

# Hot-melt adhesive based on SEPTON™ BIO-series

Elastomer R&D department  
Elastomer division

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# Properties of Hot-melt adhesive

- SEPTON™ BIO-series SF904 based compound has excellent balance of adhesion and melt viscosity as compared to the SEPS compound and SIS compound.

		Unit	SEPTON™ BIO-series SF904 (HSFC)	SEPTON™ 2063 (SEPS)	SIS *1	Test Method		
Elastomer		phr	100	100	100	100		
Tackifier *2		phr	150	150	100	150		
Paraffin oil		phr	50	50	200	50		
Antioxidant		phr	0.1	0.1	0.1	0.1		
180° Peel strength*3	to PE	N/25mm	16.0	11.9	0.5	20.6	ISO 8510-2	
	to SUS	N/25mm	23.3	25.5	0.4	24.7		
Ball tack *4		Ball No.	5	6	3	7	JIS Z0237	
SAFT *5		deg.C	85	86	63	101	86	ASTM D3654M
Melt Viscosity	140deg.C	mPa · s	12,400	86,500	5,080	145,000	15,100	ISO 2555
	160deg.C		4,600	31,400	2,610	40,300	3,900	
	180deg.C		2,200	14,500	1,530	20,500	2,130	

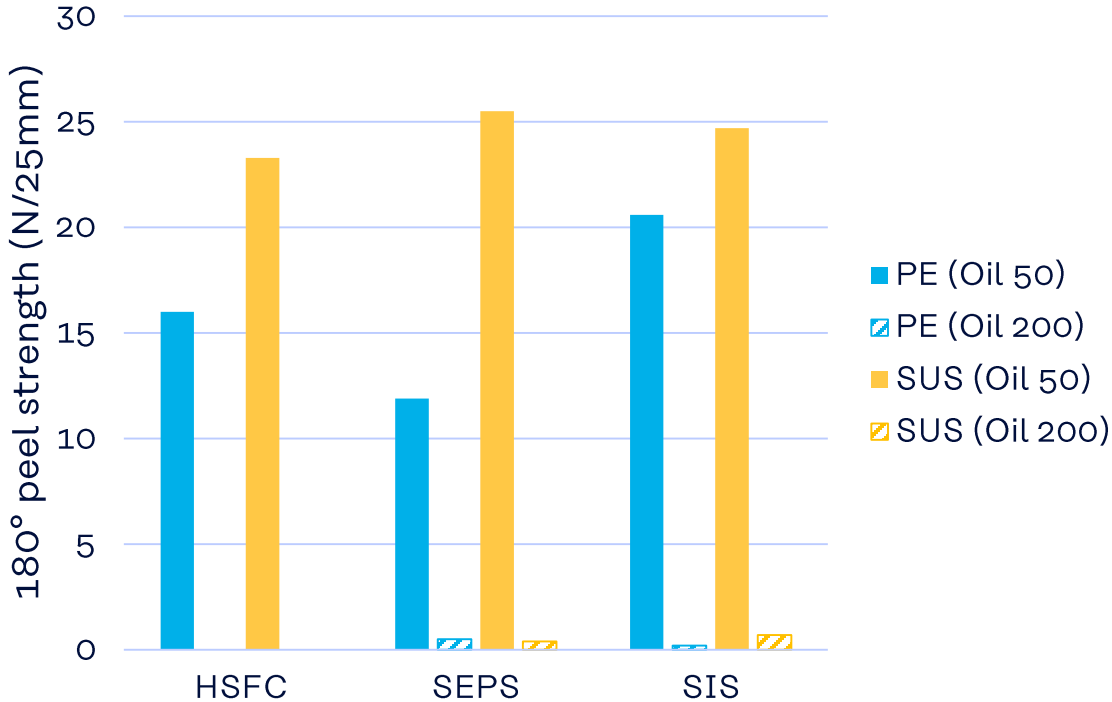
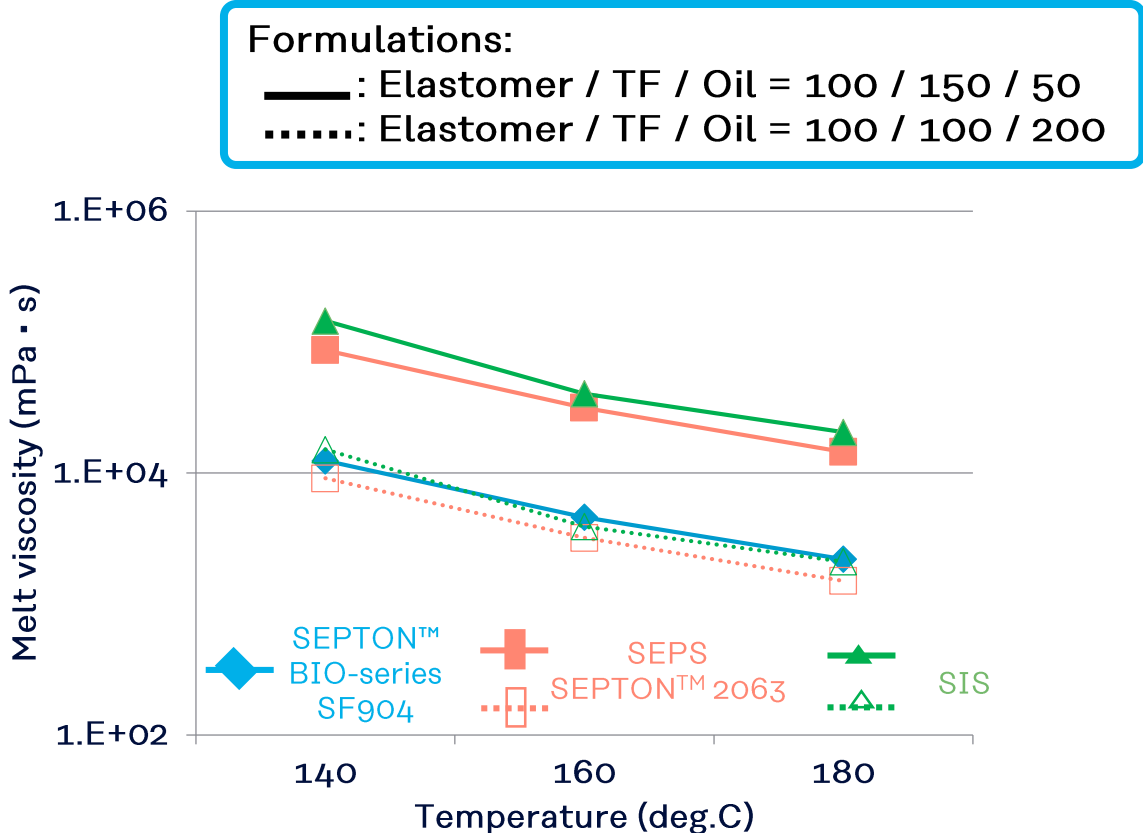
\*1 SIS; St=14 wt%, Mt=220,000, \*2 ARKON P-125 (Arakawa Chemical Industries, Ltd.), \*3 Toluene solution coating to PET film, thickness 25μm , \*4 Inclination angle 30°,

