

1.0 PURPOSE

This Standard Test Procedure (STP) is used by the Electrical Safety Division to determine if representative samples of an electric cap lamp battery comply with the drop test requirements of 30 CFR 19.6(a).

2.0 SCOPE

This STP applies to batteries for use as a component of an electric cap lamp approved per 30 CFR Part 19.

3.0 REFERENCES

3.1. 30 CFR 19.6(a) "The suitability of the materials and the construction shall be determined by preliminary inspection, by dropping tests¹..."

¹Batteries are dropped 3 feet, at least 20 times onto an oak floor.

3.2. 30 CFR 19.8(a) "Spilling of Electrolyte. The lamp shall be so designed and constructed that, when properly filled, the battery will neither leak or spill electrolyte under actual service conditions. Lamps passing a laboratory spilling test will be considered satisfactory in this respect, contingent upon satisfactory performance in service."

3.3. ACRI2001 "Criteria for the Evaluation and Test of Intrinsically Safe Apparatus and Associated Apparatus".

4.0 DEFINITIONS

4.1. Battery - The complete battery assembly worn on the miner's belt

4.2. Significant Damage - Any crack, breakage, disconnection, displacement of any component, short circuit, or similar type of damage that could adversely affect the operation, intrinsic safety, or performance of the cap lamp.

4.3. Minor Damage - Damage that would not affect the operation, intrinsic safety or performance of the cap lamp, for example chipping of paint, scratches, or other similar damage.

5.0 TEST EQUIPMENT

5.1 Drop Test Apparatus (Lab Division Model 5D 100S), or other means of dropping the battery in a free-fall without obstruction. The floor of the

drop test apparatus is constructed of an oak planking not less than 1 inch thick. A nonrestrictive guide (swing arm) is used to assure a free-fall drop on the impact point of the battery. When placed on the arm of the apparatus, the battery will fall 3 feet \pm 1 inch onto the oak floor.

5.2 Temperature measuring device capable of measuring ambient temperature \pm 1° C.

5.3 Tape measure or yard stick

5.4 Camera

6.0 TEST SAMPLES

Three fully charged complete cap lamp assemblies in their proposed marketable form.

7.0 PROCEDURES

7.1. Before starting the test, put on your personal protective equipment, that is, earplugs, safety glasses, and gloves. **CAUTION:** This test may result in the release of acids that can cause skin and clothing burns.

7.2. Inspect the sample for any significant damage. Any sample having significant damage shall not be tested. Minor damage shall be noted, but not considered cause for rejection. A note describing the minor damage should be recorded on the test sheet. Photographs showing the minor damage may be attached to the test sheet.

7.3. Verify that the ambient temperature is 25 \pm 10 °C. Record the temperature on the test sheet.

7.4. Verify that the swing arm on the drop test apparatus is 3 feet \pm 1 inch above the oak floor. Measure and record the height on the test sheet.

7.5. Place the battery on the swing arm so that when the battery falls to the oak planking the battery will impact the points on the battery most likely to be damaged. The selected points include corners, sides, top, bottom and parts extending from the enclosure.

7.6. Position the battery on the drop test apparatus swing arm, holding the headpiece cord with enough slack to not interfere with the free fall.

- 7.7. Release the swing arm by pushing the foot pedal, allowing the battery to fall unobstructed onto the oak floor.
- 7.8. Record the impact point on the test sheet and inspect the sample for any damage. Record any significant or minor damage on the test sheet. Photographs of the damage may be attached to the test sheet. Terminate testing if significant damage occurs on any sample.
- 7.9. Repeat steps 7.2 through 7.8 for a total of twenty drops, attempting to impact the battery on as many different points as possible.
- 7.10. Repeat steps 7.2 through 7.8 on the remaining two samples.

8.0 TEST DATA

- 8.1. Ambient temperature
- 8.2. Test equipment identification (e.g., manufacturer, model number, part number, serial number, calibration due date).
- 8.3. Test number
- 8.4. Sample identification (e.g., sample number, manufacturer, model number, part number, serial number).
- 8.5. A pictorial sketch of the sample may be used to identify the impact point.
- 8.6. Results of the visual inspection after each drop. Reasons for failures must be documented.
- 8.7. The post-test inspection results - pass or fail, for the tested sample. Photographs may be attached to the test sheets.

9.0 PASS/FAIL CRITERIA

- 9.1. No significant damage shall be incurred by any sample tested. Refer to Section 4.0.
- 9.2. There shall be no electrolyte leakage from any battery sample during or after the drop test.