N3XTDIMENSION®

TECHNICAL DATA SHEET

N3D-RIGID785

Ultra high-strength material

SLA DLP LCD

N3D-RIGID785 exhibits extremely high strength & rigidity while maintaining good elongation, making it suitable for high performance functional prototypes and demanding engineering applications.

KEY PROPERTIES

N3D-RIGID785	
Liquid	
Appearance	Grey
Viscosity @ 25°C	400
Material	
Tensile Strength	101 MPa
Tensile Modulus	3920 MPa
Tensile Elongation at Break	7%
Flexural Strength	177 MPa
Flexural Modulus	3870 MPa
HDT @ 0.455 MPa	118°C
HDT @ 1.8 MPa	105°C
T_α, by DMA	147°C

KEY FEATURES

- → Ultra-high strength
- → High heat deflection temperature
- → Excellent toughness

APPLICATIONS

- → Functional prototyping
- → Electrical connectors
- → Engineering

MAIN MARKETS

- → Automotive
- → Consumer goods
- → Industrial
- → Transportation
- → Electronics

ARKEMA

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MATERIAL PROPERTIES

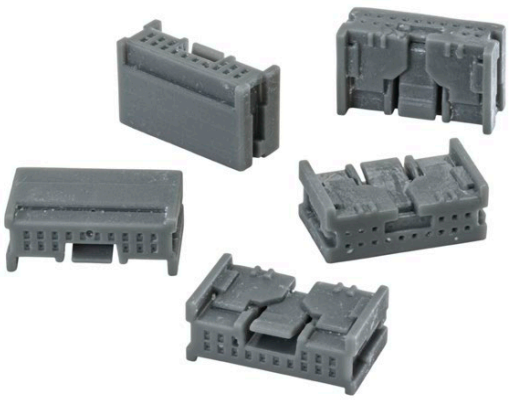
Property	Units	Method	Green[1]	Final Properties[2]
Tensile Strength	MPa	ASTM D638	47 ± 2	101 ± 3
Tensile Modulus	MPa	ASTM D638	2270 ± 120	3920 ± 270
Tensile Elongation at Break	%	ASTM D638	13 ± 10	7 ± 1
Flexural Strength	MPa	ASTM D790	73 ± 6	177 ± 2
Flexural Modulus	MPa	ASTM D790	1780 ± 150	3870 ± 80
Notched Izod Impact Resistance	J/m	ASTM D256[3]	25 ± 2	24 ± 2
HDT @ 0.455 MPa	°C	ASTM D648		118
HDT @ 1.8 MPa	°C	ASTM D648		105
Shore Hardness	Shore D	ASTM D2240		87D
T_g, by DMA	°C	ASTM D4065		147
Storage Modulus (E') Onset	°C	ASTM D4065		124
Loss Modulus (E") Peak	°C	ASTM D4065		130
Volumetric Shrinkage	%	Archimedes principle		9.5
Solid Density	g/cm^3	Density kit[4]		1.25

1 Parts were printed in the XY orientation with a 50 µm layer thickness on a 405 nm bottom-up DLP printer with an irradiance of 12 mW/cm^2. Green samples were conditioned for 40-80 hours following ASTM D618 Procedure A before testing.

2 Parts were printed in the XY orientation with a 50 µm layer thickness on a 405 nm bottom-up DLP printer with an irradiance of 12 mW/cm^2. Parts were post-cured for 60 seconds per side with 5,700 mJ/cm^2 of UVV energy dosage & 6,800 mJ/cm^2 of UVA energy dosage. Samples were conditioned for 40-80 hours following ASTM D618 Procedure A before testing.

3 Parts were printed without a notch and a notch was generated with a manual notch cutting plane.

4 Solid density was determined on 10 mm x 10 mm x 10 mm 3D printed cubes via Archimedes principle.



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LIQUID PROPERTIES

Property	Units	Method	Value
Appearance	—	—	Grey
Viscosity, 25°C	cP	Brookfield SP #31	400
Liquid Density	g/cm^3	Gardco cup	1.14

PRINTING CONDITIONS

Reactivity values were generated on a 385 nm wavelength bottom-up 3D printer with an irradiance of 4.5 mW/cm^2.

Working-Curves	Units	Value
Critical Exposure (E_c)	mJ/cm^2	2.3
Penetration Depth (D_p)	mils	4.5

3D printing parameters that can be used as starting points on LCD and DLP 3D printers are shown in the table below. Although not explicitly stated, other 3D printing parameters may be realized through process development.

3D Printing Parameter	Units	Printing & Reactivity	
Layer Thickness	µm	100	50
Wavelength	nm	405	385
Intensity	mW/cm^2	3	6
Standard Exposure Time	Sec	7	2.5
Burn in Exposure Time	Sec	35	10

For additional guidance on print parameter setup for specific 3D printers, consult with Arkema technical service teams.

POST-CURING CONDITIONS

Post-curing conditions that can be used as starting points are shown in the table below. Although not explicitly stated, other post-processing conditions may be realized through process development.

	Dymax 5000	IntelliRay 400
Time (sec)	60	60
UVA Irradiance (mW/cm^2)	100 - 120	100 - 120
UVV Irradiance (mW/cm^2)	100 - 120	100 - 120

CLEANING PROCESS

Submerge 3D printed parts in traditional 3D printing solvents and agitate and/or sonicate for approximately 10 minutes. Incorporate two-stage cleaning baths for optimal cleaning. Use compressed air to remove any residual liquid material. Repeat steps as necessary until parts are free of residual material, and then proceed to post curing. Although not explicitly stated, other cleaning procedures may be realized that adequately clean 3D printed parts.

STORAGE & HANDLING

Manually shake bottle before use. Store bottles in a cool, dry place. Do not freeze. The material is light sensitive. Keep open bottles away from ambient lighting or sunlight, and shield material from ambient light. Once opened, packaging should be resealed immediately after use. See Safety Data Sheet for additional storage & handling considerations.

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