

LOCTITE®



LOCTITE® 3D 3843™

HDT60 High Toughness
Photoplastic
Matte Black, White, Clear

LOCTITE®

Henkel Corporation

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3843™

HDT60 HIGH TOUGHNESS
PHOTOPLASTIC



LOCTITE 3D 3843™

Semi-flexible resin with moderate temperature resistance HDT60, high impact strength, and versatility for a broad range of applications.

LOCTITE 3D 3843 is a high-strength engineering plastic with good impact resistance and excellent surface finish. It is ideal for a wide variety of tooling applications on the production floor.

LOCTITE 3D 3843 displays high green strength and HDT enabling it to print accurately and function at room temperature. It is compatible with a broad range of DLP machines.



Benefits:

- Moderate heat resistance, HDT 60° C
- Tough with outstanding surface finish
- Superior strength and impact resistant



Ideal for:

- Manufacturing aids
- Jigs and fixtures
- Housings and covers
- Insoles



Markets:



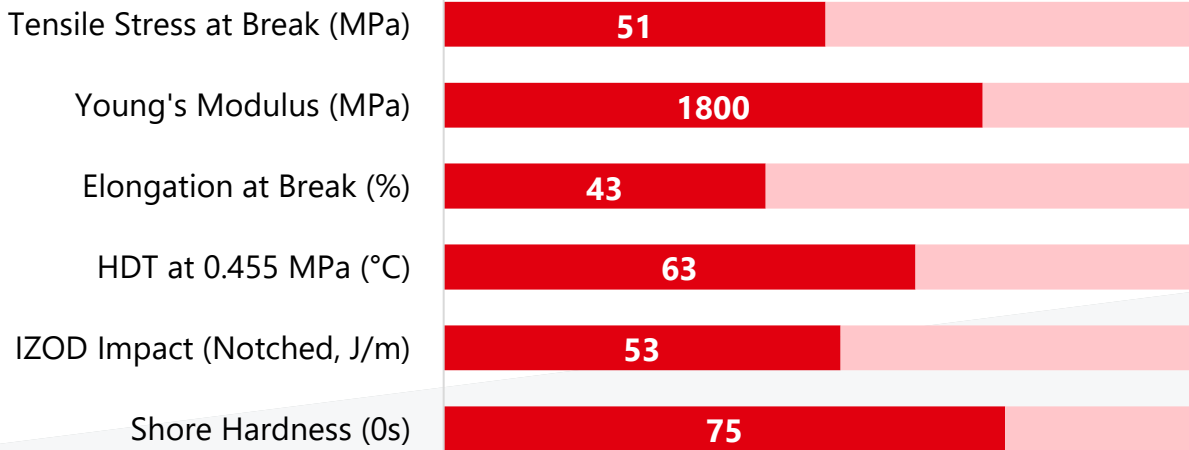
Industry



Automotive



Consumer Goods



**Values shown are linked to LOCTITE 3843 Matte Black as reference, please refer to the specific mechanical properties for each of the colors shown in this document*





PROPERTIES

| Mechanical Properties | Measure | Method | Green | Post Processed |
|------------------------------|-------------------|--------------|---------------|----------------|
| Tensile Stress at Yield | MPa | ASTM D638 | 44 ± 1 [5] | 53 ± 2 [1] |
| Tensile Stress at Break | MPa | ASTM D638 | 38 ± 1 [5] | 51 ± 2 [1] |
| Young's Modulus | MPa | ASTM D638 | 1572 ± 31 [5] | 1806 ± 47 [1] |
| Elongation at Break | % | ASTM D638 | 52 ± 10 [5] | 43 ± 10 [1] |
| Flexural Modulus | MPa | ASTM D790 | 1113 ± 23 [6] | 1783 ± 45 [2] |
| Flexural Elongation at Break | % | ASTM D790 | >5 [6] | >5 [2] |
| Flexural Stress at Break | MPa | ASTM D790 | - | - |
| Other Properties | | | | |
| HDT at 0.455 MPa | °C | ASTM D648 | - | 63°C [3] |
| IZOD Impact (Notched) | J/m | ASTM D256 | - | 53 ± 4 [4] |
| Water Absorption (24hr) | % | ASTM D570 | - | 1.94 [7] |
| Water Absorption (72hr) | % | ASTM D570 | - | 3.21 [7] |
| Shore Hardness (0s, 3s) | D | ASTM D2240 | 68, 63 [11] | 74, 67 [9] |
| Solid Density | g/cm ³ | ASTM D1475 | 1.18 [10] | 1.18 [10] |
| Thermal Conductivity | mW/(m·K) | ASTM D5930 | - | 0.21 [12] |
| Heat Capacity | J/(g·K) | ASTM D5930 | - | 1.5 ± 0.1 [12] |
| Biocompatibility | | | | |
| Irritation | | ISO10993-23* | - | Comply [13] |

