

**UNITED NATIONS / DOT
PERFORMANCE CERTIFICATION**



4G DESIGN QUALIFICATION

**4 x 4 Liter Plastic 190 Gram Bottle Packaging
with Four Case Sealing Mechanisms**

TEST REPORT #: 21-CA20171



4G / Y33.7 / S / **
USA / +CC10754

**Insert the year packaging is manufactured

TESTING PERFORMED FOR:

PUREPAK TECHNOLOGY CORPORATION

324 South Bracken Lane
Chandler, AZ 85224

ATTN: Michael Dodd

TESTING PERFORMED BY:

TEN-E PACKAGING SERVICES, INC.

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September 28, 2021

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4 x 4 Liter Plastic 190 Gram Bottle Packaging with Four Case Sealing Mechanisms		
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")
3	2" Shurtape HP260 Tape	2" Shurtape HP260 Tape
4	2" Shurtape HP260 Tape	Hot Melt Adhesive (Prepared by Client as for Transport) (Three Strips of Thermoset Adhesive – 1/2" x 4")

SECTION I: CERTIFICATION

Design Qualification of the PurePak Technology Corporation 4 x 4 Liter Plastic 190 Gram Bottle Packaging with Four 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	1.9 m	Methanol/Water Solution	September 22, 2021	PASS
Stacking (#1)	178.606	294.4 Kg – 24 Hours	Empty	September 24, 2021	PASS
Stacking (#2)	178.606	294.4 Kg – 24 Hours	Empty	September 27, 2021	PASS
Stacking (#3)	178.606	294.4 Kg – 24 Hours	Empty	September 23, 2021	PASS
Stacking (#4)	178.606	294.4 Kg – 24 Hours	Empty	September 28, 2021	PASS
Pressure	173.27	100 kPa - 30 Minutes	Water	September 27, 2021	PASS
Vibration	178.608	3.7 Hz – 1 Hour	Water	September 28, 2021	PASS
Cobb	178.516	30 Minutes	---	September 14, 2021	PASS

TEST REPORT NUMBER:	21-CA20171
UN MARKING: (CFR 49 – 178.503)	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin-right: 5px;"> u n </div> <div> 4G / Y33.7 / S / ** USA / +CC10754 </div> </div>
PACKAGING IDENTIFICATION CODE:	4G - Fiberboard Box (178.516)
PERFORMANCE STANDARD:	Y (Packaging meets Packing Group II and III tests)
AUTHORIZED GROSS MASS:	33.7 Kg (74.2 Lbs.)
"S" DESIGNATION:	Denotes Inner Packagings
YEAR OF MANUFACTURE:	** Insert year the packaging is manufactured
STATE AUTHORIZING THE MARK:	USA
PACKAGING CERTIFICATION AGENCY:	(+CC) TEN-E Packaging Services, Inc. (Ontario, CA CAA #2006030021)
THIRD PARTY PACKAGING IDENTIFICATION:	+CC10754
PERIODIC RETEST DATE:	September 28, 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:

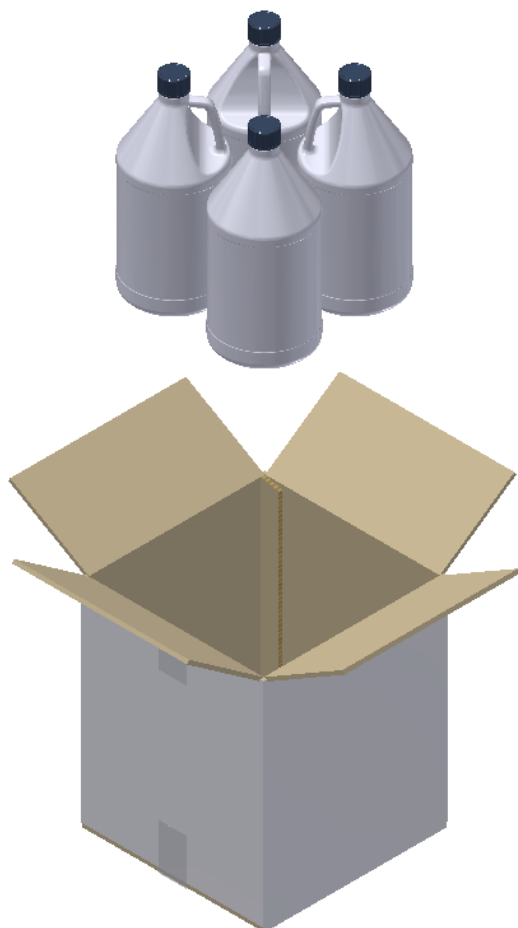
PurePak Technology Corporation
324 South Bracken Lane Suite 3
Chandler, AZ 85224


