



Designation: D8030/D8030M – 23

## Standard Practice for Sample Preparation for GCCM<sup>1</sup>

This standard is issued under the fixed designation D8030/D8030M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 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 nonconformance 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 user's 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* Some specific hazards statements are given in Section 7 on Hazards.

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

*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:*<sup>2</sup>

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

D4354 Practice for Sampling of Geosynthetics and Rolled Erosion Control Products (RECPs) for Testing

D4439 Terminology for Geosynthetics

D6026 Practice for Using Significant Digits and Data Records 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 material continues to cure and develop compressive 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 10.3.

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

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

3.2.5 *initial setting time, n*—the time subsequent to initial hydration of the GCCM at which the cementitious material

<sup>1</sup> 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.

Current edition approved Feb. 1, 2023. Published March 2023. Originally approved in 2016. Last previous edition approved in 2019 as D8030/D8030M – 19. DOI: 10.1520/D8030\_D8030M-23.

<sup>2</sup> 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.

begins to cure and form an extended structure. The measurement of initial setting time is prescribed, for instance, in Test Methods C191.

3.2.6 *uncured, 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.

3.2.7 *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 material.

4. Summary of Practice

4.1 A representative sample of uncured (dry) GCCM is either (1) cut into uncured 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 *Saw*, such as a tile saw or wall chaser cutter with diamond-tipped blades, used for cutting cured test specimens to predetermined dimensions.

6.5 *Hydration Tank*—A watertight container with dimensions sufficient to fit the forms, square support bars, and GCCM coupons.

6.6 *Forms*, typically 300 mm [12 in.] square, positioned either side of the GCCM coupons in the hydration tank. Forms must be aluminum or stainless steel, at least 0.2 in. [5 mm] thick, and flat.

6.7 *Square Support Bars*, with a square cross section of 12 mm [½ in.]. Four bars are required per coupon (see Appendix X1) and are typically 250 mm [10 in.] long for a 300 mm [12 in.] coupon.

6.8 *Miscellaneous Knives, Templates, Markers*, as required for marking and cutting samples, coupons, and specimens to fixed dimensions. A knife with a “snap off” type blade is recommended for cutting uncured GCCMs, 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. Sampling, Test Specimens, and Test Units

8.1 *Lot Sample*—For the lot sample, refer to Practice D4354 for discussion of recommended practice for breaking up shipments of GCCM into lots for testing.

8.2 *Laboratory Samples*—Cut a full-width sample from the lot sample that must be large enough to enable the required number of coupons and test specimens to be cut from it. The laboratory sample must be cut at least 300 mm [1 ft] from the ends of the lot sample. It is essential that the cementitious material is not damaged and has not fallen out of the GCCM. In cases of dispute, take a laboratory sample that will exclude material from the outer wrap of the roll or the inner wrap around the core, of at least 900 mm [3 ft] from the interior end of the roll (wrapped around the core) or exterior end of the material roll, measured from the edge of the cementitious portion of the material.

8.3 *Test Specimens*—Take specimens at random but equally spaced from the laboratory sample. The number of test specimens shall be specified in each test method. Uncured test specimens must be taken a minimum of 100 mm [4 in.] from the edge of the laboratory sample, measured from the edge of the cementitious portion of the material.

8.4 *Coupons*—For preparation of wetted or cured GCCM test specimen(s). The coupon is cut from the uncured laboratory sample and is oversized compared to the test specimen(s) by at least 25 mm [1 in.] along the perimeter of the test specimen(s). A coupon may include one or more specimens and is often 300 mm [12 in.] square; see Fig. 1.

9. Procedure A – Uncured (Dry) Specimens

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

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

9.2 Preparation of Uncured Specimens:

9.2.1 Using a die, or template and knife, carefully cut the required number of test specimens.

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

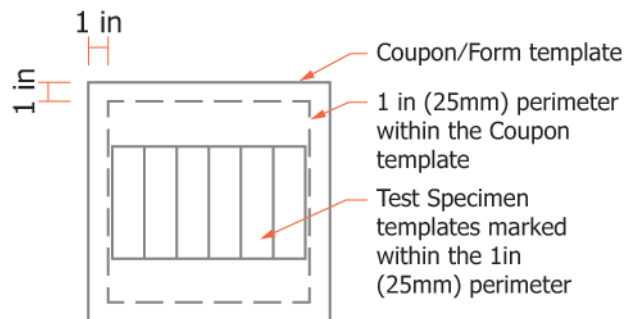


FIG. 1 Test Specimen Templates Marked Within the 1 in. Perimeter of the Coupon Template

9.2.3 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 uncured 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.

