

Section 9.2 Volume II

STRUCTURAL CONCRETE PRODUCTION FACILITIES GUIDE

The following new SUBARTICLES are added after SUBARTICLE 9.2.18 and they are only applicable when the use of auger cast pile (ACP) grouts are delineated in the Plans. **Materials Manual Volume II, Section 9.2** articles are applicable unless modified in this **DevMM9.2ACP**.

DevMM9.2ACP does not apply for any other structural concrete.

9.2.19 PURPOSE

For the purposes of this document, the term concrete may also be in reference to auger cast pile (ACP) portland cement grout (grout).

This standard must be used in conjunction with developmental specifications **Dev346ACP** and **Dev455ACP**.

9.2.20 REFERENCES

Florida Department of Transportation. Developmental Specifications, Section 346 ACP Grout (**Dev346ACP**).

Florida Department of Transportation. Developmental Specifications, Section 455 ACP (**Dev455ACP**).

9.2.21 GENERAL INFORMATION

Grout will be produced in an approved structural concrete production facility.

Plants that supply concrete, including ACP grout, to Department projects must have a Producer QC Plan accepted by the Department in accordance with **Specifications Section 105**. The Department will maintain a list of Plants with accepted QC Plans that meet the requirements of this guide.

Concrete produced in accordance with **DevMM9.2ACP** will be accepted based on the proper certification and verification of project compressive strength acceptance criteria.

9.2.22 MATERIAL REQUIREMENTS

Meet the requirements of **Dev346ACP**.

9.2.22.1 Admixtures

Use only admixtures, including fluidifiers for ACP grout, approved by the Department in the concrete mixes. A certification from the admixture supplier that the admixture meets the requirements of **Specifications Section 924** is required. A certification from the fluidifier supplier that the fluidifier meets the requirements of **ASTM C937** is required. The admixture dosage rate of the product to be used should be within the range of the admixture manufacturer's technical data sheet. Dosage rates outside of this range may only be used with written recommendation from the admixture producer's technical representative.

Use fluidifiers meeting the requirements of **ASTM C937** that do not contain chlorides.

9.2.22.2 Scales, Meters, and other Weighing or Measuring Devices

Calculate the fine aggregate free moisture based upon dry sample weights and adjusting for absorption per **AASHTO T 255**. For fine aggregate, use a minimum sample size of 500 grams in lieu of the sample sizes required in **AASHTO T 255** Table 1.

9.2.22.3 Substitution of Materials

Obtain the Department's approval for portland cement, aggregates, and supplementary cementitious materials substitutions before placing the grout.

The Department may require a single 3.0 cubic yards minimum test batch at the Plant to demonstrate that the properties of the adjusted mix design are within the efflux, unit weight (density), air content, compressive strength, and chloride tolerances provided in **Specifications Section 346** or **Dev346ACP**.

9.2.22.4 ACP Grout Mix Designs

Concrete mix designs shall meet the requirements of **Specification Section 346** or **Dev346ACP**.

Proceed as follows to select the overdraft value in ACP grout mixes:

Use Table 1(a) at the concrete producer's option, or when the concrete producer has no records of field strength tests performed within the past 24 months and spanning no less than 45 calendar days for a class of concrete within 1,000 psi of that $f'c$.

TABLE 1a – Overdesign requirements for establishing $f'cr$ when data is not available				
Class of ACP Grout	56-day $f'c$ (psi)	Overdesign (psi)	56-day $f'cr$ (psi)	Maximum Allowable 56-day Compressive Strength (psi)
ACP Grout Class I	5,500	1,250	6,750	7,850
ACP Grout Class II	8,000	1,500	9,500	11,000

The Department may approve specific ACP grout mix designs for acceptance at 56 days in accordance with Table 1a. The mix design shall meet the durability requirements at 56 days when specified in the **Contract Documents**. Submit the strength development plot (cylinder compressive strength versus age) for test cylinder ages of 3, 7, 28 and 56 days. Mix designs meeting the overdesign requirements at 28-day will not be approved.

Attach the following supporting documentation with each new mix design submittal:

- (1) Submit a certification statement from the admixture manufacturer's technical representative that the proposed admixtures including fluidifier, if used, are compatible with all other admixtures to be included in the ACP grout mix design.
- (2) Thermal data from the demonstration pile for ACP grout mixes showing the maximum core temperature does not exceed 160°F. Include the maximum core temperature, the time to peak temperature, and the maximum temperature differential between the core and outer reinforcement.
- (3) Initial set time test results of ACP Grout mix in accordance with **ASTM C403**.
- (4) Efflux time test result in accordance with **ASTM D6449**.

9.2.22.5 Trial Batch Mixes

Ensure that the trial batch grout mix meet the plastic property requirements of the **Dev346ACP**.

For the hot weather trial batch mixes (mix temperature of 94°F or higher). Hold the trial batch mix in the mixer for 90 minutes (120 minutes for ACP Grout) after completion of initial mixing. During the extended mixing period, turn the drum intermittently for 30 seconds every five minutes. Cover the drum with wet burlap or an impermeable cover material during the rest periods. At the end of the 90 minute (or 120 minute) period, remix the trial batch mix for a minimum of one minute and make a slump (flow cone for ACP Grout) test to verify that the concrete is within the specified range for slump (flow cone). Ensure that the mix temperature is not less than 94°F at any time.

9.2.22.6 Mixing and Delivering Grout

Operate all Plant mixers at speeds per the mixer manufacturer's design or recommendation. Do not allow the volume of mixed batch material to exceed the mixer manufacturer's rated mixing capacity. Do not allow the volume of mixed batch material to exceed 80 percent of the mixer manufacturer's rated mixing capacity.

Do not haul ACP grout in mixer trucks loaded with more than 80 percent of the rated capacity shown on their attached plates.