

Multi-Component Epoxy Adhesive for Bonding to Concrete—Specification

An ACI Standard
Reported by ACI Committee 548

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1 *This Specification describes bonding fresh concrete, hardened concrete, steel, and other*
2 *materials to hardened concrete with a multi-component epoxy adhesive as defined for this*
3 *purpose in ASTM C881/C881M. Included are controls for adhesive labeling; storage; handling;*
4 *surface evaluation and preparation; mixing and application; and inspection, safety, quality*
5 *control, and testing.*

6

7 **Keywords:** adhesive; bond; construction; epoxy; epoxy resin; fresh concrete; quality control;
8 repair; safety; surface.

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16 SECTION 1—GENERAL REQUIREMENTS**17 1.1—Scope**

18 **1.1.1** This Specification covers the use of multi-component epoxy adhesives, meeting the
19 requirements of ASTM C881/C881M for bonding to hardened concrete as specified in 2.1.1 and

20 3.1.1.

21 **1.1.2** This Specification is incorporated by Contract Documents and provides requirements for the

22 Contractor.

1 **1.1.3** This Specification governs for construction within its scope, except project-specific
2 Contract Documents govern if there is a conflict.

3 **1.1.4** This Specification governs if there is a conflict with reference material and testing
4 standards.

5 **1.1.5** Contractor is permitted to submit written alternatives to any provision in this
6 Specification for consideration.

7 **1.1.6** Do not use this Specification in conjunction with ACI 301 or ACI 350.5 unless Contract
8 Documents state that this Specification governs for Work covered by 1.1.1.

9 **1.1.7** Ignore provisions of this specification that are not applicable to the Work.

10 **1.1.8** Values in this Specification are stated in inch-pound units. A companion specification in
11 SI units is also available.

12 **1.1.9** The Notes to Specifier are not part of this Specification.

14 **1.2—Interpretation**

15 **1.2.1** Unless otherwise explicitly stated, this Specification shall be interpreted using the
16 following principles.

17 **1.2.1.1** Interpret this Specification consistent with the plain meaning of the words and terms
18 used.

19 **1.2.1.2** Definitions provided in this Specification govern over the definitions of the same or
20 similar words or terms found elsewhere.

21 **1.2.1.3** Whenever possible, interpret this Specification so that its provisions are in harmony
22 and do not conflict.

1 **1.2.1.4** Headings are part of this Specification and are intended to identify the scope of the
2 provisions or sections that follow. If there is a difference in meaning or implication between the
3 text of a provision and a heading, the meaning in the text governs.

4 **1.2.1.5** Where a provision of this Specification involves two or more items, conditions,
5 requirements, or events connected by the conjunctions “and” or “or,” interpret the conjunction as
6 follows:

7 “and” indicates that all of the connected items, conditions, requirements, or events apply.

8 “or” indicates that the connected items, conditions, requirements, or events apply
9 singularly.

10 **1.2.1.6** The use of the verbs “may” or “will” indicates that the Specification provision is for
11 information to the Contractor.

12 **1.2.1.7** The phrase “as indicated in Contract Documents” means the specifier included the
13 provision requirements in the Contract Documents.

14 **1.2.1.8** The phrase “unless otherwise specified” means the specifier may have included an
15 alternative to the default requirement in the Contract Documents.

16 **1.2.1.9** The phrase “if specified” means the specifier may have included a requirement in the
17 Contract Documents for which there is no default requirement in this Specification.

18 **1.2.1.10** Unless otherwise stated, the inch-pound system of units is applicable to combined
19 standards referenced in this Specification.

20

21 **1.3—Definitions**

22 The following definitions shall govern in this Specification.

1 **accepted**—determined by the Architect/Engineer to be in compliance with Contract
2 Documents.

3 **Architect/Engineer**—the architect, engineer, architectural firm, or engineering firm issuing
4 Contract Documents or administering the Work under Contract Documents, or both.

5 **bond interface**—the layer of adhesive which connects two adjacent materials.

6 **continuous metering and mixing**—the process of providing accurately measured quantities of
7 ingredients into a blending chamber and as a result, generating a stream of properly blended
8 product at the exit.

