# Chapter 8

# Polymeric Impregnate, Embedment, and Adhesives

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# Introduction

Function

This chapter covers the procedures to be used for the impregnation and embodiment of transformers and inductors used in electrical circuits. This process provides electrical insulation, together with moisture and mechanical protection for these parts. The transformer and inductor will be referred to as, "magnetic component," throughout this chapter.

Materials Covered (See Table 8-1)

The complete procedure shall consist of impregnation, (Scotchcast 280), followed by embedment, (Scotchcast 281), unless either, "impregnation only," or, "embedment only," is specified on the engineering drawing. Scotchcast 280 and 281 are high temperature materials, (Class F, 155°C). Scotchcast 235 and 241 are for low temperature impregnation and embedment. Scotchcast 235 is the impregnate and 241 is the embedment, to be used at lower temperature, (Class B, 130°C). Also, included are the gap adhesive cements, EC2216 A and B, the stress relief materials, RTV566A and B for the magnetic core, and the spot bonding material, Stycast 1095/9. Application and mixing procedures are given for all materials.

**Table 8-1.** Polymeric Materials.

| Polymeric Materials | | | | | |
|---|---|---|---|---|---|
| Application | Manufacturer | Materials and Mix Ratio | | Cure[2] | Cured Control Sample[3] |
| | | Polymeric | Ratio[1] | | |
| Transformer Gap Cement | Emerson Cuming, Inc. | EC2216A<br>EC2216B | 140 (+/-1)<br>100 (+/-1) | Min. cure 24 hrs. at room temp.<br>Full cure, 7 days at room temp.<br>3 hrs. at 65°C (150°F) | A-93 (+/-3) |
| Transformer Stress Relief Open Cores | GE | RTV566A<br>RTV566B | 100 (+/-1)<br>0.1 | Min. cure, 24 hrs. at room temp.<br>Full cure, 7 days at room temp. | A-47 |
| Transformer Spot Bonding | Emerson Cuming, Inc. | Stycast 1095<br>Catalyst | 100 (+/-1)<br>9 (+/-1) | 24 hrs. at room temp. | >D-65 |
| Transformers and Inductors, (potting) | | | | | |
| Impregnation | 3M | Scotchcast 235A<br>Scotchcast 235B | 1<br>2 | 16 to 20 hrs. at 94°C (200°F) | D-50 or higher |
| Embedment | 3M | Scotchcast 241A<br>Scotchcast 241B | 1<br>2 | 16 to 20 hrs. at 94°C (200°F) | D-60 or higher |
| Impregnation | 3M | Scotchcast 280A<br>Scotchcast 280B | 2<br>3 | 16 to 20 hrs. at 94°C (200°F) | D-60 or higher |
| Embedment | 3M | Scotchcast 281A<br>Scotchcast 281B | 2<br>3 | 16 to 20 hrs. at 94°C (200°F) | D-60 or higher |

1. All ratios are parts-by-weight (pbw).
2. Specimens being produced to provide proof of cure.
3. Shore Hardness per ASTM D-2240.

## Applicable Documents

The following documents are specified, as the controlling specification herein:

## Specifications

| | |
|---|---|
| 3M Company, | Material Specification, Epoxy Resin Encapsulant (Scotchcast 281 A/B). |
| 3M Company, | Material Specification, Epoxy Resin Encapsulant (Scotchcast 280 A/B). |
| 3M Company, | Material Specification, Epoxy Resin Encapsulant (Scotchcast 241 A/B). |
| 3M Company, | Material Specification, Epoxy Resin Encapsulant (Scotchcast 235 A/B). |
| Emerson Cumming, | Material Specification, Epoxy Resin Bonding (Stycast 1095/9) |
| 3M Company, | Material Specification, Epoxy-Polyamide Adhesive (EC-2216 A/B) |
| General Electric, | Material Specification, Silicone Rubber Adhesive (RTV-566 A/B) |

Federal

O-T-620 1,1,1 Trichlorethane (Inhibited) Methyl Chloroform

## Standard

American Society for Testing Materials

ASTM-D-1706-61 Indentation Hardness of Plastic by Means of a Durometer

## Impregnation/Embedment, (The Two Step Process)

## Part Preparation

Potting Cups

Clean the potting cups as shown in Figure 8-1, by immersing them in 1,1,1 trichlorethane, and brushing them with a No. 1 acid brush as shown in Figure 8-2. Allow the potting cups to air dry for a minimum of five minutes before using then: Do not touch the interior of the cups with bare hands after they have been cleaned. All personnel required to handle these parts shall wear clean, white, cotton gloves, when handling parts after surface preparation.

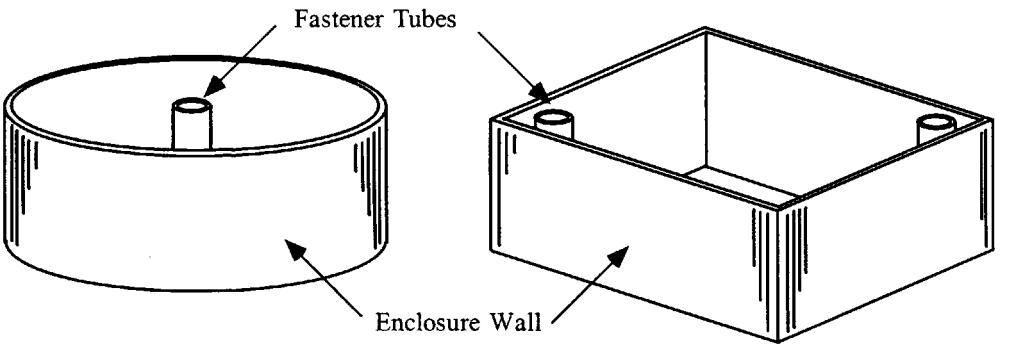


**Figure 8-1**. Typical Enclosures for a Magnetic Device.

**Figure 8-2.** Typical, Acid-Cleaning Brush.

Magnetic Components

Visually inspect the parts to be sure the lead ends are identified with EZ code labels, or equivalent and that they are free of grease or dirt. If grease or dirt is present, clean the parts by wiping with a clean cloth, wet with 1,1,1 trichlorethane. Dry the parts in a vacuum oven, for one hour at 100° +/-3°C, (212° +/-10°F), and at 2 ±0.5 mm Hg pressure to remove any entrapped moisture. If a vacuum oven is not available, the parts may be dried in an air-circulating oven at 100° +/-5°C, (212° +/-10°F), for three hours. Leave the parts in the oven until they are ready to be processed.

## Impregnation Using Scotchcast 280 or 235

Application I

Impregnate the magnetic component using either of the following procedures: The first procedure, A, which uses a vacuum oven or tank, has provisions for the introduction of material under vacuum. The second procedure, B, permits introduction of the material at ambient pressure, followed by the application of a vacuum to accomplish the impregnation.

A. Procedure-Vacuum Application

Place the warm, predried magnetic component in a suitable container and then place the container in a heated vacuum oven or tank, which has provisions for the introduction of material under vacuum. Preheat and maintain the vacuum oven or tank at a temperature of 60° +/-3°C, (140° +/-5°F). With the vacuum oven maintained at this temperature, lower the pressure to less than 10 mm, Hg. Hold this pressure for 15 minutes. Without releasing the vacuum, allow the warm, degassed resin to flow rapidly into the container until the parts are covered. Maintain the vacuum for an additional 20 minutes. Gradually return the vacuum oven or tank, (within one minute), to room pressure and maintain at this pressure for 10 minutes. Evacuate the chamber, again, to less than 10 mm, Hg, and hold this pressure for an additional 20 minutes. Release the vacuum slowly to room ambient pressure. Remove parts from the liquid resin and allow the excess material to drain off. Remove additional material by wiping with a clean cloth or tissue.

B. Procedure - Ambient Pressure Application

Place the warm, predried transformer or inductor into a suitable container. Fill the container, at ambient pressure, with the warm 60°C, (140°F), degassed resin until the parts are covered. Where possible, preheat the vacuum chamber to a temperature of 60° +/-6°C, (140° +/-10°F). Place the container of parts and resin into the vacuum chamber and evacuate to less than 10 mm Hg and maintain this vacuum for 20 minutes. Gradually, return the chamber, (within one to two minutes), to room pressure and maintain at this pressure for 5 to 10 minutes. Repeat this procedure of evacuating the vacuum chamber, maintaining the vacuum for 20 minutes and then, return the chamber to ambient pressure. Remove the parts from the liquid resin and allow the excess material to drain off, as shown in Figure 8-3 and Figure 8-4.

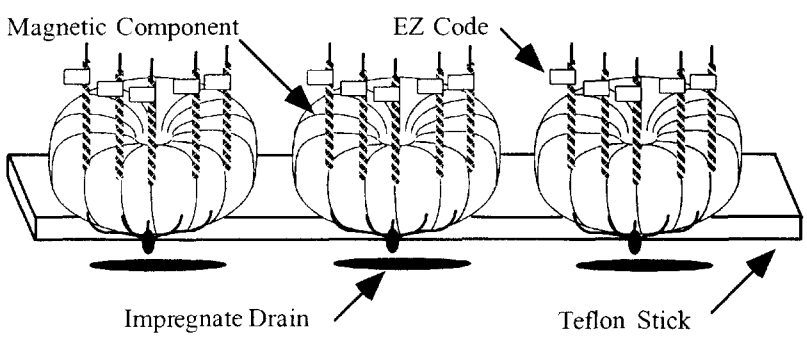


**Figure 8-3.** Draining the Magnetic Component Before Curing.

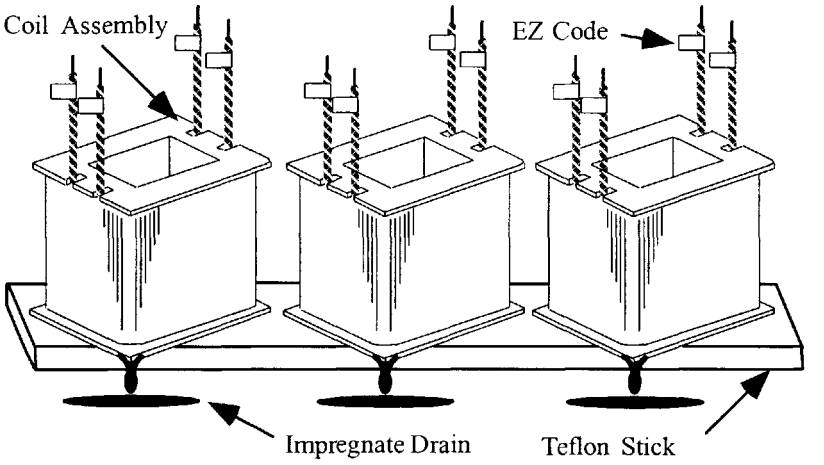


**Figure 8-4.** Draining the Wound Coil Assemblies, Before Curing.

Cure

Place the impregnated parts into an air circulating oven and cure at 75° +/-3°C, (167° +/-5°F), for 15 to 20 hours. Inspect the part and remove the excess resin with a Q-tip, clean cloth or tissue during the first hour of cure.

