New Developments in Testing Standards

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Q-Lab

View Recorded Presentation

Q-Lab's New Webinar Series

Today is the second of four new webinars this spring from Q-Lab on weathering and corrosion testing topics

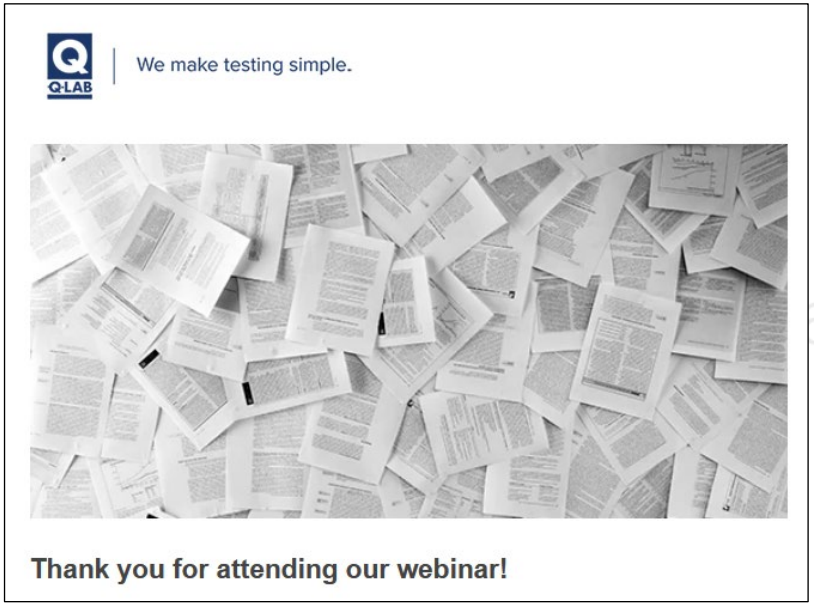
All upcoming and archived webinars can be accessed at: q-lab.com/webinars

Date	Topic
29 May	How to Perform a Comparison Test
12 Jun	New Developments in Testing Standards
01 Jul	Q-PANEL Standard Substrates
17 Jul	QUALICOAT

Administrative Notes

You'll receive a follow-up email from info@email.q-lab.com with links to a survey, registration for future webinars, and to download the slides

Use the **Q&A feature in Zoom** to ask us questions today!



Standards Development

- Weathering and corrosion test standards have been in use for over **100 years**
- The most popular ASTM, ISO, SAE, and company standards have **A LOT** of historical data
  - Large changes are not common
  - Revisions are done carefully and with international support and agreement

Standards Development

Standards committees actively review, revise, and create test protocols!

- Calibration and maintenance recommendations
- Performance verification techniques
- Hardware neutrality
- Updates to cycles, accessories, and instrument parameters
- Incorporation of new technologies
- Language and typographical updates

Standards update types

1. New standard
   - A new project request is started, if approved
   - **Problem-based** (an issue requires a standardized solution) or **Supply-based** (new equipment needs a repeatable procedure)
2. Systematic review
   - Every ~5 years, depending on organization
3. Revision
   - Any time a need for an update is identified, a member can request a work item for the revision

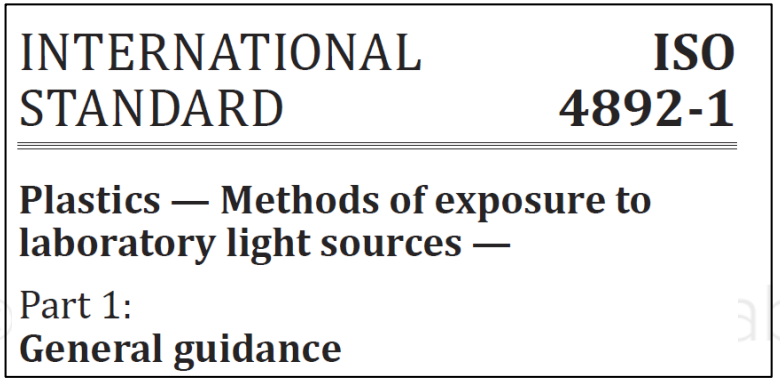
Q-Lab Standards Leadership

- ISO
  - TC 61 (plastics)
  - TC 35 (paints and coatings)
  - TC 38 (textiles)
  - TC 42 (photography)
  - TC 156 (corrosion)
- IEC
  - TC 82 (photovoltaics)
  - TC 104 (environmental tests)
- ASTM
  - D20 (plastics)
  - D01 (paints and coatings)
  - G03 (Weathering)
  - G01 (Corrosion)
- AATCC (textiles)
- FGIA (building products)
- SAE (automotive standards)
- GB (Chinese national standards)

General Standards Updates

ISO 4892-1: General Lab Testing

- General laboratory guidance – widely referred to in many international standards
- Updates definitions including specimens, reference materials, test types, and black and white panel thermometers
- Clarifies black panel temperature sensor construction, performance, and calibration requirements
- Adds reference to ISO 23741 for water delivery in xenon testing – authored by Q-Lab
- Modernizes requirements for the test report


