



**UNITED NATIONS / DOT
PERFORMANCE CERTIFICATION**



1H1 DESIGN QUALIFICATION

**Greif 55 Gallon Tight Head HDPE Drum
with EPV Valve**

TEST REPORT #: 04-3107



1H1 / Y1.9 / 150 / **
USA / +AA4310

**Insert the year the packaging is manufactured

TESTING PERFORMED FOR:

MICRO MATIC
19791 Bahama Street
Northridge, CA 91324

ATTN: Henrik Rokkjaer

TESTING PERFORMED BY:

TEN-E Packaging Services, Inc.
1666 County Road 74
Newport, MN 55055
Phone: (651) 459-0671
Fax: (651) 459-1430

September 14, 2004

TABLE OF CONTENTS

Objective _____	3
-Brief overview of the report and referenced regulatory sources	
Test Sample Description _____	4-5
-Specifications for the tested package provided by the client	
Quality Control Audit Results _____	6-8
-Complete audit of the tested package compiled by TEN-E Packaging Services, Inc.	
Test Sample Preparation _____	9
-Summary of sample preparation and conditioning	
Test Procedures and Results _____	10-14
-Results of UN/DOT testing performed on the specified package by TEN-E Packaging Services, Inc.	
UN/DOT Package Certification _____	15
-Summary of UN/DOT certification for the specified package	
Appendix I _____	16
-Regulatory and Industry Standard References	

REPORT & SAMPLE INFORMATION
--

DATE LAST SAMPLES RECEIVED: September 10, 2004

TEST COMPLETED ON: September 14, 2004

SAMPLES:

- The samples tested arrived in good condition at TEN-E Packaging Services, Inc.
- The following results are based solely on the product samples provided by the manufacturer.

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN PERMISSION OF TEN-E PACKAGING SERVICES, INC.

OBJECTIVE

To certify the **Greif 55 Gallon Tight Head HDPE Drum with EPV Valve** to the Design Qualification performance requirements outlined in the Department of Transportation's Title 49 Code of Federal Regulations (CFR), Part 178:

- Subpart L - Non-Bulk Performance-Oriented Packaging Standards; Section 178.509
- Subpart M - Testing of Non-Bulk Packagings and Packages:

PACKAGING CODE DESIGNATION	PACKING GROUP	SPECIFIC GRAVITY	INTERNAL PRESSURE
1H1 Non-Removable Head Plastic Drum	II Medium Danger Hazardous Materials	Not Exceeding 1.9	150 kPa

This package is also certified for shipment under the International Regulatory Codes referenced in Appendix I. However, it is the responsibility of the shipper (end user) to determine package authorization for use under these hazardous materials regulations. Appendix I also references Industry Standards used in conducting this certification.

TEST SAMPLE DESCRIPTION

Greif 55 Gallon Tight Head HDPE Drum with EPV Valve

VALVE

DESCRIPTION:

Micro Matic EPV Valve Design with Dip Tube

MATERIAL: High Density Polyethylene

PIGMENT: White Valve with Natural Dip Tube

OVERALL DIMENSIONS:

- **Height:** Not Provided
- **Diameter:** Not Provided

THREAD DIMENSIONS:

- **T:** Not Provided
- **E:** Not Provided

GASKET: Black EPDM

SUPPLIER / MANUFACTURER:

Micro-Matic

2" NPS PLUG

DESCRIPTION:

2" Rieke® PPA-57 NPS Threaded Plug

MATERIAL: Polypropylene

PIGMENT: Natural

OVERALL DIMENSIONS:

- **Height:** Not Provided
- **Diameter:** Not Provided

THREAD DIMENSIONS:

