

## SERVICE WORKS

## “UP ON TOP” NEWS

## TPO Roofing Membranes

A thermoplastic elastomer is a diverse family of rubber-like materials that, unlike conventional thermoset rubbers, can be reprocessed and recycled like thermoplastic materials. Thermoplastic polyolefins are in the thermoplastic elastomer family and are commonly referred to as TPO in the single-ply roofing industry.

TPO-based products have been used in various applications, including the automobile industry since the 1980s, and have seen their usage continue to expand. In 1989, TPO-based membrane moved into the roofing industry as a non-reinforced sheet. In 1993, the original non-reinforced TPO membrane was replaced with membranes containing reinforcing fabric. Since that time, the TPO single-ply roofing market has grown to hundreds of millions of square feet annually with TPO membrane comprising the fastest growing segment of the U.S. single-ply roofing industry.

TPO roofing membrane is typically based on polypropylene and EP (ethylene-propylene) rubber polymerized together using state-of-the-art polymer manufacturing technology. This technology enables the production of TPO membranes that are flexible at low temperatures without the use of polymeric or liquid plasticizers. Unlike some other popular thermoplastic roofing membranes, the TPO polymer does not contain chlorine and no chlorine-containing ingredients are added during sheet production. This lack of chlorine has allowed TPO marketers to tout their membrane as an environmentally safe, “green” product.

The TPO resin is compounded with other components including a weathering package, fire retardants and pigments for color to create a product that can withstand the elements associated with rooftop exposure. The membrane is comprised of TPO based top and bottom plies encapsulating a reinforcing fabric that enhances the physical properties of the sheet. The combination of the fabric and TPO plies provide reinforced membranes with high breaking and tearing strength and puncture resistance.

TPO roofing membrane is typically installed using mechanical fasteners and plates placed along the edge of the sheet and fastened through the membrane and into the roof decking. Adjoining sheets of TPO membrane are overlapped, covering the fasteners and plates, and joined together with a minimum 1 1/2 inch wide hot air weld.

The membrane may also be fully adhered to an insulation or deck material using an adhesive. Insulation is typically secured to the deck with mechanical fasteners and the TPO membrane is adhered to the in-

ulation. This type of system is highly resistant to wind and its associated uplift forces. Since the sheet is 100 percent affixed to the substrate, the membrane does not flutter due to associated wind forces. With no sheet movement due to the 100 percent attachment of the membrane, the fully adhered system is ideal for very visible roofs such as domes or other high slope applications.

One of the primary benefits of TPO membrane is the ability to fuse the sheets together with a hot air weld. The welding process results in a bond that is actually stronger than the sheet itself. Flashing details, such as exhaust vents, pipes and parapet corners are also completed using hot air welds and flashing material (typically non-reinforced).

TPO membrane, reinforced and non-reinforced, is 100 percent recyclable during the production process. During production, if the need arises, the membrane can be ground into “rework” and this regrind can be incorporated into the bottom ply during the extrusion process to produce new TPO product. This process results in 100 percent reuse of recycled product.

Another important characteristic of TPO membrane is its high level of reflectivity. Because of this, white TPO membranes can meet and even substantially exceed the U.S. Environmental Protection Agency’s ENERGY STAR performance levels.

Over the past decade, TPO membranes have succeeded in gaining strong roofing industry credibility based on their physical property characteristics, wide sheet technology and long term rooftop performance throughout the world.



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