

# ESD

A rugged ESD-safe material to improve your electronics manufacturing workflows.

Reduce risk and increase manufacturing yield by 3D printing custom tools, jigs, and fixtures with ESD Resin that protect your critical electronics components from static discharge. ESD Resin is a cost-effective solution for producing static-dissipative parts designed to endure use on the factory floor.

**Anti-static prototypes and end-use parts**

**Housings for sensitive electronics**

**Tooling, jigs, and fixtures for electronics manufacturing**



**FLESDS01**

\* May not be available in all regions

**Prepared** 12 . 01 . 2021

**Rev.** 01 12 . 01 . 2021

To the best of our knowledge the information contained herein is accurate. However, Formlabs, Inc. makes no warranty, expressed or implied, regarding the accuracy of these results to be obtained from the use thereof.

MATERIAL PROPERTIES DATA

ESD Resin

|                                  | METRIC <sup>1, 2</sup>                 | IMPERIAL <sup>1, 2</sup>  | METHOD                      |
|----------------------------------|----------------------------------------|---------------------------|-----------------------------|
|                                  | Post-Cured                             | Post-Cured                |                             |
| Mechanical Properties            |                                        |                           |                             |
| Ultimate Tensile Strength        | 44.2 MPa                               | 6410 psi                  | ASTM D 638-14               |
| Tensile Modulus                  | 1.937 GPa                              | 280.9 ksi                 | ASTM D 638-14               |
| Elongation at Break              | 12%                                    | 12%                       | ASTM D 638-14               |
| Flexural Properties              |                                        |                           |                             |
| Flexural Strength                | 61 MPa                                 | 8860 psi                  | ASTM D 790-17               |
| Flexural Modulus                 | 1.841 GPa                              | 267 ksi                   | ASTM D 790-17               |
| Impact Properties                |                                        |                           |                             |
| Notched Izod                     | 26 J/m                                 | 0.489 ft-lbs/in           | ASTM D 256-10               |
| Unnotched Izod                   | 277 J/m                                | 5.19 ft-lbs/in            | ASTM D 4812-11              |
| Thermal Properties               |                                        |                           |                             |
| Heat Deflection Temp. @ 1.8 MPa  | 54.2 °C                                | 129.6 °F                  | ASTM D 648-18               |
| Heat Deflection Temp. @ 0.45 MPa | 62.2 °C                                | 143.9 °F                  | ASTM D 648-18               |
| Thermal Expansion                | 123.7µm/m/°C                           | 68.7µin/in/°F             | ASTM E 813-13               |
| Electrical Properties            |                                        |                           |                             |
| Surface Resistivity              | 10 <sup>5</sup> - 10 <sup>8</sup> Ω/sq |                           | ANSI/ESD 11.11 <sup>3</sup> |
| Volume Resistivity               | 10 <sup>5</sup> - 10 <sup>7</sup> Ω-cm |                           | ANSI/ESD 11.11 <sup>3</sup> |
| Physical Properties              |                                        |                           |                             |
| Density                          | 1.116 g/cm <sup>3</sup>                | 69.67 lbs/ft <sup>3</sup> | ASTM D792                   |
| Hardness                         | 90 Shore D                             |                           | ASTM D2240                  |

<sup>1</sup> Material properties may vary based on part geometry, print orientation, print settings, temperature, and disinfection or sterilization methods used.

<sup>2</sup> Data for post-cured samples were measured on Type IV tensile bars printed on a Form 3 printer with 100 µm ESD Resin settings, washed in a Form Wash for 20 minutes in ≥99% Isopropyl Alcohol, and post-cured at 70°C for X 60 minutes in a Form Cure.

<sup>3</sup> ESD Resin was tested at ETS 700 West Park Avenue, Perkasie, PA 18944.

SOLVENT COMPATIBILITY

Percent weight gain over 24 hours for a printed and post-cured 1 x 1 x 1 cm cube immersed in respective solvent:

| Solvent                         | 24 hr weight gain, % | Solvent                                    | 24 hr weight gain, % |
|---------------------------------|----------------------|--------------------------------------------|----------------------|
| Acetic Acid 5%                  | 0.5                  | Mineral oil, heavy                         | 0.1                  |
| Acetone                         | 13.1                 | Mineral oil, light                         | 0.1                  |
| Bleach ~5% NaOCl                | 0.5                  | Salt Water (3.5% NaCl)                     | 0.6                  |
| Butyl Acetate                   | 3.8                  | Skydrol 5                                  | 0.5                  |
| Diesel Fuel                     | 0.2                  | Sodium hydroxide solution (0.025% pH = 10) | 0.7                  |
| Diethyl glycol monomethyl ether | 3.6                  | Strong Acid (HCl Conc)                     | 1.4                  |
| Hydraulic Oil                   | 0.2                  | TPM                                        | 0.6                  |
| Hydrogen peroxide (3%)          | 0.6                  | Water                                      | 0.7                  |
| Isooctane                       | < 0.1                | Xylene                                     | 1.60                 |
| Isopropyl Alcohol               | 2.6                  |                                            |                      |