

HOW TO READ A UL BLUE CARD.



Example Blue Card and White Card, other information and ratings may be shown

Plastics for Additive Manufacturing
[\[guide info\]](#)

ABC Company
333 Pflingsten Rd Northbrook, IL 60062 USA

4300
Polyetherimide (PEI), furnished as filaments

Material performance classifications are achieved when utilizing the processing parameters indicated below

Printing Process Designation Number:

Process Category: Material Extrusion

E12345

Color	Min Thk (mm)	Flame Class	HWI	HAI	RTI Elec	RTI Imp	RTI Str
NC	1.5	V-0	0	0	105	105	105
	3.0	V-0, 5VA	0	0	105	105	105

Comparative Tracking Index (CTI): 3

Dielectric Strength (kV/mm): 20

High-Voltage Arc Tracking Rate (HVTR): 2

Inclined Plane Tracking (IPT): -

Volume Resistivity (10⁴ ohm-cm): 17

High Volt, Low Current Arc Resis (D495): 6

Processing Parameters

Build Plane: Horizontal Raster Angle (Degrees): 0/90

Layer Thickness (mm): 1.8 Print Speed (mm/sec): 6

Infill (%): 100

Post Processing Method: Thermoforming

For use with printer: MXX 2500 (XYZ Systems Corporation)

Limited properties and ratings assigned to samples produced by Additive Manufacturing technique representing a specific set of printing parameters and build strategy. Other print parameters and build strategies may result in significantly different results.

ANSI/UL 94 small-scale test data does not pertain to building materials, furnishings and related contents. ANSI/UL 94 small-scale test data is intended solely for determining the flammability of plastic materials used in the components and parts of end-product devices and appliances, where the acceptability of the combination is determined by UL.

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IEC and ISO Test Methods

Test Name	Test Method	Units	Thk (mm)	Value
Flammability	IEC 60695-11-10, IEC 60695-11-20	Class (color)	1.5	V-0 (NC)
			3.0	V-0, 5VA (NC)
Glow-Wire Flammability (GWFI)	IEC 60695-2-12	°C	1.5	960
			3.0	960
Glow-Wire Ignition (GWIT)	IEC 60695-2-13	°C	1.5	875
			3.0	875
IEC Comparative Tracking Index	IEC 60112	Volts (Max)	-	-
IEC Ball Pressure	IEC 60695-10-2	°C	-	-
ISO Heat Deflection (1.80 MPa)	ISO 75-2	°C	-	-
ISO Tensile Strength	ISO 527-2	MPa	-	-
ISO Flexural Strength	ISO 178	MPa	-	-
ISO Tensile Impact	ISO 8256	kJ/m ²	-	-
ISO Izod Impact	ISO 180	kJ/m ²	-	-
ISO Charpy Impact	ISO 179-2	kJ/m ²	-	-



Flame Class – UL94

Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, now harmonized with IEC 60695-11-10, 60695-11-20, ISO 9772 and ISO 9773. There are twelve UL 94 specified flame classifications assigned to materials based on the results of these small-scale flame tests.

HWI – Hot Wire Ignition

The test method for the determination of resistance to ignition of plastic materials from an electrically heated wire is described in the Standard ASTM D 3874.

HAI – High Arc Ignition

The HAI test determines a material's ability to withstand electrical arcing either directly on or just above the surface of the plastic material. This can occur in the presence of open switch contacts or in the event of the failure of an electrical connection.



RTI – Relative Thermal Index

The maximum service temperature for a material where a class of critical property will not be unacceptably compromised through chemical thermal degradation over the reasonable product lifetime. Electrical RTI is associated with critical electrical insulating properties. Mechanical impact RTI is associated with critical impact resistance, resilience and flexibility properties. Mechanical strength RTI or mechanical without impact is associated with critical mechanical strength where impact resistance, resilience, and flexibility are not essential.

Note: For some tests a Performance Level Category (PLC) may be assigned. This is typically a numeric rating from 0 – 5, where each number represents a range of property values, and 0 represents the best rating available.



CTI – Comparative Tracking Index

ASTM D 3638 (IEC 60112) Method: This test is used as a measure of the susceptibility of the material to tracking.

Dielectric Strength

The test method for the determination of the dielectric breakdown and strength of insulating materials, described in the Standard ASTM D 149 (IEC 60243).

HVTR – High Voltage Arc Tracking Rate

Test method to determine the susceptibility of the test material to track or form a visible carbonized conducting path over the surface when subjected to high-voltage, low-current arcing.

IPT – Inclined Plane Tracking

Described in the Standard ASTM D 2303, used as a measure of the susceptibility of a material to track.

Volume Resistivity

Testing according to ASTM D 257 (IEC 60167), procedures for the determination of d-c volume resistance, volume resistivity, surface resistance, and surface resistivity of electrical insulating materials.

High Voltage, Low Current Arc Resistance

Testing to ASTM D495, based on the number of seconds that a material resists the formation of a surface-conducting path when subjected to an intermittently occurring arc of high-voltage, low-current characteristics.



Process Category

Definition of the 3D Printing technology:

- Material Extrusion
- Powder Bed Fusion Systems
- VAT Polymerization
- Material Jetting
- Binder Jetting
- Sheet Lamination
- Directed Energy Deposition



Build plane

The plane in which the samples are built, either horizontal or vertical.

Layer thickness

The thickness of one printed layer (in mm or microns).

Post processing method

Processing applied to the printed part after printing (eg. blasting, coating, electro-plating, etc.).

Specific to Material Extrusion:

Air gap

Shortest distance between two adjacent beads of the material (in mm or microns).

Print speed

The speed of printing (in mm/sec).

Raster angle

The angle of a printed layer relative to x-axis of the part (in degrees).

Specific to Powder Bed Fusion:

Hatch spacing

Distance between the adjacent hatch lines (in mm or microns).

Scan strategy

Scan strategy refers to the laser scan pattern used for performing the fusion. (Ex., Parallel Scans, Alternate Scans, etc.,).

Scan Speed

Speed of the laser beam on the heated powder bed (in mm/sec).

Laser Power

Power value of the laser beam (in Watts).