

Single Point Data

Thermoplastic materials

Property	Symbol	Standard	Specimen (Dimensions in mm)	Unit
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Rheological properties					
Melt volume-flow rate	MVR	ISO 1133	Material	cm ³ /10 min	
Moulding shrinkage	parallel (p)	S _{MP}	ISO 294-4 (Th.-plast)	60 * 60 * 2	%
			ISO 2577 (Th.-sets)		
	normal (n)	S _{MN}	ISO 294-4 (Th.- plast)		

Mechanical properties					
Tensile modulus	E _t	ISO 527-1 and -2	ISO 3167	MPa	
Yield stress	σ _y			%	
Yield strain	ε _y				
Nominal strain at break	ε _{tB}			MPa	
Stress at 50% strain	σ ₅₀				
Stress at break	σ _B			%	
Strain at break	ε _B				
Tensile creep modulus	1h	E _{tc1}	ISO 899	MPa	
	1000h	E _{tc} 10 ³			
Charpy impact strength	unnotched	a _{cU} +23	ISO 179/1eU	80 * 10 * 4	kJ/m ²
		a _{cU} -30			
	notched	a _{cA} +23	ISO 179/1eA		
		a _{cA} -30			
Tensile impact strength	a _{t1}	ISO 8256/1			
Puncture impact properties	Max. Force	F _M +23	ISO 6603-2	60 * 60 * 2	N
		F _M -30			
	Punct. Energy	W _P +23			J
		W _P -30			

Thermal properties						
Melting temperature	T _m	ISO 11357-1 and -3	Material	°C		
Glass transition temperature	T _g	ISO 11357-1 and -2				
Temperature of deflection under load (flexural softening temperature)	T _f 1,8	ISO 75-1 and -2	80 * 10 * 4			
	T _f 0,45					
	T _f 8,0					
Vicat softening temperature	T _V 50/50	ISO 306	≥ 10 * 10 * 4			
Coefficient of linear thermal expansion	Parallel (p)	α _p	ISO 11359-1 and -2	10 ⁻⁴ . °C ⁻¹		
	Normal (n)	α _n				
Burning behaviour	1.6 mm thick	B50/1.6	UL 94	IEC 60695-11-10	125 * 13 * 1,6	
		B500/1.6			≥150 * ≥150 * 1,6	
	-.- mm thick	B50/-.-			IEC 60695-11-20	125 * 13 * -.-
		B500/-.-				≥150 * ≥150 * -.-
Flammability by oxygen index	OI23	ISO 4589-1 and-2	80 * 10 * 4	%		

Property	Symbol	Standard	Specimen (Dimensions in mm)	Unit
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Electrical properties					
Relative permittivity	100 Hz	ϵ_r100	IEC 60250	60 * 60 * 2	-
	1 MHz	ϵ_r1M			
Dissipation factor	100 Hz	$\tan\delta100$			
	1 MHz	$\tan\delta1M$			
Volume resistivity		ρ_e	IEC 60093		$\Omega \cdot m$
Surface resistivity		σ_e			Ω
Electric strength		E_B1	IEC 60243-1	$\geq 60 * \geq 60 * 1$	kV/mm
Comparative tracking index		CTI	IEC 60112	$\geq 15 * \geq 15 * 4$	-

Other properties				
Water absorption	W_W	ISO 62 and ISO 15512	Thickness ≥ 1	%
Humidity absorption	W_H			
Density	ρ	ISO 1183		kg/m^3

Material specific properties				
Viscosity number	VN	depending on material	material	cm^3/g
Indicative density	ρ_l	ISO 1872-1		kg/m^3

Table 1: Test conditions for thermoplastic materials

Film grades

Property	Symbol	Standard	Specimen (Dimensions in mm)	Unit
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Mechanical properties											
Yield stress	parallel	σ_{Yp}	ISO 527-1, -3	ISO 3167	MPa						
	normal	σ_{Yn}									
Yield strain	parallel	ε_{Yp}			ISO 527-1, -3	ISO 3167	%				
	normal	ε_{Yn}									
Maximum stress	parallel	σ_{Mp}					ISO 527-1, -3	ISO 3167	MPa		
	normal	σ_{Mn}									
Maximum nominal strain	parallel	ε_{tBp}							ISO 527-1, -3	ISO 3167	%
	normal	ε_{tBn}									

