

**UNITED NATIONS / DOT
PERFORMANCE CERTIFICATION**



6HH1 DESIGN QUALIFICATION

**200 Liter Plastic Composite Twin Drum with
KTJ Quick Connect II and
KTJ Non-Vented Bung Closure**

TEST REPORT #: 23-MN30205



6HH1 / X1.9 / 250 / **
USA / +AA9938

**Insert the year packaging is manufactured

TESTING PERFORMED FOR:

RIKUTEC AMERICA, INC.
371 Douglas Road
Whitinsville, MA 01588

ATTN: Alex Pytka

TESTING PERFORMED BY:

TEN-E PACKAGING SERVICES, INC.
1666 County Road 74
Newport, MN 55055
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October 5, 2023

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NOTES AND COMMENTS

The drum tested under this report is the same drum design as tested under report 21-MN30117 but with the following changes:

- Changed gasket to PE flange
- Changed the bung closure manufacturer to KTJ


The packaging will retain the original +AA9938 certification.

SECTION I: CERTIFICATION

**Design Qualification of the Rikutec America, Inc.
 200 Liter Plastic Composite Twin Drum with KTJ Quick Connect II and
 KTJ Non-Vented Bung Closure**

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	49 CFR REFERENCE	TEST LEVEL	TEST CONTENTS	TEST COMPLETED	TEST RESULTS
Drop	178.603	2.85 m	Methanol/Water	October 5, 2023	PASS
Leakproofness	178.604	30 kPa – 5 Minutes	Empty	September 1, 2023	PASS
Hydrostatic	178.605	250 kPa - 30 Minutes	Water	October 2, 2023	PASS
Stacking	178.606	816.5 Kg – 28 Days	Water	September 29, 2023	PASS
Vibration	178.608	4.0 Hz – 1 Hour	Water	September 1, 2023	PASS
TEST REPORT NUMBER:			23-MN30205		
UN MARKING: (CFR 49 – 178.503)			 6HH1 / X1.9 / 250 / ** USA / +AA9938		
PACKAGING IDENTIFICATION CODE:			6HH1-Plastic Receptacle in Plastic Drum (178.522)		
PERFORMANCE STANDARD:			X (Packaging meets Packing Group I, II and III tests)		
MAXIMUM PRODUCT SPECIFIC GRAVITY:			1.9		
HYDROSTATIC TEST PRESSURE:			250 kPa		
YEAR OF MANUFACTURE:			** Insert year the packaging is manufactured		
STATE AUTHORIZING THE MARK:			USA		
PACKAGING CERTIFICATION AGENCY:			(+AA) TEN-E Packaging Services, Inc. (Newport, MN CAA #2006030022)		
THIRD PARTY PACKAGING IDENTIFICATION:			+AA9938		
PERIODIC RETEST DATE:			October 5, 2024		


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:
 Rikutec America, Inc.
 371 Douglas Road
 Whitinsville, MA 01588



 Tyler Kinderman
 Packaging Engineer
 TEN-E Packaging Services, Inc.
 1666 County Road 74
 Newport, MN 55055


SECTIONS II & V: PACKAGING DESCRIPTIONS / COMPONENT DRAWINGS


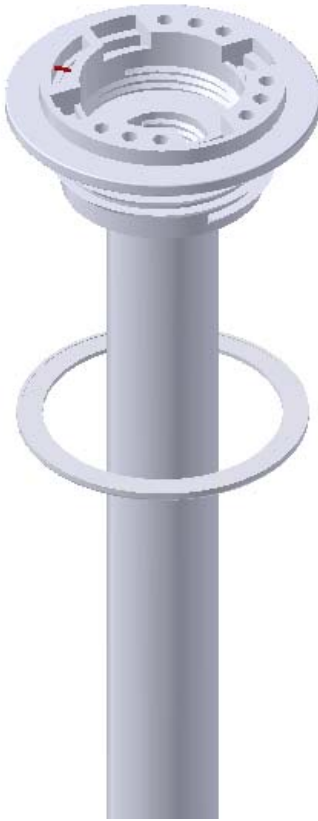
200 Liter Plastic Composite Twin Drum with KTJ Quick Connect II and KTJ Non-Vented Bung Closure

