
<b>YEAR OF MANUFACTURE:</b>		**Insert the last two digits of the year of manufacture			
<b>STATE AUTHORIZING THE MARK:</b>		USA			
<b>PACKAGING CERTIFICATION AGENCY:</b>		(+CC) TEN-E Packaging Services, Inc. (Ontario, CA CAA #2006030021)			
<b>THIRD PARTY PACKAGING IDENTIFICATION:</b>		+CC8458			
<b>PERIODIC RETEST DATE:</b>		May 14, 2027			
<b>SP NUMBER:</b>		DOT-SP 14656			

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 standards, 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:**

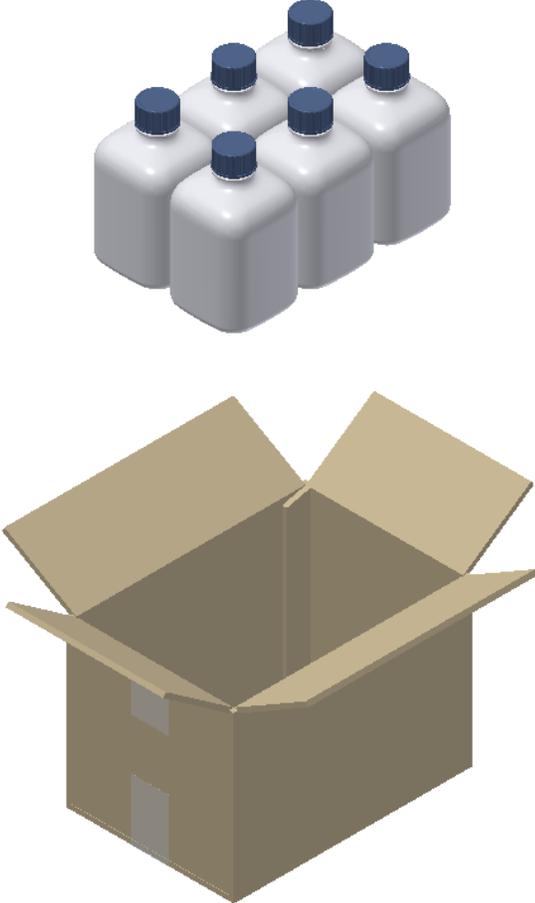
**PurePak Technology Corporation**  
 75 West Baseline Road Suite D44  
 Gilbert, AZ 85233



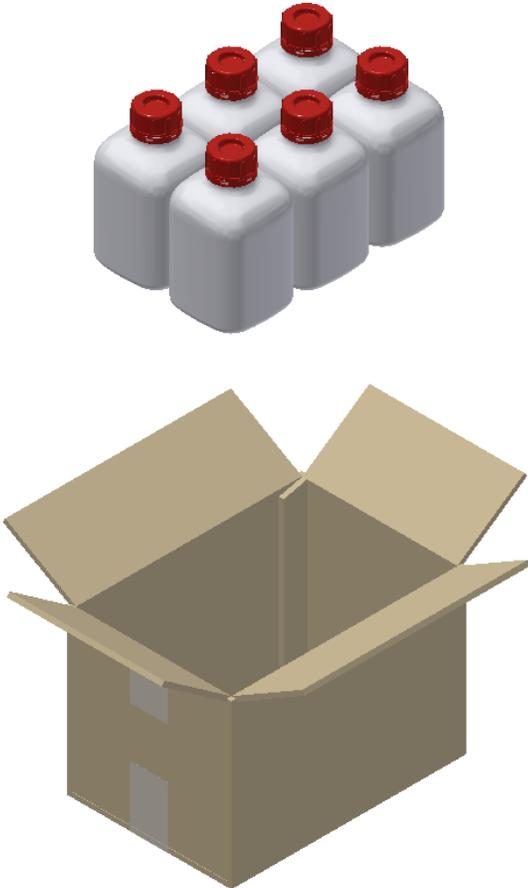
Matthew C. Anderson  
 Project Manager  
 TEN-E Packaging Services, Inc.  
 326 North Corona Avenue  
 Ontario, CA 91764