***Inspection (QA)*** (It is time to inspect the work in process.)

"C", "U", or "E" Cores

See Cut "C" Cores and "E" Cores Assembly Preparation.

Spot Bonding with Stycast 1095/9

The terminal board will be installed into the cup, as shown in Figure 8-5, at the location specified on the Spec Control Drawing, (SCD).

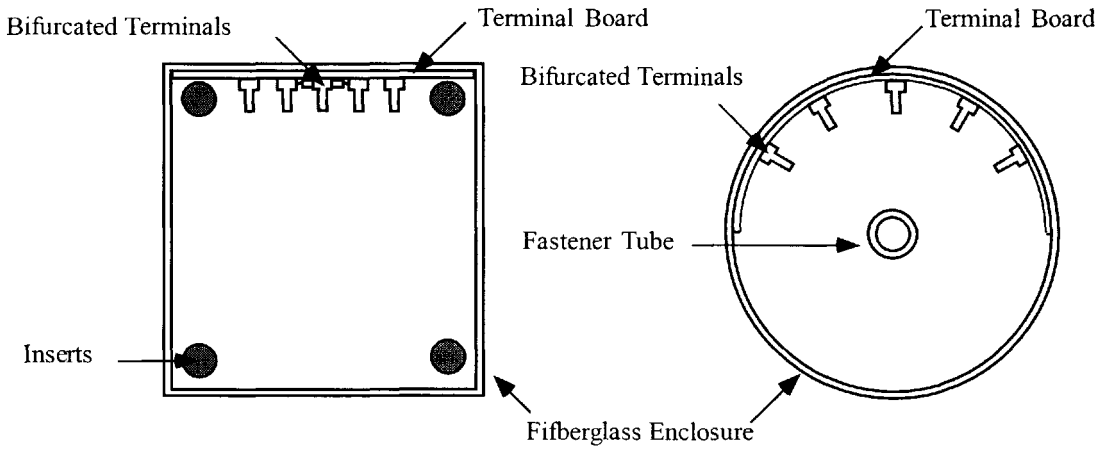


**Figure 8-5.** Terminal Boards, Bonded to the Wall.

***Inspection (QA)*** (It is time to inspect the work in process.)

Installing the Magnetic Component

The magnetic component will be placed into the cup as shown in Figure 8-6, in the location specified on the spec control drawing, (SCD). The magnetic component will be spot-bonded in place, when properly located.

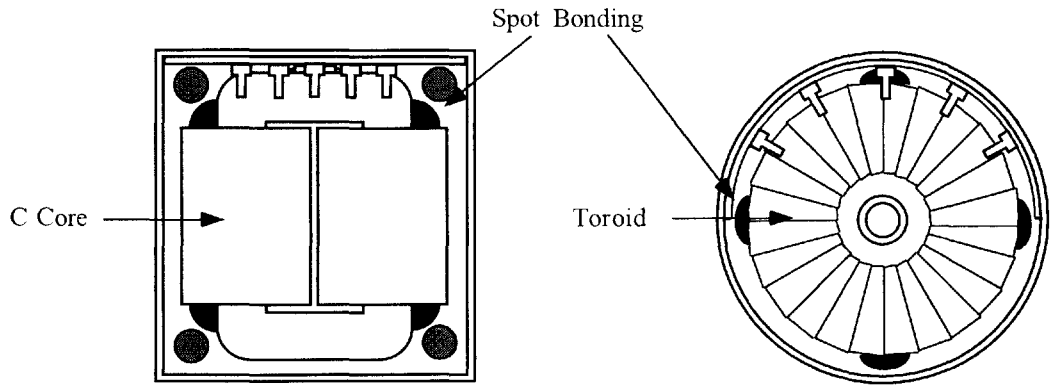


**Figure 8-6.** Spot-Bonding the Magnetic Component.

***Inspection (QA)*** (It is time to inspect the work in process.)

Leads, Termination, and Sealant

Route and terminate all leads, as required by the spec control drawing, (SCD). Verify that all solder joints have been inspected. Seal all leads, leaving the cup with RTV 3116, to prevent leakage of the embedment material. Apply the sealant around the exit of each wire, or around a group of wires, if a number of them exit within a small area, as shown in Figure 8-7. Cure the RTV 3116 for 10 minutes at room temperature.

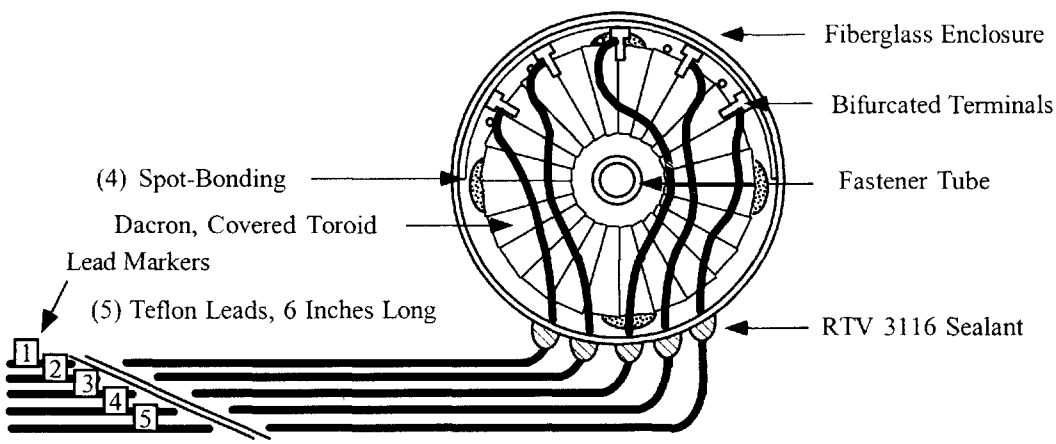


**Figure 8-7.** Typical, Magnetic Component in Final Assembly.

***Inspection (QA)*** (It is time to inspect the work in process.)

Potting Cups Without Lids

Wrap a length of Permacel, No. 248 tape around the periphery of the potting cup, so that it projects above the level of the cup to a potting well, so the potting cup may be completely filled with the embedment material, as shown in Figure 8-8.

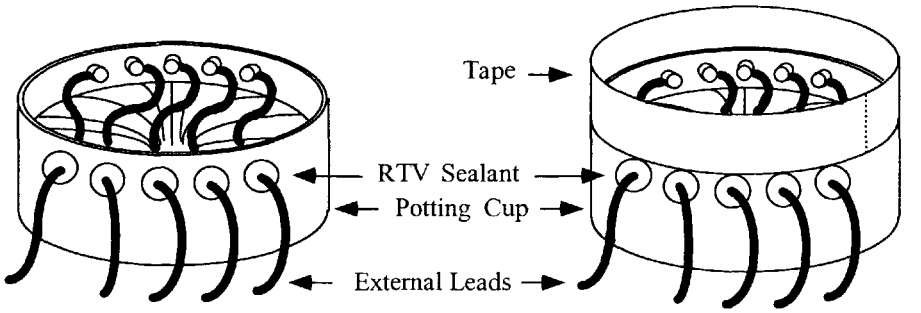


**Figure 8-8.** Potting Cup with Periphery Tape.

Potting Cups with Lids

Check all wire routing and terminations, prior to bonding lids in place. Use only lids with two holes, through which the embedment material is poured. Bond the lid in place in accordance with the applicable, engineering drawing. Modify two plastic syringes to serve as a funnel for pouring the embedment material into the cup. The funnel can also serve as a reservoir for excess material. Use Biggs, 10 cc, plastic syringes that reduce to a small diameter at the tip. Cut part of the tip off, so that the diameter of the portion remaining is only slightly larger than the hole in the lid. Cut the barrel of the syringe so that approximately two inches remain, as shown on Figure 8-9. Locate a modified syringe above each hole. Seal and hold in place, with RTV 3116 placed around the junction of the syringe and the lid, as shown in Figure 8-10. This method is not suitable if the holes in the lids are smaller than 3.2 mm, (0.125 inches) in diameter. In this case, refer to Application II.B (page 8-11), for the correct procedure.

