

**LOCTITE®**



# LOCTITE® 3D IND249™

Black

**LOCTITE®**

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# IND249 BK™ HDT



## LOCTITE 3D IND249 BK™

LOCTITE 3D IND249 BK is a high-temperature, high-strength material that prints challenging geometries with fine feature resolution. This low-viscosity material features exceptionally high green strength to enable ease of processing.

Stiffness and thermal durability make LOCTITE 3D IND249 BK ideal for production applications, including mold tooling, manufacturing aids, and other complex geometries.

LOCTITE 3D IND249 BK has validated workflows for printing on various DLP platforms.



### Benefits:

- Exceptionally high stiffness
- Low viscosity
- High accuracy
- Good temperature resistance



### Ideal for:

- Challenge geometries
- Mold tooling
- Manufacturing aids



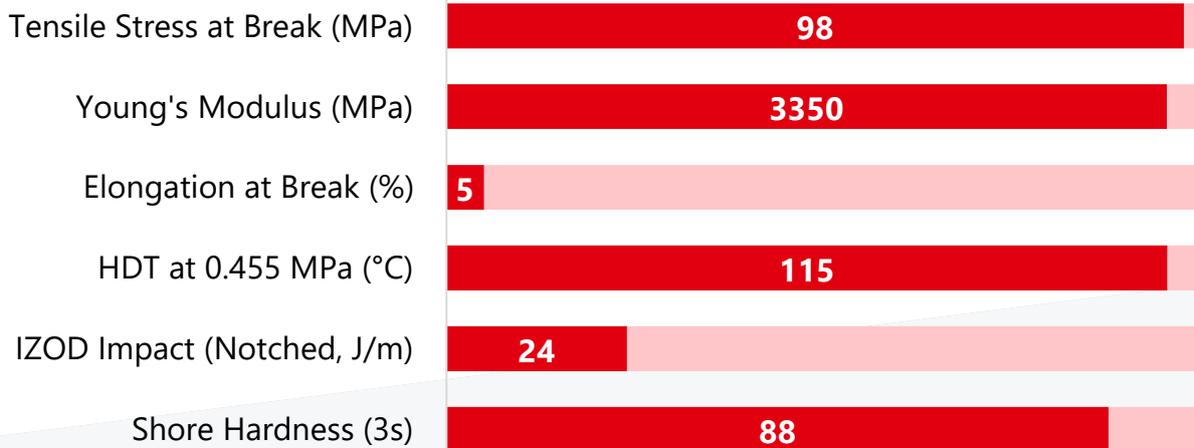
### Markets:



Industry



Consumer Goods



*\*Values shown are linked to LOCTITE IND249 BK 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	43 - 53 <sup>[1]</sup>	-
Tensile Stress at Break	MPa	ASTM D638	37 - 46 <sup>[1]</sup>	83 - 98 <sup>[1]</sup>
Young's Modulus	MPa	ASTM D638	1700 - 1880 <sup>[1]</sup>	2980 - 3350 <sup>[1]</sup>
Elongation at Break	%	ASTM D638	16 - 24 <sup>[1]</sup>	4 - 7 <sup>[1]</sup>
Flexural Modulus	MPa	ASTM D790	2340 - 3330 <sup>[2,3]</sup>	3170 - 3600 <sup>[3,4]</sup>
Flexural Elongation at Break	%	ASTM D790	>5 <sup>[2,3]</sup>	4 - 5 <sup>[3,4]</sup>
Flexural Stress at Break	MPa	ASTM D790	94 - 130 <sup>[2,3]</sup>	127 - 153 <sup>[3,4]</sup>
<b>Other Properties</b>				
HDT at 0.455 MPa	°C	ASTM D648	-	113 - 117 <sup>[5,6]</sup>
HDT at 1.82 MPa	°C	ASTM D648	-	96 - 101 <sup>[7,6]</sup>
IZOD Impact (Notched)	J/m	ASTM D256	11 - 24 <sup>[8,9]</sup>	13 - 24 <sup>[10,8]</sup>
Water Absorption (24hr)	%	ASTM D570	-	0.5 - 0.7 <sup>[11,12]</sup>
Water Absorption (72hr)	%	ASTM D570	-	0.7 - 0.9 <sup>[11,12]</sup>
Shore Hardness (3s)	D	ASTM D2240	74 - 87 <sup>[13,14]</sup>	81 - 88 <sup>[13,15]</sup>
Solid Density	g/cm <sup>3</sup>	ASTM D792	1.16 - 1.19 <sup>[16,17]</sup>	1.17 - 1.20 <sup>[16,17]</sup>
<b>Liquid Properties</b>				
Viscosity at 25°C (77°F)	cP	ASTM D7867	444 - 461 <sup>[18,19]</sup>	
Liquid Density	g/cm <sup>3</sup>	ASTM D792	1.09 - 1.10 <sup>[17,16]</sup>	

"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" (3 seconds), D7867, D1475

**Internal Data Sources:**

[1] GEN329696, [2] FOR317892, [3] FOR317854, [4] FOR317895, [5] FOR338673, [6] FOR338726, [7] FOR332911, [8] FOR332913, [9] FOR331481, [10] FOR317866, [11] FOR332975, [12] FOR316403, [13] FOR332977, [14] FOR317904, [15] FOR317906, [16] FOR332976, [17] FOR316402, [18] FOR332025, [19] FOR316377





# IND249 BK™ HDT



## 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 IND249 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/cm<sup>2</sup> to 7 mW/cm<sup>2</sup>

Settings: 385 nm at 5 mW/cm <sup>2</sup>	Measure	Method	Value
Layer Thickness	µm	Internal	100
First Layer	s	Internal	30
Burn in Region	s	Internal	20
Model Layer Cure Time	s	Internal	7

Settings: 385 nm at 5 mW/cm <sup>2</sup>	Measure	Method	Value
E <sub>C</sub>	mJ/cm <sup>2</sup>	Internal	11.37 <sup>[1, 20]</sup>
D <sub>p</sub>	mm	Internal	0.28 <sup>[1, 20]</sup>

Settings: 385 nm at 5 mW/cm <sup>2</sup>	Measure	Method	Exposure time
D <sub>C</sub> = 100µm	s	Internal	1.82 <sup>[1, 20, *]</sup>
D <sub>C</sub> = 50µm	s	Internal	1.30 <sup>[1, 20, *]</sup>

\* Exposure times are calculated without a safety factor.

Internal Data Sources:  
[1] GEN329696, [20] FOR328621





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### CLEANING

LOCTITE 3D IND249 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	IPA	Ultrasonic	1 min	1	Dry after each interval
Cleaning Step #2	IPA	Ultrasonic	1 min	1	Dry after each interval
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

### POST CURING

LOCTITE 3D IND249 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.

If a lower energy LED or other post cure unit is used, an additional heat cure at 130°C for 2 hours may be required to realize highest HDT performance. Allow the parts to rest one hour between UV cure and heat cure. To minimize risk of warpage place parts in cold oven before ramping up temperature to target value and cool down parts slowly in switched off oven after reaching the heat curing conditions.

UV Curing Unit	UV Source	Intensity	Cure time per side	Additional Settings (Shelf, Output Energy)	Heat Cure
Dymax 5000 EC Flood	Mercury Arc Bulb (broad spectrum)	148 mW/cm <sup>2</sup> at 380 nm	10 min	400W, Shelf K	-
Loctite CL36	405nm LED	80 mW/cm <sup>2</sup> at 405 nm	30 min	100% top & side	2 hours at 130°C
PCU 90	Metal halide	100%	20 min	Rotary Table	2 hours at 130°C



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## STORAGE

Store **LOCTITE 3D IND249 BK** 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

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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