LOCTITE® 3D IND3785™

Low Migration
White

LOCTITE®
Henkel Corporation
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LOCTITE 3D IND3785™

LOCTITE 3D IND3785 is a rigid photopolymer with high chemical resistance and very low migration, designed to minimize leachable substances.

LOCTITE 3D IND3785 complies with EU 10/2011 FDA CFR 177.1010 and requirements for certain short-term food contact conditions, supporting use in regulated processing and handling.

With its rigidity, durability, and resistance LOCTITE 3D IND3785 is also suited for biomedical and industrial environments requiring reliable performance under chemical exposure.

Benefits:

- Excellent chemical and moisture resistance
- High dimensional stability and accuracy
- TPO- and CMR-free formulation

Ideal for:

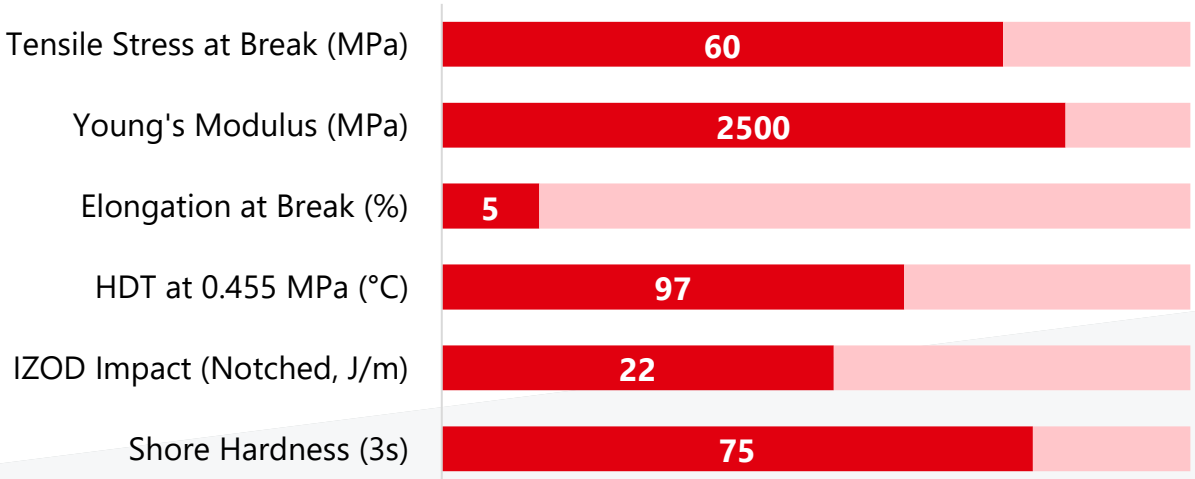
- Short term food and pharmaceutical contact
- Dispensing, filling, and packaging fixtures
- Chemical-resistant applications with low migration

Markets:

Pharmaceutical

Biomedical

Food & Beverage



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COMPLIANCE WITH REGULATIONS

Under specific conditions LOCTITE 3D IND3785 WH is suitable for the manufacture of food packaging materials in full compliance with the Federal Food, Drug, and Cosmetic Act and all applicable food additive regulations. A food contact statement with further details is available on request. **The responsibility for compliance with the specific conditions is with the end user and not with the supplier.**

DIRECTIONS OF USE

Preliminary Statement: Prior to application it is necessary to read the Safety Data Sheet for information about precautionary measures and safety recommendations. Also, for chemical products exempt from compulsory labeling, the relevant precautions should always be observed. Please also refer to the local safety instructions and contact Henkel for analytical support. Adherence to the validated workflow is required to achieve compliant results. Validated workflow information is found on page 7 of TDS.

REGULATORY APPROVAL SCOPE

The FDA opinion letter concludes that properly processed LOCTITE 3D IND3785 WH may be used in the preparation of:

- Dispensing components for solid oral pharmaceuticals and dry food stuffs (e.g., tablets)
- Repeated-use houseware components used in beverage applications These uses are limited to room-temperature or below conditions.

