Strain Gage Installations with RTC Epoxy Adhesive

DESCRIPTION

RTC Epoxy is a two-part, 100% solids, room temperature or heat curing epoxy system for strain gage bonding.

Operating Temperature Range:
-320 °F to 200 °F [-269 °C to +95 °C]

Elongation Capability:
±15% at 75 °F [+24 °C]

Shelf Life:
Minimum: 1 year at +75 °F [+24 °C]

Pot Life:
30 minutes at +75 °F [+24 °C]

RTC Epoxy Adhesive is compatible with all Micro-Measurementss polyimide and glass fiber-phenolic backed strain gages.

INSTALLATION ACCESSORIES

For proper results, the procedures and techniques presented in this bulletin should be used with qualified Micro-Measurementss installation accessory products. M-LINE accessories used in this procedure are:

- Clamps CSM Degreaser or GC-6 Isopropyl Alcohol
- Silicon Carbide Paper (SCP-1, SCP-2, SCP-3)
- M-Prep Conditioner A
- M-Prep Neutralizer 5A
- GSP-1 Gauze Sponges
- CSP-1 Cotton Applicators
- PCT-2M Cellophane Tape
- GT-14 Pressure Pads and Backup Plates
- HSC-1, HSC-2, HSC-3 Spring

Handling Precautions

While this material is considered relatively safe to handle, contact with skin and inhalation of vapors should be avoided. Immediate washing with ordinary soap and water is effective in cleansing should skin contact occur. For eye contact, rinse thoroughly with a copious amount of water and consult a physician. For additional health and safety information, consult the Material Safety Data Sheet, which is available upon request.

MIXING ADHESIVE

1. Pour the contents of Part B into the jar labeled Part A. The contents of both jars are preweighed for the correct mix ratio, by weight or volume, of 2 parts Part A to 1 part Part B.

2. Stir the mixture for 5 minutes.

3. The pot life after mixing is 30 minutes, depending on ambient conditions.

GETTING STARTED

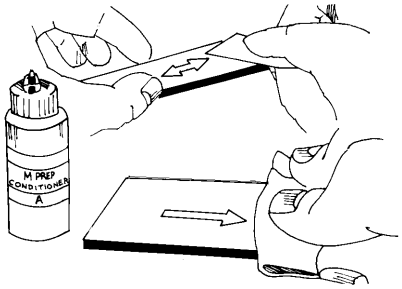
The installation procedure presented here is somewhat abbreviated and is intended only as a guide in achieving proper gage installation with RTC Epoxy Adhesive. Micro-Measurementss Instruction Bulletin B-129, *Surface Preparation for Strain Gage Bonding*, presents recommended procedures for surface preparation, and lists specific considerations that are helpful when working with most common structural materials.

Step 1

The surface preparation technique used is the same basic cleaning procedure described in Micro-Measurementss Instruction Bulletin B-129, "*Surface Preparation for Strain Gage Bonding*". The initial step is to thoroughly degrease with solvents such as CSM Degreaser or GC-6 Isopropyl Alcohol. CSM Degreaser is preferred whenever possible since this is a very active degreaser. The substitution of GC-6 as a degreasing agent should be considered for materials that may be sensitive to strong solvents.

Any degreasing should be done with clean solvents. Thus the use of a "one-way" container, such as the aerosol can, is highly advisable.

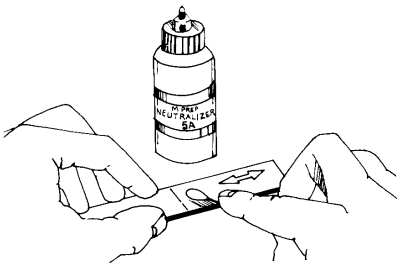
Step 2



Dry-abrade the gaging area with 220- or 320-grit silicon-carbide paper to remove any scale or oxides on the base material. Apply M-Prep Conditioner A and wet-abrade the gage area. Keep the surface wet while abrading. Remove the residue and Conditioner by slowly wiping through the gaging area with a gauze sponge. The wet-abrade and wiping procedure should then be repeated with 400-grit silicon-carbide paper.

