03600
GROUTS

This guide specification has been prepared by Dayton Superior Corporation to assist design professionals in the preparation of a specification section covering nonshrink and epoxy grouts for grouting precast concrete elements, structural steel base plates, machinery bases, anchor bolts, anchorages, dowels, and other similar applications.

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. [Non−shrink] [and] [epoxy] grouts.
B. Related Sections:
1. Section [03300 − Cast−In−Place Concrete] [_____ − _____]: Concrete elements to be grouted.
2. Section [03410 − Plant−Precast Structural Concrete] [03450 − Plant−Precast Architectural Concrete] [03470 − Tilt−Up Precast Concrete] [_____ − _____]: Precast concrete elements to be grouted.
3. Section [05120 − Structural Steel] [_____ − _____]: Structural steel base plates to be grouted.

4. Section [_____ − _____]: [Anchor bolts] [Anchorage devices] to be grouted.
5. Section [_____ − _____]: Machinery base plates to be grouted.
1.2 REFERENCES
A. American Society for Testing and Materials (ASTM):
1. C 109− Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2−in. or 50−mm Cube Specimens).
2. C 827 − Test Method for Early Volume Change of Cementitious Mixtures.
3. C 882 − Test Method for Bond−Strength of Epoxy−Resin Systems Used with Concrete.
4. C 1090 − Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic−Cement Grout.
5. C 1107 − Specification for Packaged Dry, Hydraulic−Cement Grout (Nonshrink).
6. D 570 − Test Method for Water Absorption of Plastics.
7. D 638 − Test Method for Tensile Properties of Plastics.
8. D 695 − Test Method for Compressive Properties of Rigid Plastics.
9. D 790 − Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
B. US Army Corps of Engineers (COE) CRD−C 621 − Specification for Non−Shrink Grout.
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 at a temperature between 40 and 100 degrees F (4 and 38 degrees C).
1.5 PROJECT CONDITIONS
A. Environmental Requirements: Maintain temperature between 45 and 90 degrees F (7 and 32 degrees C) during application and curing.
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 − CEMENTITIOUS GROUTS
Include the following for a high performance, nonshrink, non−metallic, cement based grout.

A. Non−Shrink Grout:
1. Product: Sure−Grip High Performance Grout.
2. Description: Cement based, nonshrink, noncorrosive, nonmetallic grout.
Minimum 5000 psi (34.5 MPa) compressive strength in 24 hours.
3. Pumpable and pourable.
4. Resistant to heat and thermal shock.
5. Vibration resistant.
6. Meet ASTM C 1107 and CRD−C 621, Grades A, B, and C.
7. Expansion: Positive expansion when tested per ASTM C 827 and ASTM C 1090.

8. Test results when tested per ASTM C 1107: Fluidity Expansion − percent Compressive Strength − psi (MPa)
1 day 14 days 28 days 1 day 3 days 7 days 28 days
Plastic Plus
0.02 Plus
0.01 Plus
0.01 6500
(44.8) 8000
(55.1) 10,000
(68.9) 12,500
(86.2)
Flowable Plus
0.01 Plus
0.01 Plus
0.01 6000
(41.4) 8000
(55.1) 10,000
(68.9) 11,000
(75.8)
Fluid Plus
0.01 Plus
0.01 Plus
0.02 4000
(27.6) 7000
(48.2) 8000
(55.1) 10,000
(68.9)

**** OR ****
Include the following for a pre−mixed, structural, non−shrink grout for dry−pack applications.

B. Non−Shrink Grout:
1. Product: Sure−Grip Grout Dri−Pak.
2. Description: Cement based, pre−mixed, nonshrink, noncorrosive, nonmetallic, high density, high strength grout for dry−pack applications.
3. Meet COE CRD−C 621.
4. Compressive strength: Tested per ASTM C 109: Days Compressive Strength − psi (MPa)
1 4200 (29.0)
7 8600 (59.3)
28 13,000 (89.6)

**** OR ****
Include the following for a standard, nonmetallic, cement based nonshrink grout.

C. Non−Shrink Grout:
1. Product: 1107 Advantage Grout.
2. Description: Cement based, nonshrink, noncorrosive, nonmetallic, grout.
3. Pumpable and pourable.
4. Meet ASTM C 1107, Grades A, B, and C.
5. Expansion:
a. Positive expansion when tested per ASTM C 827.
b. Expansion when tested per ASTM C 1090: Days Expansion − percent

