

**UNITED NATIONS / DOT  
PERFORMANCE CERTIFICATION**



**31HH1 DESIGN QUALIFICATION**

**1000 Liter All Plastic Composite Euro Pallet IBC with  
2" Vented and Non-Vented Bung Closures and  
Entegris QC II Dip Tube**

**TEST REPORT #: 20-MN40060**



31HH1 / Y / \* / USA / +AA10038 / 0 / 2010

\* Insert the month and year (last two digits) of manufacture

**TESTING PERFORMED FOR:**

**RIKUTEC AMERICA INC.**

371 Douglas Road  
Whitinsville, MA 01588

**ATTN: Mario Puzo**

**TESTING PERFORMED BY:**

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

1666 County Road 74  
Newport, MN 55055  
Phone: 651-459-0671  
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July 9, 2020

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## NOTES AND COMMENTS

Rikutec manufactures 1000 liter IBC designs with Framed and Euro style pallet bases. The Inner Bottle, Outer Shell (box) and Cover are the same for all designs. The following test reports contain documentation for the variety of closures, gaskets and fittings intended to be used on any of the IBC designs:

- **Test Report 20-MN40058:** Framed Pallet with 2" Vented and Non-Vented Bung Closures, and QC II Dip Tube
- **Test Report 20-MN40059:** Framed Pallet with 2" Non-Vented Bung Closures, and QC II Dip Tube
- **Test Report 20-MN40060:** Euro Pallet with 2" Vented and Non-Vented Bung Closures and ENTEGRIS QC II Dip Tube

All three designs will be marked to 2010 Kg and will be covered under the same UN certification (+AA10038).

**SECTION I: CERTIFICATION**

**DESIGN QUALIFICATION of the Rikutec America Inc.  
 1000 Liter All Plastic Composite Euro Pallet IBC with 2" Vented and Non-Vented Bung Closures  
 and Entegris QC II Dip Tube**

TEN-E Packaging Services, Inc. is a current DOT UN Third-Party Certification Agency under §107.403 and certifies that the Rikutec America Inc. 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 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
Vibration	178.819	3.3 Hz – 1 Hour	Water	July 6, 2020	PASS
Bottom Lift	178.811	2,697.0 Kg	Water	July 6, 2020	PASS
Leakproofness	178.813	20 kPa – 10 Minutes	Empty	July 7, 2020	PASS
Hydrostatic	178.814	110 kPa – 10 Minutes	Water	July 7, 2020	PASS
Drop	178.810	1.9 m	Methanol/Water	July 9, 2020	PASS
<b>TEST REPORT NUMBER:</b>			20-MN40060		
<b>UN MARKING: (CFR 49 – 178.703)</b>				31HH1 / Y / * / USA / +AA10038 / 0 / 2010	
<b>PACKAGING IDENTIFICATION CODE:</b>			31HH1 (178.707 Composite IBC)		
<b>PERFORMANCE STANDARD:</b>			Y (Packaging meets Packing Group II and III tests)		
<b>MONTH AND YEAR OF MANUFACTURE:</b>			*		
<b>STATE AUTHORIZING ALLOCATION OF THE MARK:</b>			USA		
<b>PACKAGING CERTIFICATION AGENCY:</b>			(+AA) TEN-E Packaging Services, Inc. (Newport, MN CAA #2006030022)		
<b>THIRD PARTY PACKAGING IDENTIFICATION:</b>			+AA10038		
<b>STACKING TEST LOAD:</b>			0 Kg (IBC is Not Intended to be Stacked in Transportation)		
<b>MAXIMUM PERMISSIBLE GROSS MASS:</b>			2,010 Kg (4,431 Lbs.)		
<b>PERIODIC DESIGN REQUALIFICATION DATE:</b>			July 9, 2021		
<b>ADDITIONAL REQUIRED RIGID PLASTIC &amp; COMPOSITE IBC MARKINGS (CFR 49 – 178.703(b)):</b>					
<b>RATED CAPACITY AT 20°C (liters):</b>			1000 Liters		
<b>TARE MASS (Kg):</b>			Insert individual IBC tare mass		
<b>GAUGE TEST PRESSURE (kPa):</b>			110 kPa		
<b>DATE OF LAST LEAKPROOFNESS TEST:</b>			Insert Month & Year of Last Leakproofness Test		
<b>DATE OF LAST INSPECTION:</b>			Insert Month & Year of Last Inspection		

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 Rikutec America Inc. for services rendered. In the event of future changes to the above referenced test standards, it is the responsibility of Rikutec America Inc. 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.

