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Architectural Powder Coatings: A Standards and Performance Comparison

By Thomas Schmidt and Richard Baumberger, TIGER Coatings GmbH & Co. KG, Wels, Austria

Abstract

This article compares various international industrial standards for architectural exterior powder coatings, including GSB, Qualicoat, AAMA, and HG/T 3793-2005. Most standards require both artificial accelerated weathering and outdoor exposure testing. Details of these testing requirements are discussed. Based on the performance classes described in these standards, architectural powder coatings can be specified. Results from xenon-arc testing shows correlation with real world Florida weathering tests for standard, super durable, and hyper durable TIGER Drylac® powder coatings.

Figure 1: *Architectural application of powder coatings on aluminum and steel profiles — Office Park Vienna, Austria, TIGER Drylac® Series 68 (Photo: Airport Vienna)*

The Powder Coating Advantage

For many years, powder coatings have been one of the most common surface options for architectural aluminum and steel. They are the most environmentally friendly coating option for facade panels, window profiles, visible structural steel, and other building components. Reclaiming powder overspray not only creates high material efficiencies, but it also eliminates the need for the disposal of paint sludge — all of which also lowers costs.

As a result, powder coatings have replaced liquid solvent-based lacquers in many architectural applications. One basic criteria for the use of powder coatings technology can be found in a set of international architectural standards.

Continued on page 3

Atlas' new SUNTEST® CPS+ ideal for smaller specimens
Page 12

In This Issue

Keep Your Team Up to Date!

Atlas' education and training solutions will help you and your staff master the skills now needed to develop long-lived products in shortened development cycles. Our programs are designed for all levels to ensure that everyone on your team understands the fundamentals of weathering and how to operate our instruments. For the latest schedules and locations, visit www.atlas-mts.com or e-mail atlas.info@ametek.com.

Fundamentals of Weathering I	November 6, 2012 April 17, 2013	Cologne, Germany Chicago, IL, USA	Presented in German Presented in English
Fundamentals of Weathering II	November 7, 2012 April 18, 2013	Cologne, Germany Chicago, IL, USA	Presented in German Presented in English
Sample Preparation Workshop	December 5, 2012	Linsengericht, Germany	Presented in German
SUNTEST® Workshop (CPS/CPS+ and XLS/XLS+ models without touchscreen)	November 23, 2012	Linsengericht, Germany	Presented in German
Weather-Ometer® Workshop	April 16, 2013	Chicago, IL, USA	Presented in English
Xenotest® Workshop	November 20–21, 2012	Linsengericht, Germany	Presented in German

2012

Intersolar India
November 6–8, 2012
Mumbai, India
Booth #2342

CHINACOAT 2012
November 28–30, 2012
Guangzhou, China
Booth #11.2M21/23

Visit Atlas' booth at these shows to learn about the latest weathering developments and how we can help advance your testing program.

For a complete list of Atlas shows, visit www.atlas-mts.com.

2013

PV Expo 2013
February 27–March 1, 2013
Tokyo, Japan

Plastimagen 2013
March 12–15, 2013
Mexico City, Mexico
Booth #500

European Coatings Show
March 19–21, 2013
Nürnberg, Germany
Hall 5, Booth 5-343

Asia Coatings Congress 2013
May 14–15, 2013
Ho Chi Minh City, Vietnam
Booth #45

SNEC PV Power Expo 2013
May 14–16, 2013
Shanghai, China
Booth #E1 910-911

Control
Stuttgart, Germany
May 14–17, 2013

Latin American Coatings Show
July 17–18, 2013
Mexico City, Mexico
Booth #A3

EXPO Solar 2013
September 4–6, 2013
Seoul, Korea

Asia Pacific Coatings Show
September 12–13, 2013
Bangkok, Thailand
Booth #G4

K-Show
October 16–23, 2013
Düsseldorf, Germany
Hall 10, Booth D51

The Society for Protective Coatings (SSPC) 2013

January 14–17, 2013
Henry B. Gonzalez Convention Center, San Antonio, TX

"Improved Laboratory Accelerated Weathering Test Method for High Performance Coatings"

Presenter: Allen Zielnik, Atlas Material Testing Technology LLC

Expert Forum "Plastics": Solar Heat and Photovoltaic Applications

February 6–7, 2013
Ostbayrisches Technologie Transfer Institut (OTTI), Regensburg, Germany

"Methods and Procedures for Accelerated Weathering of PV Modules and Materials"

Presenter: Andreas Riedl, Atlas Material Testing Technology GmbH

2013 IEEE Conference on Reliability Science for Advanced Materials and Devices

February 24–25, 2013
Colorado School of Mines Campus, Golden, CO

"Weather Durability Principles for Outdoor Product Reliability"

Presenter: Allen Zielnik, Atlas Material Testing Technology LLC

SKZ Presents:
Weathering of Plastics in the Automotive Industry*

April 10–11, 2013
Marienberg Fortress, Würzburg, Germany

Moderator: Andreas Riedl, Atlas Material Testing Technology GmbH

"Automotive Weathering Standards and a New Laboratory Test Method Anticipating Florida Exposure Results of Coatings"

Presenter: Dr. Artur Schönlein, Atlas Material Testing Technology GmbH

"Fundamentals of Weather Related Aging"

Presenter: Cees van Teylingen, Atlas Material Testing Technology BV

***Note:** Conference will be held in German*

Architectural Powder Coatings, from page 1

A Look at International Architectural Standards

A range of industrial standards currently describe the use of powder coatings for architectural applications. All of these standards have a country of origin but today are widely accepted on a global scale. Large, landmark architectural projects are often led by international groups of architects, and they seek out well-established standards that are familiar to them.