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

**Variable #1: 6 x 1 Liter Square Plastic Bottle Packaging with 38-439 Neck Finish**

ASSEMBLY DRAWING	TEST LEVELS		
	Certification Type:	Design Qualification	
	Packaging Code Designation:	4G	
	Packing Group:	II	
	Specific Gravity:	1.9	
	Internal Pressure:	100 kPa	
	<b>TEST SAMPLE PREPARATION</b> (Refer to Section IV)		
	Overall Packaging Tare Weight:	931 Grams	
	Fill Capacity (98% Maximum Capacity):		
	Methanol/Water Solution	1,022 Grams	
	Water	1,069 Grams	
	Package Test Weight:		
	Methanol/Water Solution	7.0 Kg	15.4 Lbs.
	Water	7.3 Kg	16.0 Lbs.
	Authorized Package Gross Mass:	13.1 Kg	28.8 Lbs.
	<b>CLOSING METHODS – INNER PACKAGING</b>		
	38mm Polypropylene Closure:		
	Application Torque:	50 In-Lbs.	
	Equipment:	Torque Wrench #W702	
	<b>CLOSING METHODS – SHIPPER</b>		
	<b>Top Flaps:</b>		
Manufacturer:	3M, St. Paul, MN		
Type:	3M MMM115894 Pressure Sensitive Tape		
Width:	48 mm (2")		
Overlap:	2" Minimum		
Tape Pattern:	Center Seam		
<b>Bottom Flaps:</b>			
Manufacturer:	3M, St. Paul, MN		
Type:	3M MMM115894 Pressure Sensitive Tape		
Width:	48 mm (2")		
Overlap:	2" Minimum		
Tape Pattern:	Center Seam		

**Variable #2: 6 x 1 Liter Square Plastic Bottle Packaging with 45mm Neck Finish**

ASSEMBLY DRAWING	TEST LEVELS		
	Certification Type:	Design Qualification	
	Packaging Code Designation:	4G	
	Packing Group:	II	
	Specific Gravity:	1.9	
	Internal Pressure:	100 kPa	
	<b>TEST SAMPLE PREPARATION</b> (Refer to Section IV)		
	Overall Packaging Tare Weight:	944 Grams	
	Fill Capacity (98% Maximum Capacity):		
	Methanol/Water Solution	1,052 Grams	
	Water	1,100 Grams	
	Package Test Weight:		
	Methanol/Water Solution	7.2 Kg	15.8 Lbs.
	Water	7.5 Kg	16.5 Lbs.
	Authorized Package Gross Mass:	13.4 Kg	29.5 Lbs.
	<b>CLOSING METHODS – INNER PACKAGING</b>		
	45mm Polypropylene Closure:		
Application Torque:	25 In-Lbs.		
Equipment:	Torque Wrench #W702		
<b>CLOSING METHODS – SHIPPER</b>			
<b>Top Flaps:</b>			
Manufacturer:	3M, St. Paul, MN		
Type:	3M MMM115894 Pressure Sensitive Tape		
Width:	48 mm (2")		
Overlap:	2" Minimum		
Tape Pattern:	Center Seam		
<b>Bottom Flaps:</b>			
Manufacturer:	3M, St. Paul, MN		
Type:	3M MMM115894 Pressure Sensitive Tape		
Width:	48 mm (2")		
Overlap:	2" Minimum		
Tape Pattern:	Center Seam		

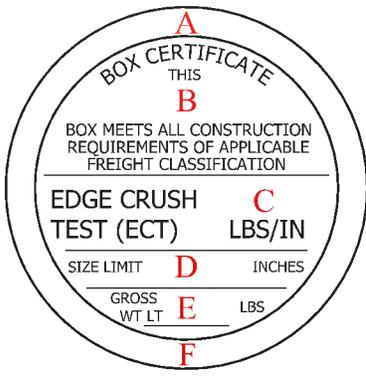
**For Packaging's with an Established Gross Mass:**

If the gross mass calculation in this report exceeds the previously established gross mass, the manufacturer may elect to maintain the current gross mass marking (e.g. the gross mass rating of the UN marking on the packaging may be less than the calculated gross mass indicated in this report) or use the newly established gross mass. In no event shall the gross mass marking on the packaging exceed the gross mass to which the packaging was tested.

