



Guide to Epoxies

Epoxies consist of two components that react with each other forming a hard, inert material. Part A consists of an epoxy resin and Part B is the epoxy hardener. Epoxy properties are dependent upon the specific chemistry of the system and the nature of the cross-linking available.

Standards & Specifications

ASTM C881 is the current standard for epoxies. There are three classifications in this standard: Type, Grade and Class. (Note: ASHTO M-235 and ASTM C881 are the same)

TYPE: Refers to the Usage:

Type I: Non-load bearing, bonding hardened to hardened concrete

Type II: Non-load bearing, bonding fresh to hardened concrete

Type III: Bonding skid-resistant materials to traffic bearing surfaces

Type IV: Load bearing, bonding hardened to hardened concrete

Type V: Load bearing, bonding fresh to hardened concrete

GRADE: Refers to Flow & Viscosity

Grade 1: Low viscosity (2,000 cps MAX.)

Grade 2: Medium viscosity (2,000 cps MIN.)

Grade 3: Gel, non-sag (1/4" max sag allowed)

CLASS: Refers to Installation Temperatures

Class A: Application temperatures >40°F

Class B: Application temperatures 40°-60°F

Class C: Application temperature <60°F

ICC-ES AC308; "AC308 establishes guidelines for evaluation of post-installed adhesive anchors in concrete elements, including requirements for evaluating the structural capacities of adhesive

anchors used to create connections between structural concrete and attachments."

ACI 355.4 "Qualification of Post-Installed Adhesive Anchors in Concrete"

ACI Adhesive Anchor Installer Certification

A requirement for some installations, an ACI Certified Installer is an individual who has demonstrated the ability to read, comprehend, and execute instructions to properly install adhesive anchors in concrete.

Epoxy Properties Overview

Viscosity

Epoxies are usually described in terms of their viscosity from low (more fluid) to high (less fluid like a gel) to measure flowability. Viscosity is generally expressed in units called Centipoise (cps). The following examples will show the approximate centipoise for various materials:

<u>Centipoise</u>		
1	Water	Low Viscosity
500	Motor Oil	Low Viscosity
2,500	Pancake Syrup	Medium Viscosity
10,000	Honey	Medium Viscosity
25,000	Chocolate Syrup	High Viscosity
50,000	Catsup	High Viscosity
250,000	Peanut Butter	Gel, Paste
1,000,000	Caulking	Gel Paste

Modulus

Epoxies are rated as High Modulus (high 'mod') or Low Modulus (low 'mod'). The modulus means Modulus of Elasticity and it is measured in psi or MPa. Modulus of Elasticity is a measure of how rigid or stiff material is after final cure. High modulus materials are used for stress transfer & where minimal movement can occur. Low modulus materials are more forgiving & can

take more movement as compared to the high modulus materials.



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For anchoring dowels or rebar into concrete or for structural crack repair, a high modulus epoxy should be used. However, for exterior use as a binder for an epoxy mortar or for a bridge deck overlay, a low modulus epoxy is best.

Proportioning and Mixing

Epoxies must be proportioned and mixed at the correct ratios. If the ratio is off, then the performance of the cured epoxy may be affected greatly. Improper ratios and mixing can cause or contribute to the following problems:

- streaking
- soft spots
- blistering
- bubbling
- stickiness

It is recommended that the epoxies are first premixed, that is, to mix the 'A' component and the 'B' component separately then blend the two together being sure all the material is out of the containers.

Always mix as directed on the data sheet and until all the streaks have disappeared and the material is a homogenous color. When adding aggregate to make an epoxy mortar, be certain the aggregate is clean and dry. Wet or damp aggregate can create excessive bubbles in the epoxy.

Temperature and Mass

Epoxy curing is temperature and mass dependent which means that temperature has an effect on the material, with cold slowing the chemical reaction and higher temperatures accelerating the reaction.

Mass dependent means the more mass, the more heat that is generated by that mass, similar to concrete.

Dayton Superior does not recommend the use of their epoxies at temperatures (surface *and* ambient) below 40°F (refer to the product's technical data sheet for exceptions).

As a rule, the pot life of the epoxy will be cut in half for each 10-15 degree in temperature above 72°F and the pot life will double for each 10-15 degree drop below 72°F. Below 40°F most epoxies will set extremely slow so as to render them ineffective.

