



## Technical Note: Joining Pre-sprayed Panels

Western Engineered Containment (WEC) sprays panels of Precidium™ ECS™ polyurea robotically onto geotextile fabric, under controlled conditions at their factory. In this way WEC can efficiently control application conditions and exercise precise control over membrane thickness, eliminating thin spots and pinholes which can occur when spraying is done by hand.

These panels are taken to the jobsite and joined together to complete the containment system. The final membrane is said to be seamless because the joints are chemically bonded together using polyurea, providing joints that do not differ from the rest of the membrane in any appreciable manner.

To confirm that the joints are not weak points, but form part of a monolithic lining system, ECS™ samples were sprayed at 60 mils thickness on metal foil. Sample panels were prepared in two ways: those which contained no joints, as well as panels with 2 joints running at 90 degrees to one another. The two types of panels were tested according to ASTM D5617 (Multi-Axial Tension Test for Geosynthetics) to compare the strength and durability of the two sample configurations.

For the ASTM D5617, 1m<sup>2</sup> samples are fastened to a pressure vessel and inflated with air at increasing pressure until they can no longer stretch, and they rupture. This test is demonstrated in the video included at the end of this technical note. The testing was carried out by an independent lab (Sageos/CTT Group, Montreal, Canada)

### **Results (Average of three samples containing joints/3 samples with no joints):**

Sample Type	Axi-Symmetric Strain% at Break (Amount Stretched at Rupture)	Vessel Pressure at Rupture (psi)	Center Point Deflection at Rupture
Sample with Joints	76.5%	14.4	37 cm
Samples without Joints	75.7%	7.5	37 cm
HDPE unseamed (for reference)	Approx 30% <sup>1</sup>		

<sup>1</sup>A Guide to Polymeric Geomembranes: A Practical Approach" J. Scheirs



The results show the samples with and without joints stretched almost identically in terms of multidirectional (axi-symmetric) strain and center point distance stretched. The samples with joints took more pressure to stretch to rupture; this is likely due to the additional polyurea material thickness present in the seams.

In practical terms the joints in the ECS™ liner were not weak points in the membrane. In fact they stretched almost identically to the samples with no joints and withstood more pressure before bursting. In a case where differential settlement undermines support for the geomembrane a deflection of 37 cm was required to cause failure, under a pressure of roughly 17.3 feet of H<sub>2</sub>O for the unjoined sample and twice that (33.2 feet H<sub>2</sub>O) for the joints.

In conclusion, presprayed Precidium™ ECS™ panels joined in the field form seamless monolithic membranes without weak or stiff spots. This represents a breakthrough in maximizing membrane uniformity, quality and cost.



ECS Seam Test Results.mp4

**Video of ASTM 5617. Double click above icon to open.**