Subject:

2.2-GALLON PLASTIC PORTABLE FUEL CONTAINER (PFC)
DEPARTMENT OF TRANSPORTATION (DOT) TESTING
SGS/TSG PROPOSAL NO. 5M152, 6M077
EXECUTIVE SUMMARY REPORT

REPORT REVISION LEVEL: A
DATE: May 3, 2016

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1. Introduction / Objective / Authorization Signatures:

Per Department of Transportation (DOT) Code of Federal Regulations (CFR) Part 178, Specification of Packages, Subpart M, a production sample set of the 2.2-gallon Surecan Portable Fuel Container (PFC) were exposed to the following set of tests:

- 178.603 – Drop Testing
- 178.604 – Leakproofness
- 178.605 – Hydrostatic Pressure
- 178.606 – Stacking
- 178.607 - Vibration

Testing was not conducted in sequential order and SGS/Testing Services Group was responsible for assigning a specific package to a specific test; testing was conducted under SGS/TSG proposals #5M152B and 6M077A.

As a SGS/Testing Services Group authorized certifying representative, I can attest that the ***Surecan 2.2-gallon Gasoline Portable Fuel Container (Model #SUR22G1)*** has been tested and is compliant with the standards and requirements of the Department of Transportation (DOT) "Subpart M: Testing of Non-Bulk Packaging and Packages CFR / I / C / 178 – Specification of Packages, Sections 178.603, 178.604, 178.605, 178.606, 178.608 and 178.609.

If you have any questions regarding this certification, feel free to contact me via phone or email.

Mike Popovich

Digitally signed by Mike Popovich
DN: CN = Mike Popovich, C = US, OU = TSG
Date: 2016.05.09 08:22:57 -04'00'

Michael S. Popovich
SGS/TSG Operations Director

2. Executive Design Qualification Test Summary:

- The "Met / Did not Meet Criteria" was strictly and only based upon the requirements set forth in DOT's Code of Federal Regulations (CFR) Part 178, Specification of Packages, Subpart M, Sections 178.603-178.606 and 178.608.

Test Type	Procedure #	Test Item ID	Result	Met Criteria	Did Not Meet Criteria
Drop	49 CFR 178.603	6M077-01	No discharge observed	X	
		6M077-01	No discharge observed	X	
		6M077-01	No discharge observed	X	
		6M077-01	No discharge observed	X	
		6M077-01	No discharge observed	X	
		6M077-01	No discharge observed	X	
Leakproofness	49 CFR 178.604	5M152-19	No leakage observed	X	
		5M152-20	No leakage observed	X	
		5M152-21	No leakage observed	X	
Hydrostatic	49 CFR 178.605	5M152-10	No Liquid Leakage Observed	X	
		5M152-11	No Liquid Leakage Observed	X	
		5M152-12	No Liquid Leakage Observed	X	
Stacking	49 CFR 178.606	5M152-13	No deterioration, distortion, buckling or deflection observed	X	
		5M152-14	No deterioration, distortion, buckling or deflection observed	X	
		5M152-15	No deterioration, distortion, buckling or deflection observed	X	
Vibration	49 CFR 178.608	5M152-01	No ruptures or leakage observed	X	
		5M152-02	No ruptures or leakage observed	X	
		5M152-03	No ruptures or leakage observed	X	

3. Description of Test Package:

Portable Fuel Container:

Manufacturer:	Surecan USA
Family Name:	Surecan
Part Number:	SUR22G1
Housing Material:	Multilayer HDPE
Manufacturing Method:	Extrusion Blow Molding
Height (inches):	12
Width (inches):	9
Length (inches):	11
Body Thickness (inches):	0.099 (nominal)
Head Thickness:	Approximately 0.25”
Capacity (gallons):	2.2
Tare Weight (lbs):	2.67 (heaviest measured container (with nozzle)

Closure:

Manufacturer:	Surecan USA
Family Name:	-
Part Number:	-
Material:	Pro Fax SG702 PP
Height (inches):	1 1/8”
Diameter (inches):	2 ½”
Cap Weight (lbs):	0.05

Closure Method:

Closure Application:	Mechanical Advantage
Closure Torque:	50 in lbs

NOTES:

