

**UNITED NATIONS / DOT
PERFORMANCE CERTIFICATION**



4G PERIODIC RETEST

4 x 1 Gallon Round Plastic Bottle Packaging Designs:

- 1) 38-400 Tamper Evident Closure & Shipper Taped Top and Bottom Flaps**
- 2) 38-400 Tamper Evident Closure & Shipper Taped Top and Hot Melt Glued Bottom Flaps**
- 3) 38-400 Closure & Shipper Taped Top and Bottom Flaps**
- 4) 38-400 Closure & Shipper Taped Top and Hot Melt Glued Bottom Flaps**

TEST REPORT #: 18-CA20082



4G / Y21.9 / S / **
USA / +CC8078

**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
Phone: 909-937-1260
Fax: 909-937-1262

May 18, 2018

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	9
#1	9
DROP TESTS	10
#2	10
DROP TESTS	11
#3	11
DROP TESTS	12
#4	12
STACKING TEST	13
#1 & #3	13
STACKING TEST	14
#2 & #4	14
PRESSURE DIFFERENTIAL TEST	15
Tamper Evident Closure	15
PRESSURE DIFFERENTIAL TEST	16
Standard Closure	16
VIBRATION TEST	17
#1	17
VIBRATION TEST	18
#2	18
VIBRATION TEST	19
#3	19
VIBRATION TEST	20
#4	20
COBB WATER ABSORPTION TEST	21
REGULATORY AND INDUSTRY STANDARD REFERENCES	22
SECTION IV: MATHEMATICAL CALCULATIONS	23
#1 & #2	23
SECTION IV: MATHEMATICAL CALCULATIONS	25
#3 & #4	25

SECTION I: CERTIFICATION

Periodic Retest of the PurePak Technology Corporation


4 x 1 Gallon Round Plastic Bottle Packaging Designs:

- 1) 38-400 Tamper Evident Closure & Shipper Taped Top and Bottom Flaps
- 2) 38-400 Tamper Evident Closure & Shipper Taped Top and Hot Melt Glued Bottom Flaps
- 3) 38-400 Closure & Shipper Taped Top and Bottom Flaps
- 4) 38-400 Closure & Shipper Taped Top and Hot Melt Glued Bottom Flaps

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	1.4 m	Methanol/Water Solution	May 9, 2018	PASS
Stacking (#1 & #3)	178.606	181.4 Kg – 24 Hours	Empty	May 9, 2018	PASS
Stacking (#2 & #4)	178.606	181.4 Kg – 24 Hours	Empty	May 16, 2018	PASS
Pressure	173.27	95 kPa - 30 Minutes	Water	May 9, 2018	PASS
Vibration	178.608	3.8 Hz – 1 Hour	Water	May 18, 2018	PASS
Cobb	178.516	30 Minutes	---	May 4, 2018	PASS

TEST REPORT NUMBERS:	18-CA20082, 16-CA20099
UN MARKING: (CFR 49 – 178.503)	 4G / Y21.9 / S / ** USA / +CC8078
PACKAGING IDENTIFICATION CODE:	4G - Fiberboard Box (178.516)
PERFORMANCE STANDARD:	Y (Packaging meets Packing Group II and III tests)
AUTHORIZED GROSS MASS:	21.9 Kg (48.2 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:	+CC8078
PERIODIC RETEST DATE:	May 18, 2020

ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY THAT THE PACKAGING TESTED IS MERCHANTABILITY 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 1 Gallon Round Plastic Bottle with 38-400 Tamper Evident Closure Packaging with Taped Top Flaps and Taped Bottom Flaps or Hot Melt Glued Bottom Flaps

ASSEMBLY DRAWING	TEST LEVELS		
	Certification Type:		Periodic Retest
	Packaging Code Designation:		4G
	Packing Group:		II
	Specific Gravity:		1.4
	Internal Pressure:		95 kPa
	TEST SAMPLE PREPARATION (Refer to Section IV)		
	Overall Packaging Tare Weight:		1,257.0 Grams
	Fill Capacity (98% Maximum Capacity):		
	Methanol/Water Solution		3,850.0 Grams
	Water		3,969.0 Grams
Package Test Weight:			
Methanol/Water Solution		16.6 Kg	36.5 Lbs.
Water		17.1 Kg	37.6 Lbs.
Authorized Package Gross Mass:		23.4 Kg	51.5 Lbs.
CLOSING METHODS – INNER PACKAGING			
Application Torque:		50 In-Lbs.	
Equipment:		Kaps All Electronic Torque Tester #W701	
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	
Inner Flaps:		Meet	
Outer Flaps:		Meet	
Bottom Flaps:			
Manufacturer: 3M, St. Paul, MN			
Type:		3M #34508 Pressure Sensitive Tape or Hot Melt Glue (6 Parallel ¼" x 4" Strips Per Bottom Flap – Prepared by Client)	
Width:		48 mm (2")	
Overlap:		2" Minimum	
Tape Pattern:		Center Seam	
Inner Flaps:		Meet	
Outer Flaps:		Meet	

