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**Laboratory #:** 788718-18

**Report Date:** October 3, 2018  
**Received Date:** August 29, 2018

**Attention:** Tom Cray  
**Specimen:** Portable Fuel Container with Child-Resistant Closure

## TEST REPORT

A specimen of portable, fuel containers with a child-resistant closure push button feature was submitted for evaluation of its child-resistance and senior-adult use effectiveness in accordance with ASTM F2517-17, "Standard Specification for Determination of Child Resistance of Portable Fuel Containers for Consumer Use".

The testing program involved the sequential protocol evaluation of fifty (50) children, and a panel of one hundred (100) senior adults. The testing of the children and senior adults took place at various locations during the month of September 2018. Observations and times were recorded for every participant that took part in the testing.

Cambridge Materials Testing Ltd. (CMTL) is an independent testing laboratory and is not affiliated in any way to nor has any commercial interests in the manufacturer or supplier of the child resistant closure button.

### IDENTIFICATION OF CLOSURE BUTTON ON PORTABLE FUEL CONTAINER



Photo #1 – Side View of Portable Fuel Container



Photo #2 – Top View of Child Resistant Closure

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Per Steve Brown  
STEPHEN BROWN, QUALITY ASSURANCE

Per Derek Wild  
DEREK WILD, TECHNICIAN



**IDENTIFICATION OF CLOSURE BUTTON ON PORTABLE FUEL CONTAINER (Cont'd)**



Photo #3 – Side View of Child Resistant Closure with Push Button and Spout



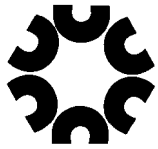
Photo #4 – View of Push Button Feature



Photo #5 – View of Front of Portable Fuel Container showing Instructions for Use



Photo #6 – View of Dispensing Water from Portable Fuel Container



Laboratory #788718-18  
No Spill Incorporated

**IDENTIFICATION OF CLOSURE BUTTON ON PORTABLE FUEL CONTAINER (Cont'd)**

Identification	Description
Product Name	No-Spill Portable Fuel Container
Product Manufacturer	No-Spill Incorporated, 9808 Pflumm Road, Lenexa, Kansas 66215
Closure Model (Trade Name)	Push Button Closure (Part #6132, Model #1405-V6)
Closure Size	Child Resistant Closure (Length = 7½-inches) with Push Button Feature (1 x ¾-inch) and Spout (Length = 3.3-inches)
Closure Manufacturer	No-Spill Incorporated, 9808 Pflumm Road, Lenexa, Kansas 66215
Closure Material & Color(s)	Green Button (Polyacetal), Green Ring (Polyacetal), O-Rings (Viton), Nozzle (High Density Polyethylene), White Piston (Polyacetal), Yellow Nozzle Body (High Density Polyethylene)
Closure Liner Material	-
TAC Seal Material	-
Opening Instructions	As directed on the affixed label (see Photograph #5)
Symbols, Numbers, and Letters Found Inside the Closure	None Inside the Closures
Container Model	Gasoline Can
Container Material and Color	Red, Blow-Molded High Density Polyethylene
Net Contents	10 L / 2½ US Gallons
Symbols, Numbers, and Letters on the Bottom of the Container	HDPE-2, 3 June 5, 2018 No-Spill, Inc Lenexa, Kansas USA <a href="http://www.nospill.com">www.nospill.com</a> – 913-888-9200
Other Product Information, for example, EPA Registration Number	TSG Classified to ANSI/ASTM F852-08 EPA Code HNSRPPFCSBF1 CARB EO G-07-049



## TEST PROCEDURES

### CHILD TEST

No-Spill Incorporated performed the following preparation of the test containers by subjecting them to:

- Low-temperature exposure at -5°F (-20.5°C) for 8 hours
- Elevated temperature exposure at 144°F (62°C) for 8 hours
- Opening and closing of each closure for 250 cycles

CMTL prepared the test containers prior to testing by filling them one-quarter full with water. The containers had been properly secured at least 72 hours before the beginning of the test and being provided to the children.

Upon completion of testing, the containers were inverted to determine presence of any leakage.

Evaluation of the children's performance to open the push button child-resistant closure was performed on three different age groups.

The age groups were identified as follows:

- Group #1 - Children Between 51 and 49 Months (Total # of children: 15; Male: 7; Female: 8)
- Group #2 - Children Between 48 and 45 Months (Total # of children: 20; Male: 10; Female: 10)
- Group #3 - Children Between 44 and 42 Months (Total # of children: 15; Male: 8; Female: 7)

The children required documented parental consent prior to participation in the evaluation of the child-resistant closures, and were selected from six (6) separate test sites. The children were tested in pairs, in the presence of one of their teachers, in a well-lit, unused classroom.

