LOCTITE®

LOCTITE® 3D IND5714™

Elastomer
Gray

LOCTITE®
Henkel Corporation
loctite3d@henkel.com

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LOCTITE 3D IND5714™

LOCTITE 3D IND5714 is an industrial elastomer with a low hazard labelling, a low shore A hardness and excellent repetitive strain resistance.

The properties of LOCTITE 3D IND5714, including the high rebound characteristics, excellent elongation at break and low modulus, makes it an ideal choice for cushioning and dampening applications in a wide range of industries.

LOCTITE 3D IND5714 is compatible with a broad range of DLP and LCD machines.

Benefits:

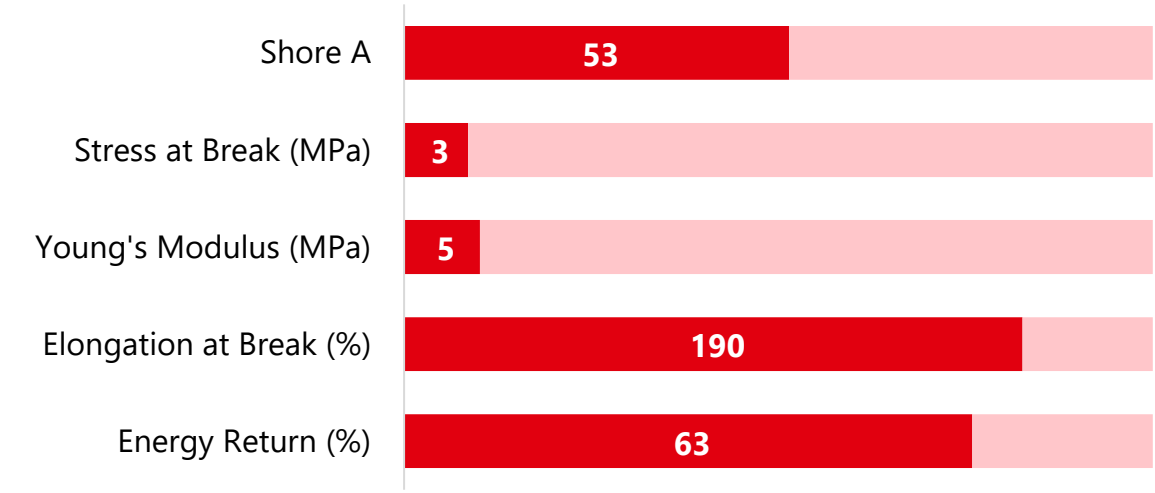
- Excellent H&S rating and TPO-Free
- Improved processing
- High rebound and excellent compression characteristics
- Soft feel and high elongation

Ideal for:

- Cushioning and dampening applications such as shock absorbers, gaskets and seals
- Sporting and consumer goods
- Soft robotics (grippers, prosthetics)

Markets:

Industry | Consumer Goods | Automotive



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PROPERTIES

Mechanical Properties	Measure	Method	Green	Post Processed
Young's Modulus	MPa	ASTM D638	-	4.1 – 4.9 [10]
Tensile Stress at Break	MPa	ASTM D638	-	1.4 [10]
Elongation at Break	%	ASTM D638	-	130 – 143 [10]
Stress at 50% Strain	MPa	ASTM D412	0.7 [9]	1.2 [9]
Stress at 100% Strain	MPa	ASTM D412	1.0 [9]	1.7 [9]
Stress at 150% Strain	MPa	ASTM D412	1.3 [9]	2.3 [9]
Stress at Break	MPa	ASTM D412	2.0 – 2.4 [9]	2.9 [9]
Strain at Break	%	ASTM D412	228 – 261 [9]	191 – 195 [9]
Tear Strength	kN/m	ASTM D624	-	8.4 – 9.4 [8]
Energy Return	%	Internal	-	55 – 63 [4]
Compression Set (22°C/24hr)	%	D395-B	-	8 – 11 [3]
Compression Set (70°C/24hr)	%	D395-B	-	25 – 32 [3]
Shore Hardness (5s)	A	ASTM D2240	-	53 [2]
Other Properties				
Solid Density (Cured)	g/cm^3	ASTM D792	-	1.04 [1]
Water Absorption (24hr)	%	ASTM D570	-	3.5 [5]
Water Absorption (72hr)	%	ASTM D570	-	5.0 [5]
Water Absorption (168hr)	%	ASTM D570	-	5.3 [5]
Biocompatibility				
Cytotoxicity		ISO10993-5		Comply[11]

