

Scotch-Weld™

EPX™ Potting Compound/Adhesive DP270

Clear and Black

Product Data Sheet

Updated : March 1996
Supersedes : November 1993

Product Description

Available in larger containers as Scotch-Weld 270 B/A Potting Compound/Adhesive.

DP270 Adhesive or (Scotch-Weld 270 B/A Adhesive) is a two-part, low viscosity epoxy resin system designed primarily for potting, sealing, and encapsulation of electronic components. It is available in clear or black. DP270 is non-corrosive to copper and offers good thermal shock resistance and excellent retention of electrical insulation properties under high humidity conditions.

DP270 Adhesive has a work life of approximately 70 minutes, a tack-free time of about 3 hours and is fully cured after 48 hours at 23°C. This product produces no exotherm in 5-10 gram masses and a very slight exotherm in larger masses.

The DP270 Adhesive (Duo-Pak) system is particularly well suited for the potting and encapsulation of heat sensitive or delicate components such as glass diodes and sensors as well as for transformers, coils, chokes, relays, etc.

It is available in the convenient Scotch-Weld EPX Applicator System for low volume usage and in bulk containers for larger applications.

Features:

Clear or Black.

Non-corrosive to copper.

Good Thermal Shock Resistance.

Excellent Electrical properties.

Long Work Life.

Negligible Exotherm.

Physical Properties

Not for specification purposes

	BASE	ACCELERATOR
Base Resin	Epoxy	Amine
Specific Gravity	1.15	0.98
Viscosity (cP at 23°C)	22,000 Mixed : 19,000	18,000
Work Life	60-70 minutes at 23°C	
Tack-Free Time	3 hours	
Full Cure	48 hours at 23°C	
Mix Ratio	1:1 by volume 1:0.85 B/A by weight	
Colour	Clear or Black	
Shelf Life	12 months from date of despatch by 3M when stored in the original carton at 21°C (70°F) & 50 % Relative Humidity	

Date : March 1996
 Potting Compound/Adhesive
 DP270 Clear and Black

Curing

DP270 Adhesive and 270 B/A Adhesive will normally achieve full cure after 2 days at 23°C (73°F).	This cure time is influenced by temperature. Please see Cured Properties below.	
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Cured Properties

Physical		
Cure Shrinkage	0.08%	
Shore D Hardness (ASTM D2240)	83	
Tack Free Time	5°C (41°F) 23°C (73°F) 50°C (122°F) 80°C (176°F) 100°C (212°F)	40 hours 3 hours 40 minutes 10 minutes 7 minutes
Full Cure Time	5°C (41°F) 23°C (73°F) 50°C (122°F) 80°C (176°F) 100°C (212°F)	20 days 48 hours 4 hours 60 minutes 30 minutes

Thermal Properties

Weight Loss by TGA (in air)	1% at 122°C 5% at 175°C 10% at 210°C	
Thermal Coefficient of Expansion by TMA	Below Tg (5-30°C range) Above Tg (60-125°C range)	80 x 10 ⁻⁶ units/unit/°C 180 x 10 ⁻⁶ units/unit/°C
Glass Transition Temperature by DSC	Onset Mid-Point	43°C 49°C
Thermal Conductivity (at 110°F on 0.025" samples)	BTU-ft/ft ² -hr-°F Cal/sec-cm-°C Watt/m-°C	0.103 0.426 x 10 ⁻³ 0.177
Thermal Shock Resistance	Potted Washer Olyphant Test. 3M/ITA Test Method C-3167 +100°C (air) to -50°C (liquid)	Pass 5 cycles without cracking.

Date : March 1996
 Potting Compound/Adhesive
 DP270 Clear and Black

Electrical Properties

Dielectric Constant (ASTM D150)	3.5 at 1 KHz at 23°C	
Dissipation Factor (ASTM D150)	.018 at 1 KHz at 23°C	
Dielectric Strength (ASTM D149)	850 volts/mil	
Volume Resistivity (ASTM D257)	4.1 x 10 ¹⁴ ohm-cm	
Insulation Resistance (.8mm/.8mm comb pattern on FR-4 60°C/96% RH/100 volts d.c)	Initial	3 x 10 ¹³ ohms
	1000 hrs	2 x 10 ¹¹ ohms

Corrosion

Per ASTM D3492	35°C/96% RH/45 d.c./15 days Pass - No Copper Corrosion
Per 3M STA Test Method C-708	45°C/96% RH/250Vdc/5 days Pass - No Copper Corrosion 65°C/96% RH/250Vdc/5 days Pass - No Copper Corrosion
Per Mil S-46163	10 days/50% RH/23°C Pass - No Aluminium, brass or steel discolouration or corrosion.

