

**UNITED NATIONS / DOT  
PERFORMANCE CERTIFICATION**



**4G DESIGN QUALIFICATION**

**4 x 9 Pint Beta Plastic Bottle Packaging with  
Standard Closure and Two Case Sealing  
Mechanisms**

**TEST REPORT #: 21-CA20096 (REV 1)**



4G / X23.2 / S / \*\*  
USA / +CC7640



4G / Y33.8 / S / \*\*  
USA / +CC7640

\*\*Insert the year packaging is manufactured

**TESTING PERFORMED FOR:**

**PUREPAK TECHNOLOGY CORPORATION**

324 South Bracken Lane Suite 3  
Chandler, AZ 85224

**ATTN: Michael Dodd**

**TESTING PERFORMED BY:**

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

326 North Corona Avenue  
Ontario, CA 91764  
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Issue Date: June 11, 2021  
Revision Date: February 15, 2022

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## NOTES AND COMMENTS

Tested as a design qualification due to a change in the basis weight of the corrugated shipper. The packaging will retain the +CC7640 Identification.

### 4 x 9 Pint Beta Plastic Bottle Packaging with Standard Closure and the following Case Sealing Mechanism Variables:

Option #	Top Flaps	Bottom Flaps
1	2" 3M #34508 Scotch Tape	2" 3M #34508 Scotch Tape
2	2" 3M #34508 Scotch Tape	Hot Melt Adhesive (Prepared by Client as for Transport) (Three Strips of Thermoset Adhesive – 1/2" x 4")

## REVISION HISTORY

Note for REV 1: Report 21-CA20096 issued on June 11, 2021 has been updated as of February 15, 2022 updating the closure description on pages 2 & 5 under this revision.



## SECTION I: CERTIFICATION

### Design Qualification of the PurePak Technology Corporation 4 x 9 Pint Beta Plastic Bottle Packaging with Standard Closure and Two Case Sealing Mechanisms

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	CFR REFERENCE	TEST LEVEL	TEST CONTENTS	TEST COMPLETED	TEST RESULTS
Drop	178.603	2.0 m	Methanol/Water Solution	June 7, 2021	PASS
Stacking (#1)	178.606	272.1 Kg – 24 Hours	Empty	June 9, 2021	PASS
Stacking (#2)	178.606	272.1 Kg – 24 Hours	Empty	June 10, 2021	PASS
Pressure	173.27	100 kPa - 30 Minutes	Water	June 11, 2021	PASS
Vibration	178.608	3.3 Hz – 1 Hour	Water	June 11, 2021	PASS
Cobb	178.516	30 Minutes	---	June 4, 2021	PASS

<b>TEST REPORT NUMBER:</b>	<b>21-CA20096</b>
<b>UN MARKING:</b> (CFR 49 – 178.503)	 4G / X23.2 / S / ** USA / +CC7640  4G / Y33.8 / S / ** USA / +CC7640
<b>PACKAGING IDENTIFICATION CODE:</b>	4G - Fiberboard Box (178.516)
<b>PERFORMANCE STANDARD:</b>	X (Packaging meets Packing Group I, II and III tests) Y (Packaging meets Packing Group II and III tests)
<b>AUTHORIZED GROSS MASS:</b>	PG I: 23.2 Kg (51.1 Lbs.) (Based on 1.3 Specific Gravity) PG II: 33.8 Kg (74.5 Lbs.) (Based on 2.0 Specific Gravity)
<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 CAA #2006030021)
<b>THIRD PARTY PACKAGING IDENTIFICATION:</b>	+CC7640
<b>PERIODIC RETEST DATE:</b>	June 11, 2023

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.