**COMPONENT INFORMATION**

CLOSURE (QIM-317-4937-A) (50093)		DRAWING
<b>Manufacturer: Berry Plastics Corporation, Evansville, IN</b>		
<b>Description:</b>	38mm Ribbed Threaded Closure	
<b>Quantity:</b>	6	
<b>Material:</b>	Polypropylene	
<b>Tare Weight:</b>	10.3 Grams	
<b>Overall Dimensions:</b>		
• <b>Height</b>	1.016" ± 0.015"	
• <b>Diameter</b>	1.701" ± 0.015"	
<b>Thread:</b>		
• <b>Type</b>	38mm	
• <b>Style</b>	439	
<b>Thread Dimensions:</b>		
• <b>T</b>	1.481" ± 0.007"	
• <b>E</b>	1.389" ± 0.007"	
<b>Markings (QC Audit):</b>	3	
<b>LINER:</b>		
<b>Description:</b>	Polyethylene Foam Liner	
<b>Tare Weight:</b>	0.67 Grams	
<b>Thickness:</b>	0.052"	
<b>Diameter:</b>	1.387"	
PLASTIC BOTTLE (ZB38SQ1H) (1279826)		DRAWING
<b>Manufacturer: PurePak Technology Corporation, Chandler, AZ</b>		
<b>Description:</b>	1 Liter Square Plastic Bottle	
<b>Quantity:</b>	6	
<b>Material:</b>	High Density Polyethylene	
<b>Method of Manufacture:</b>	Blow Molded	
<b>Tare Weight:</b>	85 Grams ± 4.25 Grams	
<b>Capacity:</b>		
• <b>Rated</b>	1 Liter	
• <b>Overflow</b>	1,090 mL (36.9 Ounces)	
<b>Overall Dimensions:</b>		
• <b>Height</b>	6.929" ± 0.070"	
• <b>Width</b>	4.010" ± 0.060"	
• <b>Depth</b>	4.010" ± 0.060"	
<b>Thread Dimensions:</b>		
• <b>T</b>	1.461" ± 0.010"	
• <b>E</b>	1.367" ± 0.010"	
<b>Wall Thickness:</b>		
• <b>Minimum</b>	0.028"	
<b>Markings (QC Audit):</b>	SPI "2" HDPE Recycling Symbol 2	