\*5 To stainless steel, sample size 25 mm x 25mm, Load 500g

# Relationship between melt viscosity and adhesive force

- SEPTON™ BIO-series SF904 shows low melt viscosity though low oil content.

- High oil contents (SEPS and SIS) destroy adhesive strength.



# Anti-oxidant package for SEPTON™ BIO-series based hot melt compound for excellent thermal stability

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# Materials and Formulations

## Materials

HSFC	SEPTON™ BIO-series SF904	: Styrene content = 21 wt%
	SEPTON™ BIO-series SF902	: Styrene content = 18 wt%
SIS	Styrene/Isoprene Copolymer	: Styrene content = 14 wt%
Oil	Process oil	: Kinetic viscosity=96 cSt@40deg.C
TF	ARKON P-125	: Hydrogenated petroleum resin, Arakawa Chemical Industries, Ltd.
AO	ADKASTAB AO-60	: Hindered phenolic antioxidant, ADEKA Corporation
	ADKASTAB PEP-36	: Phosphorus-based antioxidant, ADEKA Corporation

## Formulations

		1	2	3	4	5	6	7
SEPTON™ BIO-series	SF904	100						
SEPTON™ BIO-series	SF902		100		100		100	
	SIS			100		100		100
ARKON	P-125	150	150	150	150	150	150	150
	Oil	50	50	50	50	50	50	50
ADKSTAB	AO-60				0.2	0.2	0.2	0.2
ADKSTAB	PEP-36						0.1	0.1

# Kneading conditions



Twin screw

Plastograph EC50cc  
(Brabender GmbH & Co. KG)

## Equipment

Plastograph EC 50cc

## Process

- 1) Kneading step 1; Elastomers & AO  
Rubber temp. = 150 deg.C (SF904, SIS) or 180 deg.C (SF902)  
Screw x time = 100 rpm x 0.5 min



- 2) Kneading step 2; TF  
Rubber temp. = 150 deg.C (SF904, SIS) or 180 deg.C (SF902)  
Screw x time = 100 rpm x 1 min



- 3) 3. Kneading step 3; Oil  
Rubber temp. = 150 deg.C (SF904, SIS) or 180 deg.C (SF902)  
Screw x time = 150 rpm x 10 min

# Thermal stability test conditions












Temperature : 175 deg.C

Time : 8, 24, 72, or 120 hrs

Test equipment : Safety oven ( SPH-202, ESPEC Corporation)

Air changes rate : 10 times / hr

# Thermal stability (Color stability at 175 deg.C)

	1 SF904	2 SF902	3 SIS	4 SF902 +AO-60	5 SIS +AO-60	6 SF902 +AO-60+PEP-36	7 SIS +AO-60+PEP-36
Time (hrs)							
Thermal stability @175deg.C Appearance*1							
0	 Good	 Good	 Good	 Good	 Good	 Good	 Good
8	 Fair	 Fair	 Poor	 Good	 Poor	 Good	 Poor
24	 Poor	 Poor	 Bad	 Fair	 Bad	 Good	 Poor
72	 Bad	 Bad	 Bad	 Bad	 Bad	 Fair	 Bad
120	 Bad	 Bad	 Bad	 Bad	 Bad	 Bad	 Bad

\*1 No change Good > Fair > Poor > Bad Yellowing



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