

Epoxy Overview

An epoxy mortar resin will remain soft almost indefinitely. To use it as an adhesive a curing agent (the hardener) must be added. This hardener combines with the resin and changes it from a soft paste to a solid. This change is due to a chemical reaction between the curing agent and the resin. To accomplish this effectively, the hardener must be adequately dispersed in the epoxy. This requires thorough mixing. Casual mixing is not enough as every particle of hardener has to connect and join with its epoxy resin counterpart (give or take a margin of error built into the system). A perfect mix will harden into a solid with each molecule firmly attached to the next. If the mixing is not perfect, there will be weak spots where the molecules are not firmly attached to each other – somewhat like a wire mesh fence where some links have been cut. These spots are where failure can begin. Therefore correct mixing is vital to the success of the epoxy system.

Characteristics

Epoxy systems exhibit:

1. High strength adhesion to a wide range of substrates.
2. Very low shrinkage during cure (can be considered non-shrink).
3. Exceptional dimensional stability after cure
4. “Gap-filling” qualities.
5. Good electrical insulation.
6. Waterproof.

How Epoxies Cure – General overview

Epoxy Resin (A)	30 minutes	30 – 60 minutes	Hours	1 – 3 days	7 days +
Mix A with B	Able to be used.	Too thick to use	Soft Solid	Hard Solid	Ultimate strength
Hardener (B)	POT LIFE	GELLING	HARDENS	SOLID	SOLID

The diagram above shows in general terms what happens with an epoxy during mixing and setting. Once the epoxy has started its initial set, it should not be disturbed as this may induce stress cracking into the epoxy, especially during the period where the epoxy is in a “crystalline phase” and is susceptible to damage.

Do not disturb setting epoxy at this stage. Ideally, allow 12 hours plus before moving joint.

Factors Affecting Setting & Physical Characteristics

The following factors are responsible for poor setting & physical properties. They are:

- Incorrect proportioning of hardener & resin. Follow mix ratios carefully and do not assume that a mix ratio by volume will be the same by weight as often the weight is different for hardener and resin. Don't add extra hardener to the mix during winter as this won't work. Use a winter-grade hardener in cold weather.
- Insufficient and poor mixing techniques. Ensure that the epoxy is thoroughly mixed until of a uniform colour free from streaks and lumps. Scrap mixing container or board to ensure all parts are mixed.
- Temperature: Unless using a cold-cure epoxy, assume that when the temperature drops below 10°C, the epoxy will be very slow to set (or will not set at all). Warm the area to be repaired to help set the epoxy and stand the epoxy resin and hardener containers in hot water prior to mixing and use.



Fraser Brown & Stratmore Ltd

Address: 185 Rata Street, PO Box 35136 Naenae, Lower Hutt, New Zealand

Telephone: 04 567 8436 Freephone: 0800 835 699 Facsimile: 04 567 7232 Freefax: 0800 FIBRES (342 737)

Website: www.fbsltd.co.nz

Email: info@fbsltd.co.nz

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