



# **Guideline for Packaging, Handling, Storage, and Deployment of Fabricated Geomembrane Panels**

## **Fabricated Geomembrane Institute**

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For a fabricated panel to be properly used it must be adequately identified and packaged. It must be handled and stored in such a way that its physical property values are not degraded. Failure to follow good practice may result in the unnecessary failure of the fabricated panel in a properly designed application.

This guideline provides recommendations for the identification, packaging, handling, storage and deployment of fabricated geomembrane panels. It is intended to aid fabricators, suppliers, purchasers, and users of fabricated panels in the identification, packaging, handling, storage and deployment of fabricated geomembrane panels. It is not to be considered as an all-encompassing guideline, since each project involving fabricated panels presents its own challenges and special conditions. It is written for factory fabricated geomembrane panels only. Other geosynthetics use ASTM D4873 as their guideline.

This guideline 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 guideline to establish appropriate safety. Of note is that seaming and testing are not part of this guideline.

### **Terminology**

Some Terms from this guideline are defined within this section. Additional terms may also appear in ASTM D 4439.

*Fabricated panel:* refers to a geomembrane panel fabricated at a manufacturing facility into a larger panel than the original roll stock material. A fabricated panel may be a larger rectangular

panel of geomembrane or may be a specific fabricated shape or may contain special job-specific detail work.

*Rolled panel:* refers to a fabricated panel that is rolled from one end or in some cases from both ends to the middle.

*Accordion-folded panel:* refers to a fabricated panel where the material is folded back and forth in a “Z” formation in the same principal direction as the seams. This folding takes a wider panel of material and makes it into a narrow stack. For example a 30 m by 30 m prefabricated panel could be accordion-folded into a 3 m wide stack of material 10 layers deep and 30 m long.

*Accordion-folded and rolled panel:* refers to an accordion-folded fabricated panel that is first accordion-folded to the desired width and then rolled to form a finished, rolled bundle for transport.

*Double accordion-folded panel:* refers to an accordion-folded fabricated panel that is accordion-folded to the desired width and then accordion-folded in the length direction onto a pallet (or into a container). Double accordion-folded panels typically appear as a “cube” of material with square corners.

*Fabricator:* the person or organization by whom the geomembrane material is fabricated into a fabricated panel.

### **Fabrication and Identification**

1. Fabricated geomembrane panels are welded to the customer-specified sizes according to previously-agreed specifications. If a project layout is required then the fabricated panel is prepared according to the project layout. Special fabricated panels such as shaped panels or panels with fittings should be fabricated according to customer-approved drawings.
2. All fabricated geomembrane panels should be uniquely identified with a number or other identification markings. These identification markings should clearly identify where the panel will be placed in any project layout.
3. Identify each roll with a durable, gummed weather resistant label, or equivalent. One label should be placed directly on the material after fabrication and one label should be attached to the outside of the packaging.
4. Panel identification should include, at a minimum, the name of the manufacturer or supplier, product or style number, and the unique panel identification number or marking. All designations should be clearly marked and readable for the anticipated storage period. The identification label should also include the width and length of the fabricated panel. For special fabricated panels a description of the panel features is recommended.

5. All fabricated geomembrane panels should include a marking that shows how the panel will unroll or unfold on site. This marking is important to the installer so that the panel can be properly positioned before deployment.
6. All weld tests and inspections should be completed before folding, rolling, or packaging. Weld tests and inspections should be fully documented.
7. On projects where traceability is a requirement, QC documentation should make a clear connection between the unique panel marking, the weld test data for that panel, and the identification of the specific rolls that went into the making of the fabricated geomembrane panel.

### **Folding, Rolling, and Packaging**

1. The welding of multiple strips of geomembrane into a fabricated panel results in a panel wider than the initial roll widths. This wider panel can either be rolled “as is” (rolled panel), or accordion-folded and then rolled or double accordion folded for transport. Rolled panels are typically not wider than 10m as it is difficult to physically handle rolls this wide without damaging them. Most fabricated panels are accordion-folded to a narrower width of between 2 to 4 m.
2. An accordion folded and rolled panel is wound onto a sturdy core suitable for the weight of the panel. Accordion-folded and rolled panels are often placed on a pallet for transport.
3. For double accordion-folded panels the narrow, accordion-folded panel is folded once more lengthwise onto a sturdy pallet (or often into a cardboard container or crate). The resulting package is typically rectangular. Double accordion-folded panels are often sized to fit into transport trucks.
4. When a pallet is used to support the fabricated geomembrane panel it should extend past the finished dimensions of the panel. One or two layers of geotextile or geomembrane should be placed on a pallet to protect the finished panel.
5. All pallets and crates should be inspected to make sure that there are no protruding fasteners that could damage the material. Pallets and crates should be in good condition.
6. Packaging for fabricated geomembrane panels should be suitably weather resistant for the storage conditions anticipated. The most common packaging is a wrap of a weather resistant material that protects the fabricated panel from UV damage and precipitation. Double accordion-folded panels are often folded into a large cardboard box with a lid.
7. Slings, rope, or other handling and deployment aids are attached to the panel after the packaging is completed and often prior to the panel being placed on a pallet.

8. The outside label is applied and the unfolding marking is carefully checked and aligned on the packaged panel.

### **Transportation, Handling, and Storage**

1. Transport fabricated geomembranes to the project site using the most direct method. Transferring fabricated panels from truck to truck during interline transfers can cause damage due to handling. Direct shipments are recommended. If multiple handling is required then adding protection to the sides of the packaging is recommended to protect the edges of the panel during interline transfers. If extensive handling is required in transit then crating the panels is recommended.
2. While unloading or transferring the fabricated panels from one location to another, prevent damage to the wrapping and to the fabricated panel itself. If the fabricated panel is palletized or stored in a crate, a standard forklift with forks long enough to reach through the pallet or crate should be used.
3. Slings may be used to carry relatively large fabricated panels, provided that the slings do not cause damage to the panels. Do not drag the panels as damage may result.
4. Inspect fabricated panels at the time of delivery to the site, and make any claims for damage with the carrier. The receiving inspection should verify the number and identity of the panels, ensure that the packaging is intact and the panels are not damaged, and that the labels and deployment markings are in place.
5. Fabricated panels, when possible, should be stored on pallets off the ground. The storage area should be dry with a firm base. Ensure that the packaging on each panel remains in place and is suitable to protect the fabricated panels from Ultraviolet Radiation and other expected weathering.
6. Follow all applicable site or project specifications and manufacturer's recommendations for handling and installation of fabricated panels.

### **Deployment**

1. Before deploying a fabricated panel at the job site, verify its identification. If there is a project layout then match the panel identification marking to the project layout.
2. Move the fabricated geomembrane panel with suitable lifting equipment following all site safety requirements.
3. Fabricated geomembrane panels are normally placed at a starting point on one corner of the area to be lined. The deployment markings on the packaging or label will indicate which direction the panel will unfold. Note that rolled panels or accordion-folded and rolled panels will unroll in only one principal direction while double accordion-folded

panels may unfold in either principal direction.

4. Remove packaging prior to deployment. Double check the unrolling direction of rolled, and accordion-folded and rolled panels, and adjust the starting point if necessary.
5. Unroll and/or unfold the fabricated panel into the area to be lined. Do not deploy panels if winds are above site safety specifications or above the manufacturer's (or fabricator's) recommended wind speed for deployment.
6. While unrolling and/or unfolding, inspect the fabricated panel for damage or defects. Repair any damage found.
7. Provide suitable wind uplift protection with sandbags or other ballast.

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