REPEATED-USE HOUSEWARE COMPONENTS (EXPANDED EXPLANATION)

The FDA opinion explicitly identifies two allowable component categories:

- Beverage dispensing nozzles and manifold parts for room temperature liquids (e.g. spouts, taps, nozzles, connectors,)
- Repeat use non-heated lids, spouts, and outlet fittings

Housewares are generally considered to be articles sold empty and used by consumers in the home or by a commercial establishment to hold, prepare, or serve food. However, substances in housewares are not exempt from the general safety provisions of the FFDCA. - The Regulation of Food Packaging

LIMITATIONS

This approval is strictly limited to applications indicated in the regulatory approval scope and is not a general FDA Food Contact Notification (FCN) Any product requiring an FCN will be subject to further regulatory approval prior to use.

DISCLAIMER

This summary is based solely on the FDA regulatory opinion and applies only to the explicitly described uses. Manufacturers remain responsible for ensuring suitability in the final application.

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PROPERTIES

Mechanical Properties	Measure	Method	Green	Post Processed
Young's Modulus	MPa	ASTM D638	1100 – 1300 [1]	2400 – 2700 [1]
Tensile Stress at Yield	MPa	ASTM D638	32 – 35 [1]	-
Elongation at Yield	%	ASTM D638	4.3 - 4.5 [1]	-
Tensile Stress at Break	MPa	ASTM D638	32 – 35 [1]	58 – 62 [1]
Elongation at Break	%	ASTM D638	13 – 17 [1]	4 – 5 [1]
Poisson's Ratio	-	ASTM D638	-	-
Flexural Modulus	MPa	ASTM D790	950 – 1100 [1]	2500 – 2600 [1]
Flexural Stress at Break	MPa	ASTM D790	-	90-95 [1]
Flexural Elongation at Break	%	ASTM D790	>5 [1]	4.5 – 5 [1]
Charpy Impact (Notched)	kJ/m^2	ISO179-1	-	1.2 [1]
Charpy Impact (Unnotched)	kJ/m^2	ISO179-1	-	8.2 [1]
IZOD Impact (Notched)	J/m	ASTM D256	-	18 – 22 [1]
Shore Hardness (3s)	D	ASTM D2240	-	75 [1]
Abrasion Resistance	mg/1000cy.	ASTM D4060 [*]	-	103 [1]
Static Friction	μ_S	ISO 8295	-	Pending
Dynamic Friction	μ_D	ISO 8295	-	Pending

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, 5 mm/min, D790-A, 1.3 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)
[*] Taber Abrasion Test method was adapted from ASTM D4060 and DIN ISO 9352-2012 Taber Abrasion CS-17 Abrading wheels 60rpm 1000g loading 100% vacuum, measured mass loss in mg per 1000 cycles.

Internal Data Sources:
[1] GEN837205

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PROPERTIES

Other Properties	Measure	Method	Green	Post Processed
HDT at 0.455 MPa	°C	ASTM D648	-	95 – 100 [1]
HDT at 1.82 MPa	°C	ASTM D648	-	63 – 67 [1]
Water Absorption (24hr)	%	ASTM D570	-	0.28 – 0.33 [2]
Water Absorption (48hr)	%	ASTM D570	-	0.48 [2]
Water Absorption (72hr)	%	ASTM D570	-	0.50 – 0.75 [2]
Solid Density	g/cm^3	ASTM D1475	-	1.19 [2]
Thermal Conductivity	W/(m·K)	ASTM D5930	-	0.15 [4]
Heat Capacity	J/(g·K)	ASTM D5930	-	1.28 [4]
CTE (5°C to 90°C)	µm/(m·K)	ASTM E831	-	96 [2]
CTE (110°C to 200°C)	µm/(m·K)	ASTM E831	-	204 [2]
Tg	°C	ASTM E1640	-	126 [2]

Liquid Properties	Measure	Method		Value
Viscosity at 25°C (77°F)	cP	ASTM D7867	-	1100 – 1300 [2]
Liquid Density	g/cm^3	ASTM D1475	-	1.11 [2]
Biocompatibility				
Cytotoxicity		ISO10993-5	-	Comply [3]

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." D648, D570 0.125" x 2" Disc 24hr@ 25°C, D7867, D1475

Internal Data Sources:
[1] GEN837205 [2] GEN857947 [3] GEN858332 [4] FOR845384

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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 IND3785 WH is formulated to print optimally on industrial DLP printer using 385nm. 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: 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	10 - 20
Model Region	s	Internal	4 - 6

Settings: 385 nm at 5 mW/cm²	Measure	Method	Value
E_C	mJ/cm²	Internal	6.79 [1]
D_P	mm	Internal	0.19 [1]

