

**TITLE: CRITERIA FOR ENCLOSURES CONTAINING ELECTRICAL  
COMPONENTS EMBEDDED IN POTTING MATERIAL****MSHA Mine Safety and Health Administration, Approval & Certification Center**

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**1.0 PURPOSE**

This document contains specific requirements for the design and construction of enclosures containing electrical components embedded in potting material, submitted for approval under Title 30, Code of Federal Regulations, Part 18.31(b). Encapsulation used in intrinsically safe circuits, must comply with ACRI2010.

**2.0 SCOPE**

This criteria supplements the requirements of 30 CFR, 18.31(b) - Enclosures for Potted Components. Enclosures submitted for review under this criteria must be filled with potting material having no internal free volume.

**3.0 REFERENCES**

30 CFR Part 18

**4.0 DEFINITIONS**

- 4.1. Potting Material - For the purposes of this criteria; a material that is solid in its cured state and that remains attached to the electrical components and the interior walls of the enclosure.
- 4.2. Adhesion - Moisture, gas and dust tight permanent agglutination of a compound to a surface.
- 4.3. Temperature Range - The range of temperature of the potting material as specified by the manufacturer at which the material will remain in a solid or cured state.

**5.0 CRITERIA**

- 5.1. Description of the potting material - Documentation shall be submitted by the applicant including a the following information:
  - 5.1.1. The name and address for the manufacturer of the potting material.
  - 5.1.2. The exact and complete specifications of the material, including a part or other identifying number, and if relevant, percentage of fillers and any other additives and the mixture ratios.

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5.1.3. If applicable, to obtain correct adhesion of the potting material to a component and the enclosure walls, any requirement for pre-treating or surface preparation, for example: cleaning etching, or the use of primers.

(Note: The information contained in 5.1.1, 5.1.2 and 5.1.3 must be included on the applicant's approval drawings.)

5.1.4. The temperature range at which the potting material will remain in a solid or cured state.

5.2. Requirements for the potting material - The applicant must submit documentation to address the following requirements:

5.2.1. The potting material cures and remains in a solid, irreversible state, so as to make a non-serviceable assembly. A solid, non-serviceable, cured material will be determined using published specifications provided by the manufacturer of the potting material compound.

5.2.2. The potting material must be compatible with the impressed voltages.

5.2.3. The potting material will adhere to the enclosure walls, and if applicable, documentation that the material is compatible with the non-metallic parts that form part or all of the enclosure walls.

5.3. Design and Construction Requirements - The following enclosure assembly design and construction requirements must be met:

5.3.1. 30 CFR, 18.31(b) requires that - Enclosures for potted components: Enclosures shall be rugged and constructed with materials having 75 percent, or greater, of the thickness and flange width specified in paragraph (a) of this section. These enclosures shall be provided with a means for attaching hose conduit, unless energy carried by the cable is intrinsically safe.

5.3.2. The thickness of the walls and the flange width are based on the requirements of the table in 18.31(a)(6), using the calculated volume without the potting material in place. Any cover will be considered a wall in regards to thickness.

5.3.3. Openings in the enclosure walls not essential for the enclosures intended use are not permitted. Necessary openings must be as small and tight

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fitting as practical, including openings for cables or leads. These openings must be sealed with the potting material. The potting material must be at least the thickness of the enclosure wall. The potting material shall adhere to the enclosure and any cable or leads exiting the enclosure.

- 5.3.4. The maximum temperature of any component contained within or coming in contact with the potting material, will not exceed the specified temperature range of the potting material under normal operating conditions.
- 5.3.5. All electrical components within the enclosure must be embedded under the potting material.

(Note: MSHA may elect to use whatever means necessary to verify that there are no voids in the potting material.)