Protolis

Grades for Injection Molding

Material	Other names	Description	Limitations	Applications requiring transparency and high impact resistance Exterior and interior automotive parts Exterior lighting	Price (1 to 4)	Natural color	Color match	Density - g/cm3	Water absorption ASTM D570 - %	Hardness ASTM D2240 - Shore D	IZOD impact (Notched) ASTM D256 - J/m	Yield tensile strength ASTM D638 - Mpa	Elongation at break ASTM D638 - %	Flexural strenght ASTM D790 - Mpa	Flexural modulus ASTM D790 - Mpa	Heat deflection temperature at 66 psi ASTM D648 - °C/°F	Glass transition temperature - °C/°F	Inflammability - UL94
ABS	Acrylonitrile Butadiene Styrene	Acrylonitrile Butadiene Styrene is an affordable plastic material that offers impressive impact resistance, stiffness, and strength. It also boasts good dimensional stability and low water absorption. Additionally, it is easy to paint and electroplate.	Poor solvent solvents. Moderate resistance to heat, fatigue and UV light. Contains styrene	General household items: gardening tool, toys, kitchen appliances, electrical/electronic appliances Widely use for pre-production prototype of housings, covers and structural components	1	Beige	Good	1,05	0.3 - 0.8	100	200-215	27.6 - 55.2	10 - 50	66,7	2100 - 2800	98°C / 208°F	105 °C / 221°F	HB
ABS/PC	-	The plastic blend of ABS and PC exhibits a set of properties that depend on the ratio of PC to ABS. By combining the advantages and disadvantages of both materials, this blend offers a compelling proposition. The compound is both durable and impact-resistant, thanks to the combination of the two materials, making it bendable without being fragile or easily breakable.	Poor resistance to solvents	Similar to ABS applications requiring better impact strength Electrical/electronic product shell Automotive interior	1	Beige	Good	1,13	0.2 - 0.3	62 - 85	196	41	60 - 85	68	1500 - 2800	110°C / 230°F	120°C / 248°F	HB
PC	-	Polycarbonate serves as an excellent substitute for glass due to its high transparency. Furthermore, it offers high resistance to impact and good temperature resistance. Additionally, it provides good electrical insulation, excellent dimensional stability, and low water absorption. Lastly, it is easy to paint and electroplate.	Moderate resistance to chemicals, Moderate UV resistance,	Applications requiring transparency and high impact resistance Exterior and interior automotive parts Exterior lighting	2	Transparent	Good	1,2	0.15 - 0.2	90 - 95	600 - 850	59 - 70	50 - 120	90 - 103	2100 - 2600	140 °C / 240° F	147°C / 296°F	V2
PMMA	Acrylic, Plexiglas	PMMA, also known as acrylic, is a highly transparent plastic that serves as a lightweight alternative to glass and an economical substitute for PC, albeit with lower impact strength. Additionally, it offers high resistance to scratch and is UV and weather-resistant. Moreover, it provides good dimensional stability and low water absorption, and it is easy to paint and electroplate.	Poor resistance to impact, wear and abrasion Easy to crack under load Limited heat and chemical resistance	Construction outdoor applications Automotive light parts Electronic screens Cosmetic packaging and display	1	Transparent	Good	1,19	0.1 - 0.4	90 - 99	20 - 22	70	2 - 10	100	2900-3100	105 °C / 220° F	116°C / 240°F	HB
POM	Delrin, Acetal	This thermoplastic material boasts high strength, stiffness, and toughness, making it an ideal candidate for various applications. Additionally, it exhibits excellent bearing, wearing, and sliding properties, along with high tensile strength and resistance to impact, temperature, and heat. Furthermore, it offers chemical resistance to hydrocarbons and solvents, as well as good dimensional stability and low moisture absorption.	Impossible to bond and paint Poor resistance to acids, Prone to warpage	Commonly used as bushings, rollers, wear strips, gears, pump parts	1	White	Good	1,41	0.11 - 0.5	80 - 95	69 - 100	61 - 67	15 - 65	83 - 91	2600-2880	160 °C / 320° F	80°C / 176°F	HB
PP	-	Polypropylene stands out as one of the lightest thermoplastics obtainable, offering outstanding resistance to fatigue as well as chemical resistance, particularly to most alkaline and acidic substances. Moreover, it demonstrates low moisture absorption and non-toxic properties.	Impossible to bond and paint Low resistance to UV Burning very quickly	Packaging industry Household appliances Eelectric appliances Automotive decorative parts	1	White	Good	0,9	0.01 - 0.1	70 - 83	60 - 70	23 - 33	200 - 500	31 - 40	1300-1800	50 - 100 °C 122 - 212 °F	25°C / 77°F	HB