A single sample was used to derive the above information 5M152-17

4. Design Qualification Testing / Procedure / Result

49 CFR 178.603 – DOT Requirements – Plastic Containers (Packaging Group I) / Drop Testing

Test Procedures Employed:

- 49 CFR 178.603 – DOT Requirements – Plastic Containers (Packaging Group I, Revision Level N/A, Revision Date N/A / Drop Testing

Test Procedure:

1. Fill all six-(6) containers to at least 98% maximum capacity with water.
2. Torque the closure to 20 Newton Meter.
3. One at a time, hoist the filled container 1.8-m into the air.
4. Angle the package in order for the chime, or if the package has no chime, on a circumferential seam or edge, to impact the "target"[1].
5. Drop the package. Record any discharging of the liquid due to a rupture, crack, etc.
6. If leakage is not observed, hoist the package 1.8-m into the air and angle the package so impact will occur on the closure/cap.
7. Drop the package. Record any discharging of the liquid due to a rupture, crack, etc.

Test Criteria:

- No leakage 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.
- No rupturing.

Results:

SAMPLE INFORMATION		TEST PARAMETERS			RESULTS		
					Were there signs of (YES / NO)		
Test Item ID	Test Date	Capacity (gal) / Medium	Drop Height (meter)	Impact Location	Tank Rupture?	Discharge from the closure?	Leakage?
6M077-01	03/31/16-04/01/16	2.2 / Water	1.8	Bottom Seam	NO	NO	NO
6M077-01	03/31/16-04/01/16	2.2 / Water	1.8	Bottom Seam	NO	NO	NO
6M077-01	03/31/16-04/01/16	2.2 / Water	1.8	Bottom Seam	NO	NO	NO
6M077-01	03/31/16-04/01/16	2.2 / Water	1.8	Closure/Cap	NO	NO	NO
6M077-01	03/31/16-04/01/16	2.2 / Water	1.8	Closure/Cap	NO	NO	NO
6M077-01	03/31/16-04/01/16	2.2 / Water	1.8	Closure/Cap	NO	NO	NO
TEST NOTES:							
➢ N/A							

Test Photograph(s):

Test Set-Up

[1] *The target is a rigid, non-resilient, flat horizontal surface*

4. Design Qualification Testing / Procedure / Result

49 CFR 178.604 – DOT Requirements – Plastic Containers (Packaging Group I) / Leakproofness Testing

Test Procedures Employed:

- 49 CFR 178.604 – DOT Requirements – Plastic Containers (Packaging Group I, Revision Date N/A, Leakproofness Testing

Test Procedure:

1. Drill and tap a quick connect onto the top of three-(3) plastic containers.
2. Torque the closure bung to 20 Newton Meter.
3. Pressurize the package to 30-kPa[2].
4. Submerge the pressurized package into a water bath for duration of five-(5) minutes.
5. Record any air bubbles, indicating leakage, observed within the five-(5) minutes.

Test Criteria:

- No leakage observed.

Results:

SAMPLE INFORMATION		TEST PARAMETERS			RESULTS
Test Item ID	Test Date	Tank Pressure (kPa)	Test Duration (minutes)	Sample Orientation	Were there signs of Leakage within 5.0-minutes? (YES / NO)
5M152-19	04/29/16	30.0	> / = 5.0	Submerged in a water bath	NO
5M152-20	04/29/16	30.0	> / = 5.0	Submerged in a water bath	NO
5M152-21	04/29/16	30.0	> / = 5.0	Submerged in a water bath	NO
TEST NOTES:					
➢ THE FUEL CAP WAS TORQUE TO A VALUE OF 20 NEWTON METER (CUSTOMER SUPPLIED VALUE)					

[2] *Per Packing Group I Specification*

4. Design Qualification Testing / Procedure / Result

49 CFR 178.605 – DOT Requirements – Plastic Containers (Packaging Group I) / Hydrostatic Testing

Test Procedures Employed:

- 49 CFR 178.605 – DOT Requirements – Plastic Containers (Packaging Group I, Revision Date N/A, Hydrostatic Testing

Test Procedure:

1. Drill and tap a quick connect onto the top of three-(3) plastic containers.
2. Fill completely with water.
3. Apply 100-kPa of compressed air to the plastic container via the quick connect.
4. Once the air pressure has stabilized at 250-kPa, observe the package for five-(5) minutes recording any leakage.
5. Repeat for the remaining packages.

