Tough 60C White

Production Rigid

A durable white material engineered for long-term use parts, offering a balanced combination of impact strength, elongation, and tensile performance.

Save on Tooling Costs and Time with Direct Production Plastic Parts

Figure 4® Tough 60C White is a versatile, production-grade resin designed for long-term use parts that demand both strength and reliability. It combines impact resistance, tensile performance, and flexibility while maintaining a clean, durable white finish with an injection-molded surface quality.

Engineered for load-bearing medical and industrial components, this material delivers consistent performance and stability over time. With a 65°C heat deflection temperature and 23% elongation at break, it is well-suited for brackets, snaps, and clips requiring dependable strength and slight flexibility.

Its fast printing speeds and streamlined post-processing make it ideal for achieving high throughput in production environments.

HANDLING & POST-PROCESSING GUIDELINES

This material requires proper mixing, cleaning, drying, and curing to achieve consistent mechanical and surface properties.

Detailed post-processing instructions are provided at the end of this document.

Note: All listed properties are based on the standard post-processing procedure. Any deviation from these methods may result in variations in performance or finish quality.

APPLICATIONS

- Clinical trials and medical devices such as tools, handles, and small precision parts.
- Load-bearing components include handles, cranks, knobs, and levers.
- Structural parts like brackets, snap-fits, and custom fastening elements.
- Small, detailed parts are used in consumer, wearable, and general-use products.
- Functional prototyping and biocompatible end-use applications.

BENEFITS

- Designed for long-term performance in indoor and outdoor environments.
- No secondary thermal curing required, reducing turnaround time.
- Maintains a clean, bright white finish over extended use.
- Delivers excellent surface quality, dimensional accuracy, and repeatability.
- Compatible with autoclave sterilization for medical and testing applications.

FEATURES

- Demonstrates long-term stability of mechanical and color properties under UV and humidity exposure (tested per ASTM standards up to 8 years indoors and 1.5 years outdoors).
- Biocompatible-capable as per ISO 10993-5 and ISO 10993-10 standards.*
- Heat deflection temperature of 65°C at 0.455 MPa.
- Elongation at break: 23%.
- Elongation at yield: 7.1%.
- Notched impact strength: 34 J/m.
- Tensile modulus: 1500 MPa.
- UL94 HB flammability rating.
- Supports sterilization through autoclaving.

MATERIAL PROPERTIES

Material performance is evaluated as per ASTM and ISO standards, ensuring consistency and reliability across applications.

All test specimens are conditioned for a minimum of 40 hours at 23°C and 50% RH, following ASTM guidelines.

The material's characteristics include physical, mechanical, thermal, flammability, and electrical properties, including parameters such as dielectric strength, dielectric constant, dissipation factor, and volume resistivity.

LIQUID MATERIAL			
Property	**Test Method / Condition**	**Metric**	**Imperial**
Viscosity	Brookfield Viscometer @ 25 °C (77 °F)	1800 cPs	4354 lb/ft·h
Color		White	
Liquid Density	Kruss K11 Force Tensiometer @ 25 °C (77 °F)	1.09 g/cm ^{3}	0.04 lb/in ^{3}
Default Print Layer Thickness (Standard Mode)	Internal	50 µm	0.002 in
Speed - Standard Mode	Internal	mm/hr	23
Package Volume		1 kg bottle 2.5 kg cartridge 9 kg container	

