

General information

Designation

ABS (injection molding, platable), Acrylonitrile Butadiene Styrene (Injection Molding, platable)

Tradenames

Abistir, Abscom, Absolac, Abstron, Accucomp, Alcom, Allen, Altech, Anjacom, Ashlene, Astalac, Badalac, Bulksam, Certene, Cevian, Cevian-V, Cheng, Claradex, Clariant, Colorrx, Cycolac, Delta, Diamond, Dynacom, Edgetek, Electrafil, Elix, Encom, Epitec, Estadiene, Evosource, Excelloy, Ghaed, Hival, Hylac, Isopak, Jackdaw, Jamplast, Kaneka, Kralastic, Kumho, Kumhosunny, LNP Stat-Loy, Lustran, Magnum, Malecca, Micholac, Neftekhim, Next, Next Signature, Nexus, Nilac, Novakral, Novalloy-E, Novodur, Omnitech, Permastat, Plaslube, Polimaxx, Polyabs, Poly-Elek, Polylac, Polyman, Polyman, Ponacom, Pryme, Radici, Ramshine, Retelan, Ronfalin, Rotec, Royalite, Santac, Sattler, Saxalac, Shinko-Lac, Sicoflex, Sindustris, Sinkral, Spartech, Starex, Stylac, Tairilac, Taitalac, Tarodur, Techno, Tenogel, Terez, Terluran, Toyolac, Trilac, Tynab, Tyne, Veroplas, Zgpc

Typical uses

Safety helmets, camper tops, automotive instrument panels and other interior components, pipe fittings, home-security devices and housings for small appliances, communications equipment, business machines, plumbing hardware, automobile grilles, wheel covers, mirror housings, refrigerator liners, luggage shells, tote trays, mower shrouds, boat hulls, large components for recreational vehicles, weather seals, glass beading, refrigerator breaker strips, conduit, pipe for drain-waste-vent (dwv) systems.

Composition overview

Compositional summary

Block terpolymer of acrylonitrile (15-35%), butadiene (5-30%), and Styrene (40-60%).

Material family	Plastic (thermoplastic, amorphous)
Base material	ABS (Acrylonitrile butadiene styrene)
Polymer code	ABS

Composition detail (polymers and natural materials)

Polymer	100	%
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Price

Price	* 1.56	-	1.83	CHF/kg
Price per unit volume	* 1.63e3	-	1.96e3	CHF/m^3

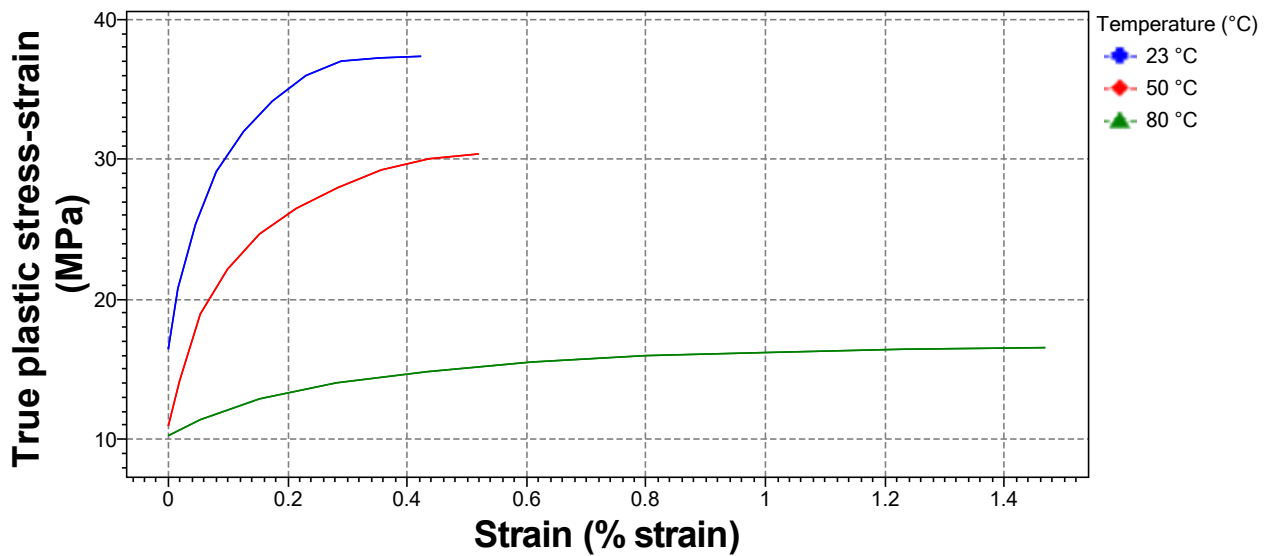
Physical properties

Density	1.04e3	-	1.07e3	kg/m^3
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Mechanical properties

Young's modulus	2.21	-	2.62	GPa
Specific stiffness	2.09	-	2.49	MN.m/kg
Yield strength (elastic limit)	42	-	46	MPa
Tensile strength	42	-	46	MPa
Specific strength	39.7	-	43.7	kN.m/kg
Elongation	* 15.3	-	20.9	% strain
True plastic stress-strain	30.3			MPa

[Paramètres](#): Strain = 0.1% strain, Temperature = 23°C



Compressive modulus	* 2.21	-	2.62	GPa
Compressive strength	* 52.8	-	58.2	MPa
Flexural modulus	2.34	-	2.68	GPa
Flexural strength (modulus of rupture)	72.4	-	79.3	MPa
Shear modulus	* 0.79	-	0.937	GPa
Bulk modulus	* 3.86	-	4.06	GPa
Poisson's ratio	* 0.391	-	0.407	
Shape factor	5.6			
Hardness - Vickers	* 13	-	15	HV
Hardness - Rockwell M	* 66	-	72	
Hardness - Rockwell R	103	-	109	
Elastic stored energy (springs)	356	-	453	kJ/m ³
Fatigue strength at 10 ⁷ cycles	* 14	-	18.2	MPa

