Preliminary

P3™ Deflect™ 190 ESD

High temperature resistant resin with HDT of 190°C, electrostatic dissipative properties (ESD), and high stiffness.

P3 Deflect 190 ESD is a high temperature resistant resin with HDT (Heat Deflection Temperature) of 190°C, electrostatic dissipative properties (ESD), and high stiffness. Developed for Origin® One with Henkel®, it offers a smooth surface finish and high chemical resistance, making it an ideal choice for jigs and fixtures in general and electronic manufacturing. Additionally, its unique characteristics make it a reliable option for tooling applications, offering versatile solutions for manufacturing needs.

Benefits

- Displays electrostatic dissipative properties (ESD)
- High HDT of 190°C
- High accuracy and fine detail printing

Applications

- High temperature solder reflow
- Electrical housings and sleeves
- Tooling at high temperature, low pressure
- Jigs and fixtures for electronic device manufacturing processes

Liquid Properties

PROPERTY	UNIT	METHOD	VALUE
Viscosity at 25°C (77°F)	cP	ASTM D7867	9,000 – 11,000 [9]
Liquid Density	g/cm3	ASTM D1475	1.1 – 1.2 [10]

Mechanical Properties

PROPERTY	UNIT	METHOD	GREEN	POST PROCESSED
Young's Modulus	MPa	ASTM D638	1300 – 1500	2800 – 3000 [1]
Tensile Stress at Break	MPa	ASTM D638	25 – 30	40 – 50 [1]
Elongation at Break	%	ASTM D638	2 – 3	1 – 2 [1]
Flexural Modulus	MPa	ASTM D790	1250 – 1350	3200 – 3400 [2]
Flexural Strength	MPa	ASTM D790	40 – 50	75 – 85 [2]
Flexural Strain at Break	%	ASTM D790	3.0 – 4.3	2.0 – 2.8 [2]
IZOD Impact (Notched)	J/m	ASTM D256		11.5– 12.5 [3]
Shore Hardness (3s)	D	ASTM D2240		86.5 [4]

Electrical Properties

PROPERTY	UNIT	METHOD	POST PROCESSED
Surface Resistivity	Ω	DIN EN61340-2-3	104 – 1011 [1]
Volume Resistivity	Ω·cm	DIN EN61340-2-3	4·106 – 24·106 [2]
Dielectric Strength	kV/mm	ASTM D149	-
AC Relative Permittivity (Dielectric Constant)[3]			
at 50 Hz (XY)	none	ASTM D150	-
at 1 kHz (XY)	none	ASTM D150	-
at 1 MHz (XY)	none	ASTM D150	-
AC Loss Characteristic (Dissipation Factor)[4]			
at 50 Hz (XY)	none	ASTM D150	-
at 1 kHz (XY)	none	ASTM D150	-
at 1 MHz (XY)	none	ASTM D150	-

Other Properties

PROPERTY	UNIT	METHOD	POST PROCESSED
HDT at 0.455 MPa	°C	ASTM D648	180 – 190 [5]
HDT at 1.82 MPa	°C	ASTM D648	100 – 110 [5]
Water Absorption (24 hr)	%	ASTM D570	<0.4 [6]
Solid Density	g/cm3	ASTM D1475	1.20 – 1.25 [7]
Thermal Conductivity	W/(m·K)	ASTM D5930	1.4[8]
Heat Capacity	J/(g·K)	ASTM D5930	0.21[8]

WORKFLOW

Validated workflows need to be followed to achieve properties as provided in the TDS. Examples of validated workflow steps are listed below. Users should defer to the most current workflow information for best results which can be found at https://www.loctiteam.com/printer-validation-settings

PRINTER SETTINGS

P3 Deflect 190 ESD is formulated to print optimally on Origin One P3™ DLP printer. Read the safety data sheet carefully to get details about health and safety instructions. Recommended print parameters:

- Shake gently to prevent foaming.
- Print Temperature: 20°C to 45°C
- Intensity: 3 mW/cm² to 10 mW/cm²

RECOMMENDED PRINTER PARAMETERS	
Print Temperature (°C):	25 - 45
Printer Wavelengths (nm):	385, 405
Irradiance (mW/cm2):	3 - 10

Layer Thickness (µm):	100
Burn-in Region (s)	40-50
Transition Region (s):	15-25
Model Region (s):	7-8

Example Print Parameters: 5 mW/cm² at 385 nm, 35°C

CLEANING

P3 Deflect 190 ESD requires post processing to achieve specified properties. Prior to post curing, support structures should be removed from the printed part, and the part should then be washed. Use compressed air to remove residual solvent from the surface of the material between intervals.

POST PROCESS STEP	AGENT	METHOD	DURATION	INTERVALS	ADDITIONAL INFO
Cleaning Step	IPA	Ultrasonic	2 min	1 or 2	Allow parts to dry
Dry	-	Compressed air	10 to 60 s	1 or 2	Air pressure (50 psi)
Wait before post curing	-	Ambient condition	60 min	1	Room temperature

POST CURING

P3 Deflect 190 ESD requires post curing to achieve specified properties. It is recommended that either an LED or wide spectrum lamp be used to post cure parts.

