

# Developments with TPO

## Revisions to ASTM International's standard show some progress

by Mark S. Graham

Changes have been made to the U.S. product standard for TPO roof membranes that should result in some improvement to their performance. If you are involved in the design and installation of TPO roof systems, you should be knowledgeable of these changes and be aware additional improvements still are necessary.

### ASTM D6878

The U.S. product standard for TPO roof membranes is ASTM D6878, "Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing." ASTM International originally published the standard in 2003 and revised it in 2006 and 2008.

This year, ASTM D6878 was revised twice. With the first revision, which was balloted by ASTM International in April, the duration of specimen heat aging before aged physical property testing was increased from 28 days at 240 F to 224 days at 240 F, an eight-fold increase. The physical property evaluation methods after heat aging remain unchanged.

This year's second revision was balloted in May and increased the minimum allowable thickness over scrim from 12 mils to 15 mils. With this change, the method for measuring TPO membrane thicknesses was changed from the previous optical method to a new test method, ASTM D7635, "Test Method for Measurement of Thickness of Coatings Over Fabric Reinforcement." ASTM D7635 is considered more reliable than the optical method.

NRCA considers the increase in the minimum thickness over scrim dimensions and new thickness measurement method to be significant improvements.

This year's two revisions to ASTM D6878

are published in ASTM D6878-11a. The "-11" in this designation denotes the revision being published in 2011, and the "a" denotes the second revision in the same year of publication.

Unfortunately, ASTM D6878-11a was approved too late to be included in ASTM International's *2011 Annual Book of Standards, Volume 4.04, Roofing and Waterproofing*. ASTM D6878-11a can be purchased at [www.astm.org](http://www.astm.org).

### More improvements needed

Although ASTM D6878 was revised, NRCA believes additional enhancements are needed before it can reasonably be relied on to ensure adequate TPO performance.

A round-robin test program of various manufacturers' TPO membranes is being conducted by a group of ASTM International task group members to evaluate the new heat aging duration and alternative methods of evaluating physical properties after heat aging test specimens.

Currently, TPO membranes' physical properties after heating aging are evaluated using percentages of retained values compared with tested values of non-aged specimens. TPO membranes' breaking strength, elongation and tearing strength are viewed by many, including NRCA, as an assessment of a TPO membrane's reinforcement strength, not the membrane's watertightness. In most instances, a membrane's TPO coating over the reinforcement will crack and, therefore, not be watertight before the reinforcement fails in testing.

As part of the round-robin test program,

## The method for measuring TPO membrane thicknesses has changed

visual examination of the TPO coating over the reinforcement is being evaluated as a possible evaluation criterion after heat aging. NRCA considers this to be a more appropriate method of evaluating performance and durability because it takes into consideration the mem-

brane's watertightness after heat aging.

Also, ASTM D6878's current physical properties are based on 45-mil-thick TPO membranes and are not necessarily representative of thicker membrane sheets, such as 60-mil-thick membrane sheets. Thicker TPO membranes should exhibit greater puncture resistance and breaking strength values and a thicker thickness over scrim than 45-mil-thick sheets. Given the increased use of 60-mil-thick and thicker TPO membranes, ASTM D6878 needs to be updated to better represent products in the U.S. marketplace.

NRCA has asked the task group responsible for maintaining ASTM D6878 to add criteria to the standard specific to thicker membranes, including 60-mil-thick sheets.

### NRCA's recommendations

Although ASTM D6878 has been revised, additional revisions to the standard still are necessary before it can reasonably be relied on to ensure proper performance.

Until ASTM D6878 is further revised, NRCA recommends designers specify TPO membranes by designating the standard's current edition, ASTM D6878-11a, and specifying a minimum 60-mil-thick membrane. 📌🔍

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