CLOSURE (KDZ 2817) (500001)		DRAWING
<b>Manufacturer: George Menshen Gmbh, Finnertrop, Germany</b>		
<b>Description:</b>	45mm Tamper Evident Threaded Closure	
<b>Quantity:</b>	6	
<b>Material:</b>	High Density Polyethylene	
<b>Tare Weight:</b>	10.57 Grams	
<b>Overall Dimensions:</b>		
• <b>Height</b>	31.5mm ± 0.39mm	
• <b>Diameter</b>	51.3mm	
<b>Thread:</b>		
• <b>Type</b>	45mm	
<b>Thread Dimensions:</b>		
• <b>T</b>	1.791"	
• <b>E</b>	1.685"	
<b>Markings (QC Audit):</b>	8 2817.1	
<b>LINER:</b>		
<b>Description:</b>	PTFE Plug	
<b>Tare Weight:</b>	0.99 Grams	
<b>Thickness:</b>	0.0108"	
<b>Diameter:</b>	1.795"	
PLASTIC BOTTLE (ZB45SQ1H) (1279801)		DRAWING
<b>Manufacturer: PurePak Technology Corporation, Chandler, AZ</b>		
<b>Description:</b>	1 Liter Square Plastic Bottle	
<b>Quantity:</b>	6	
<b>Material:</b>	High Density Polyethylene	
<b>Method of Manufacture:</b>	Blow Molded	
<b>Tare Weight:</b>	85.0 Grams ± 4.25 Grams	
<b>Capacity:</b>		
• <b>Rated</b>	1 Liter	
• <b>Overflow</b>	1,122 mL (37.9 Ounces)	
<b>Overall Dimensions:</b>		
• <b>Height</b>	6.963" ± 0.060"	
• <b>Width</b>	3.972" ± 0.060"	
• <b>Depth</b>	3.972" ± 0.060"	
<b>Thread Dimensions:</b>		
• <b>T</b>	1.772" ± 0.010"	
• <b>E</b>	1.644" ± 0.010"	
<b>Wall Thickness:</b>		
• <b>Minimum</b>	0.033"	
<b>Markings (QC Audit):</b>	SPI "2" HDPE Recycling Symbol 2/18	

SHIPPER (P369-14401-1)		
<b>Manufacturer: Packaging Corporation of America, Phoenix, AZ</b>		
<b>Description:</b>	Regular Slotted Container	
<b>Material/Flute (Outer to Inner):</b>	Double Wall Natura Kraft Corrugated Fiberboard; C/B-Flute	
<b>Basis Weight (Outer to Inner) Lbs./MSF:</b>		
• <b>Specification</b>	35 / 23 / 35 / 23 / 35	
<b>Tare Weight:</b>	355 Grams	
DIMENSIONS		
	Specification Dimensions (Inside)	Measured Dimensions (Outside)
• <b>Length</b>	12"	12-1/2"
• <b>Width</b>	8-1/16"	8-3/4"
• <b>Height</b>	7-1/8"	8-3/8"
<b>Board Caliper (Nominal):</b>	0.257"	
<b>Manufacturer's Joint:</b>	Inside Glued, 1-3/8" Lap	
<b>Markings (QC Audit):</b>	(u n) 4G / Y13.1 / S / 21 USA / +CC8458 DOT-SP 14656 ART WORK DATE 05-24-21 12 X 8 1/16 X 7-1/8	
BOX CERTIFICATE		
<b>(A) Corrugated Manufacturer:</b>	PACKAGING CORPORATION OF AMERICA	
<b>(B) Structure:</b>	Double Wall	
<b>(C) ECT:</b>	51 Lbs. Per Inch	
<b>(D) Size Limit:</b>	105"	
<b>(E) Gross Wt. Lt:</b>	120 Lbs.	
<b>(F) Location:</b>	PHOENIX, AZ	

**SECTION III: TEST PROCEDURES AND RESULTS**

**DROP TESTS**

**Variable #1**

TEST INFORMATION		TEST CRITERIA
<b>TEST CONTENTS:</b>	Methanol/Water Solution (0.964 SG)	<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. Inner receptacles, inner packagings or articles must remain completely within the outer packaging and there must be 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. (\$178.603)</li> </ul>
<b>SAMPLE PREPARATION:</b>	Refer to Section II	
<b>CONDITIONING:</b>	-18°C (0°F) Freezer #W201	
<b>CONTENTS TEMP.:</b>	-18.4°C (-1.1°F)	
<b>DROP HEIGHT:</b>	1.9 Meters (75") (Refer to Section IV)	
<b>TEST EQUIPMENT:</b>	L.A.B. Accu Drop 160	

**DROP ORIENTATIONS AND TEST RESULTS**

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

\*Side and corner drops were conducted to impact the manufacturer's joint.

\*\*Flat on bottom drop sample was also used for the top corner drop.

