

PhotoStress® Separator Gage Installations with M-Bond 200 Adhesive

Introduction

Micro-Measurements certified M-Bond 200 adhesive is excellent for use with PhotoStress Separator Gages because of its fast room-temperature cure, ease of application, and compatibility with PhotoStress coatings. For best reliability, the adhesive should be applied to the coating surfaces between the temperatures of +70°F [+20°C] and +85°F [+30°C], and in an environment with a relative humidity of 30% to 65%. M-Bond 200 catalyst has been specially formulated to control the reactivity rate of this adhesive. The catalyst should be used sparingly for best results. Excessive catalyst can contribute numerous problems, including poor bond strength, age-embrittlement of adhesive, poor glueline thickness control, and extended solvent evaporation time requirements.

Shelf and Storage Life

Opened M-Bond 200 adhesive has a shelf life of three months at +75°F [+24°C] if the cap is placed back onto the bottle immediately after each use. Note: To ensure the cap provides a proper seal, the bottle spout should be wiped clean before replacing the cap. Unopened M-Bond 200 adhesive may be stored up to three months at +75°F [+24°C] or six months at +40°F [+5°C].

Note: Condensation will rapidly degrade adhesive performance and shelf life; after refrigeration the adhesive must be allowed to reach room temperature before opening, and refrigeration after opening is not recommended.

Handling Precautions

M-Bond 200 is a modified alkyl cyanoacrylate compound. Immediate bonding of eye, skin or mouth may result upon contact. Causes irritation. The user is cautioned to: (1) avoid contact with skin; (2) avoid prolonged or repeated breathing of vapors; and (3) use with adequate ventilation. For additional health and safety information, consult the Safety Data Sheet which is available upon request.

Gage Application Technique

Following is a step-by-step procedure for installing the separator gage on the surface of the PhotoStress coating. Note: Description, specifications, and ordering information for all the surface preparation materials referred to in this procedure can be found in the Strain Gage Accessories Data Book.

Step 1

Thoroughly degrease the PhotoStress coating with a suitable solvent such as CSM Degreaser. Use of harsher solvents is to be avoided since surface crazing or hazing may result. Degreasing should be accomplished using uncontaminated solvents — thus the use of “one-way” containers, such as aerosol cans, is advisable.



Step 2

Silicone oils are used as release agents in the manufacture of PhotoStress sheets using PL-1 and PL-10 liquid plastics,



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and must be removed in order to obtain sound adhesion. Wet a gauze sponge with M-Prep Conditioner A and scrub the gaging surface thoroughly. After scrubbing, remove the contaminated M-Prep Conditioner A by slowly wiping with a clean gauze sponge. Repeat this procedure several times. The M-Prep Conditioner A should never be allowed to dry on the gaging surface. This step may be omitted when bonding the gage to Type PS-1 sheets.

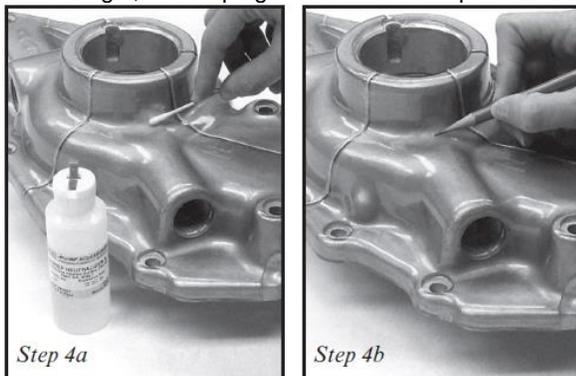
Step 3

Steps 1 and 2 will yield a bonding surface that is clean and free of moisture, finger oils, releasing agents and other contaminants. With plastics, cleanliness alone will not assure optimum bond strengths. In fact, the smoothness of PhotoStress plastics is detrimental to high adhesive bond strengths and mechanical abrasion is required. Wet the gaging surface with M-Prep Conditioner A and abrade with 400-grit silicon carbide paper. Dry by slowly wiping through with a gauze sponge.



