



# DuraForm® FR-106

Premium flame retardant Nylon 11

## Flame Retardant Nylon 11

Selective Laser Sintering  
(SLS)

### ACHIEVE FLAME, SMOKE, AND TOXICITY (FST) RATING OF PARTS FOR PRODUCTION USE

DuraForm FR-106 is a fire retardant Nylon 11 that produces parts that can withstand intense functional testing and use. Parts produced can achieve fire, smoke, and toxicity (FST) rating and is part of the family of offerings that can be certified to pass the FAR 25.853 60 second vertical burn requirement. DuraForm FR-106 can be approved for end-use production applications in segments like Aerospace & Defense, Transportation, and Consumer Goods.



### APPLICATIONS

- Automotive and aerospace production
- Housings and enclosures
- Complex thin wall geometries requiring strength and accuracy

### BENEFITS

- Fire retardant Nylon 11
- Superior mechanical properties while maintaining high levels of flame retardancy
- Capable of withstanding intense functional testing and use
- Only SLS material certified to pass FAR 25.853 60 second vertical burn requirement
- Achieve Flame, Smoke, and Toxicity (FST) rating that allows AM of parts for production use

### FEATURES

- Industry benchmark flame retardant material
- Able to be certified to pass the FAR 25.853 60 second vertical burn requirement
- Parts are functional (tough), long-term stable, and delivers chemical resistance
- Properties are effectively at parity with standard PA11 offerings
- Designed for use as end-use production parts

## MATERIAL PROPERTIES

The full suite of mechanical properties is given per ASTM and ISO standards where applicable. In addition, properties such as flammability, dielectric properties, and 24 hour water absorption are provided. This allows for better understanding of the material capability to aid in design decisions for the material. All parts are conditioned per ASTM recommended standards for a minimum of 40 hours at 23°C, 50% RH.

Solid material properties reported were printed along the XY-axis.

SOLID MATERIAL						
METRIC	ASTM METHOD	METRIC	ENGLISH	ISO METHOD	METRIC	US
PHYSICAL				PHYSICAL		
Solid Density	ASTM D792	1.07 g/cm <sup>3</sup>	0.039 lb/in <sup>3</sup>	ISO 1183	1.07 g/cm <sup>3</sup>	0.039 lb/in <sup>3</sup>
24 Hour Water Absorption	ASTM D570	0.54 %	0.54 %	ISO 62	0.54 %	0.54 %
MECHANICAL				MECHANICAL		
Tensile Strength Ultimate	ASTM D638 Type IV	47 MPa	6900 psi	ISO 527 -1/2	48 MPa	6900 psi
Tensile Strength at Yield	ASTM D638 Type IV	48 MPa	6900 psi	ISO 527 -1/2	48 MPa	6900 psi
Tensile Modulus	ASTM D638 Type IV	1600 MPa	240 ksi	ISO 527 -1/2	1600 MPa	230 ksi
Elongation at Break	ASTM D638 Type IV	27.7 %	27.7 %	ISO 527 -1/2	28.8 %	28.8 %
Elongation at Yield	ASTM D638 Type IV	25 %	25 %	ISO 527 -1/2	26.4 %	26.4 %
Flex Strength	ASTM D790	48 MPa	7000 psi	ISO 178	52 MPa	7600 psi
Flex Modulus	ASTM D790	1300 MPa	190 ksi	ISO 178	1500 MPa	220 ksi
Izod Notched Impact	ASTM D256	29 J/m	0.5 ft-lb/in	ISO 180-A	45 J/m <sup>2</sup>	0.0216 ft-lb/in <sup>2</sup>
Izod Unnotched impact	ASTM D4812	250 J/m	5 ft-lb/in	ISO 180-U	210 J/m <sup>2</sup>	0.1002 ft-lb/in <sup>2</sup>
Shore Hardness	ASTM D2240	75 D	75 D	ISO 7619	75 D	75 D
THERMAL				THERMAL		
Tg (DMA E")	ASTM E1640 (E" Peak)	46 °C	115 °F	ISO 6721-1/11 (E" Peak)	46 °C	115 °F
HDT 0.455MPa/66PSI	ASTM D648	189 °C	373 °F	ISO 75- 1/2 B	182 °C	359 °F
HDT 1.82MPa/264 PSI	ASTM D648	58 °C	137 °F	ISO 75-1/2 A	55 °C	131 °F
CTE -20 TO 50C	ASTM E831	119 ppm/°C	66 ppm/°F	ISO 11359-2	119 ppm/°C	66 ppm/°F
CTE 75 TO 180C	ASTM E831	218 ppm/°C	121 ppm/°F	ISO 11359-2	218 ppm/°C	121 ppm/°F
UL Flammability	UL94					



# ISOTROPIC PROPERTIES

Selective laser sintering technology prints parts that are generally isotropic in mechanical properties meaning the parts printed along either the XYZ axis will give similar results. Parts do not need to be oriented to get good isotropic behavior in mechanical properties, further improving the degree of freedom for part orientation for mechanical properties.

SOLID MATERIAL					
Metric	Method	Metric			
MECHANICAL					
		ZY	XZ	XY	Z45
Tensile Strength Ultimate	ASTM D638 Type IV	47 MPa	47 MPa	43 MPa	45 MPa
Tensile Strength at Yield	ASTM D638 Type IV	48 MPa	47 MPa	Did Not Yield	Did Not Yield
Tensile Modulus	ASTM D638 Type IV	1600 MPa	1600 MPa	1600 MPa	1500 MPa
Elongation at Break	ASTM D638 Type IV	27.7 %	26 %	16.9 %	18.1 %
Elongation at Yield	ASTM D638 Type IV	25 %	24.6 %	Did Not Yield	Did Not Yield
Flex Strength	ASTM D790	48 MPa	48 MPa	47 MPa	45 MPa
Flex Modulus	ASTM D790	1300 MPa	1300 MPa	1300 MPa	1200 MPa
Izod Notched Impact	ASTM D256	29 J/m	28 J/m	25 J/m	27 J/m
Izod unnotched impact	ASTM D4812	250 J/m	317 J/m	130J/m	110J/m
Shore D Hardness	ASTM D2240	75 D	73 D	74 D	75 D

