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March 30, 2017

Standards and Rulemaking PHH-10
Pipeline and Hazardous Materials Safety Administration
U.S. Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590-0001

Re: Petition for Rulemaking on 49 CFR 178 Appendix B
Alternative Leakproofness Test Methods

The Reusable Industrial Packaging Association (RIPA) is the U.S.-based trade association for businesses involved in the reconditioning, manufacturing, reuse and recycling of industrial containers such as steel drums, plastic drums, and composite IBCs. RIPA's membership accounts for the vast majority of the U.S. container reconditioning industry, as well as a substantial share of packaging manufacturing firms.

Under 49 CFR 106.95(a), RIPA hereby petitions for rulemaking to add the following as an Alternative Leakproofness Test Method (49 CFR 178 Appendix B; a *new paragraph* (5)):

* * *

(5) Leak Detection by Ultrasonic Sensing

Pressure differential may be created by applied pressure (compressed air) or by drawing a vacuum, as appropriate to the test station's design. Packagings are subjected to the pressure level required under this Part for the appropriate Packing Group. Test stations may be configured as a chamber that creates a seal over and around the tested packaging, or a mechanical plug, disk or plate (typically affixed to a mechanical arm or piston) that seals the closure. Other designs equally effective may be used. Ambient sound must not affect the results of the test. The performance of the tester must be verified when first installed and at a minimum daily before the initial production run. The sensor must be capable of detecting, under 3 psi pressure, a known orifice of 0.010 inches (0.25 mm) placed in the body of the packaging at a position determined to be farthest from the ultrasonic sensor (microphone). Each "calibration packaging" used for verification must be made of the same material and be of the same design type as appropriate for the intended production run. Production may not begin until the system is determined to be operating properly. All tests must be conducted for a period of time sufficient to determine if there is leakage into or out of the packaging. A packaging passes the ultrasonic test if the sensor detects no ultrasound.

* * *

Background and Industry Experience

In August 2011 and in June 2013, PHMSA issued "CA" Approvals authorizing ultrasonic testing for a reconditioner in Michigan (CA2009050053 1st Revision) and a reconditioner in New Jersey (CA2011040027 3rd Revision), respectively. The Approvals authorized the use of ultrasonic sensing (as described above) in the leakproofness testing of 55-gallon steel and plastic drums.

Leading up to the Approvals, RIPA and its members met with PHMSA personnel on multiple occasions to demonstrate and discuss the performance of ultrasonic sensing. Demonstrations included a range of settings including a laboratory demonstration and a full scale steel drum manufacturing operation. Demonstrations also have been made for PHMSA personnel at the two sites granted Approvals.

In 2006, RIPA submitted to PHMSA comparative test data showing the detection results of ultrasonic testing compared to the approved water submersion method. Ultrasonic testing was shown to detect a leak more frequently for a significant sample of drums (40) than was the case with the water submersion method. (That data is submitted again here as Appendix A). Note: The possibility that some ultrasound detections could be "false positives" does not bear on safety considerations insofar as drums so identified would be removed from service.

A more recent test trial (October, 2016) showed the ultrasonic method repeatedly and uniformly detecting a leak in a test drum with a known orifice of 0.010 inches (0.010" being the standard for "calibration" written into each Approval).

As a condition of approval, grantees of the two CA's were required to keep a log for each production run showing: (a) the calibration results, (b) the personnel performing tests, (c) the numbers of drums that passed and failed the test (by design type), and (d) any corrective actions taken to address any failures in "calibration".

The grantees also were required to conduct an annual re-certification of the sensor's sensitivity. However, there is no need for an annual, third-party re-certification of the sensor. A daily systems check as described in the proposed language for Appendix B (standard orifice of 0.010" tested at 3 psi) will ensure that the ultrasonic sensor and the test apparatus are performing as required. The typical sensor is engineered to produce a binary "detect" or "non-detect" outcome. The sensor is simply a conduit for transmission of ultrasound to computer logic control; the device is a listening tool and not an instrument for making measurements. If a daily systems check is unsuccessful (i.e., the "calibration packaging" is *not* rejected), the sensor will be the first point of examination. If the operator determines that the sensor has failed, a new sensor will be installed. As with any other part or device, the sensor manufacturer may issue its own warranties, as well as recommendations on maintenance and handling.

