

LOCTITE®



LOCTITE® 3D IND403™

HDT80 High Modulus
Photoplastic
Black

LOCTITE®

Henkel Corporation

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IND403™

HDT80 HIGH MODULUS
PHOTOPLASTIC
BLACK



LOCTITE 3D IND403™

LOCTITE 3D IND403 is a high temperature resistance material that allows the production of parts with high surface quality and outstanding dimensional accuracy.

LOCTITE 3D IND403 is ideal for tooling production for processes such as silicone casting, low pressure molding and open mold PU molding. The material can withstand mechanical stresses while maintaining dimensional stability for multiple cycles, for fast product development and rapid process iteration.



Benefits:

- High heat deflection temperature, HDT 80°C
- Tough with good dimensional stability
- Good surface finish



Ideal for:

- Tooling and molds
- Interior applications in automotive



Markets:



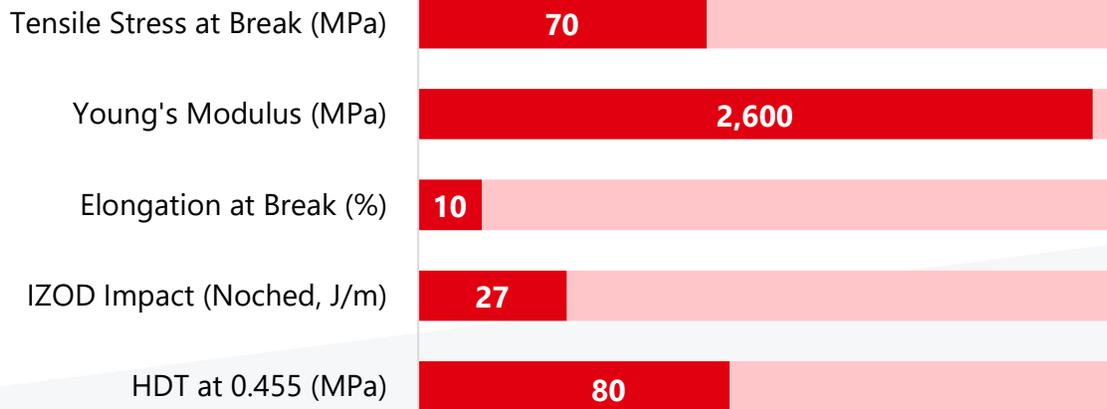
Industry



Automotive



Consumer Goods



**Values shown are linked to LOCTITE IND403 Black 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 | 40 ± 3 [1] | 72 ± 2 [2] |
| Tensile Stress at Break | MPa | ASTM D638 | 32 ± 3 [1] | 67 ± 3 [2] |
| Young's Modulus | MPa | ASTM D638 | 1777 ± 97 [1] | 2572 ± 31 [2] |
| Elongation at Break | % | ASTM D638 | 21 ± 3 [1] | 10 ± 3 [2] |
| Flexural Modulus | MPa | ASTM D790 | 1879 ± 34 [4] | 2654 ± 66 [3] |
| Flexural Elongation at Break | % | ASTM D790 | >5 [3] | >5 [3] |
| Flexural Stress at Break | MPa | ASTM D790 | - | - |
| Other Properties | | | | |
| IZOD Impact (Notched) | J/m | ASTM D256 | - | 27 ± 5 [7] |
| Shore Hardness (0s, 3s) | D | ASTM D648 | 81, 76 [9] | 80, 78 [10] |
| Solid Density | g/cm ³ | ASTM D1475 | 1.17 [11] | 1.20 [12] |

| Liquid Properties | Measure | Method | Value |
|--------------------------|-------------------|-----------|----------------|
| Viscosity at 25°C (77°F) | cP | ASTMD7867 | 100 – 200 [13] |
| Liquid Density | g/cm ³ | ASTMD1475 | 1.08 [14] |

"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 IV, 5mm/min, D790-B, 2mm/min, D256 Notched IZOD (Machine Notched), 6 mm x 12 mm, D2240, Type "D" (0, 3 seconds), D7867, D1475

