

N3D-IC163

Investment casting material

SLA DLP LCD

N3D-IC163 is a casting material that allows for printing highly intricate & detailed parts used for manufacturing jewelry.



KEY PROPERTIES

N3D-IC163	
Liquid	
Appearance	Yellow
Viscosity @ 25°C	190 - 210
Material	
Tensile Strength	14 MPa
Tensile Modulus	930 MPa
Tensile Elongation at Break	3%
Flexural Strength	29 MPa
Flexural Modulus	910 MPa
HDT @ 0.455 MPa	94°C
HDT @ 1.8 MPa	48°C
T _g , by DMA	65°C



KEY FEATURES

- High resolution, high detail printing
- Clean burnout
- Excellent performance for printing and casting of filigree parts



APPLICATIONS

- Metal casting
- Filigree & intricate parts



MAIN MARKETS

- Jewelry
- Consumer goods



MATERIAL PROPERTIES

Property	Units	Method	Green ⁽¹⁾	Final Properties ⁽²⁾
Tensile Strength	MPa	ASTM D638	12	14
Tensile Modulus	MPa	ASTM D638	640	930
Tensile Elongation at Break	%	ASTM D638	4	3
Flexural Strength	MPa	ASTM D790	24	29
Flexural Modulus	MPa	ASTM D790	640	910
Notched Izod Impact Resistance	J/m	ASTM D256 ⁽³⁾	4	11
HDT @ 0.455 MPa	°C	ASTM D648		94
HDT @ 1.8 MPa	°C	ASTM D648		48
Ash Content Via TGA	%			< 0.05
Shore Hardness	Shore D	ASTM D2240		82
T _g , by DMA	°C	ASTM D4065		65
CTE 20°C (Above T _g)	µm/m*°C	IPC-TM-650 2.4.24.3		270
Volumetric Shrinkage	%	Archimedes principle		10.1
Water Absorption	% weight gain, 24 hours	ASTM D570		1.56
Solid Density	g/cm ³	Density kit ⁽⁴⁾		1.248

1 Parts were printed in the XZ orientation with a 50 µm layer thickness on a 405nm bottom-up DLP printer with an irradiance of 12 mW/cm². Green samples were conditioned for 40-80 hours following ASTM D618 Procedure A before testing.

2 Parts were printed in the XZ orientation with a 50 µm layer thickness on a 405nm bottom-up DLP printer with an irradiance of 12 mW/cm². Parts were post-cured for 60 seconds per side with 5,700 mJ/cm² of UVV energy dosage & 6,800 mJ/cm² 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 10mm x 10mm x 10mm 3D printed cubes via Archimedes principle.



LIQUID PROPERTIES

Property	Units	Method	Value
Appearance	—	—	Yellow
Viscosity, 25°C	cP	Brookfield SP #31	190 - 210
Liquid Density	g/cm ³	Gardco cup	1.134

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	0.9
Penetration Depth (D _p)	mils	1.1

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
Wavelength	nm	405
Intensity	mW/cm ²	4
Standard Exposure Time	Sec	15
Burn in Exposure Time	Sec	3

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.

	LED Cure Box
Time (sec)	300
UVA Irradiance (mW/cm ²)	50
UVV Irradiance (mW/cm ²)	75