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.



4 x 1 Gallon Round Plastic Bottle with 38-400 Standard Closure Packaging with Taped Top Flaps and Taped Bottom Flaps or Hot Melt Glued Bottom Flaps


ASSEMBLY DRAWING	TEST LEVELS		
	Certification Type:		Periodic Retest
	Packaging Code Designation:		4G
	Packing Group:		II
	Specific Gravity:		1.4
	Internal Pressure:		95 kPa
	TEST SAMPLE PREPARATION (Refer to Section IV)		
	Overall Packaging Tare Weight:		1,245.0 Grams
	Fill Capacity (98% Maximum Capacity):		
	Methanol/Water Solution		3,850.0 Grams
	Water		3,969.0 Grams
Package Test Weight:			
Methanol/Water Solution		16.6 Kg	36.5 Lbs.
Water		17.1 Kg	37.6 Lbs.
Authorized Package Gross Mass:		23.4 Kg	51.5 Lbs.
CLOSING METHODS – INNER PACKAGING			
Application Torque: 50 In-Lbs.			
Equipment:		Kaps All Electronic Torque Tester #W701	
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	
Inner Flaps:		Meet	
Outer Flaps:		Meet	
Bottom Flaps:			
Manufacturer: 3M, St. Paul, MN			
Type:		3M #34508 Pressure Sensitive Tape	
Width:		3M #34508 Pressure Sensitive Tape or Hot Melt Glue (6 Parallel ¼" x 4" Strips Per Bottom Flap – Prepared by Client)	
Overlap:		2" Minimum	
Tape Pattern:		Center Seam	
Inner Flaps:		Meet	
Outer Flaps:		Meet	

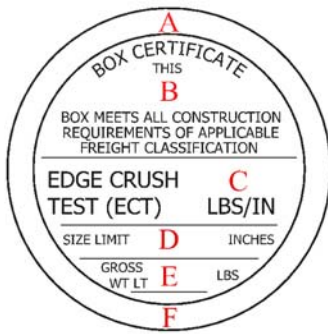
For Packagings with an Established Gross Mass:

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 (Dwg. No.: CA 38-18 REV B)		DRAWING
Manufacturer: Hotter Plastics Corp., So. Elgin, IL		
Description:	38mm Tamper Evident Threaded Closure Drop-Lok	
Quantity:	4	
Material:	Polypropylene	
Tare Weight:	4.26 Grams	
Overall Dimensions:		
• Height	0.745" ± 0.015"	
• Diameter	1.590" ± 0.015"	
Thread:		
• Type	38mm	
• Style	400	
Finish Dimensions:		
• T	1.470" ± 0.010"	
• E	1.370" ± 0.010"	
• Thread	8 Threads Per Inch	
Markings (QC Audit):	38 HP	
Liner:		
Description:	P.E. Foam Liner	
Tare Weight:	0.38 Grams	
Thickness:	0.032"	
Diameter:	1.471"	
CLOSURE (Dwg. No.: 21015155-C)		DRAWING
Manufacturer: Berry Plastics Corporation, Evansville, IN		
Description:	38mm Standard Threaded Closure	
Quantity:	4	
Material:	Polypropylene	
Tare Weight:	2.45 Grams	
Overall Dimensions:		
• Height	0.457"	
• Diameter	1.598"	
Thread:		
• Type	38mm	
• Style	400	
Finish Dimensions:		
• T	1.486" ± 0.007"	
• E	1.390" ± 0.007"	
• Thread	6 Pitch	
Markings (QC Audit):	38	
Liner:		
Description:	P.E. Foam Liner	
Tare Weight:	0.36 Grams	
Thickness:	0.028"	
Diameter:	1.468"	



