

WEATHER- ABILITY MATTERS

Developing Coatings for all Conditions



SHERWIN-WILLIAMS®
Coil Coatings



THE IMPORTANCE OF WEATHERABILITY

DEVELOPING COATINGS FOR ALL CONDITIONS

The Sherwin-Williams industry-leading test site in Florida provides conditions that are perfect for natural exposure “real world” testing. Currently, there are approximately 100,000 exposure panels at various angles, and the oldest panel is from 1968.

Pictured: Fort Myers, FL Site

WEATHER TESTING

For more than 150 years, Sherwin-Williams has shaped its reputation for coatings that are rugged enough to withstand the harshest of conditions. While coatings need to perform, they must also maintain their beauty over time.

There are many elements to developing a quality coating, but one critical component is testing - and the testing methodology at Sherwin-Williams is rigorous.

The centerpiece of Sherwin-Williams Coil Coatings exposure sites is a 6.25-acre facility in Fort Myers, Florida. Based on its subtropical location of 26° 39'N and 81° 49'W, this weathering site provides conditions that are perfect for natural exposure testing. The site has 100,000 panels on exposure and a laboratory staffed with experts to review results and complete accelerated weather tests.

In addition to this site, Sherwin-Williams has three other company owned facilities: Rochester, PA to test acid rain; Marengo, IL to test freeze / thaw; and Rockhampton, Queensland Australia is a high-UV site. All of these facilities work together to make sure we are testing our coatings in every condition possible.

MOST ACCREDITED TEST FACILITY

The Sherwin-Williams “Test Fence”, as it is known by its employees, is the most accredited manufacturer’s test facility in the coil coatings industry. We have equal accreditations to the facilities that our competitors use for exposure and cool roof testing.

What does that mean for our customers? Peace of mind. When Sherwin-Williams puts a new product on the market, it has been tested by a technical staff that is evaluated, tested, and retested by accreditation bodies to ensure they meet all of the requirements for accreditation. During the process, factors relevant to a laboratory’s ability to produce precise, accurate tests and calibration is assessed, including testing environment and handling of test items to meet industry standards.

BENEFITS TO OUR CUSTOMERS

Our commitment to quality is fueled by our end goal to do what is best for our customers. To help customers navigate the world of weatherability, Sherwin-Williams provides access to our test fence facility and knowledgeable staff.



SITE ACCREDITATIONS

- ISO 17025 for Testing / Calibration Laboratories accredited by A2LA (American Association for Laboratory Accreditation)
- EPA 1st Party Laboratory for Roof Coatings, listed by the ENERGY STAR® Website
- Accredited Manufacturing Testing Laboratory by CRRCC (Cool Roof Rating Council)
- AAMA Accredited Component Laboratory by the American Architectural Manufacturers Association

KNOW YOUR CHALLENGES

Exposure to the sun (ultraviolet light), moisture and humidity, high temperatures, and temperature fluctuations can lead to color changes, chalking, blistering, corrosion, and many other physical reactions for protective metal coatings.

Knowing challenging weathering elements and understanding how it can affect our coatings helps Sherwin-Williams develop and deliver exceptional products to our customers.

Testing and evaluating how these elements interact is an important step in the coatings industry. UV light from the sun usually initiates the breakdown of the coating molecules, but it is a combination of the sun, heat, and moisture

that can accelerate the damage more than any one factor alone. Testing a coating's ability to resist weathering is crucial.

TECHNOLOGY IS KEY

Weather testing is a critical variable to Sherwin-Williams technical engineers when they are formulating new materials or improving upon old formulas. All new formulations are put through rigorous testing, because it is important to know if we are heading in the right direction or if we need to go back to the drawing board.



REASONS WHY SHERWIN-WILLIAMS CONDUCTS TESTING:

- New product development
- Prevent field failure
- Improve quality and durability
- Expand product lines
- Improve current product lines
- Resin development
- Patch performance
- Application performance
- Pigment studies
- Product warranty requirements
- Meet new customer requirements
- Comply with government regulations
- Comply with environmental regulations
- Outlast the competition
- Help customers make educated decisions





TEST, TEST, AND TEST AGAIN

Sherwin-Williams has two key approaches to weather testing: long-term natural exterior weather exposure and laboratory accelerated weathering. Each of these testing approaches verifies performance, application, weathering, and appearance of our sample panels.

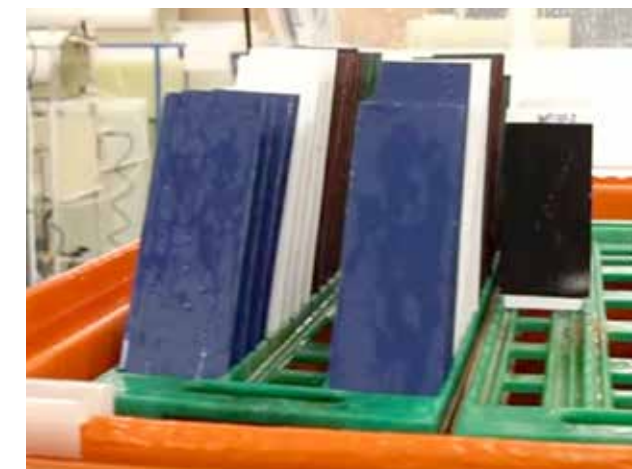
Tests and evaluations are performed to appropriate industry association standards by Sherwin-Williams technical experts.

NATURAL EXPOSURE

Exterior weather exposure (natural weathering) involves placing sample panels on inclined open racks orientated at the sun, usually at a 45-degree angle in a southerly direction. This angle ensures full UV exposure.

