

Installation of Strain Gages with SR-4[®] Precoat/Adhesive

Introduction

These instructions apply to all SR-4 strain gages with nitrocellulose impregnated thin (tissue) paper backing. The thin paper backing provides for a fast drying of the adhesive. The use of fast drying SR-4 Adhesive is recommended for installation of the SR-4 gages to take maximum advantage of the fast drying qualities.

Installation Accessories

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

- CSM Degreaser or GC-6 Isopropyl Alcohol
- Silicon Carbide Paper
- M-Prep Conditioner A
- M-Prep Neutralizer 5A
- GSP-1 Gauze Sponges
- CSP-1 Cotton Applicators
- W-1 Microcrystalline Wax

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

This is a single component adhesive system that does not require mixing.

Getting Started

The installation procedure presented here is somewhat abbreviated and is intended only as a guide in achieving proper gage installation with SR-4 Adhesive. Micro-Measurements 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-Measurements 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

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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

Paint the surface to be bonded to with the thinnest possible coat of SR-4 Precoat. Allow to air dry for at least 10 minutes. The SR-4 Precoat provides adhesion of the SR-4 Adhesive. The SR-4 Precoat is not essential on many materials, but is always recommended on extra smooth or polished surfaces, and on titanium, magnesium, and copper alloys.

Caution: SR-4 Precoat has the viscosity of water. If it appears to thicken, thin with SR-4 Precoat Thinner as needed.

Step 5

Apply a liberal coat of the SR-4 Adhesive to an area somewhat larger than the gage to be applied.

Place the gage in the desired location. Allow a few seconds for the adhesive to slightly soften the paper backing. Using your finger press lightly down on the gage and with a rolling motion work the excessive adhesive from under the gage. The gage will lay flat and does not require further clamping pressure.

Cure

Drying times of the adhesive vary based on temperature and humidity conditions during the cure. For best results, allow 6 hours drying time under average laboratory conditions. A longer time is required if the atmosphere is exceptionally humid or cold. Four hours will suffice if the atmosphere is warm and dry. The application of heat will accelerate drying and the following heat cycle will provide drying under the poorest conditions normally encountered.

- 30 minutes at room temperature
- 2 hours at 120 to 140° F (50 to 60° C)

Application of W-1 Microcrystalline Wax should be applied as soon as practical to avoid moisture absorption. Heat the part with a warm air blower to drive off any entrained moisture and to allow the wax to wet the surface. Note: Excessive heat may cause the adhesive to bubble. The wax should be applied in layers until a thickness of 1/16 inch is achieved. The wax should extend at least 1/4 inch beyond the gage backing and adhesive flow out. Caution: Rough handling of the leadwires prior to strain relief can break the wax seal.