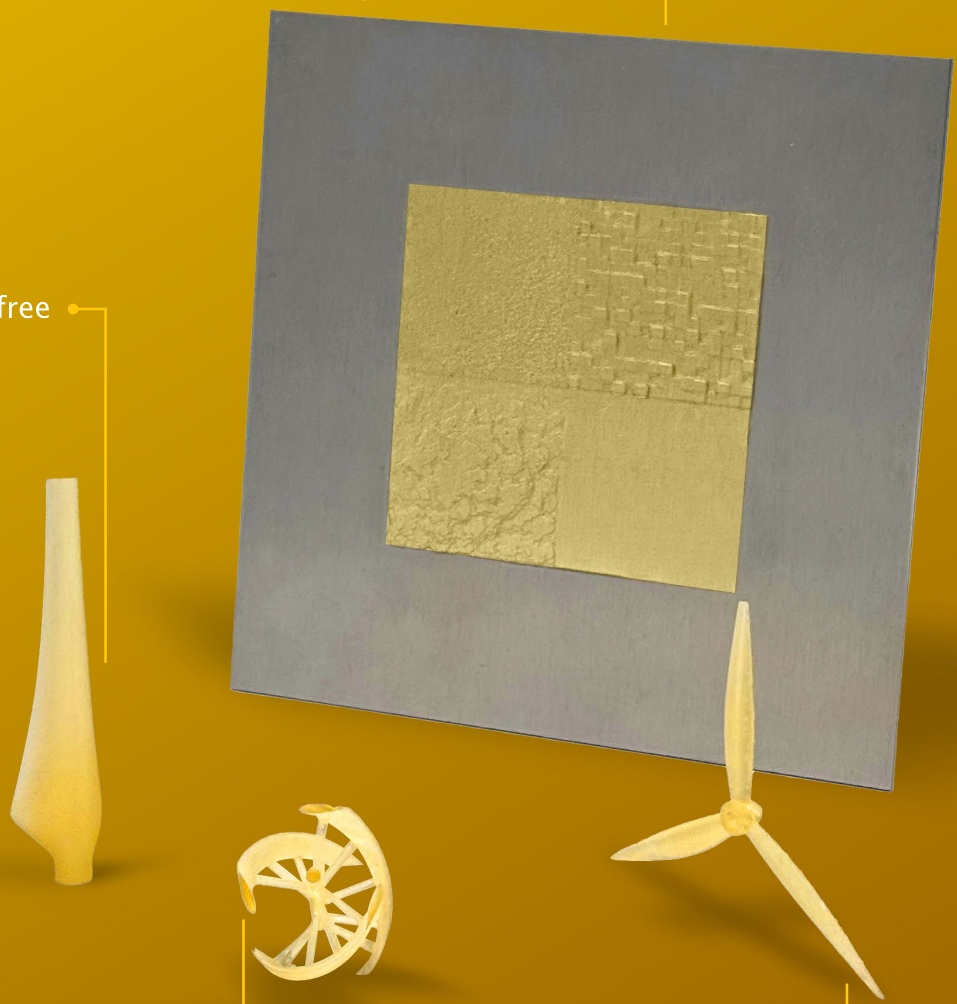
# HARDWEAR

## High-stiffness, flexible and chemically resistant low-viscosity resin for structural and coating applications




**HARDWEAR** is a high-stiffness, flexible, and scratch-resistant resin designed for advanced structural applications. With its ultra-low viscosity, it offers superior adhesion to metals, excellent print resolution and exceptional resistance to acids, saline environments, and mechanical stress — all while being PFAS-free.

