

1.0 PURPOSE

1.1 This test procedure is used by the Electrical Safety Division (ESD) to determine if a representative sample of an encapsulated electrical assembly meets the impact test requirements of ACRI2001 “Criteria for the Evaluation and Test of Intrinsically Safe Apparatus and Associated Apparatus”, Section 9.13.2.

1.2 To provide a person knowledgeable in the appropriate technical field with a written procedure that will assure consistent repeatable test data and results independent of the person conducting the test.

2.0 SCOPE

This Standard Test Procedure (STP) applies to the testing of encapsulated electrical assemblies, not protected from shock by another enclosure, that are used as components of intrinsically safe equipment approved, certified, or evaluated per 30 CFR Parts 18, 19, 20, 22, 23, and 27.

3.0 REFERENCES

3.1 ACRI2001 “Criteria for the Evaluation and Test of Intrinsically Safe Equipment and Associated Apparatus”, Section 9.13.2.

3.2 30 CFR Part 18 “Electric Motor-Driven Mine Equipment and Accessories”

3.3 30 CFR Part 19 “Electric Cap Lamps”

3.4 30 CFR Part 20 “Electric Mine Lamps other than Standard Cap Lamps”

3.5 30 CFR Part 22 “Portable Methane Detectors”

3.6 30 CFR Part 23 “Telephone and Signaling Devices”

3.7 30 CFR Part 27 “Methane-Monitoring Systems”

4.0 DEFINITIONS

Encapsulated Electrical Assembly - An assembly that has been completely enclosed within a homogeneous high resistance insulating material, "encapsulant", thereby sealing the electrical components from exposure to the ambient atmosphere.

5.0 TEST EQUIPMENT

- 5.1 A test mass made of solid hard metallic material that weighs 8.9 newtons (approximately 0.908 kilograms), designed within the constraints specified in Section 5.3 and shaped symmetrically about a vertical axis with a shaft on the top end and a 25 mm diameter hemispherical impact head on the bottom end.
- 5.2 A test fixture designed within the constraints specified in Section 5.3, comprising a base table of hardened steel, a manually operated quick release mounting mechanism to hold the test mass vertically at the top end of its shaft, and an adjusting mechanism for positioning the mounted test mass to precise vertical locations.
- 5.3 Designs of the test mass and the test fixture shall be such that when the test mass is mounted in the test position; the test mass vertical axis shall be plumb, the test mass impact head shall be at its lowest end, and except for the vertical separation distance, orientation of the test mass to the base table shall not change after the quick release mechanism is tripped and the test mass is in free fall.

6.0 TEST SAMPLES

One sample of the encapsulated electrical assembly in its proposed marketable form.

Note: If required, the same sample must be used to perform, in either order, both this impact test and the ASTP2224 "Force Test of Encapsulated Electrical Assemblies" test.

7.0 PROCEDURES

- 7.1 Perform a pre-test inspection. Inspect the surfaces of the encapsulated assembly. Reject the sample for any surface deformations or faults which defeat the sealing property or protection provided by the encapsulant. Replace the rejected sample.

- 7.2 Mount the test mass onto the test fixture with the impact head of the test mass facing but above the base table.
 - 7.3 Place and secure the test sample to the base table beneath the test mass. Select a test point in a weak area such as near a corner or edge. If the sample has no determinable weak areas, select a point at random. Simultaneously, maneuver the test mass elevation, the test sample's position, and the test sample's orientation until the impact head is centered on the selected test point while the vertical axis of the test mass is perpendicular to the surface of the test sample at the selected point.
 - 7.4 Without changing the position of the test sample, adjust the test fixture until the test mass impact head is 0.225 meters above the sample test point.
 - 7.5 Actuate the quick release mechanism to allow the test mass to come to rest onto the selected test point.
- Note: When the test mass, which weighs 8.9 newtons, is dropped from a height of 0.225 meters, the energy imparted onto the test sample is 2.0 joules.
- 7.6 Post-test inspection. Visually inspect the surfaces of the tested encapsulated assembly for any damage, including permanent encapsulated surface deformation or other damage that impairs the sealing property or protection provided by the encapsulant.
 - 7.7 Select a different test point on the same encapsulated surface and repeat Sections 7.4 through 7.6 until the number of points tested equals four.
 - 7.8 Repeat Sections 7.2 through 7.7 for the remaining unprotected encapsulated surfaces of the sample.

8.0 TEST DATA

- 8.1 The manufacturer of the encapsulated electrical assembly.
- 8.2 The manufacturer's model or part number of the encapsulated electrical assembly.
- 8.3 The manufacturer of the encapsulating material.
- 8.4 The manufacturer's type number of the encapsulating material.

- 8.5 Weight of the test mass and its height above the selected point on the test sample at the start of its fall.
- 8.6 The pre-test inspection results for every rejected assembly. Photographs may be attached to the test sheet.
- 8.7 Diagrams or photographs that identify the sample, tested surfaces, and test points.
- 8.8 The post-test inspection results, pass or fail, for the tested assembly. Include the reason(s) for failure, if applicable. Photographs may be attached to the test sheet.

9.0 PASS / FAIL CRITERIA

A test sample shall be failed for any permanent surface deformation or other damage (denting, cracking, chipping, breaking, indentation, etc.), regardless of the size, shape or extent, that would impair the sealing property or protection provided by the encapsulant.