

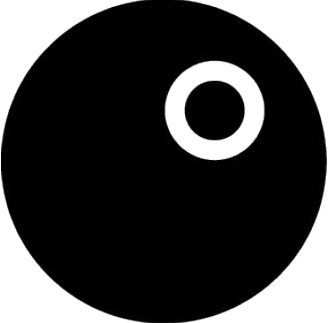



DARK

PA 11

FABULOUS

MATERIALS

DARK is a fine powder based on polyamide 11 (thermoplastic) especially formulated to function on rapid prototyping systems by laser sintering (SLS, LS) or radiation (IRS, MJF). It enables to obtain productions of models and functional parts in "plastic engineering" with long cycle of life and excellent chemical resistance.

   	<p>Typical features :</p> <p>Bio-sourcing (Castor oil) Better elasticity than PA12 with 75 shore A</p> <p>Fine granulometry Resistance in extreme low and high temperatures Possible use in continuous-shifting regenerating cycles</p>	<p>Applications examples :</p> <ul style="list-style-type: none"> → Mechanical parts → Aerospace → Automotive industry, Innovative applications → Luxury industry → Mechanical parts in engine Fuel or oil tanks
	<p>Refresh rate :</p> <p>40% to 50% limited to 6-8 cycles</p> <p>The process ability of the powder on your systems is optimized ; thus all the powder of a building can be re-used after sifting. The refreshing factor for regeneration is lower than the usual rates giving a real economic advantage.</p>	<p>Key Points :</p> <p>Ductility Elongation Impact Resistance</p>

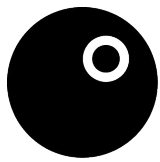
General Properties :

<p>Chemical Nature of the Preparation :</p> <p>Physical State (20°C) and Color :</p>	<p>POLYAMIDE 11, Presence of additives Possible presence of : Carbon black Colored grade = DARK Solid (powder) Colored Grade : Mass Black</p>	
<p>Average Particle Size :</p> <p>Grain Size :</p> <p>Grain Size :</p> <p>Grain Size :</p> <p>Powder packed Density 23 °C :</p> <p>Part Density :</p> <p>23°C Moisture absorption 24 hrs :</p>	<p>Diffraction laser :</p> <p>D10</p> <p>D50</p> <p>D90</p> <p>Method FABULOUS :</p> <p>Method FABULOUS :</p> <p>ASTM D570</p>	<p>45 < _ < 60 μm</p> <p>35 μm</p> <p>50 μm</p> <p>70 μm</p> <p>0,55 +/- 0,05 g/cm³</p> <p>1,02 +/- 0,05 g/cm³</p> <p>1,12 +/- 0,05 %</p>

Mechanical Properties :

<p>Young Modulus*</p> <p>Flexural Modulus*</p> <p>Tensile strength (Average XY)*</p> <p>Tensile strength (Average Z)*</p> <p>Elongation at break (Average XY)*</p> <p>Elongation at break (Average Z)*</p> <p>Charpy – Impact strength*</p> <p><i>*statistics after several cycles >10 refresh</i></p>	<p>ISO 527</p> <p>ISO 178</p> <p>ISO 527</p> <p>ISO 527</p> <p>ISO 527</p> <p>ISO 527</p> <p>ISO 179 (20°C)</p>	<p>1300 - 1500 MPa</p> <p>1100 - 1300 MPa</p> <p>45 +/- 3 MPa</p> <p>38 +/- 3 MPa</p> <p>40 +/- 10 %</p> <p>25 +/- 5 %</p> <p>NO BREAK dry/Cond.24 hrs KJ/m²</p> <p>50 cond. 24 hrs</p>
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The mechanical properties can vary according to the positioning of the tensile bars, operating conditions and exposure parameters of the systems used. These data rest on the current state of our knowledge. They do not give the exact characteristics of material and does not represent a guarantee.



Thermal Properties :

T_f Melting Point : T_g Glazing Point : T° Process : According to machine the Black color offset the reading :	DSC DSC Glazing Method	196 < _ < 204 °C 40 < _ < 46 °C - 12 +/- 2 °C (ex : 187 °C +/-2)
Flammability – Fire Classification UL-94 following ASTM D618(ISO 921) with a barrel 125 mm x 13 mm, e=13 mm	UL94 vertical & Horizontal test	Colored grade: HC Out Classification

Electrical Properties :

According to the value reach in CEI 93 the material is considered as : **ISOLANT**

Volume resistivity Horizontal surface Voluminal resistivity Vertical surface Voluminal resistivity	CEI 93 CEI 93 CEI 93	1.3 E+13 Ohms/m 1.2 E+15 Ohms 1.5 E+15 Ohms
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Surface Finish :

Natural Coloration : Shore D Hardness : Surface Ra/ Upper Facing processed & blasting : Surface Ra/ Upper Facing after Finishing :	Visual ISO 868 (20°C) ISO 4287 ISO 4287	Mass Black 75 Shore D 10 +/- 2 µm 6 +/- 1 µm
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Chemical Properties :

Matrix in Polyamide 11 with a good chemical resistance to alkaline, hydrocarbons, oils, gasoline's, gas oil and solvents.
 Attack by the acids. Sealing of wall starting from **1.6 mm thickness**.

SOLUBILITY : WATER : Solvents : Odor : pH:	Insoluble in Water on the basis of its structure at 20 °C < 1 mg/m3 (estimated) Soluble in :Mineral acids, Phenols Insoluble in most organic solvents Insoluble in : Chlorinated solvents, Alkaline conditions None NA
Melting Point / Range : Decomposition Temperature : Explosive Properties : Explosive Limits :	> 180 °C Polymer: > 350 °C Dust may form explosive mixture in air (30 - 60 g/m3) Test of dust behavior in explosions : Kst = 200 - 250 m.bar/s PURE / 301 m.bar/s Explosibility class : St2 PURE Standard : ISO 6184/1 - ASTM E 1226 Lower : (in air 30 - 60 g/m3) Higher (*) : In air (*) Approximately 200 g/m3 (estimated)

Data Sheet_DARK PA11_ May 2020.