Solvent Resistance

Visual check after immersion is specified solvent at 23°C (73°F)

Solvent	1 Hour	1 Month
Acetone	B	C
Isopropyl Alcohol	A	B
Freon TF	A	A
Freon TMC	B	C
1,1,1 Trichloroethane	A	C
RMA Flux	A	B
Key: A - Unaffected	B - Slight Attack	C - Moderate/Severe Attack

**Handling/Curing
Information**

Mixing:

DP270 Adhesive is supplied in a dual syringe Duo-Pak as part of the Scotch-Weld EPX Applicator System. To use, insert the Duo-Pak cartridge into the EPX applicator and start the plunger into the cylinders using light pressure on the trigger. Next, remove the Duo-Pak cap and expel a small amount of resin to be sure both sides of the Duo-Pak are flowing evenly and freely. Use a pin if necessary to clear any obstruction from either or both orifices. The Duo-Pak is now ready for use. For automatic mixing, attach the EPX applicator mixing nozzle to the Duo-Pak and dispense material.

When mixing Part A and B by hand DP270 (Clear or Black) Adhesive, the components must be mixed in the ration of 1 to 1 by volume or 1 part base to 0.85 parts accelerator by weight. They should be proportioned within 3% accuracy and mixed thoroughly to obtain a homogeneous mixture. Complete mixing of the two components is required to obtain optimum properties. If not mixed thoroughly, the product can exhibit tacky or brittle areas, resulting in poor performance.

Many types of two part meter and mix dispensing systems are available for intermittent or production line use. These systems are ideal because of their variable shot size and flow rate characteristics. For further information contact 3M.

Work Life:

DP270 (Clear or Black) Adhesive has a work life of approximately 70 minutes at 23°C (73°F) when properly mixed. During intermittent use of DP270 in an EPX Applicator system, work life of a mixer nozzle can be extended beyond 70 minutes by periodically expelling the material in the length of the nozzle which essentially resets the 70 minute clock with respect to nozzle life. When hand mixing a larger quantity of the bulk product, DP270 B/A Adhesive, the batch work life depends to a large extent upon the maximum viscosity allowable in the particular application.

**Additional Product
Information**

DeAerating (If Desired):

Dispensing of DP270 by means of an EPX Applicator or machine dispensing of DP270 B/A Adhesive will normally result in air-free material. However, thorough hand-mixing of the DP270 B/A Adhesive will usually result in entrapment of air in the product. Optimum performance of the product will only be obtained if most of this air is removed, especially if high humidity conditions exist at the time of mixing.

A typical method to remove this air is to evacuate the mixture at about 10-15mm of mercury absolute pressure for a period of 5-10 minutes. Container side walls should be about four times the height of the resin to contain the foaming that takes place under vacuum. Elevating the temperature slightly will also aid in entrapped air removal. Care must be taken not to accelerate the cure sufficiently to prevent application at the desired viscosity.

Gel Time:

The DP270 or DP270 B/A Adhesive products will normally gel in about 80-90 minutes at 23°C (73°F) or in 15 minutes at 65°C (150°F) Tack-free time follows in approximately 3 hours or 30 minutes, respectively, at these temperatures.

Storage Conditions

The resin system has a minimum shelf life of one year when stored at 23°C (73°F).

Containers should be kept tightly closed when not in use and stored in a cool, dry place.

Adhesive Properties

Although DP270 Adhesive and DP270 B/A Adhesive are designed for potting and encapsulation applications, they can be used as adhesives.

The following show typical shear and peel value determined on several common substrates.

NOTE:

The values reported in this data sheet are average values of several determinations and as such are typical data only and are not to be used for specification purposes.

OLS Adhesion (ASTM D1002-72)	Curing Conditions - 7 days at 23°C (73°F)	
Aluminium/Aluminium	-55°C (-67°F) at 23°C (73°F) at 82°C (180°F) at	1200 - 1250 psi 2450 - 2500 psi 300 - 350 psi
FR-4/FR-4	23°C (73°F) at	1750 - 1800 psi
Copper/Copper	23°C (73°F) at	1700 - 1750 psi
90° T-Peel Adhesion (ASTM D1876-61T)	23°C (73°F) at	< 2 piw

Health & Safety Information

Precautions:

DP270 is corrosive and can cause burns. May cause sensitisation by skin contact. May be harmful if absorbed through skin. May cause respiratory system irritation. Avoid contact with skin and eyes. Wear suitable protective clothing, gloves and eye/face protection. Use only in well ventilated areas. Avoid prolonged breathing of vapours.

First Aid:

Eye Contact:
 Rinse immediately with plenty of water and seek medical advice.

Skin Contact:

Wash with soap and water.

Ingestion:

Drink two glasses of water and call a physician immediately. Do not induce vomiting.

For further Health and Safety Information please contact the Toxicology Department at the Bracknell Head Office on (0344) 858000.