Four testers were used to test the child resistance of the push button closure, and the order in which they were tested was random and recorded.

The children received one portable fuel container with push button child-resistant closure for evaluation of their effectiveness. The children were instructed to try and get the water to come out of the container using whatever method they liked. They were also told that their attempts would be observed during a timed, maximum 5 minute period.

The children were not given the impression that they were taking part in a game or test and no rewards were offered. The tester only encouraged the children to continue trying if they lost interest or gave up trying.

If the children were unable to get the water to come out of the container after the maximum 5 minute period, the tester demonstrated how to gain access to the contents without verbal instruction and using their own, demonstration container. The children were then allowed another 5 minute period in which to attempt to gain access to the contents.

The children were allowed to talk to each other, watch each other, but not open/gain access to each other's container.



### CHILD TEST (Cont'd)

If the child was able to gain access to the contents of the container, the tester said, "Thank you" and took the container away from the child.

The container's push button child-resistant closure was considered a failure if the child was able to release it causing water to dispense.

At the conclusion of testing, the tester thanked the children for helping and told them that they should never try to open containers like this in the absence of an adult and that this type of container will have something dangerous in it that will make them sick. The children's teacher then escorted the children back to their regular classroom.

### SENIOR ADULT TEST

CMTL prepared the test containers prior to testing by filling them one-quarter full with water. Upon completion of testing the containers were inverted to determine presence of any leakage.

Two test stations were set up in order to evaluate the push button child-resistant closure.

The senior adults were presented with two identical, portable, fuel containers with push button child-resistant closure for evaluation of their use effectiveness. They were tested individually, and instructed to release the child-resistant closure, based on the instructions provided on the front of the can.

Participants were provided with a copy of the sticker instructions, as seen in Photograph #5 and asked to attempt to fill a receiving tank with water.

The evaluation of the senior adult's performance to open the child-resistant closures was performed on three different age groups. The age groups were identified as follows:

- Group #1 - Senior Adults between 50 and 54 years (Total # of seniors: 24; Male: 8; Female: 17)
- Group #2 - Senior Adults between 55 and 59 years (Total # of seniors: 24; Male: 8; Female: 17)
- Group #3 - Senior Adults between 60 and 70 years (Total # of seniors: 52; Male: 15; Female: 35)

All the senior adult testing was conducted in a central location setting, and each adult was required to read and sign a consent form prior to participation.

Five testers were involved, and no more than 20% of the adults were drawn from a single Postal Code to assure geographical diversity.



SENIOR ADULT TEST (Cont'd)

The senior adults were timed with a stopwatch to record the opening times of the push button child-resistant closure.

The adults were instructed to try to dispense the contained liquid into a receiving tank using the push button child-resistant closure mechanism, while the tester observed and timed their attempts during a maximum 5 minute period. If successful, they were asked to repeat the tasks within a one minute period on the separate identical, portable, fuel container with child resistant closure.

If they were unable to dispense the liquid during the 5 minute trial, they were asked to participate in a screening test with a non-child resistant (CR) or "special" cap closure. The customer provided an identical fuel container that had the child-resistant feature disabled. The adults were allotted 61 seconds for this task and eliminated from the study if they failed.

The adult-use effectiveness of the container was considered a failure if the seniors failed to dispense liquid from the container during the trial period, but was able to dispense liquid using the non-child resistant closure on the screening container.



Photo #7 – View of Portable Fuel Container with Non-Child Resistant Push Button Feature for Screening Test