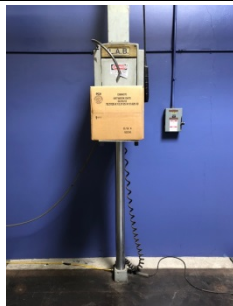


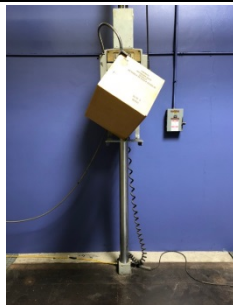
PLASTIC BOTTLE (100036)		DRAWING
Manufacturer: PurePak, Chandler, AZ		
Description:	1 Gallon Round Plastic Bottle	
Quantity:	4	
Material:	High Density Polyethylene	
Method of Manufacture:	Blow Molded	
Tare Weight:	130.0 Grams ± 6.0 Grams	
Capacity:		
• Rated	1.0 Gallon	
• Overflow	4,050.0 Grams (1.070 Gallons)	
Overall Dimensions:		
• Height	12.350" ± 0.090"	
• Diameter	6.002" ± 0.080"	
Thread Dimensions:		
• T	1.459" ± 0.012"	
• E	1.363" ± 0.012"	
• Pitch	0.125"	
Wall Thickness:		
• Minimum	0.020"	
Markings (QC Audit):	SPI "2" HDPE Recycling Symbol C.K.S. 07 K 80859	

SHIPPER (Part #: 733744)		
Manufacturer: Packaging Corporation Of America, Plano, TX		
Description:	Regular Slotted Container	
Material/Flute (Inner to Outer):	51 ECT Double Wall Natural Kraft Corrugated Fiberboard; B/C-Flute	
Basis Weight (Outer to Inner) Lbs./MSF:		
• Specification	35 / 23 / 35 / 23 / 35	
Tare Weight:	733.0 Grams	
DIMENSIONS		
	Specification Dimensions (Inside)	Measured Dimensions (Outside)
• Length	12.3125"	13-1/8"
• Width	12.3125"	12-7/8"
• Height	12.625"	13-7/8"
Board Caliper (Nominal):	0.237"	
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%; padding: 2px; margin-right: 10px;">u n</div> <div> 4G/Y21.9/S/18 USA+CC8078 HANDLE WITH CARE THIS SIDE UP C804070 ARTWORK DATE 02/20/18 12.3125 X 12.3125 X 12.625 ID PCA 740136 4 10/18 </div> </div>	
BOX CERTIFICATE		
(A) Corrugated Manufacturer:	PACKAGING CORPATION OF AMERICA	
(B) Structure:	Double Wall	
(C) ECT:	51 Lbs. Per Sq. Inch	
(D) Size Limit:	105"	
(E) Gross Wt. Lt:	120 Lbs.	
(F) Location:	PLANO, TEXAS	

SECTION III: TEST PROCEDURES AND RESULTS

DROP TESTS

#1

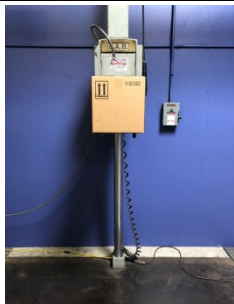
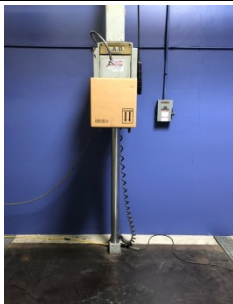
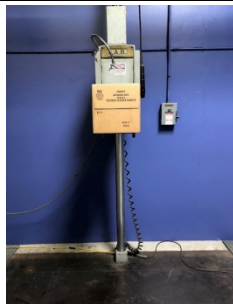
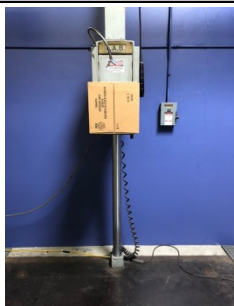
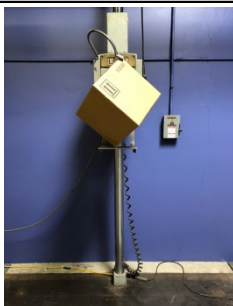