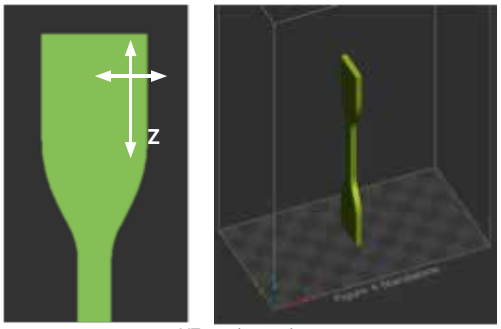
SOLID MATERIAL						
Property	**ASTM Method**	**Metric**	**Imperial**	**ISO Method**	**Metric**	**Imperial**
	PHYSICAL				**PHYSICAL**	
Solid Density 24 Hour	ASTM D792	1.23 g/cm³	0.044 lb/in³	ISO 1183	1.23 g/cm³	0.044 lb/in³
Water Absorption	ASTM D570	0.61%	0.61%	ISO 62	0.61%	0.61%
	MECHANICAL				**MECHANICAL**	
Tensile Strength Ultimate	ASTM D638 *	35 MPa	5100 psi	ISO 527 -1/2	34 MPa	5000 psi
Tensile Strength at Yield	ASTM D638	35 MPa	5100 psi	ISO 527 -1/2	33.5 MPa	4900 psi
Tensile Modulus	ASTM D638	1500 MPa	220 ksi	ISO 527 -1/2	1400 MPa	208 ksi
Elongation at Break	ASTM D638	23%	23%	ISO 527 -1/2	23%	23%
Elongation at Yield	ASTM D638	7.1%	7.1%	ISO 527 -1/2	9.4%	9.4%
Flex Strength	ASTM D790	52 MPa	7500 psi	ISO 178	40 MPa	5600 psi
Flex Modulus	ASTM D790	1500 MPa	220 ksi	ISO 178	1100 MPa	160 ksi
Izod Notched Impact	ASTM D256	34 J/m	0.6 ft-lb/in	ISO 180-A	3.1 kJ/m²	1.5 ft-lb/in²
Izod Unnotched Impact	ASTM D4812	90 J/m	2 ft-lb/in	ISO 180-U	9.2 kJ/m²	4.4 ft-lb/in²
Shore Hardness	ASTM D2240	79D	79D	ISO 7619	79D	79D
	THERMAL				**THERMAL**	
Tg (DMA, E")	ASTM E1640 (E"at 1C/min)	50 °C	123 °F	ISO 6721-1/1 (E"at 1C/min)	50 °C	123 °F
HDT @ 0.455 MPa/66 PSI	ASTM D648	65 °C	149 °F	ISO 75- 1/2 B	64 °C	147 °F
HDT @ 1.82 MPa/264 PSI	ASTM D648	48 °C	119 °F	ISO 75-1/2 A	46 °C	114 °F
CTE below Tg	ASTM E831	95 ppm/°C	53 ppm/°F	ISO 11359-2	95 ppm/K	53 ppm/°F
CTE above Tg	ASTM E831	171 ppm/°C	95 ppm/°F	ISO 11359-2	171 ppm/K	95 ppm/°F
UL Flammability	UL94	HB	HB			
	ELECTRICAL				**ELECTRICAL**	
Dielectric Strength (V/mil) @ 3.0 mm thickness	ASTM D149	13				
Dielectric Constant @ 1 MHz	ASTM D150	3.79				
Dissipation Factor @ 1 MHz	ASTM D150	0.033				
Volume Resistivity (ohm-cm)	ASTM D257	$2.45x10^{15}$				

ISOTROPIC PROPERTIES

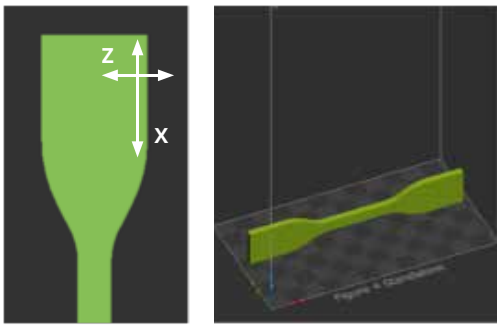
Parts printed using Figure 4 technology exhibit consistent mechanical strength across all axes (X, Y, and Z), indicating near-isotropic behavior.

This uniformity ensures that the printed components maintain reliable performance regardless of print orientation, allowing greater flexibility in part design and production setup.