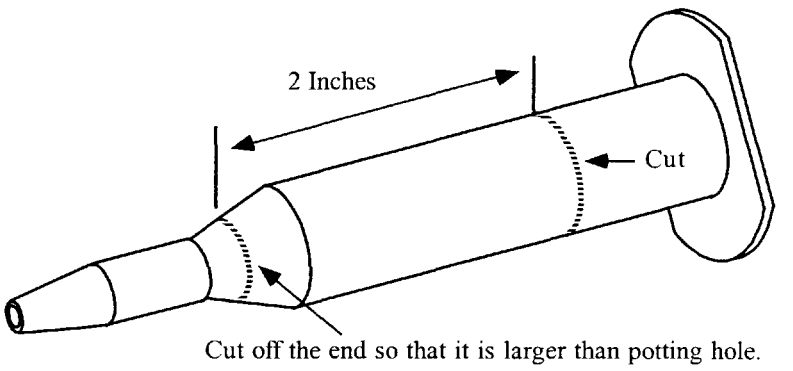


**Figure 8-9.** A Funnel Made from a Modified Plastic Syringe.

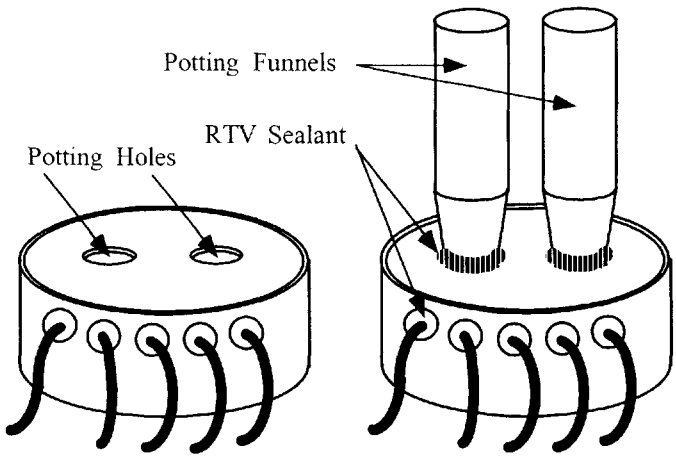


**Figure 8-10.** Potting Filling Ports.

## Embedment Using Scotchcast 281 or 241

Application II

Embed the assembled part using one of the following procedures: The first procedure, A, which uses a vacuum oven or tank, has provisions for the introduction of material under vacuum, is preferred. The second procedure, B, permits introduction of the material at ambient pressure, followed by the application of a vacuum, to accomplish the impregnation. Use of the second procedure, B, is required if the holes in the lid of the potting cup are less than 3.2 mm, (0.125 inches) in diameter.

A. Procedure-Vacuum Application

Place the assembled potting cup in a heated vacuum oven or tank which has provisions for the introduction of material under vacuum. Locate the potting cup so that the embedment material can flow from the material reservoir into the cup or modified syringe leading into the cup. Preheat and maintain the vacuum oven or tank at a temperature of 60° +/-3°C, (140° +/-5°F). With the vacuum oven maintained at this temperature, lower the pressure to less than 10 mm Hg, and hold this pressure for 15 minutes. Without releasing the vacuum, allow the warm, degassed Scotchcast 281/241 to flow, (by means of the modified syringe), into the potting cup. Fill the potting cup until the material rises in the other modified syringe. Fill the potting cups without lids, above the level of the cup. See Figure 8-8. Maintain the vacuum for an additional 20 minutes. Gradually return the vacuum oven or tank, (within one minute), to room pressure and maintain this pressure for 5 to 10 minutes. Evacuate the chamber, again, to less than 10 mm Hg, and hold this pressure for 20 minutes. Release the vacuum slowly to room ambient pressure. Remove any excess embedment material from the exterior of the potting cup by wiping with a cloth wet with methylene chloride. Do not remove the plastic syringes before curing.

B. Procedure-Ambient Pressure Application

Fill the assembled potting cup with the warm, degassed Scotchcast 281/241. For potting cups with lids having holes less than 3.2 mm (0.125 inches) in diameter, use an unmodified 10 cc syringe for filling the cup. Where possible, preheat the vacuum chamber to a temperature of 60° +/-6°C, (140° +/-10°F). Place the potted unit into the vacuum chamber and evacuate to less than 10 mm Hg, and maintain this vacuum for 20 minutes. Gradually, return the chamber, (within one to two minutes), to room pressure and maintain at this pressure for 5 to 10 minutes. Repeat this procedure of evacuating the vacuum chamber, maintaining the vacuum for 20 minutes, and then, returning the chamber to ambient pressure. Remove the assemblies, and use a cloth wet with methylene chloride to remove any material from the exterior of the potting cup.

Cure

Place the embedded unit into an air circulating-oven and cure at 75° +/-3°C, (167° +/-5°F), for 15 to 20 hours. Inspect the surface of the material, where possible, for bubbles during the first hour of cure. Break any bubbles with a toothpick or any other sharp probe.

***CAUTION***

*To avoid damage, the oven shall have two independent temperature control devices; one to control and record the temperature to the predetermined setting, and the second control device to turn off the heat if the desired temperature is exceeded by more than 11°C, (20°F).*

Cleanup

Remove all RTV 3116 used as a sealing material. If cured embedment material or a portion of the polyethylene syringe adheres to the potting cup lid, cut the syringe with a razor blade so the material remaining is flush with the lid. Remove all masking tape applied to potting cups without lids. Use a cloth, wet with methylene chloride, to remove any tape residue from the exterior surfaces of the potting cup.

Dimensions

Check all completed assemblies for conformance with the dimensional requirement, as shown on the spec control drawing, (SCD). Remove any excess material protruding above the level of the potting cup, (primarily, cups without lids). Hold the part firmly and remove any excess material by filing, sawing or sanding.

***Inspection (QA)*** (It is time to inspect the work in process.)

***CAUTION***

*During machining, avoid excessive vibration, which may cause damage.*

# Quality Assurance

Inspection

Quality Assurance shall inspect the procedures, materials, and equipment, in accordance with the requirements specified herein.

Acceptance Criteria

The acceptance criteria for impregnated and embedded transformers or inductors shall be as follows. The finished part shall be unacceptable if any of the following occurs:

a. If the incorrect type of process or material was used.
b. If the cured impregnating or embedment material is soft, tacky, or has any other indication of an improper cure.
c. If there are cracks, voids, cavities, discolorations, or any other evidence of unsatisfactory blending or application.
d. If there is unsatisfactory bonding of the cured material to an epoxy fiberglass potting cup.
e. If the cured material is torn, burned or crumbling.
f. If compound is on the exterior surface of the potting cup.
g. If the dimensional requirements are not complied with.

## Impregnation/Embedment, (The Single Step Process)

## Part Preparation

Potting cups

Clean potting cups, as shown in Figure 8-11, by immersing them in 1,1,1 trichlorethane and brushing them with a No. 1 acid brush, as shown in Figure 8-12. Allow the potting cups to air dry for a minimum of five minutes before using. Do not touch the interior of the cups with bare hands after they have been cleaned. All personnel required to handle these parts shall wear clean, white, cotton gloves, when handling parts after surface preparation.

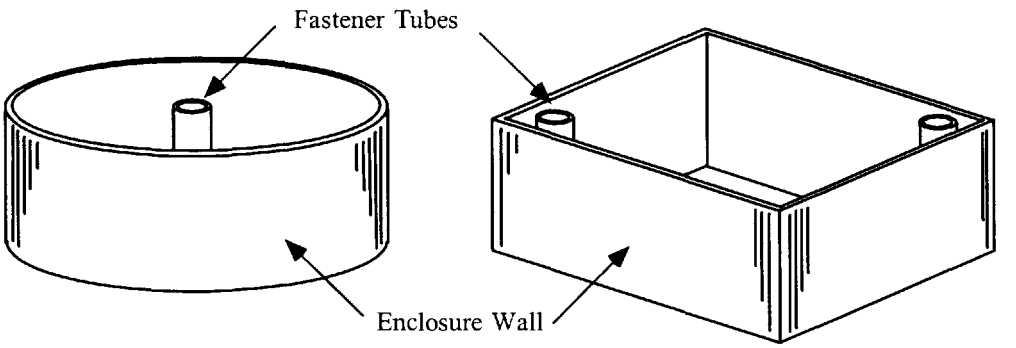


**Figure 8-11.** Typical, Enclosures for Magnetic Device.

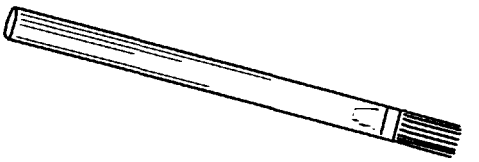

**Figure 8-12.** Typical Acid Cleaning Brush.

Magnetic Components

Visually inspect the parts to be sure that the lead ends are identified with EZ code labels, or equivalent and they are free of grease or dirt. If grease or dirt are present, clean the parts by wiping with a clean cloth wet with 1,1,1 trichlorethane. Dry the parts in a vacuum oven for one hour at 100° +/-5°C, (212° +/-10°F), and at 2 ±0.5 mm Hg, pressure to remove any entrapped moisture. If a vacuum oven is not available, the parts may be dried in an air circulating oven at 100 +/-5°C, (212° +/-10°F), for three hours. Leave the parts in the oven until they are ready to be processed.

"C", "U", or "E" Cores

See the Table of Contents for, Cut "C" Cores and "E" Cores Assembly Preparation.

Spot Bonding with Stycast 1095/9

The terminal board will be installed into the cup, as shown in Figure 8-13, at the location specified on the spec control drawing, (SCD).

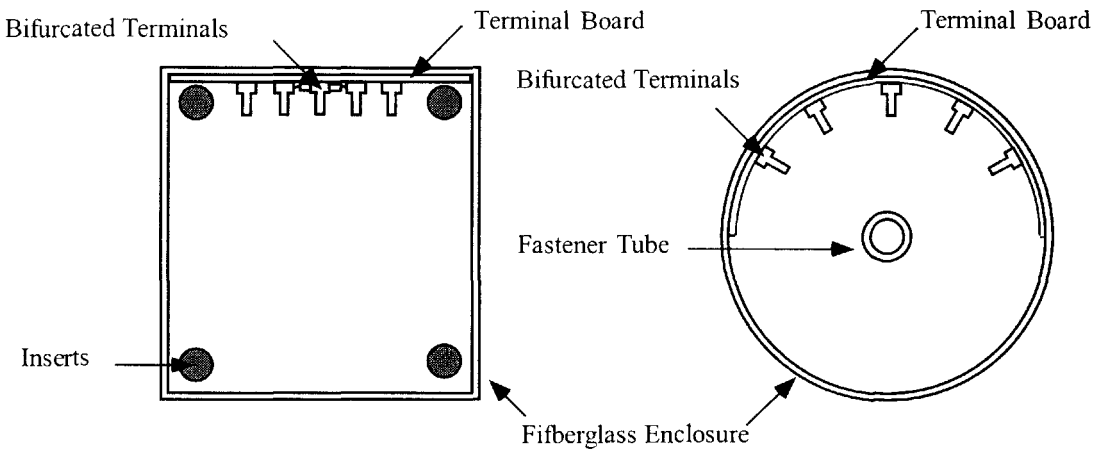


**Figure 8-13.** Terminal Boards, Bonded to the Wall.

***Inspection (QA)*** (It is time to inspect the work in process.)

Installing the Magnetic Component

The magnetic component will be placed into the cup, as shown in Figure 8-14, in the location specified on the spec control drawing, (SCD). The magnetic component will be spot-bonded in place, when properly located.

