

LOCTITE®



LOCTITE® 3D 3843™

HDT60 High Toughness
Photoplastic
Matte Black, White, Clear

LOCTITE®

Henkel Corporation

loctite3dp@henkel.com





3843™

HDT60 HIGH TOUGHNESS
PHOTOPLASTIC



LOCTITE 3D 3843™

Semi-flexible resin with moderate temperature resistance HDT60, high impact strength, and versatility for a broad range of applications.

LOCTITE 3D 3843 is a high-strength engineering plastic with good impact resistance and excellent surface finish. It is ideal for a wide variety of tooling applications on the production floor.

LOCTITE 3D 3843 displays high green strength and HDT enabling it to print accurately and function at room temperature. It is compatible with a broad range of DLP machines.



Benefits:

- Moderate heat resistance, HDT 60° C
- Tough with outstanding surface finish
- Superior strength and impact resistant



Ideal for:

- Manufacturing aids
- Jigs and fixtures
- Housings and covers
- Insoles



Markets:



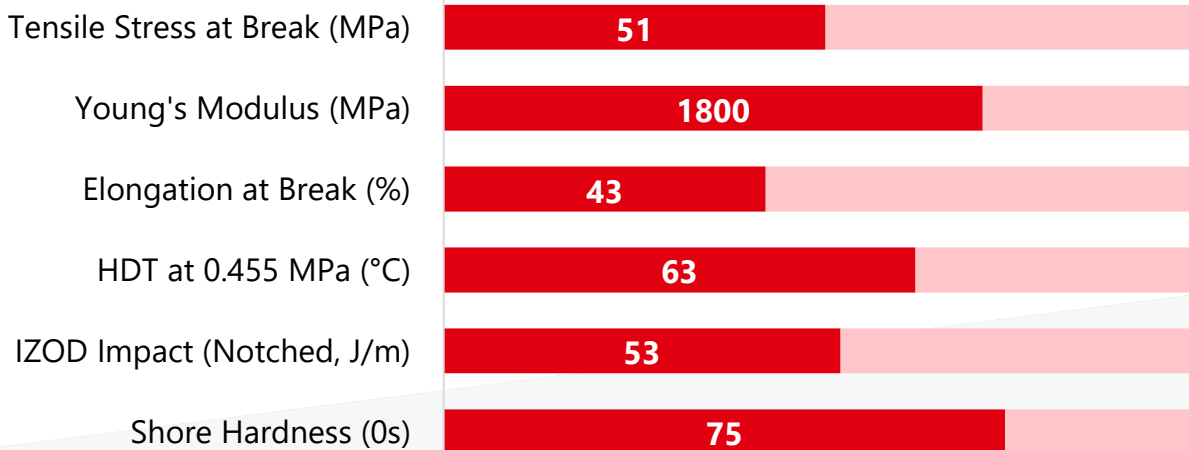
Industry



Automotive



Consumer
Goods



**Values shown are linked to LOCTITE 3843 Matte Black as reference, please refer to the specific mechanical properties for each of the colors shown in this document*



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PROPERTIES

Mechanical Properties	Measure	Method	Green	Post Processed
Tensile Stress at Yield	MPa	ASTM D638	44 ± 1 [5]	53 ± 2 [1]
Tensile Stress at Break	MPa	ASTM D638	38 ± 1 [5]	51 ± 2 [1]
Young's Modulus	MPa	ASTM D638	1572 ± 31 [5]	1806 ± 47 [1]
Elongation at Break	%	ASTM D638	52 ± 10 [5]	43 ± 10 [1]
Flexural Modulus	MPa	ASTM D790	1113 ± 23 [6]	1783 ± 45 [2]
Flexural Elongation at Break	%	ASTM D790	>5 [6]	>5 [2]
Flexural Stress at Break	MPa	ASTM D790	-	-
Other Properties				
HDT at 0.455 MPa	°C	ASTM D648	-	63°C [3]
IZOD Impact (Notched)	J/m	ASTM D256	-	53 ± 4 [4]
Water Absorption (24hr)	%	ASTM D570	-	1.94 [7]
Water Absorption (72hr)	%	ASTM D570	-	3.21 [7]
Shore Hardness (0s, 3s)	D	ASTM D2240	68, 63 [11]	74, 67 [9]
Solid Density	g/cm ³	ASTM D1475	1.18 [10]	1.18 [10]
Thermal Conductivity	W/(m·K)	ASTM D5930	-	0.21 [12]
Heat Capacity	J/(g·K)	ASTM D5930	-	1.5 ± 0.1 [12]
CTE (10°C to 60°C)	µm/(m·K)	ASTM E831	-	131.9 [14]
Biocompatibility				
Irritation		ISO10993-23*	-	Comply [13]
Cytotoxicity		ISO10993-5	-	Comply [15]

*All specimen are printed unless otherwise noted. All specimen were conditioned in ambient lab conditions at 19-23°C / 40-60% RH for at least 24 hours." ASTM Methods: D638 Type IV, 5 mm/min, D790-B, 2 mm/min, D648, D256 Notched IZOD (Machine Notched), 6 mm x 12 mm, D570 0.125" x 2" Disc 24hr@ 25°C, D2240, Type "D" (0, 3 seconds), D7867, D1475

*The biological assessment has been performed based on the in vitro method according to ISO10993-23

Internal Data Sources:

[1]FOR16424, [2]FOR16426, FOR17678, [3]FOR19725, [4]FOR16427, [5]FOR16425, [6]FOR19115, [7]FOR19118, [8]FOR21751, [9]FOR19117, [10]FOR19114, [11]FOR19119, [12]FOR26234, [13]FOR52814, [14]FOR164745, [15]FOR105481



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PROPERTIES

Liquid Properties	Measure	Method	Value
Viscosity at 25°C (77°F)	cP	ASTM D7867	720-870 [8]
Liquid Density	g/cm ³	ASTM D1475	1.07 [10]

Electrical Properties	Measure	Method	Green	Post Processed
Volume Resistivity	Ω·cm	ASTM D257	-	6.5E + 14 [1]
Surface Resistivity	Ω	ASTM D257	-	5.7E + 15 [1]
Dielectric Strength	kV/mm	ASTM D149	-	28.1 ± 1.8 [2]
AC Relative Permittivity (Dielectric Constant) ^[3]				
at 50 Hz (XY)	none	ASTM D150	-	4.8
at 1 kHz (XY)	none	ASTM D150	-	4.9
at 1 MHz (XY)	none	ASTM D150	-	4.4
AC Loss Characteristic (Dissipation Factor) ^[4]				
at 50 Hz (XY)	none	ASTM D150	-	0.021
at 1 kHz (XY)	none	ASTM D150	-	0.021
at 1 MHz (XY)	none	ASTM D150	-	0.041

*All specimen are printed unless otherwise noted. All specimen were conditioned in ambient lab conditions at 19-23°C / 40-60% RH for at least 24 hours." ASTM Methods: D638 Type IV, 5 mm/min, D790-B, 2 mm/min, D648, D256 Notched IZOD (Machine Notched), 6 mm x 12 mm, D570 0.125" x 2" Disc 24hr@ 25°C, D2240, Type "D" (0, 3 seconds), D7867, D1475

Internal Data Sources:

[1] FOR25869, [2] FOR25870, [3] FOR25870, [4] FOR25872



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WORKFLOW

Validated workflows need to be followed to achieve properties as provided in the TDS. Examples of validated workflow steps are listed below. Users should defer to the most current workflow information for best results which can be found at <https://www.loctiteam.com/printer-validation-settings>

PRINTER SETTINGS

LOCTITE 3D 3843 BK is formulated to print optimally on industrial DLP printer. Read the safety data sheet carefully to get details about health and safety instructions. Recommended print parameters:

- Shake resin bottle well before usage
- Temperature: 20°C to 35°C
- Intensity: 3 mW/cm² to 7 mW/cm²

Exposure time for an intensity of 5 mW/cm²

Layer Thickness (µm):	25	50	100	Ec (mJ/cm ²)	11.16
First layer time (s)	45	45	50	Dp (mm):	0.21
Burn in region (s):	4	5	7.5		
Model Layer Exposure (s):			9.5		

CLEANING

LOCTITE 3D 3843 BK requires post processing to achieve specified properties. Prior to post curing, support structures should be removed from the printed part, and the part should then be washed. Use compressed air to remove residual solvent from the surface of the material between intervals.

Post Process Step	Agent	Method	Duration	Intervals	Additional Info
Cleaning Step #1	Cleaner C	Ultrasonic	2 min	1 or 2	Dry after each interval
Cleaning Step #2	IPA	Ultrasonic	1 min	1	
Dry	n.a.	Compressed air	10 to 60 s	1	Air pressure (50psi)
Wait before post curing	n.a.	Ambient condition	60 min	1	Room temperature





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WORKFLOW

Validated workflows need to be followed to achieve properties as provided in the TDS. Examples of validated workflow steps are listed below. Users should defer to the most current workflow information for best results which can be found at <https://www.loctiteam.com/printer-validation-settings>

POST CURING

LOCTITE 3D 3843 BK requires post curing to achieve specified properties. It is recommended that either an LED or wide spectrum lamp be used to post cure parts.

UV Curing Unit	UV Source	Intensity	Cure time per side	Additional Settings (Shelf, Output Energy)
Dymax 5000 EC Flood	Mercury Arc Bulb (broad spectrum)	148 mW/cm ² at 380 nm	2 min	400W, Shelf K
Loctite CL36	405nm LED	80 mW/cm ² at 405 nm	20 min	100% top & side
Uvitron Intelliray 600W	Mercury Arc Bulb (broad spectrum)	66% Intensity	2 min	

STORAGE

Store LOCTITE 3D 3843 BK in the unopened container in a dry location. Optimal Storage: 8°C to 30°C. Storage below 8°C or above 30°C can adversely affect product properties. Material removed from containers may be contaminated during use. For this reason, filter used resin with 190µm mesh filter before placing back into proper storage container.



