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PGI developing new seam-burst test

The PVC Geomembrane Institute (PGI) is currently researching thermal welding and subsequent air-channel testing of PVC geomembrane seams. This article focuses on the use of a new seam-burst test to evaluate field PVC geomembrane seams. This topic is part of a larger study by the PGI on the thermal welding of PVC geomembranes. The seam-burst test is an excellent indicator of seam quality and has been directly related to seam-peel strength (ASTM D 6392). These results allow the burst test to be used in the field to test the entire length of a PVC seam for the specified peel strength instead of using destructive peel tests over a limited portion of the seam. It is anticipated that the use of the burst test will lead to a reduction in the destructive testing required during field installations.

An important difference between air-channel testing of PVC geomembranes seams vs. high-density polyethylene (HDPE) geomembrane seams is the flexible nature of PVC geomembranes, which allows the field technician to see the air channel inflate as the air pressure migrates down the seam. The inflated air channel resembles an inflated inner tube, and this distinctive behavior has been referred to as "inner tubing" of PVC seams. If a weak spot is encountered and leaks, the seam may not fully inflate at this weak spot.

The seams were evaluated by the standard peel test at 20 in./min. at 73 °F (ASTM D 6392, 1999) and by the seam-burst test developed during this project. The burst test was performed by sealing off one end of a 2-m (6-ft.) seam length and pressurizing the other end with compressed air. Most of the burst failures involved the peel mode, which occurred during the 30-second holding period. However, some seams burst during the 34.4-kPa (5-psi) air-pressure increase step. Seam-peel strength was compared to burst pressure because pressurizing the air channel results in the seam being challenged more in a peel mode than a shear mode. Therefore the seam-peel strength, and not the shear strength, was used for comparative purposes.

The main contribution of the air-channel testing research is the development of a relationship between peel strength at room temperature (22.8 °C; 73 °F) and the burst pressure at sheet temperatures ranging from 22.8 to 46.7 °C (73 to 116 °F). This relationship allows field personnel to perform seam QA/QC operations without conducting destructive tests because the seam peel strength can be measured indirectly by applying air pressure to the air channel in a dual track weld. The main advantage of the peel strength/burst pressure relationship is the ability to test the entire seam length instead of a 1-m coupon. This procedure coupled with the visual inspection afforded by the burst test results in an excellent means for ensuring the integrity of field thermal seams in PVC geomembranes. GFR

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