03050
BASIC CONCRETE MATERIALS AND METHODS

This guide specification has been prepared by Dayton Superior Corporation to assist design professionals in the preparation of a specification section covering anchoring cements, epoxy grouts and bonding adhesives, epoxy sprays, and bonding agents.

This specification may be used as the basis for developing either a project specification or an office master specification. Since it has been prepared according to the principles established in the Manual of Practice published by The Construction Specifications Institute (CSI), it may be used in conjunction with most commercially available master specifications systems with minor editing.

The following should be noted in using this guide specification:

Editing notes to assist users are included within bordered boxes. Delete these notes prior to final printing.

Optional text requiring a selection by the user is enclosed within brackets, e.g.: Section [01330][_____]."

Items requiring user input are enclosed within brackets, e.g.: Section [_____−_____]."

Optional paragraphs are separated by an OR" statement, e.g.:

**** OR ****

Metric equivalents to inch−pound units follow the inch−pound units and are contained within parenthesis. Metric measurements are rationalized units based on the SI system of measurement. Delete either the inch−pound or metric units of measure depending on project requirements; do not include both units in a project specification, as conflicting requirements could result.

This guide specification is available in both hard copy and a variety of electronic formats to suit most popular word processing programs and operating platforms. Please contact Dayton Superior Corporation at (800) 745−3707 for additional copies or for information on available electronic formats.

1 GENERAL
1.1 SUMMARY
Edit the following to suit project requirements.

A. Section Includes:
1. Anchoring cements.
2. Epoxy [grouts] [and] [bonding adhesives].
3. Epoxy protection of reinforcing steel.
4. Bonding agents.
Edit the following paragraphs to suit project requirements; list only those sections specifically applicable to the work of this section.

B. Related Sections:

1. Section [03200 − Concrete Reinforcement] [_____ − _____].
2. Section [03300 − Cast−In−Place Concrete] [_____ − _____].
3. Section [05500 − Metal Fabrications] [_____ − _____].

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. C 39 − Test Method for Compressive Strength of Cylindrical Concrete Specimens.
2. C 496 − Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
3. C 881 − Specification for Epoxy−Resin Base Bonding Systems for Concrete.
4. C 882 − Test Method for Bond−Strength of Epoxy−Resin Systems Used with Concrete.
5. C 1042 − Test Method for Comparing Concrete on the Basis of Bond Developed with Reinforcing Steel.
6. C 1059 − Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
7. D 570 − Test Method for Water Absorption of Plastics.
8. D 638 − Test Method for Tensile Properties of Plastics.
9. D 695 − Test Method for Compressive Properties of Rigid Plastics.
10. D 790 − Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

1.3 SUBMITTALS

Edit the following paragraph to indicate the correct Division 1 section.

A. Submit under provisions of Section [01330] [_____]:
1. Product Data: Include manufacturer's specifications, surface preparation and application instructions, and protection of adjacent surfaces.
2. Test Data: Confirm compliance with specified requirements.

1.4 DELIVERY, STORAGE AND HANDLING

Edit the following paragraph to indicate the correct Division 1 section.

A. Deliver, store, and handle products under provisions of Section [01600] [_____].
B. Store materials in a dry area within temperature range recommended by manufacturer.

1.5 PROJECT CONDITIONS

A. Environmental Requirements:
1. Do not apply anchoring cements at temperatures below 40 degrees F (4 degrees C).
2. Do not apply epoxies at temperatures below 40 degrees F (4 degrees C).

2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Dayton Superior Corporation, 402 South First Street, Oregon, IL 61061, (800) 745−3707.

Edit the following paragraph to indicate whether substitutions will be permitted; indicate the correct Division 1 section.

B. Substitutions: [Not permitted.] [Under provisions of Section [01630] [_____].]

2.2 MATERIALS FOR ANCHORING

Include the following for a cementitious anchoring cement.

A. Anchoring Cement:
1. Product: Ankertite Cement.
2. Description: Cementitious based, fast setting, high strength, freeze/thaw resistant anchoring cement.
3. Compressive strength: Tested per ASTM C 39 with following results: Time Compressive Strength − psi (MPa)
3 hours 4100 (28.2)
1 day 5100 (35.1)

7 days 6100 (42.0)
28 days 6800 (46.9)

4. Bond strength: 2100 psi (14.5 MPa) at 7 days, tested per ASTM C 882 Modified.
5. Tensile strength: 340 psi (2.3 MPa) at 28 days, tested per ASTM C 496.
**** OR ****
Include the following for a high modulus epoxy gel adhesive for anchoring.

