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## **FAST-DRYING GLUE Z 70 for strain gauges sticking**

**(Appendix to the lectures of the subject LA 1)**

**Elaborated by: Doc. Ing. Vladimír Humen, CSc., Jiří Drahoňovský**

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Glue Z 70 is special glue for strain-gauge applications. This glue is a developed version of glue from the group of acrylatecyanide glues. It is used for all kinds of strain gauges of the programme HBM and bonds all common metals. It is not suitable for sticking porous materials, such as wood, concrete, foams etc.

### **1. General Information**

Curing (polymerization) is done by means of catalytic action of absorbed atmospheric humidity. The most suitable conditions of curing are at humidity between 40 and 70%. At humidity less than 30% the reaction is significantly slower, in extreme case it may not occur at all. At humidity more than 80% shock curing occurs. It means that in the layer of glue internal stresses arise that considerably reduce ductility of the bond. It is thus necessary to stick to the above stated boundary values of humidity in the process of curing. The curing takes place completely and in the required time only in a thin layer (film). In a thick layer it is incomplete, or it does not occur at all. In case of very rough surfaces the bonding may not be realized at all.

Curing speed depends on chemical state of bonded parts. Basic materials accelerate bonding, acid materials not only slow down the curing, but can also prevent curing (in case of acid materials it is suitable to use separately delivered curing agent BCY01). In the Table 1 there are correct values of curing time at the temperature of approx. 20°C and relative humidity 65%. After that time the glue is cured enough so that the connecting of cables can be started. However, the curing is not totally completed sooner than in 24 hours. Measurement can be started after the lapse of time given in the Table 2.

### **2. Preparation of Surfaces for Gluing**

The aim of preparation is to get flat smooth and well-wettable surfaces. It depends on the state of the measured object, which of the following steps are necessary.

#### **2.1 Rough Cleaning**

Rust, scale, paint smudges and further rough dirt have to be removed within considerably large area around the point of measurement.

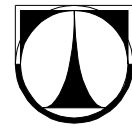
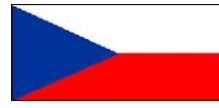
#### **2.2 Smoothing**

It is necessary to remove various roughnesses at the measured area by means of grinding.

#### **2.3 Degreasing**

The choice of a detergent depends partly on the kind of pollution and partly on the sensitivity of the surface being cleaned to the detergent. Applicable are strong degreasing agents such as RMS 1 from HBM, methane ethyl ketone, acetone, wax and other similar agents dissolvable in toluene.

The cleaned surfaces have to be wiped with a cloth absorbing the detergent. At first a large area around the point of measuring must be cleaned, then a smaller area, so that the sticking area is not soiled by impurities from the edges. Large areas are to be brushed up or washed with water



and then dried by some absorbent cloth. It is convenient to use ultrasonic bath or vapour degreasing.

**Remark:** The detergent must be chemically clean and must not leave any remnants. It must never be used directly from the bottle but from a small clean bowl. The rest of the detergent from the bowl must never be put back into the bottle. The absorbent cloth can be used only once and then disposed. You should never dip the used cloth in the dissolvent.

## **2.4 Roughing**

Slight roughing of the surface results in a better contact of the surface with the glue. This roughing can be achieved by sandpaper with the grain 180 ... 240 or by means of fine sand jet - grain 320. The pressure air must be necessarily without grease. If grooves appear during the previous steps, it is necessary to smoothen them. If the surfaces of the measured body are not damaged, the glue Z70 without restrictions in ductility can be used for polished and completely smooth surfaces. Mechanical and/or chemical preparation of the surfaces must be done shortly before the glue application so that the surfaces did not oxidise again.

## **2.5 Final cleaning**

Dust and dirt originating from roughening must be carefully removed. For removing it is useful to use detergent mentioned in the chapter 2.3. A piece of absorbent cloth is gripped by pincers and the surface in question is cleaned at one touch. Wiping is repeated as long as the cleaning cloth does not show any more stains. Remaining particles should be removed using tissue paper; never should they be blown off by expiration. The point of measuring must be left dry, never touched by fingers.

## **3. Strain Gauge Preparation**

The strain gauge prepared for application shall not be additionally cleaned as the sticking film could be affected.

## **4. Gluing**

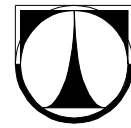
Considering short reaction time of the glue Z60, further adjustment of the strain gauge is not possible if the given procedure of gluing have been applied. If we use the procedure described hereafter, then we will obtain undoubted and credible results.

Stick the adhesive tape on the upper side of the strain gauge. Place the strain gauge at the clean point of measuring, carefully adjust in the demanded direction, press the exceeding end of the adhesive tape with pincers as far as the end of the strain gauge. The outstanding hinge-like joint enables to fix the strain gauge without disturbing demanded direction of gluing (see sketch 1).

Cut off a piece of an enclosed Teflon tape. If the width of the area of application is larger than 15 mm, cut off a skew Teflon strip. Drop one drop of glue on the application surface and make an even thin layer at one draw of the Teflon strip. Hold the strip straight while applying minimum pressure (see sketch 2). At higher pressure the glue starts curing immediately. Place the strain gauge carefully back, cover it with a strip of Teflon foil and firmly press by your thumb. Press as long as the glue hardens (see table 1).

After a couple of minutes remove the cover foil and carefully release the lead-in wires of the strain gauge from the glue. The layer of glue for correctly glued strain gauge is 0,008 mm  $\pm$ 20% thick.

At unfavourable conditions, such as



- low humidity,
- low temperature,
- acid reacting surface,

a curing agent BCY 01 can be used to shorten the curing. If the glued surface is treated with the agent BCY 01, glue curing occurs immediately.

#### **WARNING**

Experience shows problems in connection with curing a thick layer of the glue Z70. Neutralising agent should be used only when this circumstance is completely eliminated.

## **5. Package Content, Detergent, Storage**

Package of „Fast-drying strain gauge glue Z70“ contains:

1. Polyethylene bottle with dropper, the contents of about 10 cm<sup>3</sup> of glue. Glue is sufficient for gluing of about 200 to 500 strain gauges.
2. Plastic tips, Teflon band 600-15-0.4 mm, Teflon foil 3 m long and 60 mm wide.

#### **WARNING**

Screw cap serves for fixing the dropper and must not be unscrewed.

At the bottle opening you should act from the side of the tip of the screw cap. Thus the bottom part of the screw cap breaks and it can be removed by pulling upwards.

The tip of the dropper should be carefully cut-off. After application the dropper will be pushed back and closed. The plastic tip should be inserted into the hole in the dropper. By means of the tip we can sensitively dose the glue Z70 and put it on the hardly accessible places.

When being out of use for a long time, the glue begins to cure and the tip closes. Having been cleaned, the tip can be used again.

When cleaning the bottle, take notice of the following instructions:

- After application remove immediately the plastic tip from the dropper.
- Removed the rest of the glue from the dropper with a not-fluffing cloth and thus prevent sticking the screw cap with the dropper on the screw.
- Close the bottle with the cap firmly and thus prevent access of moisture and further curing.
- Store the bottle in a vertical position.

The glue Z70 has to be protected against sunshine, heat and humidity. Store it at a cold and dry place. The “best before” period is indicated on the package and at the above-stated conditions and room temperature is at least 6 months. Nearly endless period of storage can be achieved when storing the glue at the temperature of -15°C. Before the application, bring the glue to the room temperature as fast as possible. Multiple cooling has no influence on the glue properties.