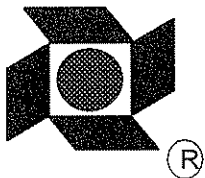


Report No.: 11868.10, Rev 1  
Re: S-7338

Date of Report: 11/14/08  
Date of Revision: 7/31/09



## CONTAINER-QUINN TESTING LABORATORIES, INC.

A division of H.H. Holmes Testing Laboratories, Inc.

170 Shepard Avenue, Wheeling, IL 60090

Phone: 847-537-9470 Fax: 847-537-9098

E-Mail: spowell@container-quinn.com

### DEPARTMENT OF TRANSPORTATION PERFORMANCE ORIENTED PACKAGE TESTING CERTIFICATION

**Performed by:**

Container-Quinn Testing Laboratories, Inc.  
170 Shepard Avenue  
Wheeling, IL 60090

**Testing Performed for:**

ULine Shipping Supply Specialists  
Attn.: Marie Gloria  
2200 South Lakeside Drive  
Waukegan, IL 60085  
800-295-5510

Design Qualification Testing for a  
UN 4G Fiberboard Box containing  
two (2) 1-gallon round openhead metal cans with friction lids and armlok closures  
with EPS positioning inserts

u 4G / Y 18.8 / S / \*\*  
n USA / +AX5355

\*\* is to be replaced by the year of box manufacturer

Certification Expires: 11/14/10

This package is certified for shipment by air  
This package is ISTA certified

**Reason for Revision: (1)** addition of Central Can and Normlok closures

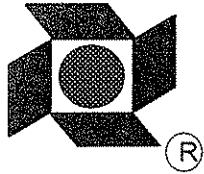
CONTAINER-QUINN TESTING LABORATORIES, INC.

APPROVED BY:

Stephen C. Powell - Laboratory Director

AS A MUTUAL PROTECTION FOR OUR CLIENTS AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL  
PROPERTY OF OUR CLIENTS, AND AUTHORIZATION FOR PUBLICATION IS RESERVED PENDING WRITTEN APPROVAL.

SAMPLES WILL BE DISPOSED OF 30 DAYS AFTER TESTING IS COMPLETED UNLESS OTHER ARRANGEMENTS ARE AGREED TO IN WRITING



**Section 1**

**Fiberboard Box: See Appendix A for Drawing and/or Picture(s)**

Manufacturer: International Paper, Hartford City -or- Bedford Park North  
 Box Description: 44# ECT (69-31C-56) / RSC style / "C" flute / glued joint  
 Part Number: S-7338  
 Outer Dimensions: 17 1/4" x 8 3/4" x 10 1/8"  
 Inner Dimensions: 17" x 8 1/2" x 9 1/2"  
 Manufacturer's Joint: glued, 1 1/2" joint  
 Tare Weight: 1.1 lbs.  
 Description: RSC style "C" flute corrugated shipper with glued joint  
 Closure Gap: Top: 0"  
 Bottom: 0"

**Box Closure Materials: See Appendix A for Drawing and/or Picture(s)**

Manufacturer: U-Line  
 Description: S-472 - Clear  
 Part Number: 2" nominal (48mm)

\* All dimensions for corrugated materials utilize a +/-1/8" tolerance.  
 All readings in a minimum of 8th inch increments

**EPS Caps: See Appendix A for Drawing and/or Picture(s)**

Manufacturer: ThermoSafe  
 Material: Expanded Polystyrene  
 Description: 1-gallon foam insert, 1.5 SG  
 Weight: 25.44 gms

**Basis Weights**

Item	Facing/Corrugation	Location	Basis Weight (Lbs./MSF)
Outer Box:	Facing	Outer	66.4
	Facing	Inner	54.4
	Corrugation	C-Flute	32.0

**Caliper**

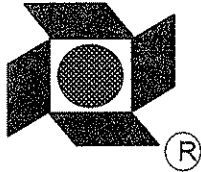
Item	Facing/Corrugation
Outer Box:	0.1503"

**Additional Test Information**

Overall Weight of Package: 41.4 lbs. (18.8 kg)  
 Overall Tare Weight of Package: 2.9 lbs  
 Test Contents: Water  
 Specific Gravity: 1.000  
 Product Specific Gravity: 2.3 (19.2 lbs./gal)  
 Shipper Specific Gravity: nte 2.3  
 Authorized Package Gross Wgt: 41.4 lbs. (18.8 kg)

**Closing Methods:**

Fiberboard Shipper:  
 Sealing Method: 1 strip of 2 inch wide (48mm) p.s. poly tape on the top and bottom of the box. The tape extends approximately 3 inches over each end of the box.