After using a post curing unit, an additional heat cure at 170°C for 3 hours is required to reach the best properties. Allow the parts to rest one hour between UV cure and heat cure. To minimize risk of warpage place parts in cold oven before ramping up temperature to target value and cool down parts slowly in switched off oven after reaching the heat curing conditions.

UV CURVING UNIT	UV SOURCE	INTENSITY	CURE TIME PER SIDE	ADDITIONAL SETTINGS (SHELF, OUTPUT ENERGY)	HEAT CURE
Dymax 5000 EC Flood	Mercury Arc Bulb (broad spectrum)	148 mW/cm² at 380 nm	10 min	400W, Shelf K	3 hours at 170°C
Loctite CL36	405nm LED	80 mW/cm² at 405 nm	30 min	100% top & side	3 hours at 170°C
Rapidshape RS Cure XL	Multiple LEDs	150%	30 min	Third shelf from bottom	3 hours at 170°C

STORAGE

Store P3 Deflect 190 ESD in the unopened container in a dry location. Optimal storage: 20°C to 30°C, storage below 20°C or greater than 30°C can adversely affect products properties. More specific information is given in the Safety Data Sheet.

ESD PROPERTIES

P3 Deflect 190 ESD provides ESD properties with a surface resistivity in the range of 104Ω to 1011Ω accordingly to DIN EN61340-2-3.

The exact value of the surface resistivity depends on the print orientation and part geometry. Please note that the burn-in region can show higher surface resistivity outside of the ESD range. Due to that we recommend printing with parts on supports or to adjust the print orientation accordingly to ensure that the printed part provides ESD properties at the desired surface.

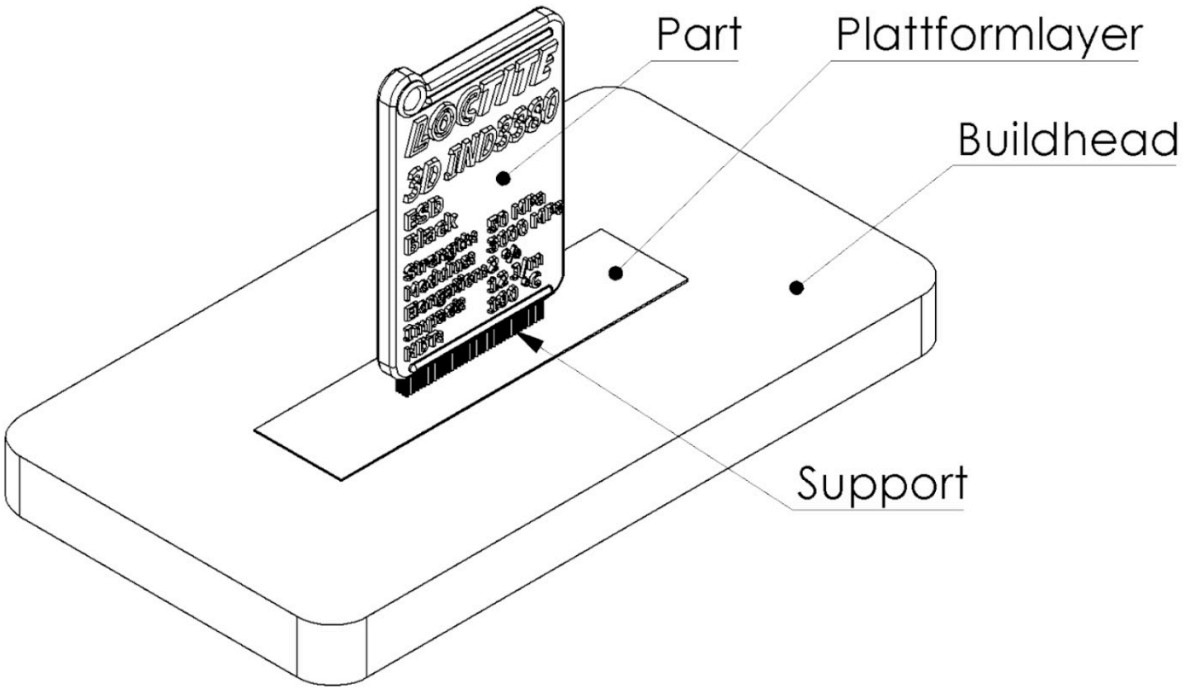
TIPS & TRICKS

This section is a collection of useful advice, guides, and recommendations designed to help users of the P3 Deflect 190 ESD deal with specific process tasks more efficiently.

PRINT ORIENTATION

To enhance the build head adhesion of P3 Deflect 190 ESD, it is recommended to use an initial platform layer. The required part should be attached to this layer using supports. The burn-in region, which will be the initial platform layer, can be discarded afterwards. This also ensures that the printed part provides the desired ESD performance since the burn-in region can show higher surface resistivity outside of the ESD range.

The part should be orientated to have the smallest possible cross-sectional area in the z-direction to minimize detachment forces during the print process.



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