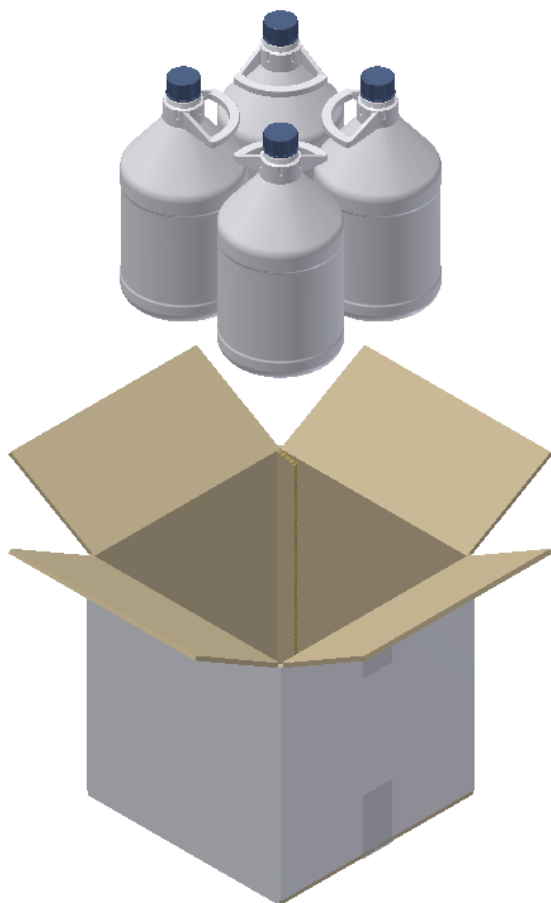
#### MANUFACTURER:

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

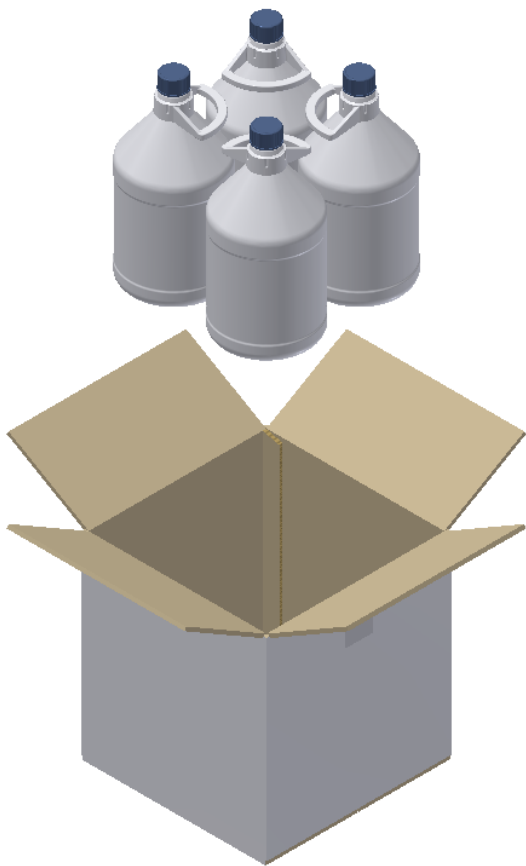

  
 Matthew C. Anderson  
 Project Manager  
 TEN-E Packaging Services, Inc.  
 326 North Corona Avenue  
 Ontario, CA 91764

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

### 4 x 9 Pint Beta Plastic Bottle Packaging with Standard Closure with Taped Top and Bottom Flaps

ASSEMBLY DRAWING	TEST LEVELS		
	Certification Type:		Design Qualification
	Packaging Code Designation:		4G
	Packing Group:		I & II
	Specific Gravity:		PG I - 1.3 PG II – 2.0
	Internal Pressure:		100 kPa
	TEST SAMPLE PREPARATION (Refer to Section IV)		
	Overall Packaging Tare Weight:		1,764.0 Grams
	Fill Capacity (98% Maximum Capacity):		
	Methanol/Water Solution		3,916.7 Grams
	Water		4,122.9 Grams
	Package Test Weight:		
	Methanol/Water Solution		17.4 Kg 38.3 Lbs.
	Water		18.2 Kg 40.1 Lbs.
	Authorized Package Gross		PG I: 23.2 Kg 51.1 Lbs
	Mass:		PG II: 34.7 Kg 76.4 Lbs
	CLOSING METHODS – INNER PACKAGING		
	Application Torque:		50 In-Lbs
	Equipment:		Kaps All Electronic Torque Tester
	CLOSING METHODS – SHIPPER		
	Top Flaps:		
	Manufacturer: 3M, St. Paul, MN		
	Type:		3M #34508 Pressure Sensitive Tape
	Width:		48 mm (2")
	Overlap:		2" Minimum
	Tape Pattern:		Center Seam
	Bottom Flaps:		
	Manufacturer: 3M, St. Paul, MN		
	Type:		3M #34508 Pressure Sensitive Tape
Width:		48 mm (2")	
Overlap:		2" Minimum	
Tape Pattern:		Center Seam	



