Halar®

SOLVAY

asking more from chemistry®

Halar® ECTFE

Long-Term Weather Resistance

SPECIALTY POLYMERS

Halar® ECTFE

A Weatherable Fluoropolymer for Outdoor Applications

Halar® ECTFE is a partially fluorinated polymer manufactured with a proprietary technology from Solvay Specialty Polymers. Because of the unique combination of ethylene and chlorotrifluoroethylene co-monomers in its backbone, Halar® ECTFE offers extremely high fire and chemical resistance, combined with excellent barrier properties.

These unique properties make Halar® the material of choice in several highly demanding applications, from Aerospace to Semiconductors.

In addition, the partially fluorinated structure also provides extreme long term stability when it is exposed to sunlight and atmospheric events.

For this reason, Halar® ECTFE is finding more and more applications in markets such as Photovoltaic (frontsheets[1] and backsheet) and architectonic structures.

The information below provides an in-depth look at Halar® ECTFE and its excellent weatherability characteristics.

Weatherability

Method

Transparent Halar® ECTFE films were tested in accelerated and natural aging conditions in Florida.

Methods used for accelerated aging are Q-UVb[2] and Xenon Arc Weather-O-Meter[3].

Given the irradiance of the Q-UV instrumentation used, a rough correlation between accelerated and natural aging has been calculated: 100 hrs in Q-UVb are estimated to correspond to 120 days of outdoor exposure in Florida (valid as indicative estimation only).

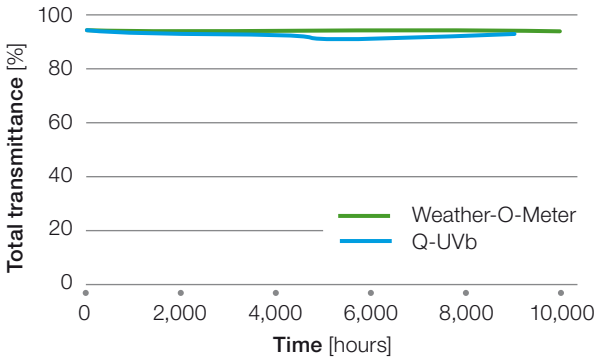
Results

At regular intervals, optical (such as total light transmission and yellow index) and mechanical properties were tested. Results confirm that Halar® ECTFE films undergo very limited changes in properties, with variations well in line with other partially fluorinated polymers used in outdoor applications.

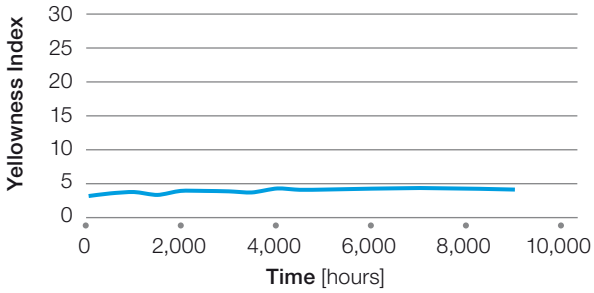
Total transmittance, measured both in Q-UVb and with the Weather-O-Meter showed very limited changes and the same is true also for Yellowness Index.

The limited variation in optical properties measured after exposure of the film to UVb are of particular interest, since the samples were submitted to very high doses of this high energy radiation[2].

Total transmittance evolution in time



Yellowness Index evolution of Halar® films under Q-UVb



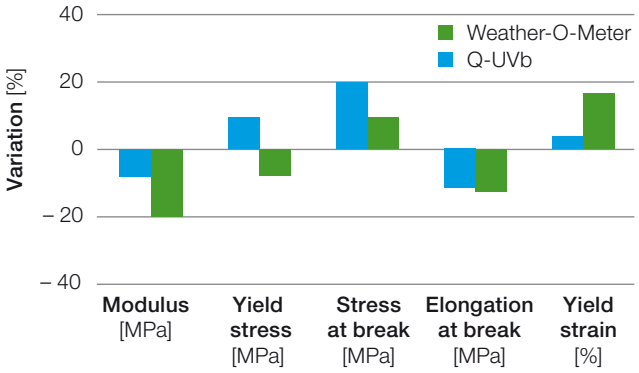
1 Halar® ECTFE films (50 and 100 micron) are listed on UL QIHE2 (generic RTI, VTM-0, UL746C outdoor use and ASTM E162 radiant panel)
2 Q-UV Panel UVb 313 nm lamps; 8 h light at 70 °C; 4 h condensation 50 °C; irradiance 18.3 W/m² between 270 and 320 nm.
3 W-O-M ci35 black panel: 60 °C; Lamp: Xenon Arc; Filter inner and outer: Borosilicate; irradiance: 0.35 W/m²; no dark circle/no rain circle

Mechanical property changes measured with the same accelerated testing and after real aging in Florida also conclude that long exposure to sunlight and atmospheric conditions in general have very limited effect on Halar® ECTFE.

