Weldability and Seam Strength

One of the most advantageous performance properties of PVC coated polyester fabrics is the ability to be efficiently welded into large panels that can be incorporated into membrane structure. Unlike conventional building materials such as wood, steel or bricks that require assembly at the job site, Shelter-Rite can be pre-fabricated into large panels and then brought to the job site for final assembly.

Shelter-Rite uses a polymeric exterior coating compound on both the top and bottom of the material. This compound is a thermoplastic material, meaning that it can be heat bonded to itself. The heat bonding process can be accomplished with a radio frequency welder, hot air impulse or hot wedge welder. Seams can be produced at speeds of up to 20 feet per minute.

Since the base fabric carries the loads on a building, the seams must be able to transfer these loads from one piece of coated fabric to another. This creates a shear force on the seam. As a result, it is important that the tensile performance properties of the finished seam be equal to the strength of the fabric itself to ensure the integrity of the entire structure. Each seam must be able to handle all of the load requirements on the building under the full range of environmental conditions.

Shelter-Rite's superior seam strength is a function of the adhesive coat, exterior coat, and the welding process. The adhesive coat must form a bond between the polyester base fabric and the exterior coating compound such that it can handle the shear forces that are created under loads. Seaman formulates the exterior coating compound and applies it properly such that it can be welded to itself and handle the shear forces. The welding process must be designed to give the proper amount of overlap and the necessary amount of heat and time to form a good weld. Typically, high tensile strength materials require a greater overlap at the seam to carry the shear forces.

Seaman recommends a series of seam strength tests that include weld adhesion, seam shear strength and dead (static) load testing. The weld adhesion is done with the same ASTM D 751 Peel Adhesion test previously described. This is a quick check to determine that the coating has been heat bonded to itself.

The seam shear test is a modification of ASTM D 751 Cut Strip Tensile test. In this test, a one-inch sample is cut perpendicular to the seam and a tensile test is performed across the seam. The coated fabric should always break outside the seam area, with results equivalent to the tensile strength of the coated fabric, assuring that the fabricated seam is at least as strong as the fabric itself. Care must be taken when preparing the seam shear as to include 1 inch of yarn perpendicular to the seam.

The most important test that can be performed is the deadload test. The test involves applying a load across the seam on a one-inch sample for a period of four hours. The test is performed at both room temperature and at high temperature, usually 160°F. This test most closely simulates actual field conditions in that there is a constant load on the seam when the building is in service. The complete test procedure can be found in ASTM D 751 Dead Load Seam Strength.

1000 VENTURE BLVD. WOOSTER, OHIO 44691 USA, www.architecturalfabrics.com
Phone 330.262.1111, Fax 330.263.6950 U.S. *Toll-Free:* Phone 800.927.8578, Fax 800.649.2737