**OPTION #1**

**Metal Cans: See Appendix A for Drawing and/or Picture(s)**

Manufacturer: Brockway Standards  
 Mfg. Method: Formed and welded  
 Part Number: 1-gallon open head  
 Material: Tinplated Steel  
 Capacity, nominal: 1-gallon  
 Capacity, overflow: 1.02-gallons (8.5 lbs.)  
 Tare Weight: 261.16 gms  
 Bottle Information: 1-gallon round open head metal (paint can style) can with metal friction lid and armlok style plastic ring closure

**Friction Lid: See Appendix A for Drawing and/or Picture(s)**

Manufacturer: Brockway Standards  
 Mfg. Method: Formed  
 Material: Tinplated Steel  
 Description: 1-gallon friction lid  
 Closure Weight: 54.98 gms

**Armlok Ring: See Appendix A for Drawing and/or Picture(s)**

Manufacturer: Brockway Standards  
 Material: HDPE  
 Description: 610 dia Armlok style plastic closure ring  
 Closure Weight: 39.92 gms

**OPTION #2**

**Metal Cans: See Appendix A for Drawing and/or Picture(s)**

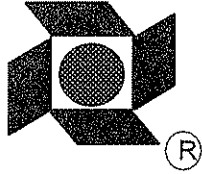
Manufacturer: Central Can Company  
 Mfg. Method: Formed and welded  
 Part Number: 1-gallon open head  
 Material: Tinplated Steel  
 Capacity, nominal: 1-gallon  
 Capacity, overflow: 1.02-gallons (8.5 lbs.)  
 Tare Weight: 261.16 gms  
 Bottle Information: 1-gallon round open head metal (paint can style) can with metal friction lid and armlok style plastic ring closure

**Friction Lid: See Appendix A for Drawing and/or Picture(s)**

Manufacturer: Central Can Company  
 Mfg. Method: Formed  
 Material: Tinplated Steel  
 Description: 1-gallon friction lid  
 Closure Weight: 54.98 gms

**Armlok Ring: See Appendix A for Drawing and/or Picture(s)**

Manufacturer: Norman International  
 Material: HDPE  
 Description: 610 dia Normlok style plastic closure ring  
 Closure Weight: 39.92 gms



**Section 2**

**Test Descriptions and Results**

**Package Preparation - For All Testing**

The packages were filled to overflow capacity. The inner packagings were inserted as shown in picture

**DROP TEST**

Test Method: 49CFR 178.603  
 # Test Packages: 5 each packout option  
 Drop Height: 2.3 meters (90.625") (Calculation for drop height is provided in Appendix B)  
 Equipment: Split Table Drop Tester

Testing was conducted to certify the package for PGII liquids with a specific gravity of up to 2.3

**Conditioning:**

The packages were conditioned to 23+/-3° C and 50+/-5% RH, in accordance with 49CFR 178.603(c). The packages were conditioned for 48 hours to ensure the package and contents were at the proper temperature prior to testing. Drop testing was conducted approximately 5-minutes after removal of the test package from the conditioning chamber.

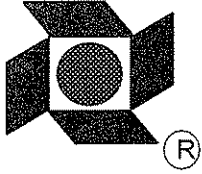
**Results**

Box Number	Package Weight	Orientation	Results
1	19.9 lbs.	Bottom, Mfg. Corner	Pass - corner crushed approx. 1 1/4"
2	20.0 lbs.	Flat on short side	Pass - no damage
3	19.9 lbs.	Flat on long side	Pass - no damage
4	19.9 lbs.	Flat on top	Pass - no damage
5	19.9 lbs.	Flat on bottom	Pass - no damage

no release of the inner packages from the outer package, no leakage of the filling substance from the bottles noted

**Pass/Fail Criteria -**

A package is considered to successfully pass the drop tests if for each sample tested: There is no damage to the outer packaging likely to adversely affect safety during transport, there is no leakage of the filling substance from the inner packaging and any discharge from a closure is slight and ceases immediately after impact.



**STACKING TEST**

Test Method: 49CFR 178.606  
 # Test Packages: 3 each packout option  
 Method: Free Standing  
 Test Duration: 24-hours

Conditioning:  
 The packages were conditioned to 23+/-3° C and 50+/-5% RH, in accordance with 49CFR 178.602(d).

Stack Weight (lbs): 445 (See Appendix B for calculation)

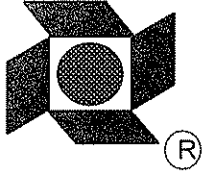
The stacking test load was applied to the top of the packages by loading each package with the calculated weight and maintaining that weight for a minimum of 24-hours.

**Results:**

- 1 Passed No damage to the packaging, normal and expected packaging fatigue and crush
- 2 Passed No damage to the packaging, normal and expected packaging fatigue and crush
- 3 Passed No damage to the packaging, normal and expected packaging fatigue and crush

**Pass/Fail Criteria -**

No test sample may leak. There must be no leakage of the filling substance from the inner receptacle or inner packaging. No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength, cause instability in stacks of packages, or cause damage to inner packagings likely to reduce safety in transportation.