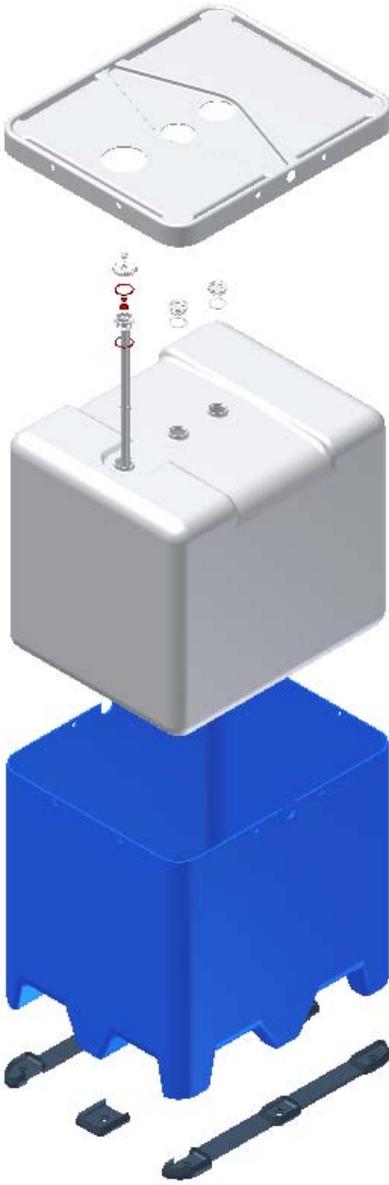
**MANUFACTURER:**  
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**SECTIONS II & V: PACKAGING DESCRIPTIONS / COMPONENT DRAWINGS**

**1000 Liter All Plastic Composite Euro Pallet IBC with 2" Vented and Non-Vented Bung Closures and Entegris QC II Dip Tube**

ASSEMBLY DRAWING	TEST LEVELS			
	Certification Type:	Design Qualification		
	Packaging Code Designation:	31HH1		
	Packing Group:	II		
	Specific Gravity:	1.9		
	Test Pressure:	110 kPa		
	<b>TEST SAMPLE PREPARATION</b> (Refer to Section IV)			
	Overall IBC Tare Weight: (Sample #1)	96.0 Kg		
	Overall IBC Tare Weight: (Sample #2)	92.0 Kg		
	Net Fill Weight (98% Maximum Capacity):			
	Water (Sample #1)	1,013.4 Kg		
	Methanol/Water (Sample #2)	972.2 Kg		
	IBC Test Weight:			
	Water (Sample #1)	1,109.4 Kg	2,445.7 Lbs.	
	Methanol/Water (Sample #2)	1,064.2 Kg	2,346.1 Lbs.	
	Maximum Permissible Gross Mass: 2,021.4 Kg 4,456.3 Lbs.			
(IBC will be marked to 2,010 Kg for the UN gross mass marking)				
<b>CLOSING METHODS</b>				
<b>2" PP Closed Bung:</b>				
Application Torque:	25 Ft-Lbs.			
<b>2" PP Vented Plug:</b>				
Application Torque:	25 Ft-Lbs.			
<b>Entegris QC II Drum Insert:</b>				
Application Torque:	20 Ft-Lbs.			
<b>Entegris QC II Shipping Cap:</b>				
Application Torque:	7 Ft-Lbs.			
<b>Entegris QC II 3/4" Plug Shipping Cap:</b>				
Application Torque:	5 Ft-Lbs.			
All closures torqued using Equipment: Torque Wrench #740				

