SECTION 03 07 13 – EPOXY RESIN ADHESIVES FOR CONCRETE

***\*\*\* Delete this preamble before printing \*\*\****

*Copyrighted material; limited license is granted to specifiers and design professionals for use in connection with public or private construction projects. Use for any other purpose by written consent of Dayton Superior Corporation only.*

*This document is intended as a stand-alone specification in CSI 3-Part format ("MasterFormat") or as a resource for supplementing a broader-scope specification.*

*Specifier should* *[enable](#Hidden_On" \o "File>Options>Display>Always Show On Screen (check \"Hidden Text\")) "Hidden Text" feature while editing and* *[disable](#Hidden_Off" \o "File>Options>Display>Printing Options (uncheck \"Hidden Text\")) feature before printing. Hidden text displays in* blue *and gives guidance to the specifier ("Editor's Notes").*

*Bold text in brackets* [**sample**] *indicates a choice to be made; refer to editor's notes for guidance.*

*Metric units are in red font and in parentheses* (sample)*; these may be retained or deleted.*

*For specification questions, email:* Specifications@DaytonSuperior.com

*For technical assistance, contact Dayton Superior Technical Services: (866) 329-8724*

[www.DaytonSuperior.com](http://www.daytonsuperior.com/)

***\*\*\* Delete this preamble before printing \*\*\****

Refer to Dayton Superior *Guide to Epoxies,* *Sure Bond J58, Sure Anchor J50, Sure Anchor I J51, and All Weather J51 AW Technical Data Sheets* (double-click icons below to open) for additional information related to the work of this Section.

    



1. GENERAL
	* + 1. SUMMARY
				1. Section Includes:

Select paragraph(s) below as applicable to project. Add other uses, if appropriate.

Epoxy adhesives for bonding **[fresh] [hardened]** concrete to hardened concrete for **[loadbearing] [and] [nonloadbearing]** conditions.

Epoxy adhesives for bonding steel items to concrete.

Epoxy anchoring adhesive for anchoring anchor bolts, dowels, reinforcing bars, threaded rods, and similar items into pre-drilled holes in concrete.

* + - 1. REFERENCES
				1. ASTM D 570 - Standard Test Method for Water Absorption of Plastics.
				2. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.
				3. ASTM D 695 - Standard Test Method for Compressive Properties of Rigid Plastics.
				4. ASTM D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
				5. ASTM C 881 (AASHTO M-235) - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
				6. ASTM C 882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
				7. ASTM D 732 – Standard Test Method for Shear Strength of Plastics by Punch Tool.
			2. PREINSTALLATION MEETINGS
				1. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

Edit list of conference participants, if necessary.

* + - * 1. Review scope of Work expected. Require representatives of each entity directly concerned with concrete slab work to attend, including the following:

Contractor’s superintendent.

Installer

Epoxy manufacturer's representative.

Architect's and/or Owner's representative (at their option).

Edit list of conference topics, if necessary.

* + - * 1. Review the following, at a minimum:

Schedule

Extent of Work.

Safety procedures.

Materials to be installed.

Procedures to be used for epoxy adhesive application.

Material storage and staging.

Scaffolding.

Temporary heating and tenting.

Cleanup and disposal of waste materials.

* + - 1. ACTION SUBMITTALS
				1. General: Submit the following for approval. Do not proceed with work involving any action submittal until approval is obtained.
				2. Product Data: Include material physical characteristics, storage and application instructions, precautions and safety data, cleanup, and maintenance information.
			2. INFORMATIONAL SUBMITTALS
				1. General: Submit the following to the Owner for the Owner's information and records. If acceptable, and unless otherwise indicated, Informational Submittals will not be acted upon or returned.
				2. Safety Data Sheets (SDS) for all products used.

Coordinate "Qualification Data" Paragraph below with qualification requirements in Section 014000 "Quality Requirements" and as may be supplemented in "Quality Assurance" Article.

* + - * 1. Qualification Data: For Installer.

Include the following ICC-ES report requirement, if necessary; include only if ICC listed product is specified in Part 2.

* + - * 1. Test Reports: International Code Council (ICC); submit ICC-ES reports, as indicated.

Include LEED submittals Paragraph only for LEED projects; coordinate with requirements selected in Part 2 for VOC limits.

