

## Soap Bubble Leak Test Procedure for US DOT

### Specification 7A, Type A Transportation Cask

TTS-14-212-003

TAG Technical Solutions, Inc.  
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**Proprietary Information**

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# TTS Inc.

TAG Technical Solutions, Inc.

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FOR INFORMATION ONLY

## 1.0 Purpose and Scope

- 1.1 This procedure states the requirements for performing a Low Pressure Soap Bubble Leak Test on the following US DOT Specification 7A, Type A Transportation Cask: 14-212
- 1.2 The purpose of this test will be to prove the integrity of welds, cask gaskets, threaded fittings, flanges and any other joints where pressure tests at or below 8 psi are adequate to meet contractual/function requirements.
- 1.3 The testing of US DOT Specification 7A, Type A Transportation Casks shall be performed:
  - 1.3.1 As a minimum, every 12 months
  - 1.3.2 When required by contract
  - 1.3.3 Prior to acceptance of a cask from a fabricator
  - 1.3.4 When lid gasket is repaired
  - 1.3.5 When lid gasket is replaced
  - 1.3.6 When seating surface is repaired

## 2.0 References

The referenced documents are part of this procedure to the extent specified. If the contents of this procedure appear to conflict with the requirements of a referenced document, the procedure shall govern. The referenced documents are to be utilized when TAG Technical Solutions, Inc. personnel are conducting this test. When this test is performed by other than TTS personnel, the Quality Assurance procedures for inspection, instructions and discrepancy reporting, in force at the tester's facility, shall be utilized.

- 2.1 DOE Standard, NE-F5-1T, Cleaning and Cleanliness Requirements for Nuclear Components
- 2.2 TTS Procedure No. TTS-14-212-001, Cask Handling Procedure for US DOT Specification 7A, Type A Transportation Casks
- 2.3 TTS Procedure No. QAP-9.1, Control of Special Processes
- 2.4 TTS Procedure No. QAP-12.2, Control of Measuring and Test Equipment
- 2.5 TTS Procedure No. QAP-15.1, Control of Nonconforming Items
- 2.6 TTS Procedure No. QAP-17.1, Quality Records
- 2.7 TTS Procedure No. QAP-2.1, Personnel Training, Indoctrination and Qualification
- 2.8 TAG Technical Solutions Engineering Document, "Test and Evaluation Document for US DOT Specification 7A, Type A Packaging for 14-212 Transportation Cask" (TTS-ENG-14-212-001).

2.9 TAG Technical Solutions, Inc. Drawing Number TTS-0001A and TTS-0001B

### 3.0 Definitions

3.1 **TTS:** TAG Technical Solutions, Inc.

### 4.0 Responsibilities

4.1 TTS General Manager, or designee, is responsible for implementation of this procedure and for ensuring that TTS personnel performing leak tests are qualified in accordance with reference 2.7.

4.2 TTS Field Technician(s) / Cask Maintenance Technician(s) is responsible for performing the leak test in accordance with this procedure and for maintaining compliance with customer safety and health physics requirements.

**NOTE:** If there is a problem meeting any of the requirements of this procedure, it is the responsibility of the procedure user to immediately notify the TTS General Manager, or designee.

### 5.0 Safety and Environmental Precautions

5.1 Proper radiological precautions shall be taken during all phases of the leak test.

5.2 Appropriate precaution shall be taken when connecting, disconnecting, and venting pressurized systems.

5.3 Tests shall be performed when ambient temperature and barometric conditions are stable.

### 6.0 Prerequisites

6.1 Cleanliness of the sealing surfaces of the tested unit shall be maintained in accordance with Reference 2.1.

### 7.0 Equipment

The following equipment is required for the Low Pressure Soap Bubble Test:

7.1 **Air Supply:** A standard shop compressor or bottle compressed air capable of pressurizing the tested cavity to the required test psig.

7.2 **Test manifold:** Test manifold shall have at least one air isolation valve, a gauge isolation valve, and a pressure relief valve (optional) set between 10% and 25% above test pressure.

7.3 **Gauge:** The test gauge shall be appropriate for the intended use with the specified test pressure being between 20% and 80% of the full scale. The gauge calibration shall be current and capable of indicating at least 1.5% of the gauge's full scale. A throttle screw or orifice shall be installed in the gauge connection.

7.4 **Torque wrench** with a calibrated accuracy of 4% of the indicated load.

