

SECTION 503 – DRILLED SHAFT FOUNDATIONS

503.01 DESCRIPTION

This Section describes the requirements for installing and testing drilled shafts.

503.02 MATERIALS

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Provide materials as specified:

Concrete	903.03
Self Consolidating Concrete	903.06.01
Grout	903.08.02
Reinforcement Steel	905.01.01
Drilled Shaft Casing	906.03
Structural Steel Paint (Organic Zinc)	912.01.01
Water	919.08

Table 503.03.06-1 – Mineral Slurry³

Property	Range	Test
Density at time of slurry introduction	64.3 – 69.1 ¹ lbs/ft ³	API 13B, Bentonite Slurry Section (Mud Balance) ASTM D 4380
Density in hole at time of concreting	64.3 – 75.0 ¹ lbs/ft ³	API 13B, Bentonite Slurry Section (Mud Balance) ASTM D 4380
Viscosity at time of slurry introduction	28 – 45 ² sec/quart	API 13B, Section 2 (Marsh Funnel and Cup)
Viscosity in hole at time of concreting	28 – 45 ² sec/quart	API 13B, Section 2 (Marsh Funnel and Cup)
Sand content by volume	4% max	API 13B, Section 4 (Sand Screen Set)

		ASTM D 4381	
pH at time of slurry introduction	8 – 11	API 13B, Section 6 (Paper Test Strips or Glass-Electrode pH Meter)	6
pH in hole at time of concreting	8 – 11	API 13B, Section 6 (Paper Test Strips or Glass-Electrode pH Meter)	6

1. **Mineral Slurry.** Premix mineral slurry with water and allow time for hydration according to the manufacturer’s recommendations before using during shaft excavation. Provide slurry tanks of adequate capacity for slurry circulation, storage, and treatment. Do not substitute excavated slurry pits with slurry tanks without obtaining approval from the RE. Do not mix the slurry in the shaft.

Monitor the properties of the pre-mixed slurry as it is introduced into the borehole and periodically thereafter, including a final check of a bottom sample before placing concrete to verify that the density and sand content are within the limits for the proper slurry displacement during concreting. Use desanding equipment to control slurry sand content to less than 4 percent by volume at any point in the borehole at the time the slurry is introduced.

Perform control tests on the mineral slurry in the presence of the RE to determine density, viscosity, and pH. Adjust the slurry to meet the requirements shown in [Table 503.03.06-1](#):

¹ Increase by 2 lbs/ft³ in salt water.

² Standard measurements are in seconds per quart. One sec/quart = 1.06 sec/liter.

- a. Perform tests when the slurry temperature is above 40 °F.
- b. Ensure that the sand content does not exceed 4 percent (by volume) at any point in the borehole as determined by the API sand content test when the slurry is introduced.

³ Perform tests to determine density, viscosity and pH value during the shaft excavation to establish a consistent working pattern. Perform a minimum of 4 sets of tests during the first 8 hours of slurry use. When the results show consistent behavior, the Contractor may decrease the testing frequency to 1 set per every 4 hours of slurry use.

- 3.
4. **Polymer Slurry.** Provide a slurry management plan to the RE that includes a set of the slurry manufacturer’s written recommendations and results of the following tests, as a minimum:

1. Density Test (API 13B-1, Section 1).
2. Viscosity Test (Marsh funnel and cup, API 13B-1), Section 2.2 or approved viscometer.
3. pH Test (pH meter, pH paper).
4. Sand Content Test (API sand content kit, API 13B-1, Section 5).

Also include the tests to be performed, the frequency of those tests, the test methods, and the maximum and minimum property requirements that must be met to ensure that the slurry meets its intended functions. Ensure that all test reports are signed, and provide them to the RE on completion of each drilled sha