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 4 Liter Plastic 190 Gram Bottle Packaging with Taped Top and Bottom Flaps

ASSEMBLY DRAWING



TEST LEVELS

Certification Type:	Design Qualification
Packaging Code Designation:	4G
Packing Group:	II
Specific Gravity:	1.9
Internal Pressure:	100 kPa

TEST SAMPLE PREPARATION (Refer to Section IV)

Overall Packaging Tare Weight:	1,550.0 Grams
Fill Capacity (98% Maximum Capacity):	
Methanol/Water Solution	4,010.2 Grams
Water	4,234.6 Grams
Package Test Weight:	
Methanol/Water Solution	17.5 Kg 38.5 Lbs.
Water	18.4 Kg 40.5 Lbs.
Authorized Package Gross Mass:	33.7 Kg 74.2 Lbs.

CLOSING METHODS – INNER PACKAGING

Application Torque:	50 In-Lbs
Equipment:	Kaps All Electronic Torque Tester

CLOSING METHODS – SHIPPER

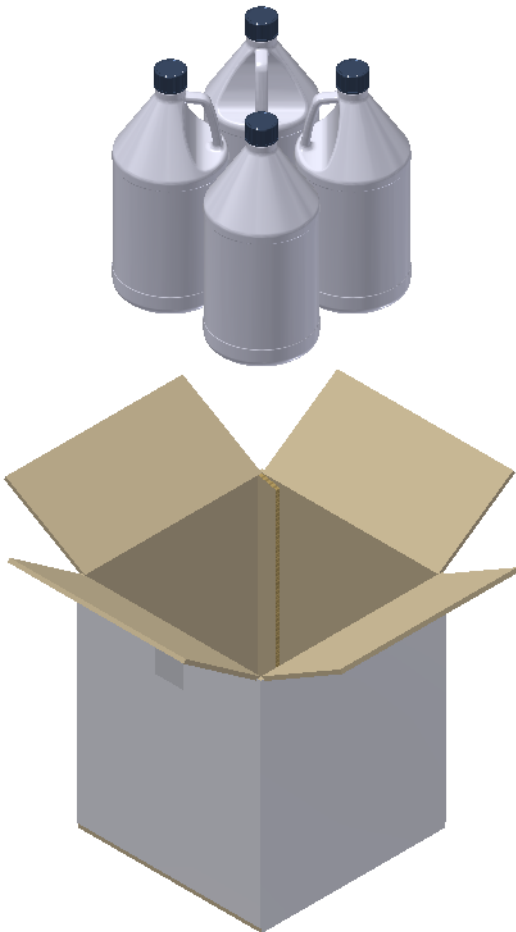
Top Flaps:

Manufacturer:	3M, St. Paul, MN & Shurtape, Hickory, NC
Type:	3M #34508 Pressure Sensitive Tape or Shurtape HP260 Pressure Sensitive Tape
Width:	48 mm (2")
Overlap:	2" Minimum
Tape Pattern:	Center Seam


Bottom Flaps:


Manufacturer:	3M, St. Paul, MN & Shurtape, Hickory, NC
Type:	3M #34508 Pressure Sensitive Tape or Shurtape HP260 Pressure Sensitive Tape
Width:	48 mm (2")
Overlap:	2" Minimum
Tape Pattern:	Center Seam

4 x 4 Liter Plastic 190 Gram Bottle Packaging with Taped Top and Hot Melt Glued Bottom Flaps

