

## Strain Measurements for Glass

The application of bonded foil strain gage sensors to glass can be problematic due to the smooth surface and the fact that surface abrasion is generally not allowed on glass or glass-like test articles (stress concentrations). That, along with glass' poor heat-sink rating can contribute to excessive gage failures while soldering, so the use of pre-cabled gages, such as C2A-Series or gage series available with options P or P2, are highly recommended. Surface preparation is generally limited to chemical rather than chemical/mechanical.



### Step 1 Define the Test Conditions

Conditions to Consider	Your Test Conditions
<b>Static measurement</b> One sample per second or less, steady loading	
<b>Dynamic measurement</b> Cyclical or impact loading, high frequency Event duration Anticipated frequency	
<b>Installation longevity</b> Short Term: Hours, days, weeks Long Term: Months, years	
<b>Environment</b> Maximum temperature Minimum temperature Exposure (outdoors, oil, chemicals)	



### Step 2 Ensure Appropriate Surface Preparation Materials Are On Hand

Use the recommended **surface preparation materials** for glass materials (surface abrasions are not allowed on glass):

GC-6 alcohol  
 GSP-1 gauze sponge  
 CSP-1 cotton-tipped applicator  
 M-Prep Neutralizer 5A

M-Prep Conditioner A  
 PCT-3M gage installation tape  
 PDT-3 drafting tape

Reference **Related Documents**: SEARCH our website using the document number.  
**11129** – Instruction Bulletin B-129; **11183** – Application Note VMM-19

# Strain Gage Installation Checklist

## Glass



### Step 3 Select the Strain Sensor

Consult the Micro-Measurements team and/or review our [Tech Note TN-505](#), “Strain Gage Selection – Criteria, Procedures, Recommendations” for detailed information about the strain gage selection process.

#### Step 3A: Select the Gage Series for the Temperature Range

Consider the temperature range that will be encountered during the strain measurements and select a **Gage Series** that meets your requirements.

Gage Series	Temperature Range	Features
CEA	-100°F to +350°F (-75°C to +175°C)	Universal, general-purpose strain gages. Large, easily soldered tabs. Precabled (Option P2) available.
C2A	-60° to +180°F (-50° to +80°C)	Precabled, general-purpose strain gages.

#### Step 3B: Choose the STC for Your Material

Self-Temperature-Compensation (STC) number **05** is often selected for glass when the measurements involve changes in temperature. For constant-temperature measurements where thermal output is not a concern, 06 is often selected due to higher stock availability.

#### Step 3C: Consider the Geometry

The strain gages below are popular for strain measurements on glass. Check [Super Stock](#) for gages that are available to ship promptly.

Type	Gage Designation	Geometry/Construction	Super Stock
For Static and Low-Fatigue Dynamic Measurements	<a href="#">C2A-06-125LW-350</a>	Linear pattern, precabled	Yes
	<a href="#">C2A-06-250LW-350</a>	Linear pattern, precabled	Yes
	<a href="#">C2A-06-125LT-350</a>	0-90 degree tee rosette, precabled	Yes
	<a href="#">CEA-06-125UN-350</a>	Linear pattern	Yes
	<a href="#">CEA-06-250UW-350</a>	Linear pattern	Yes
	<a href="#">CEA-03-250UW-350</a>	Linear pattern	Yes
	<a href="#">CEA-06-125UT-350</a>	0-90 degree tee rosette	Yes
	<a href="#">CEA-06-125UB-350</a>	Linear pattern, solder tabs on side	No
	<a href="#">CEA-06-250UB-350</a>	Linear pattern, solder tabs on side	No
	<a href="#">CEA-06-250UT-350</a>	0-90 degree tee rosette	Yes
	<a href="#">CEA-06-500UW-350</a>	Linear pattern, long gage length	Yes



### Step 4 Select the Adhesive

Adhesive	Conditions to Consider
<b>M-Bond 200 Kit</b>	Most frequently used adhesive for short-term room temperature testing, with fast installation
<b>M-Bond AE-10</b>	Long term testing where room temperature cure is required
<b>M-Bond GA-61</b> or <b>EPY-500</b>	Elevated temperature testing

Follow the instructions included with the adhesive for application and cure requirements.