Settings: 385 nm at 5 mW/cm²	Measure	Method	Exposure time
D_C = 50 µm	s	Internal	4.12* [1]
D_C = 100 µm	s	Internal	5.36* [1]

Test parameters:
*Exposure times are calculated without a safety factor

Internal data source:
[1] GEN867594

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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 IND3785 WH 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	1	Fresh IPA
Dry	n.a.	Compressed air	10 s to 60 s	1	Air pressure (30psi)
Cleaning Step #2	IPA	Ultrasonic	1 min	1	Fresh IPA
Dry	n.a.	Compressed air	10 s to 60 s	1	Air pressure (30psi)
Wait before post curing	n.a.	Ambient condition	60 min	1	Room temperature

POST CURING

LOCTITE 3D IND3785 WH 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/cm² at 405 nm	20 min	100% top and side

POST CURE CLEANING

LOCTITE 3D IND3785 WH requires an additional washing step post UV curing to achieve specified properties and extraction results. This additional washing step requires fresh solvent. Use compressed air to remove residual solvent from the surface of parts.

Post Process Step	Agent	Method	Duration	Intervals	Additional Info
Cleaning Step #1	IPA	Ultrasonic	30 min	1	Fresh IPA
Dry	n.a.	Compressed air	10 s to 60 s	1	Air pressure (30psi)

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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

STORAGE

Store LOCTITE 3D IND3785 WH 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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TIPS & TRICKS

This section is a collection of useful advices, guides, and recommendations designed to help users of the LOCTITE 3D IND3785 WH deal with specific process tasks more efficiently.

PRINT PREPARATION:

To ensure a homogeneous mixture of the LOCTITE 3D IND3785 WH or to avoid the risk of separation or sedimentation or foaming of components in the resin, we recommend using a bottle roller. Our testing utilized 40-60 rpm for 1 hour before pouring material into the printer.

POST PROCESSING:

Please start the post processing of LOCTITE 3D IND3785 WH within 24 hours after the print is finished. Gently remove green parts from the platform to achieve best part performance.

RESIN USE:

Use LOCTITE 3D IND3785 WH within two weeks after having opened the bottle to assure stable mechanical 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. Please use a separate container for used resin. Reduce exposure to ambient light to achieve best resin performance.

ULTRASONIC BATH TEMPERATURE:

When utilizing an Ultrasonic Bath ensure the temperature of the ultrasonic bath is controlled and monitored to prevent that cleaning agents like Isopropanol (IPA) do not heat up and to minimize risk of a fire hazards.

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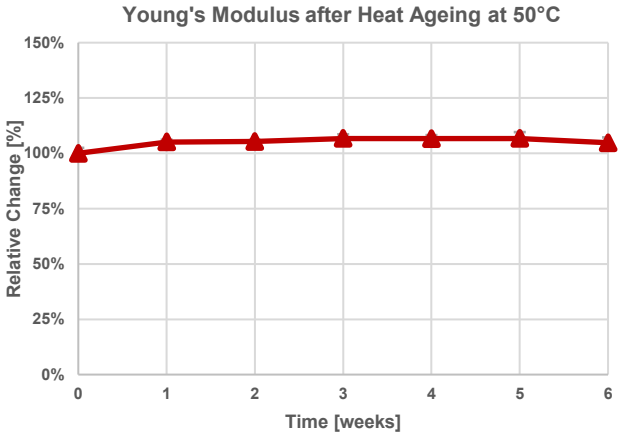
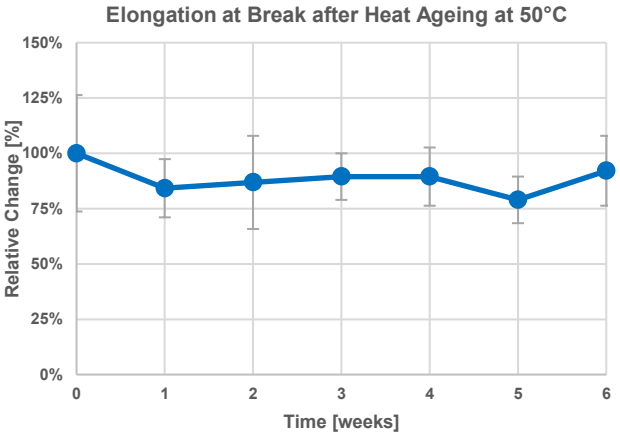
AGEING AND ENVIRONMENTAL EFFECTS – HEAT AGEING

