

1.0 PURPOSE

To determine if the compound used to encapsulate electrical assemblies can withstand variations in temperature and humidity and provide isolation from potentially explosive atmospheres.

2.0 SCOPE

Encapsulated assemblies and parts evaluated per ACRI2010.

3.0 REFERENCES

3.1. ACRI2001, "Criteria For The Evaluation And Test Of Intrinsically Safe Apparatus And Associated Apparatus"

3.2. ACRI2010, "Encapsulation Criteria"

4.0 DEFINITIONS

None.

5.0 TEST EQUIPMENT

Environmental chamber. This environmental chamber shall be of sufficient size to accommodate the test samples and be capable of maintaining a temperature/relative humidity as stated in section 7.2.

6.0 TEST SAMPLES

Two samples of the encapsulated assembly in their marketable form.

Note: These two samples will be used for additional tests.

7.0 PROCEDURES

7.1. The samples shall be subjected to a visual inspection.

7.2. Thermal endurance to heat

7.2.1. The maximum temperature of the encapsulated assembly to be used for the test shall be the higher of the following:

- 7.2.1.1. The maximum temperature of the test sample encapsulant surface under normal and fault conditions (as defined in ACRI2001); or
- 7.2.1.2. The maximum temperature at the component surface in the compound under normal operation (as defined in ACRI2001).
- 7.2.2. If the maximum temperature of the encapsulated assembly is 75° C or less, the encapsulated assemblies shall be subject to continuous storage in an environmental chamber for four weeks at (90 ± 5) % relative humidity at a temperature of (20 ± 2) ° C higher than the maximum temperature determined above in 7.2.1, but at least 80° C; or
- 7.2.3. If the maximum temperature of the encapsulated assembly is above 75° C, the period of four weeks specified above in 7.2.2 shall be replaced by a period of two weeks at (95 ± 2) ° C and (90 ± 5) % relative humidity followed by a period of two weeks at a temperature of (20 ± 2) ° C higher than the maximum temperature determined above in 7.2.1 with no humidity requirements.
- 7.2.4. The samples shall be subjected to a visual inspection.

CAUTION: Potential burn hazard. Use personal protective equipment if it is necessary to open the environmental chamber for visual inspection.

7.3. Encapsulated assembly stabilization

- 7.3.1. At the conclusion of the test in section 7.2, the encapsulated assemblies shall be subjected to continuous storage in an environmental chamber for 24 - 72 hours in an ambient temperature of (20 ± 5) ° C and (50 ± 10) % relative humidity.
- 7.3.2. The samples shall be subjected to a visual inspection, immediately followed by 7.4 below.

7.4. Thermal endurance to cold

- 7.4.1. The encapsulated assemblies shall be subjected to continuous storage in an environmental chamber for 24 hours in an ambient temperature of at least -25° C, but at most -30° C.
- 7.4.2. The samples shall be subjected to a visual inspection.

7.5. Encapsulated assembly stabilization

7.5.1. At the conclusion of the test in section 7.4, the encapsulated assemblies shall be subjected to continuous storage in an environmental chamber for 24 - 72 hours in an ambient temperature of $(20 \pm 5)^{\circ}\text{C}$ and $(50 \pm 10)\%$ relative humidity.

7.5.2. The samples shall be subjected to a final visual inspection.

8.0 TEST DATA

8.1. The manufacturer's name and part number of the encapsulation compound.

8.2. The manufacturer's name and part number of the encapsulated assembly.

8.3. The temperature and relative humidity of the environment during the thermal endurance to heat test, recorded at least hourly.

8.4. The temperature of the environment during the thermal endurance to cold test, recorded at least hourly.

8.5. The physical appearance of the test sample before testing and after each stage of testing.

9.0 PASS/FAIL CRITERIA

No visible damage to the compound that could impair the type of protection shall be evident, for example cracks in the compound, exposure of encapsulated parts, failure of adhesion, inadmissible shrinkage, discoloration, swelling, decomposition or softening. A discoloration on the surface of the compound is permissible (for example oxidation in the case of epoxy resin).