FLORIDA DEPARTMENT OF TRANSPORTATION
State Materials Office
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April 22, 2020

Florida Method of Test for The Evaluation of Post-Tensioned Tendon Grout by Using Inclined Tube Specimens

Designation: FM 5-619

1. SCOPE

1.1. This test method covers the determination of the stability of post-tensioning grout and its resistance to the filtering effect of post-tensioning strand. The test consists of measuring the moisture content and a visual examination of the hardened post-tensioning grout.

1.2. This test method does not purport to address all the safety concerns, if any, associated with its use. It is the responsibility of the user of this test method to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

2. APPARATUS

2.1. Tube Specimens and Support Frame – The tubes shall be 15 ft. in length and 3 in. in diameter, constructed of Schedule 40 PVC pipe with injection point on one end and discharge point on the opposite end (Figure 1).

2.1.1. The tubes shall contain twelve 0.6-inch diameter, 14- foot long post-tensioning strands meeting the requirements of ASTM A416.

2.1.2. The support frame shall be constructed to sustain the tube specimens at a 30-degree angle without movement or deflection. A minimum of four support points are required. Additional support points may be required based on the number of specimens being tested.

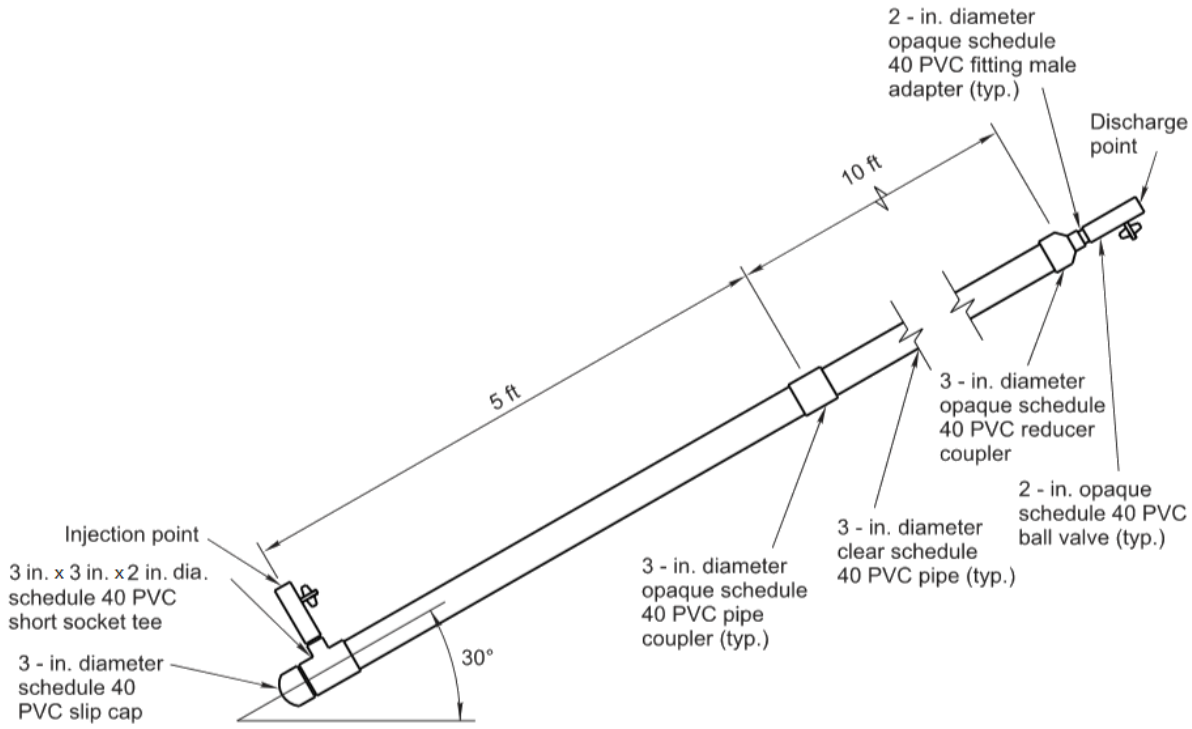

Figure 1

2.2. Grout Production Plant – The grout production plant shall be a high shear colloidal mixer capable of the following:

2.2.1. Two tank system to allow for continuous grout mixing and agitation.

2.3. Grout Pump – The grout pump shall be a 3-stage progressing cavity, positive displacement, rotor-stator pump capable of the following:

2.3.1. Ability to apply a consistent injection point pressure of 55 psi.

3. SAMPLE PREPARATION

3.1. Ensure that no moisture is present inside the tube specimens. Insert the 12 strands into the tube prior to closing all openings. Place the inclined tube specimens containing the strand and secure them to the support frame.

3.1.1. Fabricate a minimum of 2 specimens per type of grout being tested.

3.2. Mix the grout mixture material in accordance with the manufacturer's mixing recommendations and the requirements for laboratory testing in Standard Specifications Section 938.

3.3. Pump and recirculate the grout through the grout plant to assure a homogeneous mixture at a rate to produce an injection point pressure of 55 psi. Immediately discharge an appropriate amount of grout for required testing per Standard Specifications Section 938, Table 938-1.

3.4. Attach the grout hose to the injection point.

3.5. Inject grout into tube at a controlled uniform rate to fill the tendon in a period of approximately 1 minute. Continue to pump grout until a stable, void free slurry is discharged. Collect an appropriate amount of grout from the discharge point for required testing per Standard Specifications Section 938, Table 938-1.

3.6. Immediately after collecting the grout, close the upper discharge point valve.

3.7. Maintaining the 50-psi grout pressure, close the lower discharge point valve.

3.8. Disconnect the grout hose from the injection point.

3.9. Repeat 3.4 through 3.8 on additional specimens.

4. TESTING OF SAMPLE

4.1. During pumping of grout observe the grout in the clear viewing portion of the tube for any noticeable inconsistencies.

4.2. Allow sample to harden for 24 hours.

4.3. Remove an approximately 6-inch length section of the entire outer PVC pipe casing at the lower and upper portions of the tube specimens. Use caution not to lose any grout material or liquid from the tendon by using a catch tray to contain any material lost during the removal process.

4.4. Make visual inspections of the hardened grout material for signs of soft grout and any residual liquid on top of the grout. Extract residual liquid and measure its volume (ml). Using a handheld penetrometer meeting the requirements of ASTM C780 apply pressure up to 500 psi checking for penetration.

4.5. Remove approximately 25 grams of hardened grout material from the exposed lower and upper portions of the tube specimens.

4.6. Measure the initial mass of each sample to the accuracy of 0.1 grams.

4.7. Dry samples to a constant mass in oven at 110° ±5°C. Samples will be considered to be dry when two consecutive 24-hour mass readings exhibit less than 0.5% difference.

5. Calculation

5.1. Calculate the Percentage of Bleed Water based on the extracted liquid volume as it relates to the total volume of the tube specimen.

5.2. Calculate moisture content, P, of both upper and lower sections of the samples in accordance with ASTM C 566 as described below:

$$P = \left(\frac{W - D}{D}\right) 100$$

where:

P = moisture content of sample, percent

W = original weight of sample, g

D = dried weight of sample, g

5.3. Calculate the difference between the moisture contents of the samples taken from lower and upper portions of the tube specimens.

6. Report

6.1. Include the following items in the test report *(Note 1)*:

6.1.1. Grout Manufacturer.

6.1.2. Product name.

6.1.3. Mixing date.

6.1.4. Mixing temperature.

6.1.5. Amount of Bleed, 0.0%.

6.1.6. Difference between the upper and lower portion moisture contents, 0.0%

6.1.7. Any notable mixture inconsistency observations on grout during pumping and after curing.

6.1.8. Measurement of penetration at 500 psi, nearest 1 mm.

6.1.9. Photos illustrating details pertaining to the moisture contents, bleed water, or notable mixture inconsistency observations.

Note 1: Reported results will be based on the average of samples. Samples that have any testing irregularities due to sample preparation or technician error may be excluded from the test results and retesting will be necessary