RIPA is submitting as part of this petition data logged at the two separately owned and operated reconditioning facilities issued CA's (Appendix B). For ease of review, the data are limited to several weeks or up to a month, but is representative of logged data extending back to the issuance of the first Approval in 2011. Additional data from daily logs can be made available to DOT upon request.

The data are statistically consistent between the two sites. The average, daily rates of detection are well within an order of magnitude of each other. The average, daily rates of detection are in the range of 1.2 - 4.3%, rates which are consistent with - even higher - than those for other approved test methods (2-3% according to consensus in the industry). As such, RIPA believes that the test method provides an equivalent – if not higher - level of safety in transporting hazardous materials as compared to other methods, including water submersion. Additionally, all logged entries for each facility and for all days shown indicate that the daily "calibration" check was successfully completed.

Another condition of the issued Approvals is that the grantees durably mark the CA number on each drum successfully tested with an ultrasonic tester. To RIPA's knowledge, over a period extending five years, no incident was reported about, or attributed to, drums tested by an approved ultrasonic system. During those five years, one facility alone, averaging about 1000 drums per day, produced approximately 1,250,000 drums which were tested and used without incident. Anecdotally, RIPA also can report that many shippers support the test method as a proven means of quality control.

RIPA wishes to point out that ultrasonic sensing is an established, proven technology with a number of applications in safety assurance and quality control. Notably, ultrasonic sensing has been in use for some time in checking regulated cylinders for cracks or defects. Other applications have been reported in military and space flight systems.

Ultrasonic Technology Enhances Operational Efficiency, Advances Technology

A RIPA member recently conducted tests to compare the operating speed of an ultrasonic tester with that of a pressure differential tester. Both testers detected known leaks successfully; however, the ultrasonic tester was notably faster in arriving at the result. One of PHMSA's stated goals is to advance technology "….particularly in materials, construction and defect detection…." (*PHMSA Strategic Plan 2012-2016*). Combining its accuracy in detection with its operational efficiency and its 5-year record of safety, RIPA believes the ultrasonic test method represents an advancement of technology that results in improvements in operational efficiency and at least equivalent leak detection results when compared to an already approved system (e.g., pressure differential).

Benefits to Industry; Economic Impacts

The speed with which an ultrasonic tester can determine whether a leak exists is at least twice that of a pressure differential tester and as much as ten times faster than a water immersion test. Ultrasonic sensing can detect a leak in as little as three seconds compared to seven seconds or more for a pressure differential tester monitored with a pressure gauge. Further, the chance for human error is eliminated.

RIPA believes initial gains in production through faster testing will be somewhat limited because production speed is necessarily limited by other processing requirements such as application of paint and coatings. However, while gains in throughput may be constrained initially, the industry's expectation is that there will be significant in-plant savings on labor costs. Since ultrasonic leakproofness testing platforms are largely automatic, the amount of labor required to operate the tester is about half that required to operate a water submersion tester. Assuming an average plant worker makes approximately $15.00/hour, over the course of a 2000-hour work year, savings at a single plant with one ultrasonic leakproofness system would be approximately $15,000/year. RIPA has approximately 70 members who operate about 115 plants. If half of these plants were to install a single leakproofness testing system in the next five years, labor savings across the industry would eventually equal about $1,005,000 annually.

RIPA believes these potential savings are significant given that more than half of all RIPA members are small businesses. Additionally, many reconditioners *and* manufacturers would prefer the option of using the ultrasonic method both for its efficiency as well as its accuracy.

Conclusion

RIPA understands that PHMSA will evaluate this petition and notify the association promptly in writing as to whether the application is complete and whether rulemaking is justified. RIPA also understands that codification of this test method in the Hazardous Materials Regulations would be subject to the normal notice-and-comment procedures.

