

Instructions for Using PC-1 Adhesive

Introduction

PC-1 is a 12-hour room-temperature-curing adhesive for bonding PhotoStress® coating types PS-1 and PS-8 flat sheets, and contoured sheets made from type PL-1 and PL-8 liquid plastics. It is the most common adhesive used for general-purpose PhotoStress analysis.

PC-1, like all adhesives for bonding PhotoStress coatings, is a two-component resin/hardener system. It is mixed at room temperature, and will exhibit a pot life of approximately 40 minutes for a 30-gram mix. The pot life will be shortened for mixes larger than 30 grams, and no more than 100 grams of PC-1 adhesive should be mixed at one time in a single container. At 100 grams maximum, the pot life will be approximately 10 minutes. If more than 100 grams of adhesive are required at one time for the bonding application, the total needed should be split up into two or more mixes of lesser amounts.

Shelf Life

Shelf life of unopened PC-1 is one year when stored at +75°F [+24°C]. Storage life after opening, even when tightly closing the containers, may be only a few months or weeks. Therefore, after first opening the containers, the material should be used as soon as possible.

Because condensation inside refrigerated containers will rapidly degrade both resin and hardener, refrigeration may shorten shelf or storage life, and is not recommended. Refrigerated containers must be allowed to reach room temperature before opening.

Important: These instructions only apply for temperature conditions between 70° to 75°F [21° to 24°C] only. Because PC-1 adhesive is exothermic, its pot life, working time, and curing time will be longer for lower temperatures, and shorter for higher temperatures.

Application

1. **Surface Preparation of the Test Part** - The detailed instructions given in Application Note IB-223 must be followed without exception in order to achieve a good bond between the coating and the test part.

2. **Preparation of the PhotoStress Plastic** - The detailed instructions given in Application Note IB-223 must be followed without exception in order to achieve a good bond between the coating and the test part.

3. **Final Surface Preparation** - Because of possible contamination of the bonding surface during the plastic preparation, a final surface cleaning may be required. In most instances, a thorough wash-down with Neutra-Sol is all that is necessary (see Application Note IB-223 for brass, bronze, copper, manganin and related alloys).

4. **Masking the Bond Area** - Place the cleaned plastic sheet over the cleaned surface of the test part. Then, using masking tape, mask off an open space around the plastic, leaving about 1/4 in [6 mm] between the edge of the plastic and the tape. When the tape is removed after bonding, this procedure will leave a clean, neat glue line.

5. **Adhesive Preparation** - The amount of adhesive required must be calculated in advance. One gram of mixed adhesive will cover approximately a 1.5 in² [10 cm²] area. No more than 100 grams of adhesive should be prepared per mix.

Resin-Hardener Proportion - The amount of hardener required is calculated in parts per hundred, or "pph". For PC-1 the amount is 10 pph. In other words, 10 pph of hardener means 10 grams of hardener for 100 grams of resin.

Example: If a total of 60 grams of mixed adhesive is required, the resin-hardener amounts are calculated as follows:

PC-1 Resin: $60 \times 100 / 110 = 54.55$ grams

PCH-1 Hardener: $60 \times 10 / 110 = 5.45$ grams

Note: PC-1 Resin is prone to settlement during storage and should be thoroughly mixed in its original bulk container before weighing. Also, only the resin should be pre-heated to 90°F [32°C] before mixing.

When mixing 50 to 100 grams of adhesive, a 6-ounce mixing cup will suffice (Part No. 012-8 or equivalent). The mixing container should be made of a nonabsorbent material that can be discarded after using the adhesive.

Note: It is not necessary to weigh the material when using the PC-1 or PC-1C 80-gram kits, since the exact proportions of both resin and hardener have been pre-weighed. To use the pre-weighed kits, the contents of the hardener are simply emptied into the resin container.

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After the hardener has been added to the resin, mix thoroughly using a wooden mixer (Part No. 011-13 or equivalent). The mixing time required is three to four minutes (depending on amount) to ensure a homogeneous blend. When mixing, the container should not be cradled in the palm of the hand since the resulting body heat will accelerate the exotherm and decrease the pot life.

6. **Bonding Procedure** - Immediately after mixing, pour and brush the adhesive (using Part No. 011-14 or equivalent) onto the prepared area in a uniform layer approximately .031 to .063 in [0.8 to 1.6 mm] thick depending on the regularity of the surface. Any adhesive left in the mixing container should be poured onto a clean paper towel and the mixing container discarded. If the adhesive is immediately spread in a thin layer after it has been mixed, its working time will be 40 to 60 minutes.

Carefully place the plastic over the adhesive. Now, beginning at one end, press down on the plastic with moderate finger pressure and slowly work toward the opposite end. This technique will allow any air bubbles that form to flow out with excess adhesive. If air pockets return when finger pressure is relaxed, reapply pressure and brush additional adhesive along the edge of the plastic. Then, after releasing the pressure, adhesive will flow in instead of air. A layer of adhesive approximately 0.003 to 0.005 in (0.076 to 0.13 mm) is optimum, although the actual thickness will vary according to the surface condition of the test part and complexity of the contour.

After all of the excess is squeezed out, apply a thin coating of adhesive around all edges of the plastic (including holes that may have been drilled), to provide a seal against moisture absorption. Depending on the application, the coating may have a tendency to slide from its bonded position before the adhesive begins to set. This is particularly true when bonding flat sheets, and when bonding coatings to vertical and overhead surfaces. In these situations, masking tape can be used to securely hold the coating in place.

Note: Type PC-1T (thixotropic) adhesive is frequently used for bonding sheets to overhead and vertical surfaces. The hardener-to-resin ratio for PC-1T is the same as for PC-1.

The adhesive will become stiffer as it cures. After about one and a half hours it will be about the consistency of putty. At this time, if adhesive bevels are required, they should be built and any remaining adhesive on top of the coating should be cleaned off using the recommended solvent. The masking tape should also be removed and a final clean-up made. After 12 hours of cure from the start of mixing the PC-1 adhesive, the part will be ready for testing.

CAUTION

Epoxy resins and hardeners may cause dermatitis or other allergic reactions, particularly in sensitive persons. The user is cautioned to: (1) avoid contact with either the resin or hardener; (2) avoid prolonged or repeated breathing of the vapors; and (3) use these materials only in well-ventilated areas. If skin contamination occurs, thoroughly wash the contaminated area with soap and water immediately. In case of eye contact, flush immediately and secure medical attention. Rubber gloves and aprons are recommended, and care should be taken not to contaminate working surfaces, tools, container handles, etc. Spills should be cleaned up immediately. For additional health and safety information, consult the Material Safety Data Sheet.

Refer to these publications for detailed information on:

Tech Note TN-704, "*How to Select PhotoStress Coatings.*"

Document 11222, "*PhotoStress Coating Materials and Adhesives.*"

Application Note IB-221, "*Instructions for Casting and Contouring PhotoStress Sheets.*"

Application Note IB-223, "*Instructions for Bonding Flat and Contoured PhotoStress Sheets.*"

For applications involving special materials or unusual testing conditions, consult the Micro-Measurements Applications Engineering Department.

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