1 Plus 0.02
3 Plus 0.03
14 Plus 0.08
28 Plus 0.09

6. Test results when tested per ASTM C 1107. Fluidity Compressive Strength − psi (MPa)
1 day 3 days 7 days 28 days
Dry Pack 5000
(34.5) 7000
(48.2) 9000
(62.0) 10,000
(68.9)
Flowable 2500
(17.2) 5000
(34.5) 6000
(41.4) 8000
(55.2)
Fluid 2000
(13.8) 4000
(27.6) 5000
(34.5) 7500
(51.7)

2.3 MATERIALS − EPOXY GROUTS
Include the following for a high performance, chemical resistant epoxy grout.

A. Epoxy Grout:
1. Product: Sure−Grip Epoxy Grout (J−54).
2. Description: Multi−component, pre−proportioned epoxy grout.
3. High impact and vibration resistance.
4. Compressive strength: Tested per ASTM D 695: Time at Test Compressive Strength − psi (MPa)
At 72 degrees F
(22 degrees C) At 50 degrees F
(10 degrees C)
8 hours 6000 (41.4) −−−
1 day 12,000 (82.7) 9200 (63.4)
7 days 12,300 (84.8) 10,500 (72.4)
14 days 12,500 (86.2) 12,000 (82.7)

5. Modulus of elasticity (compressive): 350,000 psi (2413 MPa), tested per ASTM D 695 at 14 days.
6. Tensile strength: 2600 psi (17.9 MPa), tested per ASTM D 638 at 10 days.
7. Flexural strength: 5000 psi (34.5 MPa), tested per ASTM D 790 at 14 days.
8. Bond strength to concrete: 2200 psi (15.2 MPa), tested per ASTM C 882 at 14 days.
9. Water absorption: 0.3 percent, tested per ASTM D 570.
10. Approximate working time at 72 degrees F (22 degrees C): 60 minutes.
2.4 ACCESSORIES
Include the following for cementitious grouts where depth of grout will exceed 3 inches (75 mm).

A. Aggregate: Washed pea gravel, maximum 3/8 inch (10 mm) in size.
Include the following for cementitious grouts. Select the curing compound to suit project requirements. J−18 and J−19 are VOC compliant, water based, acrylic curing compounds. J−23 is a curing compound in an aromatic solvent.

B. Curing Compound: [Safe Cure & Seal [(J−18)] [(J−19)]] [Day−Chem Cure & Seal: 30% (J−23)].
2.5 MIXING
A. Mix materials in accordance with manufacturer's instructions.
Include the following for applications where depth of grout will exceed 3 inches (75 mm).

B. Add aggregate at maximum rate of 25 pounds (11.3 kg) per 55 pound (25 kg) bag.
C. Do not retemper mix.
3 EXECUTION
3.1 PREPARATION
A. Clean surfaces to remove loose and foreign matter by waterblasting, mechanical abrasion, or sandblasting.
B. Remove unsound concrete by chipping or grinding.
C. Grind or sandblast steel surfaces; remove rust, mill scale, and paint.
D. Install forms to contain liquid grout. Seal joints and corners.
3.2 INSTALLATION − CEMENTITIOUS GROUTS
A. Follow manufacturer's instructions.
B. Just prior to grouting, thoroughly saturate concrete surfaces for 24 hours; remove excess water.
C. Place grout continuously by most practical means. Work from one side to avoid entrapped air.
D. Grout may be rodded or tamped, but do not vibrate.
E. Apply curing compounds to exposed grout in accordance with manufacturer's instructions or cure with wet burlap for 3 days.
3.3 INSTALLATION − EPOXY GROUTS
A. Follow manufacturer's instructions.
B. Allow surfaces to dry completely before grouting.
C. Place grout continuously by most practical means. Work from one side to avoid entrapped air.
D. For grout depths exceeding 3 inches (75 mm), place grout in maximum 3 inch (75 mm) lifts; allow each lift to cure before placing next lift.
E. Consolidate material to eliminate voids and air pockets.
F. Lightly mist exposed grout with solvent, then steel trowel to smooth surface. Do not apply curing compounds.

END OF SECTION