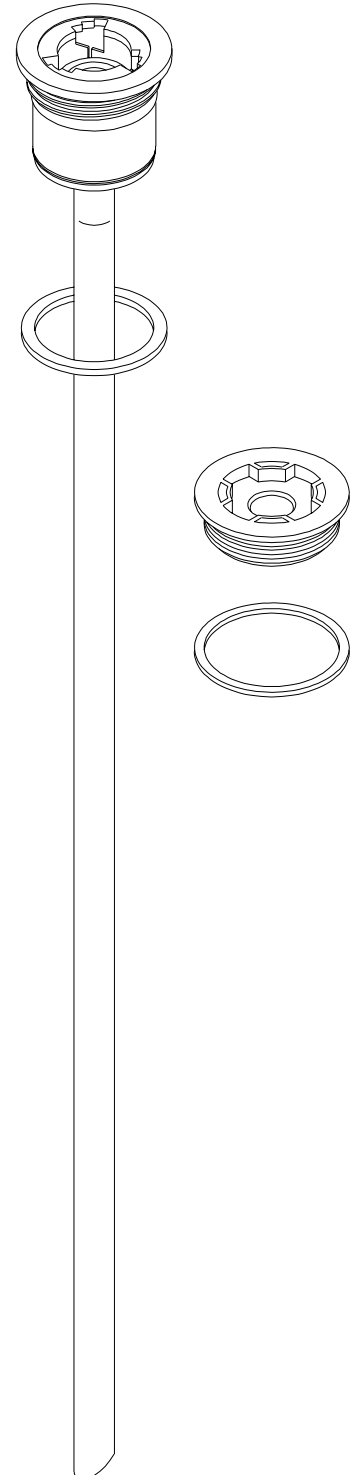
- **T:** Not Provided
- **E:** Not Provided

GASKET: EPDM

SUPPLIER / MANUFACTURER:

Rieke Packaging Systems

Contact packaging manufacturer for specifications.



TEST SAMPLE DESCRIPTION

Greif 55 Gallon Tight Head HDPE Drum with EPV Valve

DRUM

DESCRIPTION:

Greif GP55 One Piece Non-Removable Head Drum

MATERIAL:

High Density Polyethylene

CAPACITY:

- **Nominal:** 55.0 Gallons
- **Overflow:** Not Provided

OVERALL DIMENSIONS:

- **Top Diameter:** Not Provided
- **Btm. Diameter:** Not Provided
- **Height:** Not Provided

WALL THICKNESS:

- **Radius:** Not Provided
- **Sidewall:** Not Provided

TARE WEIGHT: Not Provided

DRUM OPENINGS:

- (1) 2" Buttress Threaded Opening and
- (1) 2" NPS Threaded Opening

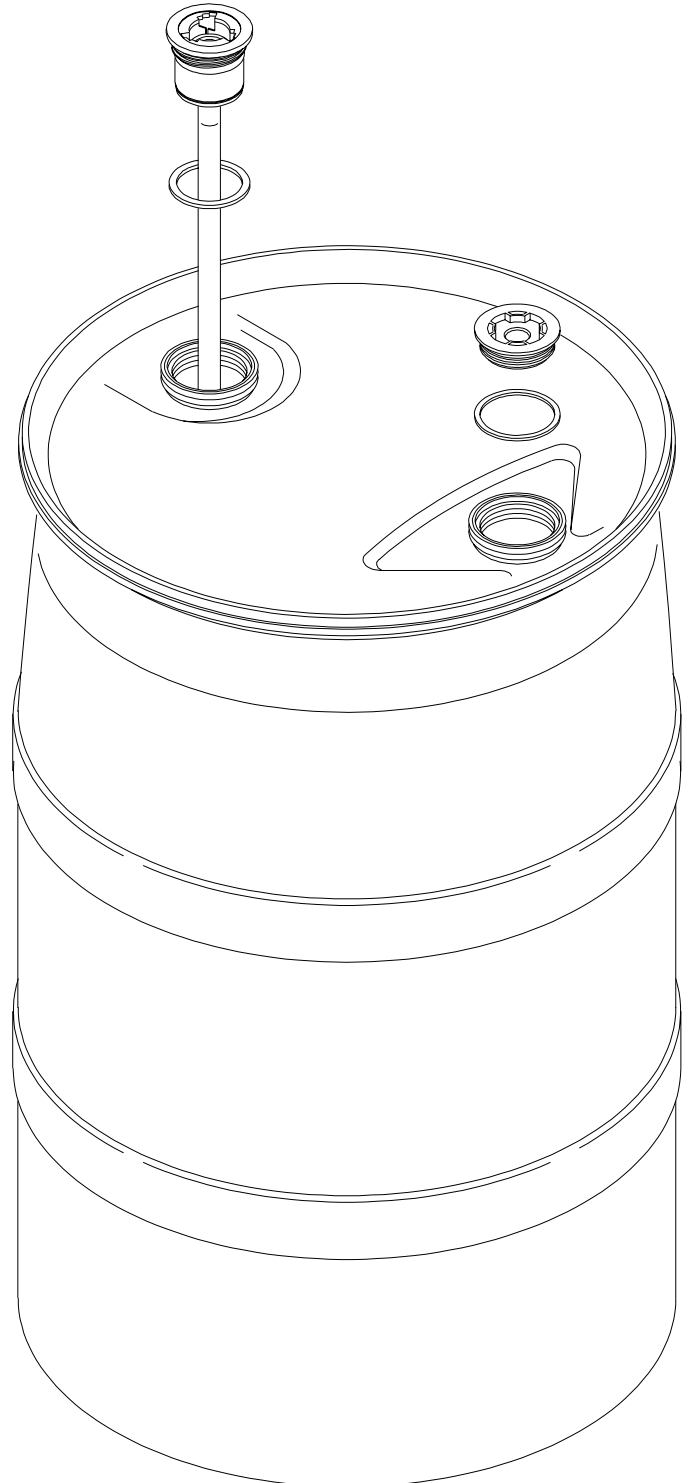
HANDLING RING:

360° Fully Integrated Top Ring

SUPPLIER / MANUFACTURER:

Greif

Contact packaging manufacturer for specifications.





QUALITY CONTROL AUDIT RESULTS

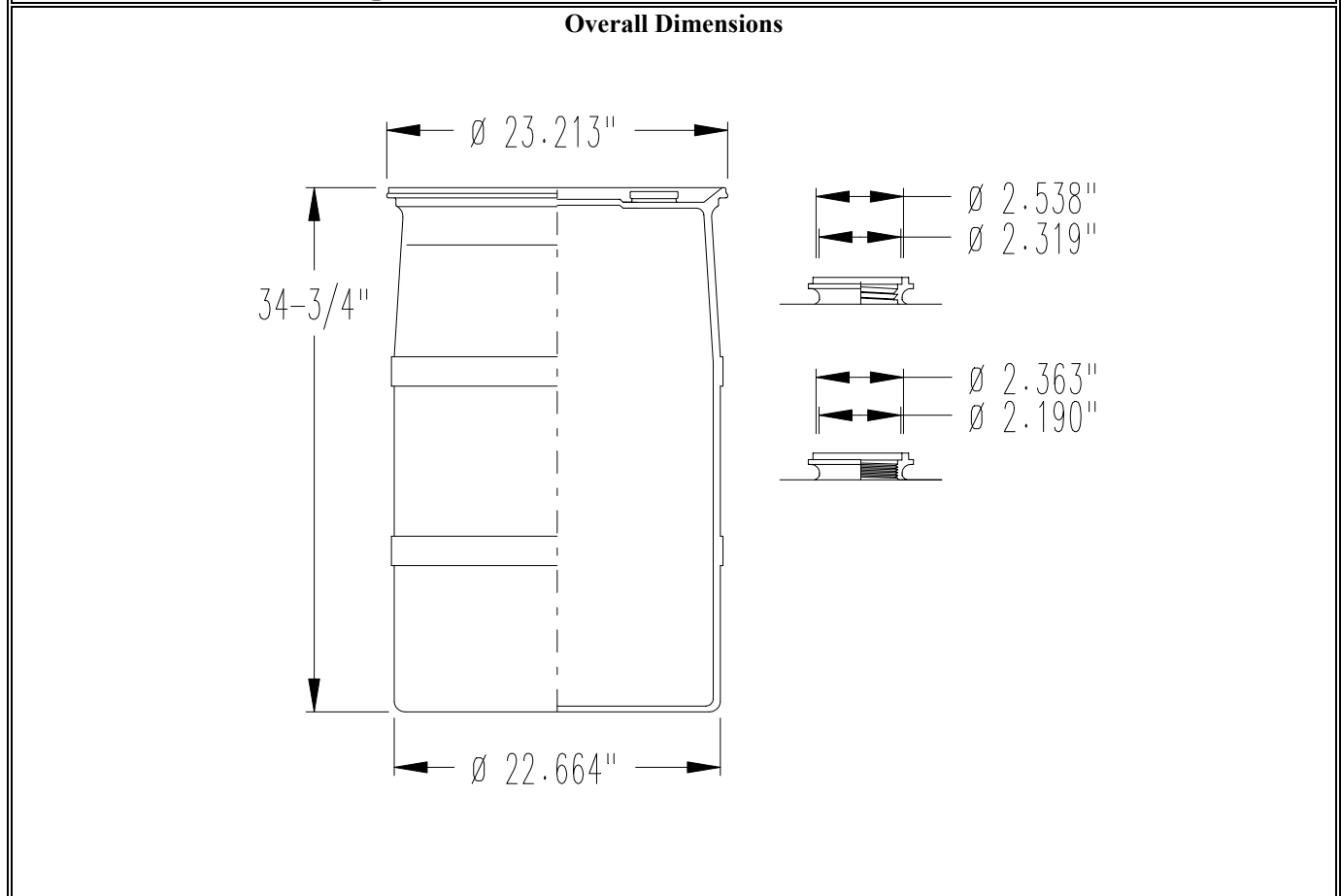
The following quality control audits were performed by TEN-E Packaging Services to document the packaging design:

MICRO MATIC EPV VALVE			
• Description:	2" Buttress Threaded Valve Fitting with Dip Tube		
• Material/Pigment:	• Valve: High Density Polyethylene; White	• Density: 0.959 g/cc	
	• Dip Tube: High Density Polyethylene; Natural	• Density: 0.943 g/cc	
• Tare Weight:	117.38 Grams		
• Markings:	MIRCO MATIC	3A	
• Gasket:	Material: Black Rubber	Tare Weight: 5.16 Grams	Thickness: 0.143"
Overall Dimensions 			

PLUG			
• Description:	2" NPS Threaded Plug		
• Material/Pigment:	Polypropylene Copolymer; Natural		• Density: 0.884 g/cc
• Tare Weight:	27.59 Grams		
• Markings:	Rieke®	PPA-57	Pat'd Pat. 5,680,953 00
• Gasket:	Material: EPDM	Tare Weight: 4.42 Grams	Thickness: 0.153"
Overall Dimensions 			

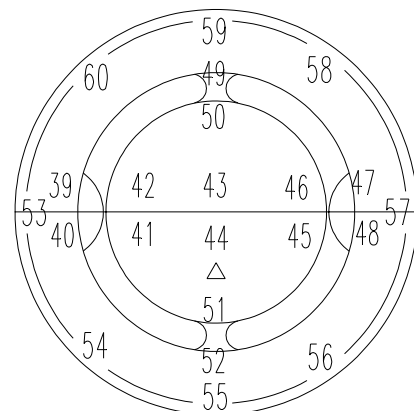
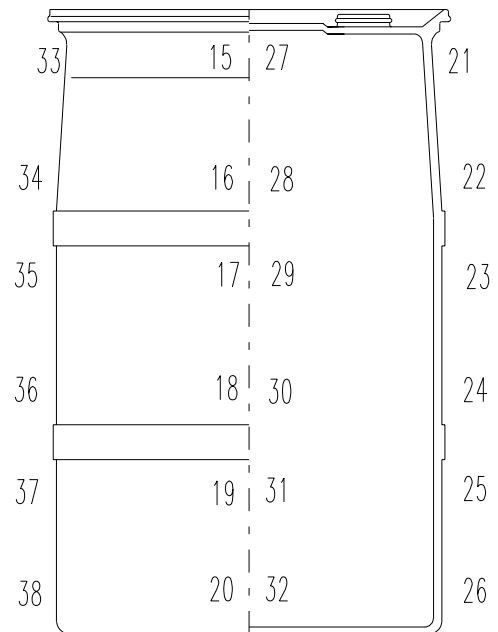
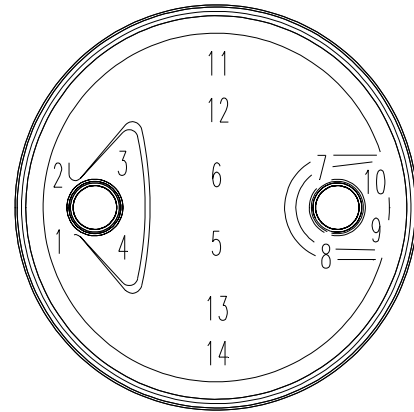
QUALITY CONTROL AUDIT RESULTS

