Airable
RESEARCH LAB

Evaluation of Roof Maxx™ on Solar Panel Mounts and Related Materials

Abstract

Roof Maxx™ is an asphalt rejuvenator that has been proven to extend the life of asphalt roofing shingles. However, many roofs are now home not only to roofing materials but also to solar panels. Roof Maxx Technologies LLC engaged Airable Research Lab to determine whether Roof Maxx treatment has any detrimental impact on the materials used in solar panel installations. The study scope included the most commonly used materials: asphalt shingles, rubbery EPDM gaskets to mount the solar panels and create a watertight seal around the roof fasteners, waterproof thermoplastic polyolefin polymers used for exterior junction boxes, and other types of boots for roofing vents used on residential roofs. While asphalt shingles that underwent extreme exposure to Roof Maxx brand asphalt restaurant (400% more than the usual roof treatment application) showed slight softening, there was very little impact on the physical and mechanical properDes of the most typical rubber and polymer materials used in relation to solar panel mounting. These findings indicate that Roof Maxx is safe to use on roofs that support solar panels.

Background

Roof Maxx is an asphalt rejuvenator that has been proven to extend the life of asphalt roofing shingles. However, shingles are no longer the only installation on a number of roofs, and that number is growing. Solar panels have become more common in residential buildings, especially over the last decade,[1] as the price of solar cells has dropped. Since the price is expected to continue declining over the next decade,[2] the increase in residential solar panel systems will likely also continue over the next ten years. It is therefore important to test the compatibility of roofing rejuvenators with the materials used in solar panel installations.

This study was iniDated to ensure that these investments are safeguarded. To that end, Roof Maxx Technologies LLC engaged Airable Research Lab to test the shingle rejuvenating formula on solar panel materials to be sure that there is no detrimental impact on their physical or mechanical properties.

Materials

Asphalt shingles are the most common roofing material. Mounting solar panels onto asphalt shingled roofs typically employs rubbery EPDM gaskets to create a watertight seal around the roof fasteners. Additionally, waterproof thermoplastic polyolefin polymers can be used for exterior junction boxes and other types of boots for roofing vents used on residential roofs.

Methods

Baseline hardness and tensile test data were collected on all materials. The baseline samples were conditioned for a minimum of 16 hours at 23°C/50% RH prior to testing. Material hardness testing was performed according to a ASTM D2240. Tensile strength and elongation testing utilize micro-tensile specimens and was performed according to ASTM D412.

To simulate intermittent fluid aging or exposure cycles, based on ASTM D471,[5] test shingles were dipped into standard Roof Maxx solution at 23°C, followed by oven drying for 1 hour at 60°C. This process was conducted five times for each sample to simulate five exposures to Roof Maxx—or 400% more exposure than shingles would experience during a typical Roof Maxx treatment. After the five cycles a final drying was performed for 24 hours at 60°C.

Physical properDes were recorded both before and after the fluid aging. These data were used to calculate any changes in these properDes, e.g., differences in mass and volume. Additionally, the hardness and tensile strength tests were repeated to observe the effects of fluid aging on mechanical properties.

Results

Material hardness (durometer) softened by about 5%–10% aPer five applications of Roof Maxx.

Figure 1. Durometer, aka hardness, before and after five Roof Maxx applications.

While there was some slight softening of the materials, the other mechanical properDes were not impacted. Tensile testing showed no impact on the material's strength, elongation, and modulus aPer repeated exposures to Roof Maxx. The data clearly show that, overall, Roof Maxx does not diminish the efficacy of EPDM or thermoplastic roofing materials.

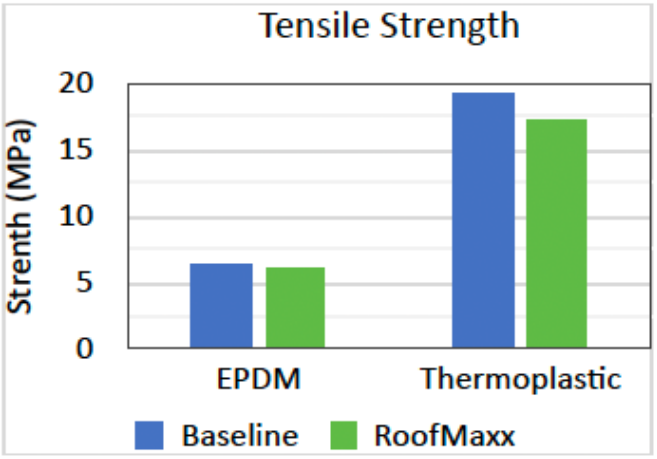

Figure 2. Tensile strength before and after five Roof Maxx applications.