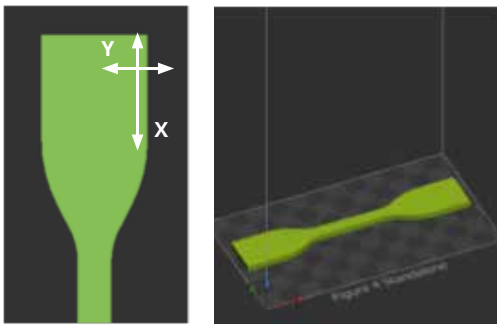
SOLID MATERIAL					
MECHANICAL					
METRIC	METHOD	METRIC			
METRIC	METHOD	ZY	XZ	XY	Z45
Tensile Strength Ultimate	ASTM D638 Type IV	35 MPa	38 MPa	38 MPa	35 MPa
Tensile Strength at Yield	ASTM D638 Type IV	35 MPa	38 MPa	38 MPa	35 MPa
Tensile Modulus	ASTM D638 Type IV	1500 MPa	1500 MPa	1500 MPa	1500 MPa
Elongation at Break	ASTM D638 Type IV	23%	30%	34%	20%
Elongation at Yield	ASTM D638 Type IV	7.1%	7.2%	8.2%	10.1%
Flex Strength	ASTM D790	52 MPa	44 MPa	46 MPa	44 MPa
Flex Modulus	ASTM D790	1500 MPa	1200 MPa	1300 MPa	1200 MPa
Izod Notched Impact	ASTM D256	34 J/m	41 J/m	41 J/m	26 J/m
Shore Hardness	ASTM D2240	79D	N/A	N/A	N/A



YZ - orientation



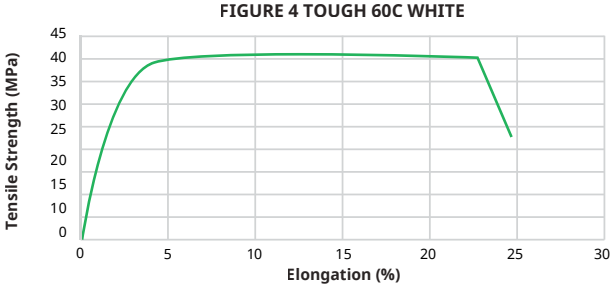
XZ - orientation

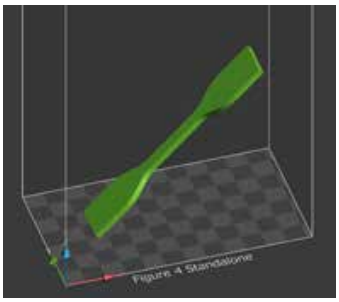


XY - orientation

ISOTROPIC PROPERTIES

The graph illustrates the stress-strain behavior of Figure 4 Tough 60C White, evaluated as per ASTM D638 testing standards.
It demonstrates the material's strength, elongation, and deformation characteristics under tensile loading.





Z45-Degree - orientation

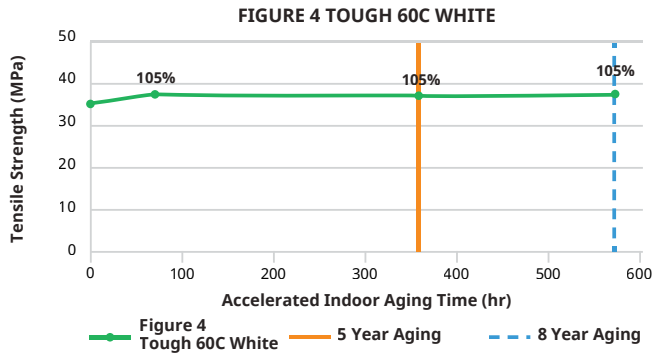
LONG TERM ENVIRONMENTAL STABILITY

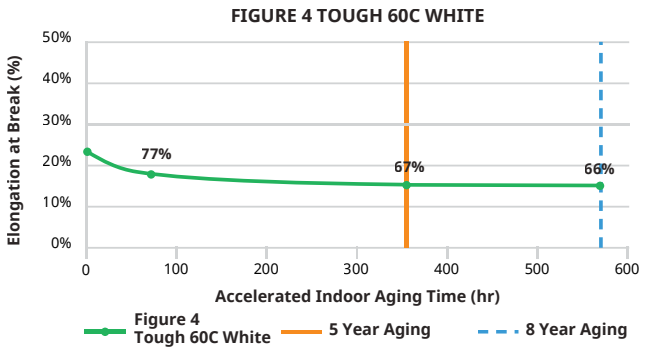
Figure 4 Tough 60C White is designed to maintain mechanical integrity and performance under prolonged exposure to UV and humidity. The material is evaluated for its ability to retain a high percentage of its initial mechanical properties over time, providing realistic data for design validation and long-term application planning.