These standards describe the overall performance of architectural coatings, including mechanical properties, hardness, chemical resistance, and — last but not least — long-term weathering and real-world exterior performance. Weathering performance, especially UV resistance, is usually evaluated according to change of gloss and change of color of the paint film. Today, the most commonly used standards are GSB, Qualicoat, AAMA, and HG/T 3793-2005. Figure 2 shows the countries of origin for each standard and a range of countries where these standards are primarily applied.

Standard	Country of Origin	Countries Primarily Specified in Today
GSB	Germany	Germany, Austria, Northern European Countries
Qualicoat	Switzerland	Switzerland, Italy, Spain, France, Other European Countries, China
AAMA	United States	United States, Worldwide
HG/T 3793-2005	China	China and some other Asian Countries

Figure 2: *Architectural powder coating standards, their country of origin, and countries where they are primarily specified*

Continued on next page

Architectural Powder Coatings, from previous page

It is clear that no standard today is limited to only one country, and in fact, many of the standardization organizations try to expand their impact on international architectural businesses by offering their services in various global regions.

Florida Exposure Natural Weathering Tests				
	1 Year (Standard Grade Coating)	3 Year (Super Durable Coating)	5 Years	10 Years (Hyper Durable Coating)
GSB	Standard Minimum Gloss Retention 50%	Master Minimum Gloss Retention 50%	Premium Minimum Gloss Retention 30%	
Qualicoat	Class 1 Minimum Gloss Retention 50%	Class 2 Minimum Gloss Retention 1 year, 75% 2 years, 50% 3 years, 50%		Class 3 Minimum Gloss Retention 1 year, 90% 4 years, 70% 7 years, 55% 10 years 50%
AAMA	2603–02 Slight Fading No Checking, Crazing or Loss of Adhesion		2604–05 Chalking Minimum Rating #8	2605–11 Color Uniformity Chalking Minimum Rating #8

Figure 3: *Florida exposure classification and minimum gloss retention specifications according to various architectural standards*

Figure 3 summarizes the requirements specified for natural Florida weathering for each of the standards listed above. For each performance class (1, 3, 5, or 10 years Florida), a minimum gloss retention value in % is specified. In addition, the Qualicoat standard specifies minimum gloss levels for certain check points during weathering experiments — e.g., for Class 3, it is specified that after the first year in Florida, gloss retention should be > 90%; after 4 years it should be > 70%; after 7 years it should be > 55%; and after 10 years it should be > 50%.

By following these specifications, performance could be evaluated throughout the weathering experiments, and failing samples could be identified at an earlier stage without waiting for the final result.

The Chinese standard HG/T 3793-2005, however, does not specify a Florida test result but only an accelerated weathering test result using xenon light (see Figure 4).

Artificial Weathering Tests				
	1 Year	3 Years	5 Years	10 Years
GSB	300h Fluorescent UV B Minimum Gloss Retention 50%	600h Fluorescent UV B Minimum Gloss Retention 50%	1000h Fluorescent UV B Minimum Gloss Retention 50%	
Qualicoat	Xenon 1000h Minimum Gloss Retention 50%	Xenon 1000h Minimum Gloss Retention 50%		Xenon 2000h Minimum Gloss Retention 90%
AAMA	No Test		No Test	No test
HG/T 3793–320				Xenon 4000h Minimum Gloss Retention 90%

Figure 4: *Artificial accelerated weathering according to the various architectural standards*

Figure 4 summarizes the requirements specified in the standards for artificial accelerated weathering and correlates the artificial weathering requirements with natural Florida weathering. It is obvious that the various standards use very different methods for evaluating coating performance. Some require shorter testing times, which offer an obvious advantage, but the disadvantage is in the reliability of test results in correlation to natural weathering.

The GSB standard specifies fluorescent UV testing and clearly provides the fastest and most

economical test results. Qualicoat and HG/T 3793-2005 specify xenon testing. Xenon testing offers the advantage of a spectral power distribution that more closely mimics the full spectrum of natural sunlight, leading to a very good differentiation between the performance of samples and real outdoor weathering. AAMA, however, does not specify any artificial accelerated weathering method and relies solely on natural Florida testing. While it is the most realistic test method, it limits innovation and market entry of newly developed products due to the years of required testing before AAMA certificates can be obtained.

Standard	Maximum Color Deviation after Weathering
GSB	1 < DL* < 5 0 < DC* ab < 8 depending on color, according to CIE Lab
Qualicoat	0 < DE < 8, depending on color
AAMA	DE < 5, according to Hunter
HG/T 3793-2005	DE < 5

Figure 5: *Maximum color deviation of the various architectural standards*

All of the standards also define a range of maximum color deviation after accelerated or Florida weathering tests. GSB and Qualicoat define single requirements for an extended RAL color range for each specific color, whereas in AAMA and HG/T 3793-2005, general maximum color deviations are specified. Figure 5 shows the specifications for the above-mentioned standards.

Based on the above-described architectural coating standards, powder coatings have been developed over the years complying with different specified performance classes. Architects today have a choice of powder coatings and can select performance class according to climatic and geographic conditions at a building site.

Evaluating Powder Coating Performance

Generally, powder coatings are classified for interior and for exterior architectural use. Obviously, the exterior grade powder coatings need to show a much better performance in UV resistance than interior grade powder coatings, where only lightfastness performance using low-intensity UV attenuated via window glass is relevant. Exterior grade coatings are mainly damaged by strong UV radiation, often in combination with moisture. Moisture is especially critical, as hydroxyl radicals are formed by UV radiation and efficiently attack and degrade organic coatings polymers. Detailed chemical studies on degradation mechanisms in coatings have been published in various literature [1, 2, 3, 4].