ASSEMBLY DRAWING	TEST LEVELS		
	Certification Type:		Design Qualification
	Packaging Code Designation:		4G
	Packing Group:		II
	Specific Gravity:		1.9
	Internal Pressure:		100 kPa
	TEST SAMPLE PREPARATION (Refer to Section IV)		
	Overall Packaging Tare Weight:		1,550.0 Grams
	Fill Capacity (98% Maximum Capacity):		
	Methanol/Water Solution		4,010.2 Grams
	Water		4,234.6 Grams
	Package Test Weight:		
	Methanol/Water Solution		17.5 Kg 38.5 Lbs.
	Water		18.4 Kg 40.5 Lbs.
	Authorized Package Gross Mass:		33.7 Kg 74.2 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 & Shurtape, Hickory, NC
	Type:		3M #34508 Pressure Sensitive Tape or Shurtape HP260 Pressure Sensitive Tape
	Width:		48 mm (2")
	Overlap:		2" Minimum
	Tape Pattern:		Center Seam
	Bottom Flaps:		
	Type:		(Prepared by Client as for Transport) Hot Melt Adhesive (Three Strips of Thermoset Adhesive – 1/2" x 4") (PHC-9256)

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		DRAWING
Manufacturer: PurePak Technology Corporation, Chandler, AZ		
Description:	4 Liter Round Plastic Bottle	
Quantity:	4	
Material:	High Density Polyethylene	
Method of Manufacture:	Blow Molded	
Tare Weight:	192.0 Grams	
Capacity:		
• Rated	4 Liter	
• Overflow	4,321.0 Grams (1.1 Gallons)	
Overall Dimensions:		
• Height	13.626"	
• Diameter	6.027"	
Thread Dimensions:		
• T	1.464"	
• E	1.364"	
Wall Thickness:		
• Minimum	0.030"	
Markings (QC Audit):	SPI "2" HDPE Recycling Symbol CKS 8085 17:51 08.10.21 LN3	







SHIPPER (P369-14406-1)		
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:	727.0 Grams	
DIMENSIONS		
	Specification Dimensions (Inside)	Measured Dimensions (Outside)
• Length	12-5/16"	13-1/8"
• Width	12-5-16"	13"
• Height	13-7/8"	15-1/4"
Board Caliper (Nominal):	0.282"	
Manufacturer's Joint:	Inside Glued, 1-3/8" Lap	
No Box Manufacturer's Certification		
Markings (QC Audit):	None	

SECTION III: TEST PROCEDURES AND RESULTS

DROP TESTS Design #1

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Methanol/Water Solution (0.950 SG)	<ul style="list-style-type: none"> For packaging containing liquid, each packaging does not leak. 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. Any discharge from a closure is slight and ceases immediately after impact with no further leakage. (§178.603)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	-18°C (0°F) Freezer #W201	
CONTENTS TEMP.:	-19.2°C (-2.5°F)	
DROP HEIGHT:	1.9 Meters (75.0") (Refer to Section IV)	
TEST EQUIPMENT:	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
		
PASS: No leakage or damage.	PASS: No leakage or damage.	PASS: No leakage or damage.
*Sample #4: Flat on Short Side	*Sample #5: Bottom Corner	**Sample #1: 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.

DROP TESTS

Design #2







TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Methanol/Water Solution (0.950 SG)	<ul style="list-style-type: none">For packaging containing liquid, each packaging does not leak.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.Any discharge from a closure is slight and ceases immediately after impact with no further leakage. (§178.603)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	-18°C (0°F) Freezer #W201	
CONTENTS TEMP.:	-19.2°C (-2.5°F)	
DROP HEIGHT:	1.9 Meters (75.0") (Refer to Section IV)	
TEST EQUIPMENT:	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
		
PASS: No leakage or damage.	PASS: No leakage or damage.	PASS: No leakage or damage.
*Sample #15: Flat on Short Side	*Sample #16: Bottom Corner	**Sample #12: 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.

DROP TESTS

Design #3







TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Methanol/Water Solution (0.950 SG)	<ul style="list-style-type: none">For packaging containing liquid, each packaging does not leak.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.Any discharge from a closure is slight and ceases immediately after impact with no further leakage. (§178.603)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	-18°C (0°F) Freezer #W201	
CONTENTS TEMP.:	-19.2°C (-2.5°F)	
DROP HEIGHT:	1.9 Meters (75.0") (Refer to Section IV)	
TEST EQUIPMENT:	L.A.B. Accu Drop 160	
DROP ORIENTATIONS AND TEST RESULTS		
Sample #23: Flat on Bottom	Sample #24: Flat on Top	*Sample #25: Flat on Long Side
		
PASS: No leakage or damage.	PASS: No leakage or damage.	PASS: No leakage or damage.
*Sample #26: Flat on Short Side	*Sample #27: Bottom Corner	**Sample #23: 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.

