

LOCTITE®

IND405™

PhotoPlastic

HDT50

High Elongation

Clear

5110 Port Chicago Hwy
Concord CA 94520

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Preliminary v3.2



IND405™ HDT50 High Elongation Clear

Description

LOCTITE® 3D IND405™ is a high elongation and high toughness material with outstanding impact resistance and excellent surface finish. This stiff and durable high performance material is ideal for a wide variety of tools in the production floor, including manufacturing aids and final parts such as housings and consumer goods applications. The unique set of performance attributes makes it comparable to an unfilled thermoplastic like polypropylene. Parts can be printed with various DLP printers and machined, tapped, or polished for final finish.

Available Colors: Black, Clear

| Mechanical Properties | Method | Green | Post Processed |
|--------------------------------|------------|------------------------------|-------------------------------|
| Tensile Stress at Break | ASTM D638 | 35 ± 3 MPa ^[21] | 52 ± 3 MPa ^[2] |
| Tensile Stress at Yield | ASTM D638 | 23 ± 1 MPa ^[21] | 39 ± 1 MPa ^[2] |
| Young's Modulus | ASTM D638 | 847 ± 26 MPa ^[21] | 1378 ± 41 MPa ^[2] |
| Elongation at Failure | ASTM D638 | 166 ± 14 % ^[21] | 127 ± 6 % ^[2] |
| Maximum Flexural Stress | ASTM D790 | | 69 ± 2 MPa ^[1] |
| Flexural Modulus | ASTM D790 | | 1500 ± 76 MPa ^[1] |
| Flexural Strain at Break | ASTM D790 | | Does not Break ^[1] |
| Impact Strength—IZOD Notched | ASTM D256 | | 71.6 ± 3 J/m ^[6] |
| Impact Strength—IZOD Unnotched | ASTM D256 | | >1500 J/m ^[6] |
| Other Properties | | | |
| HDT @ 0.455 MPa | ASTM D648 | | 53°C ^[16] |
| Shore Hardness "D" (0s,3s) | ASTM D2240 | | 79,76 ^[10] |
| Water Absorption | Internal | | 2% ^[11] |
| Liquid Density | ASTM D1475 | | 1.050 ^[12] |
| Solid Density (Green) | ASTM D1475 | | 1.126 ^[12] |
| Solid Density (Post Processed) | ASTM D1475 | | 1.134 ^[12] |
| Liquid Properties | | | |
| Viscosity @ 25°C (77°F) | ASTM D7867 | | 2300 cP ^[5] |

"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, 50mm/min, D790-B, 2mm/min, D256 Notched IZOD (Machine Notched), 6 mm x 12 mm, D648, D2240, Type "D" (0, 3 seconds), D1475, D7867

- 1) TaskID Reference: FOR16318
- 2) TaskID Reference: FOR16273
- 3) TaskID Reference: FOR5556
- 4) TaskID Reference: FOR9594
- 5) TaskID Reference: FOR16316
- 6) TaskID Reference: FOR16321
- 7) TaskID Reference: FOR10162
- 8) TaskID Reference: FOR16266
- 9) TaskID Reference: FOR16274

- 10) TaskID Reference: FOR18476
- 11) TaskID Reference: FOR16322
- 12) TaskID Reference: FOR17633
- 13) TaskID Reference: FOR18202
- 14) TaskID Reference: FOR18207
- 15) TaskID Reference: FOR18206
- 16) TaskID Reference: FOR18829
- 17) TaskID Reference: FOR18201
- 18) TaskID Reference: FOR18611

- 19) TaskID Reference: FOR18208
- 20) TaskID Reference: FOR18531
- 21) TaskID Reference: FOR19711
- 22) TaskID Reference: FOR20002

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Clear Color Properties

Method: ASTM E308, Total Transmission

| Part State | L* | a* | b* | C* | h | dE |
|---|--------|--------|-------|------|---------|----------|
| Green / no post-processing ^[8] | 92.425 | -1.205 | 2.195 | 2.5 | 118.735 | NA |
| Dymax 5000EC 10 minutes / side ^[9] | 92.255 | -0.52 | 1.265 | 1.37 | 112.28 | 1.17 |
| Loctite CL36 60 min/side ^[22] | 92.18 | -0.32 | 0.89 | 0.94 | 109.88 | 1.831366 |

QUV exterior weathering conditions (ASTM G-154—Cycle 1): Clear color

Method: ASTM G-154—Cycle 1 & ASTM E308, Total Transmission

| QUV Exposure Time (Hrs) | L* | a* | b* | C* | h | dE |
|-------------------------|-------|-------|------|------|--------|------|
| 0 | 90.86 | -0.65 | 1.03 | 1.22 | 122.49 | NA |
| 240 | 91.06 | -0.47 | 1.42 | 1.49 | 108.47 | 0.47 |

QUV exterior weathering conditions (ASTM G-154—Cycle 1): Clear color mechanical properties

Method: ASTM G-154—Cycle 1

| QUV Exposure Time (Hrs) | Tensile Stress at break (MPa) | Yield Stress (MPa) | Young's Modulus (MPa) | Elongation at break (%) |
|-------------------------|-------------------------------|--------------------|-----------------------|-------------------------|
| 0 | 49 ± 3 | 42 ± 1 | 1412 ± 60 | 116 ± 12 |
| 300 | 41 ± 3 | 40 ± 1 | 1343 ± 103 | 78 ± 12 |
| 520 | 41 ± 2 | 44 ± 1 | 1469 ± 35 | 63 ± 16 |
| 800 | 38 ± 1 | 45 ± 1 | 1478 ± 51 | 46 ± 16 |

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Machine Settings

LOCTITE® IND405™ is formulated to print optimally on any DLP machine. It is recommended to print with 385-405 nm wavelength projectors with irradiance between 3-7 mW/cm². Layer time is given below at 5 mW/cm²:

| | |
|--------------------------|------|
| Ec (mJ/cm ²) | 6.2 |
| Dp (mm): | 0.15 |

| Layer Thickness | 25 µm | 50 µm | 100 µm |
|----------------------------------|-------|-------|--------|
| First Layer Exposure Duration | 10 s | 20 s | 40 s |
| Burn In Region Exposure Duration | 6 s | 12 s | 25 s |
| Model Exposure Duration | 2 s | 3 s | 6 s |

Recommended printing Temperature range: 20°C to 45°C

Post Processing

LOCTITE® IND405™ requires post processing to achieve specified properties. Prior to post curing, support structures should be removed from the printed part, and the part should be washed in a compatible cleaner. LOCTITE® recommends either IPA or Cleaner C in 2 minute interval wash cycles. Use compressed air to remove residual solvent from the surface of the material between intervals. Exact times and methods can be found by contacting us at www.loctiteAM.com.

Post Curing

LOCTITE® IND405™ requires post curing to achieve specified properties. A wide array of post cure equipment can be used to cure LOCTITE® IND405™ appropriately. A list of validated devices with detailed information can be found by contacting us at www.loctiteAM.com.

Additional Development Options

Colors: LOCTITE® IND405™ formula can be made in additional pigment colors.

LCD printers: LOCTITE® IND405™ currently testing, there's potential.

Limitations

Vat Printer: LOCTITE® IND405™ formula is not possible.

Post Cure: LOCTITE® IND405™ requires UV/Visible light post curing.



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