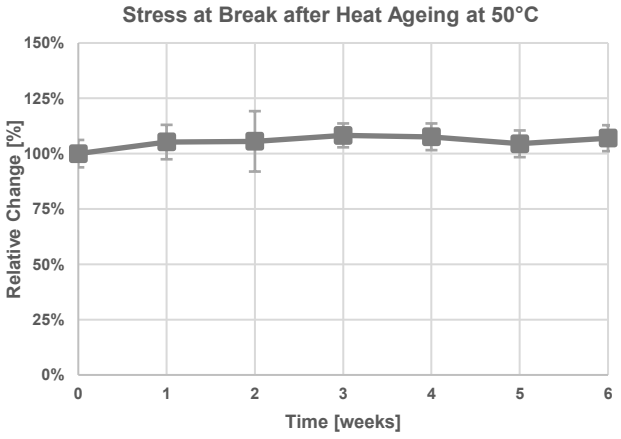
LOCTITE 3D IND3785 WH was heat aged without load according to ASTM D3045. Test samples were exposed for a defined time at 50°C and conditioned for 24 hours at 22°C before mechanical testing. Control samples were stored at a constant 22°C. All samples were printed in the same print job using a validated workflow. Mechanical testing was conducted according to ASTM D638 at standard lab conditions (22°C).

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 D638: Type IV, Pull speed: 5 mm/min, Young's modulus measured at 0.1-1.0% (regression), 22°C

Internal Data Sources:
FOR806808, FOR806809

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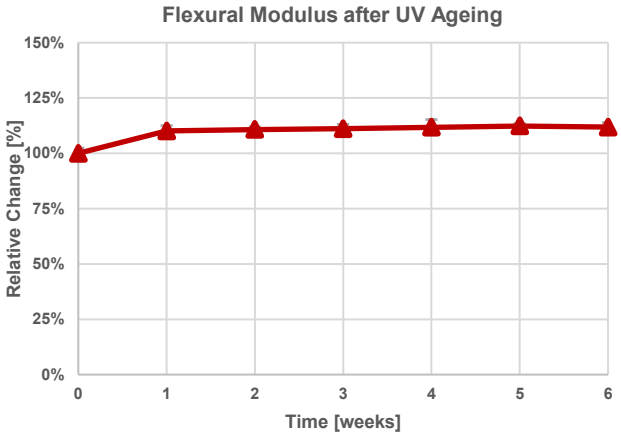
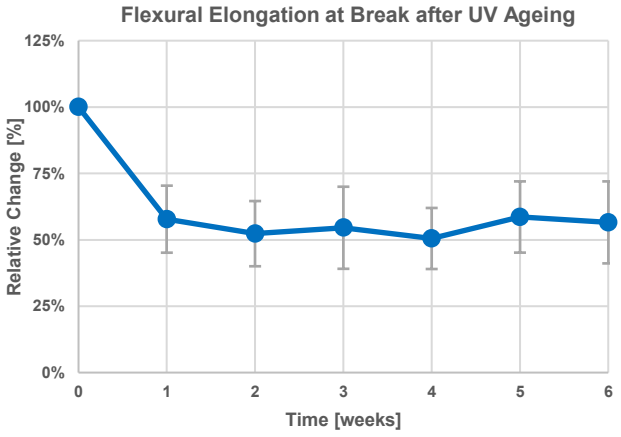
AGEING AND ENVIRONMENTAL EFFECTS – ACCELERATED WEATHERING (UV AGEING)

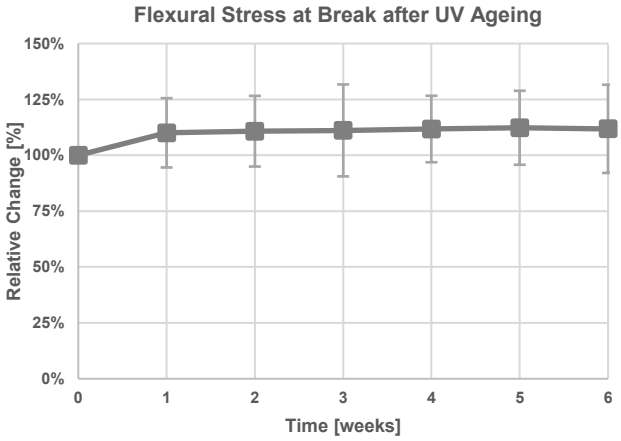
LOCTITE 3D IND3785 WH has been tested after accelerated outdoor weathering according to ASTM D4329 (Cycle A). Test samples were exposed to defined conditions of heat, water condensation and UV light. Exposed samples were conditioned for 24 hours at 22°C before mechanical testing. Control samples were 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 D790 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.