B. Epoxy Adhesive:
1. Product: Sure−Anchor Epoxy I (J−51).
2. Description: Two component, pre−proportioned, 100 percent solids, high modulus, high strength epoxy gel adhesive.
3. Meet ASTM C 881, Types 1, 2, 4, and 5, Grade 3, Classes B and C.
4. Compressive strength: 10,600 psi (73 MPa), tested per ASTM D 695.
5. Bond strength: 3000 psi (20 MPa) at 14 days, tested per ASTM C 882.
6. Concrete pullout resistance: Rod Diameter − Inches (mm) Hole Diameter − Inches (mm) Hole Depth − Inches (mm) Ultimate Pullout Strength based on Concrete Compressive Strength − pounds (kg)
3500 (24) 3500 (24) 4000 (27) 4500 (31)
3/8 (10) 7/16 (11) 4 (102) 7100 (3216) 7150 (3238) 7190 (3257)
3/8 (10) 7/16 (11) 5.5 (140) 8500 (3850) 8600 (3896) 8690 (3936)
1/2 (13) 9/16 (14) 5 (127) 14,200 (6432) 14,400 (6523) 14,600 (6613)
1/2 (13) 9/16 (14) 6.5 (165) 17,600 (7972) 17,800 (8063) 18,000 (8154)
5/8 (16) 3/4 (19) 6 (152) 21,500 (9739) 21,700 (9830) 21,900 (9920)
5/8 (16) 3/4 (19) 7.75 (197) 25,400 (11,506) 25,800 (11,687) 26,200 (11,868)
3/4 (19) 7/8 (22) 7 (178) 28,600 (12,955) 28,800 (13,046) 29,200 (13,227)
3/4 (19) 7/8 (22) 9.5 (240) 34,600 (15,673) 34,800 (15,764) 35,200 (15,945)
7/8 (22) 1 (25) 8.0 (203) 34,400 (15,583) 34,600 (15,673) 35,000 (15,855)
7/8 (22) 1 (25) 10 (254) 43,500 (19,750) 43,800 (19,841) 44,100 (19,977)
1 (25) 1−1/8 (28) 10 (254) 43,600 (19,750) 43,900 (19,886) 44,200 (20,022)
1 (25) 1−1/8 (28) 12 (305) 49,600 (22,468) 49,900 (22,604) 50,200 (22,740)

7. Modulus of elasticity (compressive): 500,000 psi (3447 MPa), tested per ASTM D 695.
8. Water absorption: 0.9 percent, tested per ASTM D 570.
**** OR ****
Include the following for a high modulus, medium viscosity, pourable epoxy bonding adhesive for anchoring.

C. Epoxy Adhesive:
1. Product: Resi−Bond (J−58).
2. Description: Two component, pre−proportioned, 100 percent solids, high strength, medium viscosity epoxy bonding adhesive.
3. Meet ASTM C 881, Types 1, 2, 4, and 5, Grade 2, Classes B and C.
4. Compressive strength: 10,400 psi (71.7 MPa), tested per ASTM D 695 at 7 days.
5. Bond strength: Tested per ASTM C 882, moist cured, with following results:
a. 2550 psi (17.6 MPa) at 2 days.
b. 3150 psi (21.7 MPa) at 14 days.
6. Modulus of elasticity: 275,000 psi (1896.0 MPa), tested per ASTM D 695.
7. Tensile strength: 7580 psi (52.3 MPa), tested per ASTM D 638.
8. Water absorption: 0.13 percent, tested per ASTM D 570.
**** OR ****
Include the following for a pourable, high performance epoxy grout for anchoring.

D. Epoxy Grout:
1. Product: Sure−Grip Epoxy Grout (J−54).
2. Description: Multi−component, pre−proportioned, noncorrosive, nonshrink, moisture insensitive, high performance epoxy grout.
3. Compressive strength: Tested per ASTM D 695 with following results. Time Compressive Strength − psi (MPa)
8 hours 6000 (41.4)
1 day 12,000 (82.7)
7 days 12,3000 (84.8)
14 days 12,500 (86.2)

4. Bond strength: 2200 psi (15.2 MPa) at 14 days, tested per ASTM C 882.
5. Modulus of elasticity (compressive): 350,000 psi (2413 MPa), tested per ASTM D 695. Tensile strength: 2600 psi (17.9 MPa), tested per ASTM D 638 at 10 days.
6. Flexural strength: 5000 psi (34.5 MPa), tested per ASTM D 790 at 14 days.
7. Water absorption: 0.3 percent, tested per ASTM D 570.
2.3 MATERIALS − EPOXY REINFORCING SPRAY
Include the following for an epoxy spray for protecting reinforcing steel.