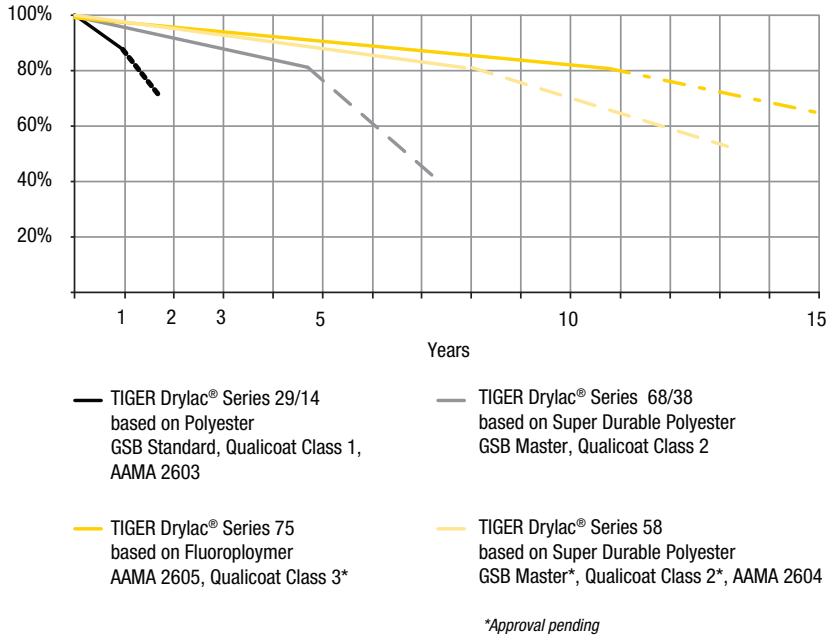

Figure 6: *Comparison of Florida weathering results of various exterior grade powder coatings*

Builders today have a choice of powder chemistries for exterior application. The most established chemistry is based on polyester polymers. Within polyester powder coatings, there is a differentiation between standard architectural performance and super durable performance.

Standard performance is equivalent to 1 year Florida and is widely used in central Europe and geographical areas of low UV impact. They offer a good combination of affordability and performance. In recent years, however, a shift in Europe from standard architectural performance to super durable polyester powder coatings has occurred due to higher quality specifications of many architects and building owners. Standard architectural performance is delivered by TIGER Drylac® Series 29 and 14 and is externally supervised by GSB, Qualicoat, and AAMA. See Figure 6 for a graphical comparison of the weathering performance of various powder coatings product ranges.

Over the last decade, super durable polyester powder coatings have become well known and have recently experienced strong growth due to specifiers' high quality expectations. Traditionally,

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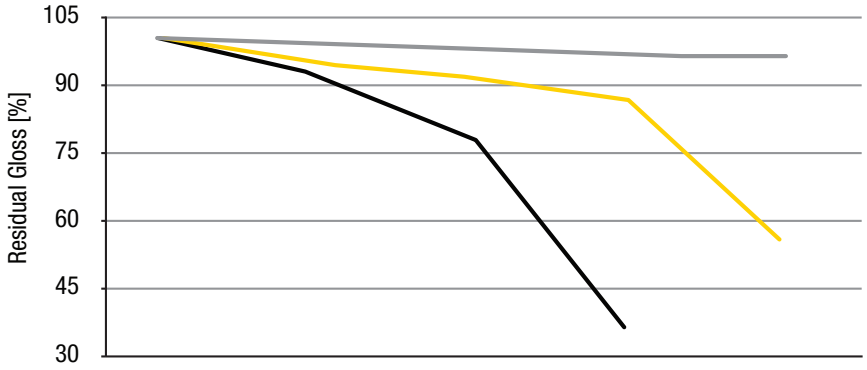
Architectural Powder Coatings, from previous page



	Start Gloss [%]	Gloss Retention After 500 h [%]	Gloss Retention After 1000 h [%]	Gloss Retention After 2000 h [%]	Gloss Retention After 3000 h [%]
Standard	100	92.1	78.0	36.0	
Super Durable	100	94.4	91.8	86.4	55.5
Hyper Durable	100	98.5	97.7	96.8	96.3

Figure 7: *Comparison of xenon weathering results of various exterior grade powder coatings and correlation to natural Florida weathering. Accelerated testing was performed in an Atlas Ci4000 Weather-Ometer®, and natural weathering was performed at Atlas' South Florida Testing Services.*

super durable powder coatings have been used in geographical areas of high UV impact such as southern Europe and sub-tropical climatic zones, and in areas of low UV impact but with very high quality expectations. Within the super durable polyester powder coatings, there is a range of products suitable for 3 years Florida exposure (TIGER Drylac® Series 68 and 38) and another range of products suitable for 5 years Florida exposure (TIGER Drylac® Series 58).

Architects looking for the very best durability and extreme long-term weathering performance typically select fluoropolymer powder coatings. This class of powders is represented by TIGER Drylac® Series 75. Generally, fluoropolymers are known as the very best performing architectural coatings, and are well established as solvent-based liquid PVDF coatings in international markets. For several years now, a similar fluoropolymer technology has been available for powder coatings, offering the well-recognized advantages — cost effectiveness, no emissions, overspray reclaim, robust chemical cross-linked surfaces, etc. — as well as extreme weathering performance. See Figure 6 (on previous page) for the superior weathering performance of fluoropolymer powder coatings compared to polyester-based chemistries.

During development of architectural powder coatings, it is essential for quality assurance that research teams have a good understanding of how to test weathering performance via accelerated laboratory methods and how to correlate artificial accelerated test results to real-world natural weathering. Only if reliable, accelerated lab test methods are available, development of new coating systems can be done in an efficient way, leading to a shorter time-to-market with controlled risk when introducing new products. Figure 7 shows accelerated xenon weathering data for a standard and super durable polyester powder coating compared with a fluoropolymer powder coating.

In evaluating the performance of the powder coatings described above, it is evident that the requirements of various architectural standards could be met by selecting the right type of powder chemistry for each job.

