



# Testing Frequency for Factory Seams

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Factory seaming of geomembranes has been occurring successfully for many years and it provides many advantages over field seaming, including, optimal temperature, wind, and sunlight, dirt free, firm subgrade, and more attentive personnel for seaming. This always results in factory welds being better and more consistent than field seams. The large amount of factory seaming that can be performed also reduces the amount of field seaming which results in a better overall product. In summary, the ability to factory fabricate geomembranes provides many substantial benefits over geomembranes that must be seamed in the field, such as higher quality and consistent seams, reduced installation time and cost, better visual inspection of the materials before installation, and less potential for construction induced damage.

Recently some confusion has developed over the frequency of testing factory welded seams. Initially the National Sanitation Foundation (NSF) 54 specification required a test every 3000 lineal feet (915 m) of seam or once per panel (see Table 14 of NSF 54). Unfortunately, the NSF stopped supporting NSF-54 in December 1996 so other entities, e.g., the PVC Geomembrane Institute (PGI), created specifications to fill the void left by the removal of NSF-54 from the marketplace. The FGI, in cooperation with its members, has developed this guideline to clarify the PVC Geomembrane Fabrication and Installation Specification prepared by the PGI and dated 3 July 2006 that provides the following recommendation for **field** seaming:

### 3.04 Seaming Specifications

#### 2. Thermal Welding Specifications

- F. Destructive seam samples shall be pulled at intervals as directed by the Owners Representative or at a minimum of **one per 500 lineal feet (152.5 m) of thermally welded seam** when Air Lance Testing using ASTM D4437 is performed. When Air Channel Testing is performed on the thermally welded seam in accordance with ASTM D7177, no destructive samples will be taken from the production liner. However, destructive samples will be obtained from test welds and/or welds in the anchor trench at the beginning and end of each day.

Unexplainably, the field requirement of one destructive seam test at a minimum of one per 500 lineal feet (152.5 m) of thermally welded seam has been referenced for factory welded seams. This is overly conservative because of the optimal conditions under which factory seaming is performed and the consistently acceptable seams created in the factory versus the field. This FGI guideline presents a recommendation for the testing frequency for factory fabricated seams.

#### Pre- and Post-Qualification Seam Testing

1. Pre- or Post-Qualification Test Seams shall be prepared and tested by the Geomembrane Fabricator either (1) prior to production or (2) after production seaming is completed for that production period, respectively, to verify that the seaming parameters, equipment, and personnel for each welding station are adequate.
2. Trial seams shall be made by joining two pieces of the geomembrane to be seamed at least 6 ft (2 m) long using the same equipment, operator, and conditions anticipated during production welding. Trial seams will be tested in both shear and peel strength using either ASTM D 6392 (heat welded) or ASTM D 6214 (chemical welded).
3. Samples shall be tested and evaluated in accordance with the project specification.
4. If a test seam fails, an additional test seam shall be immediately completed. If the additional test seam fails, the seaming equipment shall be rejected and not used until the deficiencies are corrected and a successful test seam can be produced for a pre-qualification test. If a post-qualification test fails then the seams produced with that equipment will be inspected and repaired.

5. The results of each test seam shall be recorded including panel identification, seam number or test location, technician performing the test seam and a pass or fail description.

### **Production Seam Testing**

1. A Production Test Seam shall be prepared and tested by the Geomembrane Fabricator during production to verify that the seaming parameters, equipment, and personnel for each welding station are adequate.
2. During production the Geomembrane Fabricator should adopt the typical industry testing frequency of sampling once every shift change or every 4 hours of production, which ever is more frequent, to ensure high quality factory seams.
3. Test seams shall be made by joining two pieces of the geomembrane to be seamed at least 6 ft (2 m) long using the same equipment, operator, and conditions anticipated during production welding. Trial seams will be tested in both shear and peel strength using either ASTM D 6392 (heat welded) or ASTM D 6214 (chemical welded).
3. Samples shall be tested and evaluated in accordance with the project specification.
4. If a production seam test fails the seams affected by this test specimen will be inspected and repaired as required.
5. The results of each test seam shall be recorded including panel identification, seam number or test location, technician performing the test seam and a pass or fail description.

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