A. Epoxy Reinforcing Spray:
1. Product: Rebar Epoxy Spray (J−62).
2. Description: Epoxy coating in self−contained spray applicator.
3. Color: Green.
2.4 MATERIALS − BONDING AGENTS
Include the following for a high modulus, medium viscosity epoxy bonding agent.

A. Bonding Agent:
1. Product: Resi−Bond (J−58).
2. Description: Two component, pre−proportioned, 100 percent solids, high strength, medium viscosity epoxy bonding adhesive.
3. Meet ASTM C 881, Types 1, 2, 4, and 5, Grade 2, Classes B and C.
4. Compressive strength: 10,400 psi (71.7 MPa), tested per ASTM D 695 at 7 days.
5. Bond strength: Tested per ASTM C 882, moist cured, with following results:
a. 2550 psi (17.6 MPa) at 2 days.
b. 3150 psi (21.7 MPa) at 14 days.
6. Modulus of elasticity: 275,000 psi (1896.0 MPa), tested per ASTM D 695.
7. Tensile strength: 7580 psi (52.3 MPa), tested per ASTM D 638.
8. Water absorption: 0.13 percent, tested per ASTM D 570.
**** OR ****
Include the following for a non−reemulsifiable, acrylic latex bonding agent.

B. Bonding Agent:
1. Product: Day−Chem Ad Bond (J−40). Description: Non−reemulsifiable, acrylic latex emulsion bonding agent.
2. Meet ASTM C 1042, Type II.
3. Bond strength: Tested per ASTM C 1059 with following results: Test Age Compressive Strength − psi (MPa)
14 days 1865 (12.9)
28 days 2436 (16.8)

**** OR ****

Include the following for a reemulsifiable/rewettable, PVA bonding agent.

C. Bonding Agent:
1. Product: Superior Concrete Bonder (J−41).
2. Description: Reemulsifiable/rewettable, polyvinyl acetate emulsion bonding agent.
2.5 ACCESSORIES
Include the following for anchoring cement.

A. Aggregate: Clean, well graded natural sand or 1/8 to 1/4 inch (3 to 6 mm) clean, washed pea gravel.
2.6 MIXING
Include the following paragraph only for products requiring site mixing or thinning.

A. Mix materials in accordance with manufacturer's instructions.
Include the following for anchoring cement.

B. Add water and aggregate at rate of 50 to 100 pounds (23 to 45 kg) aggregate per 50 pound (23 kg) bag to achieve a workable mix.
C. Do not over−water or retemper mixes.
3 EXECUTION
3.1 INSTALLATION − CEMENTITIOUS ANCHORING CEMENT
A. Follow manufacturer's instructions.
B. Remove loose matter from concrete holes with compressed air, then presoak with clean water. Remove standing water prior to placing anchoring cement.
C. Place item to be embedded unless item can be installed after cement is placed.
D. For horizontal surfaces, place pourable consistency anchoring cement in continuous pour until void is filled.
E. For vertical or overhead surfaces, reduce amount of water and place putty consistency anchoring cement with putty knife or trowel; pack into voids until filled.
3.2 INSTALLATION − EPOXY GROUT
A. Follow manufacturer's instructions.
B. Clean surfaces to remove loose and foreign matter by waterblasting, mechanical abrasion, or sandblasting.
C. Remove unsound concrete by chipping or grinding.
D. Allow surfaces to dry completely before grouting.
E. Place item to be embedded unless item can be installed after grout is placed.
F. Place grout continuously by most practical means.
G. Lightly mist exposed grout with solvent, then steel trowel to smooth surface. Do not apply curing compounds.
3.3 INSTALLATION − EPOXY ADHESIVE
A. Follow manufacturer's instructions.
B. Clean surfaces to remove loose and foreign matter by waterblasting, mechanical abrasion, or sandblasting.
C. Remove unsound concrete by chipping or grinding.
D. Allow surfaces to dry completely before grouting.
E. Place adhesive continuously by most practical means.
F. Place item to be embedded; rotate slowly during insertion.
3.4 APPLICATION − EPOXY SPRAY
A. Follow manufacturer's instructions.
B. Clean surfaces to remove loose and foreign matter, oil, grease, and silicones.
C. Protect adjacent and underlying surfaces.
D. Apply in several light, even coats.

3.5 APPLICATION − BONDING AGENTS

A. Follow manufacturer's instructions.

B. Clean surfaces to remove loose and foreign matter, dirt, oil, grease, paint, and curing compounds that could interfere with adhesion or performance of products. Remove deteriorated concrete.

C. Apply by [brush] [broom] [roller] [or] [spray].

D. Place topping or patch within time period recommended by manufacturer, or recoat.

END OF SECTION