



Your step-by-step guide to install a strain gauge on a concrete surface

The process of a strain gauge installation on concrete has some variation when compared to the procedure typically used when bonding a strain gauge to steel. The rough, porous, dusty concrete surface is certainly not conducive to good adhesive bonding. When you add to this the length of the strain gauge, typically 50 – 150mm long, strain gauge bonding on concrete presents quite a challenge. We have found that the use of a combination of two adhesives, HBM X60 and HBM Z70, results in a repeatable and accurate mounting method, even when bonding to the underside of a concrete structure.

Equipment required



1. HBM strain gauge
2. HBM X60 adhesive
3. HBM Z70 adhesive
4. Teflon sheet
5. Masking tape
6. Paintbrush
7. 220 grit sandpaper
8. Flat bar with adhesive automotive foam bonded to one side (160mm x 25mm x 2mm)
9. Ruler

Bonding Procedure

Surface Preparation

The surface preparation on concrete is done to remove any dirt and ensure the selected area does not have loose pieces that will detach underneath the strain gauge, once bonded.

1. Use the paintbrush to dust off any loose dirt from the surface.



2. Lightly sand the surface to remove any loose concrete.



3. Brush the surface again to remove the sanding dust.



Base Adhesive Layer

HBM X60 is applied to the concrete as a base adhesive layer. The X60 creates a smooth surface to bond the strain gauge, as it fills in any air pockets and surface defects, ensuring that the entire strain gauge grid is fully bonded.

HBM X60 could be used to directly bond a strain gauge to concrete, but is typically not practical, due to the long curing time of ± 20 minutes. You would need to securely hold the strain in place until the adhesive is cured. By using a combination of the two adhesives, the HBM X60 can be left to cure, where after the HBM Z70, which is a fast-curing adhesive, can then be used to finally bond the strain gauge. Z70 adhesive bonds well on the prepared X60 surface.

1. Mark the length of the strain gauge on the prepared concrete area. This will ensure the X60 covers a sufficient surface area to mount the strain gauge to.



2. Mix HBM X60 adhesive to a consistency that will fill any voids in the concrete but not too runny that it runs off the surface.



3. Place a strip of the Teflon sheet over the HBM X60 and gently apply pressure with the steel and foam side of the flat bar. Be careful not to press too hard and squeeze all the adhesive away. Leave the Teflon sheet over the HBM X60 until the adhesive is completely cured, ± 20 minutes.



Bonding the Strain Gauge

1. Use the masking tape to secure a strip on the Teflon sheet over the steel and foam bar.

Fold over two pieces of the masking tape with the sticky side outwards and use them to hold the strain gauge onto the Teflon sheet.



2. Cover the strain gauge with a thin layer of HBM Z70 adhesive.



3. Quickly place the Strain Gauge onto the prepared surface on the concrete, applying gentle pressure to the reverse side of the bar. The Z70 starts to cure within seconds of being applied to the strain gauge.



4. After 2 minutes, remove the bar and masking tape off the strain gauge.



5. Check that the strain gauge is bonded along its full length.



6. Solder lead-wires to the strain gauge and test the resistance with a multimeter.



The strain gauge is now bonded to the concrete. It is always recommended to protect the installation even for short-term measurements. A full list of approved coverings and protective materials can be found on the HBM website as well as a guide on when to choose what covering.



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