DRUM			
• Description:	55 Gallon Blow Molded Drum with 360° Fully Integrated Top Ring		
• Material/Pigment:	High Density Polyethylene; Blue		
• Tare Weight:	23.06 Lbs	(10.46 Kg)	
• Overflow Capacity:	56.80 Gallons	(474.0 Lbs., 215.0 Liters)	
• 98% Overflow:	55.67 Gallons	(464.5 Lbs., 210.7 Liters)	
• Melt Index (I²¹):	5.60 g/10 minutes		
• Density:	0.944 g/cc		
• Markings:	 1H1/Y1.9/150/04/USA/GBC  1H1/Y1.4/150/04/USA/GBC with Vent	Greif Houston, Texas 2.2mm M-156 SPI "2" HDPE Recycling Symbol	GP55 8 208L 55 USG



QUALITY CONTROL AUDIT RESULTS

Measurement Location	Msmt I.D.	Sample #1
TOP HEAD	1	.265
	2	.286
	3	.239
	4	.266
	5	.239
	6	.220
	7	.210
	8	.262
	9	.305
	10	.287
	11	.261
	12	.264
	13	.283
	14	.285
SIDEWALL	15	.222
	16	.180
	17	.173
	18	.156
	19	.166
	20	.153
	21	.256
	22	.189
	23	.193
	24	.171
	25	.181
	26	.208
	27	.240
	28	.163
	29	.164
	30	.159
	31	.165
	32	.162
	33	.277
	34	.206
35	.201	
36	.185	
37	.204	
38	.208	
BTM HEAD	39	.247
	40	.192
	41	.244
	42	.247
	43	.267
	44	.261
	45	.242
	46	.270
	47	.219
	48	.249
	49	.173
	50	.229
51	.251	
52	.171	
BTM RADIUS	53	.254
	54	.153
	55	.167
	56	.165
	57	.264
	58	.178
	59	.179
	60	.155



SAMPLE PREPARATION

Greif 55 Gallon Tight Head HDPE Drum with EPV Valve

SAMPLE PREPARATION AND PACKAGE WEIGHT INFORMATION

OVERALL PACKAGE TARE WEIGHT:	• 10,544 Grams (23.25 Lbs.)
OVERFLOW CAPACITY:	• 215.0 Kg (474.0 Lbs.)
FILL CAPACITY (98% Of Maximum Capacity):	• 210.7 Kg (464.5 Lbs.) Net
PACKAGE TEST WEIGHT:	• 221.2 Kg (487.7 Lbs.)
SPECIFIC GRAVITY:	• 1.9

PACKAGE CLOSING METHOD:

- Micro Matic EPV Valve: 20 Ft-Lbs.
- 2" Rieke NPT Plug: 20 Ft-Lbs.

It is the responsibility of the manufacturer or other person certifying compliance to provide closing instructions in accordance with Title 49 CFR 178.2

TEST	SAMPLE ID:	TEST CONTENTS:	CONDITIONING:
Drop	1,2,3,4,5,6	Methanol/Water Solution	-18°C (0°F)
Leakproofness	7,8,9	Empty	Ambient
Hydrostatic Pressure	10,11,12	Water	Ambient
28 Day Stack	13,14,15	Water	40°C (0°F)
Vibration	16,17,18	Water	Ambient

Specifications for test contents are on file with TEN-E Packaging Services, Inc.

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.

TEST PROCEDURES AND RESULTS - DROP TESTS

SAMPLE PREPARATION/CONDITIONING:

- Refer to Sample Preparation Page

DROP HEIGHT:

- 1.9 meters (74.8")

REGULATORY REFERENCES:

- Refer to Appendix I

DROP TEST EQUIPMENT:

- Quick Release Hook Mechanism


DROP HEIGHT CALCULATION:

- Packing Group II Materials, SG not exceeding 1.9 (1.0m x 1.9 S.G.)


INDUSTRY STANDARD REFERENCE:

- Refer to Appendix I

DIAGONAL TOP CHIME DROP TEST SET-UP & RESULTS

	Sample #	Results	Comments / Observation
	1	Pass	No leakage, slight deformation at point of impact.
	2	Pass	No leakage, slight deformation at point of impact.
	3	Pass	No leakage, slight deformation at point of impact.