Some exceptions include the ProAnchor WeatherMax, the Sure-Anchor All Weather Epoxy J51AW, Pro-Poxy 400, and Rapid Resin Repair that can be installed below freezing. (Refer to each product's technical data sheet)

Miscellaneous information

- Semi-rigid epoxies should be used in control joints, not hi-Modulus or low modulus epoxies
- Epoxies are not U.V. stable & will discolor when exposed to sunlight
- Polyesters do not have the bond strength that epoxies do, however, they have good chemical resistance and good U.V. resistance
- When anchoring, the annular space should be 1/8" max., thus the hole should be no larger than 1/4" greater than the anchor
- Epoxies are vapor barriers and are not recommended for exterior slab-on-grade applications where they will be subjected to freeze-thawing action.
- When placing an epoxy mortar, always prime the substrate first with the neat epoxy that is being used for the epoxy mortar



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Dayton Superior Epoxies & Urethanes

Anchoring Gels:

ProAnchor Elite

- Dayton Superior's highest performing anchoring epoxy
- Meets requirements ICC-ES AC308 per IAPMO ER-690.
- Certified to conform to NSF/ANSI Standard 61 by UL
- Qualified for Seismic Design Categories A- F
- Design Software available

ProAnchor WeatherMax

- Meets requirements ICC-ES AC308 per ESR-4554
- Installation down to 14°F (-10°C)
- Qualified for Seismic Design Categories A- F
- Design Software available

ProAnchor Select

- Meets requirements ICC-ES AC308 per IAPMO ER-797.
- Certified to conform to NSF/ANSI Standard 61 by UL
- Qualified for Seismic Design Categories A- F

Sure Anchor™ J50/ Pro-Poxy™ 300

- Standard set, high-strength structural adhesive
- Ideal for anchoring dowels, bolts, reinforcing steel and threaded rod

Sure Anchor™ I J51/ Pro-Poxy 300™ Fast

- Fast-set, high-strength structural adhesive
- Ideal for anchoring dowels, bolts, reinforcing steel and threaded rod

All Weather J51 AW/ Pro-Poxy™ 400

- Cold weather, non-sag gel
- Down to temperatures of 15°F (-9°C).

Medium Viscosity Bonding Agents:

Sure Bond J58/Pro-Poxy 200

- Standard set, high-strength structural adhesive
- Compliant per CDPH V1.2 for LEED projects
- Water System Component, NSF/ANSI 61 Approved

Pro-Poxy 204

- Grade 2: Medium Viscosity
- Fast set, high-strength adhesive

Slow Set Bonding Agent

- Slow set, high strength adhesive
- Ideal for bonding fresh to old concrete
- Long open time
 - Gel time- 105 minutes
 - Tack Free- 6 hours 15 min

Crack Injection/ Filler:

ProPoly CR

Polyurethane hybrid

- Rapid repair of hairline cracks
- Used for gravity feed applications
- Spall repair when mixed with aggregate
- Super low viscosity, for deep penetration
- Application range of 0°F to 110°F (-18 to 43°C)

Pro-Poxy 100

- Used for epoxy injection
- Viscosity ~500 cP

Pro-Poxy 50

- Used for epoxy injection or gravity feed.
- Viscosity ~250 cP



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Concrete Patching:

Sure Patch

- 3-Component
- Type III, Grade 1 (resin only)
- Open to vehicle traffic in 3-5 hours
- Thermally compatible with concrete
- Complies with FAA Specification Item P-501

Rapid Resin Repair

- 3-component
- Fast setting, horizontal epoxy repair mortar
- Ideal for cold weather installations

ProPatch VO

- 2-component
- Overhead and vertical repairs
- Bulk or Cartridge systems
- Non-shrink & Chemically resistant
- Water System Component, NSF/ANSI 61 Approved

Healer/Sealer:

Pro-Poxy 40 LV/LM

- 100% solids, low modulus, highly penetrating, epoxy polymer.
- Ideal for sealing cracks in concrete bridge decks, parking deck slabs or other structurally sound horizontal concrete.

Sure Seal HMWM

High Molecular Weight Methacrylate

- 3-Component with optional accelerator
- 100% solids/reactive formula
- Ideal for sealing cracks in concrete bridge decks, parking deck slabs or other structurally sound horizontal concrete.

Joint Fillers & Sealers:

Sure Fil J52/ ProFlex

- 100% solids, two component epoxy
- Semi-rigid joint filler
- Ideal for warehouse and hard rubber wheel applications

Profill (Urethane)

- One-component, elastomeric, urethane sealant
- Expansion joints up to 1½" wide x ¾" deep

Profill AW (Polyurea)

- Two-component polyurea joint filler
- Install between -40°F to 120°F

Pro-Poxy P606

- Two component, 100% solids, flexible loop sealant
- Ideal for roadway & airport runway wiring & fixtures
- Meets FAA P606 requirement

Epoxy Grout:

Epoxy Grout J55

- Used for precision grouting of machinery
- 3 component system
- Up to 8" in a single pour (unextended)
- Tenacious adhesion to concrete and steel
- 14,000 psi at 7 days per ASTM C579

Misc:

Epoxy Rebar Spray J62

- Epoxy rebar coating packaged in a ready to use 12-ounce spray can
- Color- Green
- Designed to touch-up damaged rebar epoxy coating, such as nicks, scratches etc.