N3XTDIMENSION®

TECHNICAL DATA SHEET

N3D-DMT303

Dental modeling material

SLA DLP LCD

N3D-DMT303 is a high performance rigid 3D printing material that allows for accurate and fast printing of dental models and thermoforming molds for the manufacturing of clear dental aligners.

KEY PROPERTIES

N3D-DMT303	
Liquid	
Appearance	Off-white/tan
Viscosity @ 25°C	450-630
Material	
Tensile Strength	52 MPa
Tensile Modulus	2600 MPa
Tensile Elongation at Break	6%
Flexural Strength	86 MPa
Flexural Modulus	2530 MPa
HDT @ 0.455 MPa	66°C
HDT @ 1.8 MPa	57°C
T_α, by DMA	109°C

KEY FEATURES

- → High accuracy
- → High throughput
- → Suitable heat deflection temperature for thermoforming applications
- → Good feature visualization

APPLICATIONS

- → Dental & orthodontic models
- → Thermoforming molds

MAIN MARKETS

- → Dental

ARKEMA

N3D-DMT303

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MATERIAL PROPERTIES

Property	Units	Method	Green[1]	Final Properties[2]
Tensile Strength	MPa	ASTM D638	20 ± 1	52 ± 1
Tensile Modulus	MPa	ASTM D638	790 ± 100	2600 ± 100
Tensile Elongation at Break	%	ASTM D638	18 ± 1	6 ± 1
Flexural Strength	MPa	ASTM D790	38 ± 1	86 ± 7
Flexural Modulus	MPa	ASTM D790	800 ± 40	2530 ± 100
Notched Izod Impact Resistance	J/m	ASTM D256[3]		16 ± 3
HDT @ 0.455 MPa	°C	ASTM D648		66
HDT @ 1.8 MPa	°C	ASTM D648		57
Shore Hardness	Shore D	ASTM D2240	81	85
T_α, by DMA	°C	ASTM D4065	65	109
Storage Modulus (E') Onset	°C	ASTM D4065	34	53
Loss Modulus (E") Peak	°C	ASTM D4065	27	65
Solid Density	g/cm^3	Density kit[4]		1.205
Water Absorption	% weight gain, 24 hours	ASTM D570		0.23

1 Parts were printed in the XZ 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 XZ 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 10mm x 10mm x 10mm 3D printed cubes via Archimedes principle.

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LIQUID PROPERTIES

Property	Units	Method	Value
Appearance	—	—	Off-white/tan
Viscosity, 25°C	cP	Brookfield SP #31	450-630
Liquid Density	g/cm^3	Gardco cup	1.089

PRINTING CONDITIONS

Reactivity values were generated on a 385 nm wavelength bottom-up 3D printer with an irradiance of 6 mW/cm^2.

Working-Curves	Units	Value
Critical Exposure (E_c)	mJ/cm^2	3.6 - 7.4
Penetration Depth (D_p)	mils	3.7 - 4.1

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	100
Wavelength	nm	385	385
Intensity	mW/cm^2	6	7
Standard Exposure Time	Sec	4	4.5
Burn in Exposure Time	Sec	16	18

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	300
UVA Irradiance (mW/cm^2)	100-120	22
UVV Irradiance (mW/cm^2)	100-120	20

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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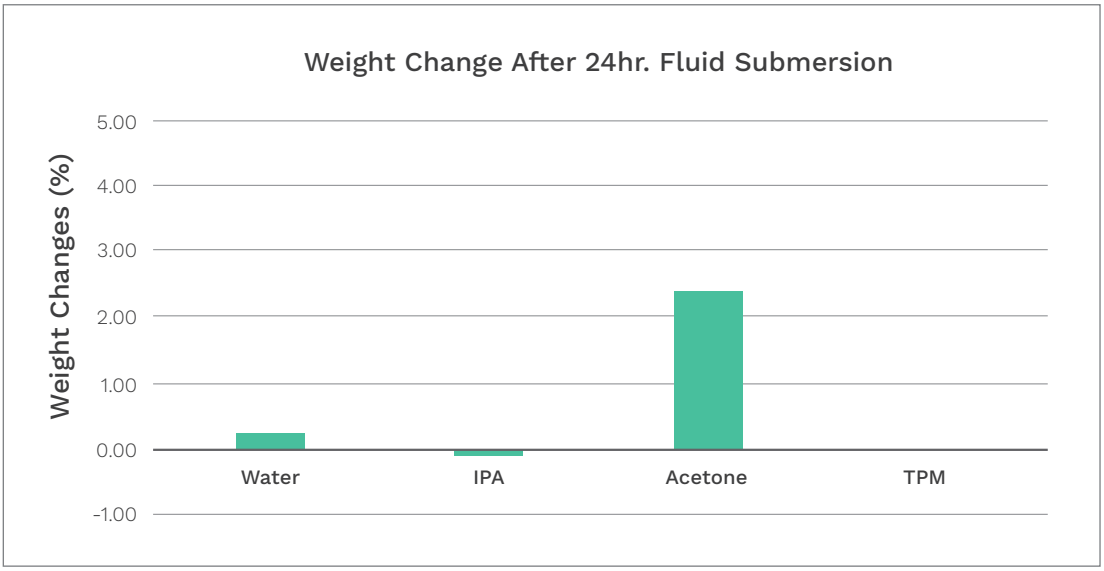
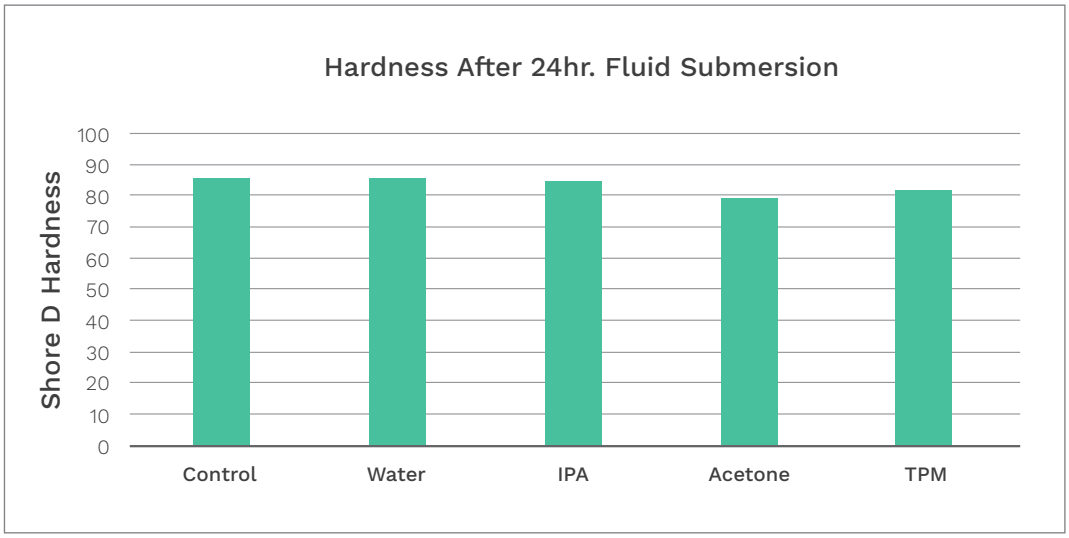
CHEMICAL RESISTANCE



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.

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