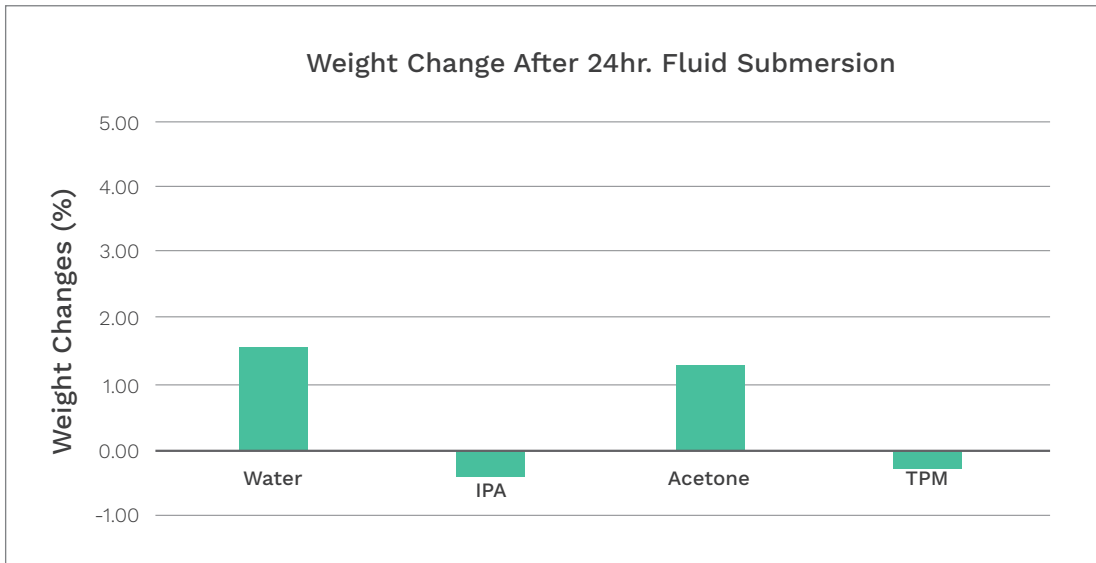
CLEANING PROCESS

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.

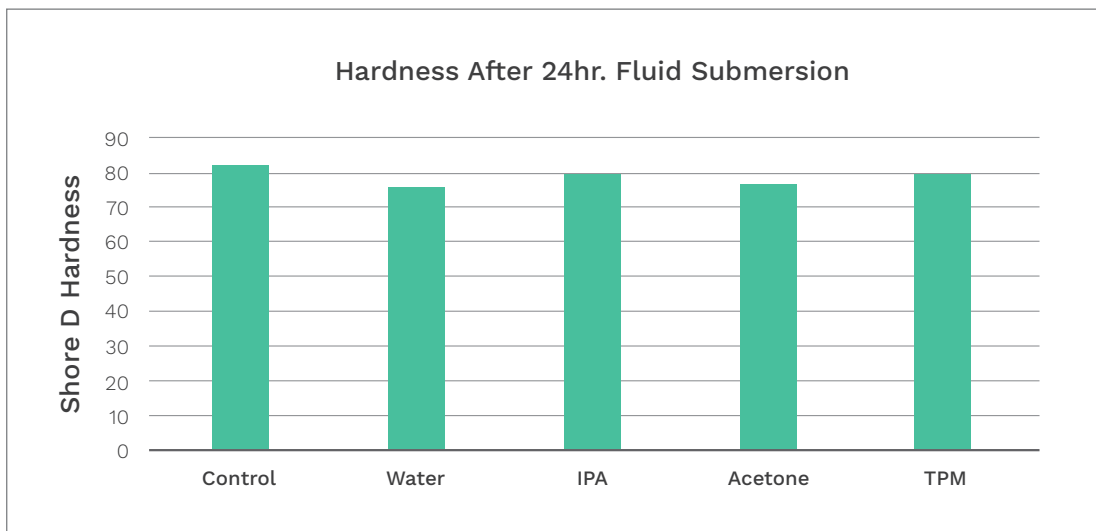
STORAGE & HANDLING

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.

CHEMICAL RESISTANCE



2" diameter discs (1/8" thickness) were 3D printed & post-processed, dried for 24 hours at 50°C, and submerged at room temperature conditions for 24 hours complying with ASTM D570 for water resistance and ASTM D543 for chemical resistance. Weight before and after submersion was measured & resulting percent changes were calculated.



2" diameter discs (1/8" thickness) were 3D printed & post-processed, dried for 24 hours at 50°C, and submerged at room temperature conditions for 24 hours complying with ASTM D543 & ASTM D570. Resulting Shore D hardness was measured via ASTM D2240.