Step 4

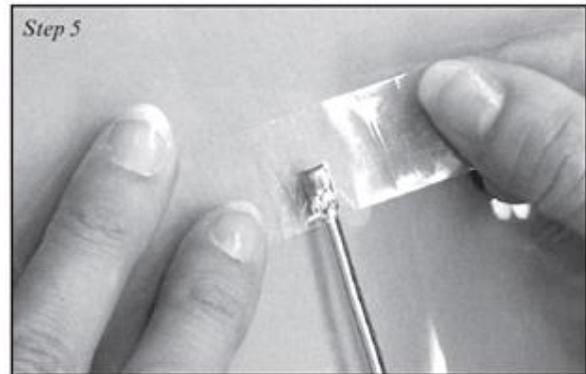
Apply a liberal amount of M-Prep Neutralizer 5A and scrub the gaging area vigorously with a cotton-tipped applicator. With a gauze sponge, carefully dry the surface with a single, slow wiping motion. Do not wipe back and



forth since this may allow contaminants to be redeposited. With a 4-H drafting pencil, indicate the location at which the measurements are to be made. Predetermined angular orientation of the separator gage is not required since the measurement of the sum of principal strains is an invariant, independent of gage orientation.

Step 5

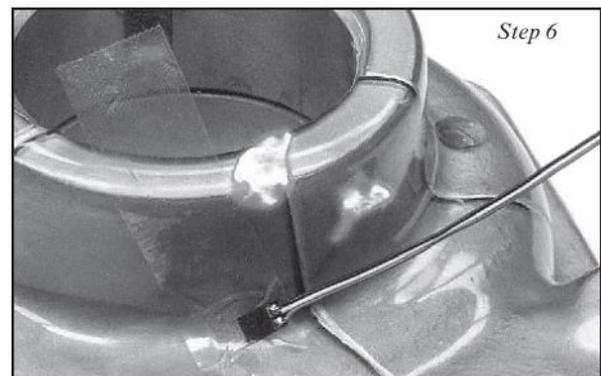
Carefully remove the separator gage from its acetate envelope. Since this gage is provided with preattached leadwires, care must be exercised so that the gage is not damaged by mishandling. Place the gage (bonding side down) on a chemically clean glass plate.



Place a 4 to 6-in [100- to 150-mm] piece of gage installation tape (Part No. PCT-2M) over the gage. Carefully lift the tape at a very shallow angle, lifting the gage up with the tape.

Step 6

Position the gage/tape assembly at the predetermined point at which measurements are to be made. Firmly anchor one end of the gage installation tape to the test specimen.



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Step 7

Lift one end of the tape assembly at a shallow angle to the specimen surface, taking care not to crease the gage. Continue lifting the tape until it is free from the specimen approximately 1/2 in [13 mm] beyond the gage, exposing the bonding surface. Clean the measurement reference point (pencil mark) from the bonding surface using a cotton tipped applicator dampened with M-Prep Neutralizer 5A. Dry the surface with a clean gauze sponge.

Step 8

Fold the tape assembly back and hold in position. M-Bond 200 catalyst can now be applied to the bonding surface of the strain gage. Very little catalyst is needed and it should be applied in a thin, uniform coat. Remove the brush cap from the catalyst bottle and wipe the brush approximately 10 strokes against the lip of the bottle to remove the excess catalyst. Use the side of the brush and apply catalyst to the entire gage bonding surface. Move the brush to the adjacent tape area prior to lifting from the surface. Allow the catalyst to dry at least one minute under normal ambient conditions of +75°F [+24°C] and 30%–65% relative humidity.

The following Steps 9, 10 and 11 must be completed in the sequence presented, and within 5 seconds.