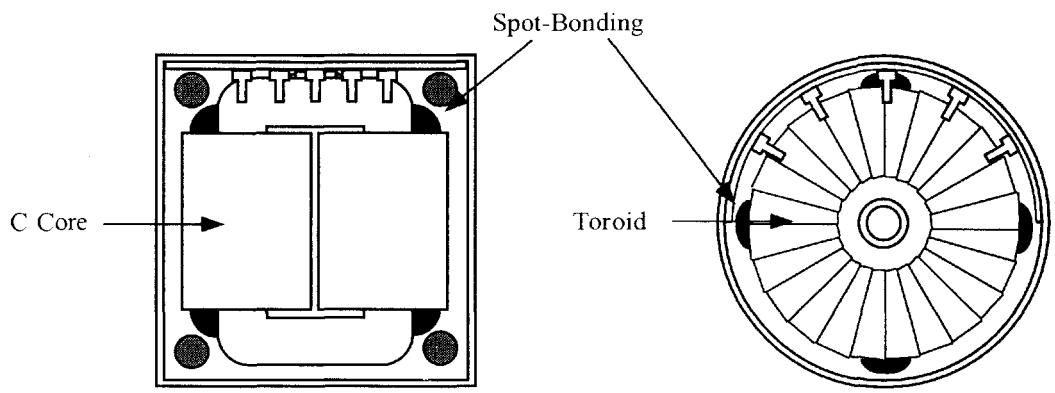


**Figure 8-14.** Spot-Bonding the Magnetic Component.

***Inspection (QA)*** (It is time to inspect the work in process.)

Leads, Termination and Sealant

Route and terminate all leads, as required by the spec control drawing, (SCD). Verify that all solder joints have been inspected. Seal all leads leaving the cup, with RTV 3116, to prevent leakage of the embedment material. Apply the sealant around the exit of each wire, or around a group of wires, if a number of them exit within a small area, as shown in Figure 8-15. Cure the RTV 3116 for 10 minutes at room temperature.

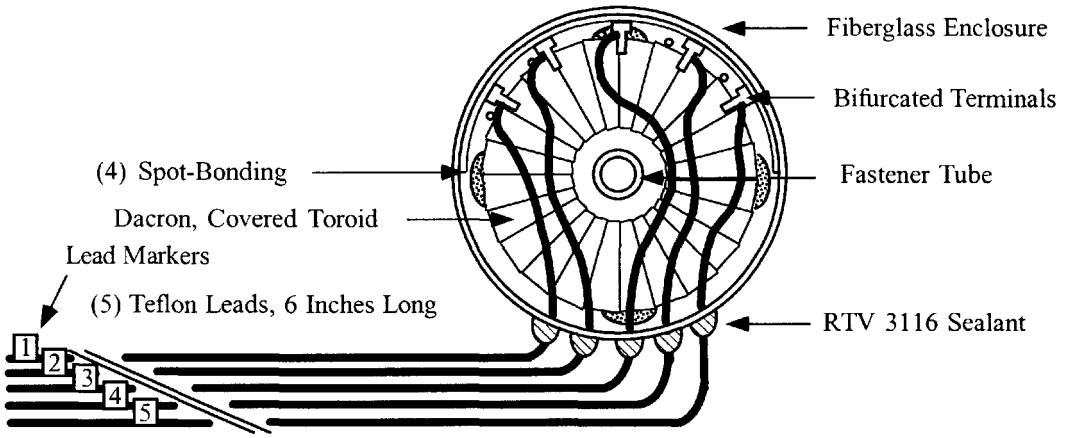


**Figure 8-15.** Typical Magnetic Component in Final Assembly.

***Inspection (QA)*** (It is time to inspect the work in process.)

Potting Cups Without Lids

Wrap a length of Permacel, No. 248 tape around the end of the potting cup, so that it projects above the level of the cup to a potting well, so that the potting cup may be completely filled with the embedment material, as shown in Figure 8-16.

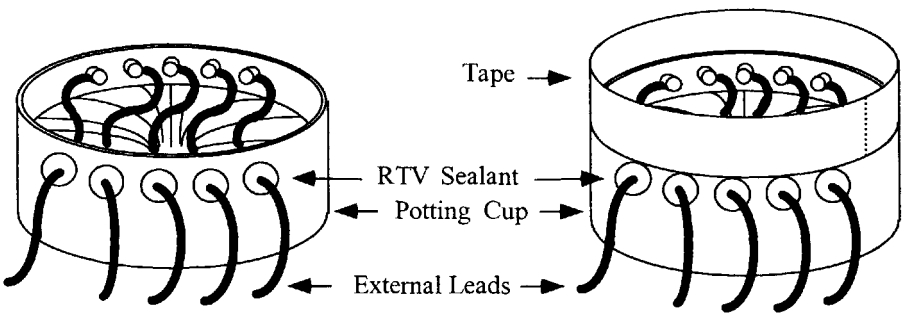


**Figure 8-16.** Potting Cup with Periphery Tape.

Potting Cups with Lids

Check all wire routing and terminations prior to bonding the lids in place. Use only lids with two holes, through which the embedment material is poured. Bond the lid in place in accordance with the Spec Control Drawing, (SCD). Modify two plastic syringes to serve as a funnel for pouring the embedment material into the cup. The funnel can also serve as a reservoir for excess material. Use Biggs, 10 cc, plastic syringes that reduce to a small diameter at the tip. Cut part of the tip off so that the diameter of the portion remaining is only slightly larger than the hole in the lid. Cut the barrel of the syringe so that approximately two inches remain, as shown on Figure 8-17. Locate a modified syringe above each hole. Seal and hold in place with RTV 3116 placed around the junction of the syringe and the lid, as shown in Figure 8-18.

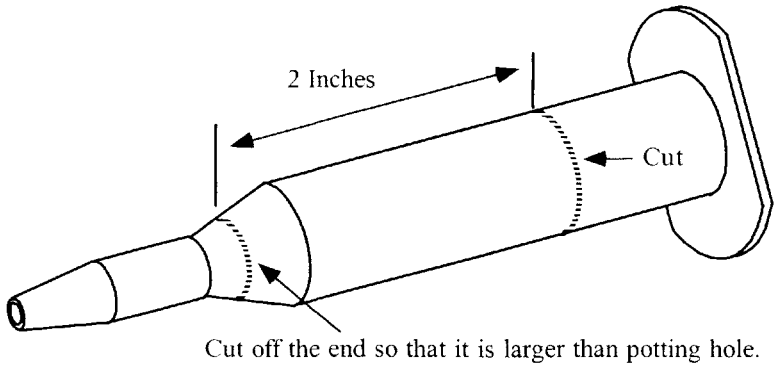


**Figure 8-17.** A Funnel Made from a Modified Plastic Syringe.

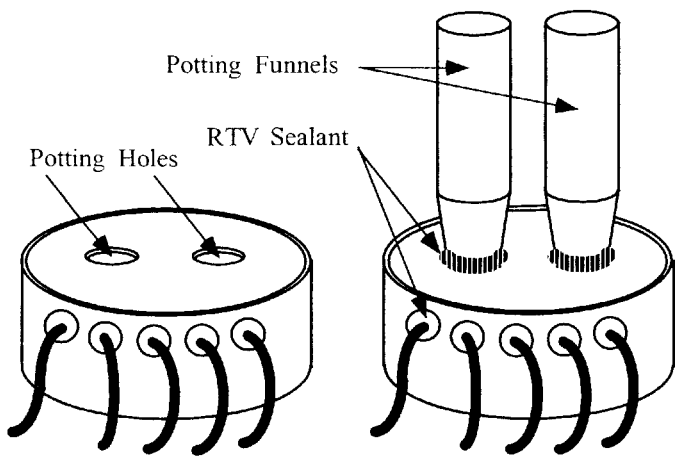


**Figure 8-18.** Potting Filling Ports.

## Embedment Using Scotchcast 281 or 241

Application

Embed the assembled part using one of the following procedures: The first procedure, A, which uses a vacuum oven or tank, that has provisions for the introduction of material under vacuum. The second procedure, B, permits introduction of the material, at ambient pressure, followed by application of a vacuum, to accomplish the impregnation. Use of the second procedure, B, is required if the holes in the lid of the potting cup are less than 3.2 mm, (0.125 inches), in diameter.

A. Procedure-Vacuum Application

Place the assembled potting cup in a heated vacuum oven or tank which has provisions for the introduction of material under vacuum. Locate the potting cup so that the embedment material can flow from the material reservoir into the cup or modified syringe leading into the cup. Preheat and maintain the vacuum oven or tank at a temperature of 60° +/-3°C, (140° +/-5°F). With the vacuum oven maintained at

this temperature, lower the pressure to less than 10 mm Hg, and hold this pressure for 15 minutes. Without releasing the vacuum, allow the warm, degassed Scotchcast 281/241 to flow (by means of the modified syringe) into the potting cup. Fill the potting cup until the material rises in the other modified syringe. Fill the potting cups without lids, above the level of the cup. See Figure 8-16. Maintain the vacuum for an additional 20 minutes. Gradually return the vacuum oven or tank, (within one minute), to room pressure and maintain this pressure for 5 to 10 minutes. Evacuate the chamber, again, to less than 10 mm Hg and hold this pressure for 20 minutes. Release the vacuum slowly to room ambient pressure. Remove any excess embedment material from the exterior of the potting cup by wiping with a cloth wet with methylene chloride. Do not remove the plastic syringes before curing.