ACCELERATED TESTING

Special environmental cabinets and instruments are used to speed up the weathering process and measure its effects under extreme conditions.



| Cabinet Testing | Description | Standard |
|-------------------|-------------------------|-----------------|
| Corrosion Testing | Neutral Salt Spray | ASTM B117 |
| | Cyclic Prohesion | ASTM G85 Annex5 |
| | Cosmetic Corrosion Test | SAE J2334 |
| | Cyclic UV Fog | ASTM D5894 |
| | 100% Humidity @ 100°F | ASTM D2247 |
| UV Testing | Cleveland Humidity | ASTM D4585 |
| | Dew Cycle Weatherometer | ASTM D3361 |
| | QUV A - 340nm Bulb | ASTM D4587 |
| | QUV B - 313nm Bulb | ASTM D4587 |

| Physical Testing | Description | Standard |
|------------------|--------------------------------------------|------------|
| | Falling Sand Abrasion Test | ASTM D968 |
| | Adhesion Testing | ASTM D3359 |
| | Chalking | ASTM D4214 |
| | Solar Reflectance | ASTM C1549 |
| | Emittance | ASTM C1371 |
| | Gloss | ASTM D523 |
| | Instrumental Color | ASTM D2244 |
| | Impact | ASTM D2794 |
| | Pencil Hardness | ASTM D3363 |
| | MEK Rubs | ASTM D5402 |
| | Dry Film Thickness - Boring Device | ASTM D5796 |
| | Detergent Resistance | ASTM D2248 |
| | Water Resistance | ASTM D4585 |
| | Measure of Thickness - Eddy-Current Method | ASTM B244 |

| Exterior Exposure | Description | Standard |
|-------------------|--------------------------------------------|----------|
| | Atmospheric Environmental Exposure Testing | ASTM G7 |

| Wet Stack Testing | Description | Standard |
|-------------------|--------------------------------------------------|------------|
| | Wet Stack Test | ASTM D7376 |
| | Degree of Rust | ASTM D610 |
| | Degree of Blistering | ASTM D714 |
| | Evaluation of Specimens in Corrosive Environment | ASTM D1654 |

| Physical, Accelerated and Exterior | Description | Standard |
|------------------------------------|----------------------------|------------------------|
| | All Testing and Weathering | AAMA 2603, 2604 & 2605 |



TESTING TO HELP PREVENT FAILURES

Weather testing has become a crucial step to head off potential product failures. Innovation matters at Sherwin-Williams, where research and development is ongoing in order to improve the performance and durability of our coating systems. A well-planned weathering test program could identify coating failure risks in advance. With this, new formulations are created and need to be tested to failure. Below are a few of the many potential coating failures we are testing for.

GLOSS RETENTION

Gloss refers to a coating's ability to reflect light without it scattering. Direct UV exposure can degrade the luster of the topcoat. While all types of coatings will lose some degree of gloss over time, lower quality paints will generally lose gloss much earlier than superior coatings.

CHALKING

Chalking is caused by degradation of the resin system at the surface of the finish due to exposure to ultraviolet (UV) rays. As the resin system breaks down, resin particles take on a white appearance and imbedded pigment particles lose their adhesion to the film. Chalking is tested by transferring the chalk to a fabric or adhesive tapes, then is compared to a photographic reference standard (ASTM D4214). The range is from 10 to 1, with 10 showing the least amount of chalking and 1 showing the presence of extreme chalking.

FADING / DELTA E

Delta E (dE) is a single number that represents the distance between two colors. One color is always the standard - the starting point for the calculation. The second color is the weathered panel. The Delta E number will provide the color change that is expected due to fade and loss of gloss after exterior exposure. The lower the number, the lower the amount of color change. The higher the number, the higher the amount of fading.

BLISTERING

Blistering represents a localized loss of adhesion and the lifting of the coating film from the underlying surface. This is caused by heat, moisture, or a combination of both. This condition eventually leads to peeling and corrosion. Surface blistering can sometimes be caused by improper drying or curing of the coated material.

CRACKING / FLAKING

Hairline fractures occur in the coating that then splits and eventually peels away from the substrate to cause cracking and flaking. Improper application, spreading paint too thin, poor surface preparation, or improper paint selection for the environmental conditions can all cause cracking or flaking in a coating system.

COMPLETE SOLUTIONS THAT OUTLAST THE COMPETITION

Sherwin-Williams is constantly evaluating our products to make sure they withstand the damaging forces of nature and provide the excellent long-term durability and beauty our customers have come to expect. While accelerated weathering cabinets are a key resource when developing and reporting to industry associations, Sherwin-Williams does not rely on those tests alone.

Nothing provides better results than natural exposure to the sun, heat, and moisture, even if it takes years. Sherwin-Williams is continually testing and collecting data on our products, as well as our competitor products. We focus on what matters to our customers — a coating system they can trust.



WEATHERING GOVERNING ASSOCIATIONS

WHAT IS ASTM?

ASTM International, formerly known as the American Society for Testing and Materials (ASTM), is a globally recognized leader in the development and delivery of international voluntary consensus standards. ASTM standards help level the playing field so that businesses of all sizes can better compete in the global economy. For more information, visit www.astm.org.

WHAT IS AAMA?

American Architectural Manufacturers Association (AAMA) stands as a strong advocate for manufacturers and professionals in the fenestration industry and is dedicated to the promotion of quality window, door, curtain wall, storefront, and skylight products. They work to improve product, material, and component performance standards. For more information, visit www.aamanet.org.

OTHER ASSOCIATIONS

Sherwin-Williams prioritizes sustainable practices. We are a proud member of the following organizations: ENERGY STAR®, U.S. Green Building Council, LEED®, Cool Roof Rating Council, and ILFI (Living Building Challenge).



WEATHERABILITY MATTERS

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