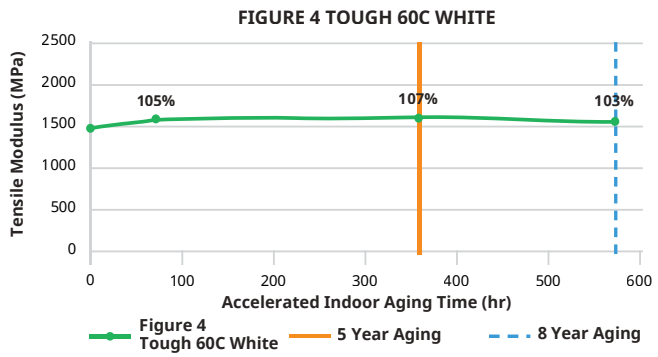
The graph represents actual measured values on the Y-axis, expressed as a percentage of the initial property value.

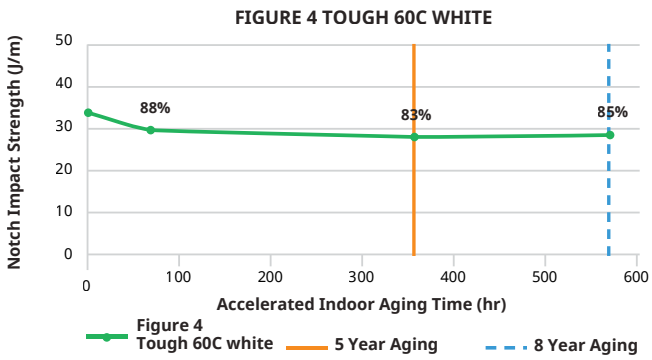
INDOOR STABILITY: Tested as per ASTM D4329 standard method to evaluate long-term resistance to UV exposure and humidity under controlled indoor conditions.