DROP TESTS

Design #4

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Methanol/Water Solution (0.950 SG)	<ul style="list-style-type: none">For packaging containing liquid, each packaging does not leak.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.Any discharge from a closure is slight and ceases immediately after impact with no further leakage. (§178.603)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	-18°C (0°F) Freezer #W201	
CONTENTS TEMP.:	-19.2°C (-2.5°F)	
DROP HEIGHT:	1.9 Meters (75.0") (Refer to Section IV)	
TEST EQUIPMENT:	L.A.B. Accu Drop 160	
DROP ORIENTATIONS AND TEST RESULTS		
Sample #27: Flat on Bottom	Sample #28: Flat on Top	*Sample #29: Flat on Long Side
		
PASS: No leakage or damage.	PASS: No leakage or damage.	PASS: No leakage or damage.
*Sample #30: Flat on Short Side	*Sample #31: Bottom Corner	**Sample #27: Top Corner
		
PASS: No leakage or damage.	PASS: No leakage. Slight deformation to impact location.	PASS: No leakage. Slight deformation to impact location.

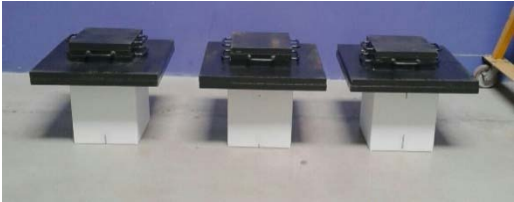
*Side and corner drops were conducted to impact the manufacturer's joint.

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

STACKING TEST **Design #1**

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Empty	<ul style="list-style-type: none"> 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)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	73°F / 50% RH Quality Room #W202	
TEST LOAD APPLIED:	249.4 Kg (550.0 Lbs.) (Refer to Section IV)	
TEST DURATION:	24 Hours	
TEST EQUIPMENT:	Dead Load Weights	

STACKING TEST SET-UP & RESULTS


	Sample #	Maximum Deflection After 24 Hours	Results
	9	0"	PASS
	10	1/16"	PASS
	11	0"	PASS
Comments/Observations: Following the 24-hour stack test, there was no leakage of contents from the test samples and no damage likely to affect the performance of the packaging.			

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

STACKING TEST **Design #2**

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Empty	<ul style="list-style-type: none"> 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)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	73°F / 50% RH Quality Room #W202	
TEST LOAD APPLIED:	249.4 Kg (550.0 Lbs.) (Refer to Section IV)	
TEST DURATION:	24 Hours	
TEST EQUIPMENT:	Dead Load Weights	

STACKING TEST SET-UP & RESULTS

	Sample #	Maximum Deflection After 24 Hours	Results
	20	1/16"	PASS
	21	1/16"	PASS
	22	0"	PASS

Comments/Observations: Following the 24-hour stack test, there was no leakage of contents from the test samples and no damage likely to affect the performance of the packaging.

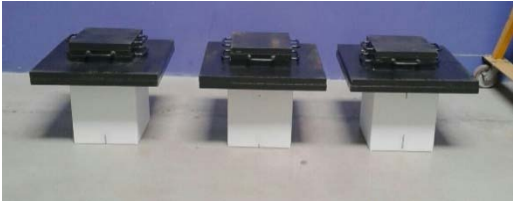
Stacking Stability: Not conducted; required only for guided load tests.

STACKING TEST

Design #3

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Empty	<ul style="list-style-type: none"> 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)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	73°F / 50% RH Quality Room #W202	
TEST LOAD APPLIED:	249.4 Kg (550.0 Lbs.) (Refer to Section IV)	
TEST DURATION:	24 Hours	
TEST EQUIPMENT:	Dead Load Weights	

STACKING TEST SET-UP & RESULTS

	Sample #	Maximum Deflection After 24 Hours	Results
	27	1/16"	PASS
	28	1/16"	PASS
	29	1/8"	PASS

Comments/Observations: Following the 24-hour stack test, there was no leakage of contents from the test samples and no damage likely to affect the performance of the packaging.

