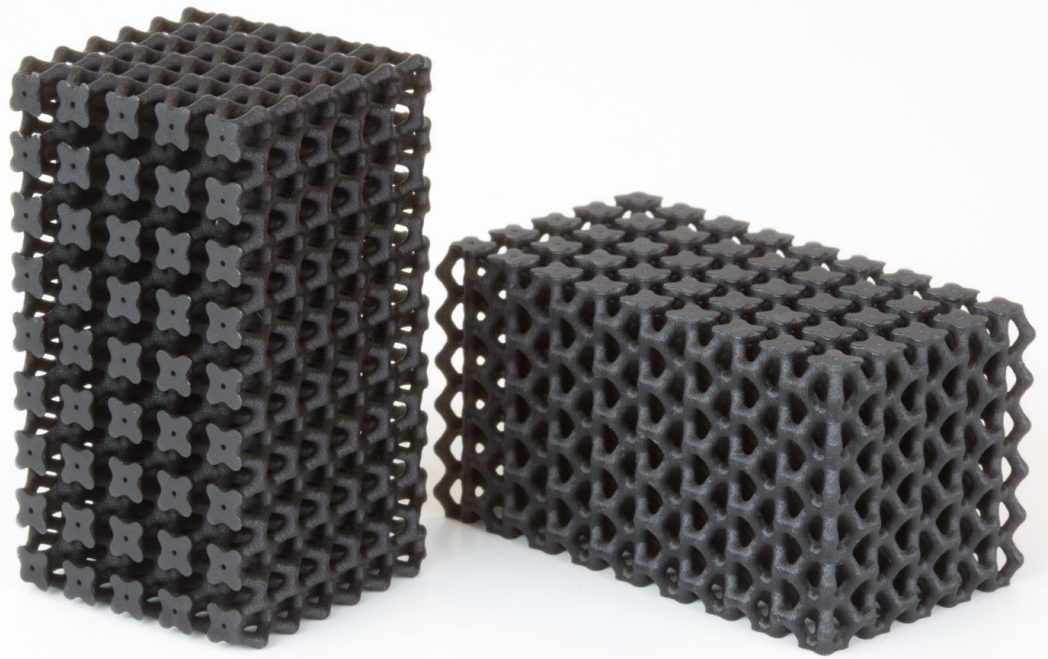


LOCTITE®



LOCTITE 3D® PRO410™

General Purpose
Black

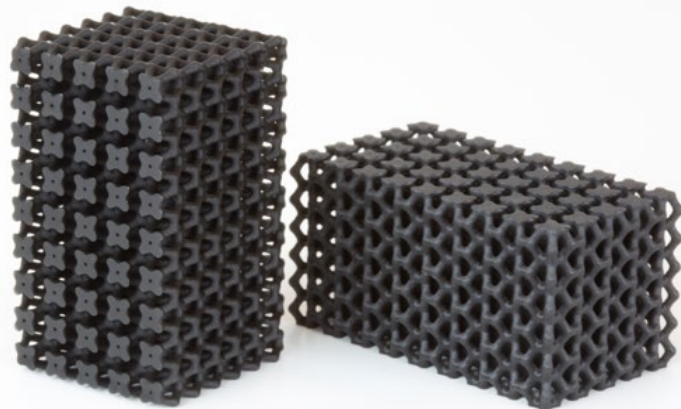
LOCTITE®
Henkel Corporation
loctite3d@henkel.com



LOCTITE®

PRO410™

GENERAL PURPOSE



LOCTITE 3D PRO410™

LOCTITE 3D PRO410 is a fast printing, rigid photopolymer that can be printed with very high-resolution.

LOCTITE 3D PRO410 has been formulated to provide high print accuracy and an exceptional surface finish. This material prints three times faster than traditional Henkel 3DP printing resins.

This product is ideal for printing accurate prototypes, that will be exposed to temperatures up to 60°C. This product can be printed on DLP and LCD machines.



Benefits:

- Excellent surface finish
- 3X faster printing*
- Accurate prototypes



Ideal for:

- Printer setup and calibration
- Rapid prototypes



Markets:



Industry



Automotive



Consumer Goods

**vs other Henkel 3D printing resins*

Tensile Stress at Break (MPa)

48

Young's Modulus (MPa)

1900

Elongation at Break (%)

5

HDT at 0.455 MPa (°C)

76

IZOD Impact (Notched, J/m)

28

Shore Hardness (3s)

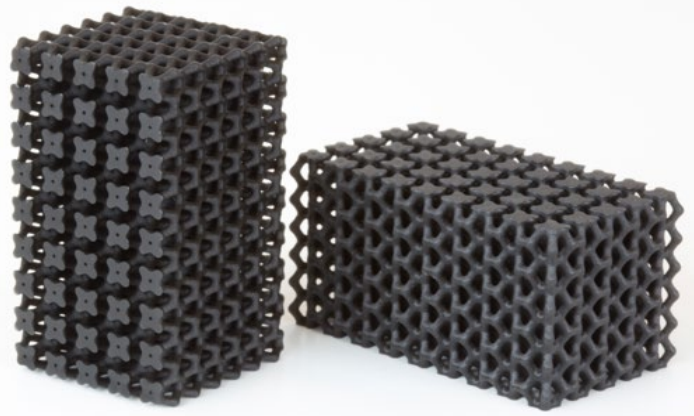
84

**Values shown are linked to parts printed on a DLP printer at 385nm & post cured with broad spectra bulb (Loctite UVALOC 1000)*





PRO410™ GENERAL PURPOSE BLACK



PROPERTIES

Mechanical Properties	Measure	Method	Green	Post Processed
Young's Modulus	MPa	ASTM D638	703 – 883 ^[1]	1630 – 1990 ^[16,2]
Tensile Stress at Break	MPa	ASTM D638	20 – 22 ^[1]	38 – 49 ^[16,2]
Elongation at Break	%	ASTM D638	6 – 12 ^[1]	4 – 7 ^[2,16]
Flexural Modulus	MPa	ASTM D790	781 – 937 ^[3]	2480 – 2520 ^[1]
Flexural Stress at break	MPa	ASTM D790	30 – 36 ^[3]	82 – 86 ^[4]
Flexural Elongation at Break	%	ASTM D790	> 5 ^[3,15]	> 5 ^[4,15]
IZOD Impact (Notched)	J/m	-	N/A	20 – 28 ^[8]
Shore Hardness (3s)	D	ASTM D2240	-	83 – 85 ^[10]
Other Properties				
HDT at 0.455 MPa	°C	ASTM D648	-	66 – 76 ^[5]
HDT at 1.82 MPa	°C	ASTM D648	-	51 – 55 ^[6]
Water Absorption (24 hr)	%	ASTM D570	-	0.2 – 0.3 ^[9]
Water Absorption (48 hr)	%	ASTM D570	-	0.3 – 0.4 ^[9,1]
Water Absorption (72 hr)	%	ASTM D570	-	0.4 ^[9,1] – 0.6 ^[9]
Solid Density	g/cm ³	ASTM D792	-	1.354 ^[11]
Thermal Conductivity	W/(m*K)	ASTM D5930	-	0.204 – 0.206 ^[12]
Heat Capacity	J/(g*K)	ASTM D5930	-	1.211 – 1.231 ^[12]
Biocompatibility				
Irritation		ISO 109935-23*		Comply ^[13]
Liquid Properties				
Viscosity at 25°C (77°F)	cP	ASTM D7867		400 – 600 ^[14]
Liquid Density	g/cm ³	ASTM D792		1.1 ^[11]

Test parameters:

All specimen are printed unless otherwise noted. All specimen were in ambient lab conditions at 19-23°C / 40-60% RH for at least 24 hours. ASTM Methods: D638 Type IV, 5mm/min; D790-B 1.3 mm/mi; D256 Notched IZOD (Machine Notched) 6 mm x 12 mm; D2240 Type "D" (3, 5 seconds); D648 127 mm x 13 mm x 6,8 mm; D570 3.2 mm x 51 mm Disc 24hr@ 25°C; D792 solid 8 mm x 10 mm Disc; D5930 80 mm x 40 mm x 10 mm; D7867@ 25°C (77°F).

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

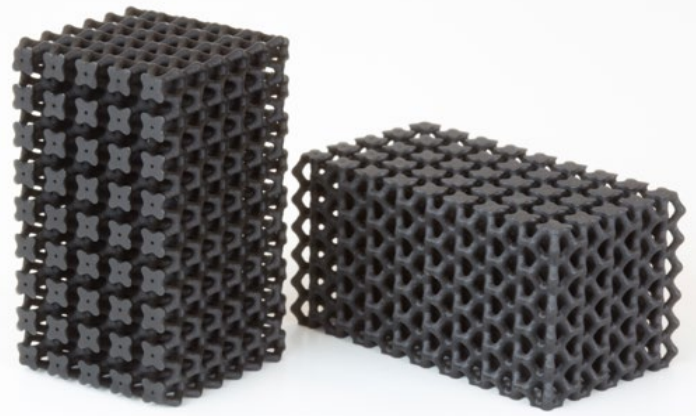
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PRO410™ GENERAL PURPOSE BLACK



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 PRO410 BK product is formulated to print optimally on any DLP machine. 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 25°C
- Intensity: 4 mW/cm² to 8 mW/cm²

Settings: 385nm at 5 mW/cm ²	Measure	Method	Value
Layer Thickness (µm):	µm	Internal	100
Burn-in Region (s)	s	Internal	25
Transition Region (s):	s	Internal	15
Model Region (s):	s	Internal	3.2

Settings: 385nm at 5 mW/cm ²	Measure	Method	Value
E _C	mJ/cm ²	Internal	2.42 ^[16,17]
D _p	mm	Internal	0.100 ^[16,17]

Settings: 385nm at 5 mW/cm ²	Measure	Method	Exposure time
D _C = 50µm	s	Internal	0.50*
D _C = 100µm	s	Internal	1.23*

Test parameters:

*Exposure times are calculated without a safety factor.

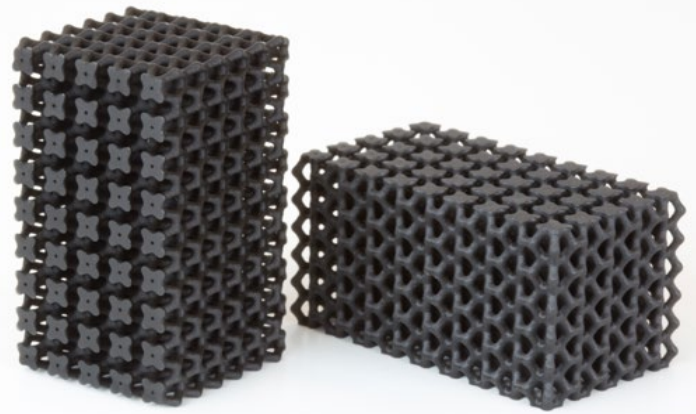
Internal Data Sources:

[16] FOR42484, [17] GEN201614





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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>

CLEANING

LOCTITE 3D PRO410 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	IPA	Ultra sonic bath	1 min	2	Allow parts to dry between intervals
Dry	n.a.	Compressed air	10 to 60 s	2	Air pressure (50psi)
Wait	n.a.	Ambient condition	60 min	1	Room temperature

POST CURING

LOCTITE 3D PRO410 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)
Loctite CL36	405nm LED	80 mW/cm ² at 405 nm	10 min	100% top & side
Loctite UVALOC 1000	Mercury Arc Bulb (broad spectrum)	30 mW/cm ² at 365 nm	5 min	500 W, Level 0 (From Bottom)
Dymax 5000 EC Flood	Mercury Arc Bulb (broad spectrum)	150 mW/cm ² at 380 nm	2 min	Shelf K

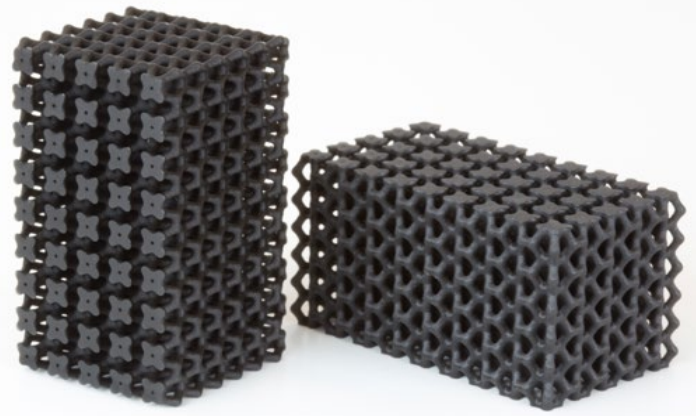
STORAGE

Store LOCTITE PRO410 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.





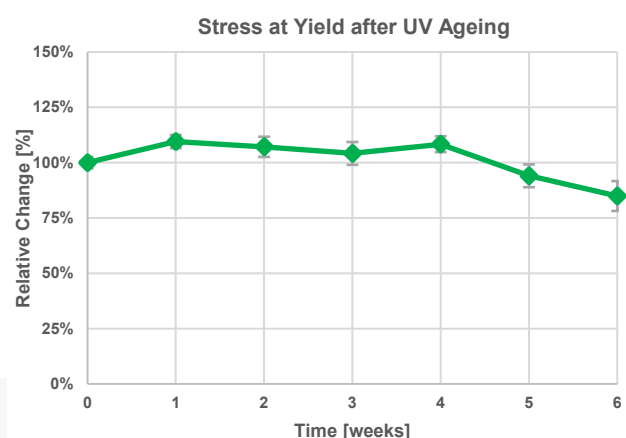
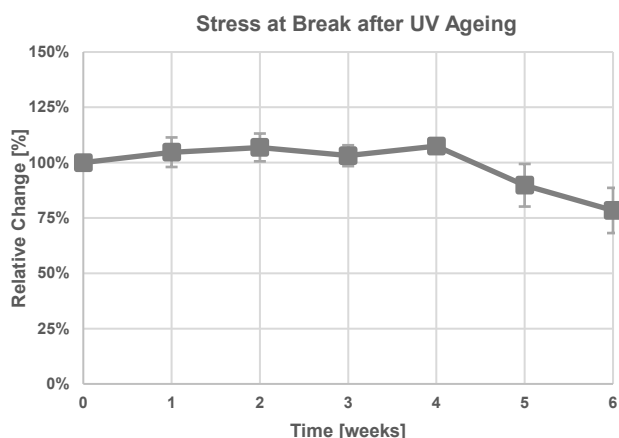
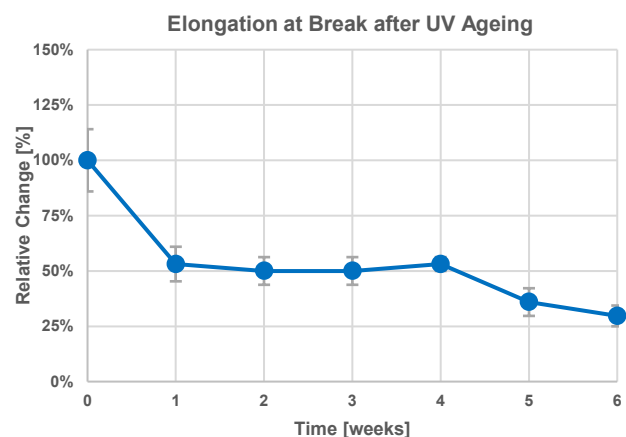
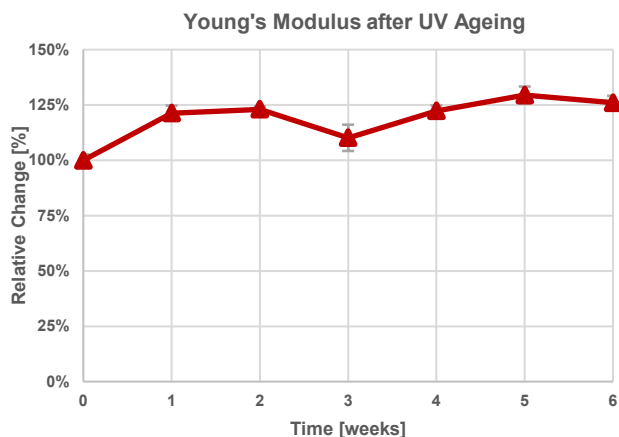
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AGEING AND ENVIRONMENTAL EFFECTS – ACCELERATED WEATHERING (UV AGEING)

LOCTITE 3D PRO410 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.

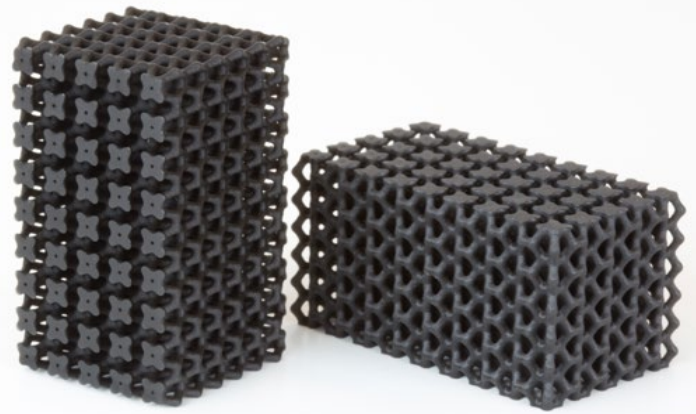
Internal Data Sources:

FOR305337, FOR305339





PRO410™ GENERAL PURPOSE



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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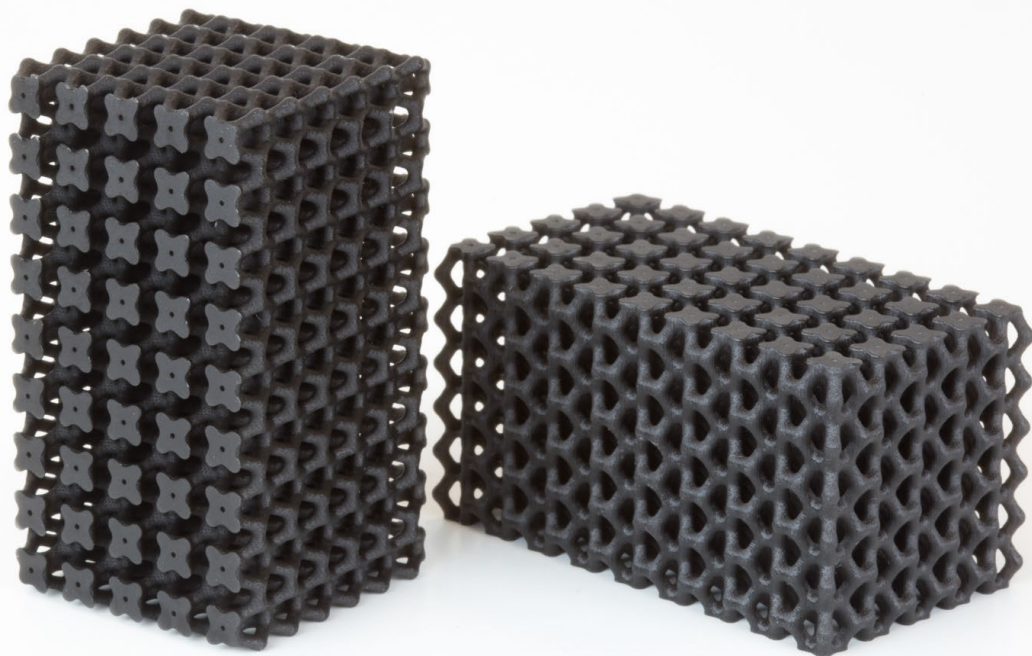
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