

# Weathering (cont.)

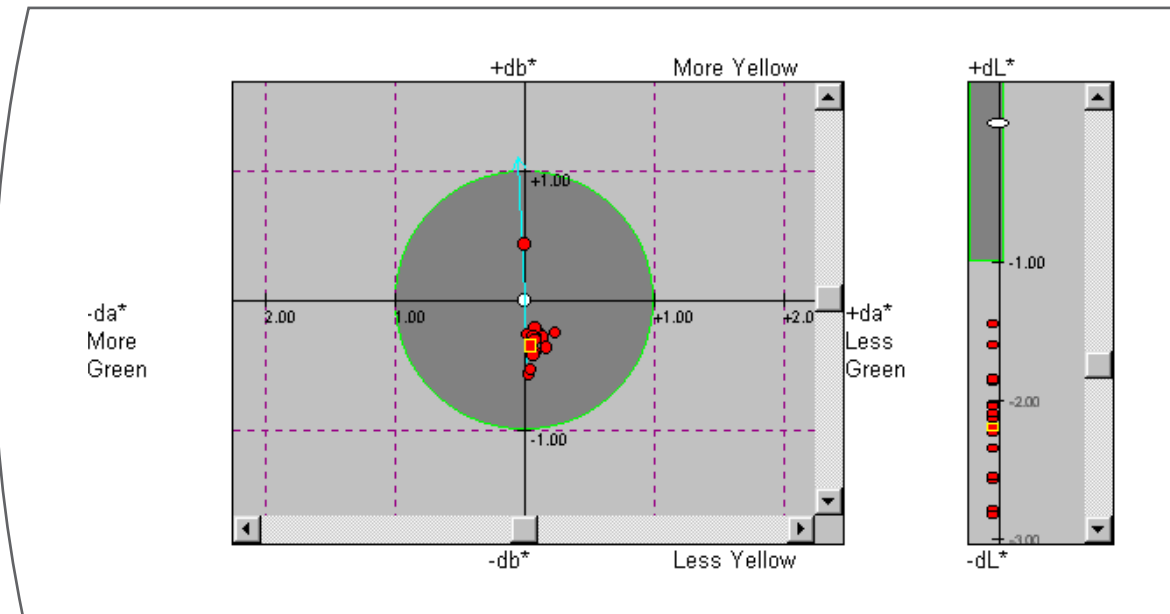
## Color Measurement/Matching

Color measurement analyzes the condition of a material's surface after exposure to ultraviolet light to determine the degree of degradation or discoloration.

Color matching is a quality control method intended to check the color of end use products against federal standardized color chips.

Color Measurement/Matching Test Methods Available Include But Are Not Limited To:

AATCC Gray Scale for Color Change	ASTM D 1003	ASTM D 1925/DIN 6167
ASTM D 2244	ASTM E 308-99	ASTM E 313-98
ASTM E 991-98	ASTM E 1164-94	ASTM E 1349-90 (98)
FED-STD-595B	SAE J 1545	TAPPI 525/ISO R457



Example of a Color Measurement Chart

# Physical Testing: Weathering

## Will Your Product Stand Up Against the Elements?

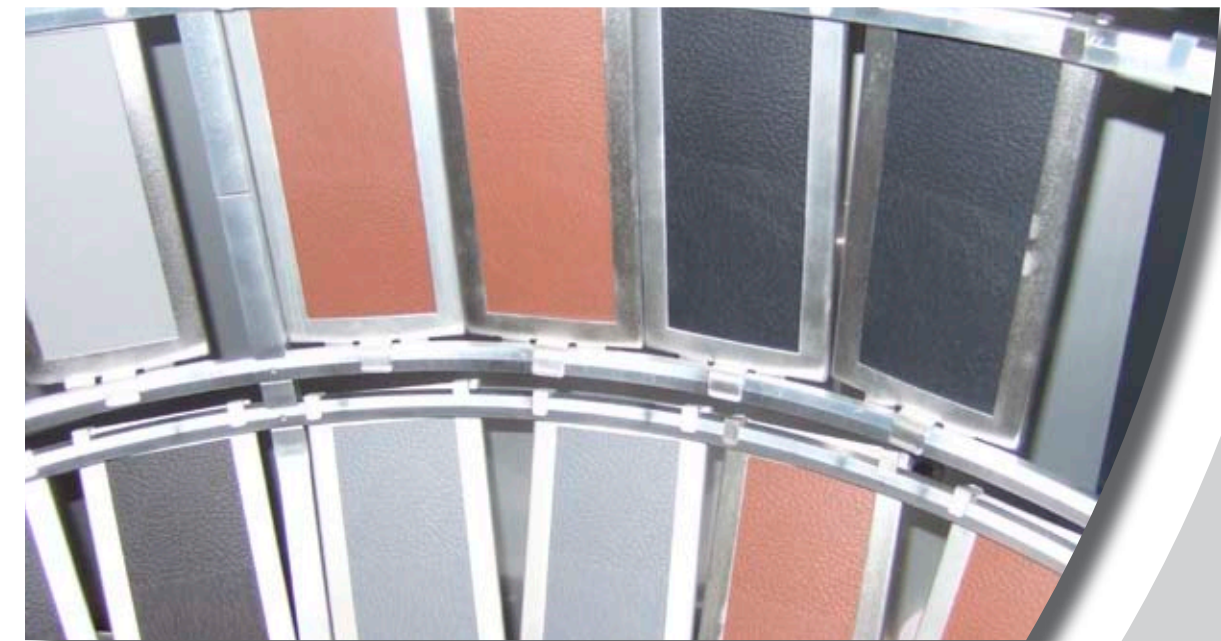
Ensure your product will outperform your customers' expectations with product and material weathering testing at ARDL.

