Designation: ~~D7560 – 16ε1~~ D7560 – 22

Standard Test Method for Determination of Fiber Length Percentages in Hydraulic Erosion Control Products (HECPs)[1]

This standard is issued under the fixed designation D7560; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

~~ε[1] NOTE—Editorially corrected units of measurement statement in June 2021.~~

1. Scope

1.1 Hydraulic erosion control product (HECP) fibers are manufactured and processed to specific length and width dimensions to facilitate the hydraulic application and to prevent clogging of the pump, recirculation pipes, nozzles, and tips. This test method ~~provides the requirements and procedures needed~~ is used to determine ~~quantitatively~~ the ~~fiber~~ length ~~percentages of hydraulic erosion control products (HECPs).~~of the fibers on a percentage basis in an HECP.

1.2 This test method ~~allows for comparative evaluation of in-process HECPs to a manufactured product specification.~~can be used to evaluate an HECP during and after manufacturing. The results can be used for comparative evaluations of the manufacturing process.

1.3 *Units*—The values stated in SI units are to be regarded as ~~standard. The values given in parentheses are provided for information only and are not considered standard.~~the standard. No other units of measurement are included in this standard. Sieve designations are shown in both the standard and alternative designations.

1.4 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026.

1.4.1 The procedures used to specify how data are collected/recorded or calculated in the standard are regarded as the industry standard. In addition, they are representative of the significant digits that generally should be retained. The procedures used do not consider material variation, purpose for obtaining the data, special purpose studies, or any considerations for the user's objectives; and it is common practice to increase or reduce significant digits of reported data to be commensurate with these considerations. It is beyond the scope of this standard to consider significant digits used in analysis methods for engineering design.

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.*

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

[1] This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.25 on Erosion and Sediment Control Technology.

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2. Referenced Documents

2.1 *ASTM Standards:*[2]

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D2974 Test Methods for Determining the Water (Moisture) Content, Ash Content, and Organic Material of Peat and Other Organic Soils

D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

D4753 Guide for Evaluating, Selecting, and Specifying Balances and Standard Masses for Use in Soil, Rock, and Construction Materials Testing

D6026 Practice for Using Significant Digits and Data Records in Geotechnical Data

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

3. Terminology

3.1 ~~*Definitions—Definitions:* For common definitions of technical terms used in this standard, refer to Terminology D653.~~

3.1.1 For definitions of common technical terms used in this standard, refer to Terminology D653.

3.2 *Definitions of Terms Specific to This Standard:*

~~3.2.1 *hydraulic erosion control product, HECP, n*—a manufactured, temporary, degradable, pre-packaged fibrous material that is mixed with water and hydraulically applied as a slurry designed to reduce soil erosion and assist in the establishment and growth of vegetation.~~

3.2.1 *hydraulically applied, adj—in erosion control*, ~~applied within a water slurry, solution, or emulsion~~applying a liquid based substance, such as a water slurry, solution or emulsion, to the soil surface ~~as a spray-on or dropped-on application through various means, such as nozzle, tower, and~~by spraying or dropping using devices such as nozzles, towers, or aerially.

4. Summary of Test Method

4.1 A ~~sample of HECP is~~ representative sample is obtained either during manufacturing or from a processed and sealed bag. A test specimen is taken from the representative sample, put in a sieve stack that is placed in a sieve shaker ~~machine and after five minutes, the various screens are emptied and the cumulative fiber~~and allowed to shake for 5 min. After shaking, the mass of fibers retained on each sieve ~~is weighed and the percent retained for each sieve is recorded on the data sheet.~~ are measured and recorded. The cumulative mass retained per sieve is then calculated and recorded.

5. Significance and Use

5.1 ~~This test method determines the various fiber lengths that make up an HECP fiber mulch material. HECP fibers are engineered and processed to specific length and width dimensions that facilitate the hydraulic application and prevent clogging of the pump, recirculation pipes, nozzles, and tips.~~The fiber length of an HECP plays a role in the ability of the HECP to effectively be mixed and applied. This standard can be used by manufacturers to evaluate their manufacturing process (quality assurance/quality control). Laboratories can also use this method for quality assurance/quality control and also conformance to criteria testing.