* + - * 1. LEED Submittals:

Product Data for IEQ credit 4.2: For products of this Section containing volatile organic compounds (VOC), including liquid/resinous materials with zero VOC content.

* + - 1. QUALITY ASSURANCE
				1. Manufacturer Qualifications: Company regularly engaged in the manufacturing of the products specified in this section.
				2. Installer Qualifications: Firm with satisfactory experience in epoxy adhesive application similar to the scope of work specified in this Section.
			2. DELIVERY, STORAGE, AND HANDLING
				1. Deliver products in original factory packaging, bearing identification of product, manufacturer, batch number, and expiration date.

Furnish Safety Data Sheets to the project superintendent for each product.

* + - * 1. Store products in a location protected from freezing, damage, construction activity, precipitation and direct sunlight in strict accordance with the manufacturer's recommendations.

Maintain ambient temperature at material storage locations within manufacturer's prescribed range at all times.

* + - * 1. Handle all products with appropriate precautions and care as stated on the Safety Data Sheet.
			1. PROJECT CONDITIONS
				1. Do not use products under conditions of precipitation or if temperatures are outside manufacturer's recommended temperature range. Use appropriate measures for protection and supplementary heating to ensure proper curing conditions in accordance with manufacturer's recommendations if application occurs during inclement weather.
				2. Protect adjacent work from contamination due to mixing, handling, and application of epoxy resin adhesive products.
1. PRODUCTS
	* + 1. MANUFACTURERS
				1. Acceptable Manufacturers:

Dayton Superior Corporation; 1125 Byers Road, Miamisburg, Ohio 45342; Tel: (877) 266-7732; Website: www.DaytonSuperior.com

Select only one of the following two Paragraphs. If first Paragraph is retained, select appropriate Division 01 Section.

* + - * 1. Requests for substitutions will be considered in accordance with provisions of Section [**01 25 00**] [**01 60 00**].
				2. Substitutions: Not permitted.
			1. MATERIALS

Dayton Superior brand products and their Unitex brand counterparts are identical; specifier may include either one or both for applications indicated.

First two products listed below (Paragraphs A and B) are for general bonding applications.

* + - * 1. Epoxy Resin Adhesive for Bonding to Hardened Concrete:

Product: Dayton Superior "Sure Bond J58" / Unitex "Pro-Poxy 200":

Component A: Modified epoxy resin, containing suitable viscosity control agents and accelerators.

Component B: Selected blend of amines, containing suitable viscosity control agents and accelerators.

Mixing Ratio: 1:1 by volume, Component A to Component B.

VOC Limit: 0 g/L.

Properties of Mixed Epoxy Resin: Meet or exceed the following:

Gel Time: Approximately 28 minutes at 73 degrees F (23 degrees C).

Viscosity (Brookfield Viscometer): 6,200 centipoise (6.2 Pascal-second).

Color: Grey.

Cured Properties of Epoxy Resin: Meet or exceed the following:

Tensile Strength, Minimum: 7,000 psi (48.3 MPa), per ASTM D 638.

Compressive Strength, Minimum (7 Days): 11,000 psi (75.8 MPa), per ASTM D 695.

Compressive Modulus of Elasticity (28 Days): 223,000 psi (1,516.8 MPa) per ASTM D 695.

Bond Strength (Hardened Concrete to Hardened Concrete):

2 Days: 1,700 psi (11.7 MPa) per ASTM C 882.

14 Days: 3,400 psi (23.4 MPa) per ASTM C 882.

Elongation: 2.3% per ASTM D 638.

Water Absorption: 0.18% per ASTM D 570.

Conform to ASTM C 881/AASHTO M-235, Type I, II, IV, V, Grade 2, Classes B and C (except gel time).

A slow-setting epoxy is useful for hot weather applications and applications requiring a relatively long period of time between adhesive application and bonding, such as those involving large surface areas.

* + - * 1. Slow-Setting Epoxy Resin Adhesive for Bonding to Hardened Concrete:

Product: Dayton Superior "Sure Bond J58 LPL" / Unitex "Slow Set Bonding Agent":

Component A: Modified epoxy resin, containing suitable viscosity control agents and accelerators.

Component B: Selected blend of amines, containing suitable viscosity control agents and accelerators.

Mixing Ratio: 2:1 by volume, Component A to Component B.

VOC Limit: 0 g/L.