FLAT ON SIDE DROP TEST SET-UP & RESULTS

	Sample #	Results	Comments / Observation
	4	Pass	No leakage, slight deformation to impact side of drum.
	5	Pass	No leakage, slight deformation to impact side of drum.
	6	Pass	No leakage, slight deformation to impact side of drum.

CRITERIA FOR PASSING THE TEST

There can be no leakage when equilibrium has been reached between internal and external pressures. Momentary leakage, which is slight and ceases immediately after impact with no further leakage is acceptable. There can be no damage to the packaging likely to adversely affect safety during transport.

TEST PROCEDURES AND RESULTS - LEAKPROOFNESS TESTS

SAMPLE PREPARATION/CONDITIONING:

- Refer to Sample Preparation Page

TEST PRESSURE:

- 20 kPa (2.9 psi)

PRESSURE TEST EQUIPMENT:

- Regulated Air Source
- DCT Digital Pressure Gauge

REGULATORY REFERENCES:

- Refer to Appendix I

AREA OF PRESSURIZATION:

- Threaded Through The Top Head

TEST DURATION:

- 5 Minutes

INDUSTRY STANDARD REFERENCE:

- Refer to Appendix I

LEAKPROOFNESS TEST SET-UP & RESULTS



Sample #	Results	Comments / Observations
7	Pass	All three samples maintained the 20 kPa test pressure for 5 minutes without any evidence of air leakage.
8	Pass	
9	Pass	

CRITERIA FOR PASSING THE TEST

There can be no leakage of air from the packaging.

TEST PROCEDURES AND RESULTS – HYDROSTATIC PRESSURE TESTS

SAMPLE PREPARATION/CONDITIONING:

- Refer to Sample Preparation Page

TEST PRESSURE:

- 150 kPa (21.8 psi)

PRESSURE TEST EQUIPMENT:

- Regulated Water Source
- DCT Digital Pressure Gauge

REGULATORY REFERENCES:

- Refer to Appendix I

AREA OF PRESSURIZATION:

- Threaded Through The Top Head

TEST DURATION:

- 30 Minutes

INDUSTRY STANDARD REFERENCE:

- Refer to Appendix I

HYDROSTATIC PRESSURE TEST SET-UP & RESULTS



Sample #	Results	Comments / Observations
10	Pass	All three samples maintained the 150 kPa test pressure for 30 minutes without leakage.
11	Pass	
12	Pass	

CRITERIA FOR PASSING THE TEST

The packaging must be able to withstand, without leakage, the prescribed test pressure.

TEST PROCEDURES AND RESULTS - STACK TESTS

SAMPLE PREPARATION/CONDITIONING:

- Refer to Sample Preparation Page

TEST LOAD APPLIED:

- 997.9 Kg (2,200.0 Lbs.)

REGULATORY REFERENCES:

- Refer to Appendix I

STACK TEST DURATION:

- 28 Days

STACK TEST EQUIPMENT:

- Dead Load Weights / Guided Load Fixtures

INDUSTRY STANDARD REFERENCE:



- Refer to Appendix I

STACK TEST LOAD CALCULATION

- Number of packages in a 3 meter (118") high stack (-1): 2.4 Drums
- Package Gross Mass (Based On 1.9 Specific Gravity): 410.9 Kg (905.9 Lbs.)

of Pkg. in 3m High Stack (-1) x Package Gross Mass = Minimum Required Load Per Drum
2.4 x 410.9 Kg = 986.2 Kg (2,174.2 Lbs.)

STACK & STABILITY TEST RESULTS

28-Day Stack Test Setup				One-Hour Stack Stability Test Setup
	Sample #	Maximum Deflection After 28-Days	Results	
	13	0.375"	Pass	
	14	0.375"	Pass	
	15	0.375"	Pass	

CRITERIA FOR PASSING THE TEST

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 or cause instability in stacks of packages. In guided load tests, stacking stability must be assessed after completion of the test; two filled packagings of the same type must be placed on the test sample. The stacked packages must maintain their position for 1 hour.

