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Performance Evaluation of Thermoplastic Polyolefin (TPO) Roofing Membranes

Objectives

To evaluate the performance of unexposed and exposed thermoplastic polyolefin (TPO) roofing membranes.

Background

Thermoplastic polyolefin is a compound of ethylene and propylene, which is used as an elastomeric single-ply roofing membrane. TPO roofing membranes are new, and are reported to be as heat-resistant as the more commonly used ethylene propylene diene monomer (EPDM), and as heat-weldable as polyvinyl chloride (PVC). TPOs do not contain plasticizers and so avoid the problem of plasticizer loss. However, little is known about their durability characteristics such as tensile breaking strength or elongation at break, which govern how the material will respond to physical forces such as impact or abrasion.

Statement of Work

TPO roofing membranes are being exposed at four sites for one, three, five and seven years. Those membranes, as well as unexposed samples, are being tested for thickness, tensile strength, elongation, dimensional stability and water absorption. The glass transition temperature of the membranes will also be determined before and after exposure using dynamic mechanical analysis (DMA). The changes in the chemical composition of the samples due to exposure in the field will also be investigated using Fourier Transform Infrared spectroscopy and thermogravimetry.

Expected Outcomes

Mechanical and physical properties will be compared to the ASTM D6878 specifications. The results will help roofing contractors to evaluate the properties and performance of TPO roofing membranes.

Partners

Western States Roofing Contractors Association

Start/Expected Completion Dates

This project began in 2003 and will be completed in 2009.

Project Manager

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For more information, see http://irc.nrc-cnrc.gc.ca/bes/prsi/tpo_e.html

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Researcher places a sample on the DMA to measure glass transition temperature (T_g)



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