**DROP TESTS**

**Variable #2**

TEST INFORMATION		TEST CRITERIA
<b>TEST CONTENTS:</b>	Methanol/Water Solution (0.964 SG)	<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. Inner receptacles, inner packagings or articles must remain completely within the outer packaging and there must be 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. (§178.603)</li> </ul>
<b>SAMPLE PREPARATION:</b>	Refer to Section II	
<b>CONDITIONING:</b>	-18°C (0°F) Freezer #W201	
<b>CONTENTS TEMP.:</b>	-18.4°C (-1.1°F)	
<b>DROP HEIGHT:</b>	1.9 Meters (75") (Refer to Section IV)	
<b>TEST EQUIPMENT:</b>	L.A.B. Accu Drop 160	

**DROP ORIENTATIONS AND TEST RESULTS**

Sample #12: Flat on Bottom	Sample #13: Flat on Top	*Sample #14: Flat on Long Side
		
<b>PASS:</b> No leakage or damage.	<b>PASS:</b> No leakage or damage.	<b>PASS:</b> No leakage or damage.
*Sample #15: Flat on Short Side	*Sample #16: Bottom Corner	**Sample #12: Top Corner
		
<b>PASS:</b> No leakage or damage.	<b>PASS:</b> No leakage. Slight deformation at impact corner.	<b>PASS:</b> No leakage. Slight deformation at impact corner.

\*Side and corner drops were conducted to impact the manufacturer's joint.

\*\*Flat on bottom drop sample was also used for the top corner drop.

**STACKING TEST**

TEST INFORMATION		TEST CRITERIA
<b>TEST CONTENTS:</b>	Empty	<ul style="list-style-type: none"> <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>
<b>SAMPLE PREPARATION:</b>	Refer to Section II	
<b>CONDITIONING:</b>	73°F / 50% RH Quality Room #W202	
<b>TEST LOAD APPLIED:</b>	181.4 Kg (400.0 Lbs.) (Refer to Section IV)	
<b>TEST DURATION:</b>	24 Hours	
<b>TEST EQUIPMENT:</b>	Dead Load Weights	

**STACKING TEST SET-UP & RESULTS**

	Sample #	Maximum Deflection After 24 Hours	Results
	9	1/8"	PASS
	10	1/8"	PASS
	11	1/8"	PASS

**Comments/Observations:** Following the 24-hour stack test, there was no damage likely to affect the performance of the packaging.

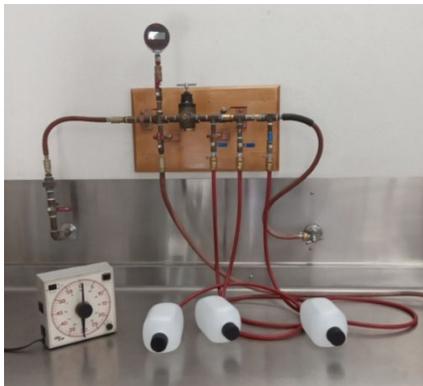
**Stacking Stability:** Not conducted; required only for guided load tests.

**PRESSURE DIFFERENTIAL TEST**

**Variable #1**

TEST INFORMATION		TEST CRITERIA
<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(c))</li> </ul>
<b>WATER TEMPERATURE:</b>	22.4°C (72.4°F)	
<b>FILL CAPACITY:</b>	Maximum Capacity	
<b>CLOSURE APPLICATION:</b>	Refer to Section II	
<b>CONDITIONING:</b>	Ambient	
<b>TEST PRESSURE:</b>	100 kPa	
<b>TEST DURATION:</b>	30 Minutes	
<b>AREA OF PRESSURIZATION:</b>	Through the Bottom	
<b>TEST EQUIPMENT:</b>	Regulated Water Source #: 1 Digital Pressure Gauge #: W605	