INTERNATIONAL STANDARD ISO 4892-1

Plastics — Methods of exposure to laboratory light sources —

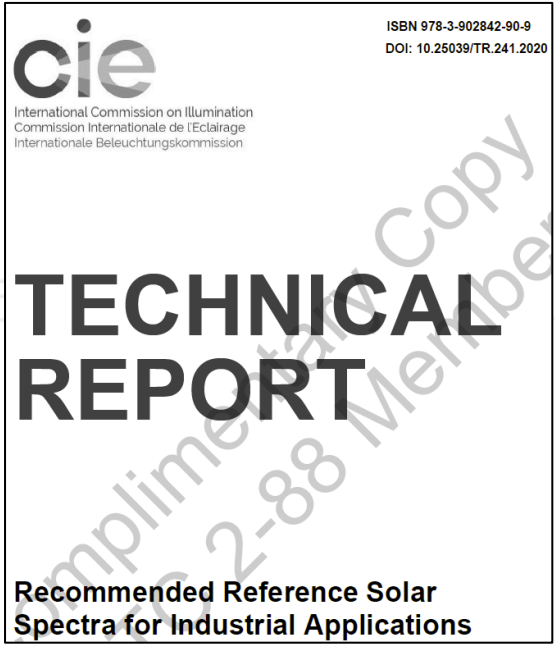
Part 1:
General guidance

CIE 241: Solar Reference Spectra

- Widely-referenced standard with reference solar irradiance tables
- Important table **CIE-H1** for "noon summer sun" updated with improved data, modeling, and precision

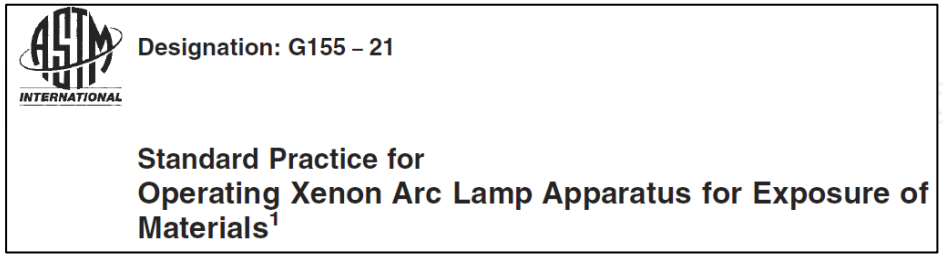
Table A.2 – CIE-H1: Global solar spectral irradiance on a horizontal plane at sea level
AM: 1,0, Water Vapour: 1,42 atm-cm, O_3: 0,340 atm-cm, AOD: 0,10, Albedo: 0,2

Wavelength nm	$E_{\lambda,H1}$ $W \cdot m^{-2} \cdot nm^{-1}$	Wavelength nm	$E_{\lambda,H1}$ $W \cdot m^{-2} \cdot nm^{-1}$	Wavelength nm	$E_{\lambda,H1}$ $W \cdot m^{-2} \cdot nm^{-1}$	Wavelength nm	$E_{\lambda,H1}$ $W \cdot m^{-2} \cdot nm^{-1}$
290	1,956E-05	570	1,653E+00	850	9,548E-01	1 130	1,941E-01
295	1,025E-03	575	1,658E+00	855	9,206E-01	1 135	1,765E-01
300	1,478E-02	580	1,656E+00	860	9,766E-01	1 140	2,776E-01
305	7,653E-02	585	1,657E+00	865	9,422E-01	1 145	2,163E-01
310	1,894E-01	590	1,572E+00	870	9,555E-01	1 150	2,346E-01
315	3,113E-01	595	1,594E+00	875	9,463E-01	1 155	2,941E-01
320	4,238E-01	600	1,587E+00	880	9,333E-01	1 160	3,588E-01
325	5,700E-01	605	1,598E+00	885	9,205E-01	1 165	4,140E-01
330	7,221E-01	610	1,587E+00	890	9,085E-01	1 170	4,415E-01
335	7,102E-01	615	1,551E+00	895	8,090E-01	1 175	4,379E-01
340	7,562E-01	620	1,549E+00	900	6,973E-01	1 180	4,323E-01



Xenon Arc

ASTM G155: Xenon arc general weathering



Designation: G155 – 21

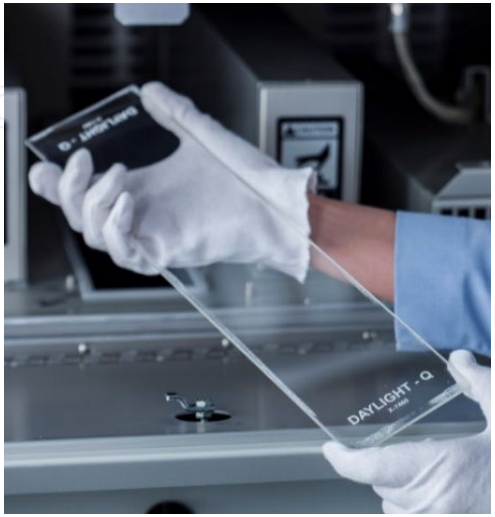
Standard Practice for
Operating Xenon Arc Lamp Apparatus for Exposure of Materials[1]

- Performance-based standard for operating a xenon-arc accelerated laboratory weathering apparatus, referred to in numerous standards
- Scope now includes all materials, not just “Non-metallic” ones
- Updates test cycles with chamber air temperatures, new modern test cycle for transportation coatings, and information on step transitions
- Recommends to always reposition specimens and demonstrates how

Daylight Optical Filter Classifications

ASTM and ISO define classes of Optical Filters:

- Daylight
- Window
- Extended UV (ASTM only)