~~5.2 This test method is used by manufacturers of HECP products for quality assurance testing.~~

NOTE 1—The quality of the result produced by these test methods is dependent on the competence of the personnel performing it, and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D3740 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of these test methods are cautioned that compliance with Practice D3740 does not in itself assure reliable results. Reliable results depend on many factors; Practice D3740 provides a means of evaluating some of those factors.

6. Apparatus

6.1 *Balance/Scale*—~~A balance or scale conforming~~ Balances/scales shall conform to the requirements of Guide D4753 ~~readable to 0.1% of the total test mass, or better. See Annex A1 for examples.~~ and be verified/calibrated annually. The balance/scale must

[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.

have a readability without estimation of 0.001 g or better; and have a capacity that exceeds the mass of the sample plus a container. In general, a balance/scale with a minimum capacity of 200 g is usually sufficient.

6.2 *Mechanical Sieve Shaker*—~~Sieve shaker machine capable of a~~ A device that holds a stack of sieves while imparting a circular motion having a minimum of 270 oscillations ~~in a circular motion~~ and a minimum of 150 vertical taps per minute. The ~~sieve shaker must be able to hold six full height 50 mm (2 in.) sieves with a diameter of 200 mm (8 in.).~~shaker shall have a timing device or a timing device shall be used in conjunction with the shaker having a readability to the nearest 1 s or better. The sieve shaker shall be verified annually.

6.3 *Sieves*—~~Test sieves compliant with~~Each sieve shall conform ~~E11 - 13, Requirements.~~ to the requirements of Specification E11~~The specified sieve frame are 203 mm (8 in.)~~ . The sieves, lids, and pans shall be 203 mm in diameter and 50.8 mm ~~(2 in.) in height.~~ in height. The sieve stack consists of a lid, 2.36 mm (No. 8), 1.18 mm (No. 16), 0.710 mm (No. 25), 0.300 mm (No. 50), 0.150 mm (No. 100), and a pan in order from top to bottom.

6.4 *Miscellaneous Items*—~~Standard sieve set consisting of 2.36 mm No. 8 (.0937 in.), 1.18 mm No. 16 (0.0469 in.), 0.71 mm No. 25 (0.0278 in.), 0.3 mm No. 50 (0.0117 in.), 0.150 mm No. 100 (0.0059 in.), and sieve pan.~~Items such as dust masks, sieve brushes, and bowls may be useful.

~~7. Hazards~~

~~7.1 7.1 HECPs may be dusty and a dust mask is recommended when working with these products.~~

7. ~~Sampling, Test Specimens,~~ Sampling and Test ~~Units~~Specimens

7.1 HECPs may be dusty and a dust mask is recommended when working with these products.

7.2 *Manufacturing Process Sampling*—~~When testing during the manufacturing process, obtain a~~ Obtain a representative sample of at least ~~90 g (3.17 oz) with a moisture content of 10 ± 5 %~~ 90 g that has a water content of 10 ± 5 % before the bagging ~~procedure.~~ process. Working quickly, measure and record the mass of the representative sample to the nearest 1 g. Then immediately take 50 ± 10 g of material from the representative sample and use it to determine the water content. Follow the procedure in Test Methods D2974, Method A for obtaining only the water content. Measure and record all the values associated with the water content determination. Place the remaining representative sample in an airtight container and seal until the water content has been determined and verified to be within the stated range. If the water content is not within the specified range, discard the representative sample and obtain a new representative sample. Once a representative sample meets the specified water content range, proceed to 7.4.

~~8.1.1 Place the fiber in a large mixing bowl and break the compressed fibers apart with your thumb and fingers.~~

7.3 *Sealed Bag or Bale Sampling*—Check any bag or bale to be used for testing for visible damage, such as tears, rips, and holes prior to use. If the packaging is damaged, do not use it for testing. Working quickly, open the bag or bale and take at least 30 g from each of the top one third, middle one third, and the bottom one third of the bag or bale. Record the mass of each of the thirds and the total mass of the representative sample to the nearest 1 g. Then immediately take 50 ± 10 g of material from the representative sample and use it to determine the water content. Follow the procedure in Test Methods D2974, Method A for obtaining only the water content. Measure and record all the values associated with the water content determination. Place the remaining representative sample in an airtight container and seal until the water content has been determined and verified to be within the stated range. If the water content is not within the specified range, discard the representative sample and obtain a new representative sample. Once a representative sample meets the specified water content range, proceed to 7.4.

