1.0 PURPOSE

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" and ACRI2010 "Encapsulation Criteria."

2.0 SCOPE

This Standard Test Procedure (STP) applies to the testing of encapsulated electrical assemblies that provide protection for components of equipment approved, certified, or evaluated per 30 CFR Parts 18, 19, 20, 22, 23, and 27.

3.0 REFERENCES

3.1. 30 CFR Parts 18, 19, 20, 22, 23, and 27

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

3.3. ACRI2010 "Encapsulation Criteria"

4.0 DEFINITIONS

Encapsulated Electrical Assembly - An assembly that uses encapsulation to seal 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 hardened steel 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

6.1. Evaluation per ACRI2001: One sample of the encapsulated electrical assembly in its marketable form.

6.2. Evaluation per ACRI2010: Two samples of the encapsulated electrical assembly in their marketable form that have completed the ASTP2245 – Encapsulation Thermal Endurance Test, the Pressure Test – ACRI2010 (if applicable), and the ASTP2224 – Force Test of Encapsulated Electrical Assemblies.

7.0 PROCEDURES

7.1. Perform a pre-test inspection. Inspect the surfaces of the encapsulated electrical assembly.

Note: If the evaluation is per ACRI2001, 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. A plumb bob may be used to assist in the alignment.

7.4. Without changing the position of the test sample, adjust the test fixture until the test mass impact head is 0.225 meters (approximately 8 7/8 inches) above the sample test point.

7.5. Actuate the quick release mechanism to allow the test mass to impact 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 electrical 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 encapsulated surfaces including enclosure surfaces in which wall thickness is used to determine compliance.

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's name and part number of the encapsulating material.

8.4. If applicable, the enclosure material specifications and wall thickness.

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 result, 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 or enclosure, if applicable.