Outlook

Within the architectural market, powder coatings play an important role today on aluminum and steel substrates, and they continue to replace solvent-borne coating systems as a result of their cost effectiveness and environmental friendliness. Innovative new development of low-temperature architectural powder coatings not only offers energy savings and higher productivity (faster cure), but also allows for the application of powder coating technology to new architectural substrates beyond metals. This is important since market expansion today is being driven by products such as pultruded composite profiles, carbon fiber composites (CFC), and other heat-sensitive materials. All of these new applications will need to be tested with accelerated weathering methods such as xenon testing before products can be successfully launched in the markets.

References

[1] S.G. Croll, A.D. Skaja, *J. Coat. Technol.,* 75 (2003), 85
[2] A. Rivaton, *Polym. Degrad. Stab.,* 41 (1993), 283
[3] A. Rivaton, *Polym. Degrad. Stab.,* 41 (1993), 297
[4] D. Maetens, *Prog. in Organic Coatings,* 58 (2007), 171

Specimen Management Moves to the Cloud

Atlas is excited to offer cloud-based specimen management solutions for outdoor and accelerated laboratory testing. Responding to increasing requests for specimen management support, Atlas has made our in-house specimen management application accessible to clients — anywhere at any time. The Static Accelerated Testing System — known as SATS — allows you to administer your own outdoor test site and accelerated lab from the convenience of your desktop or laptop.

SATS enables you to access information and perform various functions, including:

- Test setup
- Standards database
- Report writing
- Preventative maintenance scheduling
- Specimen return and recall
- Evaluation database
- Consumables scheduling (lamps, filter, etc.)

SATS operates in a virtual cloud environment, ensuring clients protected access to their data while at the same time allowing Atlas to update and provide support for various applications.

To learn more about SATS or request a cost estimate for this new feature, please contact Richard Slomko at richard.slomko@ametek.com or 305-245-3659 x201.

Atlas Consolidates UK and France Accelerated Testing Labs

In keeping with our efforts to provide clients with a broad range of laboratory testing services more efficiently and cost-effectively, Atlas Material Testing Technology has consolidated its accelerated labs in Bicester, UK and Moussy le Neuf, France into a new facility in Leicester, UK.

This modern, state-of-the-art testing facility is fully equipped with the latest Atlas testing instruments and evaluation services. The comprehensive array of accelerated weathering equipment at the new lab includes:

- Xenon Weather-Ometers
- Fluorescent UV Devices
- Carbon Arc Weather-Ometers

All samples for testing/evaluations should now be sent to:

Atlas Material Testing Technology, LLC
Attn: Accelerated Lab, 2 New Star Road
Leicester, LE4 9JD, United Kingdom

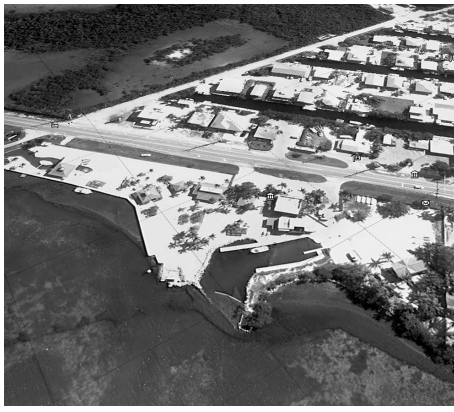
If you have questions or would like a quotation, please contact Jo Snow-Tyler, at +44 (0) 116 2762930 or jo.snow-tyler@ametek.com, or your local sales representative.

Atlas Opens New Florida Keys Exposure Site

Atlas is proud to announce the opening of a new corrosion test site in Layton/Long Key, Florida. The test facility is situated on the Gulf of Mexico, just steps away from the salt water. The site is operated by the Keys Marine Lab (KML), which provides education and research on the only tropical marine ecosystems in the continental United States.

Based on client feedback, Atlas saw a real need to offer a site for natural corrosion testing, as choices are currently limited. Some of the benefits of the new Layton/Long Key exposure facility:

- The site is close to Atlas' Miami, Florida facility, making it ideal for client visits
- The KML facility offers laboratories and offices that can be utilized by Atlas clients
- Atlas' rolling rack system has been installed onsite, allowing testing to be performed at any requested angle and facilitating easy sample removal in case of hurricanes
- Corrosion measuring tools will soon be installed to provide clients with valuable testing information



For more information on our new Florida Keys exposure site, please contact John Wonders at john.wonders@ametek.com or at +1-623-465-7356 x101.

Evaluating Long-Term Solar Inverter Durability: A 4-Track Strategy

How Does Your Product Compare with Your Competitors?

Atlas often receives the same question from the solar inverter industry: "How should I test for long-term durability of my inverters?" This question has led Atlas to further research durability testing solutions for the solar inverter industry, including central, string, and micro-inverters.

Until recently, the inverter industry's priorities were focused on meeting industry testing requirements — such as those defined by IEC and UL to prove infant viability and safety — on ramping up production capabilities, and on reducing backlogs. These pressing matters left little time for long-term durability testing.

As growth of the PV market has slowed, inverter companies are increasingly looking for ways to differentiate themselves from competitors. Long-term durability testing is a must for PV module manufacturers and is now becoming an expectation of the inverter industry as well.

Many of the industry standards concerning inverters primarily cover safety tests; long-term durability tests are not specified. Although some standards, such as IEC 62093, incorporate UV exposure as part of the testing sequence, it must be clarified that this "UV testing" is not a durability test, but rather is related to performance testing. In fact, the radiation delivery of 15kWh/m^2 of UV outlined in IEC 62093, 61215, and 61646 is equivalent to the UV dosage received within a 3-month period under real-world conditions in a desert environment such as Phoenix, Arizona — certainly not a durability test by any means!

Considering that many inverters are installed outdoors, and ideal lifetime expectations for inverters are similar to PV modules — often 20 years or more — Atlas has devised the following **4-Track Strategy** as an answer to the inverter durability question.

