TPO membrane standard

by **Mark S. Graham**

In May, ASTM International published a new product standard that applies to TPO roof membrane sheet products—ASTM D6878, "Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing." This provides the first consensus standard defining TPO products available in the United States.

ASTM D6878

ASTM D6878's scope indicates it addresses flexible sheets made with TPO as the principal polymer intended for use in single-ply roof membranes exposed to weather.

ASTM D6878 contains specific provisions for TPO sheet materials and manufacture; physical properties and tolerances; dimensions and permissible variations; workmanship, finish and appearance; test methods; rejection and resubmittal; product marking; and packaging and package marking.

The standard's materials and manufacture requirements include a provision that a sheet be formulated from ethylene and alpha-olefin polymers, co-polymers and mixtures in amounts greater than 50 percent by weight of the total polymer content.

Physical property requirements include a minimum overall sheet thickness of 39 mils (0.039 of an inch [1 mm]) and minimum thickness over scrim of 12 mils (0.012 of an inch [0.305 mm]). Minimum breaking strength is established at 220 pound force (lbf) (976 N) with a minimum elongation at reinforcement break of 15 percent. Sheet-tearing strength is a minimum of 55 lbf (245 N), and factory-seam strength is a minimum of 66 lbf (290 N). The brittleness point is a maximum of -40 F (-40 C).

Additional physical properties also apply, including testing after heat aging and accelerated weathering.

The standard's requirements for product marking include a provision that a sheet's weather side be marked to identify the sheet as a TPO membrane and include the ASTM designation and name of the manufacturer or supplier. Such markings are to occur in the long direction of the sheet and be applied by the manufacturer to be legible for five years after installation. This type of product marking should assist in identifying TPO products in the field and aid contractors when making repairs.

Code compliance?

Because ASTM D6878 is newly published, it has not yet been incorporated into most building codes. As a result, the concerns I raised regarding the code compliance of TPO single-ply membrane roof systems still exist. (See "Do TPOs comply?" February 2002 issue, page 84.)

NRCA has submitted a code change proposal to the International Code Council (ICC) to establish ASTM D6878 as the basis for code acceptance of TPO membrane roof systems in the *International Building Code* (IBC). ICC will take final action on this proposal at its 2004 final action consideration hearing May 17-20, 2004, in Overland Park, Kan. Code change proposals approved at that hearing will be published in IBC's 2006 edition.

Until ASTM D6878 or some other suitable acceptance criteria are incorporated into building codes, I encourage users of TPO single-ply roof membrane systems to use the alternative acceptance provisions (and evaluation reports) described in my February article.

Closing thoughts

The development and publication of ASTM D6878 are steps forward in improving the market credibility of TPO single-ply membrane roof systems. At the same time, however, understand some requirements contained in ASTM D6878 are relatively lax.

Comparison of the physical property requirements in ASTM D6878 to the results of NRCA's 2001 testing of TPO single-ply membranes reveals persuasive data for increasing the standard's minimum overall sheet thickness and thickness-over-scrim requirements and decreasing the maximum linear dimensional change value. NRCA's testing also provides a strong argument for increasing the standard's minimum breaking-strength, tearing-strength and brittleness-point values. (For additional information regarding NRCA's 2001 testing of TPOs, see "Testing the differences," November 2001 issue, page 22.)

Although ASTM D6878 is in need of improvement, at this point, it probably is better than having no product standard for TPO products at all. Therefore, I encourage users of TPO single-ply membrane roof systems to seek out and use TPO products that not only meet but exceed the requirements of ASTM D6878. Over time, I hope appropriate improvements can be made to the standard.

Editor's note: *ASTM D6878 was published too late to be included in the current edition of ASTM's Annual Book of Standards; however, it is available from ASTM as a single standard by calling (610) 832-9500 or accessing www.astm.org.*

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