**4 x 9 Pint Beta Plastic Bottle Packaging with Standard Closure with Taped Top and Hot Melt Glued Bottom Flaps**

ASSEMBLY DRAWING	TEST LEVELS	
	Certification Type:	Design Qualification
	Packaging Code Designation:	4G
	Packing Group:	I & II
	Specific Gravity:	PG I - 1.3 PG II - 2.0
	Internal Pressure:	95 kPa
	<b>TEST SAMPLE PREPARATION</b> (Refer to Section IV)	
	Overall Packaging Tare Weight:	1,764.0 Grams
	Fill Capacity (98% Maximum Capacity):	
	Methanol/Water Solution	3,916.7 Grams
	Water	4,122.9 Grams
	Package Test Weight:	
	Methanol/Water Solution	17.4 Kg 38.3 Lbs.
	Water	18.2 Kg 40.1 Lbs.
	Authorized Package Gross	PG I: 23.2 Kg 51.1 Lbs
	Mass:	PG II: 34.7 Kg 76.4 Lbs
	<b>CLOSING METHODS – INNER PACKAGING</b>	
	Application Torque:	50 In-Lbs
	Equipment:	Kaps All Electronic Torque Tester
	<b>CLOSING METHODS – SHIPPER</b>	
	<b>Top Flaps:</b>	
	Manufacturer:	3M, St. Paul, MN
	Type:	3M #34508 Pressure Sensitive Tape
	Width:	48 mm (2")
	Overlap:	2" Minimum
	Tape Pattern:	Center Seam
	<b>Bottom Flaps:</b>	
	Type:	(Prepared by Client as for Transport) Hot Melt Adhesive (Three Strips of Thermoset Adhesive – 1/2" x 4") (PHC-9256)

**For Packagings 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)		DRAWING
Manufacturer: Berry Plastics, Evansville, IN		
Description:	38mm Threaded Closure	
Quantity:	4	
Material:	Polypropylene	
Tare Weight:	10.3 Grams	
Overall Dimensions:		
• Height	1.016" ± 0.015"	
• Diameter	1.701" ± 0.015"	
Thread Dimensions:		
• T	1.481" ± 0.007"	
• E	1.389" ± 0.007"	
Markings (QC Audit):	2	
LINER:		
Description:	Polyethylene Foam	
Tare Weight:	0.67 Grams	
Thickness:	0.057"	
Diameter:	1.381"	
PLASTIC BOTTLE (ZB38RD9A)		DRAWING
Manufacturer: PurePak Technology Corporation, Chandler, AZ		
Description:	9 Pint Beta Plastic Bottle with Oval Handle	
Quantity:	4	
Material:	High Density Polyethylene	
Method of Manufacture:	Blow Molded	
Tare Weight:	193.0 Grams + 7.5 Grams / - 5.0 Grams	
Capacity:		
• Rated	9 Pint	
• Overflow	4,207.0 Grams	
Overall Dimensions:		
• Height	12.680" ± 0.090"	
• Diameter	6.267" ± 0.090"	
Thread Dimensions:		
• T	1.461" ± 0.015"	
• E	1.367" ± 0.015"	
Wall Thickness:		
• Minimum	0.032"	
Markings (QC Audit):	SPI "2" HDPE Recycling Symbol PPT C95 3 3/21 SET 2	

SHIPPER (507089 & 817308)		
Manufacturer: PCA, Phoenix, AZ		
Description:	Regular Slotted Container	
Material/Flute (Inner to Outer):	51 ECT Double Wall Mottled White Corrugated Fiberboard; C/B-Flute	
Basis Weight (Outer to Inner) Lbs./MSF:		
• Specification	35 / 23 / 35 / 23 / 35	
Tare Weight:	817.0 Grams	
DIMENSIONS		
	Specification Dimensions (Inside)	Measured Dimensions (Outside)
• Length	12-3/4"	13-3/8"
• Width	12-3/4"	13-3/8"
• Height	13"	14"
Board Caliper (Nominal):	0.279"	
Manufacturer's Joint:	Inside Glued, 1-3/8" Lap	
Markings (QC Audit):	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center; margin-right: 5px;"> u n </div> <div> 4G/X23.2/S/19 4G/Y33.8/S/19 4G/Y21.4/S/19  USA/+CC7640 USA/+CC7640 USA/+CC8142  Artwork Date: 02/27/19  12 3/4 X 12 3/4 X 13 ID 89732 </div> </div>	
BOX CERTIFICATE		
(A) Corrugated Manufacturer:	-----	
(B) Structure:	Double Wall	
(C) ECT:	51 Lbs. Per Sq. Inch	
(D) Size Limit:	105"	
(E) Gross Wt. Lt:	120 Lbs.	
(F) Location:	-----	









### SECTION III: TEST PROCEDURES AND RESULTS

#### DROP TESTS Option #1

TEST INFORMATION		TEST CRITERIA
<b>TEST CONTENTS:</b>	Methanol/Water Solution (0.950 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>	19.1°C (-2.3°F)	
<b>DROP HEIGHT:</b>	2.0 Meters (79.0") (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 to impact location.	<b>PASS:</b> No leakage. Slight deformation to impact location.







