

DO YOU HAVE ants in YOUR PLANTS?

A Review of Insect Attacks on EPDM Rubber Membranes

BY LYLE D. HOGAN, RRC, FRCI, PE

Figure 1 – Planters are not exclusive to rooftops, as they are often found inside hotel lobbies, shopping malls, medical clinics, and the like. Furniture showrooms and executive offices were located below these planters, where substantial wetting occurred.

EPDM must be viewed as a success story by any rational consideration of the facts. While there have been failures and instances of misuse, the decades of low-slope roofing market share in excess of 25% are indisputable.¹

Roof technologists are sometimes called on to investigate problematic leakage, and identifying the correct source can be deceptive. Taken in perspective, insect boreholes would seemingly be a rare occurrence, but ethylene propylene diene monomer (EPDM) rubber appears to be a periodic victim. With the increasing popularity of planted roofs, leak diagnosis may take on a near-microscopic perspective.

Planters lined with rubber membrane are of potential concern. Certainly not exclusive to rooftops, they are often found inside hotel lobbies, shopping malls, medical clinics, and the like. *Figure 1* depicts a recent project involving furniture showrooms and corporate offices below planters, where substantial wetting occurred. The installing contractor was named in a liability insurance claim for flawed workmanship. Yet after investigation, his work was found to be satisfactory. Further investigation properly focused on the mulch and organic fill that had fostered insect colonization (*Figure 2*). Invading creatures



Figure 2 – Chasing leaks in planted roofs can be tedious work. Mulch and organic fill may be the necessary environment to foster insect colonization; the invading creatures may also arrive on the various plantings being introduced.



Figure 3A – This vessel incurred substantial cost, requiring removal of overburden where insect boreholes were eventually located.

Figure 3B – This vessel was similarly lined with EPDM (same contract) but never received mulch, soil fill, or plantings; leaks have not occurred below it in the years since installation.



may also arrive on the various plantings being introduced. And there is nothing to prevent them from arriving anytime later—well after the work of all trades is concluded.

Chasing leaks in planted roofs can be tedious work. The vessel in Figure 3A incurred substantial cost, requiring removal of overburden where insect boreholes were eventually located. The vessel in Figure 3B was similarly lined with EPDM at the same time and under the same contract. However, it never received mulch, soil fill, or plantings, and leaks have never occurred

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Figure 5 – Underside of this sample shows a line of partly developed boreholes. How the creatures access the underside of a functional membrane is not understood. Indeed, there may well be topside invasion in some instances.



Figure 4 – Top surface of planter liner showing tiny insect boreholes. These are unique and cannot be replicated by drill gun, ice pick, golf shoes, falling limbs, spiked hail, or any other type of mechanical contact.



below it in the years since installation. Again, this points to introduction of the pests by another source or trade.

The first time the author encountered insect boreholes was on a dilapidated (and wet) EPDM roof in South Carolina. This was approximately 30 years ago—long enough ago that it had old neoprene flashing and splicing cement. After a round of hypotheses and speculation, all in attendance eventually recognized the proper cause of the holes.

The tiny insect boreholes are unique and cannot be replicated by drill gun, ice pick, golf shoes, falling limbs, spiked hail, or any other type of mechanical contact (*Figure 4*). Weld splatter marks can somewhat resemble these, but such activity is uncommon on a finished rubber roof and will not create such a condition on the underside of a sheet. Partially developed boreholes (*Figure 5*) are a sure sign of insect colonization below the membrane. How the creatures access the underside of a functional membrane is not fully understood. Indeed, there may well be topside invasion in some instances.

On another recent project, a badly neglected rubber roof was affected. Although in close proximity, the tiny holes encountered were not punctures from nearby fastener heads (*Figure 6*). Saturated wood fiber insulation had consolidated, leaving the screw fasteners standing high in classic fashion.



Figure 6 – Although in near proximity, the tiny holes encountered here were not punctures from the nearby fastener head. The “tented” fasteners, however, may well provide the necessary underside space accommodation for the guilty insect to make the openings.

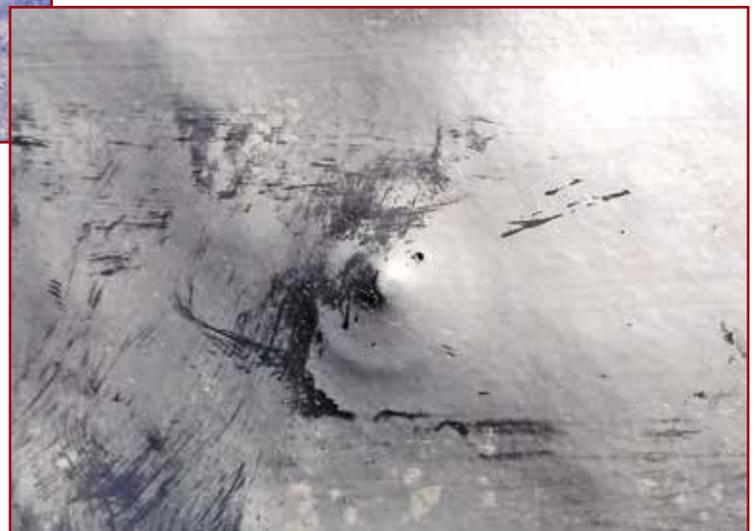


Figure 7 – Damp/saturated wood fiber insulation has been present in the roof-related studies of insect infestation carried out by the author.



Figure 8 – While the openings are quite small, prolonged ponding can exacerbate the tendency for any breach to admit a substantial amount of water.

These “tented” fasteners apparently provide the necessary underside space accommodation for openings to be made by the guilty pests.

