LOCTITE®

LOCTITE 3D PRO476 BLACK™

HDT60
Tough LCD
Black

LOCTITE®
Henkel Corporation
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PRO476 BLACK™

PHOTOPLASTIC HDT60
HIGH TOUGHNESS

LOCTITE 3D PRO476 Black™

LOCTITE 3D PRO476 is a high-strength photoplastic with good impact resistance, moderate heat resistance and excellent surface finish.

LOCTITE 3D PRO476 is ideal for a variety of performance prototype and tooling applications and can be machined, tapped, or polished for final finish..

LOCTITE 3D PRO476 is formulated to print optimally on LCD printers.

Parts with this product can be printed with various 405 nm LCD printers
LOCTITE® 3D PRO476 Black™ formula shows limited print height for parts with large cross sections.

Benefits:

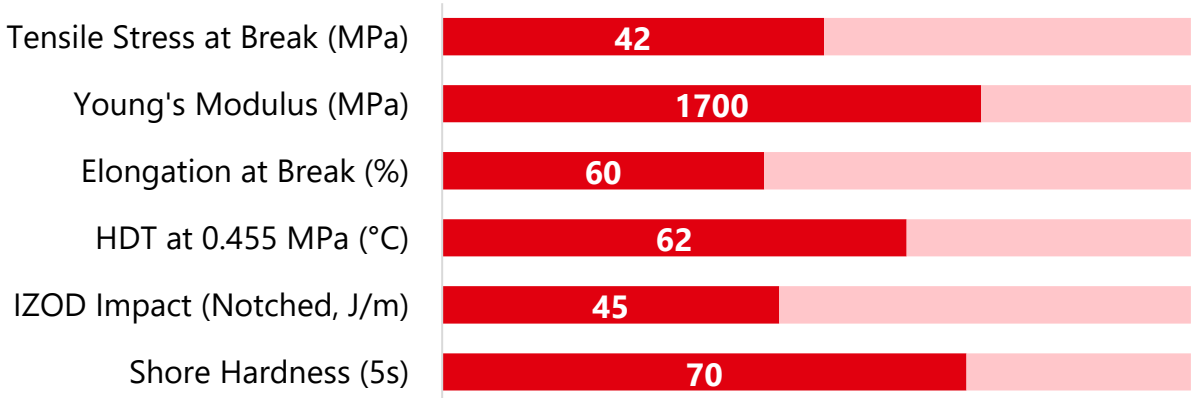
- Tough
- High impact resistance
- Moderate heat resistance, HDT 60°C
- Excellent surface finish

Ideal for:

- Textured and highly detailed parts
- Performance prototypes
- Jigs, fixtures & manufacturing aids
- Housing and covers

Markets:

Industry | Automotive | Consumer Goods



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MECHANICAL PROPERTIES

Mechanical Properties	Measure	Method	Green	Post Processed
Tensile Stress at Yield	MPa	ASTM D638	28 [4] – 33 [3]	42 [6] - 43 [5]
Tensile Stress at Break	MPa	ASTM D638	29 [4] - 32 [3]	39 [5] - 42 [6]
Young's Modulus	MPa	ASTM D638	1000 [4] - 1350 [3]	1550 [6] - 1730 [5]
Elongation at Break	%	ASTM D638	70 [3] – 75 [4]	55 [6] - 60 [5]
Flexural Stress at Yield	MPa	ASTM D790	-	-
Flexural Modulus	MPa	ASTM D790	-	1850 [8] - 2000 [7]
Flexural Strain at Break	%	ASTM D790	-	>5 [7,8]
Other Properties				
HDT at 0.455 MPa	°C	ASTM D648	-	60[9] - 62[10]
HDT at 1.82 MPa	°C	ASTM D648	-	43 - 47[10]
IZOD Impact (Notched)	J/m	ASTM D256	-	40 - 45[11]
Water Absorption (24hr)	%	ASTM D570	-	1.75[12]- 2.40[15]
Water Absorption (72hr)	%	ASTM D570	-	2.80[12] - 3.80[15]
Shore Hardness (5s)	D	ASTM D2240	-	65 - 70[13]
Solid Density	g/cm³	ASTM 792	-	1.111 – 1.310[14]

Liquid Properties	Measure	Method	Value
Viscosity @ 25°C (77°F)	cP	ASTM D7867	612[1.1] - 832[1]
Liquid Density	g/cm³	ASTM D1475	1.08[2]

"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 V, 5mm/min., D256 Notched IZOD (Machine Notched), D648; D2240, Type "D" (5 seconds); D7867@ 25°C (77°F).

Internal Data Sources:
[1] FOR90151, [1.1] FOR28964, [2] FOR25158, [3] FOR126256, [4] FOR52239, [5] FOR126257, [6] FOR23912, [7] FOR25148, [8] FOR26823, [9] FOR24553, [10] FOR136400, [11] FOR25155, [12] FOR25160, [13] FOR25159, [14] FOR137858, [15] FOR148057

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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 PRO476 Black is formulated to print optimally on industrial LCD printers. 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 45°C**
- Intensity: **> 1 mW/cm²**

Settings: 405nm at 2.4 mW/cm²	**Measure**	**Method**	**Value**
Layer Thickness	µm	Internal	100
First Layer	s	Internal	30
Burn in Region	s	Internal	30
Model Layer Cure Time	s	Internal	12

Settings: 385 nm at 5 mW/cm²	**Measure**	**Method**	**Value**
Ec	mJ/cm2	Internal	8.24 [16]
Dp	mm	Internal	0.17 [16]

Settings: 385 nm at 5 mW/cm²	**Measure**	**Method**	**Exposure time**
Dc =50um	s	Internal	1.8*
Dc =100um	s	Internal	3.6*

*Exposure times are calculated without a safety factor.

Internal data source:
[16] FOR33957

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POST PROCESSING

LOCTITE 3D PRO476 Black requires post processing to achieve specified properties. 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

CLEANING

LOCTITE 3D PRO476 Black requires cleaning 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	Ultra sonic bath	2 min	2	Allow parts to dry between intervals
Dry	n.a.	Compressed air	10 to 60 s	2	Air pressure (50psi)
Wait before post curing	n.a.	Ambient condition	60 min	1	Room temperature

POST CURING

LOCTITE 3D PRO476 Black 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)
Loctite CL36	405nm LED	80 mW/cm^2 at 405 nm	15 min	100% top & side, rotary table
Loctite UVALOC 1000	Mercury Arc Bulb (broad spectrum)	30 mW/cm^2 at 365 nm	5 min	500 W, lowest shelf
Dymax 5000 EC Flood	Mercury Arc Bulb (broad spectrum)	150 mW/cm^2 at 380 nm	10 min	400 W, Shelf K

*These values are calculated without a safety factor.

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ADDITIONAL DEVELOPMENT OPTIONS

Colors: LOCTITE 3D PRO476 Black™ formula can be made with additional pigment colors.

LIMITATIONS

Vat Printer: LOCTITE® 3D PRO476 Black™ formula is likely possible with recirculation VAT that can handle higher viscosity resins.

LCD printers: LOCTITE® 3D PRO476 Black™ formula shows limited print height for parts with large cross sections.

STORAGE

Store LOCTITE® 3D PRO476 Black™ in the unopened container in a dry location. Optimal storage: 8°C to 30°C, storage below 8°C or greater than 30°C can adversely affect products properties. More specific information is given in the Safety Data Sheet. Material removed from container may be contaminated during use. For this reason, filter used resin with 190µm mesh filter before placing back into proper storage container.

https://www.loctiteam.com/printer-validation-settings/

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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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