News and Updates

The Importance of Synergy for Weathering Factors

South Florida is the world's recognized primary benchmark weathering location. It has all the important factors of weathering in abundance. Plenty of sunshine, warm temperatures, and lots of moisture from rain and condensation. Any one of these factors can cause degradation but when all three are acting at the same time there is an add-on effect. In weathering we have called this a synergistic effect, but what does that really mean?

Synergy is the interaction or cooperation of two or more agents to produce a combined effect greater than the sum of their separate effects. Sunlight alone will degrade materials, but the progress is much faster when the temperature is higher. The third factor though is different, water in of itself does not cause degradation to increase if there is more of it. Two different results occur, one if water is present and another if it is not. Water does have one effect on rate but that is due to the number of times and the rate of changing from dry to wet, or wet to dry.

Statistics are Easy

"WEATHERING TEST RESULTS SHOULD BE CONFIRMED BY STATISTICAL EXAM. IT CANNOT BE LEFT TO A SUBJECTIVE JUDGEMENT FOR ANY TEST, SO INCLUDE A RIGOROUS INTERROGATION OF THE DATA TO APPLY A PASS OR FAIL GRADE."

Outdoor deterioration is photo-degradation. It is the sun that provides the energy to break the molecular bonds and cause the material to break down. Ultraviolet energy is required for the chemical reaction which tears apart the C=C bonds. The photonic energy increases with lower wavelengths so a climate with strong sunlight breaks more bonds.

An increase in temperature speeds up the reaction, possibly as much as double for every 10 °C rise. Warm climates are more severe than cold climate, and summers are more severe than winters. In temperate zones, the longer the warmer summer temperatures are around, the sooner the product will fail. In some cases, the progression of degradation stops altogether in winter.

The presence or absence of moisture changes the type of degradation. This is clearly seen when comparing Florida to Arizona, since both have high UV and warm temperatures, but the results of exposure are generally quite different. Both exposures will cause color change and gloss loss. At the extreme low humidities in the desert, volatile ingredients in plastics will dry out and leave the plastic brittle and easily broken. In the wet climate of subtropical Florida, the water initiates blistering cracking, chalking, erosion, biodeterioration, and corrosion.

We need sunlight to fuel the degradation process, we need warm temperature to make process move faster, and the presence or absence of water determines which type of degradation we get. The processes are not linear though and we must always be conscious of threshold levels. We must know the results of all three inputs, but remember that all three inputs work together. So a normal level of one factor might not be normal when multiplied by another.

Wet Time Measuring and Recording

With the recent publication of ASTM G229, we now have a standardized way of determining the time of surface wetness at any exposure test site. ASTM Committee G03 recently approved G229 *Standard Practice for Estimating Time of Wetness at an Outdoor Exposure Site* which uses a cotton wick sensor first developed by Charles Kettering (Chief Engineer of General Motors) in about 1931 and which has been successfully used by major test sites ever since. This practice is used to determine the total amount of wet time outdoors for a particular location. This practice is not intended to measure the time of wetness of any specific specimen. The apparatus will account for the duration of condensation events, and rain duration. A means of constructing the apparatus is included in the document, as well as calibration and maintainence procedures.

When to Stop a Test (Part 2).

When should you stop an exposure test, or alternately when is enough, enough? Obviously, if you are following a specification, the duration is given and you stop when you reach that point. But what if you are testing to gather research data, and there is no hard stop given? We are not going to recommend using hours or radiant dosage to time the end point, and there are many reasons for this. The end point should be based on the amount of deterioration in the test specimens. One way is to compare the test specimen to a reference or control specimen. When the control reaches the desired change, compare the change in the test specimen. Another way is to look at the spread of results among the different specimens in the test. When the largest spread is found, the statistics are the most reliable. One other recommendation is to expose all specimens until all specimens fail. Remove failures as they occur and note the duration.

CALENDAR

AATCC Coloration Conference
Raleigh, NC
February 24, 2026

FGIA Annual Meeting
Huntington Beach, CA
March 2 to 5, 2026

ASTM April Committee Week 2026
Committees D01, D20, G01, G03
Dallas, TX
March 23 to 26, 2026

SAE Lighting Materials Meeting
Tampa, FL
May4 to7, 2026

Standards Information

ASTM D3424-25 on Lightfasness of Printed Materials has recently been reinstated. Inadvertently withdrawn several years ago, the standard will now undergo some minor revisions.
ASTM D4674-25 has been revised to remove the outdated Methods I and II to an Appendix. These older methods used the HPUV which combined Cool White lamps and UVB lamps. No HPUV has been seen in operation for many years.
SAE J576 has finally been revised and has a 2026-01 publication date. New to this document is an accelerated lab test for decorative lamps, a specified duration for the solar concentrator test, and the return of the heat test.

Benchmark is the name of our website, and is derived from the basis that "Florida outdoor weathering is the *Benchmark* by which all other weathering tests are compared." You can find BENCHMARK at either of these URLs bestweathertest.com or bestcorrosiontest.com

BENCHMARK