

N3D-DIELEC731

Ultra-low dielectric loss material

SLA

DLP

LCD

N3D-DIELEC731 is an unfilled dielectric material with ultra-low loss, suitable for radiofrequency (RF) devices. N3D-DIELEC731 can be used in the manufacturing of antenna & connector elements, Luneburg lenses, waveguides, and dielectric reflectarrays.



KEY PROPERTIES

N3D-DIELEC731	
Liquid	
Appearance	Yellow
Viscosity @ 25°C	1960
Material	
Dielectric Constant, 1 kHz	2.98
Dielectric Constant, 10 kHz	2.59
Dissipation Factor, 10 GHz	0.0030
Breakdown Strength, V/μm	800
Volume Resistivity, Ω*cm	6.8269E+16
Surface Resistivity, Ω/sq	2.72018E+16
CTE 20°C (Above T _g /Below T _g)	76.73/135.3
T _g Onset (°C), TGA	216°C



KEY FEATURES

- Ultra-low dielectric loss
- Low moisture uptake
- High breakdown strength
- Stable dielectric constant across broad frequency range



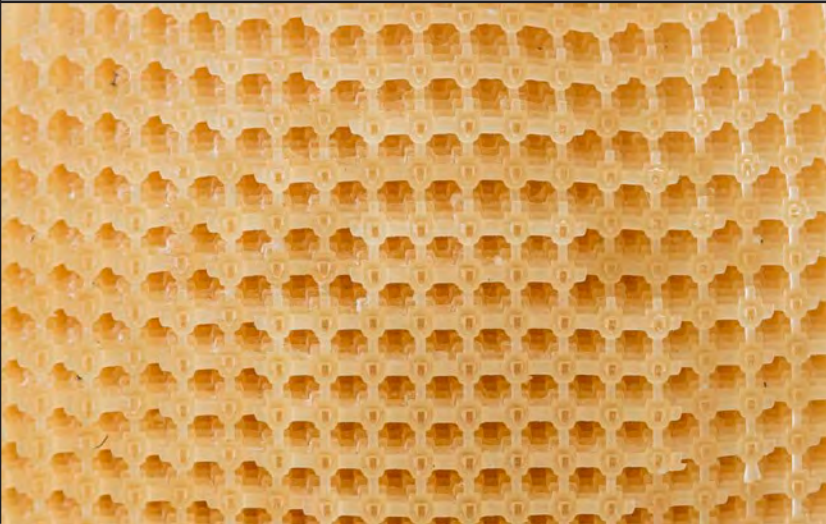
APPLICATIONS

- High frequency RF devices
- Antenna & connector elements
- Luneburg lenses
- Waveguides
- Dielectric reflectarrays



MAIN MARKETS

- Electronics
- Automotive
- Industrial
- Transportation



MATERIAL PROPERTIES

Property	Units	Method	Final Properties
Tensile Strength	MPa	ASTM D638	38 ± 2
Tensile Modulus	MPa	ASTM D638	2340 ± 10
Tensile Elongation at Break	%	ASTM D638	5 ± 1
Flexural Strength	MPa	ASTM D790	73 ± 11
Flexural Modulus	MPa	ASTM D790	2020 ± 90
HDT @ 0.455 MPa	°C	ASTM D648	102
HDT @ 1.8 MPa	°C	ASTM D648	67
T _g , by DMA	°C	ASTM D4065	77
Water Absorption	% weight gain, 24 hours	ASTM D570	0.38
Dielectric Constant	1 kHz/23°C	ASTM D150	2.98
Dielectric Constant	10 GHz/23°C	IPC-TM-650 2.5.5.13 Split-cylinder resonant cavity	2.59
Dissipation Factor	10 GHz		0.0030
Breakdown Strength	V/μm, 23°C	ASTM D149	800
Volume Resistivity	Ω*cm, 23°C	ASTM D257	6.8269E+16
Surface Resistivity	Ω/ sq., 23°C	ASTM D257	2.72018E+16
CTE 20°C (Above T _g /Below T _g)	μm/m*°C	IPC-TM-650 2.4.24.3	76.73/135.3
T _d Onset (°C), TGA	°C	ASTM D3850	216



LIQUID PROPERTIES

Property	Units	Method	Value
Appearance	—	—	Yellow
Viscosity, 25°C	cP	Brookfield SP #31	1960
Liquid Density	g/cm ³	Gardco cup	1.086

PRINTING CONDITIONS

Reactivity values were generated on a 385 nm wavelength bottom-up 3D printer with an irradiance of 4.5 mW/cm².

Working-Curves	Units	Value
Critical Exposure (E _c)	mJ/cm ²	3.4
Penetration Depth (D _p)	mils	3.5

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	50	50
Wavelength	nm	385	385
Intensity	mW/cm ²	5	12
Standard Exposure Time	Sec	4	2
Burn in Exposure Time	Sec	16	10

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

CLEANING PROCESS

Submerge 3D printed parts in ethyl lactate 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.

STORAGE & HANDLING

Store bottles in a cool, dry place. 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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