Internal Data Sources:

[1]FOR22924, [2]FOR22926, [3]FOR20444, [4]FOR16923, [5]FOR19730, [6]FOR16920, [7]FOR16913, [8]FOR26106, [9]FOR16912, [10]FOR16911, [11]FOR16928, [12]FOR16928, [13]FOR16921, [14] FOR16910



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PROPERTIES

| Thermal Properties | Measure | Method | Green | Post Processed |
|----------------------|----------|------------|-------|-----------------|
| HDT at 0.455 MPa | °C | ASTM D648 | - | 82 ± 1 [5] |
| HDT at 1.82 MPa | °C | ASTM D648 | - | 65 ± 1 [6] |
| Thermal Conductivity | mW/(m·K) | ASTM D5930 | - | 222 ± 2 [8] |
| Heat Capacity | J/(g·K) | ASTM D5930 | - | 1.46 ± 0.08 [8] |

| Electrical Properties | Measure | Method | Green | Post Processed |
|--|---------|-----------|-------|----------------|
| Dielectric Strength | kV/mm | ASTM D149 | - | 25 ± 1 [15] |
| Volume Resistivity | Ω·cm | ASTM D257 | - | 2.5 E+15 [16] |
| Surface Resistivity | Ω | ASTM D257 | - | 1.9 E+15 [16] |
| AC Relative Permittivity (Dielectric Constant) ^[17] | | | | |
| at 50 Hz | none | ASTM D150 | - | 4.7 |
| at 1 kHz | none | ASTM D150 | - | 4.5 |
| at 1 MHz | none | ASTM D150 | - | 4.0 |
| AC Loss Characteristic (Dissipation Factor) ^[17] | | | | |
| at 50 Hz | none | ASTM D150 | - | 0.014 |
| at 1 kHz | none | ASTM D150 | - | 0.014 |
| at 1 MHz | none | ASTM D150 | - | 0.040 |

Internal Data Sources:

[1]FOR22924, [2]FOR22926, [3]FOR20444, [4]FOR16923, [5]FOR19730, [6]FOR16920, [7]FOR16913, [8]FOR26106, [9]FOR16912, [10]FOR16911, [11]FOR16928, [12]FOR16928, [13]FOR16921, [14] FOR16910, [15]FOR25879, [16]FOR25878, [17]FOR25877



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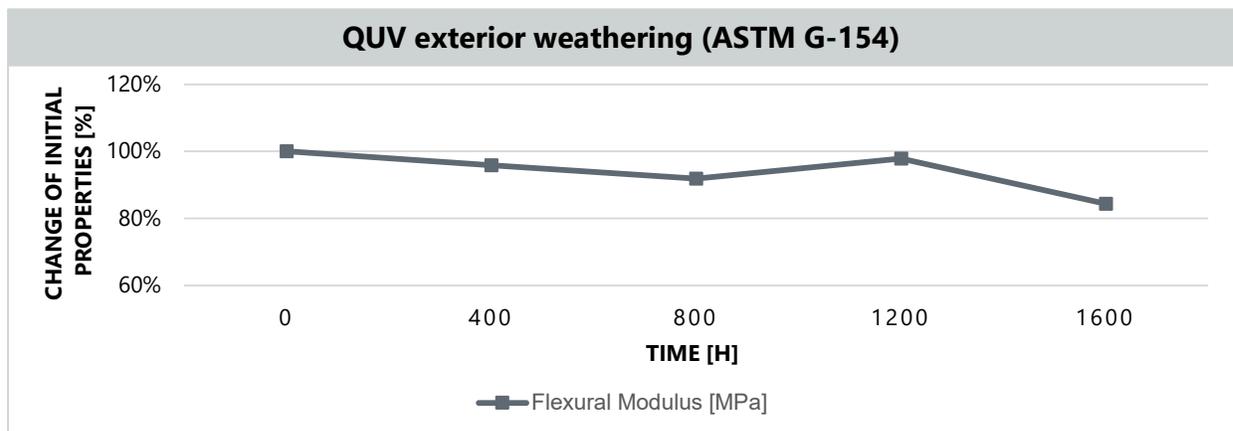
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AGING AND DURABILITY EFFECTS