9.2.4 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.

9.2.5 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.

9.2.6 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.

## 10. Procedure B – Wetted (Hydrated Only) or Cured (Hydrated and Hardened) Specimens

10.1 Obtain a sufficient amount of representative laboratory sample of the GCCM to satisfy 10.2 or 10.3.

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

10.1.2 Mark on the uncured GCCM laboratory sample a template of the forms (and therefore maximum possible coupon size). Mark the perimeter 25 mm [1 in.] inside the form template. Mark within this perimeter a template that represents the size of the test specimen(s) required for the specific test to be carried out; Fig. 1. Multiple coupons may be required to produce the number of test specimens required for the specific test. Mark the machine direction on the coupon.

10.1.3 Cut using a die or a knife the required number of coupons of the GCCM sample for preparation of wetted or cured specimens.

10.1.4 The loss of cement powder from edges of the coupon 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 specimens tested dry or wet, rather than cured, as defined under this method. The technician performing this test method should practice cutting coupons from the sample to gain confidence in preparing them without significant loss of cement powder.

### 10.2 Preparation of Wet Specimens:

10.2.1 Prepare the hydration tank with potable water equilibrated to standard temperature of  $21 \pm 2^\circ\text{C}$ .

10.2.2 Entirely immerse the coupon(s) in the tank for a period of 20 min.

10.2.3 Remove each coupon from the tank and cut the actual test specimens to the required test dimensions from the oversized coupons using die or template and knife, using the same procedure as for uncured samples (see 9.2) to collect any material that spills from the sides.

10.2.4 Place the specimen and any collected spill into a sample container.

10.2.5 If wet specimens are to be tested, there is no additional conditioning and testing is to proceed within 20 min of being removed from the hydration tank.

### 10.3 Preparation of Cured Specimens:

10.3.1 Prepare the hydration tank with potable water equilibrated at  $21 \pm 2^\circ\text{C}$ , of a sufficient depth to fully submerge all of the forms, square support bars, and GCCM coupons to be stacked.

10.3.2 Insert the first form in the bottom of the hydration tank. Place the coupon in the tank, on the form with top side uppermost. Ensure the coupon is flat and place the four square support bars on the four sides of the coupon. Each bar should be positioned no further than 1 in. [25 mm] from the edge of the coupon (outside of the 1 in. marked perimeter in Fig. 1) and the bars should not touch each other. Cover the square support bars with another form so that it is supported by the four bars. It is important that the upper form does not contact the top side of the coupon. Multiple coupons may be hydrated by forming a stack of forms, square support bars, and coupons as described above, providing the top side of each coupon is not contacted anywhere other than around its perimeter by a set of square support bars. Ensure the coupons are fully submerged and that water can enter the coupon from the edges. An example stacking procedure is shown in Appendix X1.

10.3.3 The coupon(s) is allowed to cure for 24 to 26 h in the hydration tank. The coupon(s) is then removed from the hydration tank and inspected to check that they are flat.

10.3.4 It is important that the GCCM coupons are flat to obtain repeatable measurements. If a coupon is deflected vertically by more than 2 mm [0.08 in.] away from its plate anywhere across its full surface, discard the coupon. Obtain a new coupon and repeat this procedure, but at 10.3.2 place up to two 12 mm [ $\frac{1}{2}$  in.] cubes on the coupon, close to the center if possible, in order to hold the coupon flat. The cubes must be at least 50 mm away from the center of each specimen that will be cut from the coupon.

10.3.5 Once inspected and confirmed to be within tolerance, the coupons are placed in a plastic bag that is sealed and stored in an atmosphere of  $21 \pm 2^\circ\text{C}$  and  $65 \pm 5\%$  relative humidity, and remain in this environment for the remainder of their curing time.

10.3.6 The coupons are then removed from the plastic bags and are dried by placing them on paper towels, with two layers of paper towel placed on the top of the coupon for up to 20 min.