**RESULTS: CHILD TEST**

51 - 49 Months Female										51 - 49 Months Male									
Name	Month	Day	Year	Months	Day	Months	5 Minute Test - Before Demonstration	5 Minute Test - After Demonstration		Name	Month	Day	Year	Months	Day	Months	5 Minute Test - Before Demonstration	5 Minute Test - After Demonstration	
				Calc.	Calc.	Calc.	Open Time (sec.)	Open Time (sec.)						Calc.	Calc.	Calc.	Open Time (sec.)	Open Time (sec.)	
Sarvesh	6	22	2014	51	-9	51	300	300		Eric	6	15	2014	51	-1	51	300	300	
Brooklyn	8	8	2014	49	6	49	300	300		Kyle	8	3	2014	49	11	49	300	300	
Hillary	6	22	2014	51	-8	51	300	300		Oliver	8	24	2014	49	-10	49	300	300	
Violet	7	28	2014	50	-14	50	300	300		Oscar	8	24	2014	49	-10	49	300	300	
Mya	8	8	2014	49	6	49	300	300		Grayson	8	3	2014	49	14	49	300	300	
Ava	8	9	2014	49	8	49	300	300		Avery	6	25	2014	51	-8	51	300	300	
Lily	8	14	2014	49	3	49	300	300		Britain	8	19	2014	49	-2	49	300	300	
Kloe	8	14	2014	49	3	49	300	300											
Mean							300.0	300.0		Mean							300.0	300.0	
Standard Deviation							0.0	0.0		Standard Deviation							0.0	0.0	
48 - 45 Months Female										48 - 45 Months Male									
Name	Month	Day	Year	Months	Day	Months	5 Minute Test - Before Demonstration	5 Minute Test - After Demonstration		Name	Month	Day	Year	Months	Day	Months	5 Minute Test - Before Demonstration	5 Minute Test - After Demonstration	
				Calc.	Calc.	Calc.	Open Time (sec.)	Open Time (sec.)						Calc.	Calc.	Calc.	Open Time (sec.)	Open Time (sec.)	
Jade	8	18	2014	48	13	48	300	300		Zachary	8	30	2014	48	0	48	300	300	
Ava	8	18	2014	48	13	48	300	300		Logan	8	24	2014	48	7	48	300	300	
Aarohi	9	8	2014	48	4	48	300	300		Joshua	10	27	2014	46	4	46	300	300	
Juliette	8	29	2014	49	-17	48	300	300		Mingmei	10	11	2014	46	20	47	300	300	
Frida	9	2	2014	48	10	48	300	300		Beckette	10	31	2014	47	-19	46	300	300	
Lumar	12	18	2014	45	7	45	300	300		Callum	8	31	2014	49	-19	48	300	300	
Vy	11	19	2014	46	6	46	300	300		Nico	9	24	2014	48	-12	48	300	300	
Mayar	12	18	2014	45	7	45	300	300		Talvin	9	4	2014	48	8	48	300	300	
Janlayah	9	14	2014	48	11	48	300	300		Rafael	9	20	2014	48	-3	48	300	300	
Zeina	12	2	2014	45	23	46	300	300		Kenan	12	18	2014	45	-1	45	300	300	
Mean							300.0	300.0		Mean							300.0	300.0	
Standard Deviation							0.0	0.0		Standard Deviation							0.0	0.0	
44-42 Months Female										44-42 Months Male									
Name	Month	Day	Year	Months	Day	Months	5 Minute Test - Before Demonstration	5 Minute Test - After Demonstration		Name	Month	Day	Year	Months	Day	Months	5 Minute Test - Before Demonstration	5 Minute Test - After Demonstration	
				Calc.	Calc.	Calc.	Open Time (sec.)	Open Time (sec.)						Calc.	Calc.	Calc.	Open Time (sec.)	Open Time (sec.)	
Alias	12	20	2014	44	10	44	300	300		Arjun	2	4	2015	42	26	43	300	300	
Emily	3	13	2015	41	17	42	300	300		Liam	3	10	2015	42	3	42	300	300	
Sarah	2	16	2015	42	14	42	300	300		Julius	1	29	2015	44	-16	44	300	300	
Dejah	2	25	2015	42	5	42	300	300		Allen	3	1	2015	41	30	42	120	-	
Chloe	2	30	2015	43	-17	42	300	300		Jackson	3	25	2015	42	-13	42	300	300	
Evelyn	12	23	2014	44	8	44	300	300		Alexander	2	12	2015	43	0	43	300	300	
Clare	3	4	2015	42	8	42	300	300		Harris	3	7	2015	42	5	42	300	300	
Kaylynn	2	2	2015	43	10	43	300	300		Max	2	22	2015	43	-10	43	300	300	
Mean							300.0	300.0		Mean							277.5	300.0	
Standard Deviation							0.0	0.0		Standard Deviation							63.6	0.0	
Mean-Total, all Girls & Boys							296.5	300.0											
St Dev-Total, all Girls & Boys							25.2	0.0											



CHILD TEST

There was one child able to push the push button child-resistant closure and cause water to dispense during the first 5-minute test period in age groups.

There was no leakage of water from the container both before and after testing by the children.

The mean opening times and standard deviation for each 5-minute test period are detailed within the Table above.

The percentage of containers tested at each site as a percentage of total containers was 20%.

The percentage of containers tested by each tester as a percentage of the total containers was 24 to 26%.

The push button child-resistant closure on the portable, fuel container was 98% effective for the children tested between the ages of 42 to 51 months before the demonstration, and 98% effective after the demonstration.

The push button child-resistant closure on the portable, fuel container **passed** the acceptance criteria for the children's protocol testing as per ASTM F2517-17, Standard Specification for Determination of Child Resistance of Portable Fuel Containers for Consumer Use.