ASSEMBLY DRAWING	TEST LEVELS		
	Certification Type:	Design Qualification	
	Packaging Code Designation:	6HH1	
	Packing Group:	I	
	Specific Gravity:	1.9	
	Internal Pressure:	250 kPa	
	TEST SAMPLE PREPARATION (Refer to Section IV)		
	Overall Packaging Tare Weight:	16.3 Kg	
	Fill Capacity (98% Maximum Capacity):		
	Methanol/Water Solution	183.7 Kg	
	Water	191.0 Kg	
Package Test Weight:			
Methanol/Water Solution	200.0 Kg	440.9 Lbs.	
Water	207.3 Kg	457.0 Lbs.	
CLOSING METHODS			
KTJ 2" Closed Bung Closure:			
Application Torque:	25 Ft-Lbs.		
Equipment:	Torque Wrench #740		
KTJ Quick Connect II Dip Tube:			
Application Torque:	25 Ft-Lbs.		
Equipment:	Torque Wrench #740		
3/4" KTJ Quick Connect Shipping Cap:			
Application Torque:	6 Ft-Lbs.		
Equipment:	Torque Wrench #739		
1" Vent Plug:	Installed by Manufacturer		


COMPONENT INFORMATION

PRESSURE RELIEF PLUG			DRAWING
Manufacturer: Rikutec, Altenkirchen, Germany			
Description:	3/4" Threaded Pressure Relief Plug		
Quantity:	1		
Material:	Polypropylene, Yellow		
Tare Weight:	1.954 Grams		
Overall Dimensions:			
• Height	18.13 mm	0.71"	
• Diameter	27.76 mm	1.09"	
Thread Dimensions:			
• T	19.66 mm	0.77"	
• E	17.78 mm	0.70"	
Markings (QC Audit):	3	M20 x 1.5	

NON – VENTED PLUG (21300102)			DRAWING
Manufacturer: Kunststofftechnik Jaeger, Braunschweig, Germany			
Description:	2" Buttress Threaded Plug		
Quantity:	1		
Material:	Polyethylene, Natural		
Tare Weight:	34.023 Grams		
Overall Dimensions:			
• Height	33.11 mm	1.304"	
• Diameter	78.28 mm	3.082"	
Thread Dimensions:			
• T	61.92mm	2.438"	
• E	54.76 mm	2.156"	
Markings (QC Audit):	2		
PE FLANGE GASKET			
Description:	Polyethylene, Natural Flange Gasket		
Tare Weight:	5.364 Grams		
Thickness:	7.62 mm	0.300"	
Diameter:	75.69 mm	2.980"	

CLOSURE (41010066, DT-62PE-XXX-0900-TF)		DRAWING
Manufacturer: Kunststofftechnik Jaeger, Braunschweig, Germany		
Description:	1-1/2" Quick Connect II Threaded Sealing Cap	
Quantity:	1	
Material:	Polyethylene, Natural	
Tare Weight:	17.091 Grams	
Overall Dimensions:		
• Height	25.1 mm (0.99")	
• Diameter	75.7 mm (2.98")	
Thread Dimensions:		
• T	41.2 mm (1.62")	
• E	38.6 mm (1.52")	
Markings (QC Audit):	www.qc-system.com patented U.S. Pat. No. 6,357,494	
GASKET		
Description:	Polyethylene, Natural	
Tare Weight:	0.546 Grams	
Thickness:	2.8 mm (0.11")	
Diameter:	35.6 mm (1.40")	
DIP TUBE (41010066, DT-62PE-XXX-0900-TF)		
Manufacturer: Kunststofftechnik Jaeger, Braunschweig, Germany		
Description:	2" Quick Connect II Buttress Threaded Insert with Dip Tube and Bottom Flexible Bellow	
Quantity:	1	
Material:	Polyethylene, Natural	
Tare Weight:	136 Grams	
Overall Dimensions:		
• Height	900 mm (35.43") (with Dip Tube)	
• Insert Height	33.12 mm (1.304")	
• Diameter	79.0 mm (3.11")	
Thread Dimensions (2" Container - Side):		
• Major Diameter	62.0 mm (2.44")	
• Minor Diameter	54.6 mm (2.15")	
Thread Dimensions (1-1/2" Shipping Cap - Side):		
• Major Diameter	42.7 mm (1.68")	
• Minor Diameter	40.4 mm (1.59")	
Thread Dimensions (3/4" Plug - Side):		
• Major Diameter	26.6 mm (1.05")	
• Minor Diameter	24.0 mm (0.94")	
Markings (QC Audit):	K 9/21	
PE FLANGE GASKET		
Description:	Polyethylene, Natural Flange Gasket	
Tare Weight:	5.326 Grams	
Thickness:	7.66 mm 0.302"	
Diameter:	74.85 mm 2.947"	