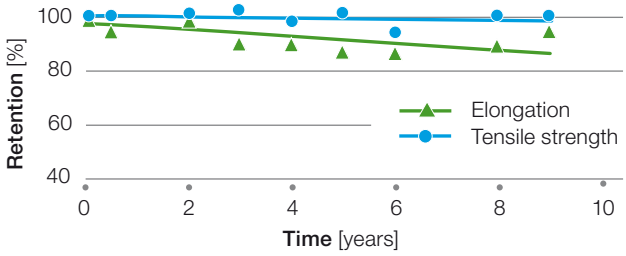
Mechanical properties after 9,000 hours of exposure to Q-UVb (corresponding to > 25 years in Florida according to the estimation above reported) and 10,000 hours in the Xenon Arc Weather-O-Meter are almost unaffected, showing changes within 20 % of the initial value.

Real exposure testing, after 9 years of Florida outdoor weathering, confirms results of accelerated aging, with very limited changes in properties recorded.

Mechanical property variations of Halar® films after 9,000 hrs. in Q-UVb panel and 10,000 hrs. in W-O-M



Tensile property evolution of a 125 micron film (Florida exposure 45° south)



All data reported confirm that Halar® ECTFE undergoes very little change in properties or appearance upon outdoor exposure to sunlight.

Both accelerated and outdoor weathering studies demonstrate the remarkable stability of the polymer to UV light and weather.

The properties of Halar® ECTFE are almost unaffected after 9,000 hours exposure to the UVb-313 source of light in the Q-UV; 10,000 hrs in the Xenon Arc Weather-O-Meter, or after 9 years of the Florida outdoor weathering.

The reported values are in line with other partially fluorinated fluoropolymers tested as benchmark, and support the benefits from the use of Halar® ECTFE in outdoor applications.

Fire and chemical resistance properties, thermal stability, barrier to humidity and other gasses combined with the exceptional weatherability discussed herein make Halar® ECTFE it a material of choice for front and back sheets in solar panels, cushioning films in architectonic constructions, and several outdoor uses such as road signs, anti-graffiti and other protective applications.

Halar® UV Blocking, More Advanced Features for Outdoor Applications

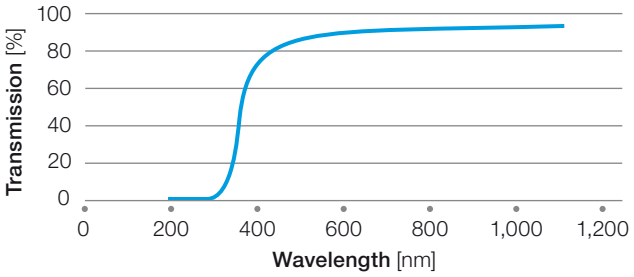
Weatherability is the paramount property for a material that has to withstand several years of exposure to the sun, but in some cases is not enough.

Very often protection of other plastic materials – such as in composite structures – is also needed.

Standard Halar® ECTFE, as with other fluoropolymers, has excellent resistance to UV (superior to any UV stabilized polymer) but is not UV blocking.

For this reason, Solvay Specialty Polymers has developed a new transparent UV blocking[4] grade of Halar® ECTFE which, while keeping all the characteristics mentioned above, also provides protection to materials underneath.

UV-Vis transmission spectrum of UV blocking Halar® film



This feature helps to protect EVA and other encapsulants from degradation in photovoltaic modules if used as frontsheet or transparent backsheet and prevents PET degradation in both photovoltaic structures (plus any other outdoor use) and in all potential plastic composites exposed to sunlight.

4 EP Appl N° 10187726.4, filed 15/10/2010; EP Appl N° 10187732.2, filed 15/10/2010

SOLVAY

asking more from chemistry®

Specialty Polymers

Worldwide Headquarters
SpecialtyPolymers.EMEA@solvay.com
Viale Lombardia, 20
20021 Bollate (MI), Italy

Americas Headquarters
SpecialtyPolymers.Americas@solvay.com
4500 McGinnis Ferry Road
Alpharetta, GA 30005, USA

Asia Headquarters
SpecialtyPolymers.Asia@solvay.com
No.3966 Jindu Road
Shanghai, China 201108

www.solvay.com

Material Safety Data Sheets (MSDS) are available by emailing us or contacting your sales representative. Always consult the appropriate MSDS before using any of our products.

Neither Solvay Specialty Polymers nor any of its affiliates makes any warranty, express or implied, including merchantability or fitness for use, or accepts any liability in connection with this product, related information or its use. Some applications of which Solvay's products may be proposed to be used are regulated or restricted by applicable laws and regulations or by national or international standards and in some cases by Solvay's recommendation, including applications of food/feed, water treatment, medical, pharmaceuticals, and personal care. Only products designated as part of the Solviva® family of biomaterials may be considered as candidates for use in implantable medical devices. The user alone must finally determine suitability of any information or products for any contemplated use in compliance with applicable law, the manner of use and whether any patents are infringed. The information and the products are for use by technically skilled persons at their own discretion and risk and does not relate to the use of this product in combination with any other substance or any other process. This is not a license under any patent or other proprietary right.

R 01/2014 | Version 2.1 Brochure design by ahlersheinel.com