



Fluon[®] LM-ETFE AH Series

ADHESIVE FLUOROPOLYMER FLUON[®] LM-ETFE AH SERIES

Adhesive fluoropolymer

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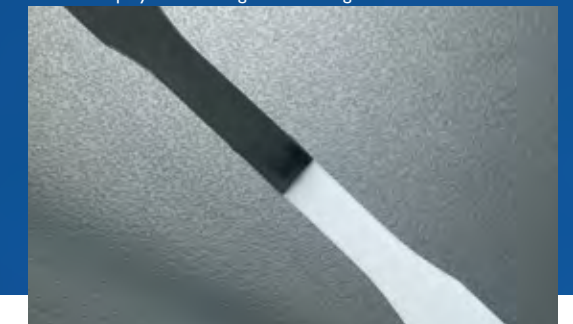
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Adhesive and anti-stick material.

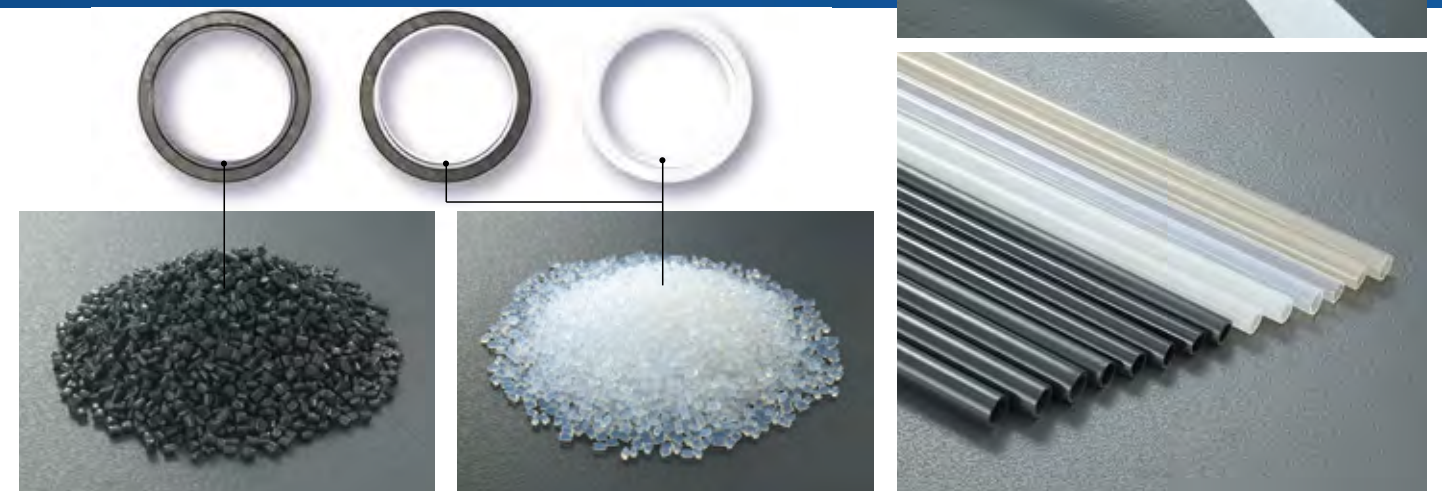


This fluoropolymer goes beyond the conventions of fluorine chemistry.

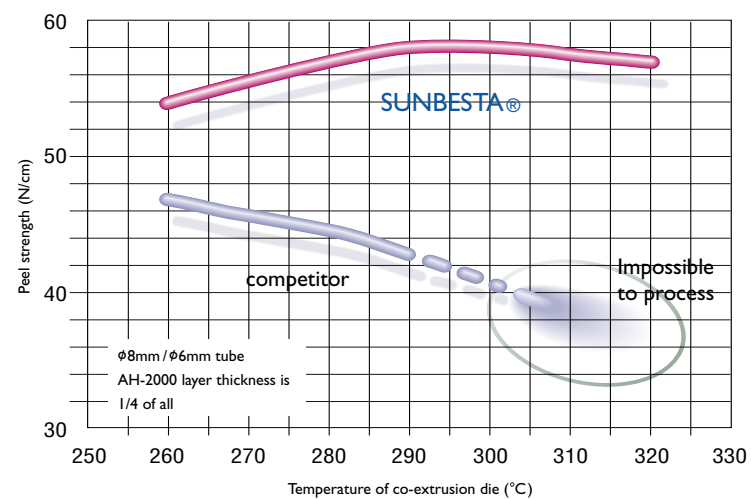
New fluoropolymer enabling melt bonding to other material