B. Procedure-Ambient Pressure Application

Fill the assembled potting cup with the warm, degassed Scotchcast 281/241. For potting cups with lids having holes less than 3.2 mm, (0.125 inches), in diameter, use an unmodified 10 cc syringe for filling the cup. Where possible, preheat the vacuum chamber to a temperature of 60° +/-6°C, (140° +/-10°F). Place the potted unit into the vacuum chamber and evacuate to less than 10 mm Hg, and maintain this vacuum for 20 minutes. Gradually, return the chamber, (within one to two minutes), to room pressure and maintain at this pressure for 5 to 10 minutes. Repeat this procedure of evacuating the vacuum chamber, maintaining the vacuum for 20 minutes, and then, returning the chamber to ambient pressure. Remove the assemblies, and use a cloth wet with methylene chloride to remove any material from the exterior of the potting cup.

Cure

Place the embedded unit into an air circulating oven and cure at 75° +/-3°C, (167° +/-5°F), for 15 to 20 hours. Inspect the surface of the material, where possible, for bubbles during the first hour of cure. Break any bubbles with a toothpick or any other sharp probe.

***CAUTION***

*To avoid damage, the oven shall have two independent temperature control devices; one to control and record the temperature to the predetermined setting, and the second control device to turn off the heat if the desired temperature is exceeded by more than 11°C, (20°F).*

Cleanup

Remove all RTV 3116 used as a sealing material. If cured embedment material or a portion of the polyethylene syringe adheres to the potting cup lid, cut the syringe with a razor blade so the material remaining is flush with the lid. Remove all masking tape applied to potting cups without lids. Use a cloth, wet with methylene chloride to remove any tape residue from the exterior surfaces of the potting cup.

Dimensions

Check all completed assemblies for conformance with the dimensional requirement as shown on the Spec Control Drawing, (SCD). Remove any excess material protruding above the level of the potting cup (primarily, cups without lids). Hold the part firmly and remove any excess material by filing, sawing or sanding.

***CAUTION***

*During machining, avoid excessive vibration, which may cause damage.*

## Quality Assurance

Inspection

Quality Assurance shall inspect the procedures, materials and equipment, in accordance with the requirements specified herein.

Acceptance Criteria

The acceptance criteria for impregnated and embedded transformers or inductors shall be as follows. The finished part shall be unacceptable if any of the following occurs:

a. If the incorrect type of process or material was used.
b. If the cured impregnating or embedment material is soft, tacky, or has any other indication of an improper cure.
c. If there are cracks, voids, cavities, discolorations, or any other evidence of unsatisfactory blending or application.
d. If there is unsatisfactory bonding of the cured material to an epoxy fiberglass, potting cup.
e. If the cured material is torn, burned or crumbling.
f. If compound is on the exterior surface of the potting cup.
g. If the dimensional requirements are not complied with.

## Preparing Polymeric Materials

Proof of Cure

All polymeric materials used in the processing of magnetic devices shall have proof of cure established by testing the hardness of a sample of the material that has been processed concurrently with the magnetic devices. The hardness of the sample shall meet the hardness specified by the manufacturer of the material.

## Preparing Scotchcast 280 for Impregnation

Control Specification for Scotchcast 280 A/B.

3M Product Information, use Electrical Resin Scotchcast 280 A/B to the latest revision.

## Mixing Scotchcast 280

Material Preparation and Control

Heat Part A and Part B of Scotchcast 280 to a temperature of 60° +/-5°C, (140° +/-10°F) prior to mixing, in order to reduce the viscosity. Heat the material, by either placing the containers in a oven, or by partially immersing them in hot water. Do not heat them on a hot plate, or over an open flame. Mix the materials thoroughly in their original containers. Weigh the separate parts to within two percent accuracy, using the proportions as follows:

1) Scotchcast 280, Part A: 2 parts by weight.
2) Scotchcast 280, Part B: 3 parts by weight.

Weigh the materials on a balance scale, accurate to 0.10 grams. Use either a glass or metal round bottom, (without corners), container, suitable for weighing and mixing. Determine the tare weight of the container and stirring rod. Thoroughly blend the ingredients, using a stainless steel spatula, until the color is absolutely uniform, or a homogeneous mixture is obtained. This information should now be recorded on the Mixing Record Form. See Figure 8-25 (or use an equivalent), noting all applicable data for each batch.

## Degassing Scotchcast 280

Place the container of warm, mixed Scotchcast 280 into a vacuum chamber that has been preheated to 60°C (140°F). Lower the pressure in the vacuum chamber to less than 10 mm Hg, and degas the material until foaming ceases. Do not subject the material to a vacuum of less than one mm Hg, or, for more than 15 minutes. The container's sidewalls should be four times the height of the liquid resin to contain the foaming that takes place in a vacuum.

## Control Sample, Scotchcast 280

For each mixed batch of Scotchcast 280, make a control sample by transferring a portion of the degassed material into an aluminum foil dish to a depth of approximately 6.4 mm (0.25 inches). Identify the control sample by writing the mixture record number and date on the outside of the bottom of the dish. Place the

control sample in the same vacuum oven or tank that will be used for processing the parts. Subject the control sample to the same process conditions that the parts will undergo. After exposure to the actual processing conditions, cure the control sample for 15 to 20 hours at a temperature of 75° +/-3°C, (167° +/-5°F). The cured sample shall be of a uniform appearance and tack free. Determine the hardness of the sample, after cure, per ASTM-D-1706-61, using a Shore D Durometer. The Shore D hardness shall be a minimum of 60. Determine tackiness by pressing a clean polyethylene film on the surface of the sample. The film shall not adhere to the surface. If any control samples fail to meet the above requirements, reject all parts processed with that particular batch of material. Record all the results in the remarks section of the Mixing Record Form.

## Curing Scotchcast 280

Cure Scotchcast 280 in a air circulating oven at 75° +/-3°C, (167 +/-5°F), for 15 to 20 hours.

## Preparing Scotchcast 235 for Impregnation

Control Specification for Scotchcast 235 A/B

3M, Product Information, use Electrical Resin Scotchcast 235 A/B to the latest revision.

## Mixing Scotchcast 235

Material Preparation and Control

Heat Part A and Part B of Scotchcast 235 to a temperature of 60° +/-5° C, (140° +/-10° F), prior to mixing, in order to reduce the viscosity. Heat the material by either placing the containers in a oven or by partially immersing them in hot water. Do not heat them on a hot plate or over an open flame. Mix the materials thoroughly in their original containers. Weigh the separate parts to within two percent accuracy using the proportions as follows:

1) Scotchcast 235, Part A: 1 part by weight.
2) Scotchcast 235, Part B: 2 parts by weight.

Weigh the materials on a balance scale, accurate to 0.10 grams. Use either a glass or metal round bottom, (without corners) container suitable for weighing and mixing. Determine the tare weight of the container and stirring rod. Thoroughly blend the ingredients, using a stainless steel spatula, until the color is absolutely uniform, or a homogeneous mixture is obtained. This information should now be recorded on the Mixing Record Form. See Figure 8-25 (or use an equivalent), noting all applicable data for each batch.

## Degassing Scotchcast 235

Place the container of warm, mixed Scotchcast 235 into a vacuum chamber that has been preheated to 60°C, (140°F). Lower the pressure in the vacuum chamber to less than 10 mm Hg, and degas the material until foaming ceases. Do not subject the material to a vacuum of less than one mm Hg, or, for more than 15

minutes. The container's sidewalls should be four times the height of the liquid resin to contain the foaming that takes place in a vacuum.

## Control Sample Scotchcast 235

For each mixed batch of Scotchcast 235, make a control sample by transferring a portion of the degassed material into an aluminum foil dish to a depth of approximately 6.4 mm (0.25 inches). Identify the control sample by writing the mixture record number and date on the outside of the bottom of the dish. Place the control sample in the same vacuum oven or tank that will be used for processing the parts. Subject the control sample to the same process conditions that the parts will undergo. After the exposure to the actual processing conditions, cure the control sample for 15 to 20 hours at a temperature of 75° +/-5°C, (167° +/-5°F). The cured sample shall be of a uniform appearance and tack free. Determine the hardness of the sample after cure, per ASTM-D-1706-61, using a Shore D Durometer. The Shore D hardness of 50 shall be the minimum. Determine tackiness by pressing a clean polyethylene film on the surface of the sample. The film shall not adhere to the surface. If any control samples fail to meet the above requirements, reject all parts processed with that particular batch of material. Record all the results in the remarks section of the Mixing Record Form.

## Curing Scotchcast 235

Cure Scotchcast 235 in a air circulating oven at 75° +/-3°C, (167° +/-5°F), for 15 to 20 hours.

## Preparing Scotchcast 281 for Embedment

Control Specification for Scotchcast 281 A/B

3M Product Information, use Electrical Resin Scotchcast 281 A/B to the latest revision.

## Mixing Scotchcast 281

Material Preparation and Control

Heat Part A and Part B of Scotchcast 281 to a temperature of 60° +/-5°C, (140° +/-10°F), prior to mixing in order to reduce the viscosity. Heat the material by either placing the containers in a oven or by partially immersing them in hot water. Do not heat them on a hot plate or over an open flame. Mix the materials thoroughly in their original containers. Weigh the separate parts to within two percent accuracy using the proportions as follows:

1) Scotchcast 281, Part A: 2 parts by weight.
2) Scotchcast 281, Part B: 3 parts by weight.

Weigh the materials on a balance scale, accurate to 0.10 grams. Use either a glass or metal round bottom, (without corners), container suitable for weighing and mixing. Determine the tare weight of the container and stirring rod. Thoroughly blend the ingredients, using a stainless steel spatula, until the color is absolutely uniform, or a homogeneous mixture is obtained. This information should now be recorded on the

Mixing Record Form. See Figure 8-25 (or use an equivalent), noting all applicable data for each batch.

## Degassing Scotchcast 281

Place the container of warm, mixed Scotchcast 281 into a vacuum chamber that has been preheated to 60°C, (140°F). Lower the pressure in the vacuum chamber to less than 10 mm Hg, and degas the material until foaming ceases. Do not subject the material to a vacuum of less than one mm Hg, or, for more than 15 minutes. The container's sidewalls should be four times the height of the liquid resin to contain the foaming that takes place in a vacuum.