*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-B, 2 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" (0, 3 seconds), D7867, D1475

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

Internal Data Sources:

[1]FOR16424, [2]FOR16426, FOR17678, [3]FOR19725, [4]FOR16427, [5]FOR16425, [6]FOR19115, [7]FOR19118, [8]FOR21751, [9]FOR19117, [10]FOR19114, [11]FOR19119, [12]FOR26234, [13]FOR52814



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MATTE BLACK



| Liquid Properties | Measure | Method | Value |
|--------------------------|-------------------|------------|-------------|
| Viscosity at 25°C (77°F) | cP | ASTM D7867 | 720-870 [8] |
| Liquid Density | g/cm ³ | ASTM D1475 | 1.07 [10] |

PROPERTIES

| Electrical Properties | Measure | Method | Green | Post Processed |
|---|---------|-----------|-------|----------------|
| Volume Resistivity | Ω·cm | ASTM D257 | - | 6.5E +14 [1] |
| Surface Resistivity | Ω | ASTM D257 | - | 5.7E +15 [1] |
| Dielectric Strength | kV/mm | ASTM D149 | - | 28.1± 1.8 [2] |
| AC Relative Permittivity (Dielectric Constant) ^[3] | | | | |
| at 50 Hz (XY) | none | ASTM D150 | - | 4.8 |
| at 1 kHz (XY) | none | ASTM D150 | - | 4.9 |
| at 1 MHz (XY) | none | ASTM D150 | - | 4.4 |
| AC Loss Characteristic (Dissipation Factor) ^[4] | | | | |
| at 50 Hz (XY) | none | ASTM D150 | - | 0.021 |
| at 1 kHz (XY) | none | ASTM D150 | - | 0.021 |
| at 1 MHz (XY) | none | ASTM D150 | - | 0.041 |

*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-B, 2 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" (0, 3 seconds), D7867, D1475

Internal Data Sources:

[1] FOR25869, [2] FOR25870, [3] FOR25870, [4] FOR25872





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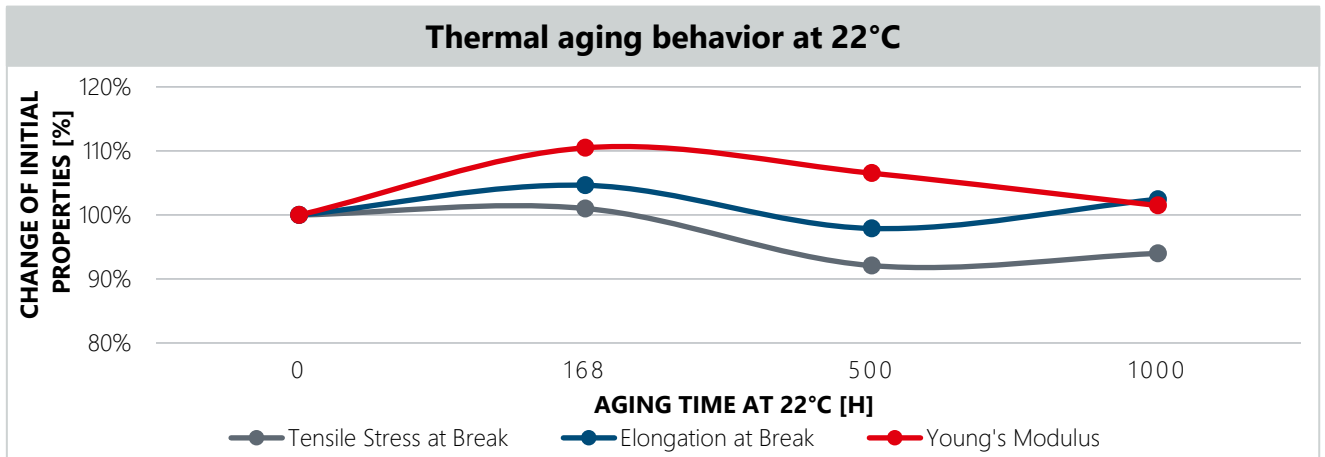


