

## 1.0 PURPOSE

This document establishes a Standard Test Procedure (STP) for conducting acid resistance test for battery box and cover insulating materials deemed necessary during post approval audits as specified in Title 30 Code of Federal Regulations (30 CFR), Part 7, Subpart A, Section 7.8.

## 2.0 SCOPE

This STP applies to all Part 7 battery box and cover insulating materials required to be tested for acid resistance under Title 30 Code of Federal Regulations (30 CFR), Part 7, Subpart C, Section 7.48.

## 3.0 REFERENCES

- 3.1. Title 30 Code of Federal Regulations (30 CFR), Part 7, Subpart A, Section 7.4 (b)
- 3.2. Section 7.8, Subpart C, Section 7.48 and ACRI1001-Test Sheet Labeling Criteria.

## 4.0 DEFINITIONS

- 4.1. Acid Resistance – The physical property whereby a battery cover sample does not exhibit any blistering, discoloration, cracking, tackiness, rubberiness or loss of bond when immersed in acid solution as described in 30 CFR, Section 7.48.
- 4.2. Blistering – An enclosed raised spot (as in paint) resembling a blister.
- 4.3. Discoloration – Change in the color or hue; stain or fade
- 4.4. Cracking – An observable break in the continuity of the insulating material.
- 4.5. Swelling – To expand beyond a normal or original limit
- 4.6. Tackiness – Sticky to the touch

4.7. Rubberiness – Resembling rubber in feed and texture.

## 5.0 TEST EQUIPMENT

The following samples and equipment are necessary for conducting the acid resistance tests; unless otherwise specified, measurements are to be taken using instruments accurate to at least one significant digit beyond the desired accuracy (30 CFR, Subpart A, Section 7.4):

- 5.1 One sample of each type of insulation used on each surface of the battery box and cover;
- 5.2 Sulfuric acid (H<sub>2</sub>SO<sub>4</sub>)
- 5.3 Water (H<sub>2</sub>O)
- 5.4 Acid resistant tray of a size to accept the samples as designated in Section 7.3;
- 5.5 Acid resistant tongs
- 5.6 Safety glasses
- 5.7 Acid resistant rubber gloves, and;
- 5.8 Acid resistant apron

## 6.0 TEST SAMPLES

- 6.1. One sample of the battery box and one of the battery box cover prepared with insulating material shall be tested.
- 6.2. The insulation thickness shall be representative of that used on the box and cover. If the insulation material and thickness of material are identical for the battery box and cover, only one sample needs to be prepared.
- 6.3. The representative sample shall have minimum dimensions of 4 inches by 8 inches by the thickness of the sample, as specified on the approval drawings, including the insulation plus the battery cover or box material.

- 6.4. While preparing the sulfuric acid solution, the following minimum safety precautions shall be employed:
  - 6.4.1 Always work under a ventilated hood and in the vicinity of an eyewash station.
  - 6.4.2 Safety glasses, acid resistant rubber gloves, and an acid resistant rubber apron shall be worn.
  - 6.4.3 Add acid slowly to water. **Never add water to acid.**
- 6.5 Prepare a 30 percent solution of sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) by mixing 199 ml of sulfuric acid with a specific gravity of 1.84 with 853 ml of water. The amount of solution prepared shall be sufficient to completely cover the sample.
- 6.6 The ambient temperature at which the tests are conducted shall range between 65° - 80° F (18.3° C- 26.7° C).

## 7.0 PROCEDURES

- 7.1. Place the sample in the tray and completely cover the sample with the 30 percent solution of sulfuric acid.
- 7.2. Maintain conditions for seven full days. After seven twenty-four hour periods, record the condition of the samples.
  - 7.2.1 The sample should be checked daily to ensure that the level of sulfuric acid solution completely covers the sample. If it does not, additional solution should be added to the point where the sample is completely covered.
  - 7.2.2 The solution should be stirred by moderate manual rotation of the pan. Upon removal from the solution, immediately wash the sample with running water, wipe it dry and record the condition of the sample.

## 8.0 TEST DATA

- 8.1 Test results shall be recorded on a Test Sheet in accordance with ACRI1001 and shall be maintained for each sample tested. The Test Sheet should include a record of the ambient temperature during testing and the final condition of each sample when removed from the acid solution.

TITLE: Battery Box Acid Resistance Test

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8.2 At the discretion of the investigator conducting the tests, photographs may be taken to document test conditions and results of the tests.

## 9.0 PASS/FAIL CRITERIA

At the end of the tests, the insulation shall not exhibit any of the following:

9.1 Blistering

9.2 Discoloration

9.3 Cracking

9.4 Swelling

9.5 Tackiness

9.6 Rubberiness

9.7 Loss of bond