SF-01 - Installation procedure

Introduction

This document aims to describe the installation procedures applicable to the installation of the SF-01 strain sensor or a similar foil-based sensor on the surface of a monitored object.

The document considers the chemical (gluing) method as the only reliable method of installation of this sensor type.

Installation requirements

Instruments & Tools

- Grinding machine or sandpaper (battery-operated with fine and medium discs)
- Cleaning supplies, and solvents (cleaning cloth, brush, …)
- Suitable adhesive for surface bonding of the sensor, including any recommended accessories, … [1]
- Personal Protective Equipment (latex gloves, eye protection, respirator, …)

note: other standard tools, accessories, and equipment may be required for the installation, but they are not the subject of this guide.

Installation time

Typical installation time of SF-01 sensor: **between 5-10 minutes** (basic surface preparation considered).

Installation sequence

This sequence is described in the next chapters in more detail. Time indicates the estimated time for efforts.

(1) Surface preparation for gluing (mechanical welding) [5 minutes] [2]
(2) Gluing of the sensor to the surface [5 minutes]

[1] The recommended adhesive for SF-01 to a metal surface is Vishay M-Bond 200 kit. The adhesive is not a subject of the delivery and needs to be bought separately.

[2] Time for completing highly depends on the surface the sensor is installed on. For metal surfaces, special preparation liquids could be required.

(1) Surface preparation for gluing (chemical bonding)

Regardless of the visual appearance of the surface, it is recommended to properly prepare the surface to ensure optimal conditions for the adhesive bonding. This process can include mechanical cleaning of the surface using grinding machines and abrasive materials, and result in removing any paint, rust, debris, or similar imperfections from the surface.

Mechanical surface preparation: **Figure 1** shows the surface of a square metal profile (regular construction steel) prepared with the use of an electrical grinding tool and sandpaper (Grit 600). The surface preparation includes the removal of rust, irregularities on the surface, and any protective layer that could obstruct the gluing process and affect the bond strength.

Figure 1: Mechanically cleaned area using an electrical grinding tool.

Chemical surface preparation: **Figure 2** and **Figure 3** show chemical cleaning and surface preparation before applying the bonding adhesive. The surface needs to be prepared 20-30 minutes before the installation to avoid passivation layers on the mechanically prepared surface. Before chemical cleaning, surface inspection is advised to ensure enough surface roughness for the creation of a mechanical contact[3] with the adhesive.

[3] The prepared surface area needs to have certain roughness.

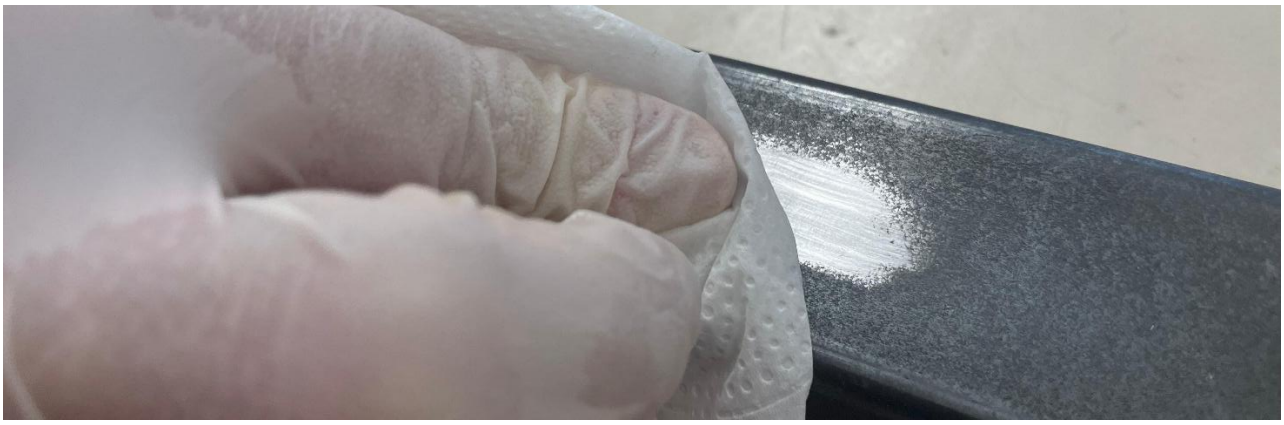

Figure 2: Degreasing and chemical cleaning of the surface.