AGING AND ENVIRONMENTAL EFFECTS

LOCTITE 3D 3843 BK has been tested in QUV exterior weathering conditions (ASTM G-154) for 800 hours with less than a 15% change in Tensile and IZOD Impact properties.

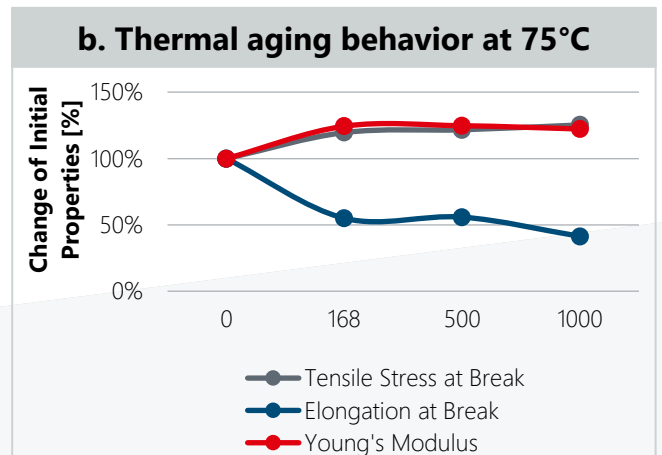
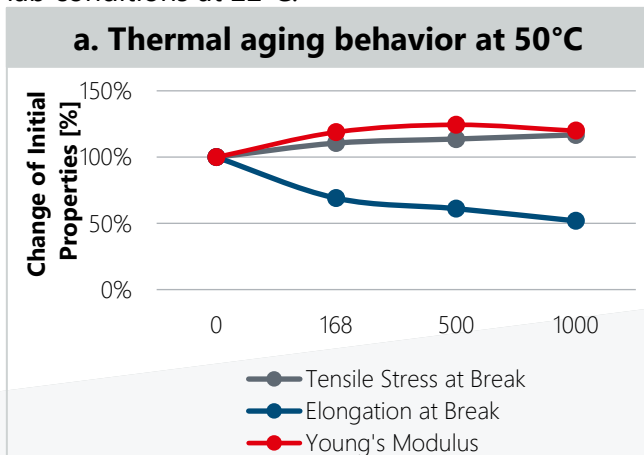
CONTROL AGING AT 22°C (Tested at 22°C)

Samples were kept at standard laboratory conditions and were not exposed to elevated temperatures. Samples were tested accordingly to ASTM D638 at standard lab conditions at 22°C.



HEAT AGING (Tested at 22°C)

Samples were aged at (a) 50°C and (b) 75°C and were tested accordingly to ASTM D638 at standard lab conditions at 22°C.

