Typical Properties: Halar® ECTFE

Product Data Sheet

Halar® ECTFE					
Property	**Units**	**300LC**	**500LC**	**901LC**	**6014**
Mechanical Properties					
Tensile Strength @ 23˚C (77˚F) at yield at break	 MPa (psi)	 30 (4300) 54 (7800)	 29 (4200) 46 (6600)	 30 (4300) 54 (7800)	 33 (4700) 49 (6600)
Elongation at yield at break	%	 5 250	 5 260	 5 250	 5 325
Impact Resistance Izod notched, 23˚C (73˚F) Izod notched, 40˚C (40˚F)	J/m (ft-lb/in)	 No Break 122 (2.3)	 No Break 64 (1.2)	 No Break 122 (2.3)	 No Break 48 (0.9)
Electrical Properties					
Dielectric Strength 0.025mm (1 mil) thick 3.18mm (125 mil) thick	KV/mm	 80 (2000) 14 (350)	 80 (2000) 14 (350)	 80 (2000) 14 (350)	 80 (2000) 14 (350)
Dielectric Constant at 10^3 Hz at 10^6 Hz	—	 2.50 2.59	 2.47 2.57	 2.50 2.59	 2.50 2.57
Dissipation Factor at 10^3 Hz at 10^6 Hz	—	 .0016 .014	 .0014 .013	 .0016 .014	 .0017 .017
Thermal Properties					
Melting Point, min.	˚C (˚F)	240 (464)	240 (464)	240 (464)	320 (428)
Brittleness Temperature	˚C (˚F)	< -74 (-105)	< -74 (-105)	< -74 (-105)	< -74 (-105)
Maximum Service Temperature	˚C (˚F)	KV/mm (V/mil)	10.4 (260)	13.0 (325)	12.4 (310)
Heat Distortion Temperature underload (ASTM D648) 0.46 MPa (66 psi) stress 1.82 MPa (264 psi) stress	˚C (˚F)	 90 (194) 63 (145)	 92 (197) 67 (152)	 90 (194) 63 (145)	 — —
Other Properties					
Weathering Resistance 1000 hours in weather-o-meter	—	 No Change	 No Change	 No Change	 No Change
Specific Gravity	—	1.68 ± .05	1.68 ± .05	1.68 ± .05	1.68 ± .05
Moisture Absorption	—	< 0.1	< 0.1	< 0.1	< 0.1

* Typical properties, not to be used for specification purposes

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Mechanical Properties: Halar® ECTFE

Product Data Sheet

HALAR fluoropolymer is a strong, highly impact-resistant material that retains its useful properties over a broad range of temperatures. Its low-temperature properties, especially those related to impact, are particularly outstanding. Information on the important mechanical properties is provided in the accompanying tables and figures. In addition to excellent impact properties, HALAR fluoropolymer is seen to have good tensile, flexural, and wear-related properties.

Halar® ECTFE		
Properties	**Metric Units**	**Halar® ECTFE**
Tensile strength at yield at break	 MPa MPa.	 30 50
Strain at break	%	250
Modulus Tensile Flexural	MPa	 1655 1690
Impact resistance Izod notched, 23˚C	J/m	No break
Flexural Strength	Mpa	47
Drop Weight (1) 2.3 mm sheet @ 23˚C @ 40˚C	joules	 > 190 > 88
Drop Weight (1) 3/4 inch Schedule 80 pipe @ 23˚C @ 40˚C	joules	 190 ductile 270 ductile
Hardness Rockwell R Shore D		 90 75
Coefficient of Friction vs. Steel Static Dynamic		 0.19 0.19
Abrasion Resistance (2) 500 revs. 1000 revs.	Taber	 0.002 0.005
Armstrong (3) volume loss	cc	0.3

(1) Tup A per ASTM 24444, 4 in. diameter disc supported on 3 in. I.D. ring.