9 **Contract Documents**—set of documents that form the basis of a contractual relationship
10 between an Owner and constructor or design-builder. These documents are defined by the
11 contractual agreement, and contain contract forms, contraction conditions, specifications,
12 drawings, addenda, and contract changes.

13 **Contractor**—the person, firm, or entity under contract for construction of Work.

14 **drawings**—graphic representations that detail requirements for Work and may include written
15 notes.

16 **epoxy**—a thermosetting polymer that is the reaction product of epoxy resin and a hardener.

17 **fresh concrete**—concrete that possesses enough of its original workability so that it can be
18 placed and consolidated by the intended methods.

19 **Owner**—the corporation, association, partnership, individual, public body, or authority for
20 whom Work is constructed.

21 **specifications**—the written document that details requirements for the Work.

22 **submit**—provide to Architect/Engineer for review.

23 **submittal**—document or material provided to Architect/Engineer for review and acceptance.

1 **Work**—the entire construction or separately identifiable parts thereof required to be furnished
2 under Contract Documents.

3

4 **1.4—Referenced standards**

5 Standards cited in this Specification are listed by name and designation, including year.

6 **1.4.1 ASTM International**

7 ASTM C42/C42M-18a Standard Test Method for Obtaining and Testing Drilled Cores and
8 Sawed Beams of Concrete

9 ASTM C881/C881M-20 Standard Specification for Epoxy-Resin-Base Bonding Systems for
10 Concrete

11 ASTM C1583/C1583M-20 Standard Test Method for Tensile Strength of Concrete Surfaces
12 and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct
13 Tension (Pull-off Method)

14 ASTM D4263-83(2018) Standard Test Method for Indicating Moisture in Concrete by the
15 Plastic Sheet Method

16 ASTM D4541-17 Standard Test Method for Pull-Off Strength of Coatings Using Portable
17 Adhesion Testers

18 ASTM D4580/D4580M-12(2018) Standard Practice for Measuring Delaminations in Concrete
19 Bridge Decks by Sounding

20 **1.4.2 The Society for Protective Coatings**

21 SSPC SP 1-1982(2004) Surface Preparation Specification No. 1, Solvent Cleaning

22 SSPC SP 2-1982(2004) Surface Preparation Specification No. 2, Hand Tool Cleaning

23 SSPC SP 3-1982(2004) Surface Preparation Specification No. 3, Power Tool Cleaning

1 SSPC SP 6/NACE No. 3-2006 Surface Preparation Specification No. 6, Commercial Blast
2 Cleaning

3

4 **1.5—Submittals**

5 **1.5.1 Certifications**—Submit manufacturer’s certification verifying conformance to material
6 specifications and that adhesive used is compatible with materials to be bonded.

7 **1.5.2 Application control**—Submit mixing and application procedures for acceptance prior to
8 use.

9 **1.5.3 Data**—Submit technical data sheets and safety data sheets.

10 **1.5.4 Additional testing**—Submit additional test results if specified.

11

12 **1.6—Delivery, storage, and handling**

13 **1.6.1 Delivery of materials**—Accept only materials delivered in sealed containers with labels
14 legible and intact.

15 **1.6.2 Labeling**—Only use materials that are marked with the following information:

16 a) Name of manufacturer

17 b) Manufacturer’s product identification

18 c) Manufacturer’s instructions for mixing

19 d) Warning for handling and toxicity

20 e) Expiration date and lot number

21 **1.6.3 Storage of materials**—Store materials at temperatures between 40 and 100°F, unless
22 otherwise specified.

1 **1.6.4 Handling of materials**—Handle materials to avoid breaking container seals and in
2 accordance with manufacturer’s recommendations.

3

4 **1.7—Project conditions**

5 **1.7.1 Environmental requirements**—Comply with manufacturer’s written instructions
6 regarding environmental conditions under which the adhesive shall be applied.