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 D790: Test speed: 1.3 mm/min, Test specimens: 85x12x3 mm, Flexural modulus measured at 0.1-1.0% (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:
FOR806243, FOR806246

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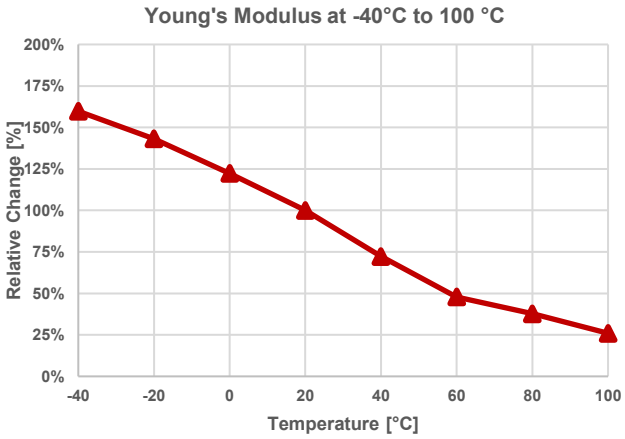
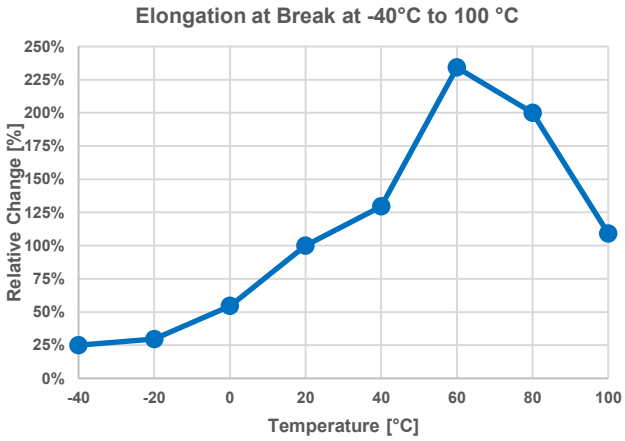
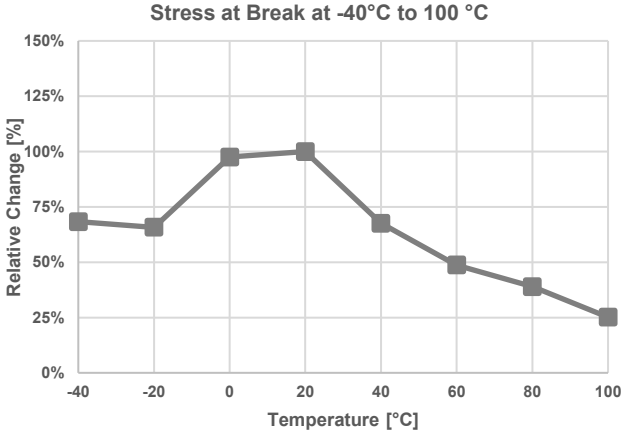
THERMAL INFLUENCE ON MECHANICAL PROPERTIES

LOCTITE 3D 3785 WH was tested according to ASTM D638 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 D638. Before each test series samples were conditioned for 60 minutes at the specific test temperature.







Test parameters:
ASTM D638, Type IV, Pull speed: 5 mm/min, Young's modulus measured at 0.1-1% (regression)

