

# Compatibility of SEPTON™ and HYBRAR™ with Polyolefin

Elastomer R&D Dept.  
Elastomer Division

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**Septon™**

**Hybrar™**

# Compatibility with Polyolefin

1) Ethylene-Octene copolymer  
2) Ethylene-Propylene rubber

Grade	Type	PE			POE <sup>1)</sup>	EPR <sup>2)</sup>	PP
		HDPE	LDPE	LLDPE	POE	EPR	Homo-PP
SEPTON™	SEEPS	C	C	C	C	C	I
	SEBS	PC	PC	PC	C	PC	I
	SEPS	PC	I	I	C	PC	I
HYBRAR™	Vinyl-bond rich SEPS	I	I	I	I	I	C

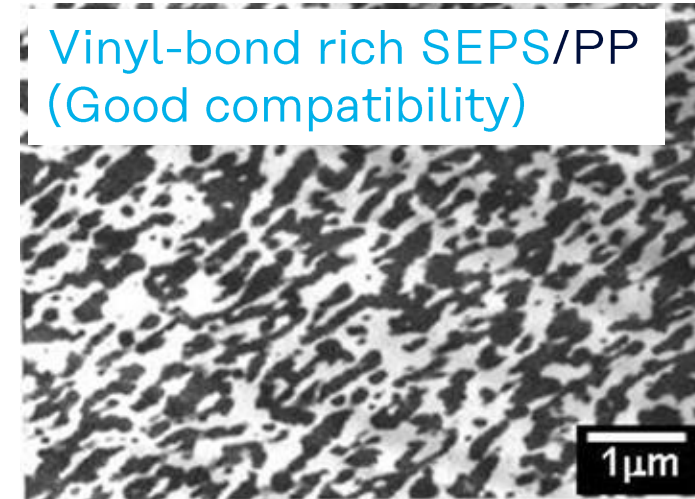
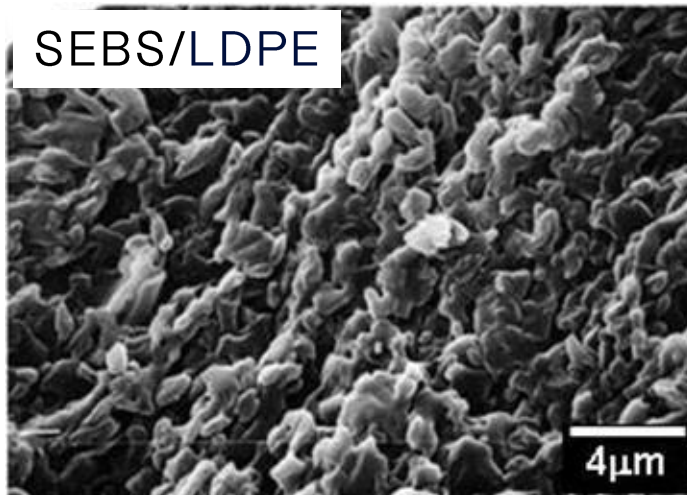
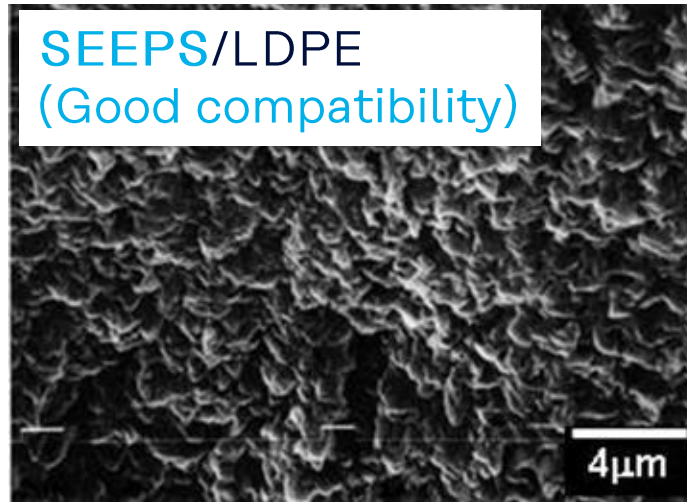
C: Compatible, PC: Partially compatible, I: Incompatible

SP value (Hoy method)	(MPa <sup>1/2</sup> )
PE	18.0
EEP	17.6
EB	17.6
EP	17.2
Vinyl-bond rich EP	16.8
PP	16.7

✓ SEPTON™ (SEEPS type) shows good compatibility with PE.

✓ HYBRAR™ shows good compatibility with PP.

