Mech Power
Parts made right

PRO-BLK 10

Production Rigid

A production-grade additive material offering thermoplastic-like strength, durability, and long-term environmental stability for functional and end-use parts.

A versatile, rigid, and heat-resistant material that combines speed, strength, and high mechanical performance, ideal for tool-less, direct production of durable plastic parts.

PRO-BLK 10 enables true direct digital manufacturing, allowing you to move from CAD design to production within a single day. Designed for tool-less, same-day part production, it combines high print speed with streamlined post-processing, requiring only one solvent cleaning and one UV curing cycle.

The material ensures excellent dimensional accuracy, smooth surface finish, and consistent sidewall quality. With strong mechanical properties and long-term environmental stability, it provides the reliability and performance required for real-world production applications.

HANDLING & POST-PROCESSING GUIDELINES

For consistent performance, ensure proper mixing, cleaning, drying, and curing of the material as specified. Detailed post-processing procedures are provided at the end of this document.

Note: All listed material properties are achieved using the recommended post-processing method. Any deviation from the specified process may result in variations in mechanical or visual performance.

APPLICATIONS

- Tool-less, same-day part production.
- Direct production of small black plastic parts, ideal for motor housings, connectors, snap-fits, and automotive interiors.
- Ideal for digital manufacturing workflows, serving as a reliable alternative to injection molding or soft tooling processes.

BENEFITS

- Stable mechanical performance with long-term environmental durability.
- High-throughput parts are ready the same day with no secondary thermal curing.
- Simplified post-processing using a single solvent cleaning step.
- Excellent surface quality and repeatability
- High-dimensional accuracy and low distortion, ensuring faster first-print success.

FEATURES

- High print speed — up to 62 mm/hr at 50 µm layer thickness.
- Excellent heat resistance, with a 70°C heat deflection temperature and 12% elongation at break.
- Combines durability and strength for functional applications.
- UL94 HB flammability rated for enhanced safety.
- Capable of meeting ISO 10993-5 and ISO 10993-10 standards' biocompatibility requirements.
- Demonstrates thermoplastic-like behavior, showing controlled necking at the tensile break point.

MATERIAL PROPERTIES

All mechanical properties are tested as per ASTM and ISO standards, including parameters such as flammability, dielectric strength, and 24-hour water absorption. These values provide a clear understanding of the material's performance to support accurate design and application decisions.

All samples are conditioned for a minimum of 40 hours at 23°C and 50% RH in accordance with ASTM recommendations. Material data is reported for parts printed along the vertical (ZY) axis.

Figure 4 materials demonstrate consistent mechanical properties across print orientations, ensuring uniform strength and performance without the need for orientation-specific printing.

LIQUID MATERIAL			
Property	**Test Method / Condition**	**Metric**	**Imperial**
Viscosity	Brookfield Viscometer @ 25 °C (77 °F)	293 cps	709 lb/ft·hr
Color		Black	
Liquid Density	Kruss K11 Force Tensiometer @ 25 °C (77 °F)	1.0 g/cm ^{3}	0.040 lb/in3
Default Print Layer Thickness (Standard Mode)		0.05 mm	0.002 in
Speed - Standard Mode		25 mm/hr	2.4 in/hr
Speed - Draft Mode		29 mm/hr	3.2 in/hr
Package Volume		1 kg bottle 2.5 kg cartridge 9 kg container	