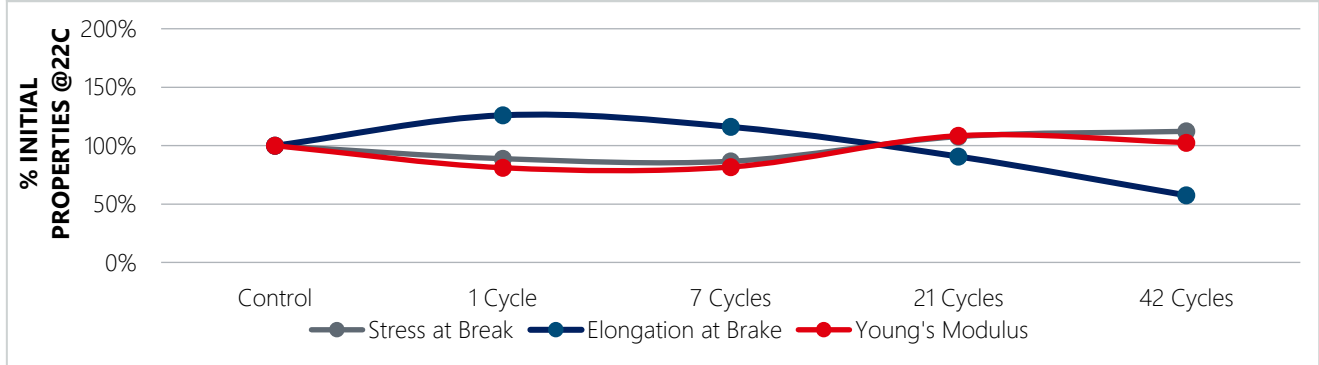


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AGING AND ENVIRONMENTAL EFFECTS

Q-Sun (ASTM D2565) – Tested accordingly to ASTM D638



Chemical Resistance - Tested accordingly to ASTM D638

Exposure Time 100 hours

% of initial strength

| Chemical | Measure | Elongation at Break | Stress at Break | Young's Modulus |
|-------------------|---------|---------------------|-----------------|-----------------|
| Water (22C°) | % | 152 | 52 | 44 |
| IPA | % | 117 | 40 | 38 |
| NaOCl | % | 120 | 57 | 58 |
| Salt Fog (22C°) | % | 169 | 43 | 30 |
| Motor Oil (87C°) | % | 93 | 104 | 100 |
| Hydrogen Peroxide | % | 158 | 47 | 38 |

Chemical Resistance - Tested accordingly to ASTM D638

Exposure Time 500 hours

% of initial strength

| Chemical | Measure | Elongation at Break | Stress at Break | Young's Modulus |
|-------------------|---------|---------------------|-----------------|-----------------|
| Water (22C°) | % | 175 | 27 | 12 |
| IPA | % | 0 | 0 | 0 |
| NaOCl 5 | % | 83 | 28 | 31 |
| Salt Fog (22C°) | % | 192 | 33 | 17 |
| Motor Oil (87C°) | % | 78 | 106 | 105 |
| Hydrogen Peroxide | % | 180 | 22 | 7 |



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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 3843 Matte Black 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 35°C
- Intensity: 3 mW/cm² to 7 mW/cm²

Exposure time for an intensity of 5 mW/cm²

| | | | | | |
|---------------------------|----|----|-----|--------------------------|-------|
| Layer Thickness (µm): | 25 | 50 | 100 | Ec (mJ/cm ²) | 11.16 |
| First layer time (s) | 45 | 45 | 50 | Dp (mm): | 0.21 |
| Burn in region (s): | 4 | 5 | 7.5 | | |
| Model Layer Exposure (s): | | | 9.5 | | |

POST PROCESSING

LOCTITE 3D 3843 Matte Black 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 | Manual | 2 min | 1 | |
| Dry | n.a. | Compressed air | 10 to 60 s | 1 | Air pressure (30psi) |
| Wait before post curing | n.a. | Ambient condition | 60 min | 1 | Room temperature |

POST CURING

LOCTITE 3D 3843 Matte Black 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) |
|-------------------------|-----------------------------------|----------------------------------|--------------------|---|
| Dymax 5000 EC Flood | Mercury Arc Bulb (broad spectrum) | 148 mW/cm ² at 380 nm | 2 min | 400W, Shelf K |
| Loctite CL36 | 405nm LED | 80 mW/cm ² at 405 nm | 20 min | 100% top & side |
| Uvitron Intelliray 600W | Mercury Arc Bulb (broad spectrum) | 66% Intensity | 2 min | |