Impact & fracture properties

Fracture toughness	1.9	-	2.1	MPa.m ^{0.5}
Toughness (G)	1.46	-	1.88	kJ/m ²
Impact strength, notched 23 °C	10.7	-	23.1	kJ/m ²
Impact strength, notched -30 °C	4.88	-	10.9	kJ/m ²
Impact strength, unnotched 23 °C	110	-	132	kJ/m ²
Impact strength, unnotched -30 °C	64.3	-	77.2	kJ/m ²

Thermal properties

Melting point	210	-	250	°C
Glass temperature	100	-	110	°C
Heat deflection temperature 0.45MPa	102	-	106	°C
Heat deflection temperature 1.8MPa	88	-	106	°C
Vicat softening point	91	-	111	°C
Maximum service temperature	63	-	77	°C
Minimum service temperature	-45	-	-35	°C
Thermal conductivity	* 0.254	-	0.264	W/m.°C
Specific heat capacity	* 1.68e3	-	1.75e3	J/kg.°C

Thermal expansion coefficient	84.6	-	95.4	μstrain/°C
Thermal shock resistance	182	-	227	°C
Thermal distortion resistance	* 0.00271	-	0.00307	MW/m

Electrical properties

Electrical resistivity	3.3e21	-	3e22	μohm.cm
Electrical conductivity	5.75e-21	-	5.22e-20	%IACS
Dielectric constant (relative permittivity)	2.8	-	3.2	
Dissipation factor (dielectric loss tangent)	0.003	-	0.006	
Dielectric strength (dielectric breakdown)	16.5	-	21.7	MV/m
Comparative tracking index	400	-	600	V

Magnetic properties

Magnetic type	Non-magnetic
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Optical, aesthetic and acoustic properties

Transparency	Opaque			
Acoustic velocity	1.45e3	-	1.58e3	m/s
Mechanical loss coefficient (tan delta)	* 0.0153	-	0.0181	

Critical materials risk

Contains >5wt% critical elements?	No
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Absorption & permeability

Water absorption @ 24 hrs	* 0.2	-	0.45	%
Water vapor transmission	2.04	-	3.2	g.mm/m².day
Permeability (O2)	47.3	-	78.5	cm³.mm/m².day.atm

Processing properties

Polymer injection molding	Excellent			
Polymer extrusion	Acceptable			
Polymer thermoforming	Excellent			
Linear mold shrinkage	0.5	-	0.8	%
Melt temperature	137	-	260	°C
Mold temperature	50	-	70	°C
Molding pressure range	55	-	172	MPa

Durability

Water (fresh)	Excellent
Water (salt)	Excellent
Weak acids	Excellent
Strong acids	Limited use
Weak alkalis	Acceptable
Strong alkalis	Excellent
Organic solvents	Unacceptable
Oxidation at 500C	Unacceptable
UV radiation (sunlight)	Poor
Flammability	Highly flammable
Oxygen index	18 - 20 %

Primary production energy, CO2 and water

Embodied energy, primary production (virgin grade)	91.5	-	101	MJ/kg
Sources 92.2 MJ/kg (PlasticsEurope, 2017); 100 MJ/kg (Ecoinvent v3.7.1)				
Embodied energy, primary production (typical grade)	* 88.9	-	98.3	MJ/kg
CO2 footprint, primary production (virgin grade)	3.51	-	3.87	kg/kg
Sources 3.32 kg/kg (Kemna et al. 2005); 3.1 kg/kg (PlasticsEurope, 2017); 4.65 kg/kg (Ecoinvent v3.7.1)				
CO2 footprint, primary production (typical grade)	* 3.41	-	3.77	kg/kg
Water usage	* 167	-	185	l/kg

Processing energy, CO2 footprint & water

Polymer extrusion energy	* 5.81	-	6.42	MJ/kg
Polymer extrusion CO2	* 0.436	-	0.481	kg/kg
Polymer extrusion water	* 4.82	-	7.23	l/kg
Polymer molding energy	* 18.3	-	20.2	MJ/kg
Polymer molding CO2	* 1.37	-	1.52	kg/kg
Polymer molding water	* 12.4	-	18.6	l/kg
Coarse machining energy (per unit wt removed)	* 0.974	-	1.08	MJ/kg
Coarse machining CO2 (per unit wt removed)	* 0.0731	-	0.0808	kg/kg
Fine machining energy (per unit wt removed)	* 5.47	-	6.04	MJ/kg
Fine machining CO2 (per unit wt removed)	* 0.41	-	0.453	kg/kg
Grinding energy (per unit wt removed)	* 10.5	-	11.6	MJ/kg
Grinding CO2 (per unit wt removed)	* 0.784	-	0.867	kg/kg

Recycling and end of life

Recycle	✓			
Embodied energy, recycling	* 30.7	-	34	MJ/kg
CO2 footprint, recycling	* 1.17	-	1.29	kg/kg
Recycle fraction in current supply	3.8	-	4.2	%
Downcycle	✓			
Combust for energy recovery	✓			
Heat of combustion (net)	* 37.6	-	39.5	MJ/kg
Combustion CO2	* 3.06	-	3.22	kg/kg
Landfill	✓			
Biodegrade	✗			

Notes

Warning

HDT 1.8 covers unannealed to annealed samples. HDT 0.45 is for annealed

Liens

ProcessUniverse
Producers
Reference
Shape