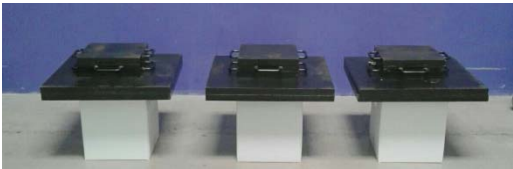
Stacking Stability: Not conducted; required only for guided load tests.

STACKING TEST

Design #4

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Empty	<ul style="list-style-type: none"> 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)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	73°F / 50% RH Quality Room #W202	
TEST LOAD APPLIED:	249.4 Kg (550.0 Lbs.) (Refer to Section IV)	
TEST DURATION:	24 Hours	
TEST EQUIPMENT:	Dead Load Weights	

STACKING TEST SET-UP & RESULTS

	Sample #	Maximum Deflection After 24 Hours	Results
	31	0"	PASS
	32	0"	PASS
	33	0"	PASS

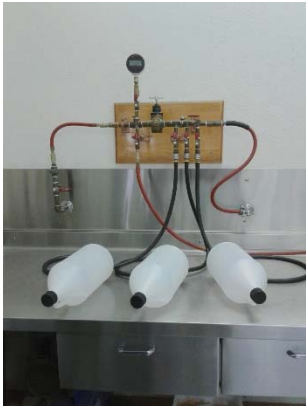

Comments/Observations: Following the 24-hour stack test, there was no leakage of contents from the test samples and no damage likely to affect the performance of the packaging.

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

PRESSURE DIFFERENTIAL TEST

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Water	<ul style="list-style-type: none"> Packaging for which retention of liquid is a basic function must be capable of withstanding the pressure requirements without leakage. (§173.27(c))
WATER TEMPERATURE:	(73.1°F)	
FILL CAPACITY:	Maximum Capacity	
CLOSURE APPLICATION:	Refer to Section II	
CONDITIONING:	Ambient	
TEST PRESSURE:	100 kPa	
TEST DURATION:	30 Minutes	
AREA OF PRESSURIZATION:	Through the Bottom	
TEST EQUIPMENT:	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

Design #1

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Water	<ul style="list-style-type: none"> 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. A packaging passes the vibration test if there is no rupture or leakage from any of the packages. No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength. (§178.608)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	73°F / 50% RH Quality Room #W202	
TABLE DISPLACEMENT:	1"	
TEST FREQUENCY:	3.7 Hz	
TEST DURATION:	1 Hour	
TEST EQUIPMENT:	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

Design #2

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Water	<ul style="list-style-type: none"> 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. A packaging passes the vibration test if there is no rupture or leakage from any of the packages. No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength. (§178.608)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	73°F / 50% RH Quality Room #W202	
TABLE DISPLACEMENT:	1"	
TEST FREQUENCY:	3.7 Hz	
TEST DURATION:	1 Hour	
TEST EQUIPMENT:	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	

VIBRATION TEST

Design #3

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Water	<ul style="list-style-type: none"> 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. A packaging passes the vibration test if there is no rupture or leakage from any of the packages. No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength. (§178.608)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	73°F / 50% RH Quality Room #W202	
TABLE DISPLACEMENT:	1"	
TEST FREQUENCY:	3.7 Hz	
TEST DURATION:	1 Hour	
TEST EQUIPMENT:	Vertical motion using L.A.B. Palletizer Vibration System	

VIBRATION TEST SET-UP AND RESULTS


	Sample #	Results	Comments/Observations
	24	PASS	No leakage or damage.
	25	PASS	
	26	PASS	

VIBRATION TEST

Design #4

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Water	<ul style="list-style-type: none"> 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. A packaging passes the vibration test if there is no rupture or leakage from any of the packages. No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength. (§178.608)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	73°F / 50% RH Quality Room #W202	
TABLE DISPLACEMENT:	1"	
TEST FREQUENCY:	3.7 Hz	
TEST DURATION:	1 Hour	
TEST EQUIPMENT:	Vertical motion using L.A.B. Palletizer Vibration System	


VIBRATION TEST SET-UP AND RESULTS

	Sample #	Results	Comments/Observations
	28	PASS	No leakage or damage.
	29	PASS	
	30	PASS	