Daylight definition is very broad and can cause different results

Standards updated to give users better guidance

Type I and Type II Daylight Optical Filters

Spectral Bandpass Wavelength λ in nm	General[B]		Type I[C]		Type II[D]		Benchmark Solar Radiation Percent[F,G,H]
	Min. %[E]	Max %[E]	Min. %[E]	Max %[E]	Min. %[E]	Max %[E]	
λ < 300[I]	2.6	8.1	0	0.2	0.2	1.1	5.8
300 ≤ λ ≤ 320			2.6	6	3.5	7.0	
320 < λ ≤ 340	28.3	40.0	10.0	17.0	10.0	17.0	40.0
340 < λ ≤ 360			18.3	23.2	18.3	23.2	
360 < λ ≤ 380	54.2	67.5	25.0	30.5	25.0	30.5	54.2
380 < λ ≤ 400			29.2	37.0	29.2	37.0	

- **General**: unchanged, still permitted
- Type I
  - Close match to natural sunlight – generally recommended
  - Includes Daylight-Q and Daylight-F (ASTM D7869 type)
- Type II
  - Match to historical borosilicate filters – recommended only to match historical data
  - More shortwave UV than natural sunlight

Daylight Filter Standards Updates

ISO 4892-2 (Plastics)

Plastics — Methods of exposure to laboratory light sources —

Part 2:
Xenon-arc lamps

AMENDMENT 1: Classification of daylight filters

ISO 16474-2 (Paints)

Paints and varnishes — Methods of exposure to laboratory light sources —

Part 2:
Xenon-arc lamps

AMENDMENT 1: Classification of daylight filters

ASTM G155 (General)

6.1.3.1 *General Daylight Filters*—These filters meet the requirements in the General column of Table 1. The General column represents the broad definition for Daylight filters found in previous versions of this standard. Both Type I and Type II filters are subsets of General Daylight filters.

ISO 23741: Water Delivery for Xenon Arc

INTERNATIONAL STANDARD

ISO 23741

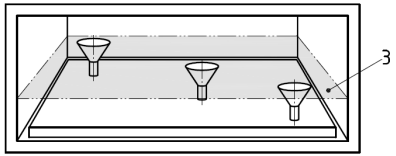
First edition
2021-03

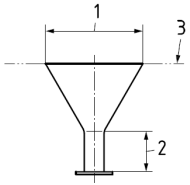
Plastics — Determination of spray water delivery during spray cycles when using a xenon arc weathering test apparatus

- Standard method introduced to quantify water delivery in xenon arc testers
- Includes rotating rack and flat array geometries
- Simple, 5-minute test with ±10% criterion for recommending specimen repositioning

ISO 23741: Water Deliver for Xenon arc

Suggested collection device configurations





Flat array

Rotating rack

SAE J2412: Xenon arc interior Weathering

SURFACE VEHICLE STANDARD	J2412™	FEB2024
	Issued 2003-11 Revised 2024-02 Superseding J2412 NOV2023	
Accelerated Exposure of Automotive Interior Trim Components Using a Controlled Irradiance Xenon-Arc Apparatus		

- Automotive interior materials performance-based standard for xenon arc testers
- Adds a defined setpoint of 0.55 W/m^2/nm instead of leaving to user discretion
- The specified Extended UV filter is inappropriate – standard now explains why Window correlates better
- Example of standards revision for **self-correction!**

ISO 105-B04: Xenon arc for outdoor fabrics

- Wet lightfastness test standard designed for outdoor fabrics and textiles like tarps and all-weather clothing
- Unclear language for years led to specification of a Window filter – wrong for an outdoor test! New revision clearly defines spectral requirements for outdoor Daylight

INTERNATIONAL STANDARD **ISO/FDIS 105-B04**

Textiles — Tests for colour fastness —

Part B04:
Colour fastness to artificial weathering: Xenon arc fading lamp test

UV Fluorescent

ISO 4892-3: UVF General Weathering

- New, high-irradiance cycles added for UVA and UVB lamps
- Use of insulated black panel (IBP) for QUV tests is now permitted

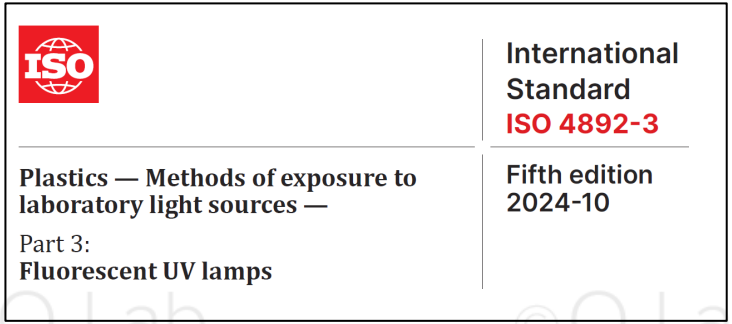


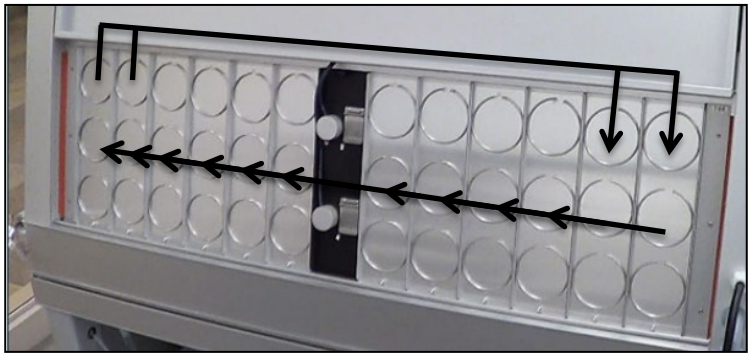
Table D.1 — Alternative exposure cycles for condensation type devices

