



Standard Practice for Testing of Factory Thermo-Fusion Seams for Fabricated Geomembrane Panels¹

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1. Scope

1.1 This practice provides manufacturing quality control guidance for the factory seaming of fabricated geomembrane panels. This practice is not to be considered as all-encompassing since there are a large number of geomembrane types, weld types and fabrication processes that cannot be anticipated and covered in this document.

1.2 This practice is written for factory fabricated geomembrane panels only and does not apply to field fabrication on-site.

1.3 This practice does not cover joining of materials during the primary geomembrane manufacturing process such as the vulcanized overlaps found in EPDM sheet.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[D4439 Terminology for Geosynthetics](#)

[D6392 Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods](#)

[D7408 Specification for Non Reinforced PVC \(Polyvinyl Chloride\) Geomembrane Seams](#)

[D7700 Guide for Selecting Test Methods for Geomembrane Seams](#)

[D7747 Test Method for Determining Integrity of Seams Produced Using Thermo-Fusion Methods for Reinforced Geomembranes by the Strip Tensile Method](#)

[D7749 Test Method for Determining Integrity of Seams](#)

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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.

[Produced Using Thermo-Fusion Methods for Reinforced Geomembranes by the Grab Method](#)
[D7865 Guide for Identification, Packaging, Handling, Storage and Deployment of Fabricated Geomembrane Panels](#)

3. Terminology

3.1 For definition of terms related to geomembranes, refer to Terminology [D4439](#).

3.2 *Definitions:*

3.2.1 *destructive test sample*—a seam sample taken before, during or after production welding that is used to determine compliance of production seams with a specification.

3.2.2 *post-production test*—a destructive test sample tested at the conclusion of the manufacturing process (production seam or trial seam) to qualify the previously produced production seams.

3.2.3 *pre-production test*—a destructive test sample tested at the beginning of the manufacturing process to qualify subsequent production seams.

3.2.4 *production seam*—a factory seam that is made as part of a finished fabricated panel.

3.2.5 *trial seam*—a seam made prior to or after production welding, made by the same personnel, using the same geomembrane material, the same welding unit and the same seaming conditions used in the actual production seaming process. Trial seams are used to provide destructive test samples without damaging production seams.

3.2.6 *welding unit*—each individual welding station or piece of welding equipment used to make a single seam.

4. Significance and Use

4.1 This practice is intended to aid fabricators, suppliers, purchasers, and users of fabricated panels in the testing requirements for factory created seams during fabrication of geomembrane panels.

4.2 Factory seaming of geomembranes has advantages over field seaming including less temperature variation, no wind, less contamination (soil and water) concerns, a consistent work surface for welding and options for factory equipment that may not be robust enough for the field environment. This results in

factory welds more consistent than field seams and allows for a lesser frequency of testing than for field seams.

4.3 This guide is not intended to replace project-specific seaming and testing requirements or quality assurance programs.

5. Procedure

5.1 *Factory Seam Testing Frequency:*

5.1.1 The quality of production seams must be verified by destructively testing portions of production seams or test seams from each welding unit used at a frequency that is sufficient to provide confidence in the seam quality contained in the factory fabricated panels. To that end, all production seaming must be bounded by passing destructive test samples consisting of, at a minimum, a pre-production test and a post-production test. A destructive test sample tested during production process qualifies as a post-production test for the seams already made as well as a pre-production test for the seams to be made going forward.

5.1.2 Destructive test samples can be taken from production seams as part of in-process inspections. Destructive test samples can be removed from extra material added to the end of a production seam or from a cut-out within a production seam. Any discontinuity in the production seam as a result of sample removal must be repaired.

5.1.3 Pre-production tests must be completed at the beginning of a shift, after any break in the seaming process that is 45 min or longer, after any change in the welding unit settings and any time the type or thickness of geomembrane being seamed is changed.

5.1.4 Post-production tests must be completed at the end of a shift, before any break in the seaming process that will be 45 min or longer, just prior to any changes in the welding unit settings and at the end of production of a certain geomembrane type or thickness.

5.1.5 A destructive test sample must be tested no less frequently than once every 4 h when a shift is welding the same geomembrane type and thickness for more than 4 h.

5.2 *Factory Seam Samples, Test Procedures and Results:*

5.2.1 The appropriate ASTM seam test procedure should be used for the type of geomembrane and type of seam being evaluated unless otherwise specified by a project specific specification. Some standard ASTM test procedures include: Test Method **D6392** for non-reinforced geomembrane thermo-fusion seams; Test Methods **D7747** and **D7749** for reinforced geomembrane seams and Specification **D7408** for non-reinforced PVC seams. Guide **D7700** provides a more detailed list of geomembrane seam tests.

5.2.2 Some types of seams do not have a loose flap available for testing seam peel strength. If a trial seam cannot easily be

made for evaluation of seam peel strength, the production seam can have a tape or some other means of interrupting the bonding of the two sheets so that two seam peel specimens can be cut and tested down the length of the seam. In that case, two test specimens are sufficient for evaluation seam peel strength. This is typically done on extra material at the beginning or end of a seam and not from the middle of a production seam.

5.2.3 Seam strength and failure mode in peel and shear will be evaluated with respect to the fabricators internal manufacturing quality control specification and, if applicable, the project specific specification or ASTM specification.

5.2.4 If a pre-production test fails, the cause of the failure must be determined and corrected. Seam failures can be due to improper welding conditions, faulty equipment or faulty geomembrane material. If the destructive test sample was part of a production seam, the seam must be repaired or cut out and replaced. Whether the destructive test sample was from a trial seam or a production seam, a destructive test sample must pass the test requirements before any seam made with that welding unit can be saved as part of a geomembrane panel.

5.2.5 If a post-production test fails, all the seams made with that welding unit since the last passing destructive test sample are considered to be rejected. If the seam can be inspected or tested and the point at which the seam went from passing to not passing can be located, the seam prior to that point is considered to be acceptable and can be used. Any portion of the seam that cannot be demonstrated to meet the specification shall be repaired or cut out and replaced.

5.3 *Fabrication and Identification:*

5.3.1 Factory fabricated panels will be packaged and handled in accordance with Guide **D7865**. The results of each destructive test sample shall be recorded including: the panel identification, seam number or test location, the technician performing the test, the test results and a pass or fail description.

6. Report

6.1 A report will be provided upon request for factory fabricated panel seams that are required to be in compliance with this practice. The information reported should meet the requirements of the report section of referenced ASTM test procedures when applicable. At a minimum, the report will contain the following information.

- 6.1.1 Seam or test locations relevant to the provided panels.
- 6.1.2 Seam peel results including locus of break codes.
- 6.1.3 Shear test results including locus of break codes.

7. Keywords

7.1 fabricated; fabricated panel; factory seam; geomembrane; MQC; seam; welding

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