7

8 **1.8—Control of adhesive mixture**

9 **1.8.1 Metering accuracy**—Use equipment or tools able to establish and maintain a ratio of the
10 components within the tolerance specified by the manufacturer of the multi-component epoxy
11 adhesive over the full range of operating pressures and temperatures. If the manufacturer of the
12 epoxy adhesive does not specify a tolerance for the mixture ratio, maintain a mixture ratio within
13 ± 5 percent of the nominal mixture ratio specified by the manufacturer of the epoxy adhesive.

14 **1.8.2 Qualification test for metering accuracy**

15 **1.8.2.1** If continuous metering and mixing is used, test the metering accuracy of equipment
16 before the start of the Work to demonstrate that the pump is capable of maintaining the ratio
17 within the tolerances required in 1.8.1. Follow the written instructions of the continuous metering
18 and mixing equipment manufacturer to verify accuracy. If no written instructions exist, use the
19 following steps to verify accuracy:

20 **1.8.2.1.a** The device used to measure metering accuracy shall be capable of controlling the
21 discharge pressure of each of the components separately as they are simultaneously discharged
22 into separate containers.

1 **1.8.2.1.b** Conduct test by discharging both adhesive components simultaneously into separate
2 containers while maintaining discharge pressure on both components at anticipated discharge
3 pressure.

4 **1.8.2.1.c** Discharge each component into separate graduated containers or into containers that
5 can be weighed. At least 7 fl oz of the larger volume component is required for an adequate ratio
6 determination. If the ratio determination is made by mass, the volumetric ratio may be
7 determined by calculation using the specific gravity of each component. The volumetric ratio is
8 determined by multiplying the mass ratio by the inverse of the ratio of the specific gravities of
9 the components. The specific gravity may be found in the adhesive manufacturer's technical or
10 safety literature.

11 **1.8.2.2** If a prepackaged cartridge system is used, only use a dispensing tool approved by the
12 multi-component epoxy adhesive manufacturer.

14 **SECTION 2—BONDING HARDENED CONCRETE, STEEL, AND OTHER** 15 **MATERIALS TO HARDENED CONCRETE**

17 **PART 2.1—GENERAL**

18 **2.1.1** *Scope*

19 **2.1.1.1** This Section covers the bonding of hardened concrete, steel, and other materials to
20 hardened concrete with a multi-component epoxy adhesive as indicated in Contract Documents..
21 This Section does not apply to anchoring dowels or adhesively bonded anchors in concrete. This
22 Section does not apply to bonding carbon or glass fabric or composites to concrete.

23

1 **PART 2.2—PRODUCTS**

2 **2.2.1 Materials**

3 **2.2.1.1 Multi-component epoxy adhesive**—Use ASTM C881/C881M Type IV for load-bearing
4 applications or Type I for non-load-bearing applications, unless otherwise specified. Curing
5 temperature requirements (Class) shall be determined by supplier and Contractor based on
6 specific project conditions. Use Grade 2 (medium viscosity) or Grade 3 (non-sag) for bonding
7 horizontal or vertical mating surfaces. Use Grade 3 for overhead and for non-mating surfaces.

8 **2.2.1.2 Fillers**—Fillers may be used to thicken the multi-component epoxy adhesive or provide
9 additional inert mass to fill voids without generating excess heat, unless otherwise specified.
10 Documentation verifying that the mixture of the multi-component epoxy adhesive, combined
11 with the specified amount of filler meets performance requirements, shall be provided in
12 certifications submitted in Section 1.5.1.

13
14 **PART 2.3—EXECUTION**

15 **2.3.1 Preparation**

16 **2.3.1.1 Preparation of concrete surfaces**

17 **2.3.1.1.a** Concrete surfaces to which epoxies are to be applied shall be newly prepared concrete
18 free of loose materials. Prepare surfaces to the surface profile indicated in Contract Documents.
19 Prepare the surfaces by blast-cleaning, unless otherwise specified.

20 **2.3.1.1.b** Control exposure to silica and concrete dust in accordance with applicable
21 regulations. Common methods to reduce exposure to dust include use of water on the surface
22 during preparation, dust filters on equipment, exhaust ventilation, and personal protective
23 equipment.