**COMPONENT INFORMATION**

CLOSURE (K12992-PP)		DRAWING
<b>Manufacturer: AS Stromungstechnik, Ostfildern, Germany</b>		
<b>Description:</b>	2" Non-Vented Buttress Threaded Plug	
<b>Quantity:</b>	2	
<b>Material:</b>	Polypropylene, Natural	
<b>Tare Weight:</b>	35.717 Grams	
<b>Overall Dimensions:</b>		
• <b>Height</b>	33 mm (1.30")	
• <b>Diameter</b>	80 mm (3.15")	
<b>Thread Dimensions:</b>		
• <b>Major Diameter:</b>	61.9 mm (2.44")	
• <b>Minor Diameter:</b>	55.6 mm (2.19")	
<b>Markings (QC Audit):</b>	as	
<b>PE Profile Gasket (K12993):</b>		
<b>Description:</b>	S62 Seal Ring, Natural Polyethylene Profile Gasket	
<b>Tare Weight:</b>	2.541 Grams	
<b>Thickness:</b>	3.8 mm (0.15")	
<b>Diameter:</b>	72.5 mm (2.85")	

CLOSURE (K13011-PP)		DRAWING
<b>Manufacturer: AS Stromungstechnik, Ostfildern, Germany</b>		
<b>Description:</b>	2" Vented Buttress Threaded Plug	
<b>Quantity:</b>	1	
<b>Material:</b>	Polypropylene, Natural with Microporous PTFE Vent	
<b>Tare Weight:</b>	35.668 Grams	
<b>Overall Dimensions:</b>		
• <b>Height</b>	35 mm (1.38")	
• <b>Diameter</b>	80 mm (3.15")	
<b>Thread Dimensions:</b>		
• <b>Major Diameter:</b>	61.9 mm (2.44")	
• <b>Minor Diameter:</b>	55.6 mm (2.19")	
<b>Markings (QC Audit):</b>	as	
<b>PE Profile Gasket (K12993):</b>		
<b>Description:</b>	S62 Seal Ring, Natural Polyethylene Profile Gasket	
<b>Tare Weight:</b>	2.511 Grams	
<b>Thickness:</b>	3.8 mm (0.15")	
<b>Diameter:</b>	72.5 mm (2.85")	

3/4" PLUG		DRAWING
<b>Manufacturer: Entegris, Chaska, MN</b>		
<b>Description:</b>	3/4" NPT Threaded Plug	
<b>Quantity:</b>	1	
<b>Material:</b>	High Density Polyethylene, Natural	
<b>Tare Weight:</b>	4.587 Grams	
<b>Overall Dimensions:</b>		
• <b>Height</b>	14.9 mm (0.59")	
• <b>Diameter</b>	29.5 mm (1.16")	
<b>Thread Dimensions:</b>		
• <b>T</b>	25.9 mm (1.02")	
• <b>E</b>	23.3 mm (0.92")	
<b>Markings (QC Audit):</b>	None	
<b>CLOSURE</b>		
<b>Manufacturer: Entegris, Chaska, MN</b>		
<b>Description:</b>	QC II Shipping Cap for Drum Insert	
<b>Quantity:</b>	1	
<b>Material:</b>		
• <b>Inner</b>	PFA, Natural	
• <b>Outer</b>	Polyethylene, Natural	
<b>Tare Weight:</b>	78 Grams	
<b>Overall Dimensions:</b>		
• <b>Height</b>	28.3 mm (1.11")	
• <b>Diameter</b>	100.7 mm (3.96")	
<b>Thread Dimensions:</b>		
• <b>Major Diameter</b>	74.0 mm (2.91")	
• <b>Minor Diameter</b>	70.2 mm (2.76")	
<b>Thread Dimensions:</b>		
• <b>Major Diameter</b>	26.6 mm (1.05")	
• <b>Minor Diameter</b>	24.0 mm (0.94")	
<b>Markings (QC Audit):</b>	PATENT NO. 5,108,015 Entegris Symbol	