TEST PROCEDURES AND RESULTS - REPETITIVE SHOCK VIBRATION TESTS

SAMPLE PREPARATION/CONDITIONING:

- Refer to Sample Preparation Page

FREQUENCY:

- 4.3 Hz

TABLE DISPLACEMENT:

- 1"

TEST DURATION:

- 1 Hour

VIBRATION TEST EQUIPMENT:

- LAB Model 6000 Transportation simulator

REGULATORY REFERENCES:

- Refer to Appendix I

INDUSTRY STANDARD REFERENCE:

- Refer to Appendix I

VIBRATION TEST SET-UP & RESULTS



Sample #	Results	Comments/Observation
16	Pass	No leakage or damage.
17	Pass	
18	Pass	


CRITERIA FOR PASSING THE TEST

There can be no rupture or leakage from the package and no deterioration that could adversely affect transportation safety or any distortion liable to reduce packaging strength.

**UN / DOT PACKAGING CERTIFICATION
DESIGN QUALIFICATION**

PACKAGE DESCRIPTION: Greif 55 Gallon Tight Head HDPE Drum with EPV Valve


TEN-E PACKAGING SERVICES, INC. certifies that the **Micro Matic** 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 the ICAO, IATA and IMDG 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 DATE	TEST RESULTS
Drop	178.603	1.9m	Methanol/Water Solution	September 14, 2004	PASS
Leakproofness	178.604	20 kPa – 5 minutes	Empty	September 14, 2004	PASS
Hydrostatic	178.605	150 kPa – 30 minutes	Water	September 14, 2004	PASS
Stack	178.606	997.9 Kg – 28 Days	Water	September 2, 2004	PASS
Vibration	178.608	4.3 Hz – 1 Hr.	Water	September 14, 2004	PASS
TEST REPORT NUMBER:		04-3107			
UN MARKING: (CFR 49 - 178.503)			IH1 / Y1.9 / 150 / ** USA / +AA4310		
PACKAGING IDENTIFICATION CODE:		IH1 – Non-Removable Head Plastic Drum (178.509)			
PERFORMANCE STANDARD:		Y (Packaging meets Packing Group II and III tests)			
MAXIMUM PRODUCT SPECIFIC GRAVITY:		1.9			
INTERNAL TEST PRESSURE:		150 kPa (Refer to 173.24a(b)(4))			
YEAR OF MANUFACTURE:		**Insert year the packaging is manufactured			
STATE AUTHORIZING THE MARK:		USA			
PACKAGING CERTIFICATION AGENCY:		(+AA) TEN-E Packaging Services, Inc.			
THIRD PARTY PACKAGE IDENTIFICATION:		+AA4310			
PERIODIC RETEST DATE:		September 14, 2005			

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 **Micro Matic** for services rendered. In the event of future changes to the above referenced test standard, it is the responsibility of **Micro Matic** 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.

APPLICANT:

Micro Matic
19791 Bahama Street
Northridge, CA 91324


 Bryan P. Anderson
 Packaging Engineer
 TEN-E Packaging Services, Inc.
 1666 County Road 74
 Newport, MN 55055

APPENDIX I: REGULATORY AND INDUSTRY STANDARD REFERENCES

REGULATORY REFERENCES					
TEST	49 CFR^① 2003 Edition	UN^② 13th Edition	IMDG^③ 2002 Edition	ICAO^④ 03-04 Edition	IATA^⑤ 45th Edition
Drop:	178.603	6.1.5.3	6.1.5.3	6; 4.3	6; 6.3.3
Leakproofness:	178.604 178; Appendix B(3)	6.1.5.4	6.1.5.4	6; 4.4	6; 6.3.4
Hydrostatic Pressure:	178.605	6.1.5.5	6.1.5.5	6; 4.5	6; 6.3.5
Stack:	178.606	6.1.5.6	6.1.5.6	6; 4.6	6; 6.3.6
Vibration:	178.608	---	---	---	---

① United States Department of Transportation Code of Federal Regulations (CFR) Title 49, Transportation, Parts 100-199

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
	ISO ^⑦ 2248: Packaging – Complete, Filled Transport Packages – Vertical Impact Test By Dropping
Stack:	ASTM ^⑥ D4577: Standard Test Method for Compression Resistance of a Container Under Constant Load
	ISO ^⑦ 2234: Packaging – Complete, Filled Transport Packages – Stacking Tests 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)