General information

Designation

Polypropylene (Impact copolymer, high flow)

Tradenames

A. Schulman Pp; Acclear; Accpro; Acctuf; Accucomp; Achieve; Addilene; Adflex; Adpro; Akrolen; Alphacan; Altech; Anapro; Aplax; Appryl; Aqualoy; Arcoplen; Armlen; Arpak; Arpro; Astryn; Atofinapolypropylene; Azdel; Bapolene; Bergaprop; Bicor; Bormed; Borstar; Bras-Tec; Braskem Pp; Bynel; Caltex; Capilene; Carboprene; Carmelstat; Cefor; Certene; Clyrell; Compel; Compotene; Comshield; Corton; Cosmoplene; Cotene; Cp Pryme Polypropylene; Cuyolen; Daelimpoly; Dafnelen; Daicelpp; Danapro; Daplen; Delta; Denilen; Dep; Dexflex; Digilyte; Dow; Dualpoly; Ecollent; El-Pro; Eltex; Eltex P; EnDure; Endura; Epsilon; Equistarpp; Escalloy; Esdash; Estaprop; Eticourt; Extron; Exxonmobil Pp; Exxpol Enhance; Exxtral; FHR; Ferrexnewfoamer; Ferrolene; Fhr Polypropylene; Fiberfil; Finapro; Flametec; Formolene; Fortilene; Gapex; Globalene; Grand Polpro; Haiplen; Halene; Hi-Glass; Hifax; Hishiplate; Hival; Hms; Hoegolen; Hopelen; Hostacen; Hostacom; Hostalen Pp; Huntsman; Huntsman Pp; Hyosung Pp; Hypro; Hyundai; Inertec; Innovene Pp; Inspire; Ipiranga; Isplen; Jazz; Kelburon; Kopelen; Kopla; Koylene; Latene; Lucent; Lupol; Luvogard; M. Holland; Mafill; Magnacomp; Majoris; Malen-P; Marlex Pp; Maxbatch; Maxpro; Maxxam; Metallyte; Metocene; Microthene; Moplen; Mosten; Multipro; Mytex; Network Polymers Pp; Neviprop; Newstren; Niplene; Nissen; Noblen; Nortuff; Novatec; Novolen; Oleform; Olehard; Olesafe; Oppalytetrespaphan; Osstyrol; Osterlene; Palprop; Percom; Permastat; Petoplen; Petrothene; Piolen; Plastiflam; Polene; Polifor; Polycom; Polycomp; Polyfill; Polyflam; Polyfort; Polystone; Polyvance; Ponalen; Pre-Elec; Primefin; Pro-Fax; Procom; Prolen; Propak; Propilco Pp; Propilven; Propylux; Protec; Proteq; Proteus; Purell; RTP; Ranplen; Razalen; Refax; Regal; Repol; Repolen; Reptol; Retpol; Rexene; Rhetech Pp; Rotothon; Sabic Pp; Samsung Total; Sanalite; Sanren; Saxene; Scolefin; Seetec; Sequel; Simona; Sinpolene; Slovalen; Spolen; Stamax; Stamylan; Starpylen; Strandfoam; Sunlet; Sunoco Pp; Sup-Tech; Syntegum; Taboren; Taffen; Taipolene; Tairipro; Talcoprene; Tatren; Tecafine; Tecolen; Teknoplen; Terez; Thermolen; Thermylene; Tipplen; Topilene; Torayfan; Total; Total Petrochemicals Polypropylene; Tracolen; Trapylen; Trilen; Trilene; Umastyr; Valmax; Valtec; Vamplem; Vylene; Vyon; Wintec; Wpp; Xenopren; Yuhwa; Yuplene; Yuyao; Zeral

Typical uses

Furniture, automotive applications, automotive bumper, lawn and garden equipment, tool/tote box, luggage, consumer applications, household goods, sporting goods, toys, containers, plastics modification, battery cases, industrial applications, lids, business equipment, construction applications, automotive interior parts, outdoor furnishings, automotive exterior parts, automotive under the hood, electrical/electronic applications, automotive instrument panel, containers, food, outdoor applications, film, cast, appliance components, fishing applications, parts, industrial, blending, compounding, fascias, trays, support, closures, containers, industrial, general purpose, packaging, food, buckets, bowls, general mechanical parts, bottle crates, medical components, washing machine drums, pipes, bottles, bottle caps, films for packaging, fibers for carpeting and artificial sports surfaces, electric cars, hybrid cars, air purifiers, dehumidifiers, air conditioners, battery packs, batteries

Included in Materials Data for Simulation	✓
Materials Data for Simulation name	Plastic, PP (impact copolymer, high flow)

Composition overview

Compositional summary

Block copolymer of PP homopolymer and 5-25 wt% ethylene-propylene copolymer rubber (EPR or E/P). Forms a two-phase (heterophase) material with EPR finely dispersed in the continuous PP phase.

