

LOCTITE®



DURA56

Black

Developed on and certified for the
Origin® One 3D printers

LOCTITE®

Henkel Corporation

loctite3dp@henkel.com





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DURA56

DURA56 is a tough, high-impact photopolymer with excellent surface quality. For functional end-use parts and prototypes

Created by Stratasys and LOCTITE to address end-use and prototyping applications with high material consumption. Ideal for housings, parts with mating features or class A surfaces..



Benefits:

- High-impact strength
- Tough
- Excellent surface finish
- Low part cost
- Low Viscosity



Ideal for:

- Enclosures and Housings
- Jigs & Fixtures
- Functional testing



Markets:

Industry	Automotive	Consumer Goods

42 MPa

*Tensile
Stress
at Break*

1,600 MPa

*Young's
Modulus*

78 %

*Elongation
at Break*

56 J/m

*Impact
Strength*

52 °C

*HDT at
0.455
MPa*



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PROPERTIES

Mechanical Properties	Measure	Method	Green	Post Processed
Young's Modulus	MPa	ASTM D638	1541 ± 28 [7]	1595 ± 63 [1]
Tensile Stress at Yield	MPa	ASTM D638	42.3 ± 0.5 [7]	44.1 ± 1.6 [1]
Elongation at Yield	%	ASTM D638	4.5 ± 0.2 [7]	4.9 ± 0.2 [1]
Tensile Stress at Break	MPa	ASTM D638	34.1 ± 1.3 [7]	42.2 ± 1.5 [1]
Elongation at Break	%	ASTM D638	63 ± 20 [7]	78 ± 8 [1]
Poisson's Ratio	-	ASTM D638	-	0.44 ± 0.03 [8]
IZOD Impact (Notched)	J/m	ASTM D256	-	55 ± 6 [2]
Shore Hardness (3s)	D	ASTM 2240	-	64 [6]
Other Properties				
HDT at 0.455 MPa	°C	ASTM D648	-	52 [4]
Water Absorption (24 hr)	%	ASTM 570	-	3 [5]
Water Absorption (168 hr)	%	ASTM 570	-	7 [5]
Thermal Conductivity	W/(m·K)	ASTM D5930	-	0.2 [3]
Heat Capacity	J/(g·K)	ASTM D5930	-	1.46 [3]

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, 50mm/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" (3 seconds), D7867, D1475, D638 Type I for Poisson's Ratio, 5 mm/min

Internal Data Sources:

[1] FOR24710, [2] FOR24464, [3] FOR39791, [4] FOR25135, [5] FOR24474, [6] FOR24476, [7] FOR24885, [8] FOR663189



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PROPERTIES

Liquid Properties	Measure	Method	Value
Viscosity at 25°C (77°F)	cP	ASTM D7867	920 [1]
Liquid Density	g/cm ³	ASTM D1475	1.13 [2]

Electrical Properties	Measure	Method	Green	Post Processed
Volume Resistivity	Ω·cm	ASTM D257	-	5.9·10 ¹⁴ [4]
Surface Resistivity	Ω	ASTM D257	-	1.0·10 ¹⁶ [4]
Dielectric Strength	kV/mm	ASTM D149	-	23 [4]
AC Relative Permittivity (Dielectric Constant)				
at 50 Hz (XY)	none	ASTM D150	-	4.4 [3]
at 1 kHz (XY)	none	ASTM D150	-	4.3 [3]
at 1 MHz (XY)	none	ASTM D150	-	3.9 [3]
AC Loss Characteristic (Dissipation Factor)				
at 50 Hz (XY)	none	ASTM D150	-	0.11 [3]
at 1 kHz (XY)	none	ASTM D150	-	0.02 [3]
at 1 MHz (XY)	none	ASTM D150	-	0.03 [3]

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, 50mm/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" (3 seconds), D7867, D1475

Internal Data Sources:

[1] FOR24493, [2] FOR24477, [3] FOR549186, [4] FOR549187



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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

Dura56 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: 5 mW/cm²

Exposure time for an intensity of 5 mW/cm²

Layer Thickness (µm):	100	Ec (mJ/cm ²)	7.88
First layer time (s)	34.273	Dp (mm):	0.131
Model Layer Exposure (s):	7.359		

CLEANING

Dura56 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	IPA	Ultrasonic	2 min	2	Dry after each interval
Dry	n.a.	Compressed air	10 to 60 s	1	Air pressure (10-30psi)
Wait before post curing	n.a.	Ambient condition	60 min	1	Room temperature