1 **2.3.1.1.c** Remove and dispose of residue material resulting from surface preparation in
2 accordance with applicable regulations.

3 **2.3.1.2** *Preparation of carbon steel surfaces*

4 **2.3.1.2.a** Clean surfaces according to SSPC SP 1, SSPC SP 2, and SSPC SP 3, as necessary to
5 prepare the surface for blast-cleaning.

6 **2.3.1.2.b** Blast-clean carbon steel surfaces in accordance with SSPC SP 6/NACE No. 3 to
7 provide a surface condition as specified. Use sand abrasive media, unless otherwise specified.

8 **2.3.1.2.c** Remove blast-cleaning residue with compressed air from an oil- and water-free
9 compressed air source or by vacuuming.

10 **2.3.1.3** *Preparation of galvanized steel surfaces*

11 **2.3.1.3.a** Scrub galvanized steel surfaces thoroughly in accordance with SSPC SP 1.

12 **2.3.1.3.b** For galvanized steel surfaces showing signs of subsurface corrosion, blast-clean as
13 specified in 2.3.1.2 for carbon steel.

14 **2.3.1.4** *Preparation of aluminum surfaces*

15 **2.3.1.4.a** Scrub aluminum surfaces thoroughly with a nonchlorinated cleaner and then etch
16 with proprietary chromate treatment in accordance with manufacturer's application instructions
17 and safety warnings.

18 **2.3.1.4.b** After etching, wash surface with distilled water and then dry.

19 **2.3.1.5** *Preparation of copper and copper-alloy surfaces*

20 **2.3.1.5.a** Blast-clean copper and copper-alloy surfaces as specified in 2.3.1.2 for carbon steel.

21 **2.3.1.5.b** Where blast-cleaning is not practical, clean the copper or copper-alloy surfaces with
22 aqueous household ammonia, wash surfaces with distilled water, and then dry.

23 **2.3.1.6** *Preparation of wood surfaces*

1 **2.3.1.6.a** Clean wood surfaces of all visible loose or foreign particles or contaminants by
2 sanding. Remove sanding or filling dust by wiping with an alcohol-soaked rag, or clean with oil-
3 and-water-free compressed air.

4 **2.3.2** *Inspection and testing*

5 **2.3.2.1** *Inspection of concrete surfaces*

6 **2.3.2.1.a** Inspect all concrete surfaces prior to application of epoxy adhesive. Surfaces shall be
7 free of deleterious materials including laitance, curing compounds, dust, dirt, oil, and other
8 material that may prevent bonding. Materials resulting from surface preparation shall be
9 removed.

10 **2.3.2.1.b** At the time of installation, surface temperature of the concrete shall be within the
11 limits recommended by the adhesive manufacturer. Additionally, surface temperature for ASTM
12 C881/C881M Class C multi-component epoxy adhesives, the surface temperature shall be at
13 least 60°F; for ASTM C881/C881M Class B multi-component epoxy adhesives shall be at least
14 40°F; for ASTM C881/C881M Class A multi-component epoxy adhesives shall be at least the
15 minimum temperature as listed in the adhesive manufacturer's written instructions.

16 **2.3.2.1.c** Evaluate moisture content of concrete in accordance with ASTM D4263 with the
17 following exceptions: a 4-ft by 4-ft polyethylene sheet shall be used in lieu of the 18-in. X 18-in.
18 sheet specified; and allow the polyethylene sheet to remain in place for the cure time of the
19 epoxy adhesive as reported by the manufacturer for the anticipated surface temperature in lieu of
20 the 16 hours specified. Do not apply epoxy adhesive until the test results indicate the absence of
21 moisture.

22 **2.3.2.2** *Inspection of metal surfaces*

1 **2.3.2.2.a** Inspect all metal surfaces prior to application of epoxy adhesive. Metal surfaces shall
2 be dry and free of loose material.

3 **2.3.2.2.b** At the time of installation, surface temperature of the metal shall be within the limits
4 as listed in the adhesive manufacturer's written instructions .