Material family	Plastic (thermoplastic, semi-crystalline)
Base material	PP (Polypropylene)
Additive	Impact modifier
Polymer code	PP-I

Composition detail (polymers and natural materials)

Polymer		80	-	90	%
Impact modifier		10	-	20	%

Price

Price	*	2,44	-	2,51	EUR/kg
Price per unit volume	*	2,19e3	-	2,27e3	EUR/m^3

Physical properties

Density		896	-	905	kg/m^3

Mechanical properties

Young's modulus	*	1,03	-	1,23	GPa
Specific stiffness	*	1,14	-	1,36	MN.m/kg
Yield strength (elastic limit)		19	-	22	MPa
Tensile strength		19	-	23	MPa
Specific strength		21,1	-	24,4	kN.m/kg
Elongation		59,5	-	245	% strain
Elongation at yield		5,5	-	10,4	% strain
Compressive modulus	*	1,03	-	1,23	GPa
Compressive strength	*	30,6	-	32,2	MPa
Flexural modulus		1,02	-	1,28	GPa
Flexural strength (modulus of rupture)		17,3	-	34	MPa
Shear modulus	*	0,401	-	0,442	GPa
Bulk modulus	*	1,07	-	1,18	GPa
Poisson's ratio	*	0,367	-	0,405	
Shape factor		6			
Hardness - Vickers		6			HV
Hardness - Rockwell M	*	43	-	47	
Hardness - Rockwell R		62	-	77	
Hardness - Shore D		63	-	68	
Hardness - Shore A	*	94	-	99	
Elastic stored energy (springs)	*	158	-	219	kJ/m^3
Fatigue strength at 10^7 cycles	*	7,37	-	7,74	MPa

Impact & fracture properties

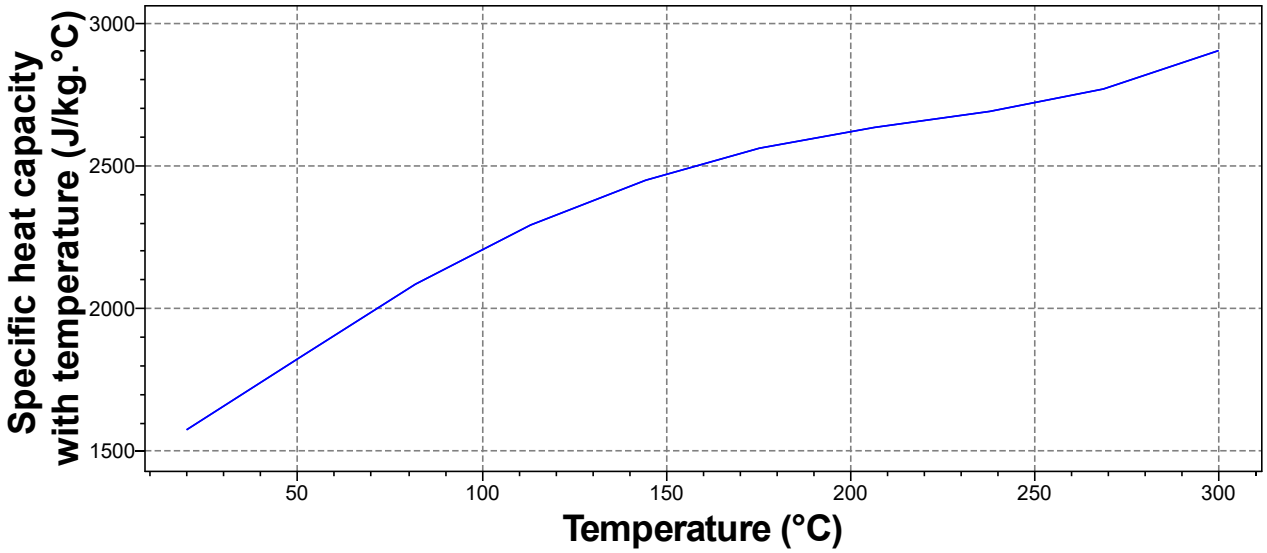
Fracture toughness	*	1,23	-	1,36	MPa.m^0.5
Toughness (G)	*	1,32	-	1,7	kJ/m^2
Impact strength, notched 23 °C		6,95	-	12,4	kJ/m^2
Impact strength, notched -30 °C		4,05	-	5,8	kJ/m^2
Impact strength, unnotched 23 °C		590	-	600	kJ/m^2
Impact strength, unnotched -30 °C		590	-	600	kJ/m^2

