## Standard Method of Test for

# Determining Water-Soluble Sulfate Ion Content in Soil

**AASHTO Designation: T 290-95 (2020)**

**Technical Subcommittee: 1a, Soil and Unbound Recycled Materials**

**Release: Group 3 (July)**

AASHTO

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**555 12th Street NW, Suite 1000**
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## 1. SCOPE

1.1. This test method covers the determination of the water-soluble sulfate ion content in soil. This standard is divided into two parts. The first part specifies the procedure for sampling and preparing the sample to size for testing. The second part delineates two test procedures (Methods A or B) for the determination of the sulfate ion content in soils. The selection of the method is dependent on the concentration of sulfate ion and the accuracy desired. Two methods are given as follows:

| | Section |
|---|---|
| Method A: (Gravimetric Method) | (1 to 7) and (8 to 16) |
| Method B: (Turbidimetric Method) | (1 to 7) and (17 to 26) |

1.2. Method A is a primary measure of sulfate ion. Method B is less time-consuming, but often more liable to interference than Method A. It is particularly useful in the lower sulfate range and can be used as a screening test. This method is directly applicable over the range of 10 to 100 mg/kg.

1.3. The values stated in SI units are to be regarded as the standard.

## 2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- M 231, Weighing Devices Used in the Testing of Materials
- R 90, Sampling Aggregate Products

2.2. *ASTM Standards*:

- D859, Standard Test Method for Silica in Water
- D1129, Standard Terminology Relating to Water
- D1193, Standard Specification for Reagent Water
- E11, Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves

- E29, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E60, Standard Practice for Analysis of Metals, Ores, and Related Materials by Spectrophotometry
- E275, Standard Practice for Describing and Measuring Performance of Ultraviolet and Visible Spectrophotometers

## 3. TERMINOLOGY

3.1. For definitions of terms used in these methods, refer to ASTM D1129.

# PART I—INITIAL PREPARATION OF TEST SAMPLES

## 4. SCOPE

4.1. This method covers the dry preparation of soil and soil-aggregate samples, as received from the field, for use in determining the sulfate ion content in soils.

4.2. The following applies to all specified limits in this standard: For the purpose of determining conformance with these specifications, an observed value or calculated value shall be rounded off "to the nearest unit" in the last right-hand place of figures used in expressing the limiting value, in accordance with ASTM E29.

## 5. APPARATUS

5.1. The balance shall have sufficient capacity, be readable to 0.1 percent of the sample mass or better, and conform to the requirements of M 231.

5.2. *Drying Apparatus*—Any suitable device capable of drying samples at a temperature not exceeding 60°C (140°F).

5.3. *Sieves*—A series of sieves of the following sizes: 6.3 mm ($^1/_4$ in.), 4.75 mm (No. 4), 2.00 mm (No. 10), and a pan. The sieve shall conform to E11, Wire-Cloth Sieves for Testing Purposes (Note 1).

**Note 1**—The sieve sizes that have an opening size of 6.3 mm ($^1/_4$ in.) or larger shall conform to the requirements specified in E11, excluding Column No. 7. This exclusion permits the use of heavier screens in nonstandard frames that are larger than the 203.2-mm (8-in.) round frames.

5.4. *Pulverizing Apparatus*—Either a mortar and rubber-covered pestle or any device suitable for breaking up the aggregations of soil particles without reducing the size of the individual grains (Note 2).

**Note 2**—Other types of apparatus are satisfactory if the aggregations of soil particles are broken up without reducing the size of the individual grains.

5.5. *Sample Splitter*—A suitable riffle sampler or sample splitter for proportional splitting of the sample and capable of obtaining representative portions of the sample without appreciable loss of fines. The width of the container used to feed the riffle sampler splitter should be equal to the total combined width of the riffle chutes. Proportional splitting of the sample on a canvas cloth is also permitted.