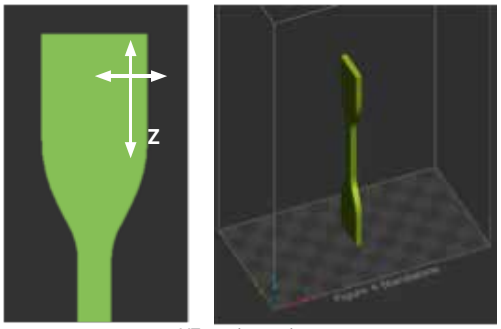
SOLID MATERIAL						
Property	**ASTM Method**	**Metric**	**Imperial**	**ISO Method**	**Metric**	**Imperial**
	PHYSICAL					
Solid Density 24 Hour	ASTM D792	1.16 g/cm3	0.042 lb/in3	ISO 1183	1.16 g/cm3	0.042 lb/in3
Water Absorption	ASTM D570	1.16%	1.16%	ISO 62	1.16%	1.16%
	MECHANICAL				**MECHANICAL**	
Tensile Strength Ultimate	ASTM D638 *	63 MPa	9140 psi	ISO 527 -1/2	58 MPa	8348 psi
Tensile Strength at Yield	ASTM D638	63 MPa	9140 psi	ISO 527 -1/2	58 MPa	8348 psi
Tensile Modulus	ASTM D638	2320 MPa	336 ksi	ISO 527 -1/2	2275 MPa	330 ksi
Elongation at Break	ASTM D638	12%	12%	ISO 527 -1/2	15%	15%
Elongation at Yield	ASTM D638	4.5%	4.7%	ISO 527 -1/2	4.3%	4.3%
Flex Strength	ASTM D790	92 MPa	13340 psi	ISO 178	89 MPa	12940 psi
Flex Modulus	ASTM D790	2290 MPa	332 ksi	ISO 178	2783 MPa	404 ksi
Izod Notched Impact	ASTM D256	24 J/m	0.5 ft-lb/in	ISO 180-A	2 J/m^2	0.0009 ft-lb/in^2
Izod Unnotched Impact	ASTM D4812	614 J/m	11.5 ft-lb/in	ISO 180-U		
Shore Hardness	ASTM D2240	79D	79D	ISO 7619	79D	79D
	THERMAL				**THERMAL**	
Tg (DMA, E")	ASTM E1640 (E"at 1C/min)	62°C	144 °F	ISO 6721-1/1 (E"at 1C/min)	62 °C	144 °F
HDT @ 0.455 MPa/66 PSI	ASTM D648	70°C	158 °F	ISO 75- 1/2 B	67 °C	153 °F
HDT @ 1.82 MPa/264 PSI	ASTM D648	56 °C	133°F	ISO 75-1/2 A	55°C	132°F
CTE below Tg	ASTM E831	71ppm/°C	39 ppm/°F	ISO 11359-2	71 ppm/°C	39 ppm/°F
CTE above Tg	ASTM E831	188 ppm/°C	104 ppm/°F	ISO 11359-2	188 ppm/°C	104 ppm/°F
UL Flammability	UL94	HB	HB			
	ELECTRICAL				**ELECTRICAL**	
Dielectric Strength (V/mil) @ 3.0 mm thickness	ASTM D149	19.3				
Dielectric Constant @ 1 MHz	ASTM D150	3.17				
Dissipation Factor @ 1 MHz	ASTM D150	0.012				
Volume Resistivity (ohm-cm)	ASTM D257	2.6x10^{15}				

ISOTROPIC PROPERTIES

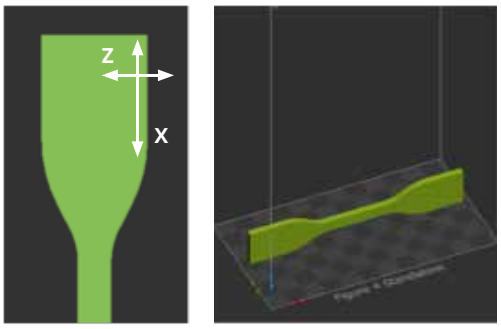
With Figure 4® technology, parts are printed with isotropic mechanical properties, meaning they exhibit consistent strength and performance across all XYZ axes.

This uniformity eliminates the need for orientation-specific printing, allowing greater design flexibility and optimized part layouts without compromising mechanical integrity.