Recommended cleaning solvents (not included inside the packaging):

- Loctite 7061
- Loctite 7063
- Acetone, Isopropyl alcohol

Figure 3: Chemical surface preparation by etching.

Recommended surface preparation liquids (not included inside the packaging):

- MCA-1 M-Prep Conditioner A (mild phosphoric acid)
- MN5A-1 M-Prep Neutralizer 5A

(2) Gluing (chemical bonding) of the sensor to the surface

The area where the sensor will be applied to needs to be properly cleaned and prepared before the actual sensor application (see Chapter 1 for more details about the surface preparation).

Note: the application of the adhesive can be restricted to certain environmental conditions, i.e., temperature or humidity. Please ensure that the environmental conditions during installation meet the information included in the datasheet for the adhesive of choice.

Adhesive application: The adhesive is applied in several steps, which are described below. Following the recommended application procedure from the supplier of the adhesive is advised.

(1) Clean the bottom side of the SF-01 sensor with isopropyl alcohol and wipe it dry. The top side of the sensor is labeled using an identification marker, which indicates the top side of the sensor and the FBG position.

(2) Apply the 200 Catalyst-C from the M-Bond 200 kit to the bottom surface area of the sensor, **Figure 4**. Stroke the brush 10x times on the edge of the bottle to remove an unnecessary amount of the catalyst from the brush. Using even strokes in one direction, apply the catalyst to the surface. Leave the catalyst to dry for about 60 seconds.

(3) Apply a small amount of the M-Bond 200 Adhesive to the surface by gently pressing the adhesive bottle, **Figure 5**.

(4) Place the sensor on the applied adhesive and apply pressure with your thumb to remove any excess glue from beneath the sensor. Use a small piece of PTFE tape between the sensor and your thumb to prevent the running glue from reaching your thumb. Maintain the pressure for at least 60 seconds (depending on the environmental conditions), **Figure 6**.

(5) Apply a fair amount of silicone covering over the whole sensor and gluing area. An RTV silicone, such as RTV 3145 silicone, is recommended. Use any tool to spread silicone to form a thin protective layer above the sensor, **Figure 7**. Keep the RTV protective silicone to dry.

Figure 4: Application of the catalyst onto the bottom surface of the sensor using the appropriate brush.

Figure 5: Application of the M-Bond 200 adhesive in the center of the area where the sensor should be placed.