Step 9

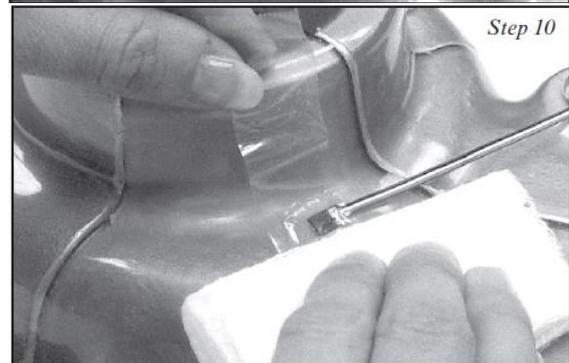
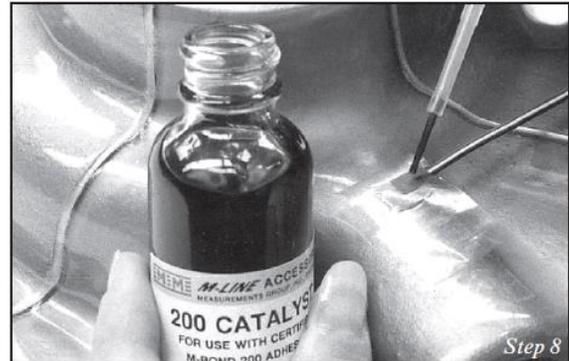
Apply one or two drops of M-Bond 200 adhesive at the fold formed by the junction of the tape and specimen surface. The adhesive application should be approximately 1/2 in [13 mm] outside the actual gage installation area. This will ensure that localized polymerization, which occurs when the adhesive comes in contact with the specimen surface, will not cause unevenness in the gage glue line.

Step 10

Immediately rotate the tape to approximately a 30-degree angle such that the tape is bridged over the installation area. Do not allow the bonding surface of the gage to contact the adhesive at this time. While holding the tape slightly taut, slowly and firmly make a single wiping stroke over the gage/tape assembly with a gauze sponge. Use a firm finger pressure when wiping over the gage. This will ensure the thin uniform adhesive layer that is desired for optimum bond performance.

Step 11

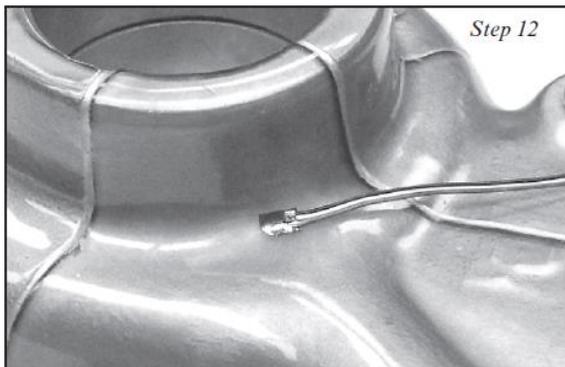
Immediately upon completion of wipe-out of the adhesive, apply firm thumb pressure to the gage. This pressure must be held for at least one minute. Since the separator



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gages are supplied with preattached leadwires, a cushion (i.e., folded gauze sponge) may be used between the thumb and tape. This will allow for a more uniform pressure over the gage area. The thumb pressure must be held for at least one minute. If an insulating cushion is used, several minutes may be required since heat from one's thumb, which accelerates polymerization, is now denied. Allow the tape to remain on the gage for two minutes. Excess adhesive flow in the leadwire area is common and not detrimental to the gage bond, or its performance.

Step 12



The gage is now solidly bonded in place. To remove the tape, pull it back directly over itself, peeling it slowly and steadily from the surface.

Protective Coating

Since the PhotoStress Separator Gage is encapsulated in polyimide, a protective coating is unnecessary in most cases. However, if testing will be conducted in an unfavorable environment, or if the installation is expected to remain over a long period of time, then a protective coating is recommended. Please refer to the Strain Gage Accessories Data Book to select an appropriate protective coating for the particular test environment that will be encountered.

Removing the Gage for Continued PhotoStress Testing

If additional measurements are required at the PhotoStress gage location after all testing is completed with the gage, proceed as follows: carefully scrape away the gage and bonding adhesive from the surface of the coating with a razor blade or other sharp cutting device. Clean the area by wiping with a gauze sponge wetted with M-Prep Neutralizer 5A. Then lubricate the blemished surface area of the PhotoStress coating with mineral oil to restore its transparency.

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