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# HARDWEAR

## RESIN PROPERTIES

| | R2W | R3W | |
|---|---|---|---|
| **Physical form** | Liquid | Liquid | |
| **Appearance** | Yellowish | Yellowish | Multiple colour avaiable |
| **Viscosity** | | | |
| Room temperature | 22 – 32 cP | 15 – 25 cP | Rheometer Antoon Paar MCR 702e (internal method) |
| 60 °C | 11,6 cP | 10,3 – 10,7 cP | |
| 80 °C | 9 cP | 9,18 cP | |
| **Density** | 1,15 g/cm³ @ 25 °C | 1,13 g/cm³ @ 25 °C | |
| **Contact angle** | | | |
| Metal (steel) | 23° | 17° | |
| Glass | 17° | 17° | |
| Cured resin itself | 22° | 23° | |
| **Superficial tension** | 25 – 30 mN/m | 26 – 28 mN/m | |

## MECHANICAL PROPERTIES

| | R2W | R3W | METHOD |
|---|---|---|---|
| Hardness (shore D) | 87 | 83 | UNI EN ISO 527-1 |

| | METRIC | | IMPERIAL | | |
|---|---|---|---|---|---|
| | R2W | R3W | R2W | R3W | METHOD |
| **Tensile Properties** | | | | | |
| Tensile Modulus ($E_t$) | 1,6 GPa | 1,08 GPa | 232 ksi | 157 ksi | UNI EN ISO 527-2/1A:2012 |
| Ultimate Tensile Strength ($\sigma_m$) | 31 MPa | 18 MPa | 4496 psi | 2610 psi | UNI EN ISO 527-2/1A:2012 |
| Elongation at Break ($\varepsilon_m$) | 3,1 % | 3,3 % | 3,1 % | 3,3 % | UNI EN ISO 527-2/1A:2012 |
| Compression Modulus ($E_c$) | 1,75 GPa | 1 GPa | 254 ksi | 145 ksi | ASTM D695-23 |
| **Flexural Properties** | | | | | |
| Flexural Modulus ($E_f$) | 1,1 GPa | 0,9 GPa | 160 ksi | 131 ksi | ASTM D790-17 |
| Flexural Strength ($\sigma_{fm}$) | 40 MPa | 27 MPa | 5800 psi | 3916 psi | ASTM D790-18 |
| Flexural Elongation at Break ($\varepsilon_{fm}$) | 4,5 % | 5,5 % | 4,5 % | 5,5 % | ASTM D790-19 |
| **Impact Properties** | | | | | |
| IZOD Impact Surface | 3 J/m | 3,5 J/m | 0,056 ft-lbf/in | 0,066 ft-lbf/in | ASTM D256-23 |
| **Thermal Properties** | | | | | |
| Degradation Temperature | 151,9 °C | 145,1 °C | 305,42 °F | 293,18 °F | TGA (internal method) [1] |
| **Corrosion Properties** | | | | | |
| Impedance | $10^{11}$ Ω·cm² | $10^{11}$ Ω·cm² | $10^{11}$ Ω·cm² | $10^{11}$ Ω·cm² | ASTM B117 |

1 Data were obtained from printed parts in Air Atmosphere with a Heating of 10° C/min.

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## SOLVENT COMPATIBILITY/RESISTANCE

1 x 1 x 1 cm 3D-Printed thermally post-cured cube immersed in the solvent for 24 h

| | R2W | R3W |
|---|---|---|
| Acetone | < 0.1 weight gain (%) | < 0.1 weight gain (%) |
| Isopropanol | < 0.1 weight gain (%) | < 0.1 weight gain (%) |
| Ethanol | 0.1 weight gain (%) | 0.1 weight gain (%) |
| Distilled Water | < 0.1 weight gain (%) | < 0.1 weight gain (%) |
| HCl solution (1 M) | < 0.1 weight gain (%) | < 0.1 weight gain (%) |
| $H_2SO_4$ solution (1 M) | < 0.1 weight gain (%) | < 0.1 weight gain (%) |

## STORAGE AND HANDLE

The product should be stored in a cool and dry place, and away from direct light sources. Avoid direct contact with eyes and skin. When opened, the package should be closed firmly. Before using this product, read and understand the Safety Data Sheet, which provides information on health, physical, and environmental hazards, handling precautions and first aid recommendations.

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MAT3D SRL | info@mat3d.tech | www.mat3d.tech | +39 011 6706347 | Via Gioacchino Quarello, 15a - 10135 Torino, Italy