Properties of Mixed Epoxy Resin: Meet or exceed the following:

Gel Time: Approximately 3.5 hours at 73 degrees F (23 degrees C).

Viscosity (Brookfield Viscometer): 6,300 centipoise (6.3 Pascal-second).

Color: Grey.

Cured Properties of Epoxy Resin: Meet or exceed the following:

Tensile Strength, Minimum: 6,500 psi (44.8 MPa), per ASTM D 638.

Compressive Strength, Minimum (7 Days): 9,000 psi (62 MPa), per ASTM D 695.

Compressive Modulus of Elasticity (7 Days): 255,000 psi (1,758.2 MPa) per ASTM D 695.

Bond Strength, 2 Days Dry Cure (Hardened Concrete to Hardened Concrete): 1,500 psi (10.3 MPa) per ASTM C 882.

Elongation: 6.5% per ASTM D 638.

Water Absorption (24 Hour Immersion): 0.75% per ASTM D 570.

Conform to ASTM C 881/AASHTO M-235, Type I, II, IV, V, Grade 2, Classes B and C.

The following epoxy anchoring gel has been tested to ICC-ES AC 308 and NSF/ANSI Standard 61:

* + - * 1. Epoxy Gel for Anchoring Rods, Anchor Bolts, etc.:

Tests and Approvals: Provide epoxy anchoring gel with the following approvals:

International Code Council (ICC): ICC-ES AC 308; approved for use in cracked and uncracked concrete.

American National Standards Institute (ANSI): NSF/ANSI Standard 61.

Product: Dayton Superior; Unitex "Pro-Poxy 500":

Component A: Modified epoxy resin adhesive of epichlorohydrin bisphenol type A, containing suitable viscosity control agents and pigments.

Component B: Selected blend of amines, containing suitable viscosity control agents, pigments, and accelerators.

Mixing Ratio: Automatically controlled by dispensing cartridge / static mixing nozzle.

VOC Limit: 4.5 g/L.

Properties of Mixed Epoxy Resin: Meet or exceed the following:

Gel Time: Approximately 11 minutes at 75 degrees F (24 degrees C).

Consistency: Non-sag gel.

Color: Grey.

Cured Properties of Epoxy Resin: Meet or exceed the following:

Tensile Strength, Minimum: 3,300 psi (22.8 MPa), per ASTM D 638.

Compressive Strength, Minimum, per ASTM D 695:

7 Days: 13,500 psi (93.1 MPa).

Tensile Modulus (7 Days): 798,000 psi (5,502 MPa) per ASTM D 638.

Conform to ASTM C 881/AASHTO M-235, Type II, Grade 3, Classes B and C (except for gel time).

* + - * 1. Epoxy Gel for Anchoring Rods, Anchor Bolts, etc.:

Product: Dayton Superior "Sure Anchor J50"/Unitex "Pro-Poxy 300":

Component A: Modified epoxy resin adhesive of epichlorohydrin bisphenol type A, containing suitable viscosity control agents and pigments.

Component B: Selected blend of amines, containing suitable viscosity control agents, pigments, and accelerators.

Mixing Ratio: 1:1 by volume, Component A to Component B.

VOC Limit: 0 g/L.

Properties of Mixed Epoxy Resin: Meet or exceed the following:

Gel Time: Approximately 40 minutes at 75 degrees F (24 degrees C).

Consistency: Non-sag gel.

Color: Grey.

Cured Properties of Epoxy Resin: Meet or exceed the following:

Tensile Strength, Minimum: 8,000 psi (55.1 MPa), per ASTM D 638.

Compressive Strength, Minimum (7 Days): 10,500 psi (72.4 MPa), per ASTM D 695.

Compressive Modulus of Elasticity (7 Days): 223,000 psi (1,537.5 MPa) per ASTM D 695.

Bond Strength (Hardened Concrete to Hardened Concrete):

2 Days: 2,500 psi (17.2 MPa) per ASTM C 882.

14 Days: 4,400 psi (30.3 MPa) per ASTM C 882.

Shear Strength: 3,200 psi (22MPa) per ASTM D 732.

Elongation: 2.6% per ASTM D 638.

Water Absorption (24 Hour Immersion): 0.12% per ASTM D 570.

Conform to ASTM C 881/AASHTO M-235, Type I, II, IV, V, Grade 3, Classes B and C.