\*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

### Option #2

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Methanol/Water Solution (0.950 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>
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	-18°C (0°F) Freezer #W201	
CONTENTS TEMP.:	19.1°C (-2.3°F)	
DROP HEIGHT:	2.0 Meters (79.0") (Refer to Section IV)	
TEST EQUIPMENT:	L.A.B. Accu Drop 160	
DROP ORIENTATIONS AND TEST RESULTS		
Sample #13: Flat on Bottom	Sample #14: Flat on Top	*Sample #15: Flat on Long Side
		
PASS: No leakage or damage.	PASS: No leakage or damage.	PASS: No leakage or damage.
*Sample #16: Flat on Short Side	*Sample #17: Bottom Corner	**Sample #13: Top Corner
		
PASS: No leakage or damage.	PASS: No leakage. Slight deformation to impact location.	PASS: No leakage. Slight deformation to impact location.

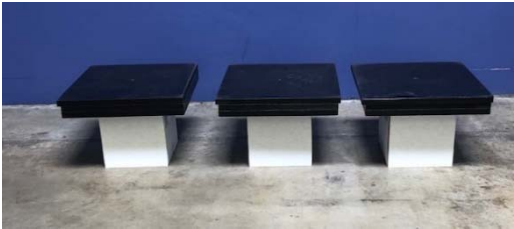
\*Side and corner drops were conducted to impact the manufacturer's joint.

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

**STACKING TEST**      **Option #1**

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>	272.1 Kg (600.0 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
	10	1/16"	PASS
	11	0"	PASS
	12	1/16"	PASS

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

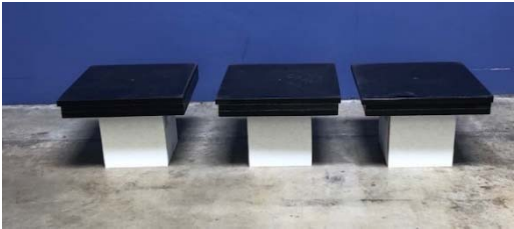
**Stacking Stability:** Not conducted; required only for guided load tests.

**STACKING TEST**

**Option #2**

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>	272.1 Kg (600.0 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
	21	0"	PASS
	22	1/16"	PASS
	23	0"	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

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>	(74.5°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 Digital Pressure Gauge	

## 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.			

**VIBRATION TEST**

**Option #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>	3.3 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
	7	PASS	No leakage or damage.
	8	PASS	
	9	PASS	

**VIBRATION TEST**

**Option #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>	3.3 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
	7	PASS	No leakage or damage.
	8	PASS	
	9	PASS	

## COBB WATER ABSORPTION TEST

TEST INFORMATION	TEST CRITERIA
<b>NUMBER OF SAMPLES:</b> 5 <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	<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>

## COBB WATER ABSORPTION TEST RESULTS

REPRESENTATIVE SET-UP PHOTO	Sample #	Water Absorbed
	1	146.0 g/m <sup>2</sup>
	2	146.0 g/m <sup>2</sup>
	3	141.0 g/m <sup>2</sup>
	4	145.0 g/m <sup>2</sup>
	5	155.0 g/m <sup>2</sup>
	<b>AVERAGE:</b>	<b>146.6 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 2020 Edition	21 <sup>st</sup> Edition	2020 Edition	2021-2022 Edition	62 <sup>nd</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 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
	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> 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

### Packing Group I

INFORMATION USED FOR CALCULATIONS		
Overall Packaging Tare Weight (PTW):	1,764.0 Grams	
Overflow Capacity (OFC):		Methanol/Water
Methanol/Water	3,996.6 Grams	SG: 0.950
Water	4,207.0 Grams	
Number of Inner Packagings (# IP):	4	
Packing Group	I	
Product Specific Gravity (PSG):	1.300	
Packing Group Multiplication Factor (MF):	1.50	
Overall Height of one Package (OH):	14.00 Inches	
Stack Test-# of Samples Tested Simultaneously:	1	