DIP TUBE – QC II DRUM INSERT		DRAWING
<b>Manufacturer: Entegris, Chaska, MN</b>		
<b>Description:</b>	QC II Threaded Drum Insert with Dip Tube and Secondary Tube	
<b>Quantity:</b>	1	
<b>Material:</b>	PFA, Natural	
<b>Tare Weight:</b>	681 Grams	
<b>Overall Dimensions:</b>		
• <b>Height</b>	Insert: 36.3 mm (1.43") With Dip Tube: 1,030.7 mm (40.58")	
• <b>Diameter</b>	73.4 mm 2.89"	
<b>Thread Dimensions (Container - Side):</b>		
• <b>Major Diameter</b>	62.8 mm (2.47")	
• <b>Minor Diameter</b>	55.7 mm (2.19")	
<b>Thread Dimensions (Shipping Cap - Side):</b>		
• <b>Major Diameter</b>	72.8 mm (2.87")	
• <b>Minor Diameter</b>	69.1 mm (2.72")	
<b>Markings (QC Audit):</b>	445 0520-15389351-22	
<b>Gasket</b>		
<b>Description:</b>	Large, Medium, and Small Internal FEP Encapsulated O-Rings	
<b>Large Gasket:</b>		
• <b>Tare Weight</b>	2.964 Grams	
• <b>Thickness</b>	3.3 mm (0.13")	
• <b>Diameter</b>	57.4 mm (2.26")	
<b>Medium Gasket:</b>		
• <b>Tare Weight</b>	1.835 Grams	
• <b>Thickness</b>	3.6 mm (0.14")	
• <b>Diameter</b>	37.0 mm (1.46")	
<b>Small Gasket:</b>		
• <b>Tare Weight</b>	0.592 Grams	
• <b>Thickness</b>	2.5 mm (0.10")	
• <b>Diameter</b>	22.4 mm (0.88")	
<b>O-Ring</b>		
<b>Description:</b>	Outer Bottom FEP Encapsulated O-Ring	
<b>Tare Weight:</b>	9.150 Grams	
<b>Thickness:</b>	6.1 mm (0.24")	
<b>Diameter:</b>	77.7 mm (3.06")	

PLASTIC INNER RECEPTACLE (T-1000L) (11000034)		DRAWING
<b>Manufacturer: Rikutec America, Inc., Whitinsville, MA</b>		
<b>Description:</b>	Rikutec 1000 Liter Rigid Inner Receptacle with (3) 2" Buttress Threaded Top Fill Port Openings	
<b>Material:</b>	High Density Polyethylene, Natural	
<b>Resin Type:</b>	Two Layer Wall Design: <ul style="list-style-type: none"> <li>• Inside: Lupolen 4261 A Q149</li> <li>• Outside: Lupolen 4261 AG UV 60005</li> </ul>	
<b>Method of Manufacture:</b>	Blow Molded	
<b>Tare Weight:</b>	47.4 Lbs. (21.5 Kg)	
<b>Capacity:</b>		
• <b>Rated</b>	1,000 Liter	
• <b>Overflow</b>	273.2 Gallons (1,034.0 Liter)	
<b>Overall Dimensions:</b>		
• <b>Length</b>	1,155.7 mm (45.50")	
• <b>Width</b>	962.5 mm (37.88")	
• <b>Height</b>	1,044.7 mm (41.13")	
<b>2" Fill Port Opening Thread Dimensions</b>		
• <b>Major Diameter</b>	64.8 mm (2.55")	
• <b>Minor Diameter</b>	57.1 mm (2.25")	
<b>Dip Tube Opening Thread Dimensions</b>		
• <b>Major Diameter</b>	64.8 mm (2.55")	
• <b>Minor Diameter</b>	57.4 mm (2.26")	
<b>Wall Thickness (Minimum):</b>	2.387 mm (0.09")	
<b>Markings (QC Audit):</b>	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; flex-direction: column; justify-content: center; align-items: center; margin-right: 5px;"> <span style="font-size: 8px;">u</span> <span style="font-size: 8px;">n</span> </div> <div> <p>31HH1 / Y / 12 19 / D / BAM 6808-RIKUTEC</p> <p>RIKUTEC D-57610 Altenkirchen Made in Germany SPI "2" PE-HD Recycling Symbol</p> </div> </div>	