Internal Data Sources:
FOR862199, FOR865363

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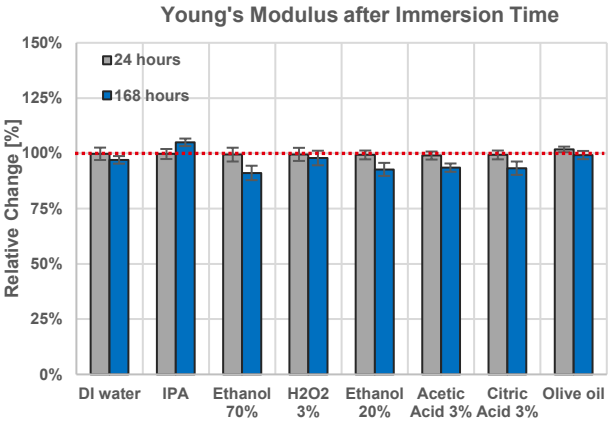
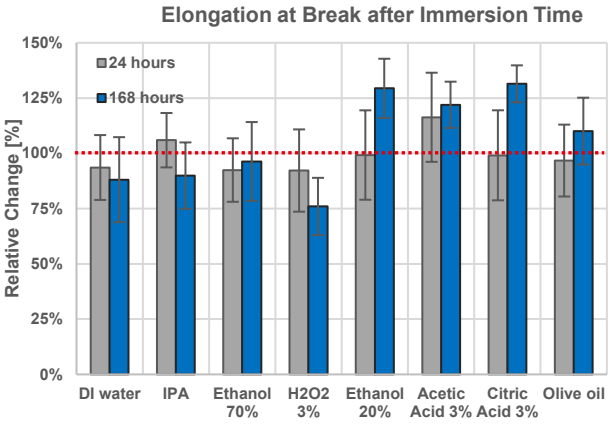
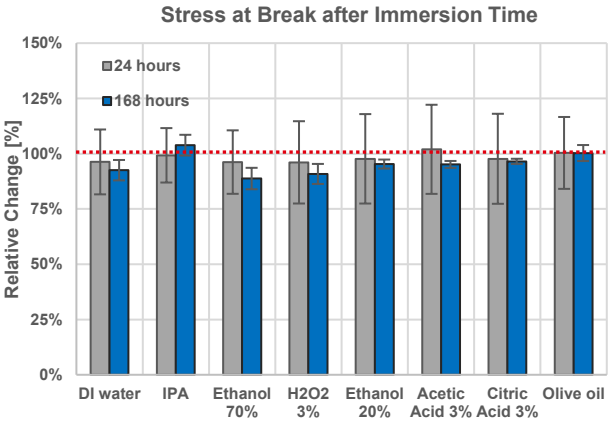
AGEING AND ENVIRONMENTAL EFFECTS – CHEMICAL RESISTANCE INDUSTRIAL

LOCTITE 3D IND3785 WH 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).

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







Test parameters:
ASTM D638: Type IV, Pull speed: 5 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.

Internal Data Sources:
FOR807570, FOR807573, FOR807575, FOR807576, FOR811268, FOR811240, FOR811269, FOR811302

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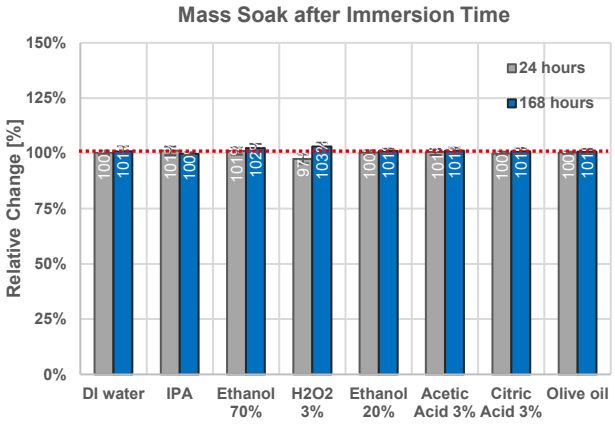
AGEING AND ENVIRONMENTAL EFFECTS – CHEMICAL RESISTANCE MASS SOAK

LOCTITE 3D IND3785 WH 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 D638: Type IV, Pull speed: 5 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.

Internal Data Sources:
FOR807570, FOR807573, FOR807575, FOR807576, FOR811268, FOR811240, FOR811269, FOR811302