PROPERTIES

| Mechanical Properties | Measure | Method | Green | Post Processed |
|--------------------------|---------|--------------|---------------------------|-----------------------------|
| Tensile Stress at Yield | MPa | ASTM D638 | 36.2 ± 1.0 ^[1] | 52.6 ± 1.1 ^[2] |
| Tensile Stress at Break | MPa | ASTM D638 | 33.1 ± 2.6 ^[1] | 49.0 ± 1.5 ^[2] |
| Young's Modulus | MPa | ASTM D638 | 1318 ± 31 ^[1] | 1720 ± 72 ^[2] |
| Elongation at Break | % | ASTM D638 | 74.4 ± 9.9 ^[1] | 47.6 ± 7.8 ^[2] |
| Flexural Modulus | MPa | ASTM D790 | 721 ± 36 ^[3] | 1673 ± 44 ^[4] |
| Flexural Strain at Break | % | ASTM D790 | >5 ^[3] | >5 ^[4] |
| Flexural Stress at Break | MPa | ASTM D790 | - | - |
| Other Properties | | | | |
| HDT at 0.455 MPa | °C | ASTM D648 | 50 ^[5] | 60 ^[6] |
| IZOD Impact (Notched) | J/m | ASTM D256 | - | 58.3 ± 4.17 ^[7] |
| IZOD Impact (Unnotched) | J/m | ASTM D256 | - | 175.3 ± 12.8 ^[8] |
| Water Absorption (24hr) | % | ASTM D570 | - | 2.3 ^[9] |
| Water Absorption (72hr) | % | ASTM D570 | - | 3.5 ^[9] |
| Shore Hardness (0s, 3s) | D | ASTM D2240 | 68, 64 ^[10] | 70, 76 ^[11] |
| Solid Density | g/cm | ASTM D1475 | 1.18 ^[13] | 1.18 ^[11] |
| Biocompatibility | | | | |
| Cytotoxicity | | ISO 10993-5 | - | Comply ^[6] |
| Irritation | | ISO 10993-23 | - | Comply ^[16] |

| Liquid Properties | Measure | Method | Value |
|--------------------------|-------------------|------------|---------------------------|
| Viscosity at 25°C (77°F) | cP | ASTM D7867 | 450 - 650 ^[14] |
| Liquid Density | g/cm ³ | ASTM D1475 | 1.07 ^[12] |

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-B, 2 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" (0, 3 seconds), D7867, D1475

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

Internal Data Sources:

[1]FOR17796, [2]FOR17795, [3]FOR17799, [4]FOR17797, [5]FOR17801, [6]FOR17800, [7]FOR17792, [8]FOR17793, [9]FOR17794, [10]FOR17790, [11]FOR17789, [12]FOR17791, [13]FOR17809, [14]FOR37133, [15] FOR38780, [16] FOR52785 (in-vitro)



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HDT60 HIGH TOUGHNESS
PHOTOPLASTIC
WHITE



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 3843 White 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 35°C
- Intensity: 3 mW/cm² to 7 mW/cm²

Exposure time for an intensity of 5 mW/cm²

| | | | | | |
|---------------------------|----|-----|-----|--------------------------|-------|
| Layer Thickness (µm): | 25 | 50 | 100 | Ec (mJ/cm ²) | 7.194 |
| First layer time (s) | 45 | 45 | 45 | Dp (mm): | 0.170 |
| Burn in region (s): | 2 | 3.5 | 6 | | |
| Model Layer Exposure (s): | | | 4.5 | | |

POST PROCESSING

LOCTITE 3D 3843 White 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 | TPM | Ultrasonic | 2 min | 2 | Dry after each interval |
| Dry | n.a. | Compressed air | 20 s | 2 | Air pressure (55psi) |
| Wait before post curing | n.a. | Ambient condition | 60 min | 1 | Room temperature |

POST CURING

LOCTITE 3D 3843 White 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) |
|-------------------------|-----------------------------------|---------------------------------------|--------------------|---|
| Uvitron Intelliray 600W | Mercury Arc Bulb (broad spectrum) | 66% Intensity | 4 min | Shelf K |
| Dymax 5000 EC Flood | Mercury Arc Bulb (broad spectrum) | 150 -175 mW/cm ² at 380 nm | 8 min | Shelf I |



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HDT60 HIGH TOUGHNESS
PHOTOPLASTIC
CLEAR



