



## SECTION 1010

### SELECT GRANULAR BACKFILL FOR STRUCTURAL SYSTEMS

**1010.1 Scope.** This specification covers backfill material used as part of a mechanically stabilized earth wall system or in other applications requiring an engineered backfill material.

**1010.2 Material.** Aggregate used for backfill material may consist of gravel, crushed stone, reclaimed concrete, or other approved material meeting the requirements of this Section. The requirements for the gradation of the material, the general makeup of the material, and the testing of the material will apply to all potential uses of this material, unless otherwise specified on the plans or in the contract documents. The electrochemical requirements listed in this specification will apply to backfill material used for mechanically stabilized earth wall systems.

#### 1010.3 General.

**1010.3.1** To ensure proper functioning of the structure, the backfill material used for structural applications shall be in accordance with the following:

Sieve Size	Percent Passing by Weight
4-inch	100
No. 40	0-60
No. 200	0-10 *

\* May be increased to 15% if gradation sample is obtained from the compacted backfill material.

**1010.3.2** The frequency of sampling of the backfill material necessary to assure gradation control throughout construction shall be as directed by the engineer.

**1010.3.3** The plasticity index (PI) of the backfill material shall be determined in accordance with AASHTO T 90 and shall not exceed 6.

**1010.3.4** The angle of internal friction for the backfill material shall be no less than 34 degrees. No testing will be required whenever 80 percent of the particle sizes are greater than 0.75 inch or whenever the backfill material consists entirely of crushed stone. When testing is required, testing shall be in accordance with one of the tests specified below.

**1010.3.5** The angle of internal friction may be determined by the direct shear test in accordance with AASHTO T 236. This test shall be performed on the portion of the material finer than the No. 10 sieve, utilizing a sample of the material compacted to 95 percent of the maximum density as determined by AASHTO T 99, Methods C or D (with oversize correction as outlined in Note 7 in that publication), at optimum moisture content.

**1010.3.6** For select granular backfill other than crushed stone the organic content of the backfill material shall be less than or equal to one percent and shall be measured in accordance with AASHTO T 267 for material finer than the No. 10 sieve.

**1010.4 Electrochemical Requirements.** The following electrochemical requirements will apply to this backfill material whenever the material is used for mechanically stabilized earth wall systems.

**1010.4.1 Metallic Soil Reinforcement.**

**1010.4.1.1** When metallic soil reinforcements are used, the backfill material shall be in accordance with the electrochemical requirements as follows:

Requirement	Test Method
Resistivity > 2000 ohm-cm	AASHTO T 288
pH of 5-10**	AASHTO T 289
Chlorides ≤ 100 ppm	AASHTO T 291
Sulfates ≤ 200 ppm	AASHTO T 290*

\* Water soluble sulfates shall be tested in accordance with AASHTO T 290 Method A-Gravimetric Method with the following modifications: Per section 13, follow subsection 13.1 through 13.3 as stated in the test procedure. Transfer 250 ml of extracted sample to a 400-ml plastic beaker and place in a 90 C oven for 30 minutes. A blank should be run concurrently with the test sample using 250 ml of DI water. After 30 minutes, add 10 ml of barium chloride (100g/L) to test sample and blank. Place test sample and blank back into a 90 C oven and let samples digest for 12 to 24 hours. Filter through a retentive paper, wash the precipitate thoroughly with hot DI water, place the paper and contents in a weighted porcelain crucible, and slowly char and consume the paper without inflaming. Ignite at 1000 C for 2 hours, cool in a desiccator, and determine the mass as grams of barium sulfate. Subtract the blank and convert grams of barium sulfate to mg/kg of sulfate ion content.

\*\* Use pH of 5-9 for aluminized soil reinforcement.

**1010.4.1.2** Whenever the resistivity of the backfill material is greater than or equal to 5000 ohm-cm, the chlorides and sulfates requirements may be waived.

**1010.4.1.3** Resistivity shall be tested by the contractor in accordance with AASHTO T 288. Resistivity result will be defined by the minimum resistivity noted during the test. Resistivity shall be tested a minimum of once per 30,000 tons, by the Contractor and a minimum of once by quality assurance representing the engineer. Minimum sample frequency is per project, per source, per product. For samples that do not meet specifications a split sample shall be obtained from the source stockpile for final comparison testing. Contact the State Construction and Materials Engineer for acceptance.

**1010.4.2 Polymeric Soil Reinforcement.** When polymeric soil reinforcements are used, the backfill material shall be in accordance with the electrochemical requirements as follows:

Requirement	Test Method
pH of 4.5-9	AASHTO T 289

**1010.5 Certification and Acceptance.**

**1010.5.1** The contractor shall furnish to the engineer written certification that the backfill material provided complies with the applicable sections of this specification. Test results in the certification shall be within one year from the start of construction of each wall. Copies of all test results for tests performed to ensure compliance with this specification shall be

furnished to the engineer. The engineer will assure a minimum of one complete set of quality assurance tests for each complete certification supplied by the contractor, within the same time constraints.

**1010.5.2** Acceptance will be based on the written certification, accompanying test reports, and any applicable tests performed as directed by the engineer.