

DURABIO™

DURABIO™ is a transparent bio-based engineering polymer developed by Mitsubishi Chemical. DURABIO™ has transparency properties similar to that of PMMA but with a much better impact behavior and an improved heat resistance. DURABIO™ beats the well-known inferior properties of PC in regard to scratch resistance, hardness, and chemical resistance. DURABIO™ closes the gap between PC and PMMA.

Colors:

DURABIO™ is available in 3 colors.

BK1	WH1	CL1
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Packaging:

DURABIO™ is available in the original packaging of Mitsubishi Chemical.

Material features:

- Excellent optical and mechanical properties
- Superb UV-resistance
- Ductility, with strong impact resistance
- High heat resistance
- Scratch resistance
- Chemical inertness
- BPA free, bio-based
- Easy to print



Filament Specs.

Size	Ø Tolerance	Roundness
1.75mm	± 0.05mm	≥ 95%
2.85mm	± 0.10mm	≥ 95%

Material Properties

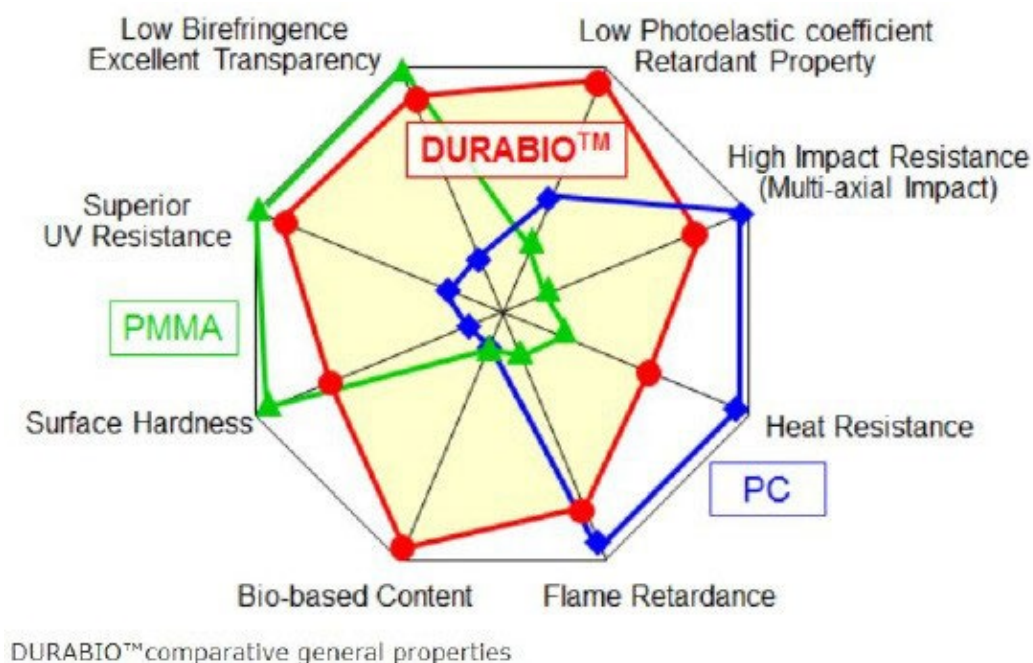
Description	Test Method	Typical value
Specific Gravity	ISO 1183	1.31 g/cm ³
MFI 230°C/2.16 kg	ISO 1133	13 g/10 min
Tensile Strength at Yield	ISO 527	64 MPa
Elongation Strain at Break	ISO 527	130%
Tensile (E) Modulus	ISO 527	2300 MPa
Impact Strength - Charpy method notched 23 °C	ISO 179	9 kJ/m ²
Flexural Modulus	ISO178	2100 MPa
Flexural Strength	ISO 178	94 MPa
Heat Deflection Temp. HDT B	ISO 75	92°C
Heat Deflection Temp. HDT A	ISO 75	82°C
Transmittance	IS13468	92%

Additional Information: DURABIO™ is particularly designed for applications requiring exceptional visual appearance with scratch and impact resistance as well as chemical inertness.

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Print Properties

Description	Typical value
Nozzle Size	0.25 cm
Bed Adhesion	Dimafix
Nozzle temperature	240±10°C
Bed Temperature	≥100°C
Layer Height	0.2 mm
Print Speed	50 mm/s
Fan Speed	50%
Extrusion Multiplier/ Material Flow	100%
Retraction Distance	5.5 mm
Retraction Speed	35 mm/s
Difficulty to Print	Intermediate
Drying Required	Min. 5 hours suggested

*Dimafix is used with a glass buildplate.

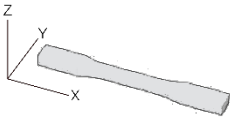
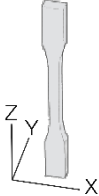
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Mechanical Specifications

During additional research, a print profile was created and optimized for achieving the highest possible tensile performance. Table 1 shows the typical values of an injection molded specimen compared to a 3D-printed specimen in both the X-Y axis (3D-printed horizontally) and the Z-axis (3D-printed vertically). After that, some important parameters are given, and the corresponding trend is briefly described

Table 1: Tensile Data of both Injection Molded and 3D-Printed Specimens.*

	Injection Molded	3D-Printed X-Y*	3D-Printed Z*
Young's Modulus [MPa]	2300	2283	2380
Stress at Yield [MPa]	64	69	55
Stress at Break [MPa]	-	56	56
Strain at Yield [%]	-	6	4
	130	11	5
Strain at Break [%]			

Important parameters:

- When increasing the Nozzle Temperature, the Stress at Yield will increase
- When decreasing the Fan Speed, the Stress at Yield will increase
- When increasing the Material Flow the Stress at Yield will increase

Print Conditions

All specimens have been printed using a 0.4mm nozzle and the layer height was set to 0.2mm. The room in which the 3D-printer was located had an environmental temperature of $\pm 25^{\circ}\text{C}$.

*Test Conditions

The tensile tests have been carried out according to ISO-527 using modified 1BA specimens (3D-printing) and 1A specimens (injection molding). The room in which the Universal Testing Machine was located had an environmental temperature of $\pm 20^{\circ}\text{C}$.

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