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Methanol/Water Solution (0.970 SG)	<ul style="list-style-type: none"> For packaging containing liquid, each packaging does not leak. There can be no damage to the outer packaging likely to adversely affect safety during transport. Inner receptacles, inner 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.:	-18.2°C (0.7°F)	
DROP HEIGHT:	1.4 Meters (56.0") (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. Slight deformation to bottles on impact.	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. Deformation to shipper on impact corner.	PASS: No leakage. Deformation to shipper on 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

#2



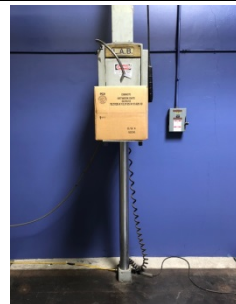
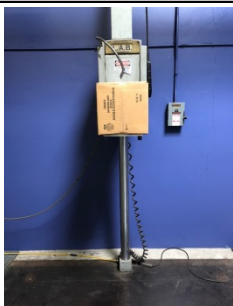

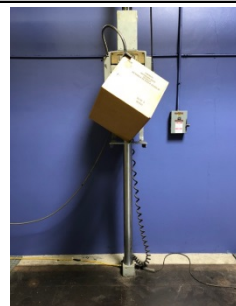
TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Methanol/Water Solution (0.970 SG)	<ul style="list-style-type: none">For packaging containing liquid, each packaging does not leak.There can be no damage to the outer packaging likely to adversely affect safety during transport. Inner receptacles, inner 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.:	-18.2°C (0.7°F)	
DROP HEIGHT:	1.4 Meters (56.0") (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. Slight deformation to bottles on impact.	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. Deformation to shipper on impact corner.	PASS: No leakage. Deformation to shipper on 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

#3

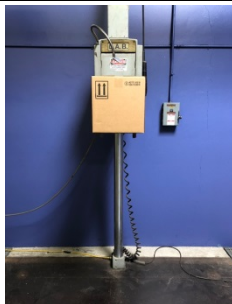
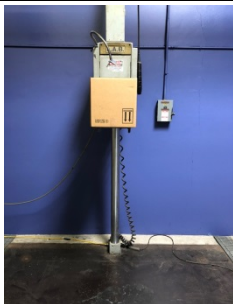
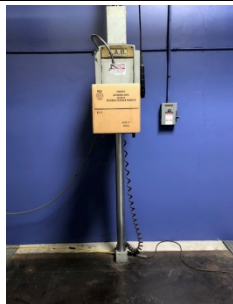
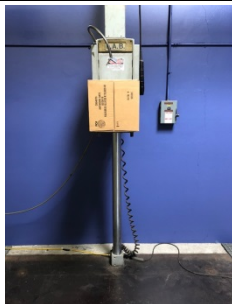
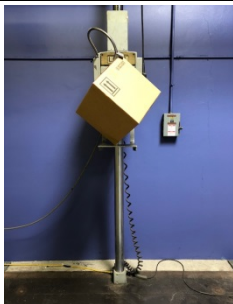

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Methanol/Water Solution (0.970 SG)	<ul style="list-style-type: none">For packaging containing liquid, each packaging does not leak.There can be no damage to the outer packaging likely to adversely affect safety during transport. Inner receptacles, inner 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.:	-18.2°C (0.7°F)	
DROP HEIGHT:	1.4 Meters (56.0") (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. Slight deformation to bottles on impact.	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. Deformation to shipper on impact corner.	PASS: No leakage. Deformation to shipper on 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

#4

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Methanol/Water Solution (0.970 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.:	-18.2°C (0.7°F)	
DROP HEIGHT:	1.4 Meters (56.0") (Refer to Section IV)	
TEST EQUIPMENT:	L.A.B. Accu Drop 160	
DROP ORIENTATIONS AND TEST RESULTS		
Sample #31: Flat on Bottom	Sample #32: Flat on Top	*Sample #33: Flat on Long Side
		
PASS: No leakage or damage.	PASS: No leakage. Slight deformation to bottles on impact.	PASS: No leakage or damage.
*Sample #34: Flat on Short Side	*Sample #35: Bottom Corner	**Sample #31: Top Corner
		
PASS: No leakage or damage.	PASS: No leakage. Deformation to shipper on impact corner.	PASS: No leakage. Deformation to shipper on 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

#1 & #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. <p>(§178.606)</p>
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	Ambient	
TEST LOAD APPLIED:	181.4 Kg (400.0 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
	6	0"	PASS
	7	1/16"	PASS
	8	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.