Test Criteria:

- No liquid leakage originating anywhere on the package.

Results:

SAMPLE INFORMATION		TEST PARAMETERS				RESULTS
Test Item ID	Test Date	Test Medium	Test Capacity	Tank Pressure (kPa)	Test Duration (minutes)	Were there signs of Liquid Leakage within 5.0-minutes? (YES / NO)
5M152-10	08/10/15	Water	100% + rated capacity	250	5.0	NO
5M152-11	08/10/15	Water	100% + rated capacity	250	5.0	NO
5M152-12	08/10/15	Water	100% + rated capacity	250	5.0	NO
TEST NOTES:						
• ALL SAMPLES LEAKED AIR DURING THE APPLICATION OF 36-PSI; BUT DID NOT LEAK LIQUID AFTER THE TEST WITH NO PRESSURE APPLIED						

Test Photograph(s):

Component under Test

4. Design Qualification Testing / Procedure / Result

49 CFR 178.606 – DOT Requirements – Plastic Containers (Packaging Group I) / Stacking Test

Test Procedures Employed:

- 49 CFR 178.606 – DOT Requirements – Plastic Containers (Packaging Group I, Revision Date N/A, Stacking Test

Test Procedure:

Dynamic Compression Testing Machine-

1. Testing must be conducted at room temperature.
2. Testing must be conducted on an empty, unsealed package.
3. Center the package onto the bottom platen of the testing machine.
4. Compression will be applied end-to-end.
5. The speed of the compression must be 12.7-mm plus or minus 6.35-mm per minute.
6. An initial preload of 18.66-kg must be applied to ensure a definite contact between the test sample and the platen.
7. The distance between the platen at this time must be recorded as zero deformation.
8. Force A[3] then must be applied
9. Testing will be considered "complete" once the load of "Force A" has been reached.
10. Inspect the package for the following: Leaks, Deterioration, distortion, buckling of the sidewalls. Note any anomalies.
11. Measure the amount of deflection. The deflection cannot exceed 25.4-mm.

Test Criteria:

- No leakage, deterioration, distortion or buckling of the sidewalls which could adversely affect transportation safety or reduce its strength or cause instability.
- Deflection cannot exceed 25.4-mm.

Results:

SAMPLE INFORMATION		TEST PARAMETERS		RESULTS		
				Were there signs of (YES / NO)		
Test Item ID	Test Date	Load Duration*	Applied Load (lb-f)	Leakage and/or deterioration?	Buckling of the Sidewalls?	Measured Deflection (mm)
5M152-13	08/26/15	Upon reaching Force A	200	NO	NO	2.77
5M152-14	08/26/15	Upon reaching Force A	200	NO	NO	2.70
5M152-15	08/26/15	Upon reaching Force A	200	NO	NO	2.87
TEST NOTES:						
➢ *Per customer direction, a weight of 200-lbs at room temperature was used*						

Test Photograph(s):

Test Set-Up

4. Design Qualification Testing / Procedure / Result

49 CFR 178.608 – DOT Requirements – Plastic Containers (Packaging Group I) / Stacking Test

Test Procedures Employed:

- 49 CFR 178.608 – DOT Requirements – Plastic Containers (Packaging Group I, Revision Date N/A, Stacking / Vibration Standard Test

Test Procedure:

1. Fill three-(3) plastic containers to 100% of their rated capacity with water.
2. Torque the closure to 20 Newton Meter.
3. Install a single container onto the vibration table.
4. Restrain the container in the horizontal attitude to prevent from falling off the fixture; the package must be able to move freely vertically, allowed to bounce and rotate.
5. The test is to be performed for one-(1) hour at a frequency that causes the package to be raised from the fixture to a height that allows a piece of material 1.6-mm thick to be passed between the bottom of the container and the fixture.
6. After one-(1) hour, inspect the package for ruptures, leaks, deterioration and distortion.
7. Repeat testing for the remaining two-(2) samples.

