Strain Gage Installations with M-Bond GA-100 Cement

GENERAL DESCRIPTION

M-Bond GA-100 is a single-component ceramic cement recommended for use with free-filament strain gages operating above +600°F [+300°C]. Principal ingredients are aluminum phosphate and silica. This cement requires an elevated-temperature cure, and the installation procedure is difficult without prior experience. Useful temperature range for extended use is -452° to +1300°F [-270° to +700°C] and up to +1500°F [+800°C] for short-term use. Elongation capability is approximately ±0.5%, depending upon the mismatch between the thermal expansion coefficient of the specimen material and the cement. Storage life is one year at +75°F [+24°C] if jars are kept tightly capped. Working time is approximately 24 hours of continuous use.

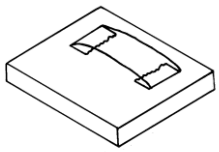
HANDLING PRECAUTIONS

M-Bond GA-100 is very corrosive to living tissue and extreme care should be exercised to avoid contact with this product. Use only in well-ventilated areas. Neoprene gloves, overclothing, and a full face shield is recommended when handling GA-100. Wash thoroughly after using. This product contains Chromium Trioxide, which is listed as a known carcinogen. Refer to the Safety Data Sheet for additional health and safety information.

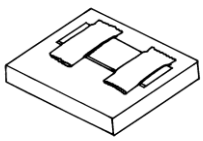
STRAIN GAGE PREPARATION

1. Clean a glass plate with Micro-Measurements M-Prep Neutralizer 5A and gauze sponge.

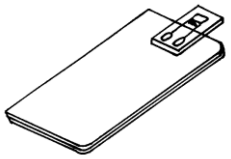
2. Take a 2 to 3 in [50 to 75 mm] long strip of Micro-Measurements PCT gage installation tape, with mastic side up, fold ends under and press to glass surface.



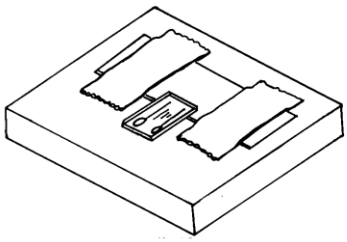
3. Tape the folds of the gage installation tape firmly to the surface with two pieces of drafting tape, leaving the center of the gage installation tape exposed approximately 1.5 times the width of gage carrier.



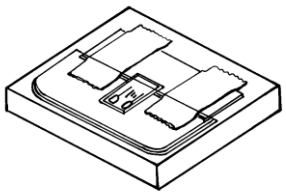
4. Partially remove the gage from its acetate folder so that the top half of the gage (grid end) is exposed.



5. With foil side of the gage facing down, position it on the exposed mastic of the tape so that half the length of each endloop contacts the lower edge of the tape. Remove acetate folder, but do not discard. Press down firmly on the gage carrier with stick end of a cotton applicator to anchor the foil to the tape mastic.

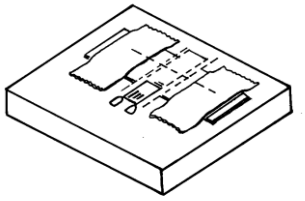


6. Place the acetate folder over the gage carrier, aligning sealed edge with top of gage endloops. Press lightly on the acetate folder and loosen the end of the gage carrier from tape mastic with a pair of tweezers.

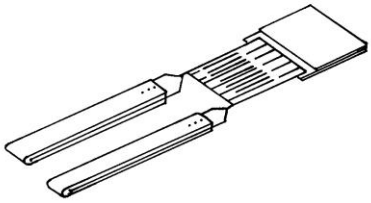


7. While maintaining pressure, fold the carrier back over the folder and peel straight back with a smooth, steady pull. Use only sufficient pressure to allow folder to slide as the carrier is peeled against it. This technique minimizes stretch in the carrier and curling of the gage filament.

8. Cover the exposed tape mastic above gage endloops with a piece of paper. With a scalpel, cut gage installation tape parallel to the edges of gage to lift out the gage.



9. If the gage has been purchased without leads, form leads from 1/32 x 0.001 in [0.8 x 0.025 mm] Nichrome V ribbon, folded in half.



10. Place the gage on a cleaned copper plate and slip the lead over the gage tabs, forming a "sandwich" effect with the tab between the two Nichrome V lead ribbon ends.

11. Spot-weld the ribbon to the center of the tab (2.5 to 3 watt-seconds).

12. Repeat the process with the other lead ribbon.

SURFACE PREPARATION AND CLEANING

Refer to Micro-Measurements Instruction Bulletin B-129.

INSTALLATION WITH GA-100 CEMENT

1. Stir cement thoroughly with a steel rod (keep cement covered when not in use).

2. Apply a thin coating ~0.001 to 0.002 in [~0.025 to 0.05 mm] of cement to the specimen surface with a 3/8 in [10 mm] camel's hair brush. Air-dry two minutes, heat to +350°F [+175°C] - orange color appearance - and cool to room temperature.

3. Position the gage and secure the leads and handling tab to the specimen surface with gage installation tape.

4. Apply a thin coating of cement to the exposed area of the gage and lead ribbons with a fresh, dry camel's hair brush. Brush from handling tab toward leads with a single slow stroke. Several strokes may be necessary to completely wet this foil surface. A slight side-to-side motion of the brush will aid in this step. Air-dry and apply heat from a 150-watt heat lamp at a distance of 11 in [280 mm] for ten minutes (approximately +150°F [+65°C]).

5. After the specimen has returned to room temperature, repeat Step 4 (above), then carefully remove the handling tab from gage by cutting through the endloop foil with a scalpel. A rolling or rocking motion of the scalpel will produce the best results.

6. After the specimen has returned to room temperature, apply a third coating of GA-100 cement as in Step 4, but brush in the reverse direction. Make sure the void left from removing the handling tab is filled with cement.

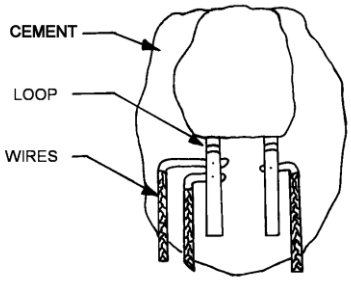
CURING PROCEDURE

1. Heat the specimen to +150°F [65°C] for ten minutes with a heat lamp at a distance of 11 in [280 mm].

2. Place the specimen in a cold oven and slowly raise the temperature to +600°F [+315°C]. Cure for one hour at +600°F [+315°C] specimen temperature.

LEADWIRE ATTACHMENT

1. Flatten the ends of the instrument leadwires. Form and position wires. Anchor wires in position.



2. Fold the lead ribbons over the top of wires. Place a thin strip of copper under the ribbons.

3. Spot-weld the junction using the copper strip as the bottom electrode. Approximately ten watt-seconds is required for welding to No. 26 AWG (0.0159 in [0.404 mm]) diameter stainless steel clad or Ni-clad wire.

4. Trim excess lead ribbon. Anchor wire-ribbon junctions to the specimen.