## Control Sample Scotchcast 281

For each mixed batch of Scotchcast 281, make a control sample by transferring a portion of the degassed material into an aluminum foil dish to a depth of approximately 6.4 mm (0.25 inches). Identify the control sample by writing the mixture record number and date on the outside of the bottom of the dish. Place the control sample in the same vacuum oven or tank that will be used for processing the parts. Subject the control sample to the same process conditions that the parts will undergo. After exposure to the actual processing conditions, cure the control sample for 15 to 20 hours at a temperature of 75° +/-3°C, (167° +/-5°F). The cured sample shall be of a uniform appearance and tack free. Determine the hardness of the sample after cure, per ASTM-D-1706-61, using a Shore D Durometer. The Shore D hardness of 60 shall be the minimum. Determine tackiness by pressing a clean polyethylene film on the surface of the sample. The film shall not adhere to the surface. If any control samples fails to meet the above requirements, reject all parts processed with that particular batch of material. Record all the results in the remarks section of the Mixing Record Form.

## Curing Scotchcast 281

Cure Scotchcast 281 in a circulating air oven at 75° +/-3°C, (167° +/-5°F), for 15 to 20 hours.

## Preparing Scotchcast 241 for Embedment

Control Specification for Scotchcast 241 A/B

3M Product Information, use Electrical Resin Scotchcast 241 A/B to the latest revision.

## Mixing Scotchcast 241

Material Preparation and Control

Heat Part A and Part B of Scotchcast 241 to a temperature of 60° +/-5°C, (140° +/-10°F) prior to mixing in order to reduce the viscosity. Heat the material by either placing the containers in a oven or by partially immersing them in hot water. Do not heat them on a hot plate or over an open flame. Mix the materials thoroughly in their original containers. Weigh the separate parts to within two percent accuracy using the proportions as follows:

1) Scotchcast 241, Part A: 1 part by weight.

2) Scotchcast 241, Part B: 2 parts by weight.

Weigh the materials on a balance scale, accurate to 0.10 grams. Use either a glass or metal round bottom, (without corners), container suitable for weighing and mixing. Determine the tare weight of the container and stirring rod. Thoroughly blend the ingredients, using a stainless steel spatula, until the color is absolutely uniform, or a homogeneous mixture is obtained. This information should now be recorded on the Mixing Record Form. See Figure 8-25 (or use an equivalent), noting all applicable data for each batch.

## Degassing 241

Place the container of warm, mixed Scotchcast 241 into a vacuum chamber that has been preheated to 60°C, (140°F). Lower the pressure in the vacuum chamber to less than 10 mm Hg, and degas the material until foaming ceases. Do not subject the material to a vacuum of less than one mm Hg, or, for more than 15 minutes. The container's sidewalls should be four times the height of the liquid resin to contain the foaming that takes place in a vacuum.

## Control Sample Scotchcast 241

For each mixed batch of Scotchcast 241, make a control sample by transferring a portion of the degassed material into an aluminum foil dish to a depth of approximately 6.2 mm, (0.25 inches). Identify the control sample by writing the mixture record number and date on the outside of the bottom of the dish. Place the control sample in the same vacuum oven or tank that will be used for processing the parts. Subject the control sample to the same process conditions that the parts will undergo. After the exposure to the actual processing conditions, cure the control sample for 15 to 20 hours at a temperature of 75° +/-3° C (167° +/-5° F). The cured sample shall be of a uniform appearance and tack free. Determine the hardness of the sample after cure, per ASTM-D-1706-61, using a Shore D Durometer. The Shore D hardness of 60 shall be the minimum. Determine tackiness by pressing a clean polyethylene film on the surface of the sample. The film shall not adhere to the surface. If any control samples fail to meet the above requirements, reject all parts processed with that particular batch of material. Record all the results in the remarks section of the Mixing Record Form.

## Curing Scotchcast 241

Cure Scotchcast 241 in a circulating air oven at 75° +/-3°C, (167° +/-5°F) for 15 to 20 hours.

## Preparing Stycast 1095/9 for Spot Bonding

Control Specification for Stycast 1095/9

Emerson and Cuming, Inc., Mixing Bulletin for Stycast 1095 and Catalyst No. 9, to the latest revision.

## Mixing Stycast 1095/9

Material Preparation and Control

Warm the Stycast 1095 in its original container to approximately 54°C, (130°F), in order to reduce the viscosity and facilitate mixing. Thoroughly blend the ingredients using a stainless steel spatula until a homogeneous mixture is obtained.

Cool the Stycast 1095 to room temperature before mixing with Catalyst 9. Weight out 100 +/-1 parts, by weight, of Stycast 1095, and add 9 +/- 0.1 parts, by weight, of Catalyst 9. Weigh the materials on a balance scale accurate to 0.10 grams. Use either a glass or metal round bottom, (without corners) container, suitable for weighing and mixing. Determine the tare weight of the container and stirring rod. Do not mix more than 100 grams of resin and 9 grams of catalyst at any one time. Mix the ingredients thoroughly keeping the end of the mixing blade below the mixture level. Avoid any whipping motion, which would tend to introduce air into the mixture. This information should now be recorded in the Mixing Record Form. See Figure 8-25 (or use an equivalent), noting all applicable data for each batch.

## Pot Life of Stycast 1095/9

The useful life of the mixed material is approximately 30 minutes, after adding the catalyst. The end of useful life is indicated by the lack of wetting and adhesion, or excessive thickening of the mixed material. Any mixed material, exhibiting these characteristics, shall be discarded immediately, regardless of the time at which it was first mixed.

## Control Sample Stycast 1095/9

For each mixed batch of Stycast 1095/9, make a control sample by transferring a portion of the material into an aluminum foil dish to a depth of approximately 1/8 inch. Identify the control sample, by writing the mixture record number and date on the outside, of the bottom of the small aluminum dish. Cure the control sample, overnight, at room temperature. The cured sample shall be of a uniform appearance and tack free. Determine the hardness of the sample after cure, per ASTM-D-1706-61, using a Shore D Durometer. The Shore D hardness of 65 shall be the minimum. If any of the control samples fail to meet the above requirements, reject all parts processed with that particular batch of material. Record all the results in the remarks section of the Mixing Record Form.

## Curing Stycast 1095/9

Allow Stycast 1095/9 to cure for four hours, minimum, at ambient temperature, before cleaning or extensive handling.

## Preparing Epoxy-Polyamide Adhesive EC-2216 B/A

Control Specification for Epoxy-Polyamide Adhesive EC-2216 B/A

Emerson and Cuming, Inc., use Mixing Bulletin for Epoxy-Polyamide Adhesive EC-2216 B/A, to the latest revision.

## Mixing Epoxy-Polyamide Adhesive EC-2216 B/A

Material Preparation and Control

Use either a glass or metal round bottom, (without corners), container suitable for weighing and mixing. Determine the tare weight of the container and stirring rod. Thoroughly blend the ingredients, using a stainless steel spatula, until a homogeneous mixture is obtained.

***CAUTION***

*Excessive loss of adhesive liquid may result in incomplete adhesive curing and reduced bonding strength. To minimize the possible loss of adhesive liquid through absorption, paper, wood, fiber, or other porous materials shall not be used when preparing the mixture. In addition, keg-lined cans or wax-coated cups shall not be used.*

***WARNING***

*The materials used in this process may cause injurious effects to allergic personnel. Avoid contact with the adhesive material, and perform the mixing procedure in a well, ventilated area. It is advisable to wash your hands thoroughly with soap and warm water, prior to, and after working with the adhesive material.*

Measure the required amount of adhesive past, in a ratio of 100 +/-1 parts by weight of EC-2216 of component B, (base), to 140 +/-1 parts, by weight, of EC-2216 component A, (hardener), in the container. Weigh the materials on a balance scale, accurate to 0.10 grams. Use either a glass or metal round bottom (without corners), container, suitable for weighing and mixing. Determine the tare weight of the container and stirring rod. Measure more adhesive, than actually required, to allow for waste. Mix the ingredients thoroughly, keeping the end of the mixing blade below the mixture level. Avoid any whipping motion, which would tend to introduce air into the mixture. This information should now be recorded on the Mixing Record Form. See Figure 8-25 (or use an equivalent), noting all applicable data for each batch.

## Pot Life of EC-2216 B/A

The useful life of the mixed material is approximately 1.5 hours at 24°C (75°F). The end of the useful life is indicated by the lack of wetting and adhesion or excessive thickening of the mixed material. Any mixed material exhibiting these characteristics shall be discarded immediately, regardless of the time at which it was first mixed.

## Control Sample EC-2216 B/A

For each mixed batch of EC-2216 B/A, make a control sample by transferring a portion of the material into an aluminum foil dish to a depth of approximately 1/8 inch. Identify the control sample by writing the mixture record number and date on the outside of the bottom of the small aluminum dish. Cure the control sample in the oven along with the parts to be bonded. The cured sample shall be of a uniform appearance and tack free. Determine the hardness of the sample after cure per, ASTM-D-1706-61, using a Shore D Durometer. The Shore D hardness of 95 shall be the minimum. If any control samples fails to meet the above requirements, reject all parts processed with that particular batch of material. Record all the results in the remarks section of the Mixing Record Form.

## Curing EC-2216 B/A

Cure EC-2216 B/A at room temperature 24° +/-3°C (75° +/-5°F) for a period of 168 hours. Curing at a elevated temperature requires an air-circulating oven, and cure at a temperature of 66° +/-5°C, (150° +/-10°F), for a period of three hours.

## Preparing Silicone Rubber Compound (RTV 566 A/B)

Control Specification for Silicone Rubber Compound RTV 566 A/B

General Electric Company, use Mixing Bulletin for Silicone Rubber Compound RTV 566 A/B, to the latest revision.

## Mixing RTV 566 A/B

Material Preparation and Control

Use either a glass or metal round bottom, (without corners), container suitable for weighing and mixing. Determine the tare weight of the container and stirring rod. Thoroughly blend the ingredients using a stainless steel spatula, until a homogeneous mixture is obtained.