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WORKFLOW

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POST CURING

Dura56 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), Part Number 38560	148 mW/cm ² at 380 nm	4 min	400W, Shelf I

STORAGE

Store Dura56 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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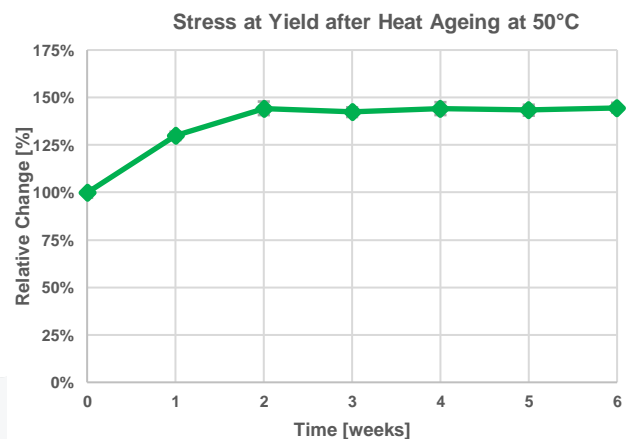
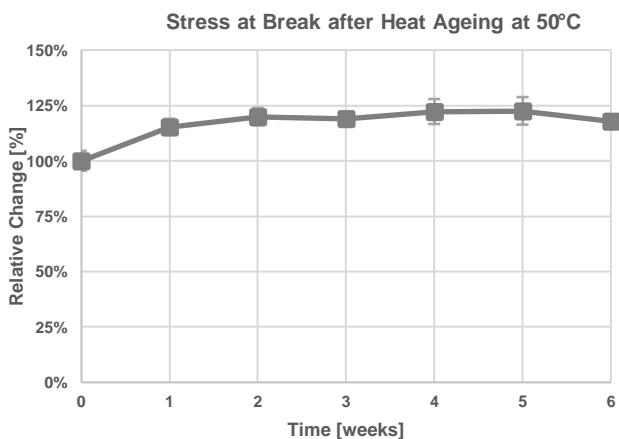
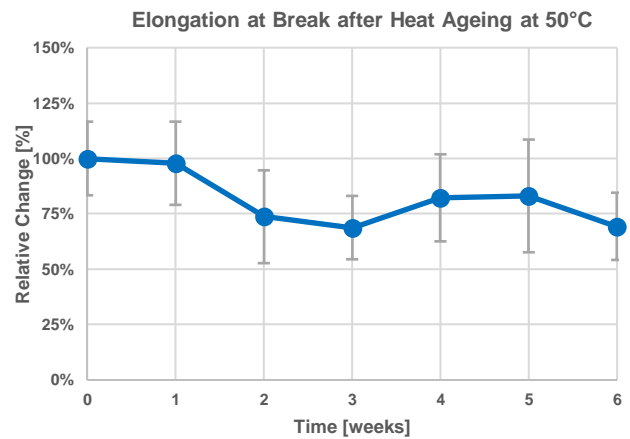
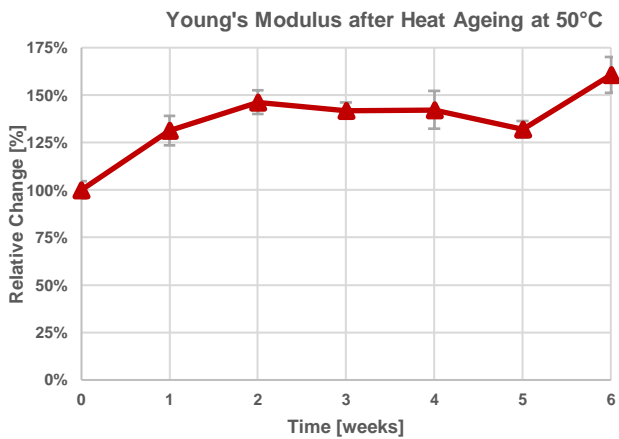
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AGEING AND ENVIRONMENTAL EFFECTS – HEAT AGEING

Dura56 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: 50 mm/min, Young's modulus measured at 0.1-1.0% (regression), 22°C