Method D: Artificial accelerated weathering with UVA-340 lamps with higher irradiance				
Cycle No.	Lamp type	Exposure period	Irradiance[a, b]	Black-panel temperature[c]
8	UVA-340	8 h dry 4 h condensation	(1,36 ± 0,02) W·m^{-2} · nm^{-1} at 340 nm UV lamps off	60 °C ± 3 °C 50 °C ± 3 °C
9	UVA-340	8 h dry 4 h condensation	(2,04 ± 0,02) W·m^{-2} · nm^{-1} at 340 nm UV lamps off	60 °C ± 3 °C 50 °C ± 3 °C

SAE J2020: UVF Automotive

SURFACE VEHICLE STANDARD	J2020™	OCT2022
	Issued 1989-06 Revised 2022-10 Superseding J2020 APR2016	
Accelerated Exposure of Automotive Exterior Materials Using a Fluorescent UV and Condensation Apparatus		

- Clarifies use of both UVA and UVB type lamps
- Improves guidance on specimen repositioning
- Describes black panel thermometers
- Adds CIE 241 spectrum data for comparison



ISO 16053-2: UVF Wood Coatings

- Long-established European standard for weathering of wood coatings: **EN 927-6**
  - Long periods of water spray
  - Ideally suited to these materials
- Now adopted as an International Standard called **ISO 16053-2**
- Future revision will permit exposures of different wood types

ISO

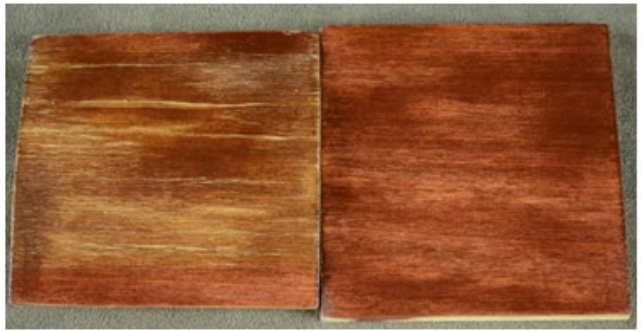
International Standard

ISO 16053-2

Paints and varnishes — Coating materials and coating systems for exterior wood —

Part 2:
Exposure of wood coatings to artificial weathering using fluorescent UV lamps and water

First edition
2024-03



ASTM G224: UVC Testing

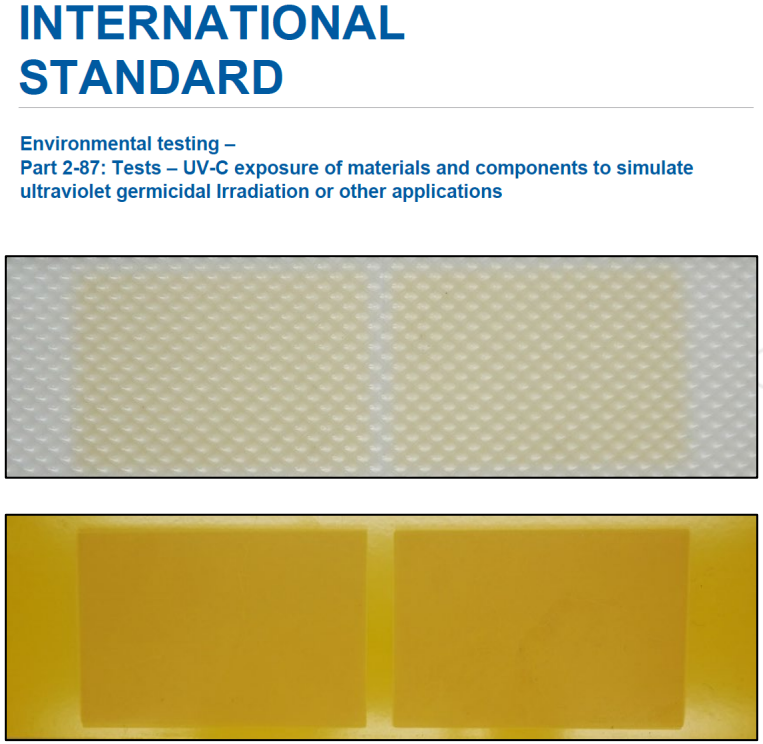
- Testing for resistance to UVC light became of great interest during the pandemic
- ASTM quickly published the first-ever international standard for UVC testing, development led by Q-Lab
- Includes some previous cycles, along with more realistic uses (lower dosage, lower temperature)

Designation: G224 – 23

Standard Practice for Operating UVC Lamp Apparatus for Exposure of Materials

IEC 60068-2-87

- IEC 60335-1 was one of the few UVC material durability standards available when COVID-19 happened, but its cycle is not widely applicable
- New Part 2-87 includes 15 “severities” that cover a range of conditions:
  - 35 °C and 60 °C
  - 1.0, 3.0, and 6.0 mW/cm^2
  - Duration from 16 - 1000 hours



Corrosion

ISO 9227:

Continuous Corrosion

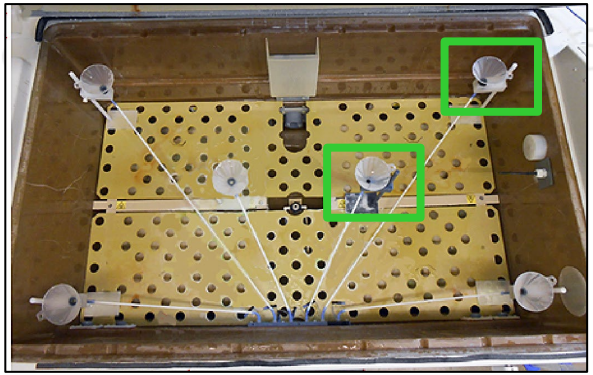
INTERNATIONAL STANDARD **ISO/FDIS 9227**