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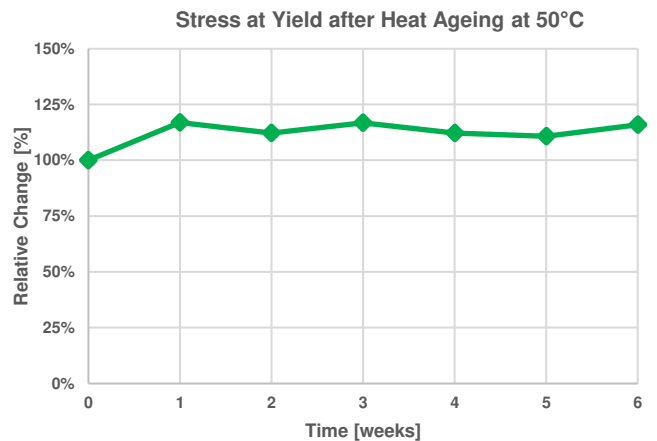
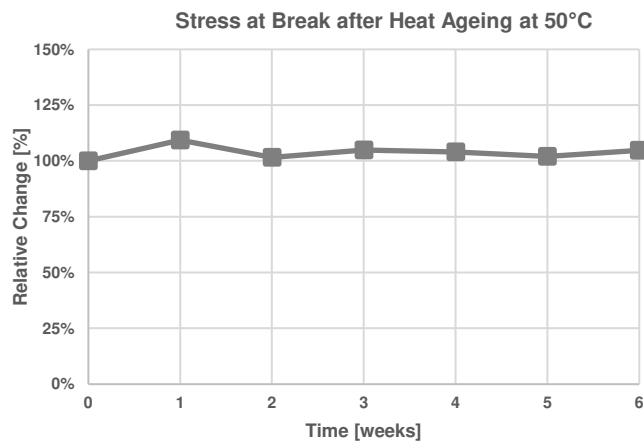
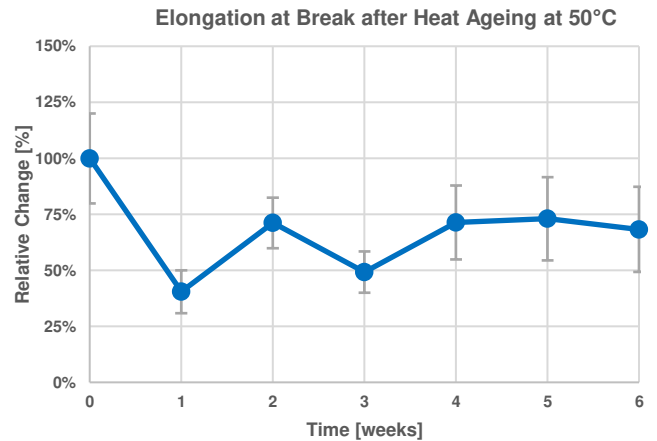
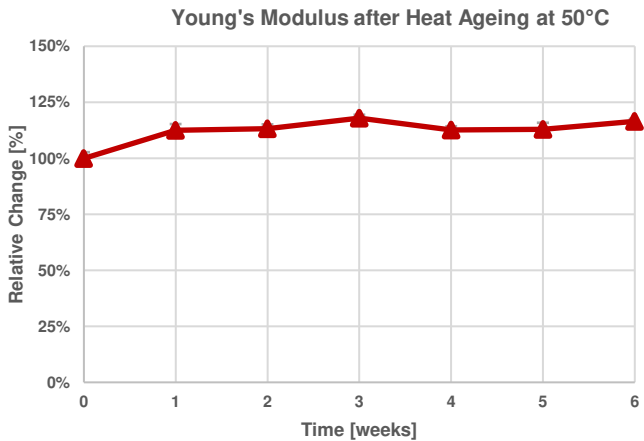


AGEING AND ENVIRONMENTAL EFFECTS – HEAT AGEING

LOCTITE 3D 3843 BK was heat aged without load according to ASTM D3045. Test samples were exposed for a defined time at 50°C and conditioned for 24 hours at 22°C before mechanical testing. Control samples were stored at a constant 22°C. All samples were printed in the same print job using a validated workflow. Mechanical testing was conducted according to ASTM D638 at standard lab conditions (22°C).

“0 weeks” represents non-aged samples stored at 22°C and tested 24 hours after post-processing.

Based on temperature dependence of reaction rates a test time of 6 weeks at 50°C can be interpreted as approximately 12 months at ambient temperature.



Test parameters:

ASTM D638: Type IV, Pull speed: 5 mm/min, Young's modulus measured at 0.1-1.0% (regression), 22°C

Internal Data Sources:

FOR88727, FOR88738





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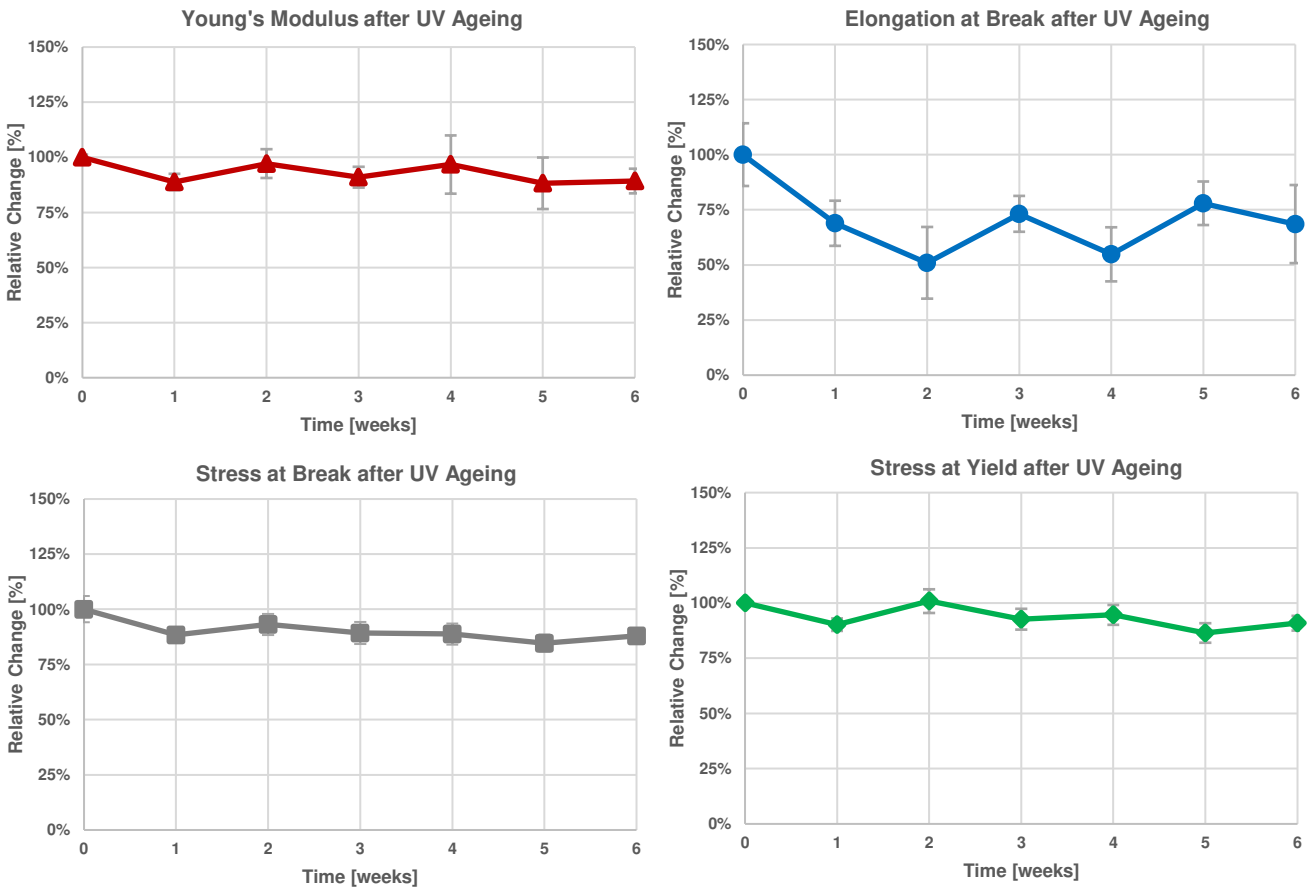
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AGEING AND ENVIRONMENTAL EFFECTS – ACCELERATED WEATHERING (UV AGEING)

LOCTITE 3D 3843 BK has been tested after accelerated outdoor weathering according to ASTM D4329 (Cycle A). Test samples were exposed to defined conditions of heat, water condensation and UV light. Exposed samples were conditioned for 24 hours at 22°C before mechanical testing. Control samples were stored at a constant 22°C. All samples were printed in the same print job using a validated workflow. Mechanical testing was conducted according to ASTM D638 at standard lab conditions (22°C). "0 weeks" represents non-aged samples stored at 22°C and tested 24 hours after post-processing.

Please note, accelerated weathering testing can never fully represent real outdoor conditions and complexity. It is therefore recommended to conduct additional (outdoor) testing relevant for your specific application needs.



Test parameters:

ASTM D638: Type IV, Pull speed: 5 mm/min, Young's modulus measured at 0.1-1% (regression), 22 °C
ASTM D4329: cycle A for general applications, QUV/se, UVA 340 nm, 0.89 W/m²·nm, 8 hours UV light at 60°C followed by 4 hours at 50°C condensation in the dark. To reduce any sample warpage during test time samples were placed in tailor-made holders without any fixation clamps or mechanical load. Exposed samples were always removed from QUV before next condensation cycle to avoid samples that are soaked excessively with water before testing.

Internal Data Sources:
FOR123511, FOR123528



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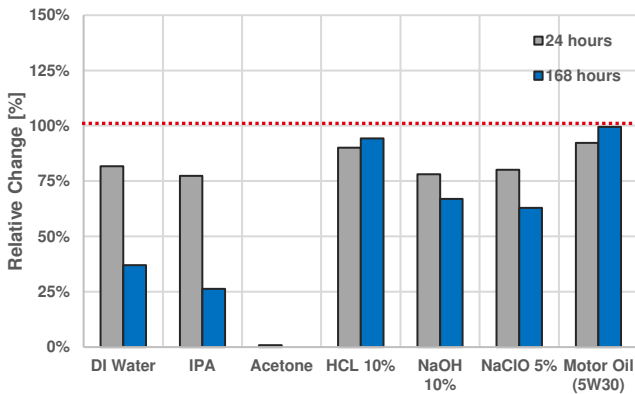
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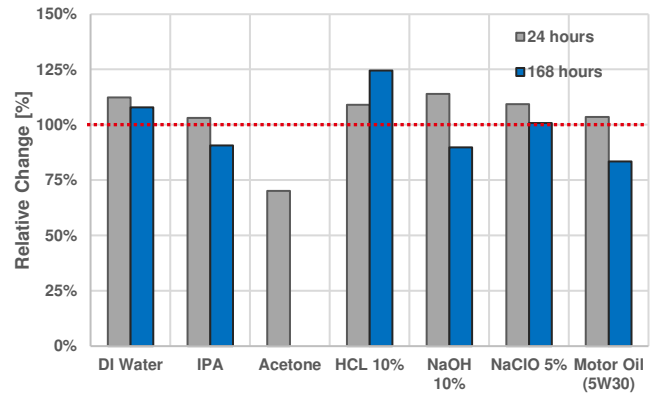
AGEING AND ENVIRONMENTAL EFFECTS – CHEMICAL RESISTANCE (1/2)

LOCTITE 3D 3843 BK has been tested after chemical ageing according to ASTM D543. The influence of chemicals was tested by measuring mechanical properties after different test times (Immersion test for 24 and 168 hours). Exposed samples were stored in containers and fully immersed in different chemicals. Samples were stirred every 24 hours using a shaker. After removal, exposed samples were washed and conditioned for 24 hours at 22°C before mechanical testing. All samples were printed using a validated workflow. Mechanical testing was conducted according to ASTM D638 at standard lab conditions (22°C). "100%" represents non-aged samples stored at 22°C and tested 24 hours after post-processing.

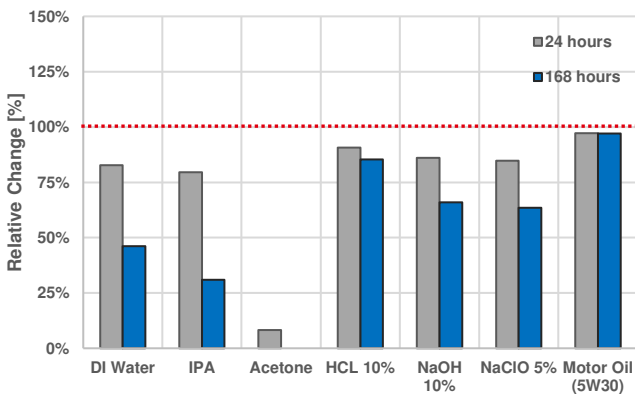
Young's Modulus after Immersion Time



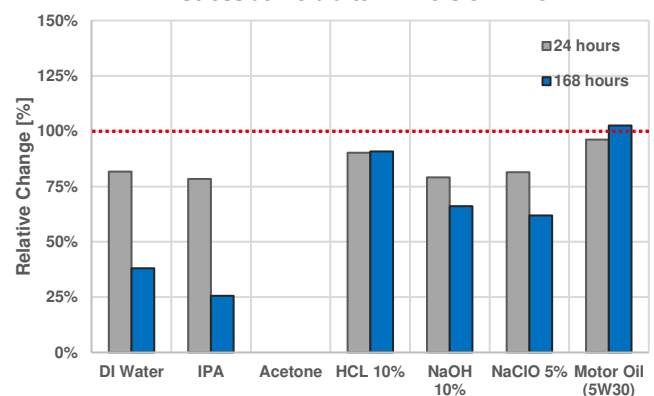
Elongation at Break after Immersion Time



Stress at Break after Immersion Time



Stress at Yield after Immersion Time



Test parameters:

ASTM D638: Type IV, Pull speed: 5 mm/min, Young's modulus measured at 0.1-1.0% (regression), 22°C

ASTM D543: Samples immersed in different chemicals were stored at 22°C. Samples immersed in Motor Oil were stored at 50°C.

Internal Data Sources:

FOR151552, FOR151553, FOR154832, FOR151551, FOR158466, FOR158473, FOR158475





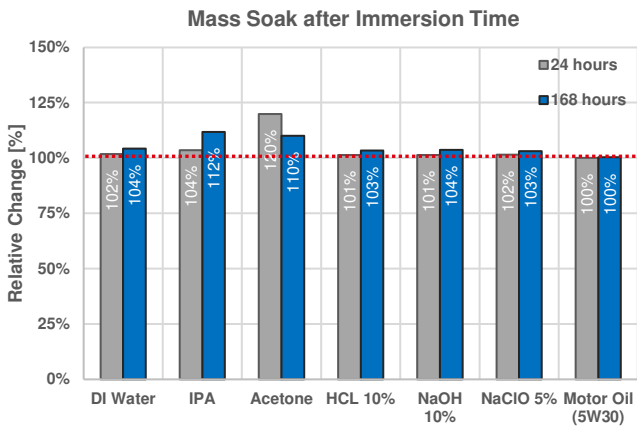
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AGEING AND ENVIRONMENTAL EFFECTS – CHEMICAL RESISTANCE (2/2)

LOCTITE 3D 3843 BK has been tested after chemical ageing according to ASTM D543. The influence of chemicals was tested by measuring the mass change after different test times (Immersion test for 24 and 168 hours). Exposed samples were stored in containers and fully immersed in different chemicals. Samples were stirred every 24 hours using a shaker. After removal exposed samples were washed, dried and immediately weighed. All samples were printed using a validated workflow. "100%" represents the initial weight 24 hours after post-processing.



Test parameters:

ASTM D543: Samples immersed in different chemicals were stored at 22°C. Samples immersed in Motor Oil were stored at 50°C.

Internal Data Sources:

FOR151556, FOR151558, FOR154830, FOR151554, FOR158448, FOR158452, FOR158454



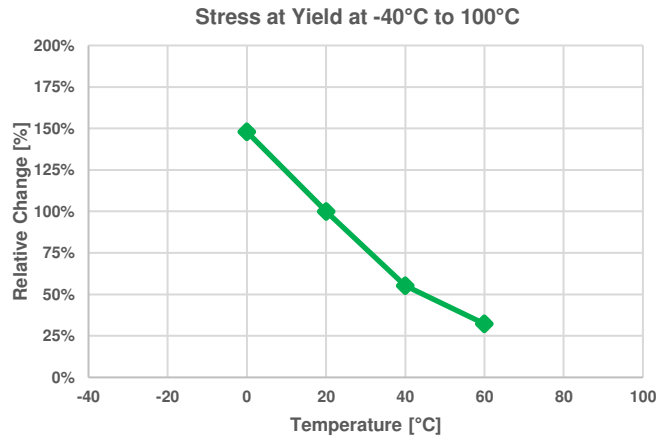
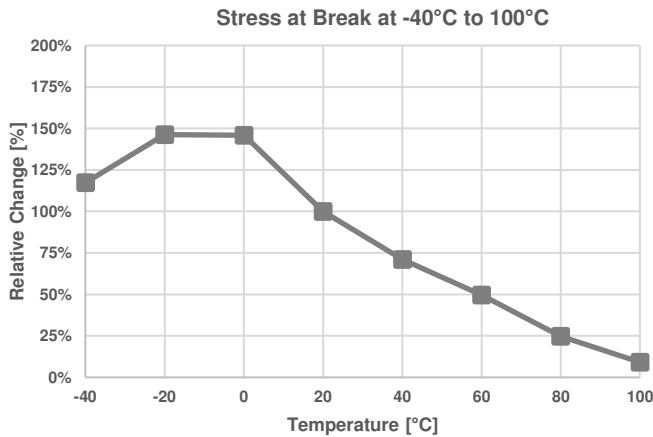
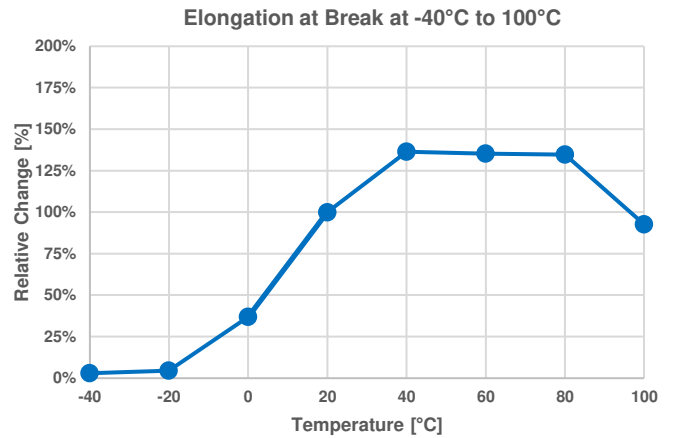
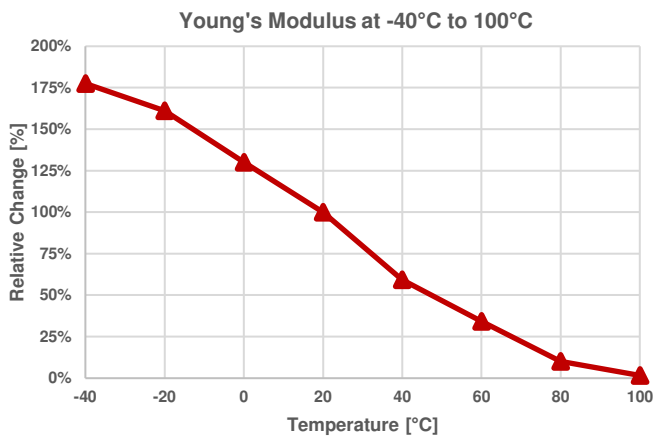
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THERMAL INFLUENCE ON MECHANICAL PROPERTIES

LOCTITE 3D 3843 BK has been tested according to ASTM D638 at varied environmental temperatures, from -40°C to 100°C. All samples were printed in the same print job using a validated workflow. Mechanical testing was conducted according to ASTM D638. Before each test series samples were conditioned for 60 minutes at the specific test temperature.



Test parameters:

ASTM D638, Type IV, Pull speed: 5 mm/min, Young's modulus measured at 0.1-1% (regression),

Internal Data Sources:

[1] FOR176839



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PROPERTIES

Mechanical Properties	Measure	Method	Green	Post Processed
Tensile Stress at Yield	MPa	ASTM D638	36.2 ± 1.0 ^[1]	52.6 ± 1 ^[2]
Tensile Stress at Break	MPa	ASTM D638	33.1 ± 2.6 ^[1]	49.0 ± 1 ^[2]
Young's Modulus	MPa	ASTM D638	1318 ± 31 ^[1]	1720 ± 72 ^[2]
Elongation at Break	%	ASTM D638	74.4 ± 9.9 ^[1]	47.6 ± 8 ^[2]
Flexural Modulus	MPa	ASTM D790	721 ± 36 ^[3]	1673 ± 44 ^[4]
Flexural Strain at Break	%	ASTM D790	>5 ^[3]	>5 ^[4]
Flexural Stress at Break	MPa	ASTM D790	-	-
Other Properties				
HDT at 0.455 MPa	°C	ASTM D648	50 ^[5]	60 ^[12]
IZOD Impact (Notched)	J/m	ASTM D256	-	58.3 ± 4.2 ^[7]
IZOD Impact (Unnotched)	J/m	ASTM D256	-	175.3 ± 12.8 ^[8]
Water Absorption (24hr)	%	ASTM D570	-	2.3 ^[9]
Water Absorption (72hr)	%	ASTM D570	-	3.5 ^[9]
Shore Hardness (0s, 3s)	D	ASTM D2240	68, 64 ^[10]	70, 76 ^[11]
Solid Density	g/cm	ASTM D1475	1.18 ^[13]	1.18 ^[11]
CTE (10°C to 60°C)	µm/(m·K)	ASTM E831	-	121.1 ^[14]
Thermal Conductivity	W/(m·K)	ASTM D5930	-	0.22 ^[6]
Heat Capacity	J/(g·K)	ASTM D5930	-	1.6 ^[6]
Biocompatibility				
Irritation		ISO 10993-23		Comply ^[18]
Cytotoxicity		ISO 10993-5		Comply ^[15]
Liquid Properties				
Viscosity at 25°C (77°F)		cP	ASTM D7867	450 - 650 ^[17]
Liquid Density		g/cm ³	ASTM D1475	1.07 ^[16]

All specimen are printed unless otherwise noted. All specimen were conditioned in ambient lab conditions at 19-23°C / 40-60% RH for at least 24 hours. ASTM Methods: D638 Type IV, 5 mm/min, D790-B, 2 mm/min, D648, D256 Notched IZOD (Machine Notched), 6 mm x 12 mm, D570 0.125" x 2" Disc 24hr@ 25°C, D2240, Type "D" (0, 3 seconds), D7867, D1475.

The biological assessment has been performed based on the in vitro method according to ISO10993-23

Internal Data Sources:

[1]FOR17796, [2]FOR17795, [3]FOR17799, [4]FOR17797, [5]FOR17801, [6]FOR210087, [7]FOR17792, [8]FOR17793, [9]FOR17794, [10]FOR17790, [11]FOR17789, [12]FOR17800, [13]FOR17809, [14]FOR164748, [15]FOR38780, [16]FOR17791, [17]FOR37133, [18] FOR52785





WORKFLOW

Validated workflows need to be followed to achieve properties as provided in the TDS. Examples of validated workflow steps are listed below. Users should defer to the most current workflow information for best results which can be found at <https://www.loctiteam.com/printer-validation-settings>

PRINTER SETTINGS

LOCTITE 3D 3843 WH is formulated to print optimally on industrial DLP printer. Read the safety data sheet carefully to get details about health and safety instructions. Recommended print parameters:

- Shake resin bottle well before usage
- Temperature: 20°C to 35°C
- Intensity: 3 mW/cm² to 7 mW/cm²

Exposure time for an intensity of 5 mW/cm²

Layer Thickness (µm):	25	50	100	Ec (mJ/cm ²)	7.194
First layer time (s)	45	45	45	Dp (mm):	0.170
Burn in region (s):	2	3.5	6		
Model Layer Exposure (s):			4.5		

POST PROCESSING

LOCTITE 3D 3843 WH requires post processing to achieve specified properties. Prior to post curing, support structures should be removed from the printed part, and the part should then be washed. Use compressed air to remove residual solvent from the surface of the material between intervals.

Post Process Step	Agent	Method	Duration	Intervals	Additional Info
Cleaning Step#1	Cleaner C	Ultrasonic	2 min	1 or 2	Dry after each interval
Cleaning Step#1	IPA	Ultrasonic	1 min	1	
Dry	n.a.	Compressed air	10 to 60 s	1	Air pressure (50 psi)
Wait before post curing	n.a.		60 min	1	Room temperature



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WORKFLOW

Validated workflows need to be followed to achieve properties as provided in the TDS. Examples of validated workflow steps are listed below. Users should defer to the most current workflow information for best results which can be found at <https://www.loctiteam.com/printer-validation-settings>

POST CURING

LOCTITE 3D 3843 WH requires post curing to achieve specified properties. It is recommended that either an LED or wide spectrum lamp be used to post cure parts.

UV Curing Unit	UV Source	Intensity	Cure time/ side	Additional Settings (Shelf, Output Energy)
Uvitron Intelliray 600W	Mercury Arc Bulb (broad spectrum)	66% Intensity	4 min	Shelf K
Dymax 5000 EC Flood	Mercury Arc Bulb (broad spectrum)	150 -175 mW/cm ² at 380 nm	8 min	Shelf I

STORAGE

Store **LOCTITE 3D 3843 White** in the unopened container in a dry location. Optimal Storage: 8°C to 30°. Storage below 8°C or above 30°C can adversely affect product properties. Material removed from containers may be contaminated during use. For this reason, filter used resin with 190µm mesh filter before placing back into proper storage container.





