General information

Designation

PE-MD (molding and extrusion), Medium density polyethylene / MDPE (medium density, branched homopolymer)

Tradenames

4Tech; ASI; AUX; Aarolene; Aaron; Admer; Advancene; Agility; Ajedium; Alathon; Alcudia; Alkadyne; Alkamax; Alkateq; Alkathene; Anteo; Asrene; Bapolene; Baystar; Bondyram; BorSafe; Borpex; Borstar; Braskem; Bynel; CERTENE; CONTINUUM; Cabelec; Canei; Cheng; Clear-Flex; Colorfast; Colorrx; Comai; Crystaladd; DPE; Daelim; Dowlex; Duratemp; Duratron; Dynamix; Dynapath; ELTEX; ESD; ETILINAS; Egyeuroptene; Egyptene; El-Lene; Eleme; Elite; Enlene; Enviroplas; Equate; Eraclene; Extem; Exxonmobil; FPC; Faralloy; Fingerprint; Flexirene; Flexomer; Formolene; Geo-Tech; Getilan; Greenethene; Hanwha; Hifill; Hival; Icorene; Incolor; Integra; Integrate; Itilen; Jam; KMI; Karina; Kemcor; Kemid; Kpol-Ldpe; Kpol-Lldpe; Lnp Colorcomp; Lnp Thermocomp; Lotte; Lucene; Lucent; Luflexen; Lumicene; Lumitac; Lupolen; Luvocom; Marflex; Marlex; Meldin; Microcene; Micropol; Microthene; NEFTEKHIM; NPC; Natureplast; Neo-Zex; Nipolon; Novapol; Novex; PQ2; PRL; Permastat; Petrothene; Peve; Pexidan; Pharmalene; Plexar; Pluris; Polidan; Polifil; Polyethylene; Polyglue; Polylink; Polyone; Poticon; Pre-Elec; Primaflex; Primalene; Primatop; Procon; Propolymers; Proxess; Pyramid; Qenos; Qr Resin; Quadrant; RTP; Ravago; Ravalene; Recythen; Redi-Link; Resility; Resindirect; Revolve; Rigidex; Rochling; Rotolene; Rotoun; Sabic; Sapylene; Sibur; Siltem; Silver; Sinelec; Sipchem; Smart; Stratasys; Sumikathene; Surpass; Sustapei; Systalen; TOTAL; TUB; Taborex; Tasnee; Tecacomp; Tecapei; Tempalux; Terralene; Texres; Titanex; Titanvene; Trademark; Tribocomp; Trucoat; Tuflin; Tymax; Tynel; Ultem; Ultron; Unilex; Unitem; VENELENE; Vinpol; Visico; WPP; Westlake; Witcom; YUCLAIR; Yparex

Typical uses

Packaging, Piping, Wire & cable jacketing, Film, Tanks, Bags, General Purpose, Industrial applications, Liners, Fittings, Containers, Food packaging, Electrical and Electronical, Blending, Automotive, Outdoor applications, Toys, Shrink wrap, Adhesives, Pipe coatings, Natural gas distribution, Building materials, Laminates, Chemical Process, Household goods, Blow molding applications, Bottles, Caps, battery packs, batteries

Included in Materials Data for Simulation	✓
Materials Data for Simulation name	Plastic, MDPE

Composition overview

Compositional summary

(CH2-CH2)n

Material family	Plastic (thermoplastic, semi-crystalline)
Base material	PE-MD (Polyethylene, medium density)
Polymer code	PE-MD

Composition detail (polymers and natural materials)

Polymer	100			%

Price

Price	*	1,39	-	1,45	EUR/kg
Price per unit volume	*	1,29e3	-	1,37e3	EUR/m^3

Physical properties

Density	931	-	946	kg/m^3

Mechanical properties

Young's modulus	0,75	-	0,8	GPa

Specific stiffness		0,798	-	0,853	MN.m/kg
Yield strength (elastic limit)		16	-	20	MPa
Tensile strength		27,5	-	33	MPa
Specific strength		17	-	21,3	kN.m/kg
Elongation		500	-	800	% strain
Elongation at yield		9	-	15	% strain
Compressive strength	*	15	-	22	MPa
Flexural modulus		0,65	-	0,73	GPa
Flexural strength (modulus of rupture)		15	-	19,3	MPa
Bulk modulus	*	1,56	-	2,22	GPa
Poisson's ratio	*	0,42	-	0,44	
Shape factor		5			
Hardness - Shore D		53	-	63	
Elastic stored energy (springs)		167	-	256	kJ/m^3
Fatigue strength at 10^7 cycles	*	11,5	-	12,7	MPa