***CAUTION***

*To minimize the possible loss of catalyst through absorption, paper, wood, fiber, or other porous materials shall not be used when preparing the mixture. In addition, keg-lined cans or wax-coated cups shall not be used.*

Weigh the required amount of silicone rubber into a clean mixing container. Add the required amount of catalyst at a ratio of 0.1 parts, by weight, to 100 parts by weight of silicone rubber. The catalyst may be added, dropwise, from a calibrated medicine dropper, or an equivalent. For example, for 20 gms of Part A, add one drop* of Part B. *(Measure from a conventional-type medicine dropper, one drop is approximately 0.02 gms). Use volumetric addition and syringe, when more precise measurements are required. Deareate in a vacuum of 10 torr or better at 24° +/-3°C, (75° +/-5°F). The vacuum shall be applied until the material

rises in the container and breaks. Then the application of the vacuum shall be continued for an additional 0.5 to 1.0 minute.

Weigh the materials on a balance scale accurate to 0.10 grams. Use either a glass or metal round bottom (without corners) container, suitable for weighing and mixing. Determine the tare weight of the container and stirring rod. Mix the ingredients thoroughly keeping the end of the mixing blade below the mixture level. Avoid any whipping motion, which would tend to introduce air into the mixture. This information should now be recorded on the Mixing Record Form. See Figure 8-25 (or use an equivalent), noting all applicable data for each batch.

## Pot Life of RTV-566 A/B

The useful life of the mixed material is approximately 20 minutes at 24°C, (75°F), when mixed with 0.1% catalyst.

## Control Sample RTV-566 A/B

For each mixed batch of RTV-566 A/B, make a control sample by transferring a portion of the material into an aluminum foil dish to a depth of approximately 3.2 mm (0.125 inches). Identify the control sample by writing the mixture record number and date on the outside of the bottom of the small aluminum dish. Cure the control sample in the same area, along with the parts that have been coated. Allow the RTV-566 A/B to cure for a minimum of 25 hours at 24° +/-3°C, (75° +/-5°F), and 50% +/-5% relative humidity. The cured sample shall be of a uniform appearance, free of soft areas and tackiness. Determine the hardness of the sample after cure, per ASTM-D-1706-6,1 using a Shore D Durometer. The Shore D hardness of 95 shall be the minimum. If any control samples fail to meet the above requirements, reject all parts processed with that particular batch of material. Record all the results in the remarks section of the Mixing Record Form.

## Curing RTV-566 A/B

Cure the RTV-566 A/B for a minimum of 25 hours at 24° +/-3°C, (75° +/-5°F), and 50% +/-5% relative humidity.

## Application and Storage

Method of Application

For convenience in using, polymeric materials may be placed in a syringe for application. Using a syringe the polymeric technician has better control with the application and the amount applied, as shown in Figure 8-19. There are several types of syringes that are used with the application of polymeric materials. When large quantities of bonding or adhesives are being dispensed, then, the one of choice would be the Semco gun with a cartridge. Smaller amounts of polymeric materials can be dispensed using a heavy-duty syringe, with a 10 cc tapered or blunt needle, or a No. 10, Polyethylene Syringe, as shown in Figure 8-20.

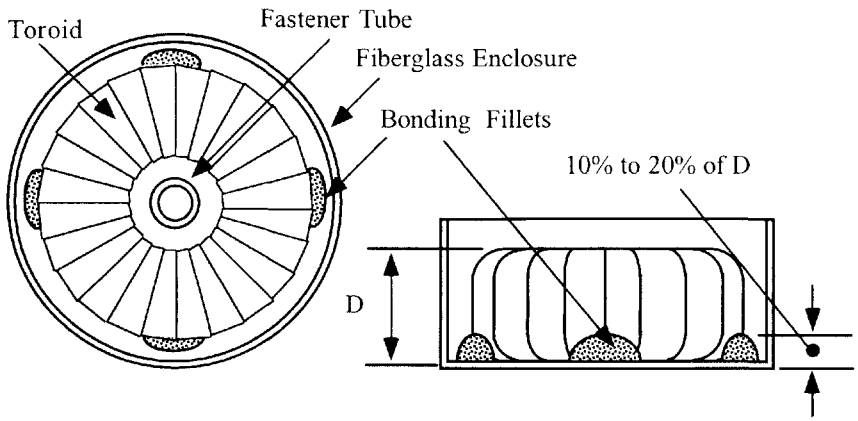


**Figure 8-19.** Bonding a Toroid into Position.

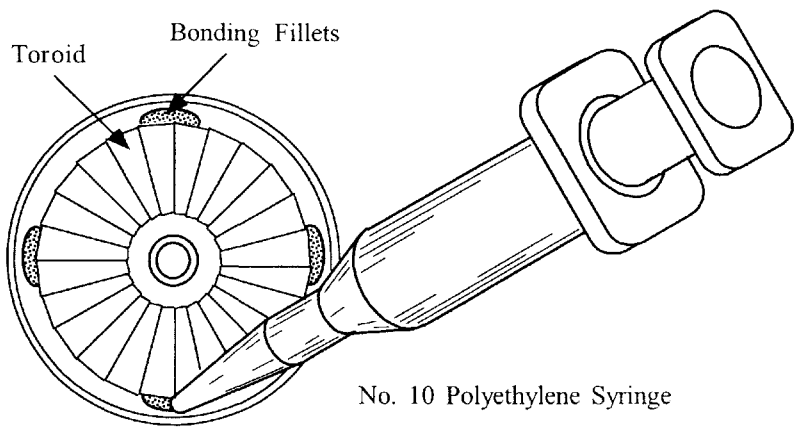


**Figure 8-20.** Applying Bonding Material with a Syringe.

Method of Storage

Polymeric materials can be prepared in advance, and the material placed in syringes. The material can then be frozen in liquid nitrogen, ($LN_2$) for long periods of time for later use. The thaw time for 10 cc syringe of the material is about 19 to 25 minutes. This method of storage does have an effect on pot life after thawing. The end of useful life, after thawing, is exhibited by a significant increase in the pressure required to extrude the material from the syringe, and a lack of wetting and adhesion, or excessive thickening, of the mixed material. Any material exhibiting these characteristics will be discarded immediately, regardless of the time at which it was first mixed.

## Cut "C" Core and "E" Core Assembly Preparation

Cut Core Preparation

Prior to banding the core halves, the mating surfaces shall be coated with an approved epoxy. A thin layer

of EC 2216 B/A, adhesive shall be applied over both mating surfaces, as shown in Figure 8-21. Bond line thickness for optimum properties shall be in the range of 0.076 to 0.254 mm (0.003 to 0.010 inches). Sufficient adhesive shall be applied to allow a bead of excess adhesive to be squeezed out when pressure is applied.

**Note:**

Providing sufficient adhesive to obtain a squeeze-out bead will minimize adhesive voids, and will allow the air, entrapped in the adhesive during mixing, to be squeezed out. The squeezed-out bead shall be kept to a minimum size, because it will be difficult, or impossible to remove, when assembled.

Banding Cut Cores

Cut cores that require a narrow gap shall be banded with phosphor-bronze banding material. The gapping material inserted into the air gap shall use, either Mylar or Kapton, depending on the temperature. Cut cores that require no air gap shall be banded with solderable, tin-coated, low-carbon steel bands. Bands and Seals for cut "C" cores, "U" cores, and "E" cores will be selected from Table 8-2. The bands shall be evenly spaced around the core, as shown in Figure 8-22. If the design requires two bands, then the seals shall be staggered, as shown in Figure 8-23.

**Note:**

There will be a magnetizing current test or inductance test, prior to banding. The test will be conducted with the core halves firmly in place with moderate pressure. The magnetizing current or the inductance measurement should not vary more than +/-5%, from the initial measurement with dry mating surfaces to the mating surface, with adhesive compound. See the Spec Control Drawing (SCD).

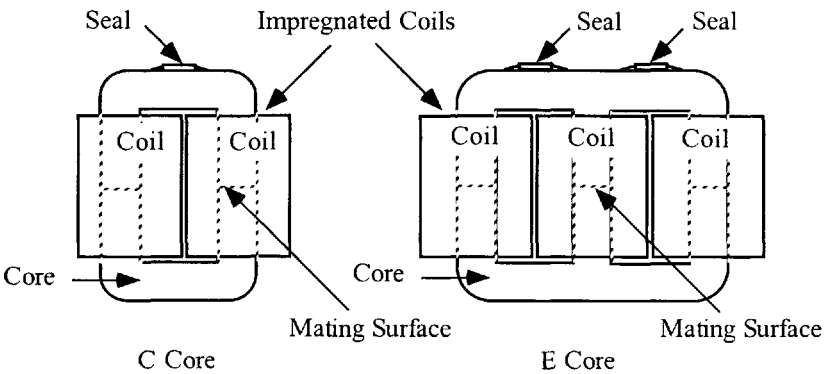


**Figure 8-21.** Mating Surface with Adhesive Epoxy.

**Table 8-2.** C Core Banding Data.

| C Core Banding Data | | | | | | |
|---|---|---|---|---|---|---|
| Core Dimensions (1 leg) | | Band Size | Bands | Seal Dimension | *Banding Force | |
| $A_c$ ($cm^2$) | D (cm) | (Inch) | Required | (Inch) | (Pounds) | (kilograms) |
| 1.21 or Less | Any | 0.188 x 0.006 | 1 | 0.188 x 0.25 | 37.5 | 17 |
| 1.21 to 2.42 | 0.953 or Larger | 0.375 x 0.006 | 1 | 0.375 x 0.375 | 75 | 34 |
| 2.42 to 4.84 | 0.953 to 3.81 | 0.375 x 0.012 | 1 | 0.375 x 0.375 | 150 | 68 |
| | 4.13 or Larger | 0.375 x 0.006 | 2 | 0.375 x 0.375 | 75 | 34 |
| 4.84 to 9.68 | 1.27 x 2.86 | 0.375 x 0.012 | 1 | 0.375 x 0.375 | 150 | 68 |
| | 3.175 or Larger | 0.375 x 0.012 | 2 | 0.375 x 0.375 | 150 | 68 |
| *This force must be reduced from 30% to 50% when banding nickel-iron or supermendur cores. | | | | | | |