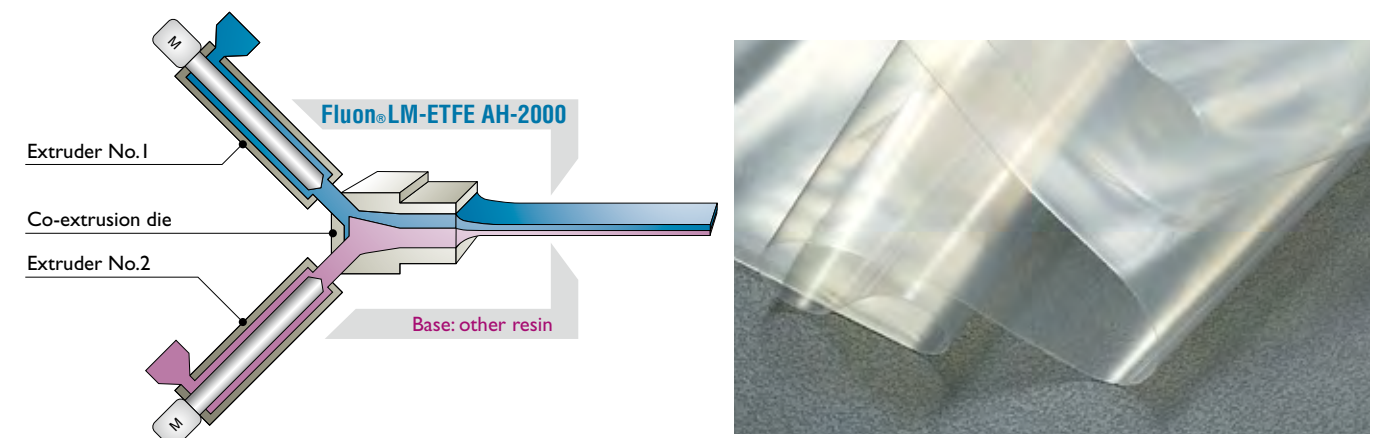
Adhesive and anti-stick properties coexist. This new material breaks new ground and brings remarkable benefits to manufacturing. The Fluon® LM-ETFE AH series of Asahil Glass Co., Ltd. provide adhesive properties enabling melt bonding to other materials. Unlike previous materials, specific adhesives and surface treatments are not needed. Multi-layer molding with strong adhesion can be completed in a single process. Of course, the original features of fluoropolymers such as anti-stick property, processability, and chemical resistance are retained. There are various advantages such as productivity advancement by simplified process, and cost reduction by thinning fluoropolymer layer. For example, newly developed double-layer tubing system <SUNBESTA®> carries out high-quality tubing at reasonable cost. This is an innovation goes beyond the bounds of common sense in fluorine chemistry, realizing new possibilities for fluoropolymer.



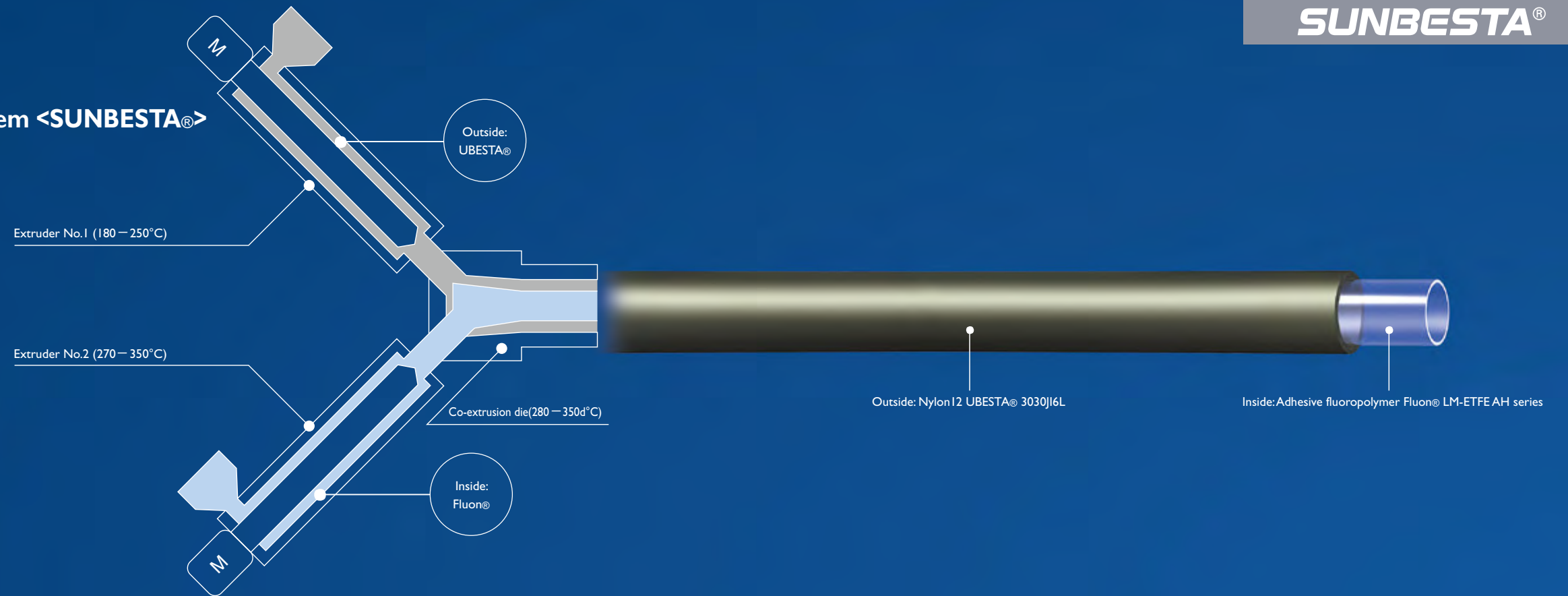
Dependency of adhesive strength on process temperature