1. **Weathering testing of materials and components**
2. **Laboratory testing of complete inverter**
3. **Outdoor weathering of complete inverter**
4. **Real-life (outdoor) performance testing of inverter**

On the next page is a cross-reference chart identifying appropriate tests for each "track."

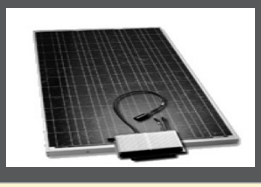
This 4-Track Strategy considers the long-term performance from the component level through the finished product under extreme stresses, real-world stresses, and real-world conditions for performance-based assessments.

Track 1 deals with weathering testing of materials and components that are commonly used in most types of inverters today and is applicable to these same components in other industries. Components can include but are not limited to:

- Coated metal housings
- Coated plastic housings
- Displays, screens
- Cables, switches, locks
- Connectors
- Sealants, seals

The following international testing standards are recommended for all plastic materials and parts as well as coated parts, such as housings, and should be considered when testing the individual durability of components:

- ISO 4892-2 - Plastics - Methods of Exposure to Laboratory Light Sources - Part 2: Xenon-Arc Lamps

Inverters	Micro	String	Central	Suggested Standards and Testing
				
1. Weathering Testing of Materials and Components	Xenon or Metal Halide	Xenon or Metal Halide	Metal Halide	ISO 4892-2 Plastics ASTM G155 Plastics ISO 11431 Paints/Coatings
2. Laboratory Testing of Complete Inverter	Metal Halide	Metal Halide	Metal Halide	IEC 61215 IEC 60529 IEC 68-2-68 IEC 62093
3. Outdoor Weathering of Complete Inverter	Operational or Non-Operational Testing	Operational or Non-Operational Testing	Operational (simulated) or Non-Operational Testing	Climates/Environments Subtropical Desert Coastal Corrosion Marine Industrial High Altitude
4. Real-Life (Outdoor) Performance Testing of Inverter	Grid-Tied or Resistive Load	Grid-Tied or Resistive Load	Simulated Load	Energy Harvest Shading Studies Multiple Climates

- ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
- ISO 11341 - Paints and varnishes - Artificial Weathering and Exposure to Artificial Radiation - Exposure to Filtered Xenon-Arc Radiation

Track 2 deals with laboratory testing of complete inverters. An inverter is an integral part of a PV system and can be a flashpoint for system failures, considering that it has to withstand environmental stresses like dust and sand impact, salt, water, temperature changes, freeze-thaw cycles, and snow. Methods that currently exist within the industry for specific stress factors include:

- Damp-heat test, e.g., IEC 61215
- Temperature cycling, e.g., IEC 61215
- Freeze-thaw cycling, e.g., IEC 61215
- Protection against water to IP-code according to IEC 60529
- Protection against sand and dust according to IEC 68-2-68
- Balance of system components for photovoltaic systems - Design qualification natural environments - IEC 62093

The intent of Track 2 is to gain knowledge of weaknesses within a system involving specific stresses. During these tests, the inverter may be operated using solar array simulator equipment, i.e., an electrical device simulating the electrical environment of an inverter, which is connected to operating PV modules.

Many of the above-mentioned tests are standard procedures in the inverter and PV industry, and often test equipment is available (http://atlas-mts.com/products/). Inverters also may be subjected to laboratory weathering tests, including simulated solar radiation, heat, and humidity, in order to

Continued on next page

Solar Inverter Durability, from previous page

Atlas' DSET Laboratories, Phoenix, AZ

Atlas' South Florida Test Service, Miami, FL

induce temperature/humidity-related failures associated specifically with a solar load.

Track 3 involves the outdoor weathering of complete inverters. An inverter must withstand the primary weather factors, i.e., the combined impact of solar radiation, heat, and rain/humidity in various locations. Therefore, outdoor testing at Atlas' internationally established benchmark outdoor test locations (http://atlas-mts.com/services/photovoltaic-testing/solar-testing-services/) only makes sense: Phoenix, Arizona and Miami, Florida.

Additional testing may be performed at high altitude (Prescott, AZ; 1531 m), under coastal/corrosion (Florida Keys, FL), with pollution (Jacksonville, FL), or at other test locations to address specific concerns associated with an end-use environment. The inverters may be long-term tested either in operating or non-operating configurations. Specific measurements and evaluations, such as thermal imaging, visual inspections, and performance monitoring, may be performed after fixed time intervals.

Finally, Track 4 deals with real-life (outdoor) performance testing, which can be carried out to investigate the losses associated with the conversion and operation of an inverter, as well as the effects of secondary environmental factors such as shading. Inverters can be installed in side-by-side simulations to obtain comparative performance data.

In summary, Atlas has utilized its 90+ years of experience as the industry leader in weathering durability to develop a fundamental evaluation addressing the stresses applied at the component level as well as to a functional, finished inverter product. This 4-Track Strategy illuminates the sensitivities of a functional inverter to specific stresses while answering questions regarding a product's performance within industry standards. Atlas now has the answers to determine, "How should I test for long-term durability of my inverters?"

For more information on weathering testing of inverters, please contact your local Atlas representative directly or via atlas.info@ametek.com. ■

AWSG U.S. Operations Reaccredited

Atlas Weathering Services Group's (AWSG) U.S. outdoor test sites and accelerated laboratory were recently reaccredited by the American Association for Laboratory Accreditation (A2LA) to the requirements of ISO/IEC 17025:2005.