# Morphology of SEPTON™ (SEEPS type, SEPS type) or HYBRAR™ (Vinyl-bond rich SEPS type) with Polyolefin



# Solubility Parameter of SEPTON™ and HYBRAR™

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# Estimation of Solubility Parameters using Group Contribution Method (Fedors Method)

Segment name	Monomer	Vinyl	Solubility parameter $\delta$	
-	-	[mol%]	[MPa <sup>1/2</sup> ]	[(cal/cm <sup>3</sup> ) <sup>1/2</sup> ]
St	Styrene	-	21.6	10.6
EP	Isoprene	0	16.9	8.26
EB	Butadiene	40	17.2	8.41
EEP	Isoprene/Butadiene	0	17.2	8.41
Vinyl-bond rich EP	Isoprene	60	16.5	8.07
cf. PP	Propylene	-	16.4	8.02
cf. PE	Ethylene	-	17.5	8.56

Note: The solubility parameters ( $\delta$ ) are estimated using Fedors method. Dienes are assumed to be fully hydrogenated.

$$\delta = \left[ \frac{\sum E_{\text{coh}}}{\sum V} \right]^{\frac{1}{2}}$$

# Estimation of Solubility Parameters using Group Contribution Method (Hoy Method)

Segment name	Monomer	Vinyl	Solubility parameter $\delta$	
-	-	[mol%]	[MPa <sup>1/2</sup> ]	[(cal/cm <sup>3</sup> ) <sup>1/2</sup> ]
St	Styrene	-	19.8	9.68
EP	Isoprene	0	17.2	8.41
EB	Butadiene	40	17.6	8.60
EEP	Isoprene/Butadiene	0	17.6	8.60
Vinyl-bond rich EP	Isoprene	60	16.8	8.21
cf. PP	Propylene	-	16.7	8.16
cf. PE	Ethylene	-	18.0	8.80

Note: The solubility parameters ( $\delta$ ) are estimated using Hoy's method.  
Dienes are assumed to be fully hydrogenated.

# Estimated Solubility Parameter (Hoy Method)

	Type	Styrene/Diene [wt/wt]	Styrene $\delta$ [MPa <sup>1/2</sup> ]	Diene $\delta$ [MPa <sup>1/2</sup> ]	Average* $\delta$ [MPa <sup>1/2</sup> ]
SEPTON™ 4033	SEEPS	30/70	19.8	17.6	18.26
SEPTON™ 2002	SEPS	30/70	19.8	17.2	17.98
SEBS-1	SEBS	30/70	19.8	17.6	18.26
HYBRAR™ 7125F	Vinyl-bond rich SEPS	20/80	19.8	16.8	17.40

Note: The solubility parameters ( $\delta$ ) are estimated using Hoy's method.  
Dienes are assumed to be fully hydrogenated.  
\*Weight average of styrene and diene

	$\delta$ [MPa <sup>1/2</sup> ]
PP	16.7
PE	18.0

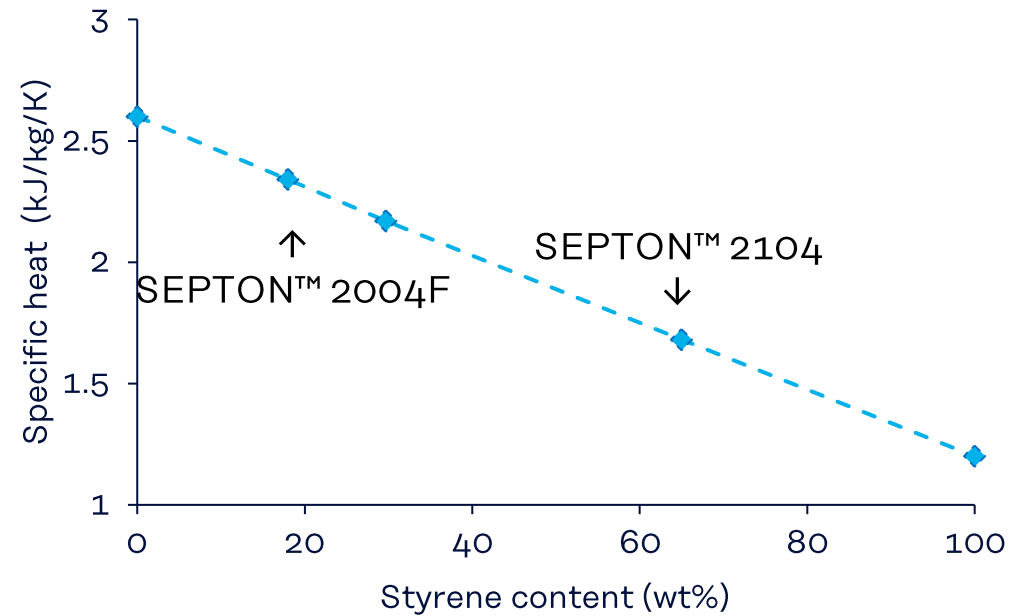
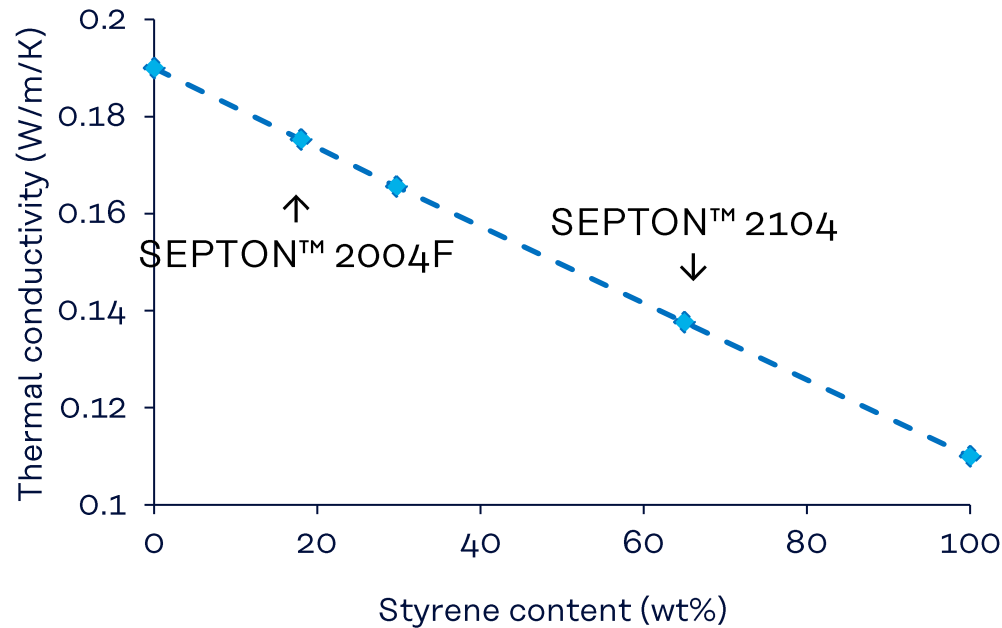
# Thermal Conductivity and Specific Heat of SEPTON™