Processing example of laminated film



World's first double-layer tubing system <SUNBESTA®>

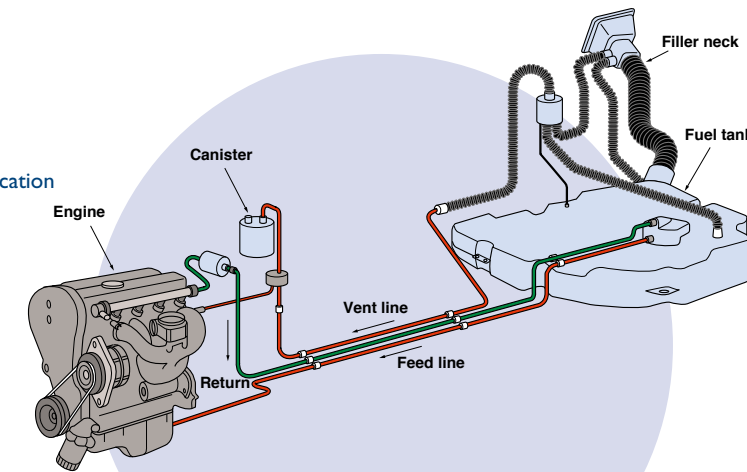


Excellent quality and high productivity of multi-layer polymer tubing.

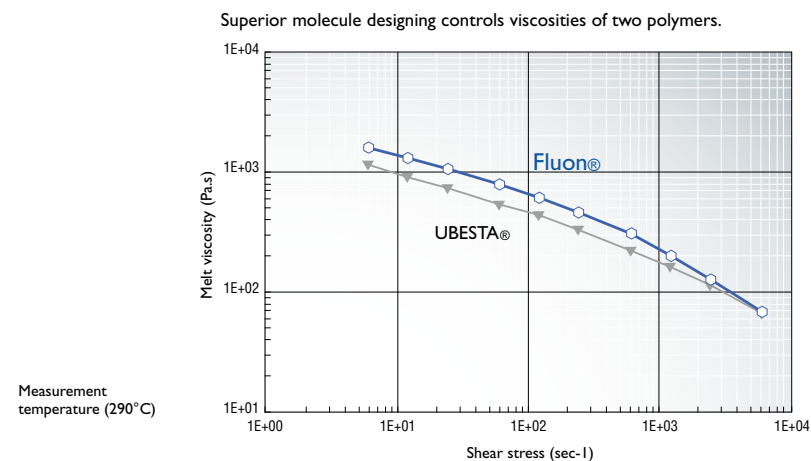
*Line speed: 50 m/min or more

Environmental regulations for automobiles are getting more important. Accordingly, in order to reduce fuel emission, demand for multi-layer polymer tubes is increasing, and they are replacing conventional single-layer polymer tubes. Asahi Glass Co., Ltd. and Ube Industries, Ltd., have jointly developed new double-layer tubing system <SUNBESTA®> to improve quality, and productivity, and to reduce process cost. This system provides a tubing consisting of fluoropolymer <Fluon®> and nylon 12 polymer <UBESTA®>. The two layers are chemically bonded to each other with enhanced adhesion strength, so that adhesive agent layer previously required between polymers is no longer necessary. Further, co-extrusion molding is available with superior processability of ultra-high line speed improving productivity many fold beyond conventional system. Moreover, <SUNBESTA®> exhibits excellent performance at fuel barrier, chemical resistance, anti-stick, and so on. <SUNBESTA®> is utilized for producing tubes/hoses at automobile fuel lines and those at various industrial fields.