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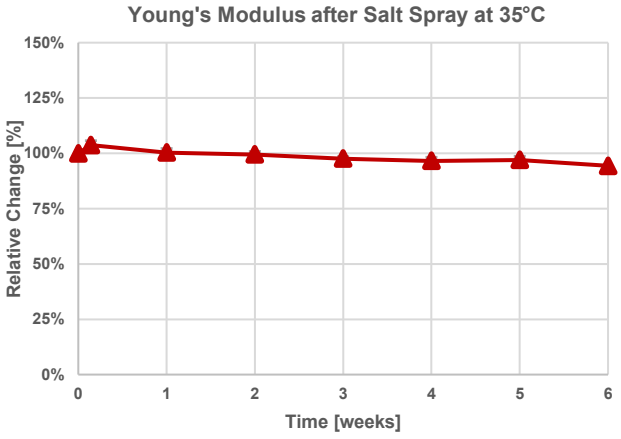
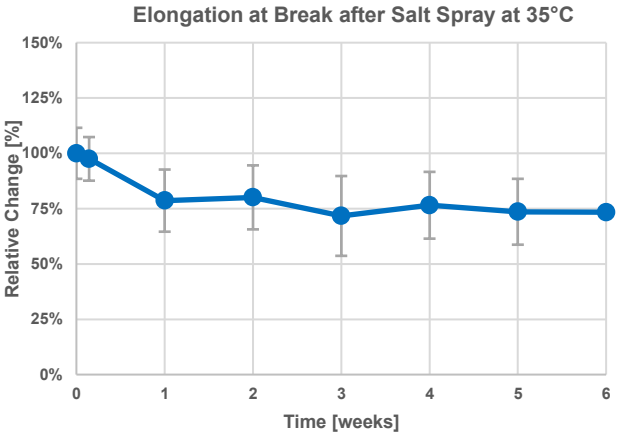
AGEING AND ENVIRONMENTAL EFFECTS – SALT SPRAY EXPOSURE

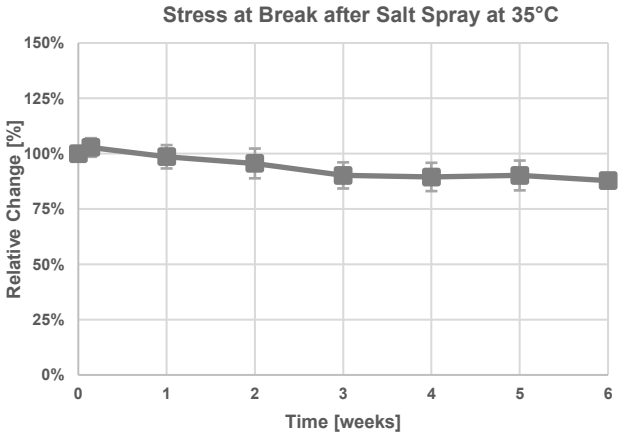
LOCTITE 3D IND3785 WH was aged according to ASTM B117-19. During the test samples were exposed to salt spray at 35°C. After removal from the test chamber, exposed samples were dried, inspected, cleaned using water and wiped dry. Before mechanical testing, samples were conditioned for 24 hours at 22°C. 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).

Values at '0 weeks' are non-aged samples stored at 22°C and tested after 24 hours of 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 B117-19: pH = 6.1; Fog collection = 1.3 ml/h
ASTM D638: Type IV, Pull speed: 5 mm/min, Young's modulus measured at 0.1-1.0% (regression), 22°C

Internal Data Sources:
FOR840205, FOR840206, FOR840207

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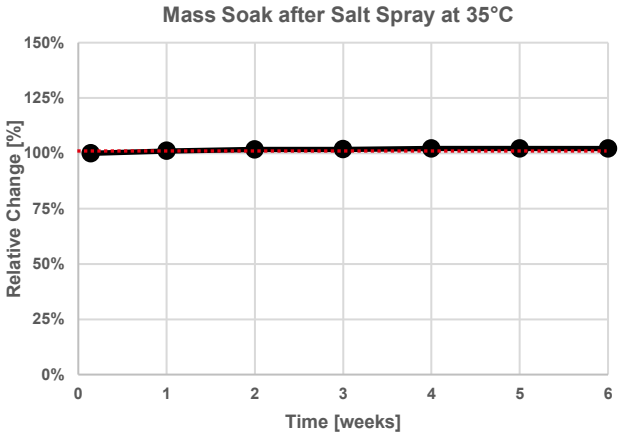
AGEING AND ENVIRONMENTAL EFFECTS – SALT SPRAY EXPOSURE

LOCTITE 3D IND3785 WH has been tested after salt spray exposure according to ASTM B117-19. All samples were printed in the same print job using a validated workflow. After removal from the salt spray environment, exposed samples were dried, inspected, cleaned using water, wiped dry and immediately weighed.

The influence of the salt spray was measured by mass change after different exposure times. Samples were weighed after 24 hours and 1 to 6 weeks.