STACKING TEST

#2 & #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. <p>(§178.606)</p>
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	Ambient	
TEST LOAD APPLIED:	181.4 Kg (400.0 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
	17	0"	PASS
	18	1/16"	PASS
	19	0"	PASS
Comments/Observations: Following the 24-hour stack test, there was no damage likely to affect the performance of the packaging.			

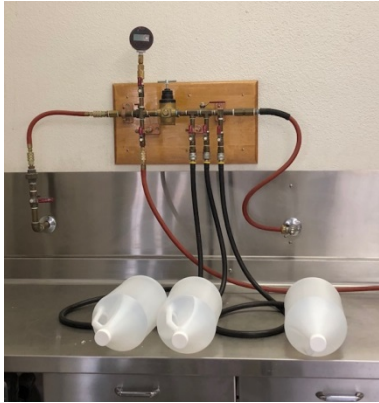
Stacking Stability: Not conducted; required only for guided load tests.

PRESSURE DIFFERENTIAL TEST

Tamper Evident Closure

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))
FILL CAPACITY:	Maximum Capacity	
CLOSURE APPLICATION:	Refer to Section II	
CONDITIONING:	Ambient	
TEST PRESSURE:	95 kPa	
TEST DURATION:	30 Minutes	
AREA OF PRESSURIZATION:	Through the Bottom	
TEST EQUIPMENT:	Regulated Water Source Digital Pressure Gauge #: 605	

HYDROSTATIC PRESSURE TEST SET-UP AND RESULTS

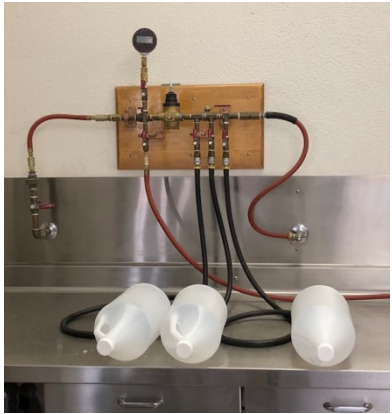
	Sample #	Results	Comments/Observations
	1	PASS	All three samples maintained the 95 kPa test pressure for 30 minutes without leakage.
	2	PASS	
	3	PASS	

PRESSURE DIFFERENTIAL TEST

Standard Closure

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))
FILL CAPACITY:	Maximum Capacity	
CLOSURE APPLICATION:	Refer to Section II	
CONDITIONING:	Ambient	
TEST PRESSURE:	95 kPa	
TEST DURATION:	30 Minutes	
AREA OF PRESSURIZATION:	Through the Bottom	
TEST EQUIPMENT:	Regulated Water Source Digital Pressure Gauge #: 605	

HYDROSTATIC PRESSURE TEST SET-UP AND RESULTS


	Sample #	Results	Comments/Observations
	1	PASS	All three samples maintained the 95 kPa test pressure for 30 minutes without leakage.
	2	PASS	
	3	PASS	

VIBRATION TEST

#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:	Ambient	
TABLE DISPLACEMENT:	1"	
TEST FREQUENCY:	3.8 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
	9	PASS	No leakage or damage.
	10	PASS	
	11	PASS	

VIBRATION TEST

#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:	Ambient	
TABLE DISPLACEMENT:	1"	
TEST FREQUENCY:	3.8 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
	20	PASS	No leakage or damage.
	21	PASS	
	22	PASS	

VIBRATION TEST

#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:	Ambient	
TABLE DISPLACEMENT:	1"	
TEST FREQUENCY:	3.8 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	

VIBRATION TEST

#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:	Ambient	
TABLE DISPLACEMENT:	1"	
TEST FREQUENCY:	3.8 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
	36	PASS	No leakage or damage.
	37	PASS	
	38	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	
Sample #	Water Absorbed
1	110.0 g/m ²
2	106.0 g/m ²
3	103.0 g/m ²
4	102.0 g/m ²
5	100.0 g/m ²
AVERAGE:	104.2 g/m²
RESULT	PASS

REGULATORY AND INDUSTRY STANDARD REFERENCES

REGULATORY REFERENCES

TEST	49 CFR ^①	UN ^②	IMDG ^③	ICAO ^④	IATA ^⑤
	October 2017 Edition	20 th Edition	2016 Edition	2017-2018 Edition	59 th Edition
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	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 Goods by Air (ICAO)