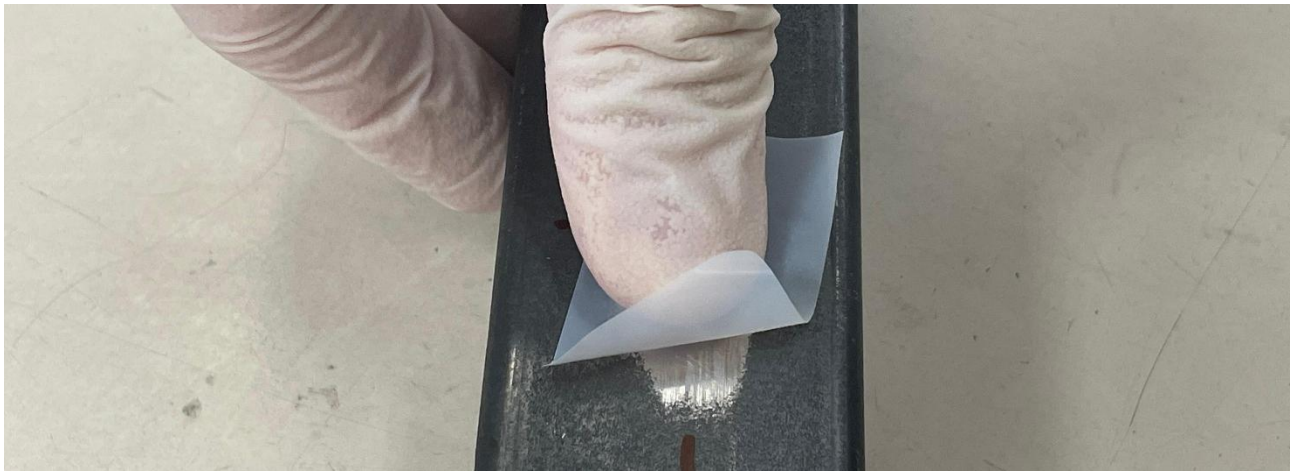

Figure 6: Applying thumb pressure on the sensor through a PTFE tape.

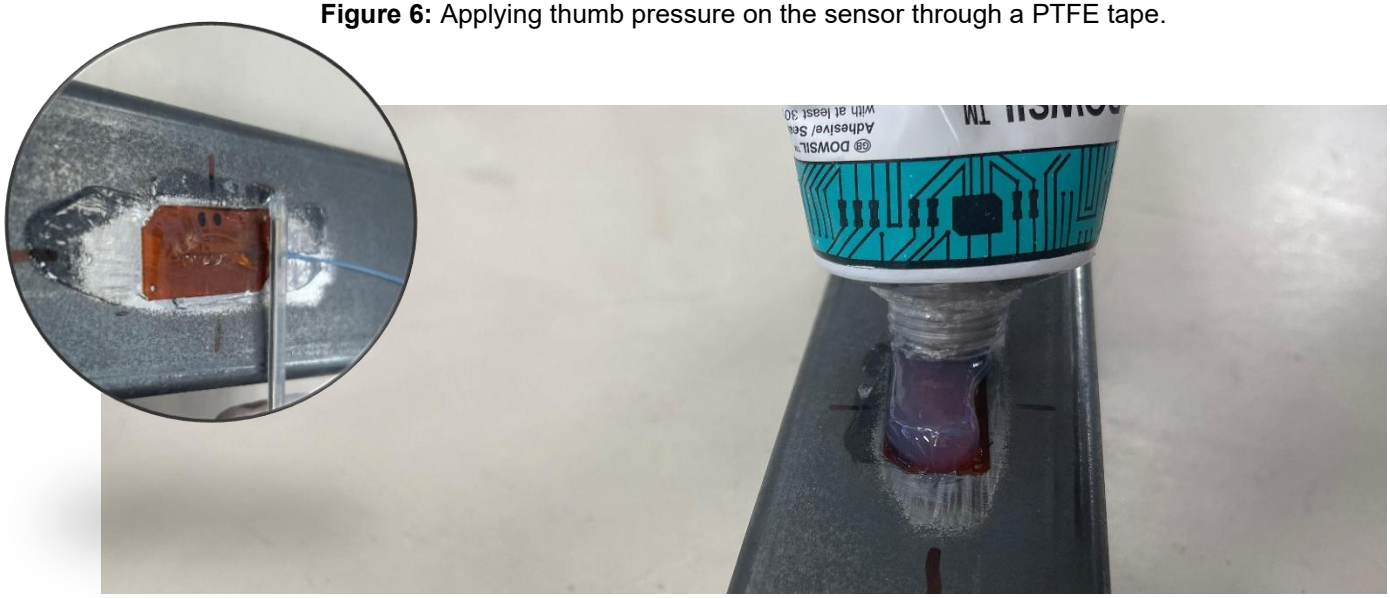

Figure 7: Application of the RTV silicone on top of the sensor and the glued area.

For more information, contact our sales team at sales@sylex.sk

* Specifications are subject to change without notice