Test Criteria:

- No ruptures, leakage, deterioration or distortion

Results:

SAMPLE INFORMATION		TEST PARAMETERS		RESULTS		
				Were there signs of (YES / NO)		
Test Item ID	Test Date	Test Duration	Vibration Profile	Leakage?	Rupture?	Deterioration / Distortion?
5M152-01	10/12/15	1-hour	±10.5mm @ 5.7908 Hz	NO	NO	NO
5M152-02	10/12/15	1-hour	±10.5mm @ 5.7908 Hz	NO	NO	NO
5M152-03	10/12/15	1-hour	±10.5mm @ 5.7908 Hz	NO	NO	NO
TEST NOTES:						
➢ *N/A*						

Test Photograph(s):

Outsourced Testing; photographs available upon request

5. Calculations:

40CFR178.603 Drop Testing:		
Weight of Empty Jerrican……	2.41	pounds
Capacity of Jerrican……	2.2	gallons
Weight of 98% filled jerrican……	16.34	pounds

40CFR178.604 Leakproofness Testing:
No calculations necessary

40CFR178.605 Hydrostatic Pressure Testing:
No calculations necessary

40CFR178.606 Stacking Testing:
Liquids: A = (n-1)[w+(s * v * 8.3 * 0.980)] *1.5 Where: A = applied load in pounds n = minimum number of containers that, when stacked reach a height of 3-meters s = specific gravity of lading w = maximum weight of one empty container in pounds v = actual capacity of container (rated capacity + outage) in gallons and 8.34-corresponds to the weight in pounds of 1.0-gallon of water 1.5 is a compensation factor that converts the static load of the stacking test into a load suitable for dynamic compression testing Per customer direction, a weight of 200-lbs at room temperature was used A = 200 lbs (90.72 kg) Weights Recorded: kilograms pounds

40CFR178.608 Vibration Standard Testing:
A frequency that causes the sample to be raised from the platform to a height that allows a piece of material 0.063" thick to be passed between the sample and the platform. (Determined at the test facility).

6. Calibrated Measurement Devices:

Instrument #	Description	Calibration Date	Due Date
31351	Scale	05/27/15	08/27/15
30785	Thickness Gage	08/03/15	08/03/16
30764	Pressure Indicator	01/12/15	01/12/16
30915	Stopwatch	05/23/13	05/23/16
20513	Tensile Machine	10/30/14	10/30/16
20515	Load Cell	10/30/14	10/30/16
30596	Stopwatch	12/15/15	12/15/18
20732	Torque Wrench	4/21/15	5/21/16
30764	Druck Pressure Gage	1/26/16	1/26/17

Additional Comments

- *N/A*

7. Material Disposition

40 CFR178.603 Drop Testing	*Held for Customer disposition*
40 CFR178.604 Leakproofness Testing	*Held for Customer disposition*
40 CFR178.605 Hydrostatic Testing	*Held for Customer disposition*
40 CFR178.606 Stacking Testing	*Held for Customer disposition*
40 CFR178.608 Vibration Testing	*Held for Customer disposition*

Additional Comments

- *N/A*

8. Test House

SGS/Testing Services Group, LLC (TSG)
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www.tsglabs.com

Company Summary:
SGS/Testing Services Group (TSG), LLC is an industry leader in fuel system testing. Founded in 1998, TSG has established a strong reputation as a valued supplier of high precision, quality testing services to the major OEM's and Tier suppliers in the automotive, recreational and container industries.

A member in good standing with accreditation body, ANSI-ASQ National Accreditation Board/ACLASS, the company also earned the prestigious "Q1" supplier distinction from Ford Motor Company in 2004 and has maintained that status plus has added several other accreditations with other quality rating organizations.

Company Certifications:
ISO / IEC 17025:2005 Testing from accreditation body ANSI-ASQ National Accreditation Board / ACLASS
Ford Quality 1
APEC Cooperation Center for Conformity Assessment
TIC-CAR, Testing, Inspection, Calibration, Certification, Accreditation Services in APEC Region

Application Relevance:
Testing/Standards/Acceptance Criteria, contained in this application, were conducted in strict accordance with 49 CFR178, Subpart M at Testing Services Group, in Lapeer, Michigan, under TSG proposal number 5M152 and 6M077. The raw data can be furnished upon permission by the Manufacturer Authorized Representative noted in this application.