

## General Information and Selection Guide

Because a strain gage can perform no better than the adhesive with which it is bonded to the test member, the adhesive is a vitally important component in every strain gage installation. Although there is no single adhesive ideally suited to all applications, Micro-Measurements offers a wide selection of adhesives to cover the spectrum of stress analysis testing, and for use in transducer manufacturing. Micro-Measurements adhesives are specially formulated and selected for highest performance under the recommended environmental conditions, and are packaged to provide for ease of mixing and application.

Each adhesive is accompanied by specific instructions for its proper handling — storage, mixing, application, curing, and, if appropriate, post-curing. The adhesive containers are also dated to assure freshness of the contents.

**Note:** It is usually misguided economy to attempt installing strain gages with outdated adhesive, or adhesive that has not been stored as recommended. It should also be noted that conventional industrial and consumer adhesives are not generally suitable for bonding strain gages.

Since different adhesives are intended for different types of applications and different environmental conditions, it is obviously important to select the most appropriate adhesive for each strain measurement task. The table below lists all of the Micro-Measurements adhesives, while the table on the following page is provided as a guide for selecting the most appropriate adhesive for compatibility with a particular strain gage series and test environment.

TYPES AND FEATURES	
<b>M-Bond 200</b>	Most widely used general-purpose adhesive. Easiest to handle. Fast room-temperature curing.
<b>M-Bond AE-10</b>	General-purpose adhesive that is highly resistant to moisture and most chemicals. Room-temperature curing.
<b>M-Bond AE-15</b>	Similar to AE-10. Recommended for more critical applications, including transducer gaging. Moderately elevated-temperature curing.
<b>M-Bond 610</b>	Used primarily in stress analysis applications over a wide temperature range, and in precision transducers. Elevated-temperature curing.
<b>M-Bond 600</b>	Similar to 610, but faster reacting. Can be cured at somewhat lower temperatures than 610.
<b>M-Bond 43-B</b>	Normally used in precision transducers. Highly resistant to moisture and chemical attack. Elevated-temperature curing.
<b>M-Bond GA-2</b>	Special-purpose adhesive primarily used on very rough and irregular surfaces. Room-temperature curing.
<b>M-Bond GA-61</b>	Special-purpose adhesive with a higher operating temperature range than GA-2, and more viscous. Also used to fill irregular surfaces and to anchor leadwires. Elevated-temperature curing
<b>M-Bond A-12</b>	Special-purpose, very high-elongation adhesive. Used only when other adhesives cannot meet elongation requirements. Elevated-temperature curing.
<b>M-Bond 300</b>	Special-purpose polyester adhesive used primarily when low-temperature curing is required. Sensitive to solvents. Not recommended as a general-purpose adhesive.
<b>M-Bond 450</b>	Special-purpose, high-performance epoxy for higher-temperature transducer applications.
<b>Denex #3 Adhesive</b>	One-part epoxy for lab and transducer work requiring minimal creep. Elevated temperature curing.
<b>EpoxyLite 813</b>	Used for long term, high temperature applications requiring a filled glue-line. Wider temperature range than GA-61.
<b>P Adhesive</b>	Single-part solvent thinned polyimide adhesive. Excellent for long-term high temperature applications.
<b>GC Cement</b>	Single-part ceramic cement used for free-filament gages. Recommended for use on low TCE materials, such as carbon.
<b>H Cement</b>	One-part ceramic cement/coating used for free filament strain gages. Good adhesion to most metals.
<b>PBX Cement</b>	Two-part ceramic cement/coating used for free-filament strain gages. Good adhesion to most metals.
<b>Sauereisen #8 Cement</b>	Single-part chemical setting zircon-based cement used for free-filament strain gages. High electrical insulation and thermal conductivity.

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The two most important considerations for proper adhesive selection are compatibility with the backing material of the strain gage, and the operating temperature range over which the bond is expected to perform.

The chart below defines the recommended adhesive(s) for use with a particular strain gage series over various operating temperature ranges. When more than one adhesive is listed for a particular gage/test condition, preference would be given to the adhesive that is easiest to apply while still meeting all of the other performance criteria.

In addition to the primary adhesive selection criteria presented here, other factors (such as test duration, cyclic endurance required, and accuracy required) may have to be considered in the test profile. Detailed selection criteria are addressed in Tech Note TN-505, "Strain Gage Selection — Criteria, Procedures, Recommendations". There are many times when the interaction of test characteristics is too complex for selecting the proper adhesive from a chart with a high degree of confidence. In these cases, contact our Applications Engineering Department for recommendations.

<b>RECOMMENDED ADHESIVES/STRAIN GAGE SERIES</b>			
<b>TYPE OF TEST OR APPLICATION</b>	<b>OPERATING TEMPERATURE RANGE</b>	<b>GAGE SERIES</b>	<b>M-BOND ADHESIVE</b>
General Static or Static-Dynamic Stress Analysis	-50° to +150°F [-45° to +65°C]	CEA, EA	200 or AE-10 or AE-15
	-50° to +150°F [-45° to +65°C]	WA, SA, WK, SK	AE-15 or 610
	-50° to +400°F [-45° to +205°C]	WA, SA, WK, SK	600 or 610
	-452° to +450°F [-269° to +230°C]	WK, SK	610
	<600°F [<315°C]	WK	610
High Elongation (Post-Yield)	-50° to +150°F [-45° to +65°C]	CEA, EA	200 or AE-10
		EP	AE-15 or A-12
Dynamic (Cyclic) Stress Analysis	-100° to +150°F [-75° to +65°C]	ED	200 or AE-10
	-100° to +150°F [-75° to +65°C]	WD	AE-10 or AE-15
	-320° to +500°F [-195° to +260°C]	WD	600 or 610
Transducer Gaging	-50° to +150°F [-45° to +65°C]	CEA, EA	AE-10 or AE-15
	-50° to +200°F [-45° to +95°C]	N2A, J2A	600 or 610 or 43-B
	-50° to +300°F [-45° to +150°C]	WA, SA, TA, TK, J5K	610, 450, P Adhesive
	-320° to +350°F [-195° to +175°C]	WK, SK, TK, J5K	610, 450, P Adhesive
High Temperature Gaging	-452° to +700°F [-269° to +370°C]	WK, RK	P Adhesive
	-320° to +1600°F [-195° to +870°C]	ZC	H Cement

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