INDOOR STABILITY



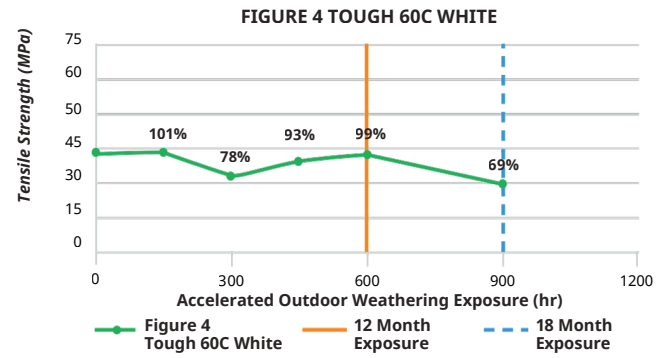


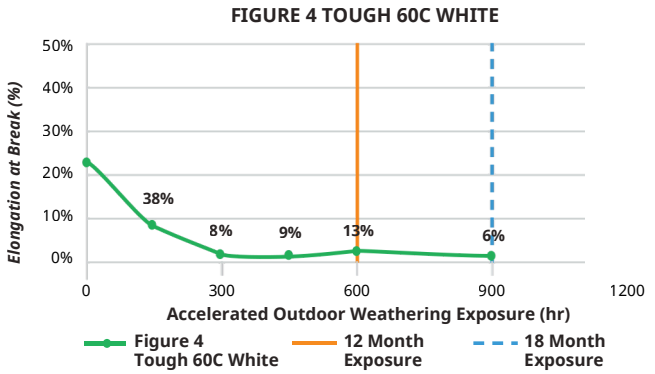


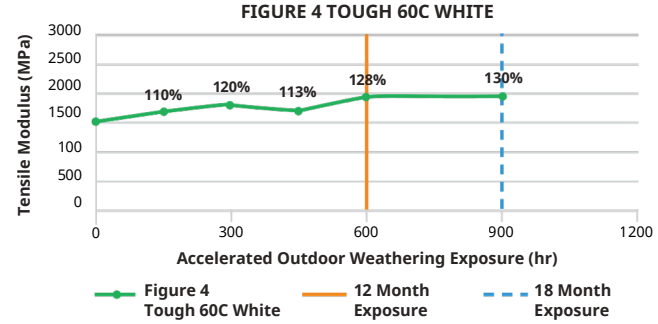


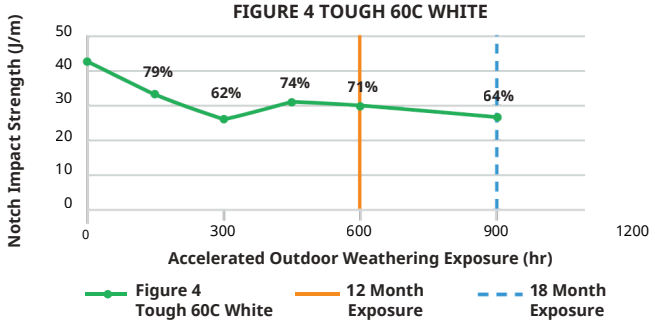
OUTDOOR STABILITY: Tested as per ASTM G154 standard method to assess durability and performance under simulated outdoor weathering environments.

OUTDOOR STABILITY









AUTOMOTIVE FLUID COMPATIBILITY

Material compatibility with hydrocarbons and cleaning agents is essential for reliable performance in automotive applications.
Figure 4 Tough 60C White parts were evaluated for sealed and surface contact compatibility as per USCAR2 test conditions.

Testing was conducted in two phases:

- 7-day immersion followed by mechanical property evaluation.
- 30-minute immersion followed by property evaluation after 7 days.

The results represent the measured retention of mechanical properties over the defined testing periods.

Fluid	Specification	Test Temp (°C)
Gasoline	ISO 1817, Liquid C	23 ± 5
Diesel Fuel 905	ISO 1817, Oil No. 3 + 10% p-xylene*	23 ± 5
Engine Oil	ISO 1817, Oil No. 2	50 ± 3
Ethanol	85% Ethanol + 15% ISO 1817, Liquid C*	23 ± 5
Power Steering Fluid	ISO 1817, Oil No. 3	50 ± 3
Automotive Transmission Fluid	Dexron VI (North American specific material)	50 ± 3
Engine Coolant	50% ethylene glycol + 50% distilled water*	50 ± 3
Brake Fluid	SAE RM66xx (latest available fluid for xx)	50 ± 3
Diesel Exhaust Fluid (DEF)	API certified per ISO 22241	23 ± 5