5 **2.3.2.3** *Inspection of wood surfaces*

6 **2.3.2.3.a** Inspect all wood surfaces prior to application of epoxy adhesive. Wood surfaces shall
7 be free of loose material. Moisture content of the wood shall be within limits recommended by
8 the adhesive manufacturer when measured with a pin-type wood moisture meter.

9 **2.3.2.3.b** At the time of installation, temperature of the wood shall be within the limits as listed
10 in the adhesive manufacturer's written instructions .

11 **2.3.2.4** *Testing of concrete and metal surfaces*

12 **2.3.2.4.a** Concrete surfaces shall have an average pull-off strength of at least 250 psi based on
13 the average three tests at each location when tested in accordance with ASTM C1583/C1583M.
14 Test locations, as indicated in the Contract Documents, shall represent no greater than 500 yd² of
15 prepared surface.

16 **2.3.2.4.b** If specified, metal surfaces shall be tested in accordance with ASTM D4541 for
17 adhesion with the multi-component epoxy adhesive at the anticipated environmental condition
18 during application.

19 **2.3.3** *Adhesive mixtures*

20 **2.3.3.1** Condition epoxy components to a temperature consistent with the adhesive
21 manufacturer's written instructions.

22 **2.3.3.2** Mix epoxy components in accordance with the adhesive manufacturer's written
23 instructions.

1 **2.3.4—Adhesive application**

2 **2.3.4.1** Apply epoxy adhesive to concrete surface by brush, roller, broom, squeegee, or spray
3 equipment. Apply epoxy adhesive at a thickness sufficient to fill, with slight excess, the gap
4 between the substrate and the element to be bonded. Do not exceed the thickness requirements in
5 the adhesive manufacturer’s written instructions. Protect concrete surfaces against spillage
6 beyond limits of surface receiving adhesive.

7 **2.3.4.2** Fasten or shore elements to be bonded when movement is likely to occur, such as
8 elements on sloping, vertical, or overhead positions. Shoring and bracing elements shall be
9 installed to prevent deflections that may cause the elements to debond when removed.

10 **2.3.4.3** Position elements to be bonded within the working time of the epoxy adhesive as
11 recommended by the manufacturer. If epoxy compound cures to the extent of losing its tack
12 before elements are in contact with the adhesive, follow the adhesive manufacturer’s
13 recommendations with respect to removing or slightly abrading the first coat and applying a
14 second coat.

15 **2.3.4.4** Do not disturb elements being bonded until the adhesive has cured in accordance with
16 the adhesive manufacturer’s written instructions for the environmental conditions.

17 **2.3.5 Cleanup**

18 **2.3.5.1** Remove any epoxy adhesive applied or spilled beyond desired areas. Perform cleanup
19 with material designated by adhesive manufacturer.

20 **2.3.5.2** Unused materials shall be disposed in accordance with manufacturer’s
21 recommendations and applicable regulations.

22 **2.3.6—Quality assurance testing**

1 **2.3.6.1** Architect/Engineer will evaluate bonding to existing concrete after the multi-
2 component epoxy adhesive has cured in accordance with the adhesive manufacturer's written
3 instructions for the environmental conditions.

4 **2.3.6.2** Testing for adequate bonding shall be by coring or pull-off testing, as indicated in
5 Contract Documents. Adhesion testing shall be performed in accordance with ASTM
6 C1583/C1583M. Coring testing shall be performed in accordance with ASTM C42/C42M and
7 core drill shall penetrate at least 1-in. beyond bond interface. Core diameter shall be at least 4-in.
8 nominal diameter and length of cores shall be twice the core diameter, unless otherwise
9 specified.

10 **2.3.6.3** Cores will be visually inspected. Further testing, if required, will be determined by
11 Architect/Engineer.

12

13 **SECTION 3—BONDING FRESH CONCRETE TO HARDENED CONCRETE**

14

15 **PART 3.1—GENERAL**

16 **3.1.1** *Scope*

17 **3.1.1.1** This Section covers the bonding of fresh concrete to hardened concrete with a multi-
18 component epoxy adhesive as indicated in Contract Documents.