7.5 Bubble Test Solution: A leak indicating solution equivalent to the following.

7.5.1 SNOOP (or equivalent), available from Nupro Company, 4800 East 345<sup>th</sup> Street, Willoughby, Ohio 44094

7.6 Adequate lighting to ensure good joint inspection.

7.7 Timepiece.

**NOTE:** All Measuring and Test Equipment (M & TE) utilized shall be in accordance with Reference 2.4.

## 8.0 Records

8.1 The Optional Test Results Record Form (Attachment A) can be used to satisfy and document the testing requirements. Attachment A shall be maintained in accordance with Reference 2.6, when utilized by TTS personnel. If equivalent procedures are used at another testing facility, they should contain as a minimum the following:

8.1.1 Test duration

8.1.2 Test pass/fail result

8.1.3 Description of any discrepancies or significant observations

8.1.4 Test performer name and signature with date

## 9.0 Procedure

9.1 Test Procedure

9.1.1 Personnel performing leak testing shall be qualified in accordance with Reference 2.7.

9.1.2 Record equipment tested, date, and gauge information on Attachment A.

**CAUTION: Liners inside the cask during pressurization shall be vented during the pressure test to prevent liner implosion.**

9.1.3 Verify that any liner inside the cask is vented and that the cask is fully assembled in the shipping configuration as specified in Reference 2.2, with the exception of the port used to pressurize the cask cavity.

9.1.4 Inspect test port to ensure no obstructions are present.

9.1.5 Install test manifold and air supply using pipe thread sealant.

9.1.6 Close the test manifold air isolation valve and gauge isolation valves. Open the air supply valve.

**CAUTION: Pressurizing the cask too quickly without isolating the test gauge may damage the gauge.**

9.1.7 Sequentially open the test manifold air isolation and gauge isolation valves such that the cask is slowly pressurized to 8 psig + 1 psig/-0 psig and maintained for five minutes before starting test. Once pressure is stable, record leak test pressure and start time on Attachment A.

**NOTE:** If cask pressure cannot be maintained stable for five minutes, then leak check suspected areas with soap bubble solution and repair leaking area as required.

9.1.8 Apply leak-detecting solution to gasket areas, threaded connections, alignment pins and ports. Also apply to welded areas and other areas as required during the initial acceptance test. Wait approximately five minutes.

**NOTE:** If bubbles are detected, then tighten affected connection or gasket area. If the area cannot be tightened or continues to leak, then the test failed.

9.1.9 After five minutes, verify that test areas do not indicate bubbles and the cask 8-psi pressurization criteria have been met.

9.1.10 Record stop time and test pressure on Attachment A.

9.1.11 Close the test manifold air isolation valve. Carefully disconnect the air supply and slowly open the test manifold air isolation valve such that the cask is slowly depressurized.

9.1.12 Remove test equipment and seal the cask port used. Wipe off test solution from cask surfaces in a manner consistent with ALARA.

## 9.2 Acceptance Criteria

9.2.1 No bubbles shall be visible to the unaided eye during the test and the cask test pressurization shall have been maintained.

9.2.2 If bubbles appear during the test, weld integrity, gasket condition, flange or lid tightness, valve position, plug security, etc., shall be checked, corrected, and item re-tested. If the cask pressurization is not maintained during the test, correct the leakage and retest.

9.2.3 If the test has failed three (3) consecutive times, a Nonconformance Report (NCR) shall be prepared in accordance with Reference 2.5 for disposition prior to proceeding further.

**\*\*\*End of Procedure\*\*\***

**ATTACHMENT A  
Optional Test Results Record Form**

**Soap Bubble Leak Test For US DOT Specification 7A, Type A Transportation Casks: TTS-14-212-003-Rev. 0**

**Leak Test Results Record Form**

1.0	<b>CASK TESTED</b>		
	Cask Type	Cask Model	Cask Serial Number

2.0	<b>LEAK TEST INSTRUMENTATION &amp; TESTING EQUIPMENT</b>				
	Description	Serial Number	Range	Calibration Due Date	Initials

3.0	<b>TEST</b>					
	Test Date	Start Time	Stop Time	Test Duration (minutes)	Leak Test Pressure: Psi	Test Results ( initial )
						PASS

4.0 Discrepancies:

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5.0	<b>SIGNATURES</b>			
	Tested By (Print):		Title	
	Tested By (Signature):		Date:	
	Verified By (Print):		Title:	
	Verified (Signature):		Date:	

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