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



Sample #	Results
1	PASS
2	PASS
3	PASS

**Comments/Observations**

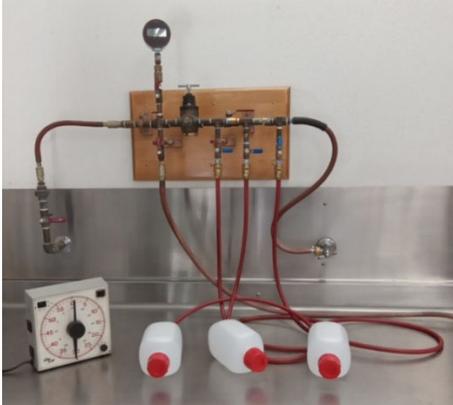
All three samples maintained the 100 kPa test pressure for 30 minutes without leakage.

**PRESSURE DIFFERENTIAL TEST**

**Variable #2**

TEST INFORMATION		TEST CRITERIA
<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(c))</li> </ul>
<b>WATER TEMPERATURE:</b>	22.4°C (72.4°F)	
<b>FILL CAPACITY:</b>	Maximum Capacity	
<b>CLOSURE APPLICATION:</b>	Refer to Section II	
<b>CONDITIONING:</b>	Ambient	
<b>TEST PRESSURE:</b>	100 kPa	
<b>TEST DURATION:</b>	30 Minutes	
<b>AREA OF PRESSURIZATION:</b>	Through the Bottom	
<b>TEST EQUIPMENT:</b>	Regulated Water Source #: 1 Digital Pressure Gauge #: W605	

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

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

**VIBRATION TEST**

**Variable #1**

TEST INFORMATION		TEST CRITERIA
<b>TEST CONTENTS:</b>	Water	<ul style="list-style-type: none"> <li>• 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.</li> <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>
<b>SAMPLE PREPARATION:</b>	Refer to Section II	
<b>CONDITIONING:</b>	73°F / 50% RH Quality Room #W202	
<b>TABLE DISPLACEMENT:</b>	1"	
<b>TEST FREQUENCY:</b>	3.8 Hz	
<b>TEST DURATION:</b>	1 Hour	
<b>TEST EQUIPMENT:</b>	Vertical motion using L.A.B. Palletizer Vibration System	

**VIBRATION TEST SET-UP AND RESULTS**

	Sample #	Results	Comments/Observations
	6	PASS	No leakage or damage.
	7	PASS	
	8	PASS	

**VIBRATION TEST**

**Variable #2**

TEST INFORMATION		TEST CRITERIA
<b>TEST CONTENTS:</b>	Water	<ul style="list-style-type: none"> <li>• 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.</li> <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>
<b>SAMPLE PREPARATION:</b>	Refer to Section II	
<b>CONDITIONING:</b>	73°F / 50% RH Quality Room #W202	
<b>TABLE DISPLACEMENT:</b>	1"	
<b>TEST FREQUENCY:</b>	3.8 Hz	
<b>TEST DURATION:</b>	1 Hour	
<b>TEST EQUIPMENT:</b>	Vertical motion using L.A.B. Palletizer Vibration System	

**VIBRATION TEST SET-UP AND RESULTS**

	Sample #	Results	Comments/Observations
	17	PASS	No leakage or damage.
	18	PASS	
	19	PASS	

**COBB WATER ABSORPTION TEST**

TEST INFORMATION		TEST CRITERIA
<b>NUMBER OF SAMPLES:</b>	5	<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>SAMPLE SIZE:</b>	5" x 5" (Minimum)	
<b>CONDITIONING:</b>	73°F / 50% RH Quality Room #W202	
<b>WATER APPLIED:</b>	100 mL / Sample	
<b>TEST DURATION:</b>	30 Minutes / Sample	
<b>TEST EQUIPMENT:</b>	UWE Analytical Balance Gurley Cobb Water Absorption Fixtures	