19

20 **PART 3.2—PRODUCTS**

21 **3.2.1** *Materials*

22 **3.2.1.1** *Multi-component epoxy adhesive*—Use ASTM C881/C881M Type II for non-load-
23 bearing or Type V for load-bearing applications, unless otherwise specified. Curing temperature

1 requirements (class) and viscosity (grade) shall be determined by supplier and Contractor based
2 on specific project conditions.

3 **3.2.1.2** *Fresh concrete*—As indicated in Contract Documents.

4 **3.2.1.3** *Fillers*—Fillers may be used to thicken the multi-component epoxy adhesive, unless
5 otherwise specified. Documentation verifying that the mixture of the multi-component epoxy
6 adhesive, combined with the specified amount of filler, meets performance requirements shall be
7 provided in certifications submitted in Section 1.5.1.

8

9 **PART 3.3—EXECUTION**

10 **3.3.1** *Preparation*

11 **3.3.1.1**—*Preparation of concrete surfaces*

12 **3.3.1.1.a** Concrete surfaces to which epoxies are to be applied shall be newly prepared concrete
13 free of loose materials. Prepare surfaces to the surface profile indicated in Contract Documents.
14 Prepare the surfaces by blast-cleaning, unless otherwise specified.

15 **3.3.1.1.b** Control exposure to silica and concrete dust in accordance with applicable
16 regulations. Common methods to reduce exposure to dust include use of water on the surface
17 during preparation, dust filters on equipment, exhaust ventilation, and personal protective
18 equipment.

19 **3.3.2** *Inspection*

20 **3.3.2.1** Inspect concrete surfaces prior to application of adhesive. Surfaces shall be free of
21 deleterious materials; including laitance, curing compounds, dust, dirt, oil, and other material
22 that may prevent bonding. Materials resulting from surface preparation shall be removed.

1 **3.3.2.2** Concrete surfaces shall have a moisture content not exceeding saturated surface-dry
2 condition.

3 **3.3.2.3** At the time of installation, surface temperature of the concrete shall be within the limits
4 recommended by the adhesive manufacturer. Additionally, surface temperature for ASTM
5 C881/C881M Class C multi-component epoxy adhesives, the surface temperature shall be at
6 least 60°F; for ASTM C881/C881M Class B multi-component epoxy adhesives shall be at least
7 40°F; for ASTM C881/C881M Class A multi-component epoxy adhesives shall be at least the
8 minimum temperature allowed by the adhesive manufacturer or minimum temperature for
9 placement of fresh concrete, whichever is higher..

10 **3.3.2.4** Concrete surfaces shall have an average pull-off strength of at least 250 psi based on
11 three tests at each location when tested in accordance with ASTM C1583/C1583M. Test
12 locations, as indicated in Contract Documents, shall represent no greater than 500 yd² of
13 prepared surface.

14 **3.3.3** *Adhesive mixtures*

15 **3.3.3.1** Condition epoxy components to a temperature consistent with adhesive manufacturer's
16 written instructions.

17 **3.3.3.2** Mix epoxy components in accordance with adhesive manufacturer's written
18 instructions.

19 **3.3.4** *Adhesive application and concrete placement*

20 **3.3.4.1** Do not apply adhesive if ambient temperature and hardened concrete temperature are
21 not within the adhesive manufacturer's allowable range. Placement of fresh concrete shall
22 conform to ambient temperature requirements as indicated in Contract Documents.

1 **3.3.4.2** Apply adhesive to concrete surface by brush, roller, broom, squeegee, or spray
2 equipment. Apply adhesive at a thickness recommended by manufacturer.

3 **3.3.4.3** Place fresh concrete while adhesive is still tacky. If the adhesive cures to the extent of
4 losing its tack before fresh concrete is placed, remove or abrade first coat and apply a second
5 coat in accordance with the adhesive manufacturer's written instructions.

6 **3.3.4.4** Consolidate fresh concrete as indicated in Contract Documents.

7 **3.3.4.5** Upon completion of finishing operations, cure concrete as indicated in Contract
8 Documents.