SENIOR TEST

Women 50 - 54 Years		PUSH BUTTON CLOSURE			
		5 Min. Test (sec.)		1 Min. Test (sec.)	
No.	Order	Open	Close	Open	Close
1	13	18		10	
2	38	14		10	
3	39	5		2	
4	53	8		2	
5	68	4		2	
6	80	21		25	
7	82	5		23	
8	86	30		3	
9	87	2		2	
10	88	4		9	
11	90	5		4	
12	91	7		2	
13	92	7		5	
14	93	10		6	
15	94	63		10	
16	95	12		6	
17	96	10		6	
Women 55-59 Years		PUSH BUTTON CLOSURE			
		5 Min. Test (sec.)		1 Min. Test (sec.)	
No.	Order	Open	Close	Open	Close
1	23	5		3	
2	28	22		13	
3	35	17		8	
4	36	16		6	
5	41	2		1	
6	48	5		3	
7	49	6		5	
8	50	5		4	
9	54	3		3	
10	58	4		3	
11	59	11		4	
12	60	5		4	
13	67	5		3	
14	70	9		4	
15	79	10		8	
16	81	18		4	
17	97	4		2	



SENIOR TEST (Cont'd)

Women 60-70 Years		PUSH BUTTON CLOSURE			
		5 Min. Test (sec.)		1 Min. Test (sec.)	
No.	Order	Open	Close	Open	Close
1	62	10		8	
2	63	26		5	
3	64	4		6	
4	7	3		2	
5	10	15		10	
6	12	8		5	
7	16	8		6	
8	17	17		5	
9	22	6		5	
10	26	16		8	
11	37	5		3	
12	42	3		2	
13	43	1		1	
14	46	6		3	
15	51	6		6	
16	52	8		6	
17	55	4		3	
18	56	12		5	
19	57	19		3	
20	65	10		4	
21	66	5		3	
22	69	5		2	
23	71	8		8	
24	72	8		4	
25	73	8		4	
26	74	4		3	
27	75	4		3	
28	76	8		5	
29	77	11		6	
30	78	6		5	
31	83	5		7	
32	84	10		3	
33	85	7		7	
34	99	6		3	
35	100	9		5	
<b>Total Women - Mean</b>		10		5	
<b>Total Women - Standard Deviation</b>		9		4	



SENIOR TEST (Cont'd)

Men 50-54 Years		PUSH BUTTON CLOSURE			
		5 Min. Test (sec.)		1 Min. Test (sec.)	
No.	Order	Open	Close	Open	Close
1	20	6		6	
2	29	11		12	
3	30	10		5	
4	33	28		5	
5	47	3		1	
6	61	4		3	
7	89	2		2	
8	45	3		2	
Men 55-59 Years		PUSH BUTTON CLOSURE			
		5 Min. Test (sec.)		1 Min. Test (sec.)	
No.	Order	Open	Close	Open	Close
1	8	2		2	
2	9	7		3	
3	18	4		1	
4	24	10		5	
5	25	5		4	
6	34	16		5	
7	40	5		2	
8	44	1		1	
Men 60-70 Years		PUSH BUTTON CLOSURE			
		5 Min. Test (sec.)		1 Min. Test (sec.)	
No.	Order	Open	Close	Open	Close
1	1	2		2	
2	2	8		7	
3	3	15		10	
4	4	3		2	
5	5	15		6	
6	6	3		3	
7	11	9		5	
8	14	4		5	
9	15	11		6	
10	19	4		3	
11	21	5		3	
12	27	12		6	
13	31	14		8	
14	32	10		5	
15	98	6		5	
<b>Total Men - Mean</b>		8		4	
<b>Total Men - Standard Deviation</b>		6		2	
<b>Total Women &amp; Men - Mean</b>		9		5	
<b>Total Women &amp; Men - Standard Deviation</b>		8		4	



SENIOR TEST (Cont'd)

There was no leakage of water from the container both before and after testing by the seniors.

The number of adult opening and re-securing failures for the push button closure in the first (5-minute) and second (1-minute) test periods zero (0), resulting in a 100% senior adult-use effectiveness (SAUE). There was no need to perform a screening test.

The opening method for the push button closure was by depressing on the button to dispense water from the portable fuel container. The instructions were provided on the front of the container to dispense the water.

The mean opening times and standard deviation for each test period are detailed within the Tables above.

The percentage of containers tested at each site as a percentage of total containers was 100%.

The percentage of containers tested by each tester as a percentage of the total containers was 25%.

The push button child-resistant closures **passed** the acceptance criteria for the senior adult-use effectiveness for the adults tested aged 50–70 years old for both test periods as per ASTM F2517-17, Standard Specification for Determination of Child Resistance of Portable Fuel Containers for Consumer Use.