



TENSILE™

Industrial Strength 3D Printer Resin



TECHNICAL DATASHEET

TENSILE™ Grey - Colours may vary from screen image

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PRODUCT DESCRIPTION

TENSILE™ is a high-strength, low-flex, rugged resin ideal for various applications. This industrial engineering polymer with an excellent surface finish, prints with ultra-high accuracy of 32K and low failures. TENSILE™ displays impressive green strengths allowing it to print accurately, and has extreme tensile strengths after post-curing.

NAME: TENSILE™

SKU(s): INT-4014GY

Available Colour(s): Grey

Suitable Models: Industrial | Automotive | Consumer Goods | Engineering



/product-category/resins/industrial/tensile/

TENSILE™

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MONOCURE 3D's TENSILE™ resin is for those who intend to 3D print models that want to remain rigid and stiff while printing yet withstand stress and strain once post-cured. The material can be machined, painted, sanded or polished if further finishing is required.

TENSILE™ QUICK GUIDELINES

- ✓ We recommend positioning the model at a tilt between 30-45°, a position found to aid in better separation from the curing interface. TENSILE™ allows parts to be printed hollow and solid, with only medium supports required.
- ✓ To eliminate the 'elephant's foot' phenomenon, which occurs at the model's base from the longer curing to help the resin adhesion onto the build-plate. We recommend taking advantage of base layer compensatory settings now available on most slicing software.
- ✓ Post-curing a 3D-printed part is a procedure to gain maximum strength and durability. For example, when using a 40-50 watt 405nm curing unit. It is advisable to the post-cure [without heat] for a minimum of 30mins or extend up to 1-2 hours [s] to reach maximum tensile properties.
- ✓ To ensure proper cleaning of the model, we recommend the use of RESINAWAY®. Good cleaning is critical when the model has been hollowed out, as it guarantees the effective removal of any trapped residual resin.

THE TENSILE™ ADVANTAGE

-  **Extreme Tensile Strength**
Specially designed to provide superior strength and durability, which can withstand high tensile stress, it is ideal for applications where strength is required.
-  **32K High-Resolution Printing**
High-resolution 3D printing resin enables the creation of intricate, finely detailed parts and prototypes, making it a preferred choice where precision is critical.
-  **'Easy-to-print' Formula**
This resin is designed with an 'easy-release' from the FEP film, making it simple to use and dial in on nearly all printers.
-  **Incredible Smooth Finish**
Developed with post-processing in mind, TENSILE™, once cured, offers a smooth-to-touch finish, allowing wet-sanding, painting, or polishing if required.

UNICAL™ CALIBRATION MODEL

Using a calibration model efficiently adjusts a 3D resin printer to work seamlessly with our TENSILE™ resin. Proper dialling-in ensures the harmonious operation between the printer and resin, yielding models of exceptional precision.



Download STL file and full instructions by scanning the QR code.



</product-category/3d-models/calibration-models/>

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MECHANICAL PROPERTIES

Method Code: ASTM D638-14

Product: Monocure TENSILE™ Resin (50µm)

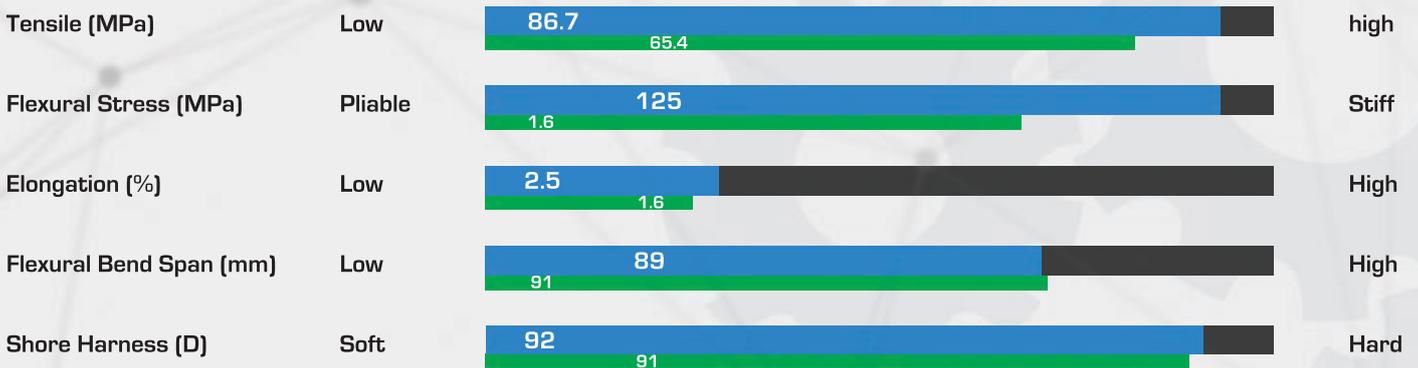
Acceptance Code: Supply Findings

Specimen Type: Rectangular beam samples (Type IV)

