



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**

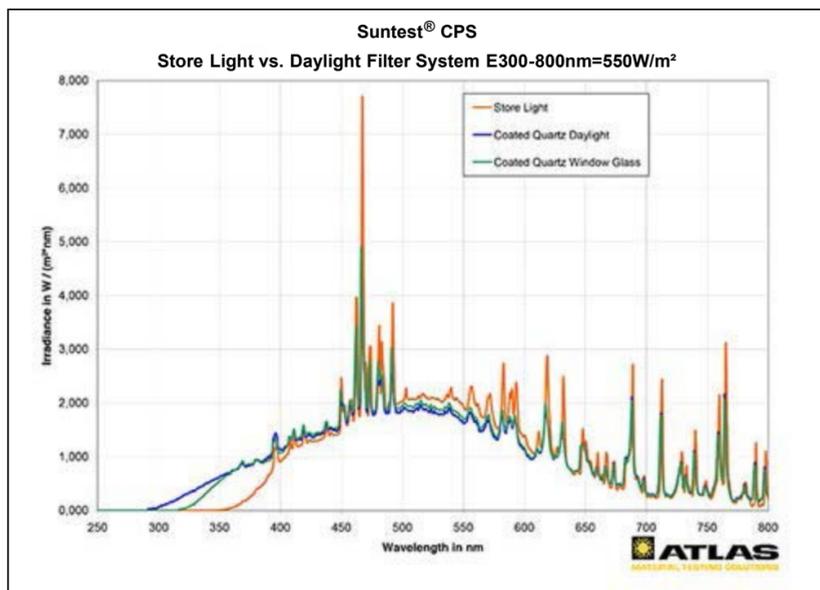
This issue of the Atlas Weathering Consulting Insights Newsletter is the second installment of a four-part series that will briefly address four of the most frequently asked questions that the Atlas Consulting Group receives in regards to weathering testing.

One of the most frequently asked questions in accelerated weathering is "I need to test my product to indoor lighting, how do I do it?" While we usually think of weathering as an outdoor exposure, interior building exposure in the workplace, home or store is not always just a subset of the outdoor condition, it has some unique aspects regarding testing.

Indoor light exposure, as well as other environmental conditions, can promote yellowing of plastics such as office/electronic equipment, fading of printed packaging or point-of-sale displays, and fading of furnishings, fixtures and merchandise such as textiles.

In the food and beverage industry, there is a major market shift underway to "go green" by replacing synthetic colors and flavors with natural ones, as well as to provide more product visibility through transparent packaging. Light can reach the product and affect color, odor, taste, nutrition, and in the case of pharmaceutical drugs, therapeutic efficacy. And specialty lighting, such as the use of UV-C sterilization in HVAC systems and healthcare facilities such as operating rooms, is an increasing trend imposing unique material durability issues.

Exposure to indoor lighting, in particular, presents more variability than to outdoor solar radiation. First, what is the indoor light source (or sources)? Is it primarily artificial such as modern tri-phosphor fluorescent or white LED, gas vapor discharge lamp or other source? Is true daylighting also present, either through window or skylight filtered sunlight? What is the filter factor of the window glass? What is the distance to the light source or window? What is the duty cycle of the lighting, e.g. 24 hours a day? What is the lighting level on the target surfaces as well as the spectral characteristics?



Store Light filter for Suntest CPS+XLS+ spectrum compared to Window Glass filtered and direct outdoor sunlight

Ideally, one would prefer to expose test samples under the target conditions of principal concern, such as "big box" indoor retail. Often however, neither the nature of the lighting across the entire distribution chain, nor the lighting levels, can be determined through field measurements for all likely scenarios. In this case, a reasonable approximation can be made, for most light sources, using either a "Store Light" filter for xenon arc devices to simulate primarily retail/office artificial lighting, or a "filtered daylight" window glass where appropriate.

Interior lighting levels can vary greatly, especially near sunlit windows and skylights. The human eye has a very large dynamic range and adapts to these large differences between purely artificial interior and window daylighting. However, from a testing perspective, the illumination near a window may be thousands of times higher and this must be taken into consideration when determining test exposure conditions. Lighting level recommendations are generally stated in photometric units.

Activity	Illumination (lux, lumen/m ²)
Public areas with dark surroundings	20 - 50
Simple orientation for short visits	50 - 100
Working areas where visual tasks are only occasionally performed	100 - 150
Warehouses, Homes, Theaters, Archives	150
Easy Office Work, Classes	250
Normal Office Work, PC Work, Study Library, Groceries, Show Rooms, Laboratories	500
Supermarkets, Mechanical Workshops, Office Landscapes	750
Normal Drawing Work, Detailed Mechanical Workshops, Operation Theaters	1,000
Detailed Drawing Work, Very Detailed Mechanical Works	1500 - 2000
Performance of visual tasks of low contrast and very small size for prolonged periods of time	2000 - 5000
Performance of very prolonged and exacting visual tasks	5000 - 10000
Performance of very special visual tasks of extremely low contrast and small size	10000 - 20000

Recommended Lux (visible light) illumination levels for indoor lighting
Source: http://www.engineeringtoolbox.com/light-level-rooms-d_708.html

These photometric units, which just include the visible portion (light) of solar radiation, must be converted to the radiometric units (which consider the solar spectrum including UV, Visible and IR) that most weathering and lightfastness instruments use. Since weathering devices are usually designed to provide at least "one sun" levels, this results in very high test pseudo "acceleration factors" and short test times, often only hours to days or weeks.

Lastly, test temperature and, to a lesser extent, humidity, may be more restrictive and less variable than for outdoor weathering. In particular, many foods, beverages, and personal goods may thermally degrade and require testing devices with cooling to provide close to near-ambient, and in some cases, even lower temperatures.



Product testing (food, packaging, beverages, etc.) using an Atlas SUNTEST

There are no simple answers, but knowing your sample and it's environment, how and where it is used, and how it likely ages, helps to make much more educated testing decisions. However, the answer will definitely not be a simple one.

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 environment(s).

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