The following epoxy anchoring gel is useful for applications requiring rapid early strength gain, potentially allowing the installation to be put into service sooner.

* + - * 1. Epoxy Gel for Anchoring Rods, Anchor Bolts, etc., Rapid Setting:

Product: Dayton Superior "Sure Anchor I J51"/Unitex "Pro-Poxy 300 Fast":

Component A: Modified epoxy resin adhesive of epichlorohydrin bisphenol type A, containing suitable viscosity control agents and pigments.

Component B: Selected blend of amines, containing suitable viscosity control agents, pigments, and accelerators.

Mixing Ratio: 1:1 by volume, Component A to Component B.

VOC Limit: 0 g/L.

Properties of Mixed Epoxy Resin: Meet or exceed the following:

Gel Time: Approximately 6 – 8 minutes at 75 degrees F (24 degrees C).

Consistency: Non-sag gel.

Color: Grey.

Cured Properties of Epoxy Resin: Meet or exceed the following:

Tensile Strength, Minimum: 8,000 psi (55.1 MPa), per ASTM D 638.

Compressive Strength, Minimum, per ASTM D 695:

24 Hours: 4,500 psi (27.6 MPa).

48 Hours: 6,300 psi (43.4 MPa).

72 Hours: 8,300 psi (57.2 MPa).

7 Days: 11,200 psi (77.2 MPa).

Compressive Modulus of Elasticity (7 Days): 316,100 psi (2,180 MPa) per ASTM D 695.

Bond Strength (Hardened Concrete to Hardened Concrete):

2 Days: 2,200 psi (15.2 MPa) per ASTM C 882.

14 Days: 3,400 psi (23.4 MPa) per ASTM C 882.

Shear Strength: 3,200 psi (22MPa) per ASTM D 732.

Water Absorption (24 Hour Immersion): 0.35% per ASTM D 570.

Conform to ASTM C 881/AASHTO M-235, Type I, II, IV, V, Grade 3, Classes B and C (except for gel time).

The following epoxy anchoring gel is intended for cold temperature applications. Gel times will be very short at warmer temperatures.

* + - * 1. Epoxy Gel for Anchoring Rods, Anchor Bolts, etc.; Low Temperature:

Product: Dayton Superior "All Weather J51 AW"/Unitex "Pro-Poxy 400":

Component A: Modified epoxy resin adhesive of epichlorohydrin bisphenol type A, containing suitable viscosity control agents and pigments.

Component B: Selected blend of amines, containing suitable viscosity control agents, pigments, and accelerators.

Mixing Ratio: 10:1 by volume, Component A to Component B.

VOC Limit: 0 g/L.

Properties of Mixed Epoxy Resin: Meet or exceed the following:

Minimum Substrate Application Temperature: -15 degrees F (-26 degrees C).

Gel Time: Approximately 7.5 minutes at 73 degrees F (23 degrees C).

Consistency: Non-sag gel.

Color: Grey.

Cured Properties of Epoxy Resin: Meet or exceed the following:

Compressive Strength, Minimum (7 Days): 10,000 psi (69 MPa), per ASTM D 695.

Compressive Modulus of Elasticity (7 Days): 270,100 psi (1,861.6 MPa) per ASTM D 695.

Bond Strength (Hardened Concrete to Hardened Concrete):

2 Days: 2,800 psi (19.3 MPa) per ASTM C 882.

14 Days: 3,200 psi (22.1 MPa) per ASTM C 882.

Water Absorption (24 Hour Immersion): 0.06 percent per ASTM D 570.

Conform to ASTM C 881/AASHTO M-235, Type I, II, IV, V, Grade 3, Classes A, B, and C (except for gel time).

1. EXECUTION
	* + 1. EXAMINATION
				1. Inspect all areas involved in work to establish extent of work, access, and need for protection of surrounding construction.
				2. Protect all surroundings from epoxy resin adhesive compounds.
			2. PREPARATION
				1. Inspect surfaces to receive epoxy resin adhesive material; ensure that substrate is clean, sound, properly cured, free of standing water, coatings, or curing compounds, foreign particles, oil, dust, grease, or laitance, that will adversely affect the bond of repair materials.

Include following Subparagraph if project includes structurally anchored embedded items.

Minimum Concrete Age for Structurally Anchored Embedments: 21 days.

Include following two Paragraphs if project includes structurally anchored embedded items.