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



Test parameters:
ASTM B117-19: pH = 6.1; Fog collection = 1.3 ml/h

Internal Data Sources:
FOR88727, FOR88738

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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.

Any liability in respect of the information in the Technical Data Sheet or any other written or oral recommendation(s) regarding the concerned product is excluded, except if otherwise explicitly agreed and except in relation to death or personal injury caused by our negligence and any liability under any applicable mandatory product liability law.

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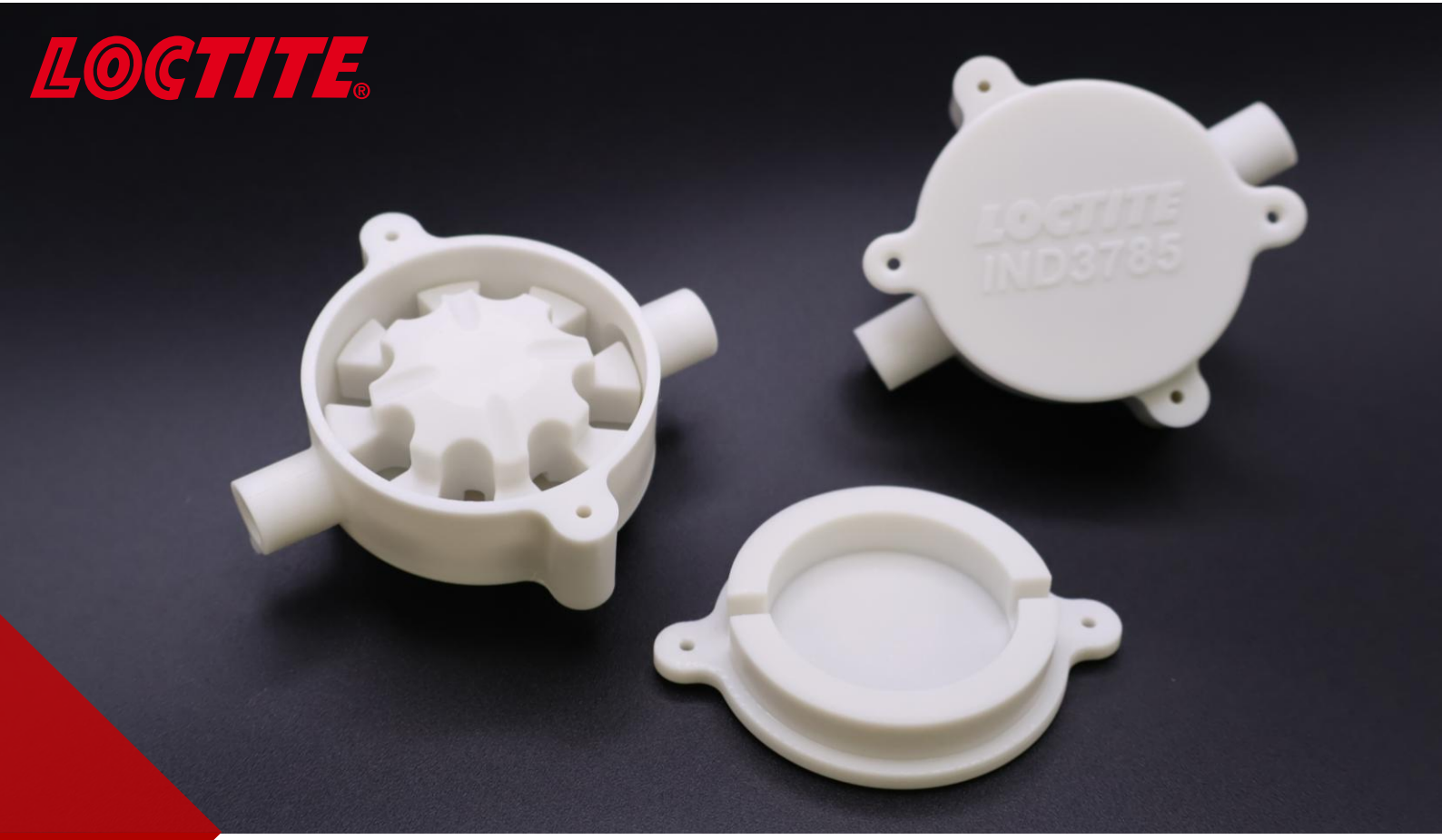

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