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Standard Specification for Silica-Based Sediments for the Evaluation of Stormwater Treatment Devices¹

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1. Scope

1.1 This specification covers the mineralogy, specific gravity, and particle size distributions (PSDs) of silica-based sediments to be used in the laboratory performance testing of stormwater treatment devices as well as criteria defining acceptable error for the target PSDs.

1.2 Silica-based sediment is used as a surrogate material for performance and scour determinations for some manufactured stormwater treatment devices such as hydrodynamic separators and filters. These data are used to gain regulatory approvals within certain jurisdictions.

1.3 Acceptance of test results attained according to this specification may be subject to specific requirements set by a Quality Assurance Project Plan, a specific verification protocol, or a policy set by an Authority Having Jurisdiction (AHJ). It is advised to review one or all of the above to ensure compliance.

1.4 The values stated in inch-pound units are to be regarded as standard, except for methods to establish and report sediment concentration and particle size. It is convention to exclusively describe sediment concentration in mg/L and particle size in mm or μm , both of which are SI units. The SI units given in parentheses are mathematical conversions, which are provided for information purposes only and are not considered standard. Reporting of test results in units other than inch-pound units shall be regarded as conforming with this test method.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* Silica-based sediment is considered hazardous under the OSHA Hazard Communications Standard (29 CFR 1910.1200).

1.6 *This international standard was developed in accordance with internationally recognized principles on standard-*

¹ This test method is under the jurisdiction of ASTM Committee E64 on Stormwater Control Measures and is the direct responsibility of Subcommittee E64.01 on Lab Evaluation.

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ization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

D2216 Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

D3665 Practice for Random Sampling of Construction Materials

D4959 Test Method for Determination of Water Content of Soil By Direct Heating

D6913/D6913M Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

D7928 Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis

E3318 Terminology for Standards Relating to Stormwater Control Measures

2.2 Other Standards:³

29 CFR 1910.1200 OSHA Hazard Communications Standard

3. Terminology

3.1 Definitions:

3.1.1 For definitions of common technical terms used in this standard, refer to Terminology E3318.

4. Specification for Silica-Based Sediment

4.1 The silica-based sediment shall comprise a minimum 98 % SiO_2 .

4.2 Technical data provided by the sediment supplier shall list a Specific Gravity equal to 2.65 for the silica-based sediment used for the test.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from Occupational Safety and Health Administration (OSHA), 200 Constitution Ave., NW, Washington, DC 20210, <http://www.osha.gov>.

4.3 The total mass of sediments must be established. The total mass can either be measured directly after drying or can be calculated on the basis of the moisture content measurements (following Test Methods [D2216](#) and [D4959](#)).

5. Specifications for Particle Size Distributions

5.1 The sediment particle size distribution for hydrodynamic separator and filter testing shall be in accordance with the distributions shown in [Table 1](#) and illustrated in [Fig. 1](#). For hydrodynamic separator evaluation with fine sediment, the measured D_{50} value shall not exceed 75 microns for suspended sediment removal testing (Sediment A) and 230 microns for sediment scour testing (Sediment C). For hydrodynamic separator evaluation with coarse sediment, the measured D_{50} value shall not exceed 110 microns for suspended sediment removal testing (Sediment B) and 230 microns for sediment scour testing (Sediment C). For filter evaluation, the measured D_{50} value of test sediment shall not exceed 75 microns for suspended sediment removal testing (Sediment D) and sediment scour testing (Sediment D). The Particle Size Distribution of the test sediment used shall be determined using Test Methods [D6913/D6913M](#) and [D7928](#). A minimum of three separate samples shall be obtained for analysis and reporting. For each sample, the measured particle sizes and their corresponding percent finer values shall be log-linearly interpolated to match the sizes listed in [Table 1](#). Following interpolation, the average percent finer values of the samples shall be calculated and used to determine compliance.

5.2 A measured value may be lower than a target percent finer value by up to two percentage points (for example, for fine suspended sediment removal testing, at least 3 % of the particles must be less than 2 microns in size since the target for 2-micron particles is 5 %), provided the measured D_{50} value does not exceed the values listed in [5.1](#).

6. Obtaining a Representative Test Sample

6.1 The test sediment to be sampled for PSD verification must be a blended sample. The blended sediment may be contained in packaged units, such as small bags or buckets not

exceeding 5 gal (18.9 L), or bulk sources, such as bulk bags or containers. Bulk sources must be re-packaged into small bags or buckets and thereafter may be considered packaged units. Obtain a composite test sample from multiple packaged units with a total mass up to 100 pounds (45.4 kg) in accordance with [6.2](#).

6.2 To obtain a composite test sample from small, packaged units, such as small bags or buckets not exceeding 5 gal (18.9 L), select units to be sampled using a random method without replacement, such as Practice [D3665](#), from the supply of packaged units. The number of units to be randomly selected from which to obtain the composite test sample shall be at least 20-percent of the total number of packaged units in the supply, but not less than three units. An equal quantity shall be taken from each selected unit and the composite shall be mixed thoroughly.

6.3 To gather subsamples from the composite test sample for analysis and reporting, each subsample must be gathered from several locations within the package container of composite test sample sediment as described in the following subsections and combined to form a composite analysis and reporting sample with a mass of at least 2 lb (0.9 kg).

6.3.1 Samples shall be taken from the center of three discrete zones within the package container. The three zones shall be established by conceptually dividing the container into three vertical sectors (the upper third, middle third, and lower third).

6.3.2 Samples may be taken as bulk sources are re-packaged into smaller packaged units or when transferring packaged units between containers. Samples shall be taken as the packaged unit container is filled by thirds. If a full packaged unit is sampled, a powder thief, trier, or lance shall be used to gather the three samples.

6.3.3 The three equally sized samples shall be combined to form a single composite analysis and reporting sample with a mass of at least 2 lb (0.9 kg).

6.3.4 Thoroughly mix the composite analysis and reporting sample and then reduce the quantity for testing to a mass of 1.0

TABLE 1 Test Sediment Particle Size Distribution

Particle Size (Microns)	Target Percent Finer (%)			
	Hydrodynamic Separators			Filters
	Sediment Removal Testing		Sediment C Sediment Scour Testing Preload	Sediment D Sediment Removal Testing and Scour Testing Preload
Sediment A Fine Sediment	Sediment B Coarse Sediment			
1000	100	100	100	100
500	95	100	90	95
250	90	100	55	90
150	75	98	40	75
125	N/A ^A	79	N/A	N/A
106	N/A	42	N/A	N/A
100	60	N/A	25	60
90	N/A	21	N/A	N/A
75	50	1	10	50
53	N/A	0	N/A	N/A
50	45	0	0	45
20	35	0	0	35
8	20	0	0	20
5	10	0	0	10
2	5	0	0	5

^AN/A = Not Applicable