



**Quick Links**



Drawing on decades of weathering leadership and expertise, the Atlas Consulting Group provides in-depth consulting services that assist you in developing and applying the best weathering test methods and strategies for your products. **Atlas Weathering Consulting Insights** offers interesting and valuable information on a variety of topics relevant to long-term durability testing.

**Weathering Testing 101 - Back to Basics  
The Question on Everyone's Mind**

**This issue of the Atlas Weathering Consulting Insights Newsletter is the first installment of a four-part series that will briefly address four of the most frequently asked questions that the Atlas Consulting Group receives in regards to weathering testing.**

By far, the most frequently asked questions in accelerated weathering are, "If I run an accelerated test for so many hours, how long will my product last?" or a similar variation such as "How long do I need to test to know if my products will last one year outdoors in Miami?"

As consultants we are expected to have the answers to such questions. For the first question, we can simply tell you, "We do not have the slightest idea how long your product will last," and for the second question, we could answer "about 365 days." These may seem like flippant responses, but they highlight the reality which is, there are no simple answers to what are fundamentally very complex questions.

The fact is, people often want easy answers.... and fortunately, there are some answers we can provide. It is possible to find, model or estimate total annual solar radiant exposure data for specific locations all over the world. Next, we can calculate the radiant exposure of a sample during the accelerated test. If we then calculate the ratio of the radiant exposure in the accelerated test to the annual radiant exposure (either total UV or total solar radiation, but don't mix the two) we have the time it takes for a sample, fully and continuously exposed in the field, to "see" the same amount of solar radiation as a sample in the accelerated test. Note that this is not "correlation" but merely a radiant energy equivalence between tests.

This is often not the whole truth but commonly, people accept this as at least a starting point. In any event, we have to mention all the disclaimers including that all other factors which influence the ageing of materials, such as the effects of temperature and humidity differences, are not considered in this model. As weathering consultants, we strive to have the answers you need. Unfortunately, we do not have a prized "Weathering Book of Secrets" at our disposal that lists exposure equivalents for all materials in all climates and all laboratory tests for all material properties. Though we wish we had such a book, we must rely instead on science, knowledge and experience.

What we do know is this – in reality there are many factors which limit this simple calculation to only an estimation, and it cannot be used for reliable lifetime prediction. Some of these factors include:

- **Location:** As noted above, each location on earth has its own individual macro and micro-climates which have to be considered, as well as seasonal variations.
- **Annual variances:** As each location is different, so is each year – we often look for 10-year averages.
- **Sample orientation:** Is the sample in the use environment facing the sun or northwards? Is it shaded? Is it covered? Is there reflection from the surrounding area? Is it vertical, near-horizontal or other? There are many factors influencing the global radiant exposure.
- **Sample mounting:** If a sample is backed or un-backed or mounted in another way, it might not change the radiant exposure, but can have a significant effect on the sample temperature.
- **Sample absorbance:** The absorbance (color) of a sample has a significant effect on the sample temperature.
- **Degradation pathway:** Degradation pathways are highly material dependent. Environmental factors such as temperature and humidity, not to mention cyclic conditions, might have different influences. Increasing the temperature in an accelerated test (which is common), can have a tremendous effect on the rate of one degradation process and almost no effect on another degradation process. The same applies to humidity and humidity cycles. This is why the technique that is chosen to perform the accelerated test and the specific test parameters can have a profound effect on the results.

**...These are just a few of the many factors that can be considered.**

By always selecting worst case scenarios (e.g. "fully exposed to solar radiation") for theoretical field exposures, we can simplify the comparison. However, other effects such as material-dependent degradation pathways, have to be considered separately, but they can be included in our calculations if the degradation for a specific material and property is understood.

There are no simple answers to the common questions – "If I run an accelerated test for so many hours, how long will my product last?" or "How long do I need to test to know if my products will last one year outdoors in Miami?", but knowing your sample, how and where it is used, and how it ages, can help to make more educated guesses than simple ratios of radiant exposures can provide.

If these questions are ones that you are struggling to find the answers to as they relate to your product, we are here to help. The Atlas Consulting Group can assist you in selecting the appropriate standards or develop the test cycles, test methods and complete test programs that are appropriate for both the product you are testing and its intended end-use climate(s).



**One of several solar radiation monitoring racks at Atlas' DSET Laboratories in Phoenix, Arizona. Detailed field solar radiation data is often used when comparing laboratory exposure "equivalents."**

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