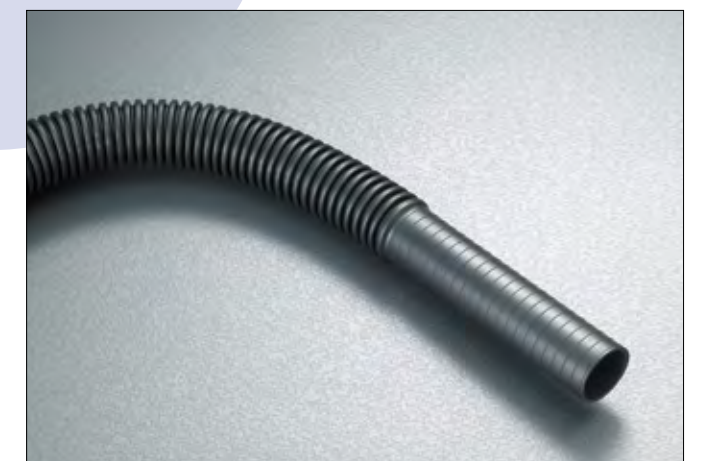
□ Example of SUNBESTA® application



□ Comparison of Melt Shear Viscosity



<Straight tube>



<Corrugate tube>

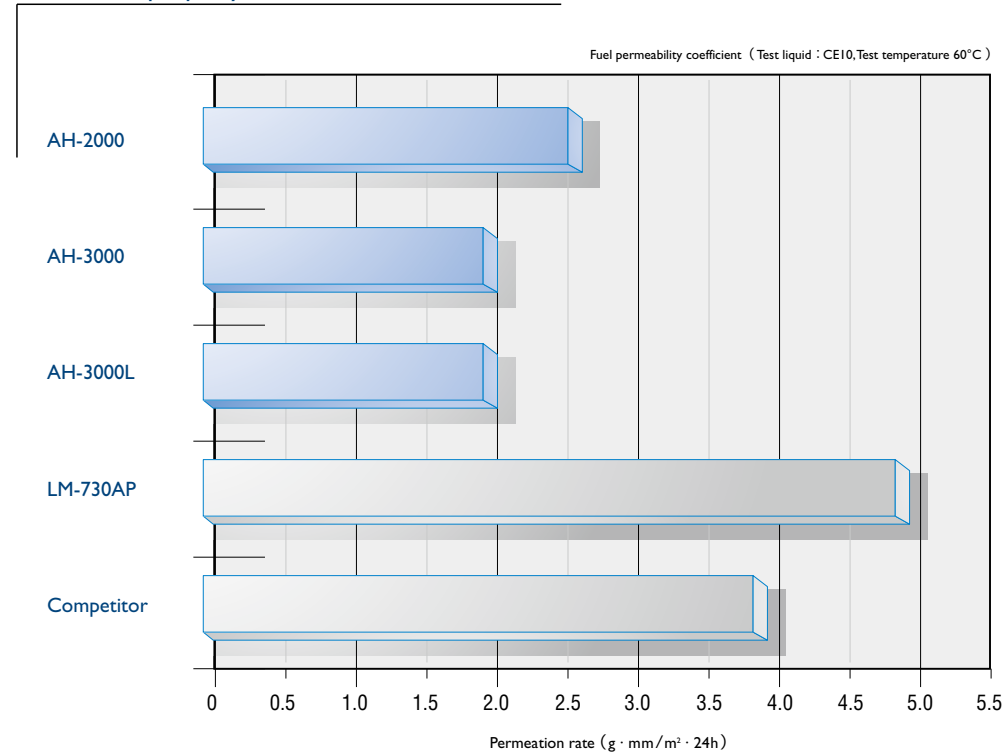
Fundamental properties of AH-2000/AH-3000/AH-3000L

Properties	Method	Units	AH-2000	AH-3000	AH-3000L	LM-730AP
MFR	ASTM D3159 (297°C, 49N)	g/10min	25	25	6.5	25
Specific gravity	ASTM D792	—	1.78	1.80	1.77	1.78
Melting point	DSC	°C	240	240	240	225
Tensile strength at break	ASTM D638	MPa	49	35	38	40
Elongation at break	ASTM D638	%	420	350	400	400
Flexural modulus	ASTM D790	MPa	790	1240	1240	650
Izod impact strength 23°C	ASTM D259	J/m	Non-Break	Non-Break	Non-Break	Non-Break
Permeation rate (CE10, 60°C)	JIS Z0208 (CUP)	g · mm/m ² · 24h	2.6	2.0	2.0	4.9
Surface resistivity	Asahi Glass	Ω / □	—	1.0E + 03	2.0E + 03	—
Surface contact angle	Hanging drop method	degrees	100	106	105	103