## UV & Visible Solar Radiation Resistance by Xenon Arc Weather-Ometer

ARDL's multiple Xenon Arc Weather-Ometers are the preferred light source for testing materials that will be exposed to natural sunlight. They use a precision gas discharge lamp sealed in a quartz tube with a water lamp cooling system. Precise humidity, chamber temperature and black panel temperature controls allow the Xenon long arc, when properly filtered, to simulate UV and visible solar radiation more accurately than any other artificial light source. Typical applications include automotive components, chemicals, paints and coatings, paper, pharmaceuticals, textiles, plastics and polymers.

Xenon Arc Test Methods Available Include But Are Not Limited To:

AATCC Test Method 16	AATCC Test Method 169	ASTM D 6695	ASTM G 151
ASTM G 155	FORD DVM 0067 MA	GME 60292	GMW 3414
Honda HES D6601	ISO 105B-06	ISO 105B-02	ISO 11341
ISO 3917	ISO 4892-2	JIS B 7754	JASO M346
MIL STD 810 F	Nissan MO 135	SAE J 1885	SAE J 1960
SAE J 2412	SAE J 2527	Toyota TSM0501G	UL 1581
VDA 621-430	VDA 621-430	VDA 75202	VW PV 1211
VW PV 1303	VW PV 3929	VW PV 3930	



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Rubber. Plastic. Latex.

# Weathering (cont.)

## Crockmeter

A Crockmeter tests the transference of color from the surface of one material to another by either wet or dry rubbing. This testing can be performed before and after weathering to detect changes after aging. In addition, the Crockmeter can also perform scuffing, wet/dry abrasion, flexing, powdering, dry-cleaning and ink abrasiveness tests.

AATCC Method 8	AATCC Method 165	ASTM F 1319	EN ISO 105, Part X12
ISO 105, Part D02	JIS K 6328	JIS L 0849	JIS L 1084

## UV Discoloration by UV Staining

ARDL can perform several types of UV staining to check product performance.

*UV Discoloration Test Methods Available Include But Are Not Limited To:*

ASTM D 925 Method B	GM 6086M	MS-AY 522	SAE J 1037	WSB-M3G102-B2
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## UV Resistance by QUV

ARDL has several large capacity QUV testers to accommodate different sample sizes and odd shapes – which means you don't have to wait in line. The QUV accelerated weathering tester is a cost-effective simulation of short wavelength UV exposure. This type of testing is often used for quality control applications and is especially useful for performance comparison of different types of polymers and stabilizers. The QUV offers a condensation system for moisture simulation that does not require water spray or humidity control.

QUV lamps are electrically similar to the common cool white lamps used in general lighting but are designed to produce mostly UV light rather than visible or infrared light. In order to cover a wide range of testing needs, ARDL uses several types of UV lamps dependent on the amount of UV energy emitted and the wavelength where the spectral energy falls.

*QUV Test Methods Available Include But Are Not Limited To:*

ASTM D 904	ASTM D 4674	ASTM D 5215	ASTM G 151
ASTM G 154	SAE J 2020	JIS D 0205	BS 2782 Part 5
ISO 4582	ISO 4892-1	DIN 53 384	

## Ozone Resistance

ARDL has numerous chambers to test your product or material for Ozone degradation under a variety of Ozone concentrations and temperatures.