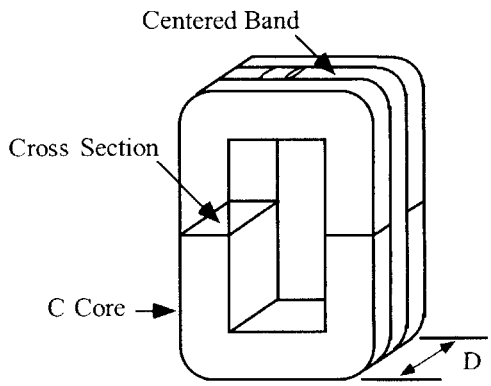


**Figure 8-22.** C Core, Banding Location.

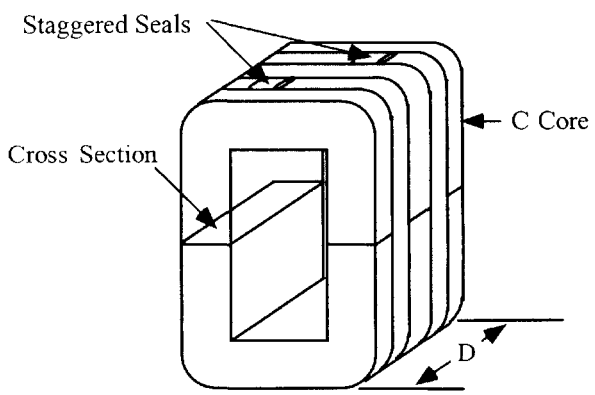


**Figure 8-23.** C Core with dual Bands.

## Cut Cores with Stress Relief Coating RTV-566

Stress Relief Coating

Stress relief coating will be applied to all cut "C" cores and "E" cores prior to potting in a rigid material as shown in Figure 8-24. The RTV-566 can be applied with a brush and/or dipped, see Figure 8-24.

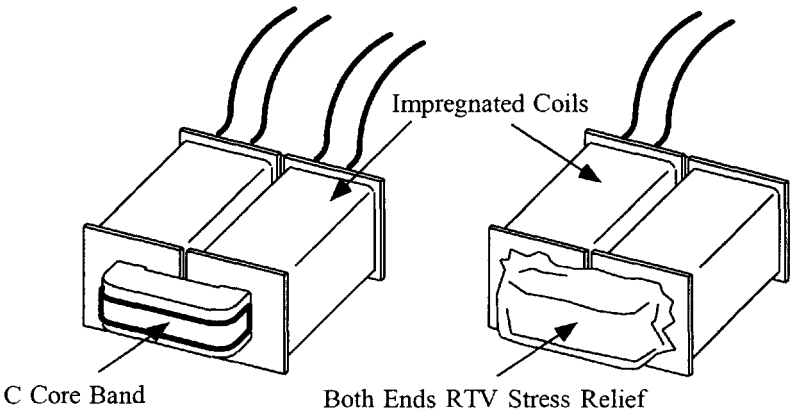


**Figure 8-24.** C Core, Coated with RTV Stress Relief Material.

Cured Material

Allow the RTV coating to cure for a minimum of 24 hours at room temperature, before handling, or, before any post curing. The cured coating shall be of a uniform appearance, free of soft areas and tackiness.

# Polymeric Mixing Record Form

Mixing Record Form

All applicable data must be recorded on the mixing record form as shown in Figure 8-25.

| Mixing Record | | Date | Mixture S/N |
|---|---|---|---|
| Project | Hardward I.D. | Work Order No. | Material Type |
| Specification No. | Drawing No. | Manufacturer Spec. | Ambient Temperature |

Mixture Ingredients

| Item | Ingredient | Manufacturer | Exp. Date | % By Wt | Wt. Grams |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| | | | Total Weight Grams | | |

| Degassing Performed | Yes | No | Material Conditioning | Yes | No |
|---|---|---|---|---|---|
| Describe: | | | Describe: | | |

| Time Mixed | Syringes # | Storage Temperature |
|---|---|---|
| Cure Cycle | Control Sample Data Required | Control Sample Data Actual |
| | Shore A Hardness | Shore A Hardness |
| | Shore B Hardness | Shore B Hardness |
| | Other | Other |
| | Inspection Report Number | |

Remarks

| | Name | Phone Number | Bldg | Room |
|---|---|---|---|---|
| Requester | | | | |
| Polymerics Technician | | | | |
| Quality Assurance | | | | |

**Figure 8-25.** Typical, Polymeric Material Mixing Form.

Aluminum Disk

All polymeric materials shall have a control sample made for each batch of mixed materials and this control sample shall meet the requirement of Table 8-1. The control sample materials shall be stored in a clean aluminum dish, similar to the one in Figure 8-26.

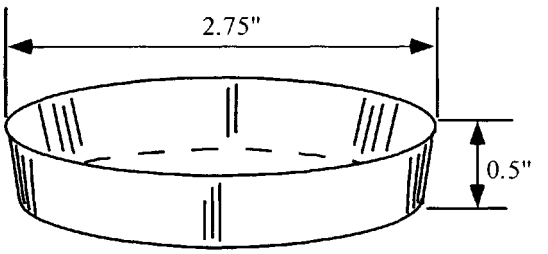


**Figure 8-26.** Proof of Cure Sample Container.

RTV Sealant

RTV 3116 is a silicone rubber sealant. It is applied around all exiting leads to prevent leakage of the embedment material. Mix RTV 3116, in proportions of 10 grams RTV 3116 to 4 drops of Nuocure 28 catalyst. Cure the RTV 3116 for 10 minutes at room temperature.

Polyethylene Syringe

The No. 10 syringe may be used for the application of some epoxies. The outline is shown in Figure 8-27.

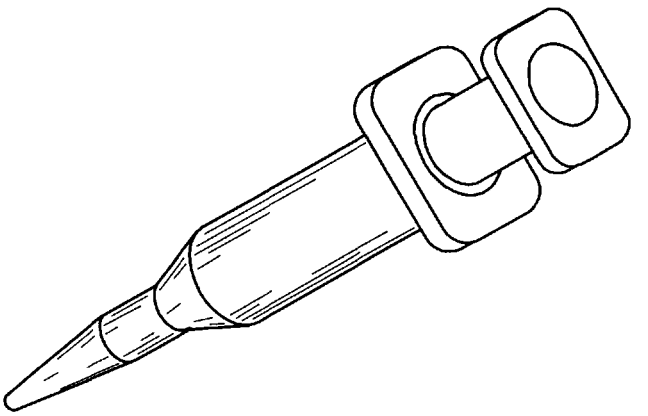

**Figure 8-27.** No. 10, Polyethylene Syringe.

Temperature Chamber (oven)

A hot, air-circulating oven, capable of maintaining 40° to 150°C +/-3°C, (100° to 300°F +/-5°F), shall be used. The oven shall be equipped with two temperature controllers. The first shall regulate the oven temperature. The second shall turn off the oven, whenever, the temperature exceeds the regulated temperature by more than 10°C, (20°F).

Balance Scales

Use a balance scale, with a capacity 1 to 500 grams minimum, with an accuracy range of +/- 0.25 grams. A typical balance scale is shown in Figure 8-28.

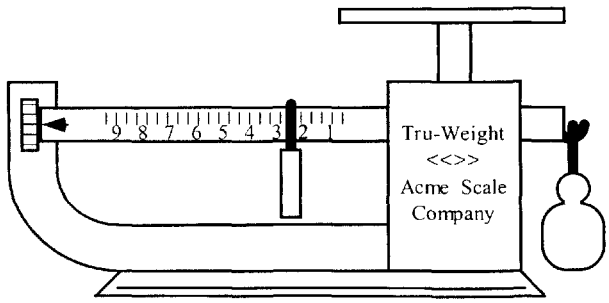


**Figure 8-28.** Typical Balance Scale Used to Measure Polymeric Materials.

Cotton Swabs

Cotton swabs are a handy device for removing epoxy droplets, globule, and material that does not drain from cracks and crevices of the magnetic device. A cotton swab is shown in Figure 8-29.

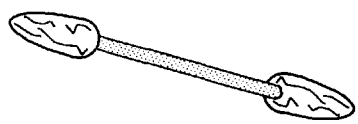

**Figure 8-29.** Typical Cotton Swabs Used for Cleaning.

Razor Blade

Industrial razor blades are a handy device for removing potting funnels and epoxy droplets from the magnetic device. A typical industrial razor blade is shown in Figure 8-30.

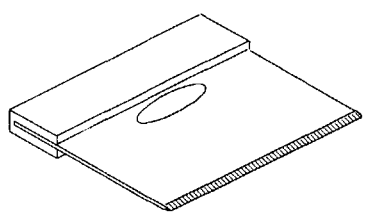

**Figure 8-30.** Typical Industrial Razor Blade Used for Cleaning.

Clean White Gloves

Prior to handling parts and/or materials, the polymeric technician shall thoroughly clean his/her hands; the use of any hand lotion is forbidden. Anyone working with or handling parts and/or materials must wear clean gloves, and/or finger cots. Gloves must be changed when they show signs of contamination, and finger cots must be replaced when they are torn or contaminated.

Paper Cup

A six ounce, unwaxed paper cup is a handy device for transferring bulk epoxy resins from storage containers to the mixing bowls for measuring. A typical paper cup is shown in Figure 8-31.

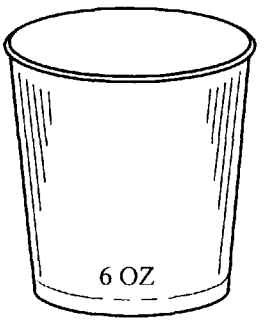


**Figure 8-31.** Typical Paper Cup used for Measuring Epoxy Resins.

Acid Brush

The industrial acid brush type No. 1 (0.375 inch), is a handy tool for cleaning with solvents, for applying coating, and a host of other uses. A typical industrial acid brush is shown in Figure 8-32.

**Figure 8-32.** Typical Industrial Acid Brush Type No. 1.