9 **3.3.5** *Cleanup*

10 **3.3.5.1** Protect concrete surfaces beyond limits of surface receiving adhesive against spillage.

11 **3.3.5.2** Remove any adhesive applied or spilled beyond desired areas. Perform cleanup with
12 material designated by adhesive manufacturer.

13 **3.3.5.3** Unused materials shall be disposed in accordance with manufacturer's
14 recommendations and applicable regulations.

15 **3.3.6** *Quality assurance testing*

16 **3.3.6.1** Architect/Engineer will evaluate bonding of fresh concrete to existing concrete after the
17 fresh concrete has cured for at least 28 days.

18 **3.3.6.2** The evaluation will be performed by sounding in accordance with ASTM
19 D4580/D4580M, unless otherwise specified.

20 **3.3.6.3** Detection of a hollow sound or other indication of delamination in any area shall be
21 reason to suspect inadequate bonding. Contractor shall core suspected area, as requested by
22 Architect/Engineer, to determine bonding adequacy.

1 **3.3.6.4** Coring shall be performed in accordance with ASTM C42/C42M and shall penetrate at
2 least 1-in. into the existing concrete. Core diameter shall be at least 4-in. nominal diameter,
3 unless otherwise specified. Length of cores shall be twice the core diameter, or twice the
4 thickness of new concrete.

5 **3.3.6.5** Cores will be visually inspected and further testing, if required, will be determined by
6 Architect/Engineer.

8 **NOTES TO SPECIFIER**

9 **General notes**

10 **G1.** ACI Specification 548.13-YY is to be used by reference in the Project Specification. Do
11 not copy individual sections, parts, articles, or paragraphs into the Project Specification because
12 taking them out of context may change their meaning.

13 **G2.** If Sections or Parts of ACI Specification 548.13-YY are copied into the Project
14 Specification or any other document, do not refer to them as an ACI Specification.

15 **G3.** A statement such as the following will serve to make ACI Specification 548.13-YY a part
16 of the Project Specification:

17 “Work on (Project Title) shall conform to all requirements of ACI Specification 548.13-YY,
18 “Specification for Using Multi-Component Epoxy Adhesive for Bonding to Concrete,” published
19 by the American Concrete Institute, Farmington Hills, Michigan, except as modified by these
20 Contract Documents.”

21 **G4.** Each technical section of ACI Specification 548.13-YY is written in the three-part section
22 format of the Construction Specifications Institute, as adapted for ACI requirements. The
23 language is imperative and terse.

1 **G5.** If ACI Specification 548.13-YY is referenced in Contract Documents along with another
2 ACI specification that contains overlapping provisions, identify which requirements are in
3 conflict and state in the Contract Documents which requirements control.
4

5 **Foreword to Checklists**

6 **F1.** This Foreword is included for explanatory purposes only; it does not form a part of ACI
7 Specification 548.13-YY.

8 **F2.** ACI Specification 548.13-YY may be referenced by the Specifier in the Project
9 Specification for any building project, together with supplementary requirements for the specific
10 project. Responsibilities for project participants must be defined in the Project Specification.
11 ACI Specification 548.13-YY cannot and does not address responsibilities for any project
12 participant other than the Contractor.

13 **F3.** Checklists do not form a part of ACI Specification 548.13-YY. Checklists assist the
14 Specifier in selecting and specifying project requirements in the Project Specification.

15 **F4.** The Mandatory Requirements Checklist indicates work requirements regarding specific
16 qualities, procedures, materials, and performance criteria that are not defined in ACI
17 Specification 548.13-YY. The Specifier must include these requirements in the Project
18 Specification.

19 **F5.** The Optional Requirements Checklist identifies specifier alternatives or additions. The
20 checklists identify the sections, parts, and articles of ACI Specification 548.13-YY and the action
21 required or available to the specifier. The specifier should review each of the items in the
22 checklist and make adjustments to the needs of a particular project by including those selected
23 alternatives or additions as mandatory requirements in the Project Specification.