Corrosion tests in artificial atmospheres — Salt spray tests

Essais de corrosion en atmosphères artificielles — Essais aux brouillards salins

- Multiple steel grades allowed for corrosion (mass-loss) coupons
- Routine fog verification may be performed with only two collection devices

Changes pending



ISO 12944-6: Corrosion of Coatings

- Major revision in progress
- Clarity to be added to panel scribing for consistency of test results and correlation

INTERNATIONAL STANDARD **ISO 12944-6**

Paints and varnishes — Corrosion protection of steel structures by protective paint systems —

Part 6:
Laboratory performance test methods

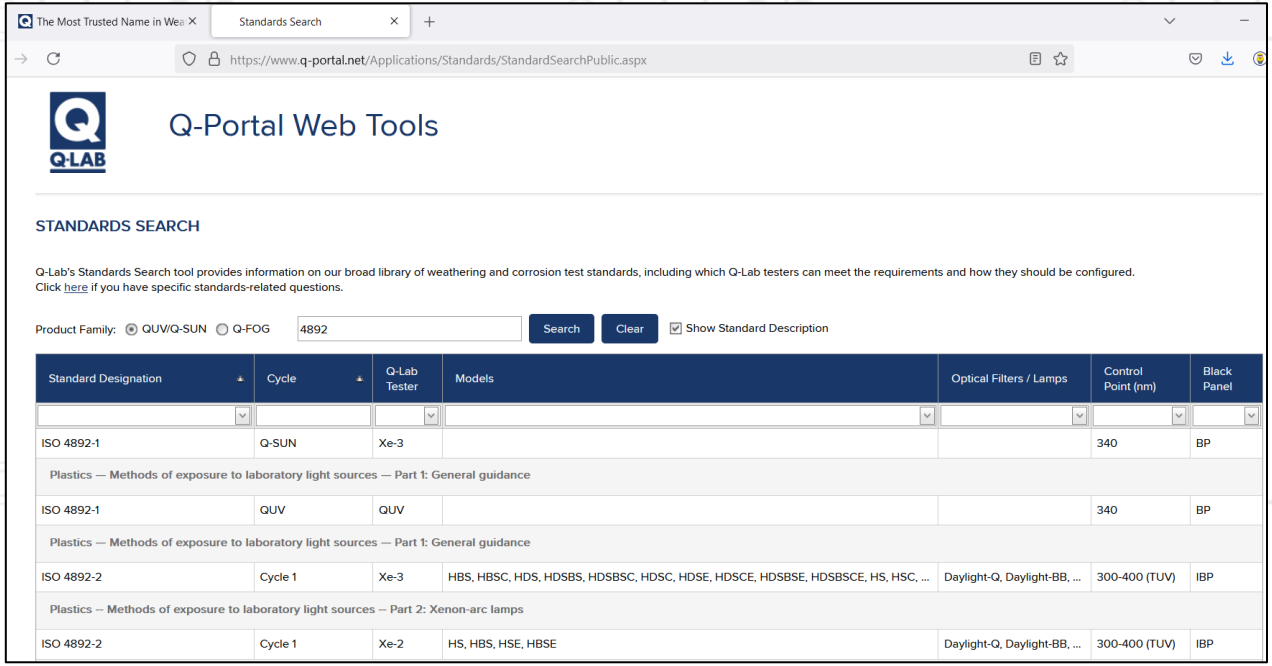
Summary

- Although many weathering and corrosion test standards have been in use for decades, international committees are continuously improving upon them
  - Add clarity, openness, and usability
- Many recent updates and new documents:
  - ISO 4892-1, CIE 241 (General)
  - ASTM G155, ISO 23741, SAE J2412, ISO 4892-2 and ISO 16474-2, ISO 105-B04 (xenon)
  - ISO 4892-3, SAE J2020, ASTM G224, IEC 60068-2-87 (UV fluorescent)
  - ISO 9227, ISO 12944-6 (corrosion)
- Many more updates and new standards in progress

Standards Resources

Q-Portal

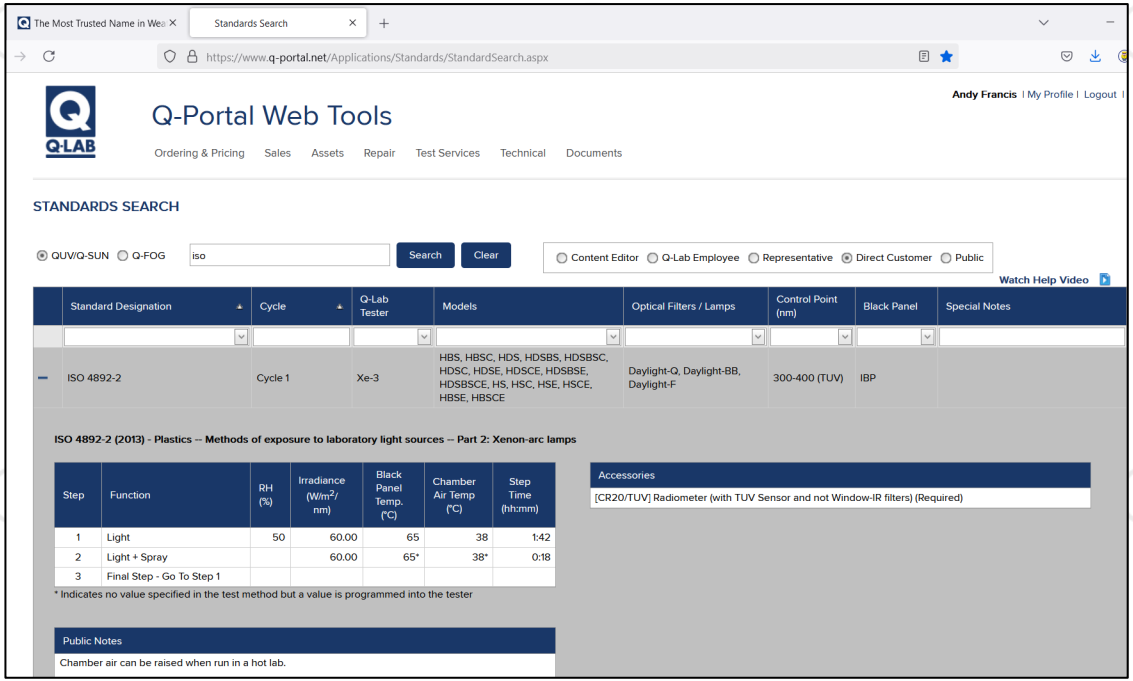
New public tool for locating standards information