Liquid Properties	Measure	Method	Value
Viscosity at 25°C (77°F)	cP	ASTM D7867	2000 - 2900 [6]
Liquid Density	g/cm^3	ASTM D1475	1.01 [7]

Test parameters:
"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, 50 mm/min, D412 Type C, 500 mm/min, D570 0.125" x 2" Disc 24hr@ 25°C, D2240, Type "A" (5 seconds), D7867, D1475
*The biological assessment has been performed based on the in vitro method according to ISO10993-23

Internal Data Sources:
[1] FOR512549, [2] FOR505649, [3] FOR506506, [4] FOR506522, [5] FOR504267, [6] GEN793206, [7] FOR459194, [8] FOR491459, [9] FOR491455, [10] FOR516571, [11] FOR685610

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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 IND5714 GY is formulated to print optimally on LCD and DLP 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 35°C
- Intensity: 3 mW/cm² to 7 mW/cm²

Settings: 385 nm at 5 mW/cm²	Measure	Method	Value
Layer Thickness	µm	Internal	100
Burn-in Region	s	Internal	40
Transition Region	s	Internal	25
Model Region	s	Internal	10

Settings: 385 nm at 5 mW/cm²	Measure	Method	Value
E_C	mJ/cm2	Internal	16.12 [1]
D_P	mm	Internal	0.12 [1]

Settings: 385 nm at 5 mW/cm²	Measure	Method	Exposure time
D_C =50um	s	Internal	5*
D_C =100um	s	Internal	7*

Test parameters:
Exposure times are calculated without a safety factor

Internal Data Sources:
[1] FOR459191

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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 IND5714 GY 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	Interval	Additional Info
Cleaning #1	IPA	Sonic	2 min	1-2	Allow parts to dry between intervals
Dry	n.a.	Compressed air	30 s	1	Use compressed air between intervals
Wait before post curing	n.a.	Ambient	60 min	1	Room temperature

POST CURING

LOCTITE 3D IND5714 GY requires post curing to achieve specified properties. It is recommended to use a wide spectrum lamp post UV cure device.

UV Curing Unit	UV Source	Intensity	Cure time Per side	Additional Settings (Shelf, Output Energy)
Loctite UVALOC 1000	Mercury Arc Bulb (broad spectrum)	30 mW/cm^2 at 365nm	10 min	500 W, 1st shelf from bottom

STORAGE

Store LOCTITE 3D IND5714 GY 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 190 µm mesh filter before placing back into proper storage container.

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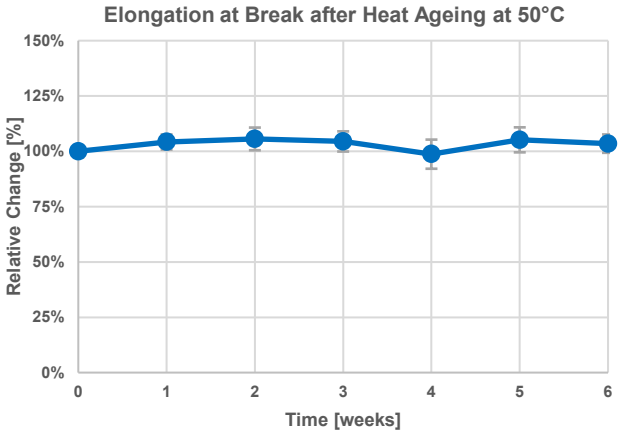
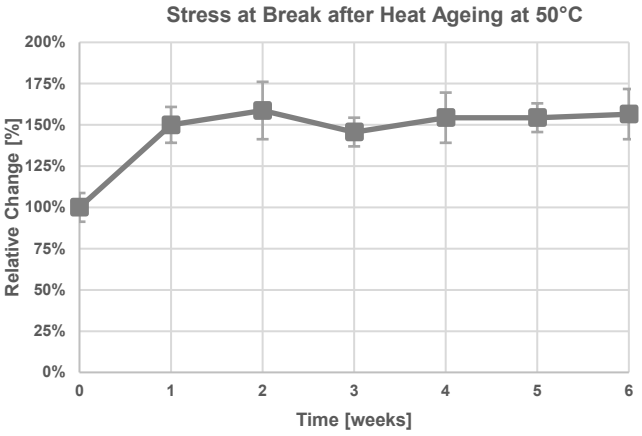
AGEING AND ENVIRONMENTAL EFFECTS – HEAT AGEING

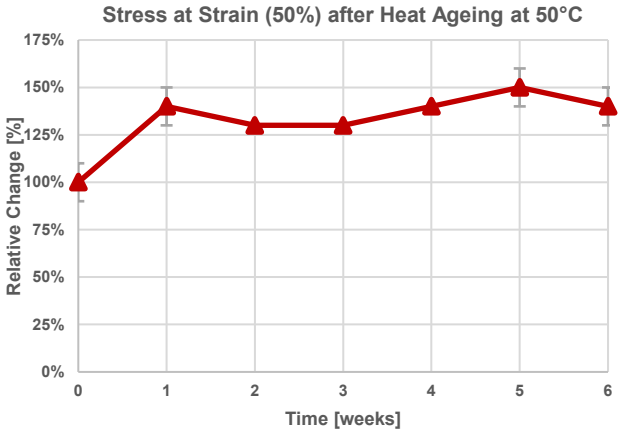
LOCTITE 3D IND5714 GY was heat aged without load according to ASTM D3045. Test samples were exposed for a defined time at 50°C and conditioned for 24 hours at 22°C before mechanical testing. Control samples were stored at a constant 22°C. All samples were printed in the same print job using a validated workflow. Mechanical testing was conducted according to ASTM D412 at standard lab conditions (22°C).

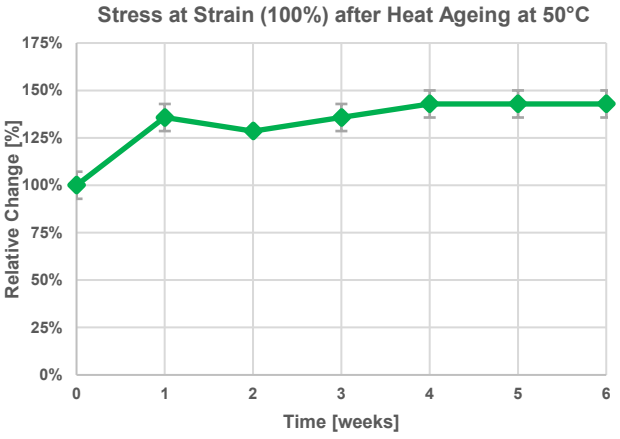
Values at '0 weeks' are non-aged samples stored at 22°C and tested after 24 hours of post-processing.

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 D412: Type Die C, Pull speed: 500 mm/min, 22°C

Internal Data Sources:
FOR511094, FOR511097

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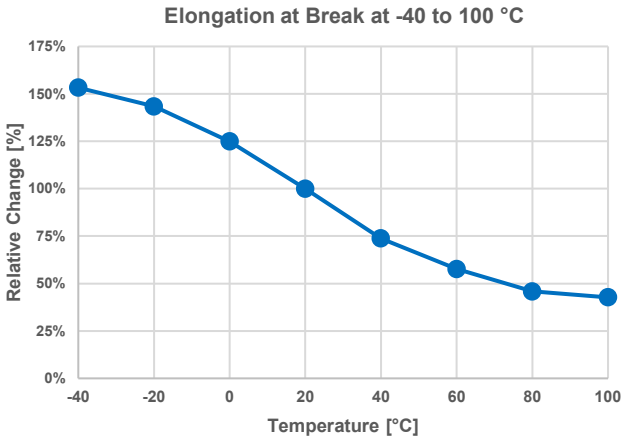
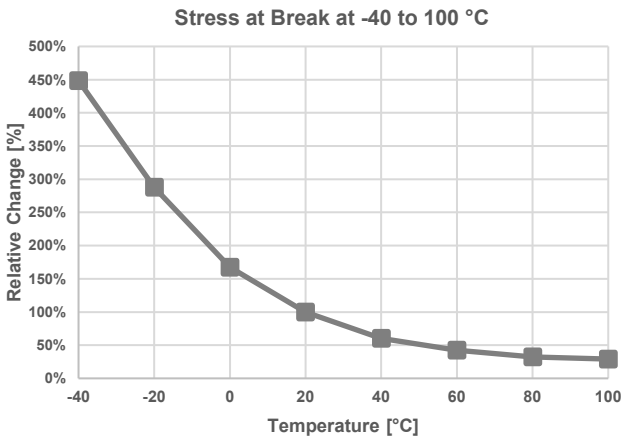
THERMAL INFLUENCE ON MECHANICAL PROPERTIES

LOCTITE 3D IND5714 GY has been tested according to ASTM D412 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 D412. Before each test series samples were conditioned for 60 minutes at the specific test temperature.





Test parameters:
ASTM D412: Type Die C, Pull speed: 500 mm/min

Internal Data Sources:
FOR548431, FOR544068

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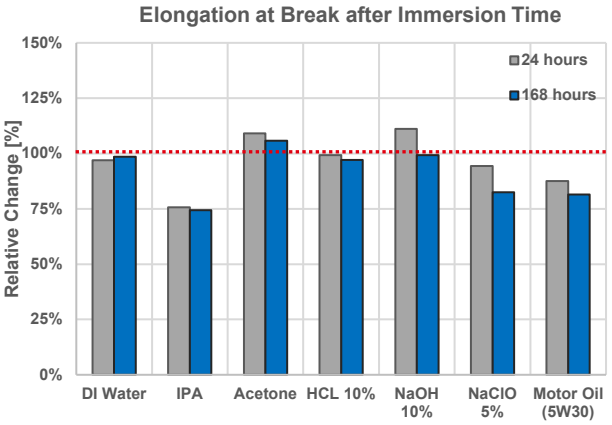
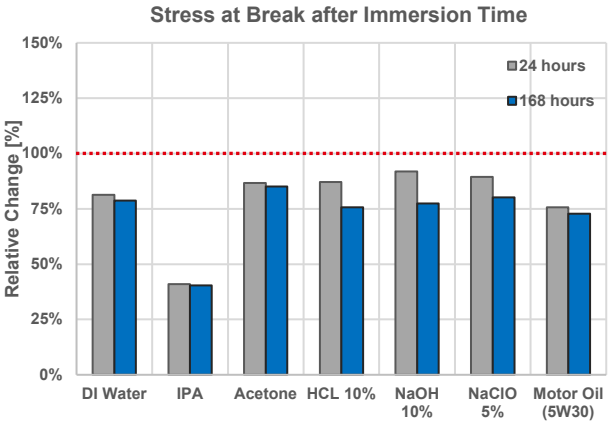
AGEING AND ENVIRONMENTAL EFFECTS – CHEMICAL RESISTANCE INDUSTRIAL

LOCTITE 3D IND5714 GY 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 D412 at standard lab conditions (22°C).

The 100% value represents the initial weight 24 hours after post-processing.





Test parameters:
ASTM D412: Type Die C, Pull speed: 500 mm/min, 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:
FOR537139, FOR537140, FOR538045, FOR538046, FOR559225, FOR559226, FOR559229

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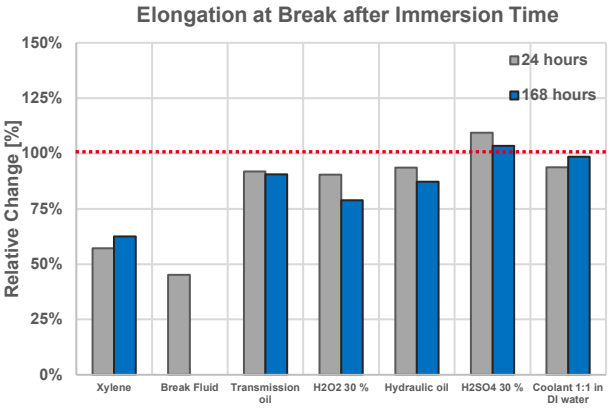
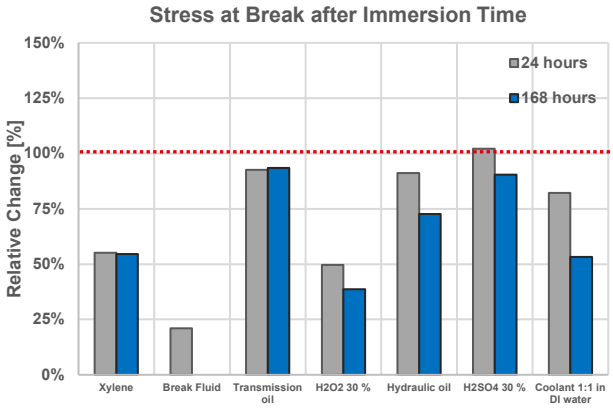
AGEING AND ENVIRONMENTAL EFFECTS – CHEMICAL RESISTANCE AUTOMOTIVE