Thermal properties

Melting point		158	-	167	°C
Glass temperature		-25	-	-17	°C

Heat deflection temperature 0.45MPa	83,3	-	101	°C
Heat deflection temperature 1.8MPa	45,2	-	61,3	°C
Vicat softening point	127	-	148	°C
Maximum service temperature	* 59,6	-	76,4	°C
Minimum service temperature	* -26	-	-11	°C
Thermal conductivity	* 0,183	-	0,19	W/m.°C
Specific heat capacity	1,66e3	-	1,92e3	J/kg.°C
Specific heat capacity with temperature	1,6e3	-	1,6e3	J/kg.°C

Parameters: Temperature = 23°C



Thermal expansion coefficient	110	-	130	µstrain/°C
Thermal shock resistance	* 133	-	175	°C
Thermal distortion resistance	* 0,00143	-	0,0017	MW/m

Electrical properties

Electrical resistivity	* 9,9e22	-	1,01e23	µohm.cm
Electrical conductivity	* 1,71e-21	-	1,74e-21	%IACS
Dielectric constant (relative permittivity)	* 2,2	-	2,28	
Dissipation factor (dielectric loss tangent)	* 1,96e-4	-	2,04e-4	
Dielectric strength (dielectric breakdown)	* 17,6	-	18,4	MV/m
Comparative tracking index	600			V

Magnetic properties

Magnetic type	Non-magnetic			

Optical, aesthetic and acoustic properties

Refractive index	1,48	-	1,5	
Transparency	Translucent			
Acoustic velocity	* 1,07e3	-	1,17e3	m/s
Mechanical loss coefficient (tan delta)	* 0,0426	-	0,0448	

Critical materials risk

Contains >5wt% critical elements?	No			

Absorption & permeability

Water absorption @ 24 hrs	*	0,0195	-	0,0205	%
Water vapor transmission		0,224	-	0,308	g.mm/m².day
Permeability (O2)		61,2	-	144	cm³.mm/m².day.atm

Processing properties

Polymer injection molding		Excellent			
Polymer extrusion		Excellent			
Polymer thermoforming		Acceptable			
Linear mold shrinkage		1,25	-	1,65	%
Melt temperature		205	-	238	°C
Mold temperature		23,4	-	49,7	°C
Molding pressure range		2,94	-	24,9	MPa

Durability

Water (fresh)		Excellent			
Water (salt)		Excellent			
Weak acids		Excellent			
Strong acids		Excellent			
Weak alkalis		Excellent			
Strong alkalis		Excellent			
Organic solvents		Excellent			
Oxidation at 500C		Unacceptable			
UV radiation (sunlight)		Poor			
Flammability		Highly flammable			
Notes					
Currently NOT UL tested but expected to pass the HB test					
Oxygen index		18	-	20	%

Primary production energy, CO2 and water

Embodied energy, primary production (virgin grade)	*	74,4	-	82	MJ/kg
Embodied energy, primary production (typical grade)	*	73	-	80,6	MJ/kg
CO2 footprint, primary production (virgin grade)	*	3,16	-	3,48	kg/kg
CO2 footprint, primary production (typical grade)	*	3,1	-	3,42	kg/kg
Water usage	*	33,5	-	37	l/kg

Processing energy, CO2 footprint & water

Polymer extrusion energy	*	5,93	-	6,56	MJ/kg
Polymer extrusion CO2	*	0,445	-	0,492	kg/kg
Polymer extrusion water	*	4,87	-	7,31	l/kg
Polymer molding energy	*	21,8	-	24,1	MJ/kg
Polymer molding CO2	*	1,63	-	1,81	kg/kg
Polymer molding water	*	13,9	-	20,8	l/kg

Coarse machining energy (per unit wt removed)	*	0,732	-	0,809	MJ/kg
Coarse machining CO2 (per unit wt removed)	*	0,0549	-	0,0607	kg/kg
Fine machining energy (per unit wt removed)	*	3,05	-	3,37	MJ/kg
Fine machining CO2 (per unit wt removed)	*	0,229	-	0,253	kg/kg
Grinding energy (per unit wt removed)	*	5,62	-	6,21	MJ/kg
Grinding CO2 (per unit wt removed)	*	0,422	-	0,466	kg/kg

Recycling and end of life

Recycle		✓			
Embodied energy, recycling	*	25,2	-	27,9	MJ/kg
CO2 footprint, recycling	*	1,07	-	1,18	kg/kg
Recycle fraction in current supply		2,57	-	2,84	%
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