Optical properties					
Gloss	20°	Gloss20	ISO 2813		-
	45°	Gloss45			
	60°	Gloss60			
Haze		Haze	ISO 14782	~ 50 * 50	%

Barrier properties								
Water vapour transmission rate	23°C; 85% rh	WVTR2385	ISO 15106-1 and -2		g/(m ² *d)			
Oxygen transmission rate	23°C, 0% rh	OTR23/0	ISO 13105-1 and -2		cm ³ /(m ² *d*bar)			
	23°C, 85% rh	OTR23/85						
Carbon Dioxide transmission rate	23°C, 0% rh	CDTR23/0				ISO 13105-1 and -2		cm ³ /(m ² *d*bar)
	23°C, 85% rh	CDTR23/85						

Table 2: Test conditions for film grades

Thermoplastic Elastomers (TPE)

Property	Symbol	Standard	Specimen (Dimensions in mm)	Unit	
Mechanical properties					
Stress at 10% strain	σ_{10}	ISO 527-1 and -2	ISO 527-1/1BA	MPa	
Stress at 100% strain	σ_{100}				
Stress at 300% strain	σ_{300}				
Nominal strain at break	ε_{tB}			%	
Stress at break	σ_B			MPa	
Compression set under constant strain	23°C	CS23	ISO 815	type B: plate $\varnothing = 13$ mm, d = 6.3 mm	%
	70°C	CS70			
	100°C	CS100			
Tear strength	TearS	ISO 34-1	angle test specimen with nick	kN/m	
Abrasion resistance	AbrRes	ISO 4649		mm ³	
Shore A hardness (3s)	ShrA/3	ISO 868	$\geq 6 * 25 * 25$	-	
Shore D hardness (15s)	ShrD/15				

Table 3: Test conditions for thermoplastic elastomers

Multi Point Data

Property Variable Parameter(s)	Symbol	ISO 11403: Part, clause	ISO testing standard	Specimen	Unit	
Dyn. shear storage modulus Temperature	$G'(T)$	1, 6.2	6721-1, 2 and 7	d > 1	MPa °C	
Dyn. shear loss modulus Temperature	$G''(T)$				MPa °C	
Shear loss factor ($\tan \delta$) Temperature	$\tan d (T)$				- °C	
Dyn. tensile storage modulus Temperature	$E'(T)$	1, 6.2	6721-1, 4	d > 1	MPa °C	
Dyn. tensile loss modulus Temperature	$E''(T)$				MPa °C	
Tensile loss factor ($\tan \delta$) Temperature	$\tan d (T)$				- °C	
Tensile modulus Temperature	$E_t(T)$	1, 6.3	527-1, -2 and -3	ISO 3167	MPa °C	
Stress Strain Temperature	$\sigma(\varepsilon, T)$				MPa % °C	
Secant modulus Strain Temperature	$E_{ts}(\varepsilon, T)$	-	-		MPa % °C	
Creep stress Strain Time, Temperature	$\sigma_c(\varepsilon, t, T)$	1, 6.4	899-1		MPa % h, °C	
Creep secant modulus Strain Time, Temperature	$E_{tcs}(\varepsilon, t, T)$	-	-		MPa % h, °C	
Specific enthalpy difference Temperature	$\Delta H(T)/m$	2, 6.2	11357-1 and 4		Material	kJ / kg °C
Viscosity Shear rate Temperature	$\eta(\dot{\gamma}, T)$		11443			Pa s s ⁻¹ °C
Shear stress Shear rate Temperature	$\tau(\dot{\gamma}, T)$	2, 6.4		Pa s ⁻¹ °C		
Specific volume Temperature Pressure	$v(T, p)$	-	17744	m ³ / kg °C MPa		

Table 4: Test conditions for multipoint data

Chemical Resistance Data




	Symbol	Description	Comments
a)		possible	Defined as: Supplier has sufficient indication that contact with chemical can be potentially accepted under the intended use conditions and expected service life. Criteria for assessment have to be indicated (e.g. surface aspect, volume change, property change).
b)		not recommended	Defined as: Not recommended for use under any condition.
c)		not recommended – see explanation	Defined as: Not recommended for general use. But short-term exposure under certain restricted conditions could be acceptable – examples to be provided (e.g. fast cleaning with thorough rinsing, spills, wiping, vapour exposure).

Table 5: Chemical resistance