COVER – POLY BOX		DRAWING
<b>Manufacturer: Rikutec America, Inc., Whitinsville, MA</b>		
<b>Description:</b>	Top Cover with (3) Access Holes Secured to Tote with (8) Plastic Pins	
<b>Quantity:</b>	1	
<b>Material:</b>	High Density Polyethylene, Natural	
<b>Tare Weight:</b>	10.5 Kg (23.1 Lbs.)	
<b>Overall Dimensions:</b>		
• <b>Length</b>	1,212.9 mm (47.75")	
• <b>Width</b>	1,003.3 mm (39.50")	
• <b>Height</b>	962.2 mm (37.88)	
• <b>Small Hole Diameter</b>	142.0 mm (5.63")	
• <b>Large Hole Diameter</b>	177.8 mm (7.00")	
<b>Markings (QC Audit):</b>	<p> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">u n</span> 31HH1 / Y / 12 19 / D / BAM /6808                      RIKUTEC/ 3314 / 2070 / TR6F142                      POLY-IBC UC 1000                      Max Capacity 1050 Liter / Tare 96kg                      Gauge of Pressure" 100 kPa                      SPI "2" PE HD Recycling Symbol                      Hersteller: RIKUTEC Richter                      Kunststofftechnik GmbH &amp; Co. KG Graf-                      Zeppelin-Strasse 5, D57610 Alten Kirchen                      Germany (0) 2681 9546-0                 </p>	
<b>EURO BASE – POLY BOX</b>		
<b>Manufacturer: Rikutec America, Inc., Whitinsville, MA</b>		
<b>Description:</b>	4-Way Entry Plastic Outer Tote with Molded Pallet Feet and Bottom Detachable Plastic Euro Pallet with (8) Plastic Screws and Bolts	
<b>Quantity:</b>	1	
<b>Material:</b>	High Density Polyethylene, Blue and Black	
<b>Tare Weight:</b>	62.5 Kg (137.8 Lbs.) (with Bottom Frame)	
<b>Overall Dimensions:</b>		
• <b>Length</b>	1,193.8 mm (47.00")	
• <b>Width</b>	990.6 mm (39.00")	
• <b>Height</b>	1,168.4 mm (46.00")	
<b>Markings (QC Audit):</b>		
• <b>Frame</b>	SPI "2" PE-HD Recycling Symbol	
• <b>Box</b>	None	

**SECTION III: TEST PROCEDURES AND RESULTS**

**VIBRATION TEST**

TEST INFORMATION		TEST CRITERIA
<b>TEST CONTENTS:</b>	Water	<ul style="list-style-type: none"> <li>An IBC passes the vibration test if there is no rupture or leakage. (§178.819)</li> </ul>
<b>SAMPLE PREPARATION:</b>	Refer to Section II	
<b>CONDITIONING:</b>	Ambient	
<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. 6000 Transportation Simulator	

**VIBRATION TEST SET-UP AND RESULTS (SAMPLE #1)**

			Results	Comments/Observations
			<b>PASS</b>	<p>The IBC met the criteria for passing the test.</p> <p>No leakage or damage.</p>

**BOTTOM LIFT TEST**

TEST INFORMATION		TEST CRITERIA
<b>TEST CONTENTS:</b>	Water	<ul style="list-style-type: none"> <li>For all IBC design types designed to be lifted from the base, there may be no permanent deformation which renders the IBC unsafe for transportation and no loss of contents. (§178.811)</li> </ul>
<b>SAMPLE PREPARATION:</b>	Refer to Section II	
<b>CONDITIONING:</b>	Ambient	
<b>NUMBER OF LIFTS:</b>	8 (Four-Way Entry with 2 Lifts per Direction of Entry)	
<b>FORK TINE PENETRATION:</b>	Entry 1 & 2: 36" Entry 3 & 4: 30"	
<b>COMBINED GROSS MASS LIFTED:</b>	2,697.0Kg (5,945.8 Lbs.) (Refer to Section IV)	
<b>TEST EQUIPMENT:</b>	Fork Truck Dead Load Weights	

**BOTTOM LIFT TEST SET-UP AND RESULTS (SAMPLE #1)**

Direction of Entry #1:	Direction of Entry #2:	Direction of Entry #3:	Direction of Entry #4:
			
Results		Comments/Observations	
Lift #1: <b>PASS</b>	Lift #5: <b>PASS</b>	The IBC met the criteria for passing the test.  No leakage or damage.	
Lift #2: <b>PASS</b>	Lift #6: <b>PASS</b>		
Lift #3: <b>PASS</b>	Lift #7: <b>PASS</b>		
Lift #4: <b>PASS</b>	Lift #8: <b>PASS</b>		

**LEAKPROOFNESS TEST**

TEST INFORMATION		TEST CRITERIA
<b>TEST CONTENTS:</b>	Empty	<ul style="list-style-type: none"> <li>For all IBC design types intended to contain solids that are loaded or discharged under pressure or intended to contain liquids, there may be no leakage of air from the IBC.</li> </ul> <p>(§178.813)</p>
<b>SAMPLE PREPARATION:</b>	Refer to Section II	
<b>CONDITIONING:</b>	Ambient	
<b>TEST PRESSURE:</b>	20 kPa	
<b>TEST DURATION:</b>	10 Minutes	
<b>AREA OF PRESSURIZATION:</b>	Through Top Closure	
<b>TEST EQUIPMENT:</b>	Regulated Air Source #: 2 Pressure Gauge #:615 & 641	

