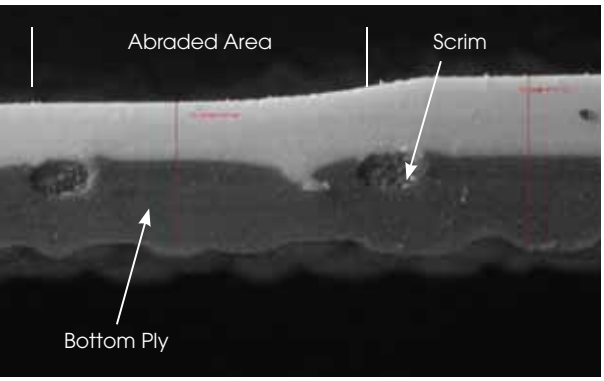
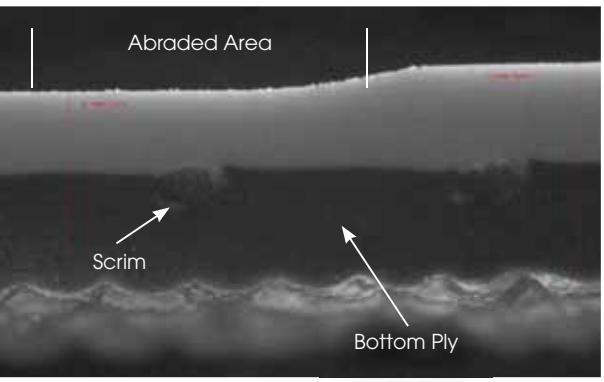
VERSIFLEX™ PVC AND KEE HP MEMBRANE THICKNESS

There are many factors that play into the weathering of a roofing membrane's surface. Abrasion caused by windblown particles and foot traffic can be a major contributor to a reduction in membrane's thickness. Thicker membranes can help to offset the dramatic effects of abrasion and general PVC aging. This article will focus on the ways in which abrasion can negatively affect the overall thickness of a roofing membrane, reducing the amount of material protecting the building.



Membrane: 60-mil PVC
Beginning Thickness: 58.94
Ending Thickness: 50.81



Membrane: 80-mil PVC
Beginning Thickness: 78.58
Ending Thickness: 73.57

Abrasion Testing

Abrasion testing was conducted on five different roofing membranes by an independent third-party testing facility in accordance with ASTM D3389. Prior to testing, each specimen was weighed on a digital balance. The specimens were cut per the instructions in the standard, identified, coded, and installed on a Taber Abrasion Tester machine operating with Calibrade H-18 abrasive wheels. The Taber Abrasion Tester was adjusted with 1,000 grams of wheel load. Five samples of each specimen were tested and the results were averaged. The abrasion tester was started and each sample was abraded for a total of 2,000 cycles. After every 250 cycles, the specimen and the abrasive wheels were cleaned according to the instructions using a brush.

Samples

Five samples of five different membranes were tested, totaling 25 tested samples. Three samples were standard PVC; of those, two were 60-mil and one was 80-mil. Two samples were KEE-modified PVC; of those, one was 36-mil and one was 50-mil.

All samples were subjected to the same abrasion testing under the same set of conditions. Each sample was weighed before and after the 2,000 cycles. The thicknesses of both the abraded area and the non-abraded area were measured by a Scanning Electron Microscope to determine the effects of abrasion and how much of the material was lost.

Measurements

Thickness was measured at the point of contact between the abrasive wheel and the surface of the membrane, and immediately outside of the abraded circle. The difference was the amount of thickness lost due to abrasion. This difference was divided by the original thickness to determine the percentage of thickness loss.