98% OF OVERFLOW				
Overflow Capacity (OFC) x 98%				
OFC	x	98%		
3,996.6	x	98% =	3,916.7 Grams	Methanol/Water
4,207.0	x	98% =	4,122.9 Grams	Water

PACKAGE TEST WEIGHTS				
Overall Pkg Tare Weight (PTW) + (98% Overflow Capacity (OFC) x # of Inner Pkg (# IP))				
PTW	+	(98% OFC)	x	# IP)
1,764.0	+	3,916.7	x	4 Methanol/Water
1,764.0	+	4,122.9	x	4 Water
Methanol/Water:		17.4 Kg		38.3 Lbs.
Water:		18.2 Kg		40.1 Lbs.

AUTHORIZED PACKAGE GROSS MASS CALCULATION (APGM)						
Overall Pkg Tare Weight (PTW) + (Product SG (PSG) x 98% Overflow (OFC) x # of Inner Pkg (# IP))						
PTW	+	(PSG)	x	98% OFC	x	# IP)
1,764.0	+	1.3	x	4,122.9	x	4
		23.2 Kg		51.1 Lbs.		

#### DROP HEIGHT

Calculation For Product Specific Gravities Exceeding 1.2  
Product Specific Gravity (PSG) x Packing Group Multiplication Factor (MF)

PSG	x	MF	Packing Group: I	
1.3	x	1.50	<u>Required Drop Height</u>	<u>Actual Drop Height</u>
		1.95	Meter	
			76.8 Inches	77 Inches

#### STACKING TEST MINIMUM LOAD CALCULATIONS

Number of Packages in a 3m High Stack (118.2 / Overall Pkg Height (OH) -1)

118.2 / Overall Height of one Pkg (OH) - 1

<u>(118.2</u>	/	<u>OH)</u>	<u>-1</u>	=	<u># 3m HS</u>
118.2	/	14.00	-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>	
23.2	x	7.5	
		174.0 Kg	383.6 Lbs.

## Packing Group II

### INFORMATION USED FOR CALCULATIONS

Overall Packaging Tare Weight (PTW):	1,764.0 Grams	
Overflow Capacity (OFC):		Methanol/Water
Methanol/Water	3,996.6 Grams	SG: 0.950
Water	4,207.0 Grams	
Number of Inner Packagings (# IP):	4	
Packing Group	II	
Product Specific Gravity (PSG):	2.000	
Packing Group Multiplication Factor (MF):	1.00	
Overall Height of one Package (OH):	14.00 Inches	
Stack Test-# of Samples Tested Simultaneously:	1	

### 98% OF OVERFLOW

Overflow Capacity (OFC) x 98%

OFC	x	98%		
3,996.6	x	98% =	3,916.7 Grams	Methanol/Water
4,207.0	x	98% =	4,122.9 Grams	Water

### PACKAGE TEST WEIGHTS

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

PTW	+	(98% OFC)	x	# IP)	
1,764.0	+	3,916.7	x	4	Methanol/Water
1,764.0	+	4,122.9	x	4	Water
Methanol/Water:		17.4	Kg	38.3	Lbs.
Water:		18.2	Kg	40.1	Lbs.

### AUTHORIZED PACKAGE GROSS MASS CALCULATION (APGM)

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

PTW	+	(PSG	x	98% OFC	x	# IP)
1,764.0	+	2.0	x	4,122.9	x	4
		34.7	Kg	76.4	Lbs.	

#### DROP HEIGHT

Calculation For Product Specific Gravities Exceeding 1.2  
Product Specific Gravity (PSG) x Packing Group Multiplication Factor (MF)

PSG	x	MF	Packing Group: II	
2.0	x	1.00	<u>Required Drop Height</u>	<u>Actual Drop Height</u>
		2.00	Meter	
			78.7 Inches	79 Inches

#### STACKING TEST MINIMUM LOAD CALCULATIONS

Number of Packages in a 3m High Stack (118.2 / Overall Pkg Height (OH) -1)

118.2 / Overall Height of one Pkg (OH) - 1

<u>(118.2</u>	/	<u>OH)</u>	-1	=	<u># 3m HS</u>
118.2	/	14.00	-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>	
34.7	x	7.5	
		260.3 Kg	573.9 Lbs.