COBB WATER ABSORPTION TEST

TEST INFORMATION	TEST CRITERIA
NUMBER OF SAMPLES: 5 SAMPLE SIZE: 5" x 5" (Minimum) CONDITIONING: 73°F / 50% RH Quality Room #W202 WATER APPLIED: 100 mL / Sample TEST DURATION: 30 Minutes / Sample TEST EQUIPMENT: UWE Analytical Balance Gurley Cobb Water Absorption Fixtures	<ul style="list-style-type: none"> An increase in mass greater than 155 g/m² over the 30 minute duration represents an unacceptable level of water resistance. (§178.516)

COBB WATER ABSORPTION TEST RESULTS

REPRESENTATIVE SET-UP PHOTO	Sample #	Water Absorbed
	1	148.0 g/m ²
	2	156.0 g/m ²
	3	138.0 g/m ²
	4	150.0 g/m ²
	5	139.0 g/m ²
	AVERAGE:	146.2 g/m²
	RESULT	PASS

REGULATORY AND INDUSTRY STANDARD REFERENCES

Drop:	178.603	6.1.5.3	6.1.5.3	6;4.3	6.3.3
Stacking:	178.606	6.1.5.6	6.1.5.6	6;4.6	6.3.6
Pressure:	173.27(c)	4.1.1.4.1	---	4;1.1.6	5.0.2.9
Vibration:	178.608	---	---	4;1.1.1 & 4;1.1.4	5.0.2.7
Cobb:	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

Drop:	ASTM® D5276:	Standard Test Method for Drop Test of Loaded Containers by Free Fall
	ASTM® D7790	Standard Test Method for the Preparation of Plastic Packagings Containing Liquids for United Nations (UN) Drop Testing
	ISO 2248:	Packaging – Complete, Filled Transport Packages – Vertical Impact Test by Dropping
Stacking:	ASTM® D4577:	Standard Test Method for Compression Resistance of a Container Under Constant Load
	ISO 2234:	Packaging – Complete, Filled Transport Packages – Stacking Test using Static Load
Hydrostatic Pressure:	ASTM® D7660:	Standard Guide for Conducting Internal Pressure Tests on United Nations (UN) Packagings
Vibration:	ASTM® D999:	Standard Test Method for Vibration Testing of Shipping Containers
	ISO 2247:	Packaging – Complete, Filled Transport Packages – Vibration Test at Fixed Low Frequency
Cobb:	ISO 535:	Paper and Board – Determination of Water Absorption – Cobb Method

® 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

Overall Packaging Tare Weight (PTW):	1,550.0 Grams	
Overflow Capacity (OFC):		Methanol/Water
Methanol/Water	4,092.0 Grams	SG: 0.950
Water	4,321.0 Grams	
Number of Inner Packagings (# IP):	4	
Packing Group	II	
Product Specific Gravity (PSG):	1.900	
Packing Group Multiplication Factor (MF):	1.00	
Overall Height of one Package (OH):	15.25 Inches	
Stack Test-# of Samples Tested Simultaneously:	1	

98% OF OVERFLOW

Overflow Capacity (OFC) x 98%

OFC	x	98%		
4,092.0	x	98% =	4,010.2 Grams	Methanol/Water
4,321.0	x	98% =	4,234.6 Grams	Water

PACKAGE TEST WEIGHTS

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

PTW	+	(98% OFC)	x	# IP)	
1,550.0	+	4,010.2	x	4	Methanol/Water
1,550.0	+	4,234.6	x	4	Water
Methanol/Water:		17.5	Kg	38.5	Lbs.
Water:		18.4	Kg	40.5	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)
1,550.0	+	1.9	x	4,234.6	x	4
		33.7	Kg	74.2	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	
1.9	x	1.00			
		1.90	Meter	Required Drop Height	Actual Drop Height
				74.8 Inches	75 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

(118.2	/	OH)	-1	=	# 3m HS
118.2	/	15.25	-1	=	6.8

Stacking Test Load Calculation (Individual Package)

Authorized Pkg Gross Mass (APGM) x # of Pkg in a 3m High Stack (# 3m HS)

APGM	x	# 3m HS	
33.7	x	6.8	
		229.2 Kg	505.3 Lbs.