*Solutions are determined as a percentage by volume

FIGURE 4 TOUGH 60C WHITE

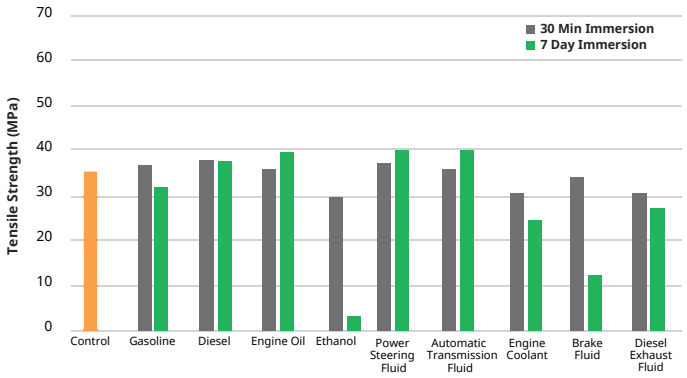


FIGURE 4 TOUGH 60C WHITE

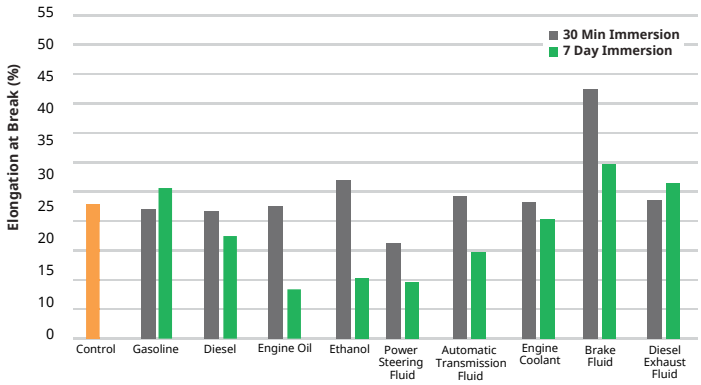


FIGURE 4 TOUGH 60C WHITE

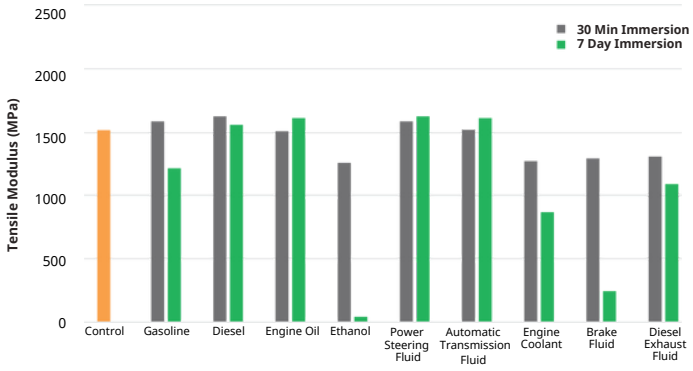
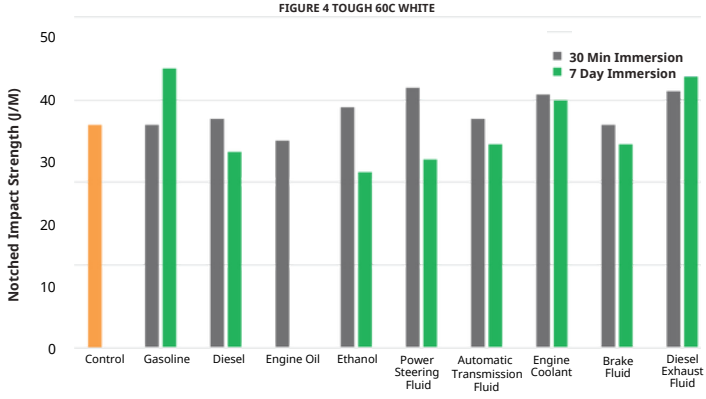


FIGURE 4 TOUGH 60C WHITE



CHEMICAL COMPATIBILITY

Chemical resistance plays a critical role in determining material suitability for end-use applications.
Figure 4 Tough 60 C White was evaluated for sealed and surface contact compatibility as per ASTM D543 test standards.

Testing was conducted in two stages:

- 7-day immersion, followed by mechanical property evaluation.
- 30-minute immersion, followed by evaluation after 7 days.

The results reflect the retention of mechanical properties over the specified test duration.

Chemical Compatibility
6.3.3 Acetone
6.3.12 Detergent Solution, Heavy Duty
6.3.23 Hydrochloric Acid (10%)
6.3.38 Sodium Carbonate Solution (20%)
6.3.44 Sodium Hypochlorite Solution
6.3.46 Sulfuric Acid (30%)
6.3.42 Sodium Hydroxide Solution (10%)
Distilled Water

*Materials marked with an asterisk were not subjected to 7-day soak conditioning.