PROPERTIES

Mechanical Properties	Measure	Method	Green	Post Processed
Tensile Stress at Yield	MPa	ASTM D638	43.8 ± 0.7 [6]	45.0 ± 1.5 [1]
Tensile Stress at Break	MPa	ASTM D638	38.0 ± 1.7 [6]	44.0 ± 2.7 [1]
Young's Modulus	MPa	ASTM D638	1,562 ± 36 [6]	1,752 ± 42 [1]
Elongation at Break	%	ASTM D638	58.0 ± 24 [6]	41.0 ± 6.7 [1]
Flexural Modulus	MPa	ASTM D790	-	1,878 ± 81 [2]
Flexural Strain at Break	%	ASTM D790	-	>5 [2]
Flexural Stress at Break	MPa	ASTM D790	-	-
Other Properties				
HDT at 0.455 MPa	°C	ASTM D648	-	63 [9]
IZOD Impact (Notched)	J/m	ASTM D256	-	65.0 ± 2.9 [3]
Water Absorption (24hr)	%	ASTM D570	-	2.13 [7]
Shore Hardness (0s, 3s)	D	ASTM D2240	-	68, 63 [8]
Solid Density	g/cm ³	ASTM D1475	1.17 [4]	1.18 [4]
CTE (10°C to 60°C)	µm/(m·K)	ASTM E831	-	121.3 [12]
Liquid Properties				
Viscosity at 25°C (77°F)	cP	ASTM D7867	400 – 600 [5]	
Liquid Density	g/cm ³	ASTM D1475	1.07 [4]	

All specimen are printed unless otherwise noted. All specimen were conditioned in ambient lab conditions at 19-23C / 40-60% RH for at least 24 hours. ASTM Methods: D638 Type IV, 5mm/min, D790-B, 2mm/min, D648, D256 Notched IZOD (Machine Notched), 6 mm x 12 mm, D570 0.125" x 2" Disc 24hr@ 25°C, D2240, Type "D" (0, 3 seconds), D7867, D1475

Internal Data Sources:

[1]FOR17386, [2]FOR17382, [3]FOR17385, [4]FOR17383, [5]FOR37129, [6]FOR17201, [7]FOR17380, [8]FOR19616, [9]FOR20038, [10]FOR20009, [11]FOR20010 [12]FOR165438





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CLEAR**



CLEAR COLOR PROPERTIES

In order to assess clear properties, color variation is measured as Delta-E (dE) to define parts transmittance.

dE measures changes from L*a*b*C*h. The table below shows the color variation for two different workflows: Method: ASTM E308, Total Transmission

Part State	L*	a*	b*	C*	h	dE
Green / no post-processing ^[10]	93.11	-1.06	2.28	2.52	114.9	-
Dymax 5000EC 5 min/side ^[10]	93.20	-0.46	1.14	1.22	111.89	1.29
Loctite CL36 60 min/side ^[11]	92.89	-0.36	1.28	1.33	105.85	1.24

The table below shows color variation after ageing for 650 hours

A dE of 1.0 - 2.0 change is the smallest color difference, in average, that the human eye can perceive QUV exterior weathering conditions (ASTM G-154—Cycle 1): Clear color
Method: ASTM G-154—Cycle 1 & ASTM E308, Total Transmission

QUV Exposure Time (Hrs)	L*	a*	b*	C*	h	dE
0	93.82	-0.49	1.35	1.44	109.91	-
325	93.10	-0.61	1.68	1.79	109.96	0.80
650	93.40	-0.86	2.47	2.61	109.22	1.25





WORKFLOW

Validated workflows need to be followed to achieve properties as provided in the TDS. Examples of validated workflow steps are listed below. Users should defer to the most current workflow information for best results which can be found at <https://www.loctiteam.com/printer-validation-settings>

PRINTER SETTINGS

LOCTITE 3D 3843 CL is formulated to print optimally on industrial DLP printer. Read the safety data sheet carefully to get details about health and safety instructions. Recommended print parameters:

- Shake resin bottle well before usage
- Temperature: 20°C to 35°C
- Intensity: 3 mW/cm² to 7 mW/cm²

Exposure time for an intensity of 5 mW/cm²

Layer Thickness (µm):	25	50	100	E _c (mJ/cm ²)	7.67
First layer time (s)	45	45	45	D _p (mm):	0.18
Burn in region (s):	2	3.5	6		
Model Layer Exposure (s):			5		

POST PROCESSING

LOCTITE 3D 3843 CL requires post processing to achieve specified properties. Prior to post curing, support structures should be removed from the printed part, and the part should then be washed. Use compressed air to remove residual solvent from the surface of the material between intervals.

Post Process Step	Agent	Method	Duration	Intervals	Additional Info
Cleaning	IPA	Ultrasonic	2 min	1	
Dry	n.a.	Compressed air	10 - 60 s	1	Air pressure (50psi)
Wait before post curing	n.a.	Ambient condition	60 min	1	Room temperature



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WORKFLOW

Validated workflows need to be followed to achieve properties as provided in the TDS. Examples of validated workflow steps are listed below. Users should defer to the most current workflow information for best results which can be found at <https://www.loctiteam.com/printer-validation-settings>

POST CURING

LOCTITE 3D 3843 CL requires post curing to achieve specified properties. It is recommended that either an LED or wide spectrum lamp be used to post cure parts.

UV Curing Unit	UV Source	Intensity	Cure time per side	Additional Settings (Shelf, Output Energy)
Dymax 5000 EC Flood	Mercury Arc Bulb (broad spectrum)	120 mW/cm ² at 380 nm	4 min	Shelf I

STORAGE

Store **LOCTITE 3D 3843 CL** in the unopened container in a dry location. Optimal Storage: 8°C to 30°. Storage below 8°C or above 30°C can adversely affect product properties. Material removed from containers may be contaminated during use. For this reason, filter used resin with 190µm mesh filter before placing back into proper storage container.





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NOTE

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