



Designation: D6497/D6497M – 02 (Reapproved 2021)

Standard Guide for Mechanical Attachment of Geomembrane to Penetrations or Structures¹

This standard is issued under the fixed designation D6497/D6497M; 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.

1. Scope

1.1 This guide covers procedures that can be employed to mechanically attach fabricated geomembranes to structures, pipes, etc.

1.2 This guide does not address all problems or situations a geomembrane installer or design engineer may face in the attachment of geomembranes to structures, pipes, etc. The sole purpose of this standard guide is to point out typical problems with geomembrane attachments and clearly state objectives of each component of the geomembrane attachment(s).

1.3 This guide has been generated for geomembrane application(s); however, a geomembrane installer or design engineer, or both, may find portions of this guide applicable to other geosynthetics.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

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 guide is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.10 on Geomembranes.

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2. Referenced Documents

2.1 *ASTM Standards:*²

C717 Terminology of Building Seals and Sealants

C822 Terminology Relating to Concrete Pipe and Related Products

D4439 Terminology for Geosynthetics

D4848 Terminology Related to Force, Deformation and Related Properties of Textiles

F118 Definitions of Terms Relating to Gaskets

2.2 *EPA Document:*³

Quality Assurance and Quality Control for Waste Containment Facilities, Technical Guidance Document, United States Environmental Protection Agency, EPA/600/R-93/182, September 1993

3. Terminology

3.1 *Definitions:*

3.1.1 *banding strap, n*—a flexible narrow strip of metal, plastic, or other material, which compresses the geomembrane around a penetration by acting as a clamp around the penetration.

3.1.2 *batten, n*—a rigid narrow strip of metal, wood, plastic, or other material which distributes the forces to compress the geomembrane against a penetration or structure.

3.1.3 *boot, n*—a factory or field-fabricated geomembrane wrap used to seal around a pipe penetration prior to attachment (see Fig. 1).

3.1.4 *clamp, n*—a flexible narrow strip of metal, plastic, or other material, which compresses the geomembrane against a penetration by tightening the bolt(s) or screw(s) of the clamp (see Fig. 2).

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 U.S. Government Publishing Office, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.gpo.gov>.

