



Designation: D8173 – 23

Standard Guide for Site Preparation, Layout, Installation, and Hydration of Geosynthetic Cementitious Composite Mats¹

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1. Scope

1.1 This guide covers directions for the installation of geosynthetic cementitious composite mat (GCCM) materials under field conditions typically present in erosion control, hydraulic structure armoring and protection, and protection applications. This guide also covers directions for the installation of a special category of GCCMs known as geosynthetic cementitious composite barrier (GCCB) materials, under field conditions typically present in geotechnical or civil engineering applications, with the purpose of reducing or preventing the flow of fluid through the construction.

1.2 The values in SI units are to be regarded as the standard. Values in inch-pound units are in parentheses for information.

1.3 This guide contains general guidelines. It is not intended to replace project-specific installation requirements. In the event of a conflict between the two, the requirements of the project specifications will supersede the requirements of this guide.

1.4 This is not an all-inclusive guide, and some projects will be beyond the scope of this guide.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D4437/D4437M Practice for Nondestructive Testing (NDT) for Determining the Integrity of Seams Used in Joining Flexible Polymeric Sheet Geomembranes

D4439 Terminology for Geosynthetics

D5641/D5641M Practice for Geomembrane Seam Evaluation by Vacuum Chamber

D5820 Practice for Pressurized Air Channel Evaluation of Dual-Seamed Geomembranes

D7177/D7177M Specification for Air Channel Evaluation of Polyvinyl Chloride (PVC) Dual Track Seamed Geomembranes

D8364/D8364M Specification for Geosynthetic Cementitious Composite Mat (GCCM) Materials

2.2 *American Concrete Institute Standard:*³

ACI 306.1 Standard Specification for Cold Weather Concreting

2.3 Further information is available on the various GCCMs from their manufacturers. Individual GCCM manufacturer's recommendations may be more detailed with regards to specific applications or details than the information found in this standard, and should be consulted prior to undertaking any installation.

3. Terminology

3.1 *Definitions:*

3.1.1 *geosynthetic cementitious composite barrier (GCCB), n*—a composite material consisting of a geosynthetic barrier bonded to an integral GCCM protective cover layer. The geosynthetic barrier component of adjacent material must be seamed to reduce or prevent the flow of fluid through the construction.

¹ This guide 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 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 American Concrete Institute (ACI), 38800 Country Club Dr., Farmington Hills, MI 48331-3439, <http://www.concrete.org>.

3.1.1.1 *Discussion*—The terms *geosynthetic barrier*, *GCCM*, and *seam* are defined in Terminology [D4439](#).

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

3.1.3 *layer, n—in a GCCM installation*, the distinct material components of which a segment of GCCM material is composed.

3.1.4 *longitudinal layup, n—in a GCCM installation*, a deployed position of the GCCM where the material is deployed in line with the greater length of the structure being lined (that is, along the length of a channel).

3.1.5 *segment, n—in a GCCM installation*, an individual strip or section of GCCM material.

3.1.6 *shingled joint, n—in a GCCM*, a connection method of two separate segments of GCCM where a length of one segment overlaps on top of an adjacent segment.

3.1.7 *transverse layup, n—in a GCCM installation*, a deployed position of the GCCM where the material is deployed transverse to the greater length of the structure being lined (that is, across the width of a channel).

3.1.8 *unjointed edge, n—in a GCCM installation*, an edge of the segment of GCCM that is not secured within an anchor trench or sufficiently fixed to provide immediate contact between the segment and substrate and to minimize ingress. Sometimes referred to as “free ends.”

3.1.9 *welding strip, n—in a GCCB installation*, an unprotected edge of the geosynthetic barrier to facilitate thermal fusion weld jointing of GCCB layers. The welding strip may be formed by separating the geosynthetic barrier and GCCM to form an open edge; alternatively, the welding strip may extend beyond the protective GCCM layer.

3.2 For definitions of additional terms used in this standard, refer to Terminology [D4439](#).

4. Significance and Use

4.1 This guide identifies proper layout, installation, and hydration procedures along with equipment for use by GCCM designers, inspectors, and installers.

4.2 *Applications*—Typical GCCM applications may include but are not limited to:

4.2.1 Hydraulic structure armoring or protection, including but not limited to: ditches, swales, canals, flumes, and other similar structures.

4.2.2 Slope protection.

4.2.3 Berm and bund lining and protection.

4.2.4 Culvert invert lining.

4.2.5 Scour protection at culvert inlets and outlets.

4.2.6 Remediation of existing concrete channels and structures.

4.2.7 Lining of outfalls and spillways.

4.2.8 Mow strips or weed suppression.

4.2.9 Lagoons and secondary containment berms (using GCCBs).

5. Procedure

5.1 *Pre-Construction Meeting and Safety:*

5.1.1 The methods and equipment used for the placement of GCCMs can vary, but the primary objective of the process is to minimize damage and maximize performance. For optimum performance, the GCCM must be installed in a manner that does not negatively impact its physical, mechanical, or hydraulic properties.

5.1.2 All applicable project safety requirements should be observed. Prior to handling any GCCM, the manufacturer’s Safety Data Sheet (SDS) should be read and understood.

5.1.3 With most projects, the construction means and methods are the responsibility of the installation contractor. However, pre-construction meetings between the owner or their representative, the contractor, the GCCM manufacturing representative, or other parties should be held prior to installation of the GCCM material.

5.1.4 This meeting shall cover details of (at a minimum):

5.1.4.1 GCCM application purpose and objectives.

5.1.4.2 Review of installation procedures.

5.1.4.3 Provisions for heavy lifting equipment needed for handling and installing GCCM rolls that are too large for manual lifting, based on local requirements for manual labor.

5.1.4.4 Clear understanding of each party’s responsibilities and authority.

5.1.4.5 Availability of required ancillaries which can include screws, connectors, ground pegs, and adhesives to be used.

5.1.4.6 Understanding the jointing of the GCCM segments when connecting to appurtenant structures, concrete slabs, curbs, soil surface, etc.

5.1.4.7 Agreed-upon time estimates for installing, then hydrating for each day.

5.1.4.8 Provisions for hydration water source, both required volume and hydration procedure for determining if the GCCM is completely hydrated.

5.1.5 Prior to deployment, the entire fabrication and installation procedures shall be reviewed and accepted by all parties.

5.2 *GCCM Storage at Installation Site:*

5.2.1 GCCMs harden when exposed to water, and therefore should be properly stored to prevent exposure to water and moisture prior to the desired installation.

5.2.2 GCCMs should be stored under cover in dry conditions away from direct sunlight and, if possible, in the manufacturer’s sealed packaging.

5.2.3 For some GCCMs, it is not recommended to store in shipping containers in direct sunlight where temperatures may exceed 40 °C (100 °F) for prolonged periods of time.

5.2.4 Once the manufacturer’s original sealed packing is opened, the material should be deployed shortly thereafter (that is, within 24 h); if there is leftover material, the leftover material is returned to a sealed package daily or other airtight packaging around the roll.

5.3 *Installation Equipment:*

5.3.1 Several means of handling and deploying the GCCM rolls are possible. Typically, large rolls may be deployed with