HDPE	-	High density polyethylene is a flexible and lightweight plastic material that provides impressive resistance to impacts, breaks, and abrasion, in addition to serving as an excellent electrical insulator. It also offers excellent resistance at low temperatures and good chemical resistance. Furthermore, it exhibits good dimensional stability and low moisture absorption.	Impossible to bond and paint Lower stiffness compared to Polypropylene. Poor UV resistance.	Construction: pipe, tanks, water storage Mechanical equipment parts Electronic appliances Food packaging and container	1	White	Good	0,96	0.005 - 0.01	60 - 70	>50	30 - 40	500 - 700	20 - 40	1000-2000	75 °C / 167°F	100°C / 212°F	HB
LDPE	-	LDPE shares many characteristics with HDPE, but it is softer and more flexible. However, under stress, it is more prone to cracking.	Similar to HDPE	Houshold application: hinge Electronic appliances Food packaging and container	1	White	Good		0.005 - 0.015	40 - 50	999 (Don't break)	4 - 20	200 - 600	14	600-1500	50°C / 122°F	100°C / 212°F	HB
PVC	-	Polyvinyl chloride is a polymer that boasts average impact strength, good tensile strength, and stiffness. Additionally, it exhibits exceptional resistance to chemicals and corrosion, good dimensional stability, no water absorption, and is self-extinguishing.	Low UV resistance, Poor heat stability and low temperature resistance	Construction industry: pipes, windows and doors frames. Automotive parts Medical devices	1	White	Good	1,4	0.04 - 0.4	65 - 90	20 - 110	47 - 62	25 - 80	72 - 91	2700-3000	70°C / 158°F	80°C / 176°F	V0
PA6	Nylon 6	Polyamide, commonly known as nylon, is a lightweight plastic material that offers good tensile strength and stiffness, comparable to that of metal. It exhibits excellent resistance to bearing, fatigue, and abrasion, along with impressive corrosion resistance and electrical properties.	Moisture absorption that can greatly reduce mechanical strength and electrical performance Poor UV resistance and dimensional stability	Construction material Automotive parts Aircraft parts Electronic & electrotechnical parts	1	Beige	Good	1,13	1.6 - 1.9	80 - 95	50 - 53	74 - 100	<=67	80 - 100	2400-3200	200°C / 392°F	49°C / 120°F	HB
PA66	Nylon 66	PA66 exhibits chemical and physical properties that are similar to PA6, albeit with slightly less moisture absorption, higher mechanical properties, and superior short-term heat resistance.	Slighty better than PA6	Construction material Automotive parts Aircraft parts Electronic & electrotechnical parts	2	Beige	Good	1,15	1 - 3	80 - 95	53 - 58.7	85	46 - 70	110 - 140	2800-3300	200°C / 392°F	49°C / 120°F	HB
PBT	-	Polybutylene terephthalate is an engineering thermoplastic material that provides outstanding mechanical properties, such as high strength and toughness, as well as excellent electrical insulation. Furthermore, it demonstrates good resistance to both UV and chemicals and can be used over a broad temperature range from -40°C to 110°C. Additionally, it exhibits high dimensional stability and low moisture absorption.	Sentitive to hot water	Food industry Electrical & electronic appliances: connector strips and insulating housing Household appliances Medical equipments	2	Beige	Good	1,31	0.07 - 0.2	90 - 95	47 - 90	58	5 - 43	50 - 85	1600-2400	150°C / 302°F	45°C / 113°F	HB
PEEK	-	Polyetheretherketone is a high-performance thermoplastic material that offers exceptional chemical resistance and low moisture absorption. It also exhibits good wear, abrasion, and fatigue resistance, along with excellent tensile strength. Furthermore, it provides high-temperature resistance and is naturally UL94 V-0, which means it emits low-toxicity gas if burnt. Additionally, it boasts good dimensional stability.	Low UV light resistance	Used in many of the most critical areas in general industries: automotive, marine, medical, aerospace	5	Beige	Good	1,31	0.1 - 0.5	85 - 95	120	>=90	15 - 50	150	4065-4275	> 260°C / 500° F	145°C / 293°F	V0
PPS	-	Polyphenylene sulfide is an advanced engineering plastic that shares properties similar to metal, including exceptional mechanical strength, excellent wear resistance, and fatigue endurance. It also provides good electrical insulation and high-temperature resistance, while being naturally UL94 V-0. Moreover, it demonstrates outstanding chemical resistance and no moisture absorption, along with good dimensional stability.	Price	Automotive: seals, fuel and brake systems Mechanical engineering: pump and valve components Electrical/Electronic components: connectors, contact rails, Medical industry	3	Beige	Good	1,3	0.01 - 0.07	86 - 92	5 - 25	65 - 85	4 - 8	50 - 80	3800-4200	> 260°C / 500° F	85°C / 185°F	V0