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Red Algae and WHITE Roofs

Within the past ten years, there has been unprecedented growth of "white" roofs. Whether thremoplastics, modified bitumens, roof coatings, or liquid-applied systems, the trend toward white surfaces is racing along, but with some unforeseen consequences.

As an example, we have seen an increased incidence of red algae growth on white thermoplastic membranes. We have contacted PVC, KEE and TPO manufacturers to inquire of their experience, but the unanimous reply has been only that they were aware of red algae growth on some of their applications, but no response was anticipated at this time. Therefore, consider the following few facts and observations concerning this phenomenon:

Red Algae appears to form on thermoplastic roof surfaces due to the lower surface temperature of the membrane. The lighter color reflects so much heat that the surface stays damp much longer than other roofing materials, making it ideal for algae to bloom. In particular,for the humid Southeast, the growth of algae on roofing membranes eventually converts an originally bright white surface to a dark gray, greatly reducing its reflective properties. The organic growth and reduction of reflectance quickly (often within the first year) negate the initial design requirements.

When not drained properly, membrane soiling, loss of reflectivity, and algae growth are likely on reflective roofs. The roofing membrane itself may not be affected by the contamination or growth, but the overall roof performance will be diminished. A cooler surface also makes it more likely for stagnant water to occur on white roofs. However, research has shown that some CSPE membranes have been damaged by organism growth.

Concerns - Red algae causes human health concerns and promotes other vegetative growth. Standing water and algae can ultimately destroy the membranes' watertight integrity by attacking the seams and laps. Some thermoplastic manufacturers allow self adhesive or glued flashing strips in lieu of welded seams, thus setting up a scenerio for failure.

Solutions - Cognizant of this problem, many building envelope products contain antifungal agents, or biocides, in their formulations. These biocides, commonly metallic salts, are leached out of the paint or membrane surface with age and successive rainfalls. The biocide is absorbed by the microorganism attempting to attach to the surface, resulting in cell death. This process is effective as long as there is biocide available to be leached out of the paint or membrane surface. Once that reserve is depleted, the surface is no longer protected from the action of nuisance microorganisms.

Another potential solution is photocatalytic coatings - an environmentally friendly approach that could potentially replace paint and membrane additives whose biocidal effectiveness eventually wears out and whose toxicity may represent a problem.

Coatings are being developed for destroying atmospheric pollutants such as nitrogen oxide gases. Stable substrates are being developed with photocatalytic nanoparticle-grade anatase (a naturally occurring crystalline form of titanium dioxide).

Other microbiological substrates are being developed for the destruction of harmful bacteria through the use of nano- and micronparticle coating additives.

In conclusion, however, the best preventative is an adequately sloped roof surface. If water does not accumulate, there is no medium for algae growth. Remember, code and manufacturer requirements for roof slope are absolute minimums, so it certainly is possible (even preferable) to exceed these minimums and ensure that no standing water is present.

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Red Algae growth on Thermoplastic membrane
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Roof installed June 2013