## Dynamic Ozone Resistance

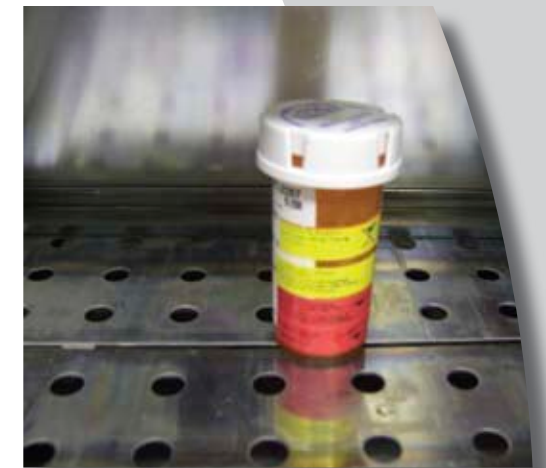
Tests for Ozone resistance under dynamic conditions.

## Fog Characteristics

Fog is a procedure performed in order to determine the tendency of interior materials to produce a light scattering film on a glass surface in a controlled environment.

## Salt Fog / Salt Spray

Salt fog is an environmental testing procedure performed on products and materials to replicate the conditions of an ocean exposed atmosphere.



## Heraeus CPS Sun Test

The CPS sun test is conducted to determine accelerated lightfastness and photostability in end use applications. The Heraeus system uses a 1,100 watt, air-cooled Xenon Arc lamp with a total exposure area of 560 cm<sup>2</sup> (86 in<sup>2</sup>) and has an integrated water immersion table. Common applications tested are pharmaceuticals, cosmetics, plastics, dental materials and textiles. ARDL can test to ICH guidelines.

*Heraeus CPS Test Methods Available Include But Are Not Limited To:*

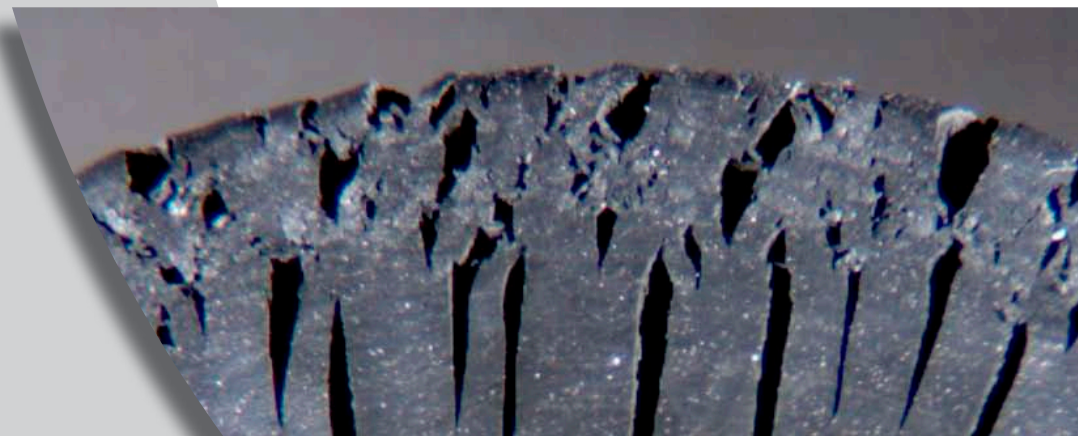
AATCC Test Method 16	ASTM D 3424	ASTM D 5010	ASTM D 5071
ASTM D 6695	ASTM G 151	ASTM G 155	EPA/ASTM E 896
ICH Guideline Q1B	ICH Guideline Q5C	ISO 4049	ISO 7491
ISO 11341	ISO 11979-5	ISO 4892-1	Qualicoat

## UV Resistance by Sunshine Carbon Arc Weather-Ometer

The Carbon Arc Weathering system provides more UV exposure at wavelengths below 300 nm than natural sunlight alone. ARDL's open-flame carbon arc light source tests lightfastness durability of materials and coatings utilizing three pairs of carbon rods that emit ultraviolet, visible and infrared radiation when an electric current is passed between them. The Carbon Arc utilizes temperature control with a black panel sensor and sample conditioning water.

*Carbon Arc Test Methods Available Include But Are Not Limited To:*

ASTM D 750	ASTM D 822	ASTM D 904
ASTM D 1499	ASTM E 188	ASTM G 23
ASTM G 152	Federal 601: Method 7311	SAE J 4C



Example of a Failed Rubber Sample After Testing in an Ozone Chamber  
1.00 mm