FIGURE 4 TOUGH 60C WHITE

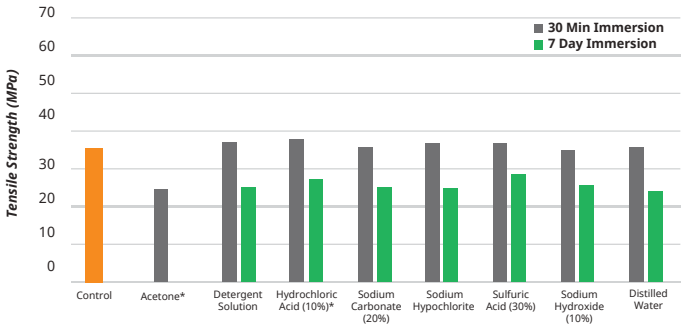


FIGURE 4 TOUGH 60C WHITE

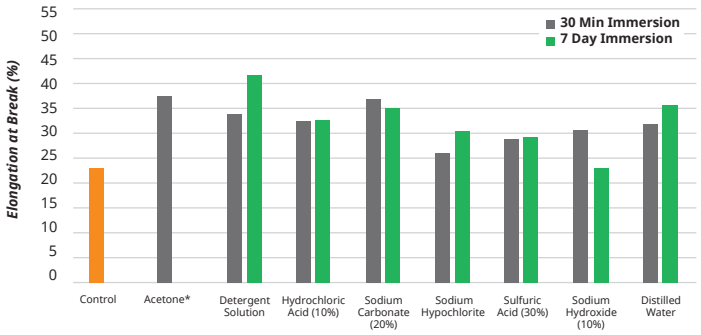


FIGURE 4 TOUGH 60C WHITE

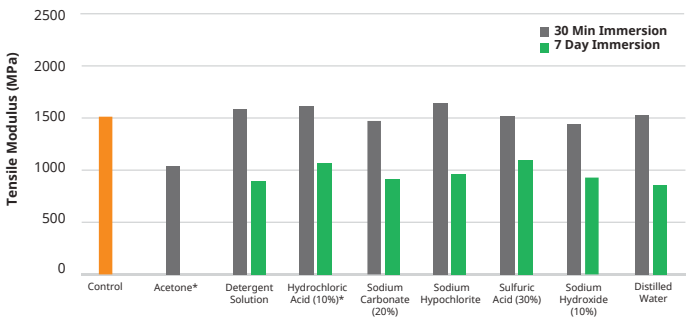
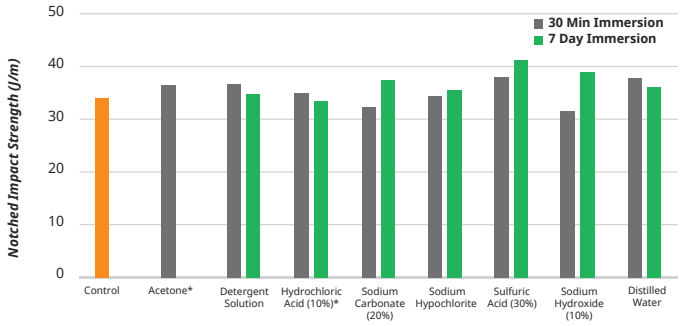


FIGURE 4 TOUGH 60C WHITE



BIOCOMPATIBILITY

Mech Power Tough 60C White samples, printed and processed as per the recommended post-processing guidelines, were tested externally in accordance with ISO 10993-5 and ISO 10993-10 — Biological Evaluation of Medical Devices, Part 5: Tests for In Vitro Cytotoxicity and Part 10: Tests for Irritation and Skin Sensitization.

The results confirmed that Tough 60 C White meets the biocompatibility requirements outlined in these standards.

It remains the responsibility of each customer to ensure that the use of Tough 60C White is safe, lawful, and technically suitable for their intended application. Customers are advised to perform independent testing to validate material suitability for their specific use case.

As laws, regulations, and material compositions may evolve, Mech Power recommends periodic verification to confirm continued compliance and performance stability.

POST-PROCESSING INSTRUCTIONS – REQUIRED TO MEET ISO 10993-5 AND ISO 10993-10

MIXING INSTRUCTIONS

This material contains pigments that may gradually settle over time. For best results, ensure thorough mixing before printing:

For 1 kg Bottle

- Roll the bottle for 1 hour before first use on a roller mixer.
- Roll for 10 minutes before each subsequent use.

For 2.5 kg Cartridge

- Shake vigorously for 2 minutes before installation.
- For modular systems, roll for 20 minutes at the start of each workday.

For 2.5 kg Cartridge

- Shake vigorously for 2 minutes before installation.

Stir the resin in the tray for 30 seconds using the Resin Mixer between print jobs.

MANUAL CLEANING INSTRUCTIONS

- Use two containers of cleaning solvent (IPA or TPM) for a wash-and-rinse process.
- Clean in a washing solvent for 2.5 minutes, agitating the part gently.
- Rinse in clean solvent for 2.5 minutes while agitating.
- Do not exceed 10 minutes of total solvent exposure to maintain mechanical integrity.
- Use gentle manual agitation or a soft brush to assist in cleaning.
- Replace the cleaning solvent once its effectiveness decreases.

DRYING INSTRUCTIONS

- Oven dry at 35 °C for 25 minutes.

UV CURE TIME

- Cure for 90 minutes in a suitable UV post-curing unit.