**Application Kits** contain specific adhesives, surface preparation materials, and in some cases wire and coatings necessary for a successful strain gage installation on glass.

- **BAK-200 Kit**  
Contains M-Bond 200 adhesive and basic materials for surface preparation (does not include GC-6 Alcohol). Excellent for use with pre-cabled gages.
- **GAK-2-200 Kit**  
Contains M-Bond 200 and all other materials needed to install strain gages on glass, including solder and cable.
- **GAK-2-AE-10 Kit**  
Contains M-Bond AE-10 and all other materials needed to install strain gages on glass, including solder and cable.



### Step 5 Select Cable and Solder Terminals

Micro-Measurements offers a variety of **cable types** for gage installation on glass. For ease of installation, consider pre-cabled gages; no additional cable is required unless length needs to be extended.

Cable	Conditions to Consider
<b>Vinyl Insulated</b>	Room temperature testing
<b>Teflon Insulated</b>	Wide temperature range testing, high moisture or water immersion, and chemical resistance

Solder Terminals	Conditions to Consider
<b>Bondable Terminals</b>	Bonded to the test structure, these can be used as transition or anchor point for cable.



### Step 6 Select a Solder

Micro-Measurements has a wide selection of **solder** for strain gage applications. Solder melt point should be at least 50°F (28°C) above the maximum operating temperature. Solder is not needed when using pre-cabled gages.



### Step 7 Select a Protective Coating

Consider the environmental conditions that the coating will need to resist and any application issues, such as:

Environmental Conditions	Application Issues
<ul style="list-style-type: none"> <li>• Temperature range</li> <li>• Humidity</li> <li>• Chemical exposure</li> <li>• Localized reinforcement concerns</li> </ul>	<ul style="list-style-type: none"> <li>• Vertical surface</li> <li>• Horizontal surface</li> <li>• Component sensitivity</li> </ul>

For room temperature testing in a laboratory environment, the most popular coating is **M-Coat A**. For field testing, **M-Coat JA**, **M-Coat F**, and **Barrier E** are rugged and waterproof.

For testing in other environments and temperatures, refer to the **Protective Coating Selection Guide** to select the proper coating.

# Strain Gage Installation Checklist

## Glass



### Step 8 Select the Measurement Instrumentation

Micro-Measurements offers a wide variety of **instrumentation** specifically designed and optimized for strain measurement. Simple Strain Indicators are available for high-accuracy static measurements. Signal Conditioning Amplifiers accept direct strain gage input and provide a conditioned signal output in the  $\pm 10$  V range. Data Systems accept direct strain gage input and provide reduced data, already in engineering units of strain and/or stress.



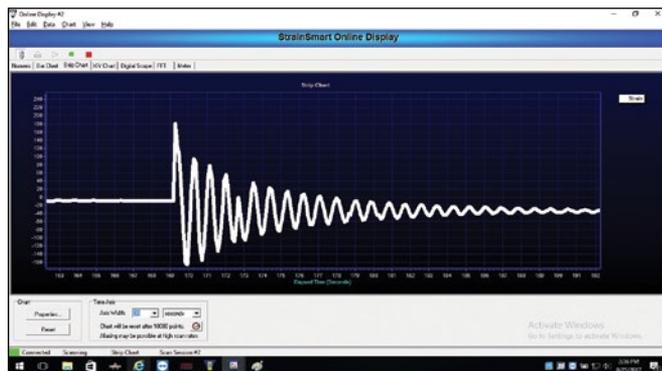
P3  
Strain Indicator



StudentDAQ



D4 Data Acquisition  
Conditioner



StrainSmart® Data Acquisition Software



System 8000 Data Acquisition



System 9000 Data Acquisition



Pacific Instruments  
Series 6000 Data Acquisition System