**REPETITIVE SHOCK VIBRATION TEST**

Test Method: 49CFR 178.608  
 # Test Packages: 3 each packout option on same table  
 Method: Repetitive Shock  
 Test Duration: 1-hours  
 Frequency: 4.0 Hz (239 cpm)  
 Equipment: Lansmont Vibration Table  
 Displacement: 1"

**Conditioning:**

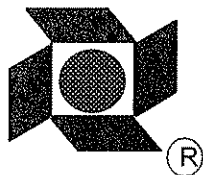
The packages were conditioned to 23+/-3° C and 50+/-5% RH, in accordance with 49CFR 178.602(d).

**Results:**

- 1 Passed No damage to the packaging, normal and expected packaging fatigue and crush
- 2 Passed No damage to the packaging, normal and expected packaging fatigue and crush
- 3 Passed No damage to the packaging, normal and expected packaging fatigue and crush

**Pass/Fail Criteria -**

No test sample may leak. There must be no rupture or leakage of the filling substance from any packages.  
 No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce packaging strength



**INTERNAL (HYDROSTATIC) PRESSURE TEST**

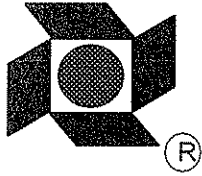
Test Method: 49CFR 178.605  
 # Test Samples 3 each packout option  
 Test Pressure 100 kPa (14.5 psi)  
 Test Duration: 5-minutes  
 Fill Level: Overflow Capacity  
 Filling Substance: Water  
 Equipment: Regulated Water Source, Pressure Monitoring Gauge

**Results:**

- |   |        |  |
|---|--------|--|
| 1 | Passed | No damage or deterioration to unit, no leakage noted |
| 2 | Passed | No damage or deterioration to unit, no leakage noted |
| 3 | Passed | No damage or deterioration to unit, no leakage noted |

**Pass/Fail Criteria -**

No test sample may leak from closure. No test sample may show any deterioration which could adversely affect transportation safety or reduce its strength, cause instability in stacks of packages or cause damage to inner packagings likely to reduce safety in transportation



**COBB WATER ABSORPTION TEST**

Test Method: ISO International Standard 535 as required by 49 CFR 178.514 (b)(1)  
 Samples Tested: 5  
 Test Equipment: COBB Water Absorption Tester, 100 ml capacity test beaker, Stop Watch  
 Filling Substance: Water  
 Test Duration: 30-minutes

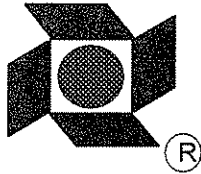
Samples were taken from the boxes and subjected to a water absorption test in accordance with ISO International Standard 535

**Results**

<u>Sample Number</u>	<u>Water Absorption (g/m2)</u>	<u>Pass/Fail</u>
1	105	Pass
2	105	Pass
3	115	Pass
4	105	Pass
5	110	Pass
Average	108	Pass

**Pass/Fail Criteria -**

An increase in mass of greater than 155 g/m2 over the 30 minute duration of the test represents an unacceptable level of water resistance



**Appendix A  
Drawings and/or Pictures of Packaging Components**

See attached photos, drawings and specification sheets

**Appendix B  
Calculations**

**1. Weight of test package:**

Total Gross Weight of Sample: 41.4 lbs. (18.8 kg)

**Filled Package Weight**

Weight of Liquid Fill: 8.5 lbs.

Weight of Filled Package (lbs):  
(8.5\*2) + 2.9 = 19.9

**2. Drop Test Height**

Package Group of Certification  
Drop Height for PG II 1.2 meters  
Specific Gravity 2.3  
Calculation for PG II SG x 1.0  
Drop Height for PG II @ 2.3 SG  
2.3 x 1.0) 2.3 meters  
(2.3 x 3.2808' x 12) 90.550 inches

**3. Stack Test Weight**

Load = (118.11 - h) / h \* w  
Where: 118.11 = height of stack test (3 meters)  
h = height of package as tested and sealed  
w = weight of tested package (lbs.)

Package Height: 10 1/8"  
Weight of Package: 41.4 lbs.

(118.11-10.125)/10.125: 10.665185  
10.6 x 41.4 441.5  
Test Weight: 445

**Appendix C  
Test Equipment and Instrumentation**

<u>Instrument/Equipment</u>	<u>Manufacturer</u>	<u>Model Number</u>
Split Table Drop Tester	LAB	
Hydrolic Vibration Tester	Lanamont	1500S
Weight Scale, large	GSE	GSE 500
Weight Scale, small	GSE	