Impact & fracture properties

Impact strength, notched 23 °C		40	-	65	kJ/m^2
Impact strength, notched -30 °C		5	-	8	kJ/m^2
Impact strength, unnotched 23 °C		590	-	600	kJ/m^2
Impact strength, unnotched -30 °C		590	-	600	kJ/m^2

Thermal properties

Melting point		123	-	127	°C
Glass temperature		-273	-	-75	°C
Heat deflection temperature 0.45MPa		51,6	-	64,1	°C
Heat deflection temperature 1.8MPa		35	-	43	°C
Vicat softening point		106	-	121	°C
Maximum service temperature	*	85	-	105	°C
Thermal conductivity		0,48			W/m.°C
Specific heat capacity		2,3e3			J/kg.°C
Thermal expansion coefficient		50	-	150	µstrain/°C
Thermal shock resistance		153	-	465	°C
Thermal distortion resistance	*	0,0032	-	0,0096	MW/m

Electrical properties

Electrical resistivity		1e21	-	1e22	µohm.cm
Electrical conductivity		1,72e-20	-	1,72e-19	%IACS
Dielectric constant (relative permittivity)		2,3	-	2,5	
Dissipation factor (dielectric loss tangent)		4e-4	-	0,001	
Dielectric strength (dielectric breakdown)		20	-	22	MV/m

Magnetic properties

Magnetic type		Non-magnetic			

Optical, aesthetic and acoustic properties

Transparency		Translucent			
Acoustic velocity		893	-	924	m/s
Mechanical loss coefficient (tan delta)	*	0,0296	-	0,0306	

Critical materials risk

Contains >5wt% critical elements?		No			

Absorption & permeability

Water absorption @ 24 hrs		0,02			%

Processing properties

Polymer injection molding		Excellent			
Polymer extrusion		Excellent			
Polymer thermoforming		Acceptable			
Linear mold shrinkage		3,3			%
Melt temperature		210	-	250	°C

Durability

Water (fresh)		Excellent			
Water (salt)		Excellent			
Weak acids		Excellent			
Strong acids		Acceptable			
Weak alkalis		Acceptable			
Strong alkalis		Acceptable			
Organic solvents		Limited use			
Oxidation at 500C		Unacceptable			
UV radiation (sunlight)		Poor			
Flammability		Highly flammable			
Oxygen index		16	-	18	%

Primary production energy, CO2 and water

Embodied energy, primary production (virgin grade)	*	75,6	-	83,3	MJ/kg
Embodied energy, primary production (typical grade)	*	71,1	-	78,9	MJ/kg
CO2 footprint, primary production (virgin grade)	*	2,76	-	3,04	kg/kg
CO2 footprint, primary production (typical grade)	*	2,6	-	2,88	kg/kg
Water usage		64	-	70	l/kg

Processing energy, CO2 footprint & water

Polymer extrusion energy	*	5,76	-	6,35	MJ/kg
Polymer extrusion CO2	*	0,432	-	0,476	kg/kg
Polymer extrusion water	*	4,99	-	7,19	l/kg
Polymer molding energy	*	16,5	-	18,2	MJ/kg
Polymer molding CO2	*	1,24	-	1,36	kg/kg
Polymer molding water	*	12,1	-	17,5	l/kg

Coarse machining energy (per unit wt removed)	* 0,66	-	0,73	MJ/kg
Coarse machining CO2 (per unit wt removed)	* 0,05	-	0,055	kg/kg
Fine machining energy (per unit wt removed)	* 2,32	-	2,6	MJ/kg
Fine machining CO2 (per unit wt removed)	* 0,175	-	0,193	kg/kg
Grinding energy (per unit wt removed)	* 4,2	-	4,6	MJ/kg
Grinding CO2 (per unit wt removed)	* 0,31	-	0,35	kg/kg

Recycling and end of life

Recycle	✓			
Embodied energy, recycling	* 25,6	-	28,3	MJ/kg
CO2 footprint, recycling	* 0,636	-	0,704	kg/kg
Recycle fraction in current supply	8	-	9	%
Downcycle	✓			
Combust for energy recovery	✓			
Heat of combustion (net)	44	-	46,2	MJ/kg
Combustion CO2	3,06	-	3,22	kg/kg
Landfill	✓			
Biodegrade	✗			

Links

ProcessUniverse

Producers

Reference

Shape