7.4 ~~When testing from a full, sealed bag, prepare the specimen by separating 90 g (3.17 oz) of fiber from an undamaged bag or bale taking one third from the top, one third from the middle, and one third from the bottom of the bag.~~Place the fibers of the remaining representative sample in a large mixing bowl and gently break the compressed fibers apart with your thumb and fingers. Take 10 ± 1 g of the representative sample to obtain the test specimen. Measure and record the mass of the test specimen to the nearest 0.001 g. If additional test specimens are desired, make sure to store them in airtight containers and keep sealed until needed.

~~8.2.1 Place the fibers in a large mixing bowl and gently break the compressed fibers apart with your thumb and fingers.~~

8. Procedure

8.1 Assemble the sieve ~~set~~stack as described in ~~6.4~~6.3 ~~from largest diameter openings to the smallest and sieve pan.~~.

8.2 Measure and record the mass of the specimen before shaking to the nearest 0.001 g (Note 2). Place the test specimen on the first/top sieve in the stack, cover with the lid, and place the sieve stack in the sieve shaker.

8.3 Shake the sieve stack for 5 min.

8.4 After shaking, remove the sieve stack from the shaker and sit the sieve stack close to the balance/scale to be used for obtaining the masses.

8.5 ~~Measure out 10 g (0.35 oz) of fiber, place it on the top screen of the~~ Starting with the first sieve, empty the contents of the first sieve without spilling outside the collection/transfer container making sure to carefully remove the fibers from the sieve. Make sure to remove all the fibers from the sieve. Measure and record the mass of the fibers retained on this sieve, MR_n, ~~sieve stack, and place the sieve stack~~ to the nearest 0.001 g. Repeat for each sieve and the pan in the sieve ~~shaker machine.~~stack. Measure and record the mass of the specimen after shaking, M_t, to the nearest 0.001 g. Masses may be recorded individually or cumulatively. If data is recorded individually, the cumulative mass retained must be calculated before using the equations in Section 9. The cumulative mass retained, CMR_n for a particular sieve (*Nth* sieve) is calculated by adding the mass of material retained on the Nth sieve (MR_n) and those above it.

~~9.2.1 Set the timer for five minutes and allow the sieve pans to shake.~~

~~9.2.2 After five minutes, remove the fiber from each sieve and the bottom sieve pan; determine and record the mass to 0.1 g (0.0035 oz).~~

~~NOTE 1—The quality of the result produced by these test methods is dependent on the competence of the personnel performing it, and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D3740 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of these test methods are cautioned that compliance with Practice D3740 does not in itself assure reliable results. Reliable results depend on many factors; Practice D3740 provides a means of evaluating some of those factors.~~

NOTE 2—The mass of the specimen before shaking may be the same as the mass of the test specimen if the test specimen is being transferred immediately from the balance/scale in 7.4. If the test specimen was transferred to another container for testing later, it is recommended to measure the mass just prior to putting it in the sieve stack. Knowing the mass of the specimen before and after shaking provides an easy quality control check.

9. Calculation or Interpretation of Results

9.1 ~~Total the volume of fiber~~Calculate the cumulative percent retained, ~~*retained*~~CPR_n, on each sieve ~~including the sieve pan, divide the mass of a single sieve or sieve pan by the total to~~ and in the pan using the following equation:

$$CPR_n = \left(\frac{CMR_n}{M_t}\right) \times 100 \quad (1)$$

~~determine percent collected, and report the percent cumulative retained for each sieve and sieve pan.~~

where:

CPR_n = cumulative percent retained on each sieve, nearest 0.1 %,
CMR_n = cumulative mass retained on the *Nth* sieve , nearest 0.001 g,
M_t = mass of test specimen after shaking, 0.001 g, and
n = subscript indicating the sieve number

10. Report: Test Data Sheet(s)/Form(s)

10.1 The methodology used to specify how data are recorded on the test data sheet(s)/form(s), as given below, is covered in 1.4 and in Practice D6026.

10.2 Record as a minimum the following general information (data):

10.2.1 Identification of the material being tested, such as manufacturer, batch number, lot number, type of HECP.