PROPERTIES

| Mechanical Properties | Measure | Method | Green | Post Processed |
|--------------------------|-------------------|------------|----------------|----------------|
| Tensile Stress at Yield | MPa | ASTM D638 | 43.8 ± 0.7 [6] | 45.0 ± 1.5 [1] |
| Tensile Stress at Break | MPa | ASTM D638 | 38.0 ± 1.7 [6] | 44.0 ± 2.7 [1] |
| Young's Modulus | MPa | ASTM D638 | 1,562 ± 36 [6] | 1,752 ± 42 [1] |
| Elongation at Break | % | ASTM D638 | 58.0 ± 24 [6] | 41.0 ± 6.7 [1] |
| Flexural Modulus | MPa | ASTM D790 | - | 1,878 ± 81 [2] |
| Flexural Strain at Break | % | ASTM D790 | - | >5 [2] |
| Flexural Stress at Break | MPa | ASTM D790 | - | - |
| Other Properties | | | | |
| HDT at 0.455 MPa | °C | ASTM D648 | - | 63 [9] |
| IZOD Impact (Notched) | J/m | ASTM D256 | - | 65.0 ± 2.9 [3] |
| Water Absorption (24hr) | % | ASTM D570 | - | 2.13 [7] |
| Shore Hardness (0s, 3s) | D | ASTM D2240 | - | 68, 63 [8] |
| Solid Density | g/cm ³ | ASTM D1475 | 1.17 [4] | 1.18 [4] |

| Liquid Properties | Measure | Method | Value |
|--------------------------|-------------------|------------|---------------|
| Viscosity at 25°C (77°F) | cP | ASTM D7867 | 400 – 600 [5] |
| Liquid Density | g/cm ³ | ASTM D1475 | 1.07 [4] |

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, D648, D256 Notched IZOD (Machine Notched), 6 mm x 12 mm, D570 0.125" x 2" Disc 24hr@ 25°C, D2240, Type "D" (0, 3 seconds), D7867, D1475

Internal Data Sources:

[1]FOR17386, [2]FOR17382, [3]FOR17385, [4]FOR17383, [5]FOR37129, [6]FOR17201, [7]FOR17380, [8]FOR19616, [9]FOR20038, [10]FOR20009, [11]FOR20010





CLEAR COLOR PROPERTIES

In order to assess clear properties, color variation is measured as Delta-E (dE) to define parts transmittance.

dE measures changes from $L^*a^*b^*C^*h$. The table below shows the color variation for two different workflows:

Method: ASTM E308, Total Transmission

| Part State | L* | a* | b* | C* | h | dE |
|--|-------|-------|------|------|--------|------|
| Green / no post-processing ^[10] | 93.11 | -1.06 | 2.28 | 2.52 | 114.9 | - |
| Dymax 5000EC 5 min/side ^[10] | 93.20 | -0.46 | 1.14 | 1.22 | 111.89 | 1.29 |
| Loctite CL36 60 min/side ^[11] | 92.89 | -0.36 | 1.28 | 1.33 | 105.85 | 1.24 |

The table below shows color variation after ageing for 650 hours

A dE of 1.0 - 2.0 change is the smallest color difference, in average, that the human eye can perceive 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 | 93.82 | -0.49 | 1.35 | 1.44 | 109.91 | - |
| 325 | 93.10 | -0.61 | 1.68 | 1.79 | 109.96 | 0.80 |
| 650 | 93.40 | -0.86 | 2.47 | 2.61 | 109.22 | 1.25 |

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PHOTOPLASTIC
CLEAR



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 3843 Clear 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 35°C
- Intensity: 3 mW/cm² to 7 mW/cm²

Exposure time for an intensity of 5 mW/cm²

| | | | | | |
|---------------------------|----|-----|-----|--------------------------|------|
| Layer Thickness (µm): | 25 | 50 | 100 | Ec (mJ/cm ²) | 7.67 |
| First layer time (s) | 45 | 45 | 45 | Dp (mm): | 0.18 |
| Burn in region (s): | 2 | 3.5 | 6 | | |
| Model Layer Exposure (s): | | | 5 | | |

POST PROCESSING

LOCTITE 3D 3843 Clear 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 | Ultrasonic | 2 min | 1 | |
| Dry | n.a. | Compressed air | 10 - 60 s | 1 | Air pressure (20psi) |
| Wait before post curing | n.a. | Ambient condition | 60 min | 1 | Room temperature |

POST CURING

LOCTITE 3D 3843 Clear 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) |
|---------------------|-----------------------------------|----------------------------------|-----------------|--|
| Dymax 5000 EC Flood | Mercury Arc Bulb (broad spectrum) | 120 mW/cm ² at 380 nm | 4 min | Shelf I |





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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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