BULKHEAD FITTING (9002568)		DRAWING
Manufacturer: Rikutec, Altenkirchen, Germany		
Description:	Plastic Threaded Clamping Nut	
Quantity:	2	
Material:	Black, Polyethylene	
Tare Weight:	0.5 Kg	
Overall Dimensions:		
• Height	13.5 mm (0.53")	
• Diameter	120.0 mm (4.72")	
Thread Dimensions:		
• T	85.52 mm (3.37")	
• E	81.30 mm (3.20")	
Markings (QC Audit):	None	
RUBBER PADS		
Description:	(2) Black Rubber Pads Placed Over Inner Drum Openings	
Tare Weight:	53 Grams	
Thickness:	4.11 mm (0.16")	
Diameter:	129.9 mm (5.11")	
TIGHT HEAD PLASTIC INNER DRUM (1220000)		DRAWING
Manufacturer: Rikutec, Altenkirchen, Germany		
Description:	200 Liter Tight Head Plastic Inner Drum	
Material/Pigment:	Polyethylene, Natural	
Method of Manufacture:	Blow Molded	
Tare Weight:	4.5 Kg	
Capacity:		
• Rated	200 Liter	
• Overflow	194.8 Kg (51.47 Gallons)	
Overall Dimensions:		
• Height	920.0 mm (36.22")	
• Overall Diameter	560.0 mm (22.04")	
• Bottom Diameter	492.5 mm (19.39")	
70 mm Opening Thread Dimensions:		
• T	65.0 mm (2.55")	
• E	57.68 mm (2.271")	
• Height	0.779"	
Outside Thread Dimensions on Opening for Bulk Head Fittings:		
• T	84.73 mm (3.34")	
• E	80.57 mm (3.17")	
Wall Thickness:		
• Minimum	2.0 mm (0.08")	
Markings (QC Audit):	221 / 6230	


TIGHT HEAD PLASTIC DRUM (12200003)		DRAWING
Manufacturer: Rikutec, Altenkirchen, Germany		
Description:	200 Liter Plastic Outer Drum to Contain Inner Drum	
Lifting Ring:	Fully Integrated	
Material/Pigment:	Polyethylene, Blue	
Method of Manufacture:	Blow Molded	
Tare Weight:	11.2 Kg	
Overall Dimensions:		
• Height	967.0 mm (38.07")	
• Diameter	578.0 mm (22.76")	
Opening Dimensions:		
Inside Diameter	102.6 mm (4.04")	
3/4" Fitting Thread Dimensions:		
• T	19.84 mm (0.78")	
• E	19.10 mm (0.75")	
Wall Thickness:		
• Minimum	4.0 mm (0.16")	
Markings (QC Audit):	<p>(u/n) 6HH1 / X1.9 / 320 / 0922 / D BAM14926 – RIKUTEC</p> <p>(u/n) 6HH1 / X1.9 / 320 / 23 / USA +AA9938</p> <p>RIKUTEC Dispense 09/22 Recirculation SPI "2" PE-HD Recycling Symbol</p>	

