

Section 1005

- 1 **A.** Applicable to Type 1 through 4 grouts.
- 2 **B.** Applicable to Type 5 grout.
- 3 **C.** Not applicable to Type 2 grout
- 4 **D.** ASTM C1107.
- 5 **E.** Minimum compressive strength at 3 days is only required to approve Type 3 grout mix
- 6 designs or evaluate Type 3 packaged grouts for the NCDOT APL.
- 7 **F.** Add mixing water to Type 3 packaged grout at the manufacturer’s recommended rate to
- 8 produce grout with the designed consistency and required 3 day strength.
- 9 **G.** Use Type 4 grout with proportions by volume of 1 part cement and 3 parts fly ash.

10 **1003-5 TEMPERATURE REQUIREMENTS**

11 When using an approved packaged grout, follow the manufacturer’s instructions for grout and
12 air temperature at the time of placement. Otherwise, the grout temperature at the time of
13 placement shall be not less than 50°F nor more than 90°F. Do not place grout when the air
14 temperature measured at the location of the grouting operation in the shade away from
15 artificial heat is below 40°F.

16 **1003-6 ELAPSED TIME FOR PLACING GROUT**

17 Agitate grout continuously before placement. Regulate the delivery so the maximum interval
18 between the placing of batches at the work site does not exceed 20 minutes. Place grout
19 before exceeding the times in Table 1003-3. Measure the elapsed time as the time between
20 adding the mixing water to the grout mix and placing the grout.
21

TABLE 1003-3 ELAPSED TIME FOR PLACING GROUT (with continuous agitation)		
Air or Grout Temperature, Whichever is Higher	Maximum Elapsed Time	
	No Retarding Admixture Used	Retarding Admixture Used
90°F or above	30 minutes	1 hr. 15 minutes
80°F through 89°F	45 minutes	1 hr. 30 minutes
79°F or below	60 minutes	1 hr. 45 minutes

22 **1003-7 MIXING AND DELIVERY**

23 Use grout free of any lumps and undispersed cement. When using an approved packaged
24 grout, mix grout in accordance with the manufacturer’s instructions. Otherwise, comply with
25 Articles 1000-8 through 1000-12 to the extent applicable for grout instead of concrete.

26 **SECTION 1005**
27 **GENERAL REQUIREMENTS FOR AGGREGATE**

28 **1005-1 GENERAL**

29 Obtain aggregates from sources participating in the Department’s Aggregate QC/QA Program
30 as described in Section 1006. Obtain aggregates from pre-approved sources, or have the
31 source approved before use. Approval of such sources is based not only on the quality of the
32 aggregate, but also on satisfactory production facilities and procedures. A list of approved
33 aggregate sources participating in the Department’s Aggregate QC/QA Program in North
34 Carolina and adjoining states is available from the Materials and Tests Unit. This list includes
35 aggregates meeting Specification requirements but whose use is restricted due to history of
36 unsatisfactory service performance. Use of aggregates is allowed in the work provided they
37 have been properly stockpiled in units of not less than 300 tons, tests of representative
38 samples of these aggregates indicate satisfactory compliance with the Specifications and the
39 source meets all the requirements of the Aggregate QC/QA Program.

1 Separate aggregate containing rock of more than one identifiable rock type or particles of
 2 visibly different degrees of weathering in amounts of 10% or more into each individual type.
 3 Aggregate is acceptable only if each type does not exceed the percentage of wear specified for
 4 a particular use.

5 Blended aggregates from different sources are allowed if all aggregates meet the
 6 Specifications for soundness or resistance to abrasion.

7 **1005-2 HANDLING AND STORING AGGREGATES**

8 Handle and stockpile aggregates in such a manner to minimize segregation.

9 Provide sites for aggregate stockpiles that are cleared, grubbed and cleaned with a firm,
 10 smooth and well drained ground surface. Maintain a cover of at least 3 inches of aggregate
 11 over the ground surface to avoid the inclusion of soil or foreign material. Operate trucks or
 12 other equipment on a stockpile in an acceptable manner.

13 Space or separate with suitable walls or partitions stockpiles of different types or sizes of
 14 aggregates to prevent the mixing of the aggregates. Do not allow the stockpile to become
 15 contaminated with foreign matter or degrade excessively. Failure of aggregate samples to
 16 meet all gradation requirements due to excessive degradation will be determined by sieve tests
 17 of samples taken from any portion of the stockpile and is cause for discontinuance of such
 18 stockpiling procedure.

19 Use material that consists mainly of rock dust produced through normal handling of the
 20 aggregate and that is essentially free from clay or shale.

21 **1005-3 GRADATION**

22 Grade all standard sizes of aggregate to meet Tables 1005-1 or 1005-2.

23 **1005-4 TESTING**

24 Aggregates will be tested in accordance with the test methods below except where other test
 25 procedures are required by other articles covering a particular application.