With a 4H (hard) drafting pencil on aluminum or a ball-point pen on steel, burnish whatever alignment marks are needed on the specimen. Rewet the surface with Conditioner A and scrub with cotton-tipped applicators until a clean applicator is no longer discolored by the scrubbing. Remove the residue and Conditioner by slowly wiping through the gaging area with a gauze sponge. Do not wipe back and forth over the gage area since this may allow contaminants to be re-deposited on the cleaned area.

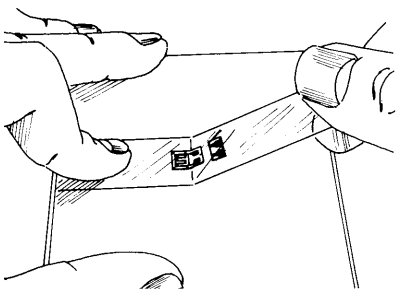
Step 3



Apply a liberal amount of M-Prep Neutralizer 5A to the gage area. Keeping the surface wet, scrub with cotton-tipped applicators. Do not allow evaporation of the cleaning material on the specimen surface since this would leave a thin, unwanted film between the adhesive and the specimen.

Remove the Neutralizer by slowly wiping through the gage area, allowing the gauze sponge to absorb the Neutralizer. Do not wipe back and forth over the gage area since this may allow contaminants to be re-deposited on the cleaned area.

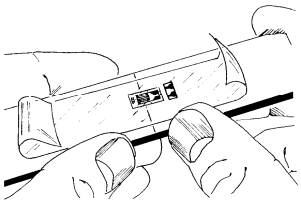
Step 4



Remove the gage from its transparent envelope by grasping the edge of the gage backing with tweezers, and place bonding side down on a chemically clean glass plate or empty gage box. If a solder terminal is to be incorporated, position it on the plate adjacent to the gage as shown. A space of approximately 1/16 in (1.6 mm)

should be left between the gage backing and terminal. Use 4 to 6 in (100 to 150 mm) PCT-2M cellophane tape is recommend a room temperature or slightly elevated cure (150° F). Tack one end of the tape to the glass plate behind the gage and terminal, and wipe forward onto the terminal and gage. Carefully lift the tape at a shallow angle (about 45 degrees to specimen surface), bringing the gage up with it.

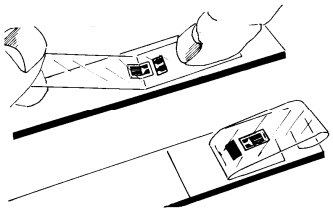
Step 5



Position the gage/tape assembly so the triangle alignment marks on the gage are over the layout lines on the specimen. Holding the tape at a shallow angle, wipe the assembly onto the specimen surface.

If the assembly appears to be misaligned, lift one end of the tape at a shallow angle until the assembly is free of the specimen. Realign properly and firmly anchor down at least one end of the tape to the specimen. This realignment can be done without fear of contamination by the tape mastic if the recommended PCT-2M cellophane tape is used. This tape will retain the mastic when removed.

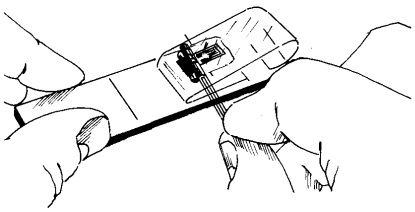
Step 6



Lift the gage end of the tape assembly as shown here at a shallow angle to the specimen surface (about 45 degrees) until the gage and terminal are free of the specimen surface.

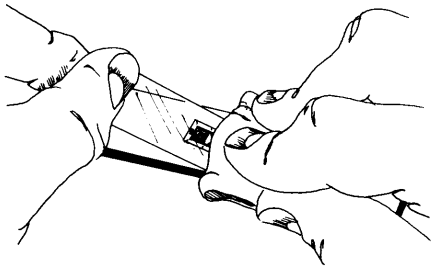
Lift one end of the tape at a shallow angle to surface (about 45 degrees) until gage and terminal are free of specimen surface. Tuck loose end of tape under and press to surface so the gage lies flat with the bonding side exposed. In some cases this may be difficult because of space limitations. If this situation occurs, leave enough slack in the tape to allow a finger to be slipped behind the gage to support it while applying the adhesive.

