



Standard Practice for Sample Preparation for GCCM¹

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1. Scope

1.1 This standard practice specifies a set of instructions for preparing samples of geosynthetic cementitious composite mat (GCCM) for index property testing.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

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

1.3.1 For purposes of comparing measured or calculated value(s) with specified limits, the measured or calculated value(s) shall be rounded to the nearest decimal or significant digits in the specified limits.

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

1.4 *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 and health practices and determine the applicability of regulatory limitations prior to use.* Some specific hazards statements are given in Section 7 on Hazards.

¹ This practice is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.05 on Geosynthetic Erosion Control.

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2. Referenced Documents

2.1 *ASTM Standards*:²

C191 Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle

D4439 Terminology for Geosynthetics

D6026 Practice for Using Significant Digits in Geotechnical Data

3. Terminology

3.1 *Definitions*: For definitions of common technical terms used in this standard, refer to Terminology D4439.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *cured, adj*—a description of the state of a GCCM after hydration for a specified period of time under specified conditions, followed by a period of time where the GCCM is kept under a specified environmental condition during which the cementitious matrix continues to crystallize and develop strength.

3.2.2 *curing time, n*—the time subsequent to initial hydration of the GCCM and immediately prior to the testing of the material during which the cementitious material is allowed to harden and form its final structure. The specific process for curing is specified in 9.3.

3.2.3 *dry, adj*—a description of the state of a GCCM before it has been exposed to a hydration source. Typically describes the "as received" dry product after conditioning in prescribed manner.

3.2.4 *geosynthetic cementitious composite mat (GCCM), n*—a factory assembled barrier consisting of a cementitious material contained within layer or layers of geosynthetic materials. The GCCM forms a hardened barrier when properly hydrated and cured.

3.2.5 *hydration, n*—exposure of the GCCM, in this case, to water in prescribed conditions for a prescribed time.

3.2.6 *index property test, n*—in geosynthetics, a standard test that may be used to compare the relative material properties of erosion control products.

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.



3.2.7 *initial setting time, n*—the time subsequent to initial hydration of the GCCM at which the cementitious gel begins to interlock and form an extended structure. The measurement of initial setting time is prescribed, for instance, in Test Methods C191.

3.2.8 *wet, adj*—a description of the state of a GCCM after it has been exposed to a hydration source for a period of time less than the initial setting time of the cementitious mixture.

4. Summary of Practice

4.1 A representative sample of dry GCCM is either 1) cut into dry specimens or 2) exposed to water under controlled conditions and for a prescribed time, allowed to cure (harden), and then cut into specimens for index testing.

5. Significance and Use

5.1 This practice is intended to create specimens of GCCM products appropriate for testing for the determination of index properties. Cured (hardened) samples are not necessarily intended to represent a field application of GCCM products but would be representative of the correct amount of water applied to a known style of product and provide a basis for consistent and repeatable index property testing.

6. Apparatus

6.1 *Balances*—A balance with 0.01 lb readability is required (excluding the mass of the sample container).

6.2 *Sample Containers*—Suitable containers which are resistant to corrosion and change in mass upon repeated exposure to moisture, materials of varying pH, and cleaning.

6.3 Die, of known dimensions.

6.4 *Tile Saw, with diamond tipped blades*—used for cutting cured sample to predetermined dimension using pattern marked on cured specimen with template and markers.

6.5 *Miscellaneous, knives, templates, markers*—as required for marking and cutting specimens to fixed dimensions before measurement of weight. A knife with a “snap off” type blade is recommended for cutting GCCM’s, which can dull blade tips rapidly.

7. Hazards

7.1 *Safety Hazards*—GCCM products can be dusty. Eye protection and a dust mask are recommended to be worn during the procedure.

8. Procedure A – Dry (unhydrated) Specimens

8.1 Obtain a sufficient amount of representative laboratory sample of the GCCM to satisfy 8.2.

8.1.1 The laboratory sample should be in satisfactory condition and representative of the bulk of the product delivered to the facility.

8.1.2 All sample and specimen cutting should be carried out in clean area free of debris and preferentially with a surface covering to collect any loose powder which may come from material during cutting.

8.1.3 The number of test specimens shall be specified in each test method. These specimens shall be cut such that they are representative of the roll width.

8.2 Preparation of Dry Specimens:

8.2.1 Using a die, or template and knife, carefully cut the required number of specimens randomly from the sample, but in a manner that is distributed across the width of the sample.

8.2.2 All samples and specimens shall be cut, whether using die, saw, or knives to the specific dimensions required for the test being performed.

8.2.3 The loss of cement powder from edges of the specimen during the cutting process may have a significant impact on the accuracy of a given test method. This can be a more significant issue for dry or wet samples, as defined under this method. The technician performing this test method should practice cutting specimens from the sample to gain confidence in preparing the sample without significant loss of cement powder.

8.2.4 If using a die to cut the specimen, loss of powder can be minimized by leaving the die in place and removing any remaining sample, including loose powder, from the outside of the die before moving the die. If a base material like cardstock is used with the die when cutting the specimen, the cardstock and die can be used as a temporary container. Transfer the specimen to a sample container with minimal loss of powder.

8.2.5 If using a template and knife to cut the specimen, mark the test specific template on the sample. After cutting the specimen, place the cut specimen into the sample container. Collect any loose powder from the cutting area. Place half of the loose powder into the sample container and discard the remaining half.

8.2.6 The specimen in the sample container, as prepared above, is now conditioned by bringing the specimens to moisture equilibrium in an atmosphere of $21 \pm 2^\circ\text{C}$ and $65 \pm 5\%$ relative humidity. Equilibrium is considered to have been reached when the change in mass of the test specimen in successive weighing, made at intervals of not less than 2 h, does not exceed 0.1% of the previous mass of the test specimen. After conditioning, the specimens are ready for testing.

9. Procedure B – Wetted (hydrated only or hydrated and hardened) Specimens

9.1 Obtain a sufficient amount of representative sample of the GCCM to satisfy 9.2.

9.1.1 The laboratory sample should be in satisfactory condition and representative of the bulk of the product delivered to the facility.

9.1.2 All sample and specimen cutting should be carried out in clean area free of debris and preferentially with a surface covering to collect any loose powder which may come from material during cutting.

9.1.3 The number of test specimens shall be specified in each test method. These specimens shall be cut such that they are representative of the roll width.

9.2 Preparation of Wet Specimens:

9.2.1 Mark on the dry GCCM lab sample a template that represents the size of the specimens required for the specific