SECTION III: TEST PROCEDURES AND RESULTS


DROP TESTS

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Methanol/Water Solution (0.967 SG)	<ul style="list-style-type: none"> For packaging containing liquid, each packaging does not leak when equilibrium has been reached between the internal and external pressures. 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) Chamber #202	
TEST CONTENTS TEMP.:	-18.7°C (-1.7°F)	
DROP HEIGHT:	2.85 Meters (113") (Refer to Section IV)	
TEST EQUIPMENT:	Quick Release Hook Mechanism	

DIAGONAL TOP CHIME ON DIP TUBE DROP TEST SET-UP AND RESULTS

	Sample #	Results	Comments/Observations
	1	PASS	No leakage. The outer shell cracked at the inside ring of the top head.
	2	PASS	No leakage. The outer shell cracked at the inside ring of the top head.
	3	PASS	No leakage. The outer shell cracked at the inside ring of the top head.

FLAT ON SIDE ON DIP TUBE DROP TEST SET-UP AND RESULTS

	Sample #	Results	Comments/Observations
	4	PASS	No leakage. Slight deformation at point of impact.
	5	PASS	No leakage. Slight deformation at point of impact.
	6	PASS	No leakage. Slight deformation at point of impact.

LEAKPROOFNESS TEST

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Empty	<ul style="list-style-type: none"> A packaging passes the test if there is no leakage of air from the packaging. (§178.604)
CLOSURE APPLICATION:	Refer to Section II	
CONDITIONING:	Ambient	
TEST PRESSURE:	30 kPa	
TEST DURATION:	5 Minutes	
AREA OF PRESSURIZATION:	Through the Top Head	
TEST EQUIPMENT:	Regulated Air Source #: 1 Digital Pressure Gauge #: 613	

LEAKPROOFNESS PRESSURE TEST SET-UP AND RESULTS



Sample #	Results
7	PASS
8	PASS
9	PASS



Comments/Observations:

All three samples maintained the 30 kPa test pressure for 5 minutes without leakage

HYDROSTATIC PRESSURE TEST

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Water	<ul style="list-style-type: none"> For each test sample, there is no leakage of liquid from the package. (\$178.605)
WATER TEMPERATURE:	17.1°C (62.8°F)	
FILL CAPACITY:	Maximum Capacity	
CLOSURE APPLICATION:	Refer to Section II	
CONDITIONING:	Ambient	
TEST PRESSURE:	250 kPa	
TEST DURATION:	30 Minutes	
AREA OF PRESSURIZATION:	Through the Top Head	
TEST EQUIPMENT:	Regulated Water Source #: 2 Digital Pressure Gauge #: 641	

HYDROSTATIC PRESSURE TEST SET-UP AND RESULTS

		Sample #	Results
		10	PASS
		11	PASS
		12	PASS
<p>Comments/Observations: All three samples maintained the 250 kPa test pressure for 30 minutes without leakage.</p>			

STACKING & STACKING STABILITY TESTS

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Water	<ul style="list-style-type: none"> No test sample may leak. 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:	40°C (104°F) Chamber #201	
TEST LOAD APPLIED:	816.5 Kg (1,800.0 Lbs.) (Refer to Section IV)	
TEST DURATION:	28 Days	
TEST EQUIPMENT:	Guided Load Fixture w/ Dead Load Weight	

STACKING TEST SET-UP & RESULTS



Sample #	Maximum Deflection After 28 Days	Results
13	3/4"	PASS
14	7/8"	PASS
15	3/4"	PASS

Comments/Observations: Following the 28-day 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 TEST SET-UP & RESULTS




Results	CRITERIA FOR PASSING THE TEST
PASS	<ul style="list-style-type: none"> In guided load tests, stacking stability must be assessed after test completion. Two filled packagings of the same type must be placed on the test sample. The stacked packages must maintain their position for one hour. (§178.606)

For stack stability, TEN-E places the filled samples one on top of the other. The bottom sample is rotated to the top until all three samples have been subjected to stacking stability for one hour each.