Step 7



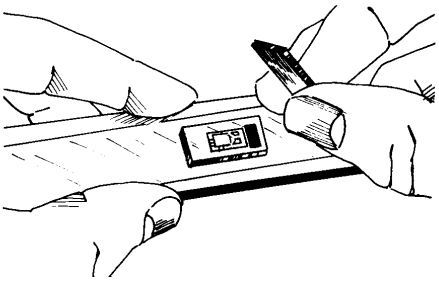
Coat back of gage with the prepared adhesive. The mixing rod can be used to apply a thin layer of adhesive. Be careful not to pick up any unmixed components of the adhesive. To ensure this, it is advisable to wipe the mixing rod clean and then pick up a very small amount of the adhesive from the center area of the adhesive mix. Immediately after coating the with adhesive, proceed without delay to Step 8. This will limit the absorption of moisture by the uncured adhesive, and the PCT-2M cellophane tape will serve as a temporary moisture barrier during curing.

Step 8



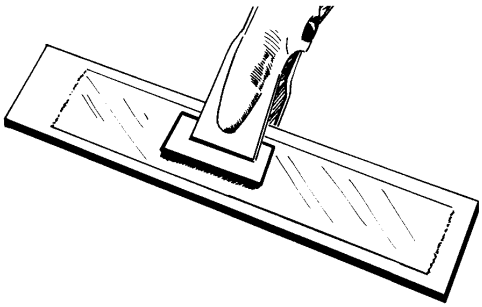
Lift the tucked-over end of tape and bridge it over the adhesive at approximately a 30-degree angle. With a piece of gauze, slowly make a single wiping stroke over the gage/tape assembly, bringing the gage back down over the alignment marks on the specimen. Use a firm pressure with your fingers when wiping over the gage, since the adhesive is quite viscous. A very thin layer of adhesive is desired for optimum bond performance.

Step 9



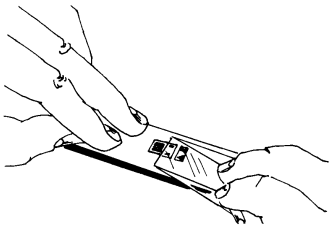
Place a silicone gum pad and backup plate (GT- 14) over the gage installation. The silicone gum should be soft (Durometer A40-60) and at least 3/32 in (2.5 mm) thick. This will allow the clamping force to be exerted evenly over the gage. The area of the silicone gum pad should be used to compute the final clamping pressure.

Step 10



Apply force by spring clamp or dead weight until a clamping pressure of 5 to 20 psi (35 kN/m2 to 138 kN/m2) is attained. Take special care in making sure the clamping pressure is equal over the entire gage. Unequal clamping pressure may result in an irregular glue line. Take steps to ensure that the clamps will not slide out of position during cure. A few strips of PCT-2M tape to assist in holding the clamps or backup plate in place during cure may be helpful. If an elevated temperature cure is desire, place the clamped gage/specimen into a cool oven and raise the temperature at a rate of 5 to 20 F° (3° to 11°C) Cure the installation for a minimum of 1 hour at +175 °F (+80 °C). If a room temperature cure is desired it must remain clamped for 24 hours at 75° F (24° F)

Step 11



The gage and terminal strip are now solidly bonded in place. To remove the tape, pull it back directly over itself, peeling it slowly and steadily off the surfaces.

This technique will prevent possible lifting of the foil on open-faced gages or other damage to the installation. It is not necessary to remove the tape immediately after gage installation. The tape will offer mechanical protection for the grid surface and may be left in place until it is removed for gage wiring.

FINAL INSTALLATION PROCEDURE

Select appropriate solder and attach leadwires. Remove solder flux with RSK Rosin Solvent. Select and apply protective coating. Micro-Measurementss gages have been treated for optimum bonding conditions and require no pre-cleaning before use unless contaminated during handling. If contaminated, the back of any gage may be cleaned with a CSP-1 Cotton Applicator slightly moistened with M-Prep Neutralizer 5A.