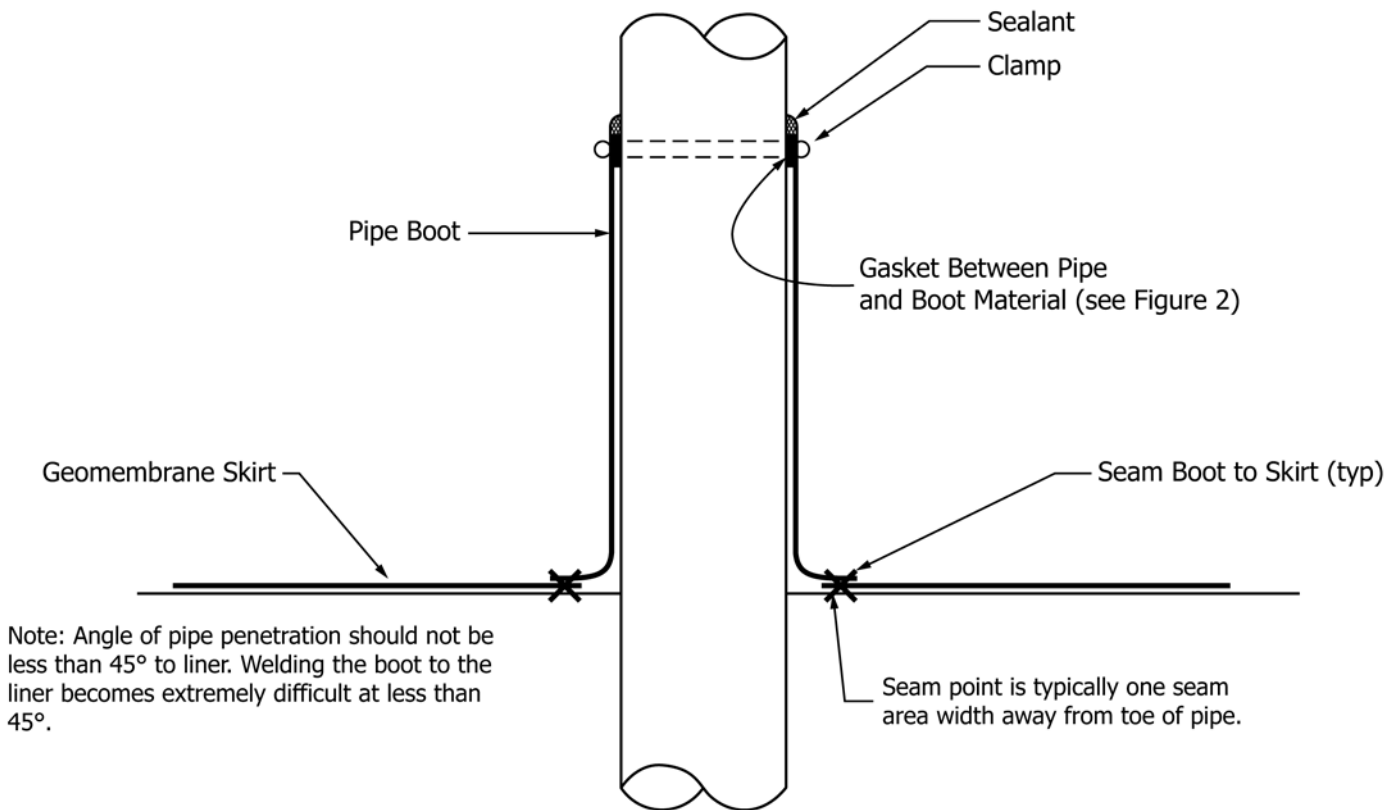


FIG. 1 Pipe Penetration—Perpendicular Face

3.1.5 *concrete, n*—a homogeneous mixture of portland cement, aggregates, and water which may contain admixtures. (C822)

3.1.6 *gaskets, n*—a material, which may be clamped between contact surfaces that acts as a static seal. Gaskets are cut, formed, or molded into the desired configuration. They may consist of any of the following construction: one or more plies of a sheet material; composites of dissimilar materials; and materials applied as a bead or other form to one or both mating faces prior to assembly. (F118)

3.1.7 *geomembrane, n*—an essentially impermeable geosynthetic composed of one or more synthetic sheets. (D4439)

3.1.8 *rondel, n*—a strip of polymeric material formed to a geometry, which is embedded and secured to a penetration or structure (for example, concrete structure) (see Fig. 3).

3.1.9 *sealant*—in building construction, a material that has the adhesive and cohesive properties to form a seal. (C717)

3.1.10 *torque, n*—a movement (of forces) which produces or tends to produce rotation or torsion. (D4848)

3.1.11 *void space, n*—in engineered structures, space(s) between the geomembrane and penetration or structure, which allow liquid or vapor migration, or allow the geomembrane to deform into the space(s) due to overburden pressure. (New, to be balloted under Terminology Committee.)

4. Significance and Use

4.1 This guide attempts to detail specific areas of concern regarding the attachment of geomembranes to structures.

Components of the geomembrane attachment are addressed as to the type and use of each component.

4.2 Although this guide does not address all aspects of geomembrane attachments, the user of this guide may note important objectives and design issues of each component of the geomembrane. All these objectives and design issues may or may not be required to obtain an appropriate geomembrane attachment. By describing these areas of concern, it is hoped that the user of this guide will be able to design geomembrane attachments, develop specifications or construct geomembrane attachments, or both, which fulfill the requirements of its design intent.

5. Types of Connection

5.1 *Batten(s)*—Battens are commonly used to attach a geomembrane to a smooth, flat surface. Anchor bolts are embedded into the penetration or structure at set locations. A gasket is placed in-line with the bolts to form a seal between the geomembrane and structure. Geomembrane is pushed or forced over the bolts to ensure a tight fit and then placed against the penetration or structure. The batten, which has holes in it that are in alignment with the bolts, is placed over the geomembrane. Nuts are placed on the bolts and tightened with sufficient torque to compress the geomembrane against the penetration or structure. The geomembrane is held in place by the friction generated by the compression effect of the batten (see Fig. 4).

5.1.1 A compression sealant or gasket can be used between the geomembrane and the penetration or structure or batten, or