

Installing Vibrating Wire Strain Gages With Glue-On Mounts

For applications where structural monitoring is to be conducted for only a few weeks or less, these sensors can be attached with various adhesives rather than welding or drilling holes in the structural members. The use of two types of adhesives are discussed below. In general, the cyanoacrylate adhesive is used for shorter tests such as for a few hours or days. For longer tests, a two-part epoxy is recommended. The following procedures are meant to complement those outlined in the Geokon user's manual for these sensors. The installer should read through both sets of instructions before installation.

- 1) Slide the mount with one set screw only onto the end of the VW strain gage that has the machined "V" groove and snug down the set screw with an allen wrench. Set the gage on a flat surface with the gluing side of the mount down, ensuring that the "pinched" section in the middle of the gage is vertical. Slide the other mount (with two set screws) over the other end of the gage, again with the gluing side down against the flat surface and snug both set screws. Once the mounts are attached at both ends, be sure to not let them "twist" relative to one another as this can cause damage to the internal vibrating wire.
- 2) Determine the location on the structural member that the gage is to be mounted. Hold the gage in place, and using either chalk or a felt pen, mark to the two locations where the mounts will attach.
- 3) If mounting to steel, use a grinder to remove the paint at the two gage mount locations. If available, use a portable grinder (a Makita Model 9500D battery-powered grinder with a 46-grit wheel works very well) to "touch up" the newly-cleaned surface. If mounting to concrete, use the grinder to lightly remove any surface scale and wipe clean with a clean rag.
- 4) Lightly grind the bottom of each mount to remove rust and other contamination. Be sure not to touch these surfaces after cleaning.
- 5) Apply the cyanoacrylate glue (Loctite 410 Black Toughened Adhesive, Part # 41045 in 0.7oz containers) to the bottom of each mount and place gage on the structural member. Immediately remove the gage, leaving two spots of glue on the structure.
- 6) Spray each adhesive contact area on the structural member (just one "light shot") with the adhesive accelerator (Loctite Tak Pak 7452, Part # 18637 in 0.7oz aerosol spray container). Very quickly, mount the gage in its proper location and apply a light force to the top of the mounts (not the center of the gage) for approximately 20-30 seconds.
- 7) If you are using epoxy rather than the cyanoacrylate glue, apply the epoxy to both surfaces prior to mounting the gage. If necessary, use duct tape to hold the gage in place until the epoxy has sufficiently hardened. The recommended epoxy is 3M DP-100 or DP110 in the Duo-Pak dispenser. This mixing system is very easy to use and insures that the proper amounts of each component are dispensed.
- 8) When the adhesive has hardened (usually overnight for epoxy), slide the "plucker" unit over the center of the strain gage and use either a hose clamp or plastic zip tie to hold it in place. Tighten the set screw in the mount with one set screw only. If you are going to "pre-load" the gage either in tension or compression, loosen the set screws in the other mount and adjust accordingly. Tighten the two set screws. Double-check the reading with the VW readout box (if available) to make sure the gage is in working order and is giving valid readings for both strain and temperature.
- 9) The gage covers can now be attached over the gage using hot-melt glue. This technique allows the covers to be easily removed once testing is completed. If a hot melt glue gun is not available, use epoxy only on the four corners of the cover. If the entire edges of the covers are glued down with epoxy, the covers will be very difficult to remove without destroying them. It is good practice to place a plastic zip-tie through one of the holes in the cover and route it loosely around the gage. If the cover gets knocked off, the zip-tie will catch it and keep it from falling.

It should be possible to mount each strain gage in approximately five to ten minutes. When the testing is complete, *carefully* loosen the gage from the mounts with the appropriate allen wrench. Use vice grips to remove the mounts from the structure. The mounts can be re-used by soaking them in acetone for a few hours to remove the hardened adhesive. Be sure to cover the container since the acetone will evaporate quickly and is very flammable! For closest Loctite dealer, call: 1-(800) 562-0560. For closest 3M dealer, call: 1-(800) 364-3577.

IMPORTANT: If the gage is to be exposed to the weather, then the gage connector needs to be protected. The connections should be covered with plastic (such as that used for kitchen bags) and held in place with duct tape. This temporary system works well and can be easily removed. Please contact us with any questions at: