

### ESSENTIUM PET-CF

Essentium PET-CF is a 15% carbon fiber reinforced polyester filament made with Luvocom® 3F resin from Lehvoss. Polyethylene terephthalate (PET) is a semicrystalline polyester commonly used in soda bottles and automotive parts when reinforced with a fiber-filler. This material is one of the easiest filaments in our portfolio to print and has an outstanding price-to-performance ratio. PET-CF has a good balance of stiffness and strength, and when annealed it has temperature resistance of over 155°C, and good chemical resistance for common solvents.

### MECHANICAL PROPERTIES

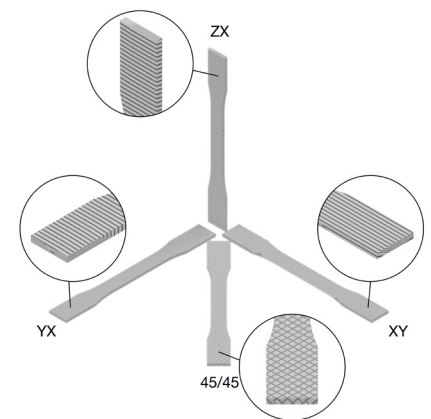
| Metric  | Test Method | Print Orientation |             |             |             |
|---|-------------|-------------------|-------------|-------------|-------------|
|   |             | XY                | 45/45       | YX          | ZX          |
| Ultimate Tensile Strength, MPa                  | ISO 527-2   | 70.7 (5.1)        | 49.7 (1.4)  | 17.7 (0.8)  | 41.1 (2.4)  |
| Tensile Modulus, GPa                            | ISO 527-2   | 9.38 (0.28)       | 4.56 (0.22) | 3.25 (0.05) | 2.99 (0.14) |
| Strain at Break, %                              | ISO 527-2   | 1.3 (0.2)         | 1.9 (0.1)   | 1.2 (0.2)   | 2.6 (0.5)   |
| Flexural Strength, MPa                          | ISO 178     | 131 (1)           | 81.2 (2.2)  | 53.3 (1.7)  | 96.3 (3.0)  |
| Flexural Modulus, GPa                           | ISO 178     | 8.06 (0.10)       | 3.80 (0.18) | 3.48 (0.06) | 2.89 (.14)  |
| Notched Izod Impact Strength, kJ/m <sup>2</sup> | ISO 180/A   | 5.6 (0.4)         | 2.9 (0.3)   | 2.0 (0.2)   | 1.9 (0.2)   |

Standard deviations listed in parentheses

### MATERIAL PROPERTIES

| Property   | Method    | Value |
|--|-----------|-------|
| Density <sup>1</sup> , g/cm <sup>3</sup>         | ISO 1183  | 1.4   |
| HDT A <sup>2</sup> @ 1.8 MPa, °C                 | ISO 75    | 155   |
| HDT B <sup>2</sup> @ 0.45 MPa, °C                | ISO 75    | 205   |
| Moist. Absorption <sup>1</sup> (23°C / 24 hr), % | ISO 62    | 0.3   |
| Continuous Service Temperature <sup>1</sup> , °C | UL 746B   | 100   |
| Melting Point <sup>1</sup> , °C                  | ISO 11357 | 248   |
| Glass Transition Temperature <sup>1</sup> , °C   | ISO 11357 | 78    |

1 Values taken from raw material TDS    2 Specimens annealed at 140°C for 4 hours



### MATERIAL HANDLING AND DRYING

Essentium PET-CF is a slightly hygroscopic thermoplastic and will absorb moisture from humid air. Keep the material in the vacuum sealed packaging until you are ready to print with it. PET-CF filament should always be fed to the printer in a dry container and stored in a dry cabinet. If the material does absorb more than 50 ppm moisture, it should be dried in a low dew point (< -40°C) oven or vacuum oven at 90°C for 6 – 8 hours. Avoid touching filament with bare fingers or introducing oils to the filament prior to printing.

### RECOMMENDED HSE PRINT SETTINGS

#### 0.4mm Hozzle

|                     |            |                        |           |
|---------------------|------------|------------------------|-----------|
| Extrusion Width, mm | 0.4 - 0.5  | Hozzle Temperature, °C | 310 - 420 |
| Layer Height, mm    | 0.2 - 0.25 | Bed Temperature, °C    | 80 - 90   |
| Print Speed, mm/s   | 50 - 450   | IR Temperature, °C     | 20 - 40   |
| Infill, %           | 15 - 75    | Fan Speed, %           | 0 - 20    |

#### 0.8mm Hozzle

|                     |            |                        |           |
|---------------------|------------|------------------------|-----------|
| Extrusion Width, mm | 0.7 - 0.9  | Hozzle Temperature, °C | 280 - 420 |
| Layer Height, mm    | 0.3 - 0.35 | Bed Temperature, °C    | 80 - 90   |
| Print Speed, mm/s   | 20 - 200   | IR Temperature, °C     | 20 - 40   |
| Infill, %           | 15 - 75    | Fan Speed, %           | 0 - 20    |

### RECOMMENDED FDM PRINT SETTINGS

|                         |           |                     |                              |
|-------------------------|-----------|---------------------|------------------------------|
| Nozzle Temperature, °C  | 265 - 285 | Fan Speed, %        | 0 - 25                       |
| Bed Temperature, °C     | 60 - 80   | Bed Material        | G-10/FR4                     |
| Print Speed, mm/s       | 20 - 80   | Bed Adhesion Method | Magigoo® Standard / Dimafix® |
| First Layer Speed, mm/s | 20 - 30   | Infill Density, %   | 15 - 75                      |

### KEY FEATURES:

- Excellent price-to-performance ratio
- Good stiffness and strength
- Very low warping
- Very low moisture absorption
- Good temperature, chemical and wear resistance

### APPLICATIONS INCLUDE:

- Jigs, fixtures, tooling
- Functional prototypes
- Brackets
- Automotive parts
- Component housings

Version 1.1  
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