TPO Update *by Jeff Evans, RRC*

In our May 2010 issue of Perspectives, I wrote an article on Benchmark's position on Thermoplastic Polyolefin (TPO) membranes. That article was prompted by a number of our clients wanting to know where we stood on the current TPO product offerings.

In that article, I cited the 2010 MRCA Technical Bulletin, which cautioned the use of TPO membranes in areas of high heat and concentrated UV exposure, as one might find adjacent to south facing reflective glass walls or tall TPO covered parapet walls.

Since that article, Benchmark has continued to investigate TPO membranes. We toured a TPO membrane manufacturing plant, and had discussions with TPO chemists from two of the five TPO manufacturers. We learned that at the center of the TPO performance discussion - is membrane formulation. Field experience has identified shortcomings in some of the manufacturer's past TPO formulations. Formulations with insufficient quantities or improper combinations of ultraviolet light and/or thermal stabilizers can cause poor membrane performance in these high UV/heat exposure areas.

In our discussions with the polymer chemists, it has been explained to us that these stabilizers are consumed during the life of the membrane. When the stabilizers are exhausted, the membrane performance can decline quite rapidly (literally within months). Finding the right combination of stabilizers and in the right amounts is the key to a TPO membrane's long-term performance. This helps explain why, in inspections spaced one year apart, we have seen a relatively sudden decline in TPO membrane condition.

Based on papers at the Midwest Roofing Contractors Association (MRCA) convention in November 2010, and the recent RCI Winter Workshop in January, it seems clear that the potential rooftop temperature the membranes must perform in has been underestimated. Our own measurements on a dirty TPO membrane taken in Georgia last July read as high as 183 degrees Fahrenheit. These readings were similar to those taken by GAF on several roofs in the desert southwest this past year.

In the MRCA presentations, examples of high UV and heat were shown to be the result of reflected or concentrated sunlight. Also highlighted were roof system design issues, such as adhering black walkpads or thin film (black) photovoltaic solar panels to TPO membranes. Additionally, HVAC heat exhaust was posed as a potential contributor to high heat loading.

During the MRCA presentation, Firestone's Dwayne Wacenske showed how improper hot air welder temperature and set-up could cause premature deterioration along membrane laps, among other installation issues.

In December, the ASTM D08 TPO sub-committee balloted on the passage of a revised TPO standard. The standard proposed increasing the Heat Aging test requirement from 240 degrees Fahrenheit for 28 days to 275 degrees Fahrenheit for 56 days. Disagreement among the stakeholders about this proposed change caused the standard not to be passed. The committee is still working to resolve that disagreement.

One thing that seems to be in agreement is there are large differences among TPO products (Koontz & Erland, "Evaluation of the Effects of Long Term UV Exposure on Single Ply Membranes" RCI Interface May/June 2010, and Tom Taylor, 2010 MRCA National Convention).

There is consensus among the TPO manufacturers and other industry professionals with regard to TPO membrane thickness - thicker is better. If you decide to use TPOs, 60 mil is our recommended minimum. It might even be prudent to use 80 mil.

The question I posed in my 2010 TPO article was, "who has it right, does anyone?" We feel we are closer to an answer, but that question remains unanswered in my opinion. As unsatisfying as that conclusion is, that is where we are.

We will continue to research and track the performance of TPO membranes and keep our readers informed of our findings.