(2) CS_17 wheels, 500 gram load; abrasion wheels cleaned after every 25 cycles

(3) 30-pound load

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Chemical Resistance Data: Halar® ECTFE

Product Data Sheet

Halar ECTFE 300

Chemical Compatibility Data Based on Actual Laboratory Tests. All specimens tested for 30 days chemical immersion at specified temperatures.

Retained Properties					
Chemical Name	**Test Temp.°C**	**Tensile Strength**	**Elongation**	**Weight Gain, %**	**Color Change**
Acetic Acid	140	I	I	3.4	1
Ammonium Hydroxide 30%	140	I	I	1.2	2
Butanol n,	121	I	I	1.9	1
Chromic Acid, 30%	100	I	I	0.0	2
Hydrochloric acid, 37%	100	I	I	0.7	3
Hydrofluoric acid, 49%	100	I	I	0.2	2
Hydrogen Peroxide (60%)	30	I	I	0.3	1
Methanol	50	I	I	0.4	1
N-Methylpyrrolidone	20	I	I	1.5	1
Methylene Chloride	50	I	I	4.1	1
Nitric Acid, 10%	121	I	I	0.4	1
Nitric Acid, 90%	71	I	I	2.3	2
Phosphoric Acid, 85%	140	I	I	-0.1	2
Potassium Hydroxide, 50%	121	I	I	-0.1	2
Propanol *	50	I	I	0.16	1
Sodium Hydroxide, 50%	132	I	I	-0.2	2
Sodium Hypochlorite, 5%	121	I	I	0.1	1
Sulfuric Acid, 98%	121	I	I	0.7	3
Toluene	20	I	I	0.7	1

* tested for 28 days; all others tested at 30 days. Values are comparable.

LEGEND

RETAINED PROPERTIES:

I - Insignificant

COLOR CHANGE:

1- no change

2- any shade of tan

3- brown or black

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Thermal Properties: Halar® ECTFE

Product Data Sheet

Coefficient of Linear Thermal Expansion

Temperature Range	˚F	˚C
-30 to +50˚C		8×10^{-5}
-22 to 122˚F	4.4×10^{-5}	
50 to 85˚F		10×10^{-5}
122 to 185˚F	5.6×10^{-5}	
85 to 125˚C		13.5×10^{-5}
185 to 257˚F	7.5×10^{-5}	
125 to 180˚C		16.5×10^{-5}
257 to 356˚F	9.2×10^{-5}	

UL Indexing Results on HALAR Fluoropolymer

Property	Thickness mm (in)	Reported Values
Flammability	.18 (.007) 1.6 (.063)	94V-0 94V-0
High Current Arc Ignition	1.6 (.063) 1.6 (.063)	39 arcs O.S. 200 arcs 1/16 A.S.(1)
Hot Wire Ignition	1.6 (.063)	20.2 sec.(2)
High Voltage Arc Tracking	1.6 (.063)	8.19"/min.
High Voltage Arc Resistance (D-495)	1.6 (.063)	50 sec.(1)
Volume Resistivity 23˚C / 50% R.H. 35˚C / 90% R.H.	 1.6 (.063) 1.6 (.063)	 1.56×10^{16} ohm-cm 1.56×10^{16} ohm-cm
Dielectric Strength (D-149) Dry 35˚C / 90% R.H.	 1.6 (.063) 1.6 (.063)	 21 kV/mm (534 V/mil) 21 kV/mm (534 V/mil)
IEC Track Index	1.6 (.063)	600 (1) CTI-Volts
DTUL-66 psi	3.2 (.125)	90˚C
Specific Gravity	1.6 (.063)	1.67
Water Absorption D570 24 hours 168 hours	 1.6 (.063) 1.6 (.063)	 < 0.1% < 0.1%
Tensile Impact D-1822-"S"	 1.6 (.063)	 806 kJ/M ^{2} (383.2 ft-lb / in ^{2})
Tensile Strength D-638-"I"	 1.6 (.063)	 53 MPa (7654 psi)

(1) test terminated at value indicated.

(2) sample melted through but no flaming drip.

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