Internal Data Sources:
FOR44497, FOR44506





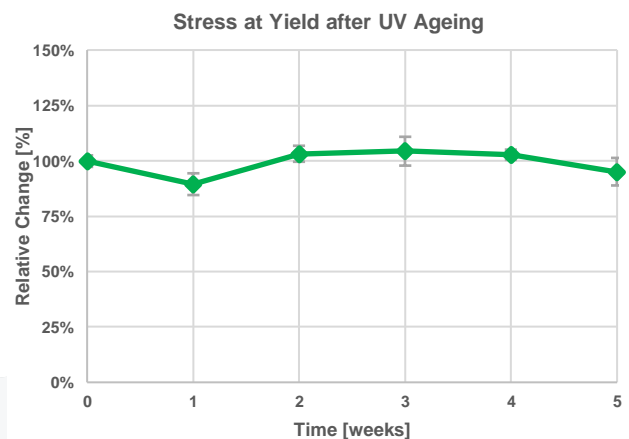
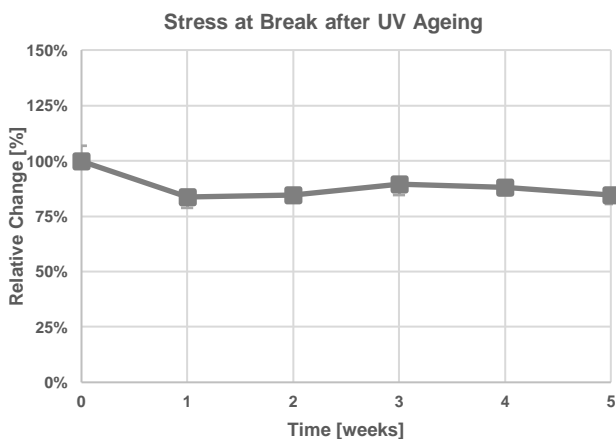
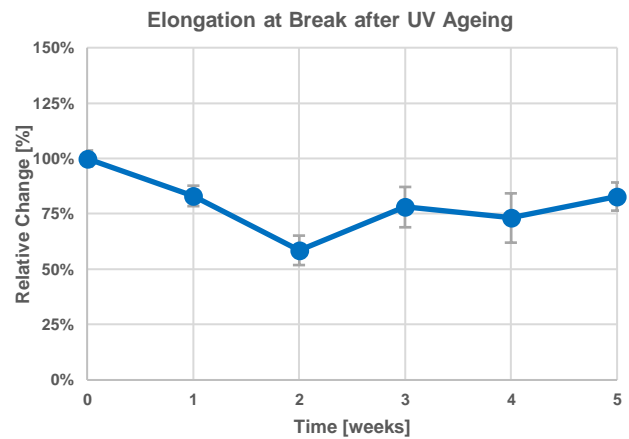
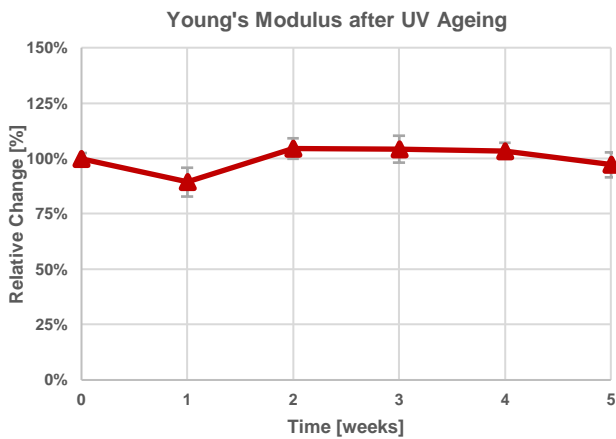
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AGEING AND ENVIRONMENTAL EFFECTS – ACCELERATED WEATHERING (UV AGEING)

Dura56 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: 50 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.

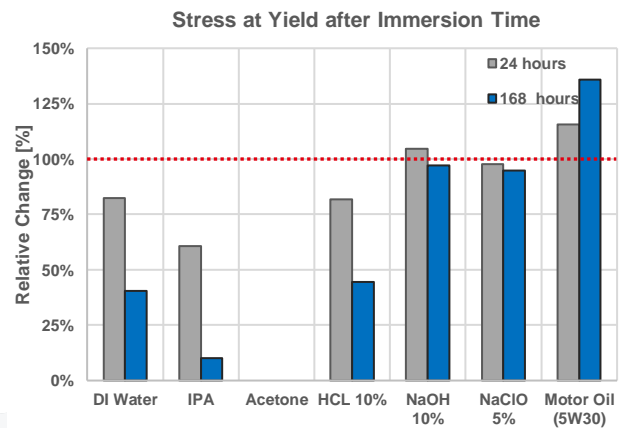
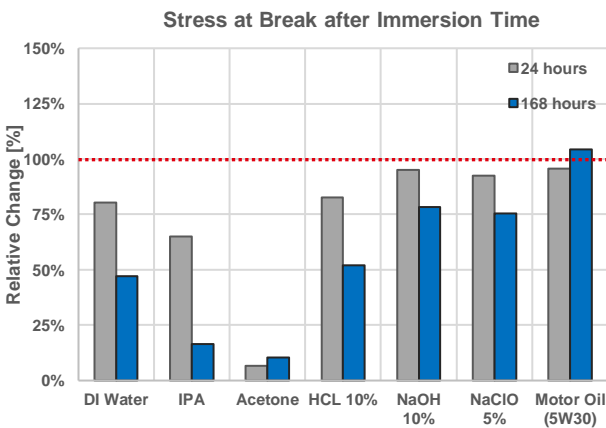
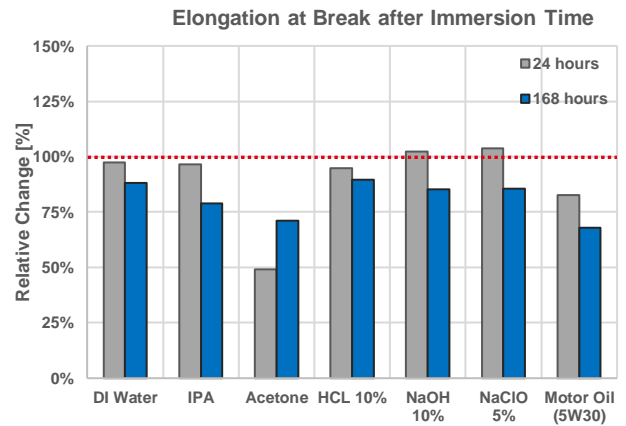
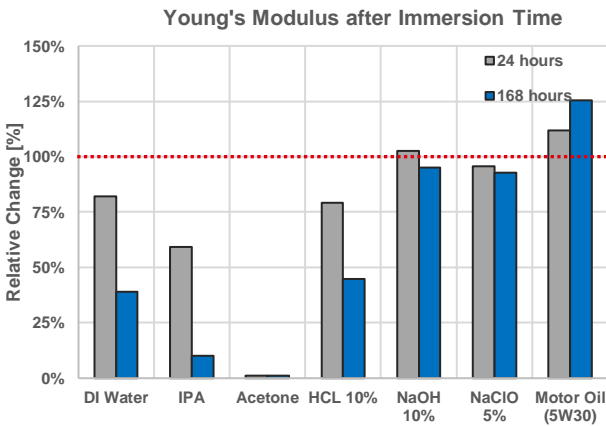
Internal Data Sources:
FOR170608, FOR170595





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

Dura56 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.



Test parameters:

ASTM D638: Type IV, Pull speed: 50 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

Properties of media used: pH(HCL, 10%) = 1; pH(NaOH, 10%) = 14; pH(NaClO, 5%) = 13

Internal Data Sources:

FOR189786, FOR189836, FOR189887, FOR189910, FOR194342, FOR194346, FOR194350



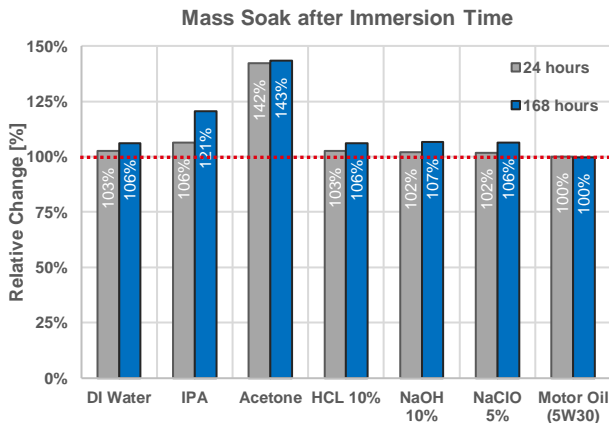
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AGEING AND ENVIRONMENTAL EFFECTS – CHEMICAL RESISTANCE (2/2)

Dura 56 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
Properties of media used: pH(HCl, 10%) = 1; pH(NaOH, 10%) = 14; pH(NaClO, 5%) = 13

Internal Data Sources:

FOR189943, FOR189942, FOR189935, FOR189930, FOR194333, FOR194335, FOR194338



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NOTE

The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. Henkel is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product.

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