Equip' Serial No: UTM Serial No. 075

Conditioning: Tested at ambient temperature

| Mechanical Properties | Post-Cured (1hr) | Green (0mins) | Mechanical Properties (Con't) | Post-Cured (1hr) | Green (0mins) |
|---|------------------|---------------|-------------------------------|------------------|---------------|
| SKU(s) | INT-4014GY | INT-4014GY | Flexural Bend Span (mm) | 89 | 91 |
| Cross-Sectional Area (mm ²) | 25.21 | 25.34 | Max Load Applied (N) | 130 | 140 |
| Max Load (kN) | 2.3 | 1.7 | Flexural Stress (MPa) | 125 | 131 |
| Tensile Strength (MPa) | 86.7 | 65.4 | Max Flex Strain (mm/mm) | 0.05 | 0.05 |
| Elongation at Break (%) | 2.5 | 1.6 | Shore Hardness (D) | 92 | 91 |
| Young's Modulus (GPa) | 1.4 | 1 | Heat Deflection Temp (°C) | 64°C @ 0.45MPa | — |



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GREEN STRENGTH BENEFITS

TENSILE™ has impressive green strength, which cures hard while printing without causing dimensional inaccuracies by over-curing. This results in fewer print failures, less dense support structures and more minor contact points required. Thus uses less resin and simplifies post-processing.

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ABSORPTION (60m Post-Cure)

| | | | | |
|----------------------|-------------|-----|-------------|-----|
| Product Code(s) | INT-4014GY | | | |
| ASTM Test Code(s) | D570-98 | | | |
| Dimensions (mm) | 50.80 X 3.2 | | 50.65 X 3.1 | |
| Absorption (hrs) | 24h | 72h | 24h | 72h |
| Liquid Type | Water | | Petrol | |
| Weight Before (gms) | 8.9133 | - | 8.7005 | |
| Weight After (gms) | 8.9929 | - | 8.7042 | |
| Average Increase (%) | 0.9 | - | 0.042 | |

OTHER PROPERTIES

| | |
|------------------------------------|-------------------|
| Product Code(s) | INT-4014GY |
| IZOD Impact (Notched) | TBC |
| Solid Density (g/cm ³) | 1.193 |
| Thermal Conductivity (W/(m.K)) | TBC |
| Heat Capacity (J/g.K) | TBC |
| Sutherland Rub Test (0.91kg) | PASSED 900 Cycles |

TENSILE™ LIQUID PROPERTIES

| | |
|-------------------------------------|----------------------------|
| SKUs | INT-4014GY |
| Colour(s) | Grey |
| Viscosity (CPS) | 500 @ 25°C (BrookfieldRVT) |
| Odour | Negligible Characteristics |
| Shelf Life (months) | 36 |
| Active Solids (%) | 100 |
| Liquid Density (g/cm ³) | 1.1 |
| UV Cure (nm) | 365 to 425 |
| Cure Speed (Seconds) | 3-5 |

| | |
|----------------------------------|--|
| Optimal Printing Temp[°C] | 25° |
| Wash Up | RESINAWAY® or IPA |
| Optimal Cleaning Method | Ultrasonic Cleaner |
| General Storage | Dark, Cool & Dry Place |
| Optimal Storage Temps [°C] | 10 - 30° |
| Storage Ventilation | Avoid fume build up |
| Safety Measures | Follow SDS information |
| Download SDS (Safety Data Sheet) | monocure3d.com.au/material-safety-data-sheets/ |

TENSILE™ COMPATIBLE PRINTER BRANDS



monocure3d.com.au/printers

Asiga Peopoly
 Anycubic Prusa
 Phrozen Uniz
 Creality Wanhao
 Elegoo Uniformation
 Epax Not Listed – Contact Us

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WORKFLOW PROCEDURES

When using 3rd party materials, it is essential to remember that most 3D printers are unique and require setting up before first-time use. We recommend that you dial-in new printers and resins using one of our handy calibration models that you can download from here: <https://monocure3d.com.au/product-category/3d-models/calibration-models/>

PRINTER SETTINGS

The following example settings are with consideration for monochrome LCD MSLA 3D printers employing a 405nm light source. For more information about all our materials and most popular 3D printer models, please refer to the official settings page at: [/monocure3d.com.au/printers/](https://monocure3d.com.au/printers/)

Shake the TENSILE™ bottle thoroughly before use and open it in a UV-protected environment. Pour into the printer's vat, allow bubbles to settle, and ensure the temperature is between 18°C and 35°C for optimal printing.