Standard Designation	Cycle	Q-Lab Tester	Models	Optical Filters / Lamps	Control Point (nm)	Black Panel
ISO 4892-1	Q-SUN	Xe-3			340	BP
Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance						
ISO 4892-1	QUV	QUV			340	BP
Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance						
ISO 4892-2	Cycle 1	Xe-3	HBS, HBSC, HDS, HDSBS, HDSBSC, HDSC, HDSE, HDSCE, HDSBSE, HDSBSCE, HS, HSC, ...	Daylight-Q, Daylight-BB, ...	300-400 (TUV)	IBP
Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps						
ISO 4892-2	Cycle 1	Xe-2	HS, HBS, HSE, HBSE	Daylight-Q, Daylight-BB, ...	300-400 (TUV)	IBP

Q-Portal

Much more information for logged-in users (free)



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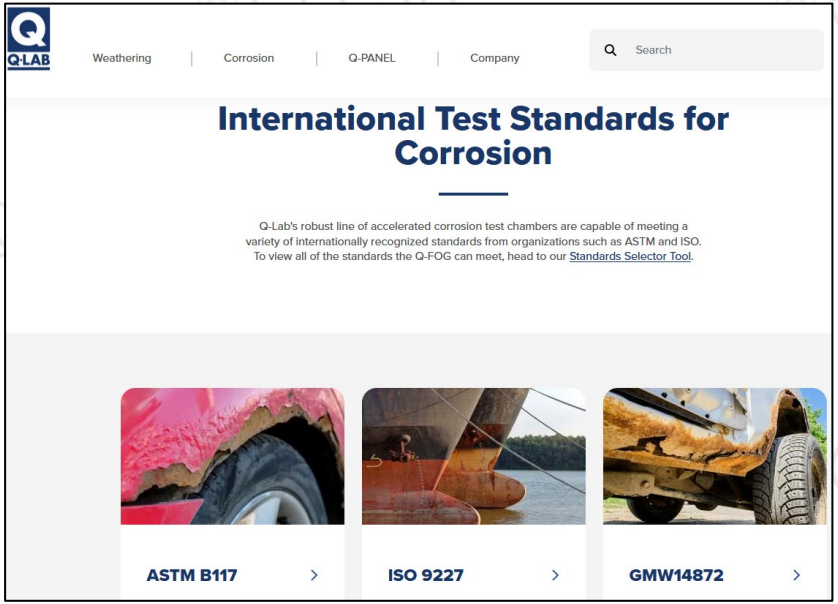
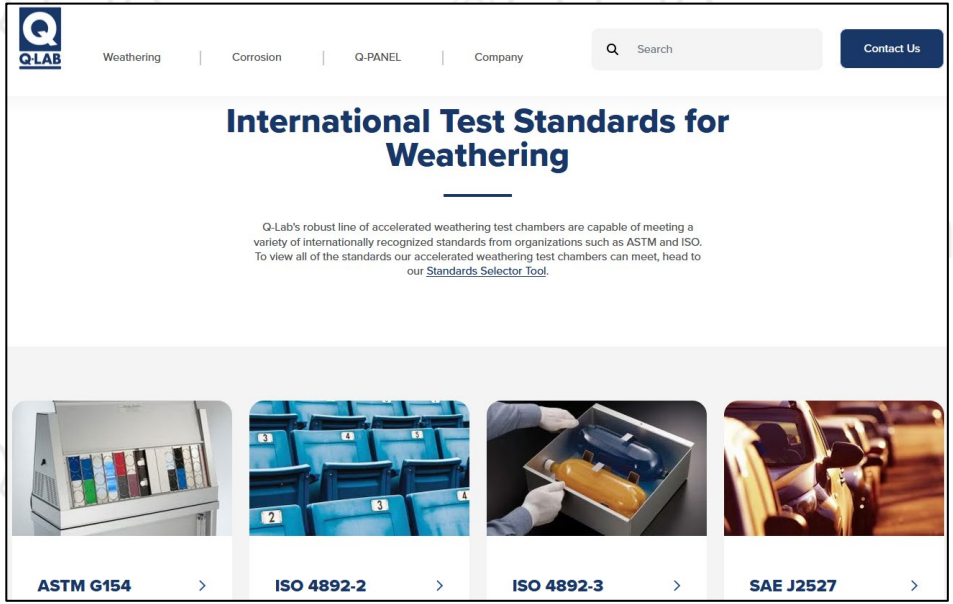
Individual Standards pages