LOCTITE 3D IND5714 GY 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 D412 at standard lab conditions (22°C).

The 100% value represents the initial weight 24 hours after post-processing.





Test parameters:
ASTM D412: Type Die C, Pull speed: 500 mm/min, 22°C
ASTM D543: Samples immersed in different chemicals were stored at 22°C. Samples immersed in Transmission oil and Coolant mix 1:1 were stored at 50°C.
Properties of media used: pH(H_2SO_4 30%) = 0; pH(H_2O_2 30%) = 5; pH (NaCl solution 0.9%) = 5
Viscosity: Hydraulic fluid = 3000 mPas at 40°C; Transmission oil = 8200 mPas at 40°C;
Minimum temperature of coolant mix 1:1 = -40°C

Internal Data Sources:
FOR692673, FOR692675, FOR692676, FOR692677, FOR695663, FOR695676, FOR695688

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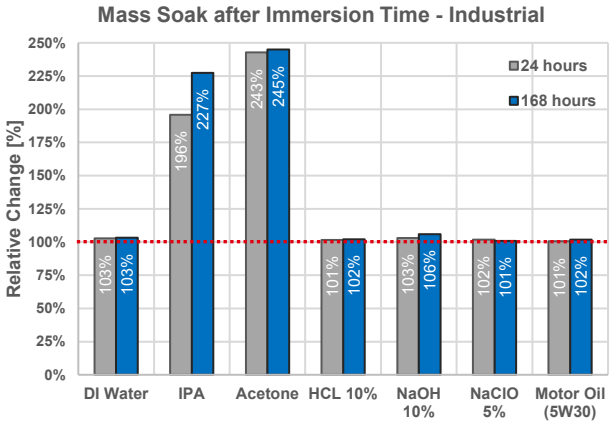
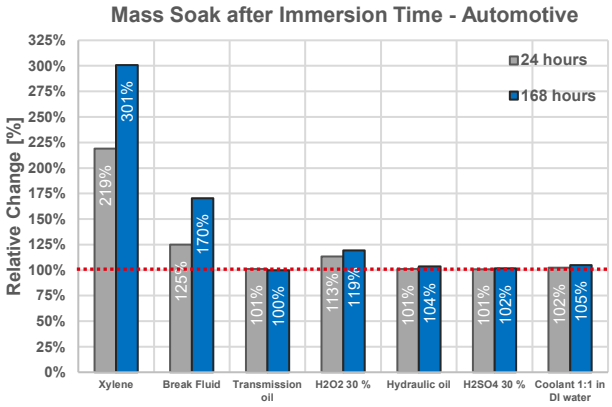
AGEING AND ENVIRONMENTAL EFFECTS – CHEMICAL RESISTANCE MASS SOAK

LOCTITE 3D IND5714 GY 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.

The 100% value 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, Transmission Oil and Coolant mix 1:1 were stored at 50°C.
Properties of media used: pH(HCl, 10%) = 1; pH(NaOH 10%) = 14; pH(NaClO 5%) = 13; pH(H_2SO_4 30%) = 0; pH(H_2O_2 30%) = 5; pH (NaCl solution 0.9%) = 5
Viscosity: Hydraulic fluid = 3000 mPas at 40°C; Transmission oil = 8200 mPas at 40°C;
Minimum temperature for coolant mix 1:1 = -40°C

Internal Data Sources:
FOR538060, FOR538066, FOR538091, FOR538092, FOR559230, FOR559231, FOR559232, FOR692673, FOR692675, FOR692676, FOR692677, FOR695663, FOR695676, FOR695688

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NOTE

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