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Elastomer Division



# Thermal Conductivity and Specific Heat of SEPTON™

Estimated values (calculated from the reference values)



## Reference values

	Styrene content (wt%)	Thermal conductivity (W/m/K)	Specific heat (kJ/kg/K)
Ethylene-Propylene Rubber	0	0.19	2.6
Polystyrene	100	0.11	1.2

# Refractive Index of SETPON™ and HYBRAR™

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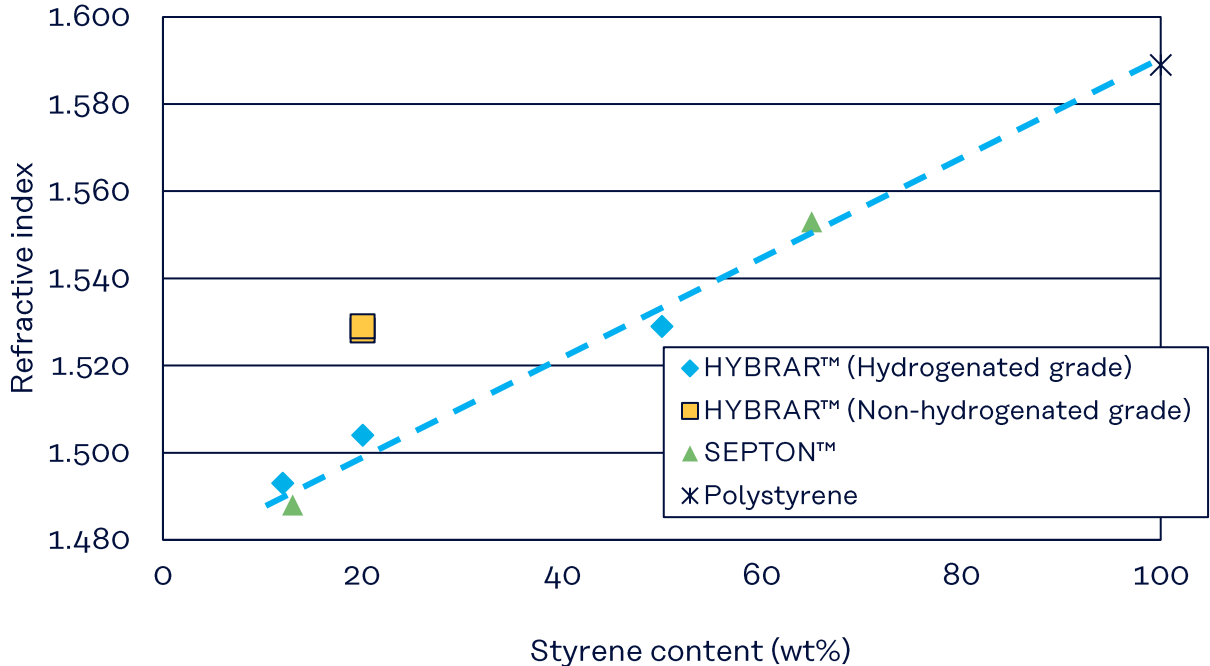
**Septon™**

**Hybrar™**

# Refractive Index of SETPON™ and HYBRAR™

Grade	Styrene content (wt%)	Refractive index
SEPTON™	2063	1.488
	2104	1.553
HYBRAR™	5125	1.528
	5127	1.529
	7125F	1.504
	7311F	1.493

(Reference) PP: 1.503, PE: 1.514, Polystyrene: 1.589



Refractive index is correlated to styrene content.

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