**COBB WATER ABSORPTION TEST RESULTS**

REPRESENTATIVE SET-UP PHOTO	Sample #	Water Absorbed
<p><b>TEN-E</b> Setting the Standard</p>	1	131.0 g/m <sup>2</sup>
	2	131.0 g/m <sup>2</sup>
	3	107.0 g/m <sup>2</sup>
	4	119.0 g/m <sup>2</sup>
	5	119.0 g/m <sup>2</sup>
	<b>AVERAGE:</b>	<b>121.4 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>	UN <sup>②</sup>	IMDG <sup>③</sup>	ICAO <sup>④</sup>	IATA <sup>⑤</sup>
	October 2024 Edition	23 <sup>rd</sup> Edition	2024 Edition	2025-2026 Edition	66 <sup>th</sup> 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 & 4;1.1.4	5.0.2.7
<b>Cobb:</b>	178.516(b)(1)	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 100-185  
 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 Good 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
	ASTM <sup>⑥</sup> D7790:	Standard Test Method for the Preparation of Plastic Packagings Containing Liquids for United Nations (UN) Drop Testing
	ISO <sup>⑦</sup> 2248:	Packaging – Complete, Filled Transport Packages – Vertical Impact Test by Dropping
<b>Stacking:</b>	ASTM <sup>⑥</sup> D8409:	Standard Guide for Conducting Stacking Tests on UN Packagings Using Guided or Unguided Loads
	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 Test using Static Load
<b>Hydrostatic Pressure:</b>	ASTM <sup>⑥</sup> D7660:	Standard Guide for Conducting Internal Pressure Tests on United Nations (UN) Packagings
<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**

**Variable #1 – 38-439 Closure**

**INFORMATION USED FOR CALCULATIONS**

Overall Packaging Tare Weight (PTW):	931.0 Grams	
Overflow Capacity (OFC):		<u>Methanol/Water</u>
Methanol/Water	1,042.0 Grams	SG: 0.964
Water	1,090.0 Grams	
Number of Inner Packagings (# IP):	6	
Packing Group	II	
Product Specific Gravity (PSG):	1.900	
Packing Group Multiplication Factor (MF):	1.00	
Overall Height of one Package (OH):	8.38 Inches	
Stack Test-# of Samples Tested Simultaneously:	0	

**98% OF OVERFLOW**

Overflow Capacity (OFC) x 98%

<u>OFC</u>	x	<u>98%</u>		
1,042.0	x	98% =	1,021.2 Grams	Methanol/Water
1,090.0	x	98% =	1,068.2 Grams	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>	
931.0	+	1,021.2	x	6	Methanol/Water
931.0	+	1,068.2	x	6	Water
Methanol/Water:		7.0	kg	15.4	lb
Water:		7.3	kg	16.0	lb

**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>
931.0	+	1.9	x	1,068.2	x	6
		13.1	kg	28.8	lb	



**Variable #2 – 45mm Closure**

**INFORMATION USED FOR CALCULATIONS**

Overall Packaging Tare Weight (PTW):	944.0 Grams	
Overflow Capacity (OFC):		<u>Methanol/Water</u>
Methanol/Water	1,073.0 Grams	SG: ,964
Water	1,122.0 Grams	
Number of Inner Packagings (# IP):	6	
Packing Group	II	
Product Specific Gravity (PSG):	1.900	
Packing Group Multiplication Factor (MF):	1.00	
Overall Height of one Package (OH):	8.38 Inches	
Stack Test-# of Samples Tested Simultaneously:	0	

**98% OF OVERFLOW**

Overflow Capacity (OFC) x 98%

<u>OFC</u>	x	<u>98%</u>		
1,073.0	x	98% =	1,051.6 Grams	Methanol/Water
1,122.0	x	98% =	1,099.6 Grams	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>	
944.0	+	1,051.6	x	6	Methanol/Water
944.0	+	1,099.6	x	6	Water
Methanol/Water:		7.2	kg	15.8	lb
Water:		7.5	kg	16.5	lb

**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>
944.0	+	1.9	x	1,099.6	x	6
		13.4	kg	29.5	lb	