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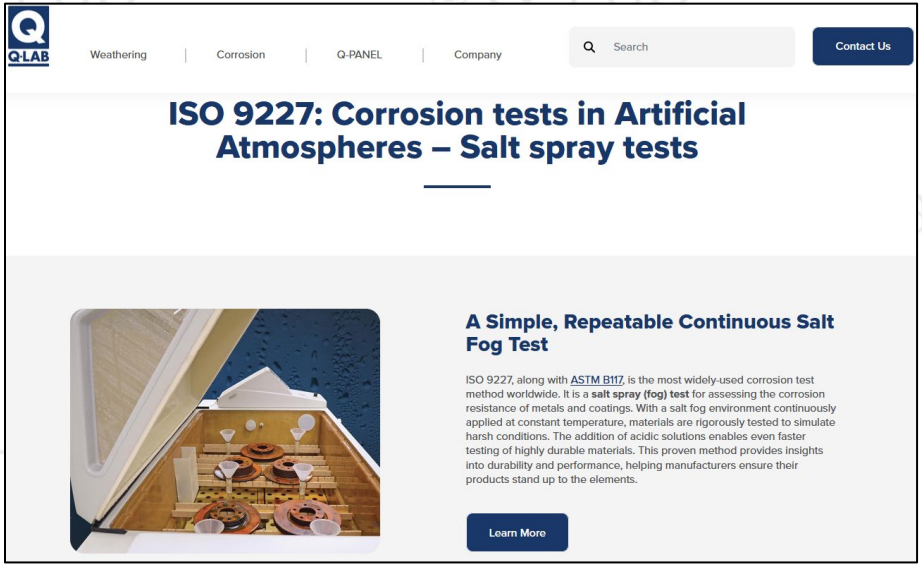
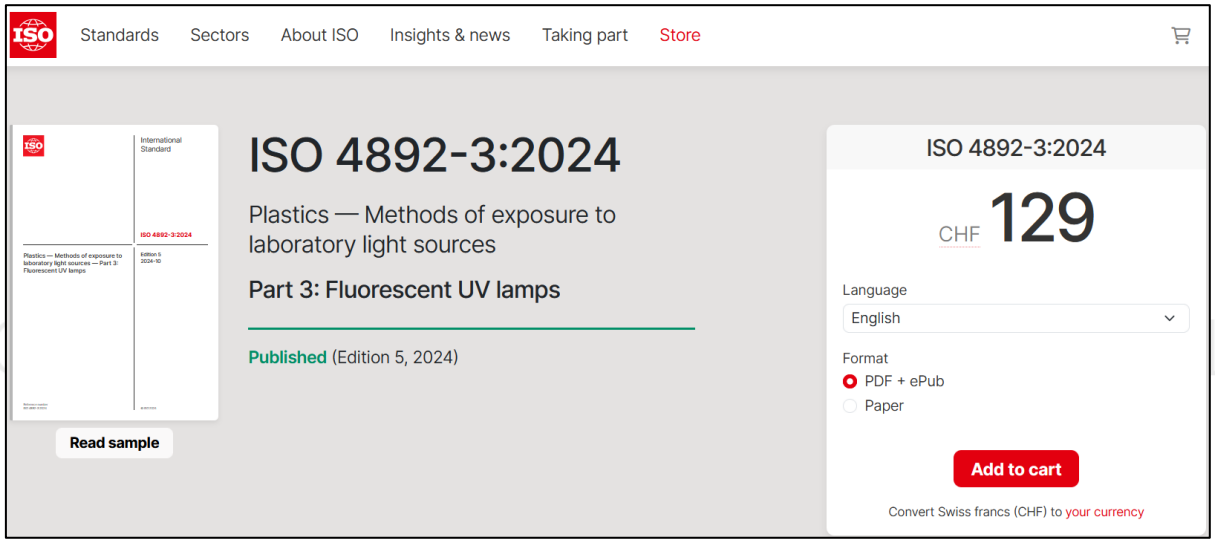
Individual Standards pages



Standards Research

- It's easy to find the status of most standards online
- Q-Lab can help with details
- Most standards are inexpensive



Standards Research

Find out what committee is responsible

Abstract

This document specifies methods for exposing plastic specimens to fluorescent UV lamp radiation, heat and water in apparatus designed to simulate the weathering effects that occur when plastic materials are exposed in actual end-use environments to global solar radiation, or to window-glass filtered solar radiation.

Fluorescent UV lamp exposures for paints, varnishes and other coatings are described in ISO 16474-3.

General information

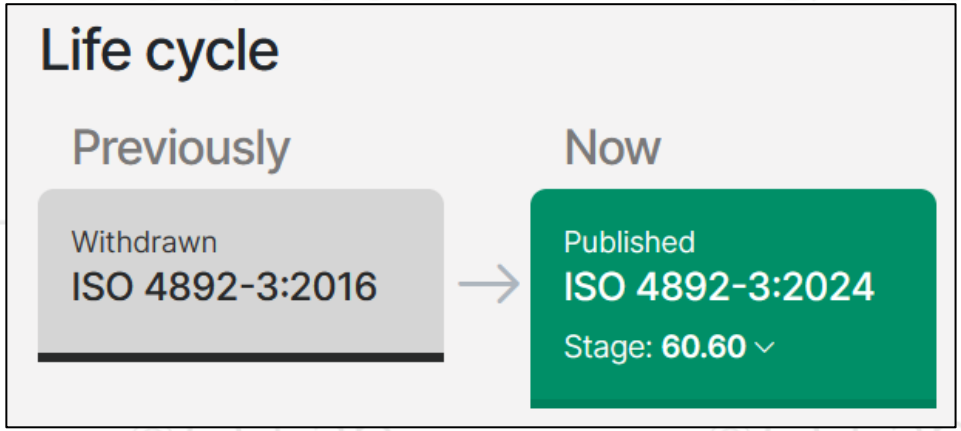
Status : Published
Publication date : 2024-10
Stage : International Standard published [60.60]