Additions to the AWSG 2012 mechanical scope include:

- Solar Thermal - ASHRAE Standard 96-1980, CSA-F3768, EN 12975-1 and EN 12975-2
- Solar PV – IEC 60904, IEC 61215 Sections 10.14, 10.16, 10.17 & 10.18, IEC 61646 Sections 10.14, 10.16, 10.17 and 10.18, IEC 61730, IEC 61853, and IEC 62108 Sections 10.5, 10.9, 10.12 and 10.13, UL Subject 8703, and ULC/ORD-C1703

AWSG is the global leader in weathering testing services. Our SFTS (Miami, FL) and DSET (Phoenix, AZ) outdoor test sites are known for their world-class testing capabilities. Our Center of Excellence at the Atlas headquarters in Chicago, Illinois offers the most advanced accelerated laboratory testing available, using xenon, carbon-arc, fluorescent, metal halide, and corrosion instruments.

AWSG also operates outdoor weathering sites in France, India, and the Netherlands, with accelerated labs located in Germany and the UK. AWSG's worldwide exposure network features more than 20 laboratories in various climates around the world.

For accelerated lab/corrosion cost quotations, please contact Carmen Zimmer at +1-773-289-5543 or carmen.zimmer@ametek.com. For all other cost quotations, please contact John Wonders at +1-623-465-7356 x101 or john.wonders@ametek.com. ■

Data Analysis Easier Than Ever with Atlas WXView Reader

Atlas is pleased to introduce a new data management tool for quick analysis of archived test parameter information. The new software application, called WXView Reader, allows customers to load data files from their Atlas xenon-arc weathering instrument into a graphical format. Features of this tool include:

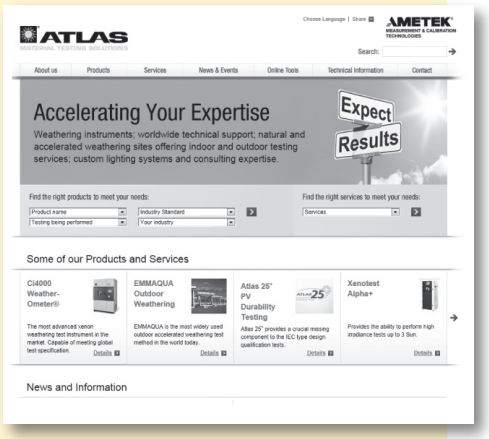
- A chart along the top of the graph to provide a high-level summary of the complete test
- A main graph screen to zoom in on a portion of the data for a more detailed analysis
- The ability to print the main graph view
- A "Save Image" option
- Functionality to select which parameters are viewed on the graph
- Standard test parameters (irradiance, temperatures, humidity) as well as control functions for troubleshooting and system diagnostics
- Standard Windows-based file management functions

WXView Reader can be used to view not only common test parameters, but also data from the revolutionary S³T system. The program works with any Windows-based PC. It is easy to install and is accessible from an icon on your desktop. The tool can read data from any DCS-based Weather-Ometer®, Xenotest® or SUNTEST® instrument.

For more information about the WXView Reader and its capabilities, please e-mail atlas.info@ametek.com, or to download the program, go to **atlas-mts.com/services/software/wxview-reader/.**

Atlas Redesigns Website to Better Serve Customers

On-Demand Webcasts Now Featured



Next time you go to Atlas' corporate website (www.atlas-mts.com), you'll find an improved user interface and a new look and feel. The redesigned site is simple, clean and easier to navigate. The content is also better organized so you can find what you need more quickly.

The testing needs of the global community have greatly diversified. In response, our website needed to offer visitors a quick and intuitive way to find the right Atlas product and service.

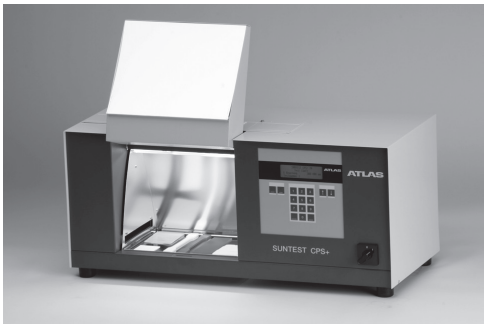
Enhancements to the new site include:

- **Improved Navigation.** A new advanced product/service search filter system helps you quickly and easily locate the weathering testing equipment and/or service that best suits your needs
- **Improved Information Access.** A new home page gives you easy access to product and service offerings, upcoming events, news, and online tools. You'll also find a local sales representative locator.
- **New Features.** Among the new features is a library of webcasts. Designed to help you advance your weathering education and learn more about the factors of weathering testing, these on-demand webinars may be viewed from anywhere at any time.

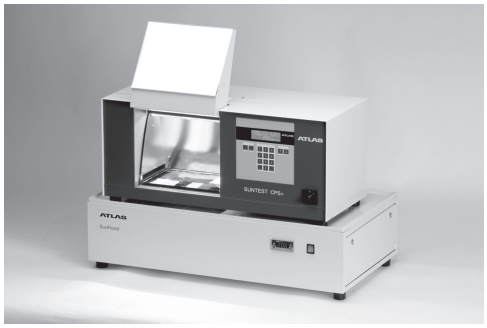
To view the current webcasts, visit **http://atlas-mts.com/technical-information/webcasts/**

New SUNTEST® CPS+:

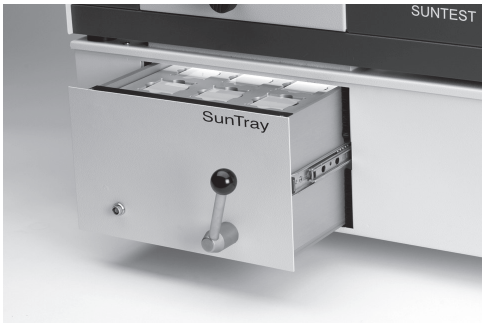
The Practical Bench-Top Xenon Testing Solution



Suntest CPS+



SunFlood



SunTray

SunCal sensor

Atlas is pleased to introduce a newly redesigned SUNTEST CPS+ — one of the most widely used test instruments for accelerated material testing. With its improved functionality and ease of operation, this fourth-generation model offers technically advanced features, including:

- **Improved Quality of Light for Better Performance.** Controlling the UV output of a xenon test chamber is critical, as UV radiation typically plays a significant role in polymer degradation. Areas of UV fading are now eliminated, and repeatability is significantly improved with our improved light technology.
- **Ease of Use.** The new SUNTEST CPS+ offers error-free operation and features:
  - A larger, 4-line display panel for easier viewing by the operator
  - 8 user interface languages (English, German, French, Spanish, Italian, Chinese, Polish, and Russian), allowing users to control the unit in their native language
  - Two pre-programmed test methods, which are convenient for new users of xenon equipment for material testing

The following accessories are also available:

- Five interchangeable optical filters that simulate all relevant light conditions: outdoor daylight, indoor daylight, artificial supermarket light, and ID65 (ICH) and solar standard
- A SunFlood immersion unit for the simulation of extremely wet, marine, or acidic environments
- A SunCool chiller and water-cooled table for specimen cooling
- A SunTray sample exchanger for safe COLIPA in-vitro testing
- SunCal calibration sensors for easy do-it-yourself calibration routines of light and temperature (BST)

The new SUNTEST CPS+ is a practical, reliable, and economical entry-level model in the SUNTEST Series of instruments, particularly useful for the aging of smaller specimens. Typical applications include light and weatherfastness testing of plastics, coatings, colors, and inks, as well as testing of cosmetics and pharmaceutical drug products. ■

Atlas Launches LS-200 Full Spectrum Monitoring Device

Several years ago, most standard weathering test methods were very specific in describing the equipment and components to be used — for example, the geometry of the exposure cabinet and specific filter designations. These were generically referred to as "hardware-based" standards.

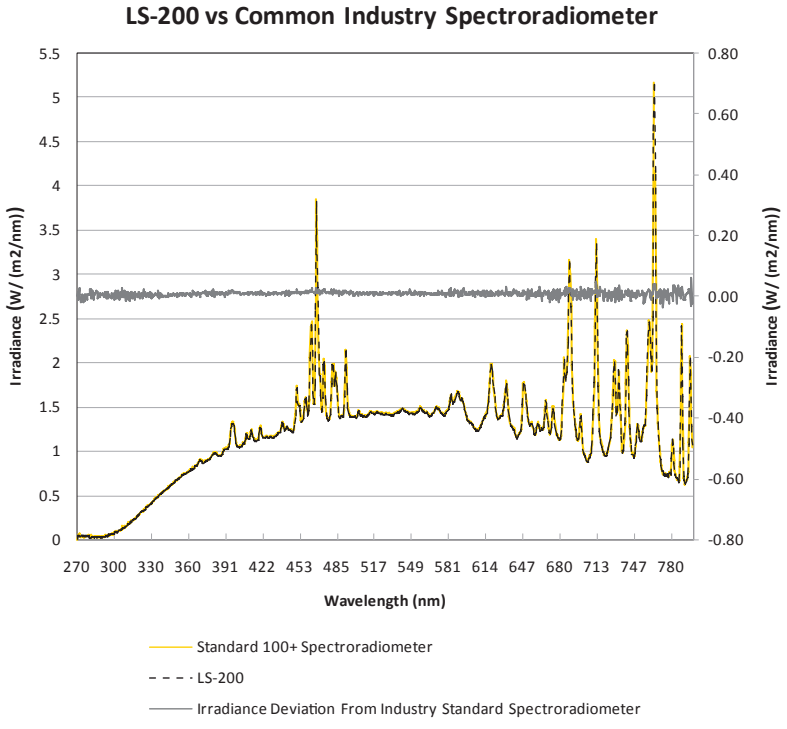
More recently, participating members of these organizations made a commitment to change the foundation of the methods to be "performance-based." So now, rather than specifying the control methodology, geometry, filters, etc., any weathering instrument can now meet the standard provided it meets the performance requirements.

The area that was most affected by this change is the spectral power distribution (SPD) provided by the light source. The performance-based standards specify the spectral output of the lamp system with certain tolerance limits to allow for nominal lamp/filter aging and minor differences between equipment manufacturers.

While indirect methods of judging aging characteristics exist (such as wattage increases, ratio of different wavelength monitoring points, or evaluating standard reference materials), the only way to verify the SPD is to take a direct measurement. The problem with this is that most laboratories cannot afford the expense of the equipment, nor do they have the resources to train someone to operate it.

To address this dilemma, we are pleased to offer the Atlas LS-200 Full Spectrum Monitoring Device. The LS-200 has been specifically designed for use in Ci-series Weather-Ometers to precisely measure the SPD output of the xenon lamp.

Validation tests have shown that this device has excellent correlation to the spectroradiometers used in the Atlas Calibration Laboratory. Since the instrument is independent from the instrument control, it can be used in multiple units and in any generation of Weather-Ometer®. Current R&D efforts are exploring the potential for utilizing the device in any weathering instrument.



You can take advantage of the LS-200 in two ways:

- By purchasing the LS-200, which would enable you inspect and verify the spectral power distribution of your Weather-Ometer — either immediately or on demand.
- By requesting Atlas' Technical Service team to perform LS-200 measurements. They can inspect and verify the spectral power distribution of your Weather-Ometer using the LS-200 as a part of a scheduled maintenance or repair visit. ■

Atlas to Co-Host Symposium in Korea

Atlas is helping stage a technical symposium for the automotive/materials industry in Asia this fall:

9th Annual International Weathering/Reliability Evaluation Technology Conference

October 23-24 » Daejeon, Korea

This event is being organized by KCL (Korea Conformity Laboratory) and Atlas Material Testing Technology LLC, and sponsored by the Korea Ministry of Knowledge and Economy and AB Nexo Co. Ltd.

The two-day symposium is expected to draw approximately 150–200 people from throughout the automotive/materials industry who want to advance their knowledge in the application of testing technology in material and product development.

