

STRAIN GAGE FOR STRESS MEASUREMENT ON TIGHTENED BOLTS

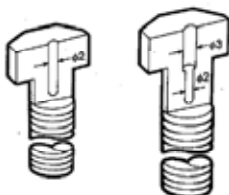
OPERATION MANUAL

1. Necessary tools and expendables

- Adhesive ... EP-18 or EP-34
- Balance 100 to 200g capacity
- Solvent Acetone ● Solvent container ● Toothpick

2. Boring a hole in the bolt

Bore a $\phi 2.0$ hole in the bolt subjected to measurement. If the bolt is large in diameter, it requires a deep hole. In this case, bore a hole in two ($\phi 3$ and $\phi 2$) stages to facilitate adhesive pouring.



3. Cleaning and drying the hole

- (1) Insert the accessory tube into the bolt hole, and squeeze it about 20 times in the solvent so that fats and metal powders are moved from the hole.
 - (2) Remove the solvent from the hole by shaking the bolt. Then sufficiently dry the hole. Dry it for over 1 hour at a room temperature or for over 30 minutes at 50 to 70°C.
4. Fix the bolt upright by using a cardboard box or other, on the top of which a hole is provided to hold the bolt top.

5. Pouring of the adhesive and insertion of the strain gage into the hole

- (1) Compound the adhesive (referring to the operation manual of the adhesive).
Once compounded, the viscosity of the adhesive comes to grow in next 15 minutes or so. Therefore, quickly proceed and finish insertion of the gage. If the adhesive's viscosity is high, it will not smoothly go into the bolt hole. If so, compound the adhesive anew.

- (2) Take the adhesive on the top of the accessory tube. Insert the tube into the bolt hole, then push and pull the tube about 10 times so that the adhesive spreads over the wall surface of the hole.

Next, take a small amount of the adhesive with a toothpick. Insert the toothpick into the hole. At this time, tilt the bolt slightly. Fill the hole with the adhesive which flows down the hole wall, taking care to avoid air bubbles.

(Once formed, an air bubble checks flowing of the adhesive. If it occurs, remove the bubble using a toothpick.) All this work decides the quality of subsequent gage installation.

- (3) Form a thin coat of the adhesive over the outside of the gage. Gradually insert the gage into the bolt hole which has been filled with the adhesive.
(One time of compounding of the adhesive allows to handle 3 to 5 bolts. A skilled operator can handle about 10 bolts.)

6. Hardening of the adhesive

Keep the bolt upright during hardening of the adhesive. A required hardening time is:
24 hours or more at a room temperature, or
3 hours at 50 to 60°C (and subsequent 1 hour or more at a room temperature)

7. Connection of the leadwires

Solder the L-6 or L-7 vinyl leadwires to the gage-leads. If the strength of the gage-leads is insufficient, cement the exclusive gage terminal to the bolt head, then connect the leadwires to the terminal. In this case, a release agent is necessary, which is to be used to peel off the coat from the gage-leads (polyester-coated copper wires).

8. Calibration of a tensile load

Perform load calibration to evaluate the adhesion of the gage. (Accuracy is rated at about 0.5 to 1% R.O.)
(Inferior adhesion results in an extremely low output or large creep.)