EPTEK Tooling Materials (Shanghai) Co., Ltd.

MP50 Hand-Applied Tooling Paste

Work Instruction

Product Description

• MP50 is a two-component, hand-applied epoxy tooling paste consisting of a white resin component and a pink hardener component. Both components are packed in 8 kg bags and supplied in cartons at a 1:1 mix ratio.

Product Storage

• MP50 hand-applied tooling paste must be stored sealed, especially the hardener component. When exposed to air, the hardener cures and becomes hard. This is an irreversible chemical reaction and cannot be reversed by heating. Once this hardening occurs, the material must be scrapped and must not be used. After opening a plastic bag, immediately tie and seal the bag if the material is not used up, and close the carton; do not store it open.

• The pink pigment in the hardener is an organic colorant. Its color gradually fades under heat and light. Keep the carton closed when the product is not being used. If opened material remains, return it to the carton promptly and store it protected from light.

• Store the resin and hardener in a dry environment at 15-30°C to prevent caking. After prolonged storage at low temperature, the material may harden and become difficult to mix. Before use, place it in a heated warehouse for at least 48 hours, or warm it to approximately 30-35°C to soften it.

Mix Ratio

• Mix MP50 at a 1:1 mass ratio. A deviation of ±5% is allowed. If the deviation exceeds 5%, the curing process and the properties of the cured tooling paste will change significantly and the product performance may be seriously affected.

• Both the MP50 resin and hardener are pre-weighed in 8 kg bags. Before use, remove the sealing ties and load equal numbers of resin and hardener bags into the mixing equipment.

Mixing

• For small quantities, hand mixing is possible after weighing the components at the correct ratio. A folding motion is recommended because it mixes efficiently and shortens manual mixing time.

• For large quantities, use a dough mixer that can switch between forward and reverse rotation. Load equal numbers of resin and hardener bags, and alternate forward and reverse rotation several times until no obvious color difference remains. The point at which the pink and white components have only just lost their visible color difference does not mean that the tooling paste is fully homogeneous. Continue mixing for another 3-5 minutes to ensure uniformity. To keep the mixing time consistent for every batch, place a timer next to the mixer.

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• During mixing, scrape material from the corners and inner walls of the dough mixer. Use a spatula to turn the tooling paste as needed to assist mixing and ensure uniformity throughout the batch.

• When the material temperature is below 20°C, its viscosity is high and uniform mixing is difficult. Preheat the tooling paste, or extend mixing by approximately 5 minutes while continuously observing the mixing condition.

• Scrape as much material as possible from the mixing blade and container walls after each batch to prevent carryover into the next batch. Residual material may not be fully mixed; manually homogenize it before applying it to the mold.

Working Time

• The two components begin reacting as soon as the resin and hardener are mixed, and viscosity and hardness gradually increase.

• Within the working time, the mixed hand-applied tooling paste has low viscosity and can still be shaped and applied. It also retains good wetting and bonding to the substrate. After the working time is exceeded, the mixed tooling paste becomes harder, making shaping and application difficult, and its wetting and bonding to the substrate deteriorate. Apply the mixed tooling paste promptly to maintain good workability and adhesion.

• In laboratory testing, 500 g of mixed hand-applied tooling paste was stacked to a height of 10 cm at 25°C. The working time of MP50 was approximately 60 minutes. Factors affecting working time include:

1) Material and ambient temperature:

a) The higher the material and ambient temperatures, the faster the reaction, the shorter the working time and the faster the cure. The reverse applies at lower temperatures.

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b) A material temperature above 30°C is not recommended. In summer, place MP50 in an air-conditioned warehouse or a well-ventilated area before use to prevent excessive material temperature and a shortened working time that could cause the tooling paste to harden before it is applied to the mold. c) In winter, when the temperature is below 20°C, the material becomes harder and mixing becomes difficult. Before use, place it in a heated warehouse for 48 hours, or put it in an oven and heat it to 30-35°C. To warm the tooling paste more quickly, remove it from the carton before heating. d) Tooling paste transfers heat relatively slowly. Rapid heating or cooling over a short period is not recommended. During heating, the outside may already be hot while the inside remains cool. The large temperature difference produces different hardness between the inner and outer material, which can cause localized non-uniform mixing in the dough mixer and inconsistent hardness after curing.

2) Quantity mixed: the larger the mixed quantity, the more heat is generated inside the material and the shorter the working time.

3) Stack thickness: the thicker the mixed tooling paste is stacked, the more heat accumulates inside and the faster the reaction proceeds, shortening the working time. Spread the mixed tooling paste out as much as possible to increase heat dissipation, reduce heat build-up and extend the working time.

Application / Lay-Up

• Knead the mixed tooling paste again by hand to release trapped air.

• Place the deaerated tooling paste into the specified mold and use a rolling pin to press it to the required thickness, or use a dough sheeter to achieve the required thickness.

• Avoid creating voids and air pockets in the hand-applied tooling paste during pressing.

• Brush a thin layer of resin onto the mold surface first to improve bonding between the tooling paste and the fiberglass-reinforced plastic (FRP) surface.

• Apply the tooling paste to the FRP surface and tap it appropriately to ensure full contact and bonding with the mold. At joints between two pieces, press the material together tightly and do not leave gaps.

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Curing

• Cure rate is mainly affected by ambient temperature. At low temperature, the tooling paste is less reactive and cures slowly; even after 7 days, the degree of cure may still be insufficient.

• When the temperature is below 25°C, heating with a temporary enclosure and hot air is recommended to increase activity and accelerate curing. The maximum heating temperature may reach 80°C; a minimum heating temperature above 35°C is recommended. Lower heating temperatures require longer heating times.

Spray Application of Sandable Gel Coat

To ensure good adhesion of the gel coat to the MP50 surface, observe the following requirements:

1) Use a hardness tester and spray the sandable gel coat only after the cured MP50 tooling paste reaches Shore D 53.

2) When the ambient temperature is below 20°C, the hand-applied tooling paste is difficult to cure completely. Spraying the sandable gel coat too early will prevent full cure and reduce adhesion. Below 20°C, heat-cure the tooling paste before spraying; the heating temperature may be 35-80°C.

3) Keep the tooling paste surface dry. On days with large day/night temperature differences or high-humidity rainy weather, the surface can adsorb substantial moisture, reducing gel-coat adhesion. Spraying is not recommended in high-humidity conditions.

4) After machining, sand the MP50 hand-applied tooling paste with sandpaper and blow off all dust.

5) Spraying gel coat at an ambient temperature above 35°C is not recommended. Excessive temperature causes solvent to evaporate too quickly and accelerates gel-coat curing, reducing adhesion to the tooling paste.

6) Apply the sandable gel coat in multiple coats; do not apply one excessively thick coat. After the first coat, wait at least 3 minutes, depending on ambient temperature, for the solvent to evaporate before applying the second coat.

7) Styrene is not recommended as a thinner because it evaporates slowly and is highly corrosive to the tooling paste. Acetone is recommended for dilution.

US customary-unit equivalents

US customary-unit equivalents are provided for convenience alongside the original SI test data. The original source values and test methods remain the controlling reference. Converted values are rounded.

Source value	US equivalent
8 kg	17.6 lb
15-30 °C	59 to 86 °F
30-35 °C	86 to 95 °F
20 °C	68 °F
500 g	1.102 lb
10 cm	3.937 in
25 °C	77 °F
30 °C	86 °F
80 °C	176 °F
35 °C	95 °F
35-80 °C	95 to 176 °F