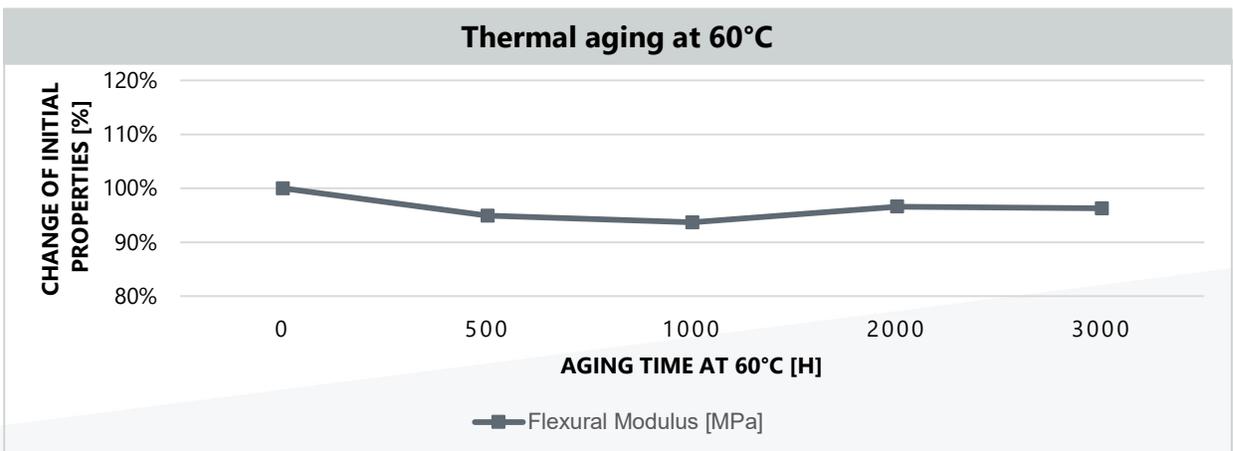
EXTERIOR WEATHERING

LOCTITE 3D IND403 BK has been aged in QUV exterior weathering conditions (ASTM G-154) for 1600 hours and tested accordingly to ASTM D790^[1] at standard lab conditions at 22°C.



THERMAL AGING AT 60°C

LOCTITE 3D IND403 BK samples were kept at 60°C for 500, 1000, 2000 and 3000 hours and tested accordingly to ASTM D790^[2] at standard lab conditions at 22°C.



Internal Data Sources:
[1]FOR12709, [2]FOR14105





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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 IND403 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 45°C
- Intensity: 3 mW/cm² to 7 mW/cm²

Exposure time for an intensity of 6 mW/cm²

| | | | |
|----------------------------|-----|--------------------------|------|
| Layer Thickness (µm): | 100 | Ec (mJ/cm ²) | 9.58 |
| First layer time (s) | 120 | Dp (mm): | 0.16 |
| Burn in region (s): | 15 | | |
| Model Layer Cure Time (s): | 6.5 | | |

POST PROCESSING

LOCTITE 3D IND403 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 | 2 min | 1 or 2 | Allow parts to dry between intervals |
| Dry | n.a. | Compressed air | 10 to 60 s | 1 or 2 | Air pressure (50psi) |
| Wait before post curing | n.a. | Ambient condition | 60 min | 1 | Room temperature |

POST CURING

LOCTITE 3D IND403 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.

| UC Curing Unit | UV Source | Intensity | Cure time/ side | Additional Settings (Shelf, Output Energy) |
|---------------------|-----------------------------------|----------------------------------|-----------------|--|
| Loctite CL36 | 405nm LED | 80 mW/cm ² at 405 nm | 20 min | 100% top & side |
| 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 | 4 min | 400W, Shelf K |



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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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