3rd May 2024

4MELLA : FLAME RETARDANT BIOBASED THERMOPLASTIC POLYURETHANE

The **4MELLA** pellets belong to the **Thermoplastic PolyUrethane (TPU)** is a thermoplastic Elastomer which provides a **flexible** properties and excellent physical and mechanical performances while being biobased. This material, **biobased** content of **25.5%**, is phthalate and halogen-free with a hardness range between 65 and 75ShA. A combination of flame-retardant additives provides an **extremely good fire protection** compatible with **railway regulation** EN 45545 (HL2-R22, R23 & R24).

KEY FEATURES

- Flexible properties
- Excellent physical and mechanical performances
- Hardness range between 65 and 75ShA
- Biobased content 25.5%
- Extremely goof fire protection (compatible with HL2-R22, R23 & R24)
- Phthalate and Halogen-free
- Easy to print

COLOURS

Black White

Pellet avalaible

Material Properties					
Description	**Test Method**	**Injection Moulded**	**3D Printed XYZ**	**3D Printed YZX**	**3D Printed ZXY**
Density	ISO 1183	1.295 g/cm^3			
MFR (@190°C – 2.16kg)	ISO 1133-1	16.57 g/10min			
Hardness Test	ISO 48-4	81 ShA	74 ShA	54 ShA	57 ShA
Tear Test	ISO 34-1	-	59 kN/m	50 kN/m	32 kN/m
Tensile Strength at yield	ISO 37	21.3 MPa	17 MPa	>11 MPa	4.5 MPa
Elongation Strain at Break	ISO 37	1144%	1000 – 1300%	600%	>250%
Tensile (E) modulus	ISO 37	-	31 MPa	35 MPa	30 MPa
Oxygen Index (%)	ISO 4589-2	>28% [thickness range: 1.2 – 10 mm]			
Smoke density	ISO 5659-2	<300 kW/m^2 [thickness range: 1.2 – 10 mm]			
Toxicity Index of Smoke	NFX70-100 1 et -2	<0.9 [thickness range: 1.2 – 10 mm]			

Print Properties	
Description	**Typical Value**
Nozzle Size	0.6 mm
Bed Adhesion	-
Nozzle Temperature	215 ± 10°C
Bed Temperature	-
Layer Height	0.36 mm
Print Speed	20 mm/s
Fan Speed	100% (depending of part)
Extrusion Multiplier / Material Flow	100%
Retraction Distance	2 mm
Retraction Speed	45 mm/s
Coasting distance	0.28 mm
Wipe nozzle	0.07 mm
Difficulty to Print	Easy
Drying Required	Min. 4 hours suggested @70°C

Additional info

4MELLA is particularly designed for applications requiring flexibility and good fire protection.

Figure 1. Bellows printed with 4MELLA

Packaging & Storage: Please be careful to store 4MELLA pellets away from source of light, temperature and moisture.

Print Conditions: All specimens have been printed using a 0.6mm nozzle and the layer height was set to 0.3mm. The room in which the 3D-printer was located had an environmental temperature of ± 25°C.

* The room in which the Universal Testing Machine was located had an environmental temperature of ± 20°C.

* Test Conditions: The Oxygen Index test and Smoke density test have been carried out according to ISO 4589-2 and ISO 5659-2 at the lab scale. Certification tests are in progress on 3D printed parts.