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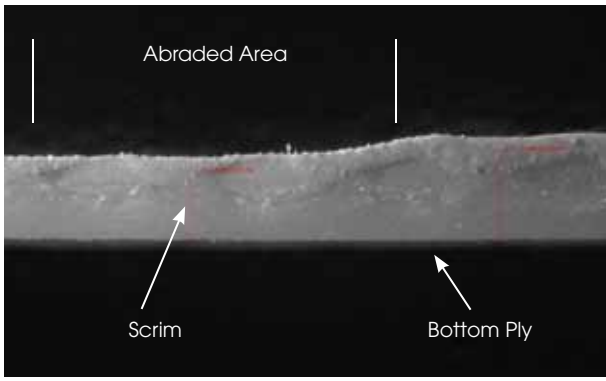
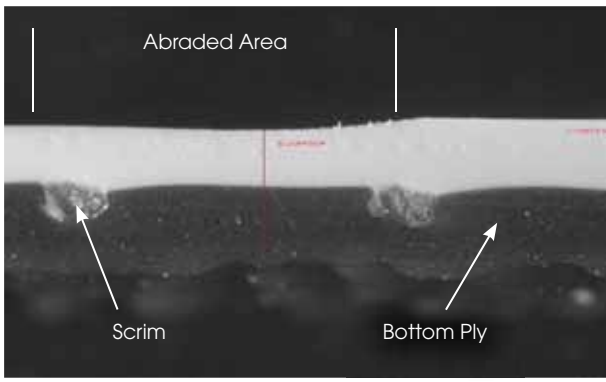
The dirt-encrusted sole of a workman's boot doesn't respect formulation, it only respects thickness over scrim. 'Thickness matters' and is more than just a marketing slogan.

Membrane Test Samples

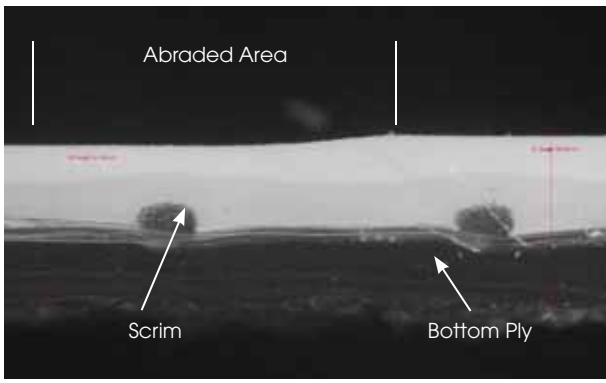
	Original Thickness	Final Thickness	% Thickness Loss
PVC/KEE 36-mil	32.74	27.37	16.4%
PVC 60-mil	58.94	50.81	13.8%
PVC/KEE 50-mil	52.72	47.75	9.4%
PVC 60-mil	59.77	54.81	8.2%
PVC 80-mil	78.58	73.57	6.4%



Membrane: 36-mil PVC/KEE
Beginning Thickness: 32.74
Ending Thickness: 27.37



Membrane: 50-mil PVC/KEE
Beginning Thickness: 52.72
Ending Thickness: 47.75



Membrane: 60-mil PVC
Beginning Thickness: 59.77
Ending Thickness: 54.81

Conclusion

As Table 1 indicates, the thinnest membrane (36-mil PVC/KEE) had the greatest percentage of material loss: 16.4% of the original thickness. The formulation of this specimen, which used a solid plasticizer, probably helped to mitigate the effects of abrasion, but the formulation benefits were diminished by the minimal thickness. The membrane that experienced the second-greatest percentage of material loss (13.8%) was a 60-mil PVC. This could have been caused by the material's softer formulation, which mostly consisted of liquid plasticizers. The 50-mil PVC/KEE had next-greatest percentage of loss (9.4%).

The membrane with the lowest percentage of thickness loss was the 80-mil PVC. This is a good indication that thicker membranes help to mitigate the effects of abrasion caused by wind-blown particles and foot traffic. If any of the samples were thinner, the membrane would wear to the scrim, jeopardizing the integrity of the sheet. Additional thickness has also proven to increase the life expectancy of the membrane (when properly formulated) thanks to the increased reservoir of plasticizers.

Abrasion is different from weathering; to defend against both, you need an ideal balance of thickness and abrasion resistance.

MEMBRANE THICKNESS REALLY DOES MATTER

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