1 **F6. Cited references**—Documents and publications that are referenced in the checklists of ACI
 2 Specification 548.13-YY are listed below. These references provide guidance to the specifier
 3 and are not considered to be part of ACI Specification 548.13-YY.

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5 *ASTM International*

6 ASTM D4258-05(2017) Standard Practice for Surface Cleaning Concrete for Coating

7 ASTM D4259-18 Standard Practice for Preparation of Concrete by Abrasion Prior to

8 Coating Application

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10 *International Concrete Repair Institute*

11 ICRI 310.2R-2013 Selecting and Specifying Concrete Surface Preparation for Sealers,

12 Coatings, Polymer Overlays, and Concrete Repair

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14 *The Society for Protective Coatings*

15 SSPC VIS 1-2002 Guide and Reference Photographs for Steel Surfaces Prepared by Dry

16 Abrasive Blast Cleaning

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MANDATORY REQUIREMENTS CHECKLIST

Part/Article	Notes to Specifiers
2.1.1.1	Indicate in Contract Documents where a multi-component adhesive is required for bonding concrete, steel, and other materials to hardened concrete.

2.3.1.1.a	Specify the required concrete surface profile as described in ICRI 310.2R.
2.3.1.2.b	Specify surface condition corresponding to ASa2, BSa2, and CSa2 of SSPC VIS 1, depending on the initial surface condition of the steel surface.
2.3.2.4.a	Specify number and frequency of testing and minimum strength. If the test results are not in failure of the concrete but in cohesion of the epoxy adhesive material used to bond the metal test disc to the test specimen, or any failure in adhesion of that epoxy adhesive material, the test shall be repeated. Repeated failures in adhesion, or cohesion in the epoxy adhesive material, indicate improper cleaning of the concrete, incorrect adhesive, or faulty adhesive application techniques.
2.3.6.2	Specify the method for assessing the adequacy of the bond between the bonded components. If coring is used, specify number of cores required.
3.1.1.1	Indicate in Contract Documents where a multi-component adhesive is required for bonding other materials to hardened concrete
3.2.1.2	Specify concrete requirements.
3.3.1.1.a	Specify the concrete surface profile as described in ICRI 310.2R.
3.3.2.4	Specify number and frequency of testing and minimum strength. If the test results are not in failure of the concrete but in cohesion of the epoxy adhesive material used to bond the metal test disc to the test specimen, or any failure in adhesion of that epoxy adhesive material, the test shall be repeated. Repeated failures in adhesion, or cohesion in the epoxy adhesive material, indicate improper cleaning of the concrete, incorrect adhesive, or faulty adhesive application techniques.

3.3.4.1	Specify ambient temperature requirements for concrete placement.
3.3.4.4	Specify concrete consolidation requirements.
3.3.4.5	Specify curing requirements for concrete.

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OPTIONAL REQUIREMENTS CHECKLIST

Part/Article	Notes to Specifiers
1.5.4	Specify additional test results to be submitted.
1.6.3	Specify alternative range of storage temperature.
2.2.1.1	Specify additional or alternative performance requirements, acceptable suppliers, or both.
2.2.1.2	Specify if fillers are not allowed.
2.3.1.1.a	Specify alternate methods for preparing surfaces, such as in accordance with other methods in ICRI 310.2R, ASTM D4258, or ASTM D4259.
2.3.1.2.b	Specify if alternative abrasive material, such as grit or shot, is required.
2.3.2.4.b	Specify if metal surfaces require adhesion testing and minimum adhesive strength.
2.3.6.2	If coring is used, specify alternative core size.
3.2.1.1	Specify additional or alternative performance requirements, acceptable suppliers, or both.
3.2.1.3	Specify if fillers are not allowed.

3.3.1.1.a	Specify alternate methods for preparing surfaces, such as in accordance with other methods in ICRI 310.2R, ASTM D4258, or ASTM D4259.
3.3.6.2	Specify alternate method to determine delamination such as pulse velocity or impact-echo.
3.3.6.4	Specify alternative diameter of cores to be obtained. Minimum 4-in. nominal diameter cores are recommended for testing. Nominal 2-in. cores may be adequate if they are only used for visual inspection.

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