Layer Thickness: 50µm

Base layer Duration: 30(sec)

No. Base Layers: 4

Normal Layer Exposure: 3(sec)

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CLEANING PARTS

For the best results, use ResinAway® cleaner or isopropyl alcohol and a soft brush to remove the uncured resin. Follow the guidelines for the best finish on 3D models.

STEP 1. Pre-Wash with ResinAway® use a soft brush to remove excess: 5mins

STEP 2. Ultrasonic cleaner with ResinAway®: 10mins

STEP 3. Dry models: Use compressed air or lint-free cloth.



POST-CURING

TENSILE™ resin requires post-curing to reach its optimal mechanical properties.

STEP 4. UV Light Source: 405nm LED Ultraviolet light.

STEP 5. Minimum Post-Curing Duration (40-50w): 5mins

STEP 6. Remove the excess ResinAway® by rinsing it with fresh water.

STEP 7. Place the model in the curing chamber for a minimum of 30 minutes to enhance the material's tensile strength, which is crucial for industrial applications.

STORAGE

To ensure the performance and longevity of Monocure 3D TENSILE™ resin, store the bottle in a cool (10-30°C), dark environment, tightly sealed in the original container, away from excess heat, direct sunlight, and moisture, while also taking care to prevent the resins from freezing



Glossary of Key Terms and Concepts

- 1. 3D Print:** The process of creating a three-dimensional object from a digital file by layering material in successive layers.
- 2. Base Layer:** The first layers in a 3D printed object that adheres to the build plate.
- 3. Calibration Model:** A specific 3D design used to adjust and test the accuracy of a 3D printer.
- 4. Curing Interface:** The platform on which the 3D print is formed and solidified.
- 5. Elongation at Break:** The measure of a material's ductility represented as a percentage elongation of area during rupture.
- 6. Elephant's Foot:** A phenomenon where the base layer of a print expands outwards, creating a bulged, widened base.
- 7. Extreme Tensile Strength:** A high level of resistance to breakage under tension.
- 8. Green Strength:** The strength of the uncured or unfinished 3D printed resin object.
- 9. Heat Deflection Temperature (HDT):** The temperature at which a polymer or plastic sample deforms under a specified load.
- 10. IZOD Impact Strength Test:** A standard method of determining the impact resistance of materials.
- 11. Layer Thickness:** The height of each individual layer of a 3D printed object, usually measured in microns (μm).
- 12. Liquid Absorption Test:** Measures a material's ability to absorb liquid over a given period of time.
- 13. Monochrome LCD MSLA:** A 3D printer that uses a monochrome LCD to cure a vat of light-sensitive resin layer by layer.
- 14. Post-Curing:** The process of exposing a 3D printed part to a light source after printing to further cure and harden the resin.
- 15. Post-Processing:** The final steps taken after a 3D print is complete to achieve the desired finish.
- 16. RESINAWAY®:** A cleaning solution used to remove uncured resin from the surface of a 3D print.
- 17. Resin:** The light-sensitive liquid material that is solidified layer by layer in a resin-based 3D printer to create an object.
- 18. Shore D Hardness:** This is a measure of the hardness of a material, typically a plastic or rubber.
- 19. Surface Scratch Test:** Measures the amount of scuff or abrasion that is caused by two surfaces rubbing together.
- 20. Supports:** Temporary structures printed along with a 3D print that hold overhanging parts of the print in place until it's cured.
- 21. TENSILE™:** The product name for an industrial type of 3D printing resin produced by Monocure 3D.
- 22. Tensile Strength:** The maximum stress that a material can withstand while being pulled before failing or breaking.
- 23. UV Light Source:** A type of light used in the post-curing process of 3D printed resin parts.
- 24. Young's Modulus:** Young's Modulus is a mechanical property that measures the stiffness of a material.

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