Damp and saturated wood fiber insulation has been present below EPDM rubber in the roof-related studies of insect infestation carried out by the author (Figure 7). While the openings are quite small, prolonged ponding has exacerbated the tendency for any breach to admit a substantial amount of water (Figure 8). The same is true for planter vessels in which a film of standing water may exist throughout the entire service life.

A few creatures (resembling ants) were observed in abundance on this particular roof and may be the source of the boreholes encountered (Figure 9). Ants especially like nesting in wood fiber, and they tend to puncture the membrane from the underside as they expand their territory in search of food. It is unclear how long it takes for holes to manifest, but punctures from the topside are most frequently associated with insects in the larval stage. After hatching, the larvae attempt to burrow in order to escape predators, and this can lead to penetration from the top. This burrowing can frequently be a multigenerational process, with each generation of larvae burrowing a little deeper.² Still, attack from the underside is equally probable, based on findings in other instances. Ants are frequently accused, but other insect varieties may have a similar appetite for rubber membranes. It is also not clear whether they in fact consume the material or merely puncture it.

Insect boreholes should not be confused with “comets” and related blemishes that may occur on EPDM rubber (Figure 10A-D).

Figure 9 – These creatures were found in abundance on the most recent study carried out by the author. Still, attack from the underside is equally probable. Ants are frequently accused, but other insects may have a similar appetite for rubber membranes.



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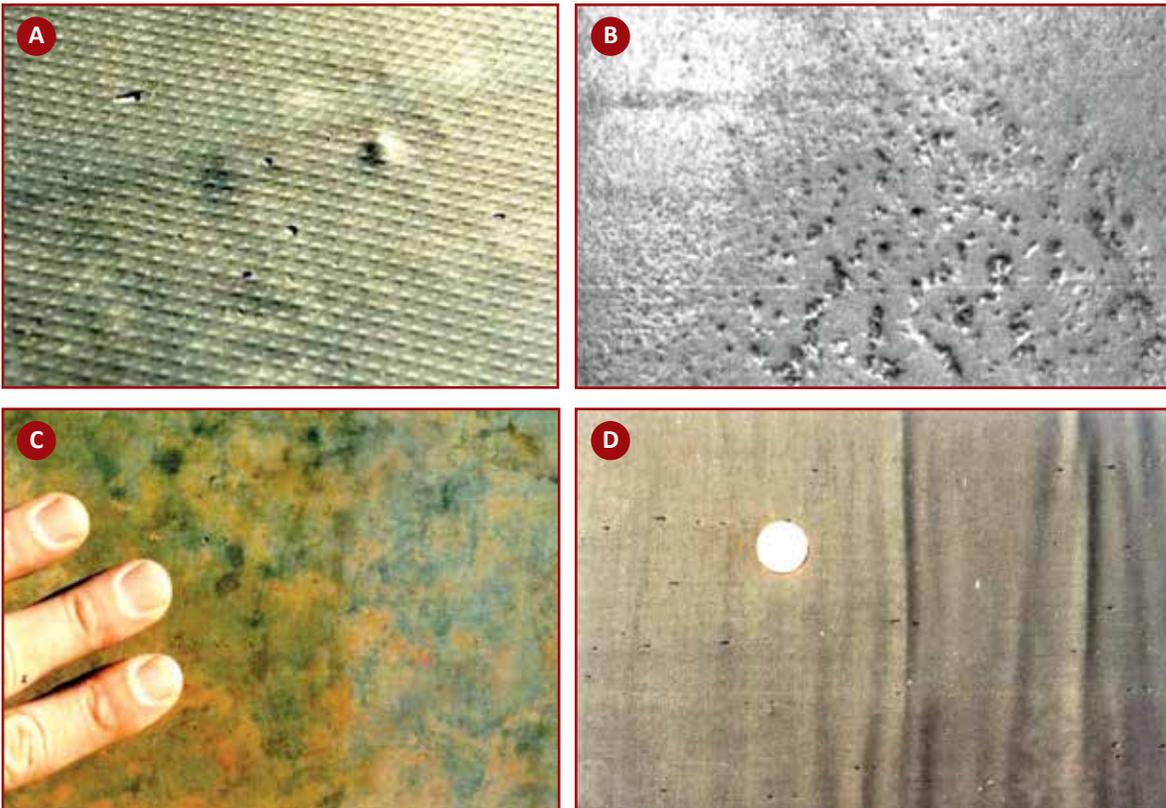
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Figures 10A-D – Insect boreholes should not be confused with “comets” and related blemishes that may occur on EPDM rubber. This condition is certainly not rampant and is scarcely different than small manufacturing defects that may be encountered with other membrane types.

The condition is certainly not rampant and is scarcely different than small manufacturing discrepancies that may be encountered with other membrane types. It should be noted that EPDM membranes are actually a two-layer arrangement. Comets are virtually certain to occur to some extent during manufacture, mostly due to speed of the advancing sheet. At that point, the material is unvulcanized, quite hot, and soft. To manage the likelihood of comets aligning in the finished product, two sheets are blended together while on the carrier belt, making the probability of alignment statistically remote. Other products have their own nuances, so this discussion is not offered to indict rubber roofing.

SUMMARY COMMENTS

As stated earlier, planters lined with EPDM and old dilapidated rubber roofs over wet wood fiber insulation are apparently prone to attack by insect bore holes. There

may be other combinations of environments and materials that are similarly prone, but for now, this is the extent of the author’s investigation experience. When investigating the source of unexplained leakage, the possibility of insect damage is a worthwhile consideration.

Finally, vegetative roofing is now rather well established in standards issued by both the International Code Council (ICC) and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). Ultimately, research is needed for better identifying the types of insects that are prone to attack rubber membranes. 

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with Dr. Jim Hoff, president of TEGNOS Research Inc., Carmel, IN.



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