RIPA appreciates PHMSA's willingness to encourage the development and use of new technologies that it believes may improve transportation safety. In the case of ultrasonic leakproofness testing for drums, the data strongly support the use of this proven technology.

Respectfully submitted,

C.L. Pettit
Director, Regulatory & Technical Affairs

Cc: Paul Rankin, RIPA President
Rick Schweitzer, RIPA Counsel

Appendix A

Forty Leak Detections by Ultrasonic Sensing Compared to Results by Submersion

Drum Number	Gage	Bung Type	Wet Test
1	1.2/.9/1.2	Trisure	Passed
2	1.0	Trisure	Passed
3	1.2/.9/1.2	Trisure	Passed
4	1.1	Trisure	Passed
5	1.2/.9/1.2	Trisure	Passed
6	1.0/.8/1.0	Trisure	2" Flange
7		Trisure	Passed
8	1.2/.8/1.2	Trisure	Passed
9	0.9	Trisure	Passed
10	0.8	Trisure	Upper Rolling Hoop
11	1.2	Trisure	Passed
12	1.2/.9/1.2	Trisure	Passed
13	0.8	Trisure	Passed
14	1.2/.9/1.2	Rieke	Passed
15	0.8	Trisure	Lower Rolling Hoop
16	1.0/.8	Trisure	2" Flange
17	1.2/.9/1.2	Trisure	3/4" Flange
18	1.2/.9/1.2	Trisure	Passed
19	1.0	Trisure	Passed
20	1.2/.8	Trisure	Chime
21	0.8	Trisure	Passed
22	0.8	Trisure	Hole in Bottom 1/3
23	1.2/.9/1.2	Rieke	Passed
24	1.0	Trisure	2" Flange
25	1.0/.8/1.0	Trisure	Passed
26	1.1/.8/1.1	Trisure	Top Chime
27	1.1	Trisure	Passed
28	0.8	Trisure	Chime
29	1.2/.9/1.2	Trisure	Passed
30	1.2/.9/1.2	Trisure	Seam
31	0.8	Trisure	Chime
32	1.2/.8/1.2	Trisure	Passed
33	1	Trisure	Top Chime
34	1.2	Trisure	2" Flange
35	1.0/.8/1.0	Trisure	Passed
36	1.2/.9/1.2	Rieke	Seam
37	1.2/.8	Trisure	Passed
38	1.2/.9/1.2	Trisure	2" Flange
39	1.2/.9/1.2	Rieke	Passed
40	1.2/.9/1.2	Trisure	Passed

APPENDIX B

DAILY LOGGED DATA – ULTRASONIC LEAKPROOFNESS TESTING*

FACILTY A (1A1) CA2009050053 June 1-30, 2015		FACILITY B (1A2) CA2011040027 Sept 1 – 24, 2015	
#PASS	#FAIL	#PASS	#FAIL
1071	24 (2%)	1384	14 (1%)
1085	40 (4%)	1537	11 (1%)
1354	47 (3%)	1507	36 (2%)
898	67 (7%)	1442	12 (1%)
1010	25 (2%)	1384	14 (1%)
819	38 (5%)	1537	11 (1%)
895	29 (3%)	1507	36 (2%)
911	56 (5%)	1442	12 (1%)
790	36 (5%)	1156	12 (1%)
879	19 (2%)	1181	12 (1%)
1032	16 (2%)	1224	12 (1%)
968	15 (2%)	1436	12 (1%)
856	46 (4%)	1923	12 (1%)
1103	61 (6%)	1497	16 (1%)
1209	43 (4%)	1507	13 (1%)
792	67 (8%)	1337	21 (2%)
870	55 (5%)		**1.2 % avg**
835	46 (4%)		
552	50 (9%)		
	4.3% avg		

*All logged entries for each facility and for all days shown indicate that the daily calibration check was successfully completed.