**LEAKPROOFNESS TEST SET-UP AND RESULTS (SAMPLE #1)**

Set-Up Photo	Leakproofness Photo	Leakproofness Photo
		
Results	Comments/Observations	
Pass	The IBC met the criteria for passing the test. No leakage.	

**HYDROSTATIC PRESSURE TEST**

TEST INFORMATION		TEST CRITERIA
<b>TEST CONTENTS:</b>	Water	<ul style="list-style-type: none"> <li>For rigid plastic and composite IBC design types intended to contain solids loaded or discharged under pressure or intended to contain liquids, there may be no leakage and no permanent deformation which renders the IBC unsafe for transportation. (§178.814)</li> </ul>
<b>WATER TEMPERATURE:</b>	21.9°C (71.4°F)	
<b>FILL CAPACITY:</b>	Maximum Capacity	
<b>SAMPLE PREPARATION:</b>	Refer to Section II	
<b>CONDITIONING:</b>	Ambient	
<b>TEST PRESSURE:</b>	110 kPa	
<b>TEST DURATION:</b>	10 Minutes	
<b>AREA OF PRESSURIZATION:</b>	Through Top Closure	
<b>TEST EQUIPMENT:</b>	Regulated Water Source #: 2 Pressure Gauge #: 615 & 641	

**HYDROSTATIC PRESSURE TEST SET-UP AND RESULTS (SAMPLE #1)**

Set-Up Photo	Hydrostatic Pressure Photo	Hydrostatic Pressure Photo
		
<b>Results</b>	<b>Comments/Observations</b>	
Pass	The IBC met the criteria for passing the test. No leakage.	

**DROP TEST**

TEST INFORMATION		TEST CRITERIA
<b>TEST CONTENTS:</b>	Methanol/Water Solution (0.968 SG)	<ul style="list-style-type: none"> <li>For all IBC design types, there may be no damage which renders the IBC unsafe to be transported for salvage or for disposable, and no loss of contents.</li> <li>The IBC shall be capable of being lifted by an appropriate means until clear of the floor for five minutes.</li> <li>A slight discharge from closures upon impact is not considered a failure provided that no further leakage occurs. (§178.810)</li> </ul>
<b>SAMPLE PREPARATION:</b>	Refer to Section II	
<b>CONDITIONING:</b>	-18°C (0°F) Chamber #202	
<b>TEST CONTENTS TEMP.:</b>	-18.1°C (-0.6°F)	
<b>DROP HEIGHT:</b>	1.9 Meters (75.0") (Refer to Section IV)	
<b>DROP ORIENTATION:</b>	Most Vulnerable Part of Base	
<b>TEST EQUIPMENT:</b>	Quick Release Hook Mechanism 5 Ton Overhead Hoist	

**DROP TEST SET-UP AND RESULTS (SAMPLE #2)**

Set-Up Photo	Post Drop Photo	Post Drop Photo
		
Results	Comments/Observations	
<b>Pass</b>	The IBC met the criteria for passing the test. Vertical crack on the front corner of the outer shell upon impact. No leakage.	

## REGULATORY AND INDUSTRY STANDARD REFERENCES

### REGULATORY REFERENCES

TEST	49 CFR <sup>①</sup>	UN <sup>②</sup>	IMDG <sup>③</sup>
	October 2019 Edition	20 <sup>th</sup> Edition	2018 Edition
<b>Vibration:</b>	178.819	6.5.6.13	---
<b>Bottom Lift:</b>	178.811	6.5.6.4	6.5.6.4
<b>Leakproofness:</b>	178.813	6.5.6.7	6.5.6.7
<b>Hydrostatic Pressure:</b>	178.814	6.5.6.8	6.5.6.8
<b>Drop:</b>	178.810	6.5.6.9	6.5.6.9

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)