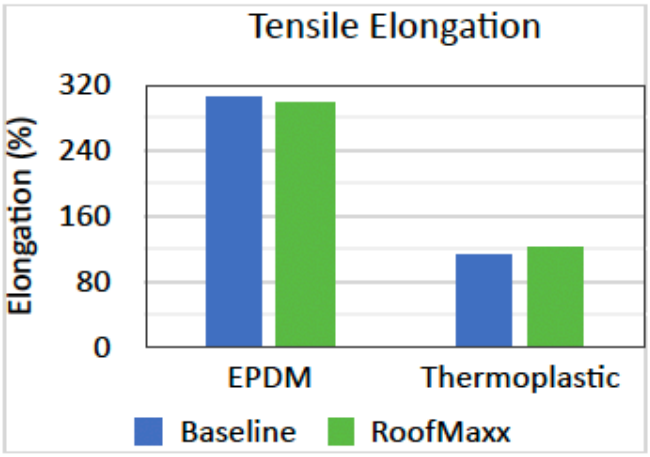

Figure 3. Tensile elongation before and after five Roof Maxx applications.

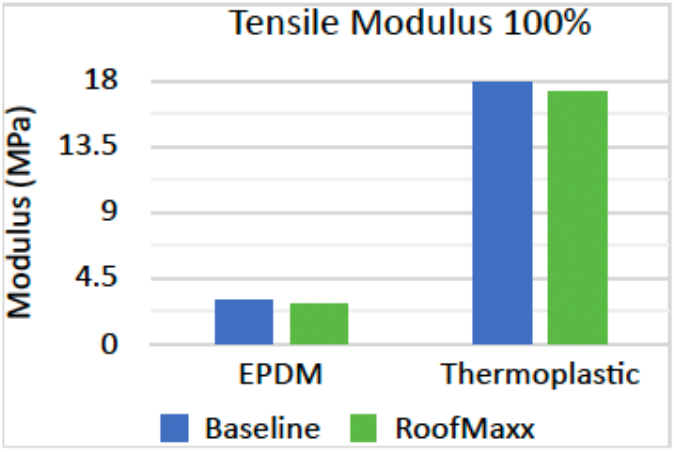

Figure 4. Tensile modulus at 100% elongation before and after five Roof Maxx applications.

The physical properties monitored included mass change and volume change. These properties showed <1% difference (i.e., virtually no impact) as a result of repeated exposure.

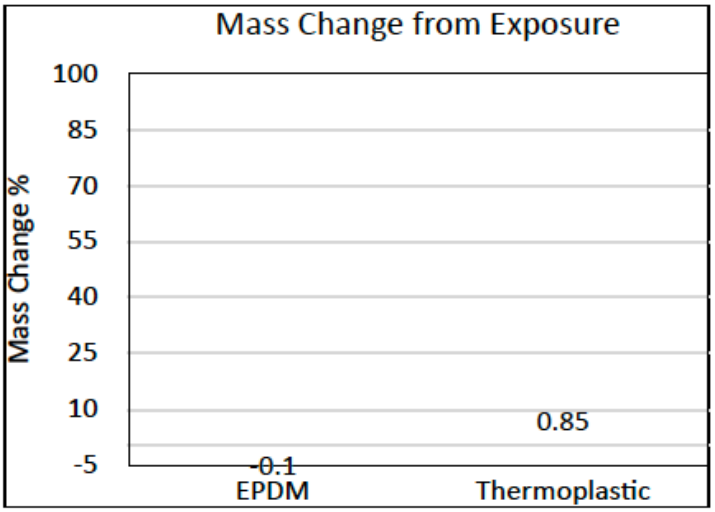

Figure 5. Mass change percent after five Roof Maxx applications.

Figure 6. Volume change a7er five Roof Maxx applications.

Discussion

Asphalt shingles that underwent extreme exposure to Roof Maxx brand asphalt resaturant showed slight softening. However, the exposure was 400% more than the usual roof treatment application (roofs are typically treated once, not five times). Overall, there was very little impact on the physical and mechanical properties of the most typical rubber and polymer materials used in relation to solar panel mounting. These findings indicate that the treatment should not result in any swelling, mass change, or volume change. This study suggests that Roof Maxx is safe to use on roofs that support solar panels.

Endnotes

[1] D. Feldman, K. Dummit, J Zuboy, R. Margolis. Spring 2023 Solar Industry Update. National Renewable Energy Laboratory, NREL/PR-7A40-86215. 2023. https://doi.org/10.2172/1974994.

[2] US Department of Energy, Office of Energy & Renewable Energy. Solar Futures Study. September 2021. https:// www.energy.gov/sites/default/files/2021-09/Solar%20Futures%20Study.pdf.

[3] ASTM International. ASTM D2240-15(2021) – Standard Test Method for Rubber Property—Durometer Hardness. Last updated July 2021. https://www.astm.org/d2240-15r21.html.

[4] ASTM International. ASTM D412-16(2021) – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension. Last updated June 2021. https://www.astm.org/d0412-16r21.html.

[5] ASTM International. ASTM D471-16a(2021) – Standard Test Method for Rubber Property—Effect of Liquids. Last updated June 2021. https://www.astm.org/d0471-16ar21.html.