Papers will be presented by a range of weathering experts as well as academic researchers throughout the region. Attendees will have in-depth technical exchanges on testing techniques and standards in the areas of weathering and durability — all aimed at advancing research and improving materials technology.

Czech Workshop Grows in Quality, Diversity

In June, Atlas' representative in the Czech Republic, KAITRADE, teamed up with its Slovak representative, TESTLAB, to host the technical workshop "Trends in Development and Product Quality." This two-day event was part of a series of seminars that began over 12 years ago, originally developed to bring companies and clients in the automotive industry together to discuss new innovations.

Over the years, as this longstanding seminar has evolved, so has its focus. Not only do various companies that KAITRADE represents present their products, but now the program includes particpation from attendees who are given the forum to present their company's product and service offerings to a wider audience. Speakers at the latest event included Dirk Oefner from Atlas Material Testing Technology GmbH, Peter Huppert from Vötsch Industrietechnik, and Markus Betz from Heraeus Noblelight.

For the last five years, this popular workshop has been held at a medieval castle called Třešť (www.castle-trest.com) located in the middle of the Czech Republic. This spring's event attracted close to 100 people from an array of industries, from automotive, paints, and cosmetics to commercial testing institutes and universities.

Feedback from attendees this year was extremely positive. Participants were pleased with the high quality of the presentations and the organization of the workshop, which allowed presenters and guests the opportunity to exchange ideas during the workshop as well as during the social activities planned around it.

Stay tuned for information about the next workshop, tentatively planned for the second quarter of 2013!

SKZ-Atlas Symposium Sheds Light on Polymers in Photovoltaics

Representatives from the German solar energy industry convened in Würzburg, Germany in July to discuss the latest developments in the use of polymeric materials and components in photovoltaic (PV) technology. Würzburg-based SKZ - German Plastics Center and Atlas Material Testing Technology co-organized the two-day event.

Renewable energies from wind, water, and sun are important for our future. Polymers can greatly contribute to sustainable, durable, and efficient products, particularly in photovoltaic applications. Polymeric materials and components can be found in a variety of applications, e.g., encapsulants, backsheets, adhesives, films, frames, and even energy-generating components.

Fourteen speakers — from test houses, scientific institutes, module manufacturers, and industry suppliers — covered developments and anticipated trends in materials, test methods, and standardization. Long-term durability and testing strategies were discussed, as well as the role of polymers in balance-of-system-components like junction boxes. Finally, the experts outlined challenges and opportunities of new technologies like organic photovoltaics (OPV), printed electronics, and fluorescent light collectors.

Despite challenges in the photovoltaic industry, the joint SKZ-Atlas conference was a success and garnered valuable feedback from participants. A follow-up conference is planned for sometime in the next two years, when additional data, expertise, and technologies will be available. Stay tuned for conference dates and details!

Atlas® Announces Alliance with SGS

Global Players Partner to Expand PV Module Durability Certification

Atlas has entered into an alliance with SGS, the world's leading inspection, verification, testing, and certification company, which will expand the Atlas 25+® PV module durability test program.

From its launch in 2009, the Atlas 25+ test program has helped manufacturers determine the long-term durability of their photovoltaic modules. By combining state-of-the-art accelerated instrument and outdoor exposure testing, the program complements short-term IEC qualification tests with long-term durability and reliability assessment to support warranty and performance claims.

Through a comprehensive battery of accelerated tests, the original Atlas 25+ program integrated both laboratory and outdoor environmental exposures targeting the long-term product "wear-out" period that can see declining module performance or outright failure.

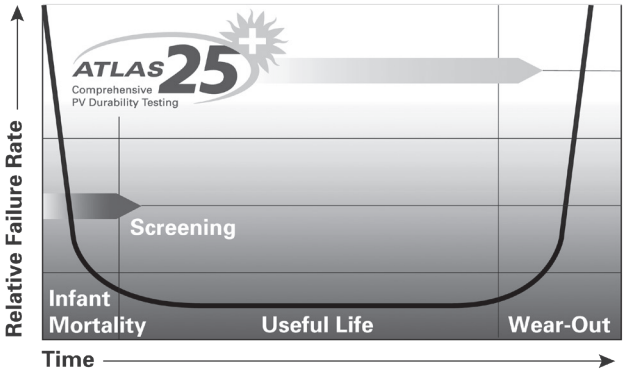
As a result of the Atlas-SGS collaboration, the standard Atlas 25+ exposure and testing protocol has been enhanced. Now customers can choose from two versions of the program — a six-month streamlined "basic" program for those needing faster results, and an expanded 12-month "premium" offering that includes additional climate factors and performance measurements.

SGS now offers Atlas 25+ as both a stand-alone program and as an optional part of its larger "SGS - PV Performance Tested" scheme, which includes options for corrosive gas (e.g., NH3), salt mist, fire, and potential-induced-degradation (PID) resistance, among others. Modules passing these tests, including Atlas 25+, now qualify for the SGS - PV Performance Tested marks.

SGS is accredited as a National Certification Body (NCB) and is one of five German CB testing laboratories (CBTL) within the IECEE certification scheme for photovoltaics. As such, SGS can issue internationally recognized CB testing certificates and CB testing reports. Atlas continues to offer the three Atlas 25+ programs (basic-standard-premium) as well as internationally certified versions through SGS. ■

For more information on the Atlas 25+ program or a quotation, please call Customer Support at 800-255-3738 or e-mail john.wonders@ametek.com.

Celebrating the new Atlas-SGS alliance: Matthias Popp, SGS Germany GmbH, Global VP CTS Automotive; Andreas Riedl, Atlas MTT GmbH, Global Manager Solar Energy Competence Center; Jörn Brembach, SGS Germany GmbH, Business Manager PV, Solar Testhouse; Dr. Peter March, Atlas MTT GmbH, Managing Director



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