Edition : 5
Number of pages : 19

Technical Committee : ISO/TC 61/SC 6
ICS : 83.080.01

Check Status

Recently published



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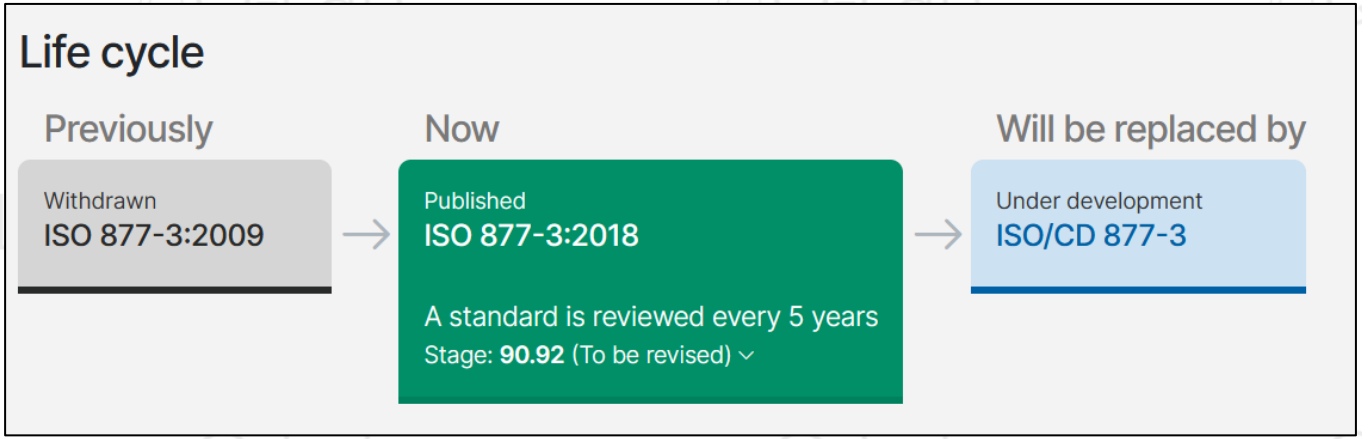
Revision in progress



ASTM, ISO, IEC, and SAE all require regular 5-year reviews

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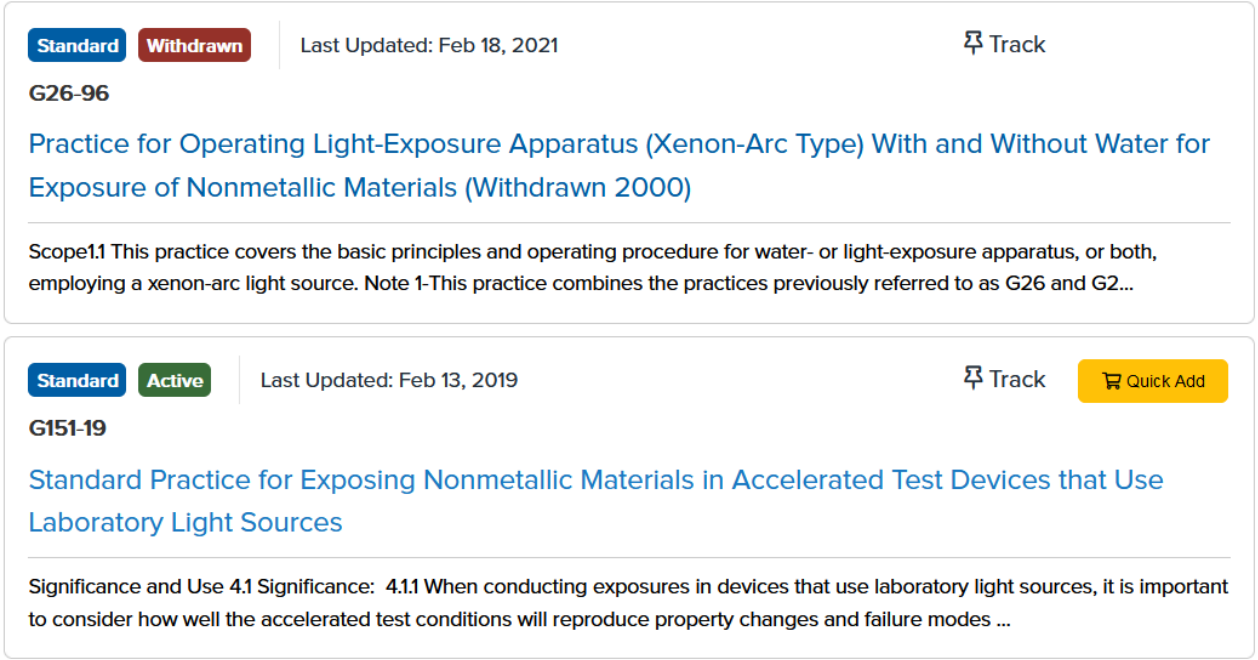
Withdrawn / replaced



Don't use this!

Use this!

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Thank you for your time.

Questions?

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We make testing simple.