

# DuraForm<sup>®</sup> FR1200

A flame-retardant nylon 12 material with high accuracy and excellent surface finish. Ideally suited for direct 3D production in aerospace, transportation and consumer goods applications where reliable fire retardancy and reduced smoke and toxicity are required.

## General Properties

| MEASUREMENT   | CONDITION | METRIC | U.S. |
|---|-----------|--------|------|
| Sintered Part Density (g/cm <sup>3</sup>   lb/in <sup>3</sup> ) | ASTM D792 | 1.02   | .037 |
| Water Absorption (%)  | ASTM D570 | 0.29   | 0.29 |

## Mechanical Properties

| MEASUREMENT                              | CONDITION  | METRIC | U.S. |
|--|------------|--------|------|
| Tensile Strength Ultimate (MPa   psi)    | ASTM D 638 | 41     | 6010 |
| Tensile Modulus (MPa   ksi)              | ASTM D 638 | 2040   | 296  |
| Elongation at Break (%)                  | ASTM D 638 | 5.9    | 5.9  |
| Flexural Strength, Ultimate (MPa   psi)  | ASTM D 790 | 62     | 8940 |
| Flexural Modulus (MPa   ksi)             | ASTM D 790 | 1770   | 257  |
| Hardness, Shore D                        | ASTM D2240 | 76     | 76   |
| Impact Strength @ 0.12" (J/m   ft-lb/in) | ASTM D256  |        |      |
| Notched Izod, 23°C                       |            | 25     | 0.46 |
| Unnotched Izod, 23°C                     |            | 233    | 4.4  |

## Thermal Properties

| MEASUREMENT   | CONDITION  | METRIC                       | U.S.                         |
|---|--|------------------------------|------------------------------|
| Heat Deflection Temperature<br>@ 0.45 MPa<br>@ 1.82 MPa             | ASTM D638  | 180 °C<br>94 °C              | 356 °F<br>201 °F             |
| Coefficient of Thermal Expansion (0-145°C)<br>(µm/m-°C   µin/in-°F) | ASTM E831  | 140                          | 78                           |
| Specific Heat Capacity<br>(J/g-°C   BTU/lb-°F)                      | ASTM E1269<br>@ 23°C<br>@ 50°C<br>@ 100°C<br>@ 150°C | 1.38<br>1.68<br>2.03<br>2.51 | 0.33<br>0.40<br>0.48<br>0.60 |
| Thermal Conductivity<br>(W/m-K   BTU-in/hr-ft <sup>2</sup> -°F)     | ASTM E1530   | 0.22                         | 1.53                         |

The parts used to generate the above data were generated by building parts using 100% virgin powder using default parameters on an sPro™ 60 HD-HS printer.

## Features

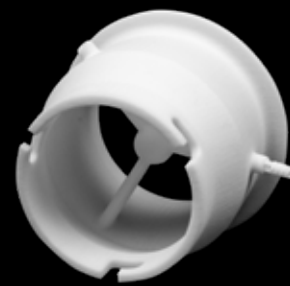
- FAR 25.853 compliant
- Passes AITM smoke density and toxicity requirements
- High accuracy and repeatability needed for manufacturing
- Non-halogenated formulation
- Excellent surface quality

## Benefits

- Reduce fuel costs with weight optimized design enabled by additive manufacturing
- Accelerate changes in cabin designs for in service aircraft
- Eliminate tooling and minimize spare part stocking costs
- Excellent flame retardancy at 12 and 60 second exposures

## Applications

- Direct 3D production of aircraft interior parts
- Parts requiring flame retardancy
- Automotive and transportation related parts where fire safety may be needed
- Consumer electronics and other goods



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## Electrical Properties

| MEASUREMENT                          | CONDITION | METRIC                  | U.S.                    |
|--------------------------------------|-----------|-------------------------|-------------------------|
| Volume Resistivity (ohm-cm   ohm-in) | ASTM D257 | 5.97 x 10 <sup>14</sup> | 2.35 x 10 <sup>14</sup> |
| Surface Resistivity (ohm)            | ASTM D257 | 2.56 x 10 <sup>13</sup> | 2.56 x 10 <sup>13</sup> |
| Dissipation Factor, 1 KHz            | ASTM D150 | 0.038                   | 0.038                   |
| Dielectric Constant, 1 KHz           | ASTM D150 | 3.0                     | 3.0                     |
| Dielectric Strength (kV/mm   kV/in)  | ASTM D149 | 22.6                    | 575                     |

## Flammability Properties

| MEASUREMENT   | CONDITION                       | METRIC  | U.S.  |
|---|---------------------------------|---------|-------|
| FAR 25.853 (a) and Appendix F Part I (b)(4) (mm   in)     | 60 sec                          | 43.0    | 0.16  |
| FAR 25.853 (a) and Appendix F Part I (a)(1)(ii) (mm   in) | 12 sec                          | 2       | 0.08  |
| AITM 2.0007B Smoke Density                                | Flaming Mode                    | 12 sec  | pass  |
|   | Non Flaming Mode                | 3 sec   | pass  |
| AITM 3.0005 Combustion Toxicity                           | Flaming Mode                    | pass    | pass  |
|   | Non Flaming Mode                | pass    | pass  |
| AITM 2.0006 (kW/m <sup>2</sup>   BTU/s ft <sup>2</sup> )  | Maximum Heat Release Rate (HRR) | -       | 141.3 |
|   | Total Heat Release (HR)         | 2 min   | 105.2 |
| Flammability (UL File #E494541)                           | V2 @ 5.0 mm (0.2")              | UL 94 V | pass  |
|   | HB @ 1.5 mm (0.06")             |         | pass  |

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