### INDUSTRY STANDARD REFERENCES

<b>Vibration:</b>	ASTM <sup>④</sup> D7387:	Standard Test Method for Vibration Testing of IBCs Used for Shipping Liquid Hazardous Materials (Dangerous Good)
	ISO <sup>⑤</sup> 2247:	Packaging – Complete, Filled Transport Packages – Vibration Test at Fixed Low Frequency
<b>Pressure:</b>	ASTM <sup>④</sup> D8134:	Standard Guide for Conducting Internal Hydrostatic Pressure Tests on United Nations (UN) IBC Design Types
<b>Drop:</b>	ASTM <sup>④</sup> D5276:	Standard Test Method for Drop Test of Loaded Containers by Free Fall
	ASTM <sup>④</sup> D7790:	Standard Test Method for the Preparation of Plastic Packagings Containing Liquids for United Nations (UN) Drop Testing
	ISO <sup>⑤</sup> 2248:	Packaging – Complete, Filled Transport Packages – Vertical Impact Test by Dropping

④ American Society for Testing and Materials (ASTM)

⑤ 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 IBC Tare Weight (IBCTW)- <b>Sample 1:</b>	96.0 Kg		
Overall IBC Tare Weight (IBCTW)- <b>Sample 2:</b>	92.0 Kg		
Overflow Capacity (OFC):			
Methanol/Water	992.0 Kg		
Water	1,034.0 Kg		
Actual Load Applied for Bottom Lift (BLALA):	3,500.0 Lbs.	<b>Min Wt To Be Applied</b>	
Packing Group	II	3,122.1	Lbs. (Btm Lift)
Product Specific Gravity (PSG):	1.9		
Packing Group Multiplication Factor (MF):	1.00		
# of IBC Stacked During Transportation (#IBC):	0		

**98% OF OVERFLOW**

Overflow Capacity (OFC) x 98%

<u>OFC</u>	x	<u>98%</u>			
1,034.0	x	98% =	<b>1,013.4 Kg</b>	Water	<b>Sample #1</b>
992.0	x	98% =	<b>972.2 Kg</b>	Methanol/Water	<b>Sample #2</b>

**IBC TEST WEIGHT (IBCW)**

Overall IBC Tare Weight (IBCTW) + 98% Overflow Capacity (OFC)

<u>IBCTW</u>	+	<u>98% OFC =</u>			
96.0	+	1,013.4	<b>1,109.4 Kg</b>	<b>2,445.7 Lbs. Water</b>	<b>Sample #1</b>
92.0	+	972.2	<b>1,064.2 Kg</b>	<b>2,346.1 Lbs. Methanol/Wate</b>	<b>Sample #2</b>

**AUTHORIZED IBC GROSS MASS (AIBCGM)**

Overall IBC Tare Weight (IBCTW) + (Product SG (PSG) x 98% Overflow (OFC))

<u>IBCTW</u>	+	<u>(PSG</u>	x	<u>98% OFC)</u>	
96.0	+	1.9	x	1,013.4	
		<b>2,021.4 Kg</b>		<b>4,456.3 Lbs.</b>	

**BOTTOM LIFT CALCULATIONS**

The IBC must be loaded to 1.25 times the combined maximum permissible gross mass with load being evenly distributed

**Minimum Required Load**

Authorized IBC Gross Mass x 1.25

<u>AIBCGM</u>	x	<u>1.25</u>	=	<u>Minimum Required Load</u>		
2,021.4	x	1.25	=	<b>2,526.9 Kg</b>	<b>5,570.7</b>	<b>Lbs.</b>

**Combined Gross Mass Lifted**

Actual Load Applied (ALA) + IBC Test Weight (IBCW)

<u>IBCW</u>	+	<u>ALA</u>	=	<u>Total Load Lifted</u>		
1,109.4	+	1,587.6	=	<b>2,697.0 Kg</b>	<b>5,945.8</b>	<b>Lbs.</b>

**DROP HEIGHT**

**Calculation For Product Specific Gravities Exceeding 1.2**

Product Specific Gravity (PSG) x Packing Group Multiplication Factor (MF)

<u>PSG</u>	x	<u>MF</u>		<b>Packing Group:</b>	<b>II</b>
1.9	x	1.00		<u>Required Drop Height</u>	<u>Actual Drop Height</u>
		<b>1.90</b>	<b>Meter</b>	<b>74.8 Inches</b>	<b>75 Inches</b>