⑤ International Air Transport Association (IATA) Dangerous Goods Regulations

INDUSTRY STANDARD REFERENCES

Drop:	ASTM ^⑥ D5276:	Standard Test Method for Drop Test of Loaded Containers by Free Fall
	ASTM ^⑥ D7790	Standard Test Method for the Preparation of Plastic Packagings Containing Liquids for United Nations (UN) Drop Testing
	ISO ^⑦ 2248:	Packaging – Complete, Filled Transport Packages – Vertical Impact Test by Dropping
Stacking:	ASTM ^⑥ D4577:	Standard Test Method for Compression Resistance of a Container Under Constant Load
	ISO ^⑦ 2234:	Packaging – Complete, Filled Transport Packages – Stacking Test using Static Load
Hydrostatic Pressure:	ASTM ^⑥ D7660:	Standard Guide for Conducting Internal Pressure Tests on United Nations (UN) Packagings
Vibration:	ASTM ^⑥ D999:	Standard Test Method for Vibration Testing of Shipping Containers
	ISO ^⑦ 2247:	Packaging – Complete, Filled Transport Packages – Vibration Test at Fixed Low Frequency
Cobb:	ISO ^⑦ 535:	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

#1 & #2

INFORMATION USED FOR CALCULATIONS

Overall Packaging Tare Weight (PTW):	1,257.0 Grams	
Overflow Capacity (OFC):		Methanol/Water
Methanol/Water	3,928.5 Grams	SG: 0.970
Water	4,050.0 Grams	
Number of Inner Packagings (# IP):	4	
Packing Group	II	
Product Specific Gravity (PSG):	1.400	
Packing Group Multiplication Factor (MF):	1.00	
Overall Height of one Package (OH):	13.88 Inches	
Stack Test-# of Samples Tested Simultaneously:	1	

98% OF OVERFLOW

Overflow Capacity (OFC) x 98%

OFC	x	98%		
3,928.5	x	98% =	3,850.0 Grams	Methanol/Water
4,050.0	x	98% =	3,969.0 Grams	Water

PACKAGE TEST WEIGHTS

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

PTW	+	(98% OFC	x	# IP)	
1,257	+	3,850.0	x	4	Methanol/Water
1,257	+	3,969.0	x	4	Water
Methanol/Water:		16.6	Kg	36.5	Lbs.
Water:		17.1	Kg	37.6	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)
1,257	+	1.4	x	3,969	x	4
		23.4	Kg	51.5	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	
1.4	x	1.00			
		1.40	Meter	Required Drop Height	Actual Drop Height
				55.1 Inches	56 Inches

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

(118)	/	OH)	-1	=	# 3m HS
118	/	13.88	-1	=	7.6

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	
23.4	x	7.6	
			177.9 Kg 392.2 Lbs.

SECTION IV: MATHEMATICAL CALCULATIONS

#3 & #4

INFORMATION USED FOR CALCULATIONS

Overall Packaging Tare Weight (PTW):	1,245.0 Grams	
Overflow Capacity (OFC):		Methanol/Water
Methanol/Water	3,928.5 Grams	SG: 0.970
Water	4,050.0 Grams	
Number of Inner Packagings (# IP):	4	
Packing Group	II	
Product Specific Gravity (PSG):	1.400	
Packing Group Multiplication Factor (MF):	1.00	
Overall Height of one Package (OH):	13.88 Inches	
Stack Test-# of Samples Tested Simultaneously:	1	

98% OF OVERFLOW

Overflow Capacity (OFC) x 98%

OFC	x	98%		
3,928.5	x	98% =	3,850.0 Grams	Methanol/Water
4,050.0	x	98% =	3,969.0 Grams	Water

PACKAGE TEST WEIGHTS

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

PTW	+	(98% OFC)	x	# IP)	
1,245	+	3,850.0	x	4	Methanol/Water
1,245	+	3,969.0	x	4	Water
Methanol/Water:		16.6	Kg	36.5	Lbs.
Water:		17.1	Kg	37.6	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)
1,245	+	1.4	x	3,969	x	4
		23.4	Kg	51.5	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	
1.4	x	1.00			
		1.40	Meter	Required Drop Height	Actual Drop Height
				55.1 Inches	56 Inches

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

(118)	/	(OH)	-1	=	# 3m HS
118	/	13.88	-1	=	7.6

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	
23.4	x	7.6	
			177.9 Kg 392.2 Lbs.