* + - * 1. Drill holes in concrete using a rotary hammer drill fitted with an SDS-type shanked drill bit. Mark or tape drill bit to ensure proper hole depth.

Comply with epoxy adhesive manufacturer's recommended minimum spacing and edge distance.

Use drill bit of recommended diameter, relative to type and size of embedded anchor.

Verify the following information to determine allowable loads on anchor:

Anchor type and diameter

Concrete compressive strength

Loading condition

Hole diameter

Hole depth

* + - * 1. Clean drilled holes prior to application:

Blow out hole using minimum 90 psi oil-free compressed air, starting at bottom of hole. Slowly withdraw nozzle while continuing to blow; repeat.

Insert nylon cleaning brush, of proper diameter, to bottom of hole, twisting the brush while inserting. Rotate brush and withdraw forcefully.

Repeat compressed air step.

Retain the following Paragraph if water-filled holes are expected, when using All Weather J51 AW/Pro-Poxy 400 (other products of the Section are not approved for water-filled holes).

* + - * 1. For application of All Weather J51 AW/Pro-Poxy 400 into water-filled holes, strictly follow manufacturer's hole preparation and filling procedures.

All Weather J51 AW/Pro-Poxy 400 can be applied down to -15 degrees F (-26 C). Retain first, second, or both of the following two Paragraphs, as appropriate.

* + - * 1. Ensure that air, material, and surface temperature is at least 40 degrees F (5 degrees C) and rising prior to beginning application.
				2. If using low-temperature epoxy adhesive (All Weather J51 AW or Pro-Poxy 400), ensure that air, material, and surface temperature is at least -15 degrees F (-26 degrees C) and rising prior to beginning application.
				3. Ensure all products to be used are within the expiration date indicated on each container.
			1. APPLICATION
				1. General: Follow all manufacturer's recommendations and written instructions when applying epoxy adhesive materials.
				2. Condition products to approximately 65 to 85 degrees F (18 to 29 degrees C) prior to use, in accordance with the manufacturer's recommendations.

Retain the following Paragraph for materials requiring field mixing; some epoxy gel materials are dispensed from pre-packed dual cartridges and do not require field mixing:

* + - * 1. Mixing Procedure (bulk materials):

Premix each component of epoxy adhesive separately before mixing together.

Measure and mix proper amounts by volume of Component A and B into a clean mixing container. Mix thoroughly using a large steel spatula or a slow speed drill (<450 RPM) with a clean, rust-free mixing paddle for 2 minutes minimum. Scrape sides of mixing container and mix an additional minute, minimum, until the two components are uniform.

Mix only the quantity that can be applied within the pot life.

* + - * 1. Adhesive Application on Flat Surfaces: Spread adhesive with brush, roller, or sprayer to thickness/coverage rate recommended by manufacturer.
				2. Adhesive Gel Application for Anchor Bolts and Rods:

Using the recommended static mixing nozzle, extrude epoxy onto a waste surface until the material comes out a uniform color, without streaks.

Insert nozzle into hole to the bottom.

Fill hole from bottom up, raising nozzle slowly as the hole fills; avoid air pockets or bubbles.

Fill hole approximately two-thirds full.

Follow manufacturer’s special instructions for overhead or upward-inclined applications.

* + - * 1. Insert rod into filled hole:

Twist rod while inserting, to ensure full thread/deformation coverage.

Insert until rod contacts bottom of hole.

Ensure rod is centered in drilled hole, with a consistent annular space all around.

Ensure hole is completely filled with adhesive and a small amount is squeezed out all around.

* + - * 1. When using dual mixing cartridges, do not allow gel time to elapse between dispensings.

If more than 15 minutes elapses between dispensings, extrude an amount of waste material until extruded material is consistent color and streak-free before filling next hole.

If gel time elapses between dispensings, extrude enough material to evacuate all material previously in the mixing portion of the nozzle.

If material has set up in the nozzle, discard nozzle and replace.

* + - 1. CLEANING
				1. Protect all surroundings from epoxy resin products.
				2. Remove uncured epoxy residue from tools and equipment with xylene, MEK, or toluene immediately after use. Remove cured material mechanically.
				3. Remove all debris and excess materials from the job site and dispose of in accordance with all applicable regulations for waste disposal.

END OF SECTION 03 07 13