MITSUBISHI CHEMICAL

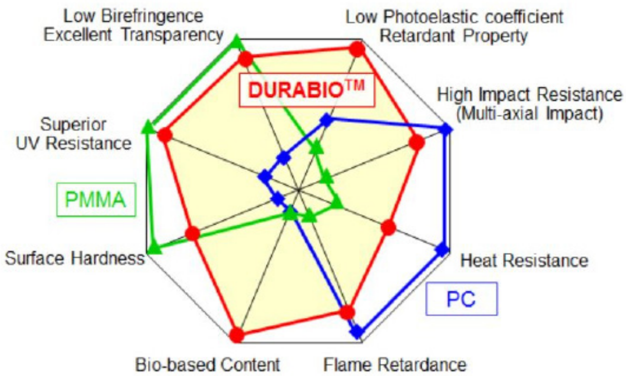
DURABIO™

25 February 2021

DURABIO™ a transparent bio-based engineering polymer developed by Mitsubishi Chemical. DURABIO™ its transparency 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 regards to scratch resistance, hardness and chemical resistance. That is why DURABIO™ closes the gap between PC and PMMA.

KEY FEATURES

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



DURABIO™comparative general properties

COLOURS

Black White Clear

Filament Specs.

Size	Ø tolerance	Roundness
1.75mm	± 0,05mm	≥ 95%
2.85mm	± 0,10mm	≥ 95%

Material Properties

Description	Testmethod	Typical value
Specific gravity	ISO 1183	1,31 g/cm³
MFI 230°C/2,16kg	ISO 1133	13 g/10min
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 23°C (notched)	ISO 179	9 kJ/m²
Flexural Modulus	ISO 178	2100 MPa
Flexural Strength	ISO 178	94 MPa
Heat deflection temperature HDT B	ISO 75	92°C
Heat deflection temperature HDT A	ISO 75	82°C
Transmittance	ISO 13468	92%

Print Properties

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

* *Dimafix is used with a glass buildplate.*

ADDITIONAL INFO

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

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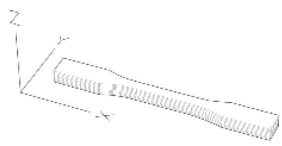
Mechanical Specifications

During additional research a print profile has been made which was optimized for achieving a highest possible tensile performance. Table 1 shows the typical values of an injection moulded 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 moulded and 3D-printed specimens.

	Injection Moulded	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
Strain at Break [%]	130	11	5



Most 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

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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 ± 25°C.

*Test Conditions

The tensile tests have been carried out according to ISO-527 using modified 1BA specimens (3D-printing) and 1A specimens (injection moulding). The room in which the Universal Testing Machine was located had an environmental temperature of ± 20°C.

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