Fundamental properties of SUNBESTA[®]

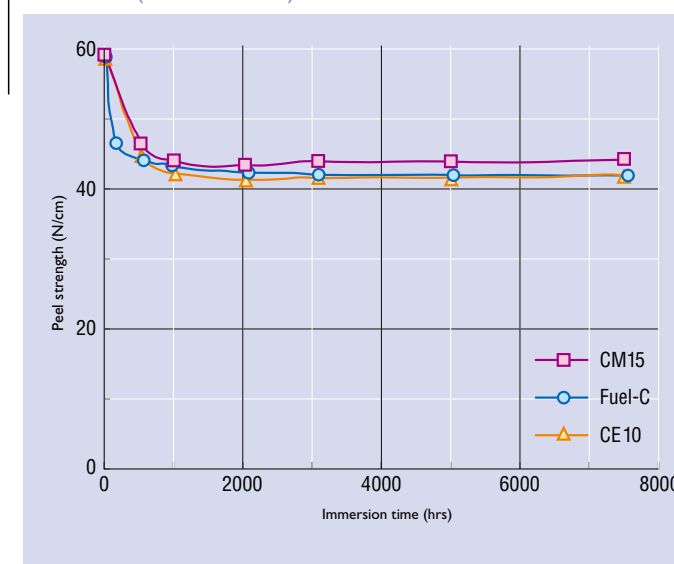
Material	Outer layer	Unit	Non-conductive	Conductive
			UBESTA [®] 3030J16L	UBESTA [®] 3030J16L
Size	Inner layer		Fluon [®] LM-ETFE AH-2000	Fluon [®] LM-ETFE AH-3000
	Outer layer	mm	0.718	0.704
	Inner layer	mm	0.285	0.275
	Diameter of Outer	mm	8.1	8.1
Burst Test (SAE J2260)	Wall thickness(Max/Min)	mm	0.99 (1.01/0.94)	1.00 (1.02/0.96)
	Burst Pressure	MPa (%)	7.0 (0.6)	7.2 (0.3)
Low Temp. Burst (SAE J2260)	Hoop Stress	MPa (%)	27	27
	Dry (-40°C)	b/t (MPa)	0/10 (7.1)	0/10 (7.2)
Peel Strength	180 deg. C Peel Test Method	N/cm	58.5	Impossible to Peel (60 or more)
Thermal Test (V.W. - Method)	Burst Test After aging for 200hr at 150 deg.C	b/t	0/10	0/10
Tensile Properties (SAE J2260)	Tensile Strength	MPa	951	914
	Elongation (Mark: 50mm)	%	278	277
	Elongation (Grip: 100mm)	%	319	322

Fuel barrier property

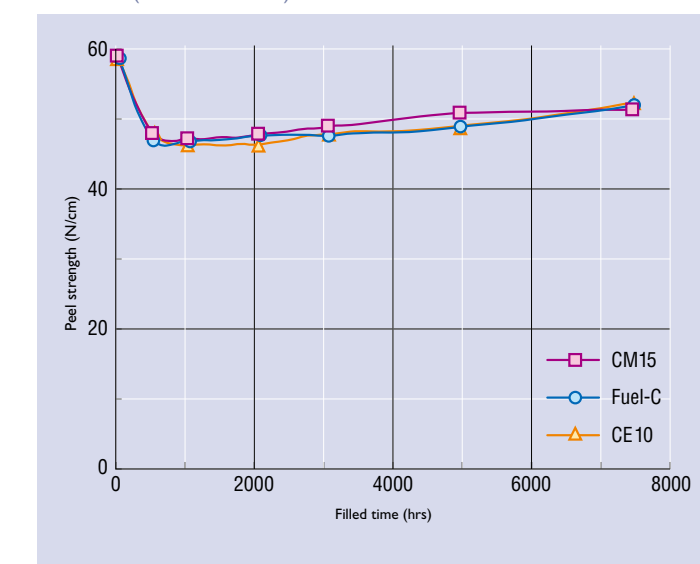


Adhesion durability of SUNBESTA[®] Nonconductive Type (against fuels)

Soaked test (treated at 60°C)



Filled test (treated at 60°C)



※ Peeling strength of Conductive Type is larger than measurement limit, 60 (N/cm), in the same test above.