Property	Test Method
Gradation	AASHTO T 27 and T11, AASHTO T 88 as Modified for Base Course and Stabilizer
Liquid Limit	AASHTO T 89 as Modified
Plasticity Index	AASHTO T 90
Resistance to Abrasion (Percentage of Wear)	AASHTO T 96
Soundness	AASHTO T 104 Using Sodium Sulfate

26 Copies of modified test procedures are available from the Materials and Tests Unit.

**TABLE 1005-1
AGGREGATE GRADATION - COARSE AGGREGATE**

Std. Size #	Percentage of Total by Weight Passing													Remarks
	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#40	#200		
4	100	90-100	20-55	0-15	-	0-5	-	-	-	-	-	A	Asphalt Plant Mix	
467M	100	95-100	-	35-70	-	0-30	0-5	-	-	-	-	A	Asphalt Plant Mix	
5	-	100	90-100	20-55	0-10	0-5	-	-	-	-	-	A	AST, Sediment Control Stone	
57	-	100	95-100	-	25-60	-	0-10	0-5	-	-	-	A	AST, Str. Conc., Shoulder Drain, Sediment Control Stone	
57M	-	100	95-100	-	25-45	-	0-10	0-5	-	-	-	A	AST, Concrete Pavement	
6M	-	-	100	90-100	20-55	0-20	0-8	-	-	-	-	A	AST	
67	-	-	100	90-100	-	20-55	0-10	0-5	-	-	-	A	AST, Str. Concrete, Asphalt Plant Mix	
78M	-	-	-	100	98-100	75-100	20-45	0-15	-	-	-	A	AST, Str. Conc., Weep Hole Drains,, Asphalt Plant Mix	
14M	-	-	-	-	100	98-100	35-70	5-20	-	0-8	-	A	Asphalt Plant Mix, AST, Weep Hole Drains, Str. Concrete	
9M	-	-	-	-	100	98-100	85-100	10-40	-	0-10	-	A	AST	
ABC	-	100	75-97	-	55-80	-	35-55	-	25-45	-	14-30	4-12 ^B	Aggregate Base Course, Aggregate Stabilization	
ABC(M)	-	100	75-100	-	45-79	-	20-40	-	0-25	-	-	0-12 ^B	Maintenance Stabilization	
Light-weight ^B	-	-	-	-	100	80-100	5-40	0-20	-	0-10	-	0-2.5	AST	

A. See Subarticle 1005-4(A). B. See Subarticle 1005-4(B). C. For Lightweight Aggregate used in Structural Concrete, see Subarticle 1014-2e(6)

- 1 (A) When aggregates are used for Portland cement concrete, asphalt treatment and asphalt
 2 plant mix, the requirements pertaining to material passing the No. 200 sieve are as
 3 follows:
- 4 (1) When tested in a stockpile at the quarry site, the amount of material passing the
 5 No. 200 sieve shall be no greater than 1.0%.
- 6 (2) When tested at the job site before use, the amount of material passing the
 7 No. 200 sieve shall:
- 8 (a) Be no greater than 1.5% for aggregate used in Portland cement concrete or
 9 asphalt surface treatment.
- 10 (b) Be no greater than 2.0% for aggregate used in asphalt plant mix.
- 11 (3) If a stockpile at the job site is found to contain in excess of the specified amount of
 12 material passing the No. 200 sieve before use, the Engineer may approve its use
 13 provided:
- 14 (a) For aggregate used in Portland cement concrete, the total percentage by weight
 15 passing the No. 200 sieve in the combined coarse and fine aggregate in the mix
 16 does not exceed 3.5%, and provided no increase in water-cement ratio is
 17 required by the use of this aggregate.
- 18 (b) For aggregate used in asphalt plant mix, the total percentage by weight of minus
 19 No. 200 material in the plant mix being produced, as determined by the
 20 extraction test, can be maintained within the limits allowed by the job mix
 21 formula.
- 22 (B) For ABC and ABC(M), in addition to the gradation requirements, the material passing
 23 the No. 40 sieve shall not have a LL in excess of 30 nor a PI in excess of 4. For ABC
 24 used in asphalt plant mix, when tested during production, in a stockpile at the quarry site
 25 or at the job site before use, the amount of material passing the No. 200 sieve shall be
 26 from 0.0% to 12.0% by weight and the gradation requirements for material passing the
 27 No. 10 sieve (soil mortar) required in Section 1010 for ABC will not apply. For ABC not
 28 used in asphalt plant mix, the gradation requirements for material passing the
 29 No. 10 sieve (soil mortar) will be as required in Section 1010.

TABLE 1005-2 AGGREGATE GRADATION FINE AGGREGATE									
Std. Size #	Percentage of Total by Weight Passing								Remarks
	3/8"	#4	#8	#16	#30	#50	#100	#200	
1S	100	90-100		40-85		0-20		0-3	Blotting Sand, Asphalt Retreatment
2S	100	95-100	80-100	45-95	25-75	5-30	0-10	0-3	Concrete, Shotcrete, Grout, Subsurface Drainage, Blotting Sand
2MS		95-100	80-100	45-95	25-75	5-35	0-20	0-8 ^A	Concrete, Shotcrete, Grout, Subsurface Drainage
4S		100	95-100			15-45	0-10	0-5	Mortar

- 30 A. When tested at the job site before use, the amount of material passing the
 31 No. 200 sieve shall not be greater than 10%.