VIBRATION TEST

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:	4.0 Hz	
TEST DURATION:	1 Hour	
TEST EQUIPMENT:	Vertical motion using L.A.B. 10000 Transportation Simulator	

VIBRATION TEST SET-UP AND RESULTS

	Sample #	Results	Comments/Observations
	10	PASS	No leakage or damage.
	11	PASS	
	12	PASS	

REGULATORY AND INDUSTRY STANDARD REFERENCES

REGULATORY REFERENCES					
TEST	49 CFR ^①	UN ^②	IMDG ^③	ICAO ^④	IATA ^⑤
	October 2022 Edition	22 nd Edition	2022 Edition	2023-2024 Edition	64 th Edition
Drop:	178.603	6.1.5.3	6.1.5.3	6;4.3	6.3.3
Leakproofness:	178.604 & 178; Appendix B (2) & (3)	6.1.5.4	6.1.5.4	6;4.4	6.3.4
Hydrostatic Pressure:	178.605	6.1.5.5	6.1.5.5	6;4.5	6.3.5
Stacking:	178.606	6.1.5.6	6.1.5.6	6;4.6	6.3.6
Vibration:	178.608	---	---	4;1.1.1 & 4;1.1.4	5.0.2.7

- 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 ^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
Hydrostatic Pressure:	ASTM ^⑥ D7660: Standard Guide for Conducting Internal Pressure Tests on United Nations (UN) Packagings
Stacking:	ASTM ^⑥ D8409: Standard Guide for Conducting Stacking Tests on UN Packagings Using Guided or Unguided Loads
	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
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

- 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

INFORMATION USED FOR CALCULATIONS

Overall Packaging Tare Weight (PTW):	16.3 Kg
Overflow Capacity (OFC):	
Methanol/Water	187.4 Kg
Water	194.8 Kg
Packing Group	I
Product Specific Gravity (PSG):	1.9
Packing Group Multiplication Factor (MF):	1.50
Nesting Height of one Package (NH):	37.88 Inches
Stack Test # of Samples Tested Simultaneously:	0

98% OF OVERFLOW

Overflow Capacity (OFC) x 98%

<u>OFC</u>	x	<u>98%</u>		
187.4	x	98% =	183.7 Kg	405.0 Lbs. Methanol/Water
194.8	x	98% =	191.0 Kg	421.1 Lbs. Water

PACKAGE TEST WEIGHT

Overall Pkg Tare Weight (PTW) + 98% Overflow Capacity (OFC)

<u>PTW</u>	+	<u>98% OFC =</u>		
16.3	+	183.7	200.0 Kg	440.9 Lbs. Methanol/Water
16.3	+	191.0	207.3 Kg	457.0 Lbs. Water

CALCULATED PACKAGE GROSS MASS (CPGM)

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

<u>PTW</u>	+	<u>(PSG</u>	x	<u>98% OFC)</u>	
16.3	+	1.9	x	191.0	
		379.2	Kg	836.0	Lbs.

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>		Packing Group:	I
1.9	x	1.50		<u>Required Drop Height</u>	<u>Actual Drop Height</u>
		2.85	Meter	112.2 Inches	113 Inches

STACK TEST MINIMUM LOAD CALCULATIONS

Number of Packages in a 3m High Stack (118.2 / Nesting Height (NH) -1)

118.2 / Nesting Height of one Pkg (NH) - 1

<u>(118.2</u>	/	<u>NH)</u>	<u>-1</u>	=	<u># 3m HS</u>
118.2	/	37.88	-1	=	2.1

Stack Test Load Calculation (Individual Package)

Calculated Pkg Gross Mass (CPGM) x # of Pkg in a 3m High Stack (# 3m HS)

<u>CPGM</u>	x	<u># 3m HS</u>		
379.2	x	2.1		
		796.4 Kg		1,755.7 Lbs.