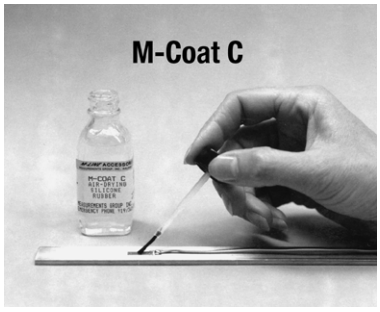
RTV Silicone Rubber Coatings

Many materials can be used to protect strain gage installations. Perhaps none is more versatile for short-term applications than room-temperature vulcanizing (RTV) silicone rubber. The list of this material's capabilities is indeed impressive:

- Available as an easy-to-apply single-component coating with uncured consistencies ranging from a low-viscosity brush-on material for thin coats, to a medium viscosity self-levelling form for use on level surfaces, to a high-viscosity no-run paste for vertical and overhead applications.
- Cures at room temperature, yet is usable over a temperature range of -75° to +550°F (-60° to +290°C).
- Has a low modulus of elasticity that is ideal for thin or flexible structures for which coating reinforcement effects may become significant.
- Provides the installation with good protection from mechanical abuse. (Also works well for anchoring leadwires to the surface of the specimen, for most applications.)
- Provides good short-term protection from water; resists many chemicals; and can be used in radiation and vacuum environments.

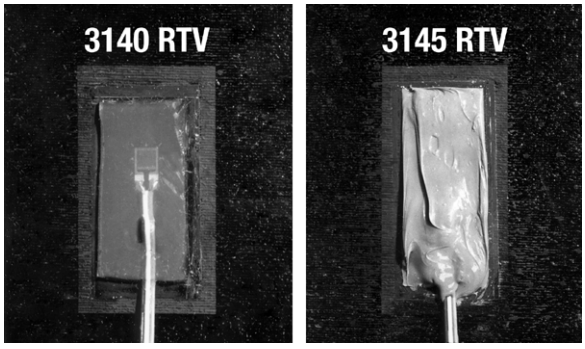
In order to cure, most single-component silicone-rubber materials must absorb a small amount of moisture from the surrounding atmosphere. This moisture reacts with the material during polymerization to produce condensation by-products, commonly acetic acid or methyl alcohol. Those producing the acetic acid by-products smell like vinegar and SHOULD NOT BE USED AS A PROTECTIVE COATING for strain gages.

Acetic acid is a relatively weak etchant. However, trace amounts trapped within a silicone rubber coating will immediately attack both open-faced gages and copper leadwires. (Any residual soldering flux will accelerate the process.) This chemical corrosion of the gage grid, solder joints, and leadwires will cause the resistance of the installation to increase, resulting in a zero-drift with time. Additionally, the fatigue life of the gage may be affected.



To ensure these problems are not encountered, Micro-Measurements offers three qualified RTV silicone rubber coatings which produce a safer methyl alcohol by-product. M-Coat C is a naptha-thinned brush-on material for thin, conformal coatings; 3140 RTV is a translucent, self-levelling coating; and 3145 RTV is an opaque, thick paste. These coatings will protect gages for several days in high humidity or water-splash environments. Even with these qualified materials, however, zero-drift will occur over time at high relative humidities - (typically in 8 to 10 days with 3140 RTV and 3145 RTV, and somewhat sooner for the thinner M-Coat C). When this happens, the resistance of the installation may initially decrease (due to internal shunting between gage grids or tabs). Within a few more days, galvanic corrosion effects can cause a net increase in resistance

Because these silicone rubber coatings require no mixing and can be brushed (M-Coat C), poured (3140 RTV), or spread (3145 RTV) on the surface, they are easily applied. For maximizing their protective qualities, the specimen surface to which the coatings are applied must be chemically clean.



Quality of the bond often can be improved by applying an appropriate primer to chemically activate the specimen surface. (Micro-Measurements offers RTV Primer No. 1, which can be used on a wide variety of materials.) However, if the surface is properly cleaned for gage bonding (and is not re-contaminated during gage installation), the application of a primer is often unnecessary.

Special care should be taken when applying silicone rubber coatings to composite materials. The low surface energy of many polymeric matrix materials, migration of plasticizers to the surface, and incomplete evaporation of surface-cleaning solvents can adversely affect the coating quality.

Easy to apply. Effective as protection against mechanical abuse and chemical attack. The versatile RTV silicone rubber coatings may be the answer to your short-term gage coating requirements. If you haven't used them before or need more details, don't hesitate to call our Applications Engineering Department concerning your specific application.

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