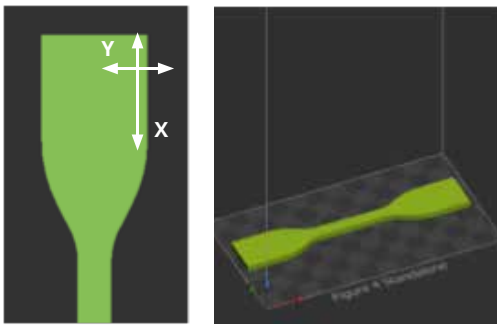
SOLID MATERIAL					
METRIC	METHOD	METRIC			
MECHANICAL					
		ZY	XZ	XY	Z45
Tensile Strength Ultimate	ASTM D638	63 MPa	56 MPa	60 MPa	57 MPa
Tensile Strength at Yield	ASTM D639	63 MPa	56 MPa	60 MPa	57 MPa
Tensile Modulus	ASTM D640	2320 MPa	3215 MPa	2330 MPa	2330 MPa
Elongation at Break	ASTM D641	12%	12%	13%	11%
Elongation at Yield	ASTM D642	4.7%	4.7%	4.7%	4.4%
Flex Strength	ASTM D790	92 MPa	91 MPa	90 MPa	85 MPa
Flex Modulus	ASTM D790	2320 MPa	2280 MPa	2742 MPa	2339 MPa
Izod Notched Impact	ASTM D256	24 J/m	22 J/m	23 J/m	23 J/m
Shore Hardness	ASTM D2240	79D	80D	79D	80D



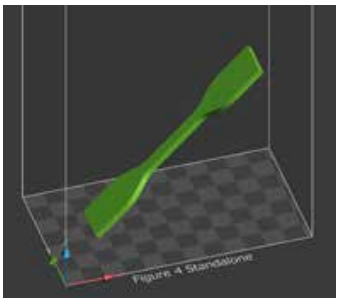
YZ - orientation



XZ - orientation



XY - orientation


Z45-Degree - orientation

LONG TERM ENVIRONMENTAL STABILITY

Figure 4® PRO-BLK 10 is designed to maintain mechanical integrity and surface performance under prolonged UV and humidity exposure.
The material is tested to ensure it retains a high percentage of its original mechanical properties over time, providing predictable performance and design reliability for real-world applications.
Performance data represent measured values on the Y-axis, with data points expressed as a percentage of the initial property value to demonstrate long-term stability.

INDOOR STABILITY: Tested in accordance with ASTM D4329 to evaluate UV and environmental performance under controlled indoor conditions.

INDOOR STABILITY

FIGURE 4 PRO-BLK 10

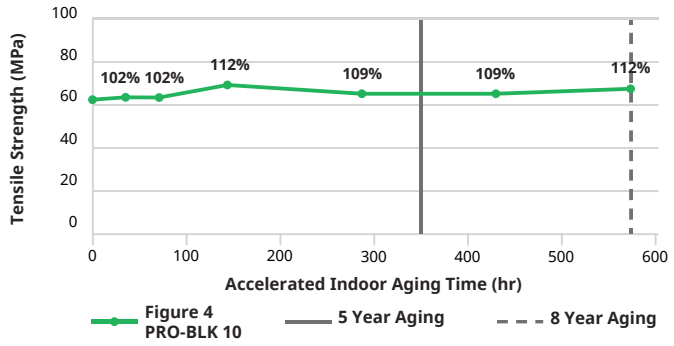


FIGURE 4 PRO-BLK 10

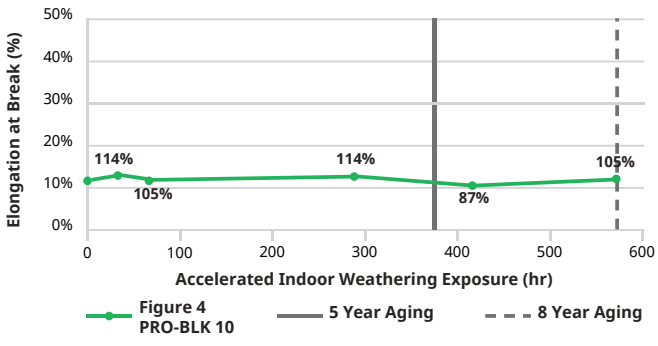


FIGURE 4 PRO-BLK 10

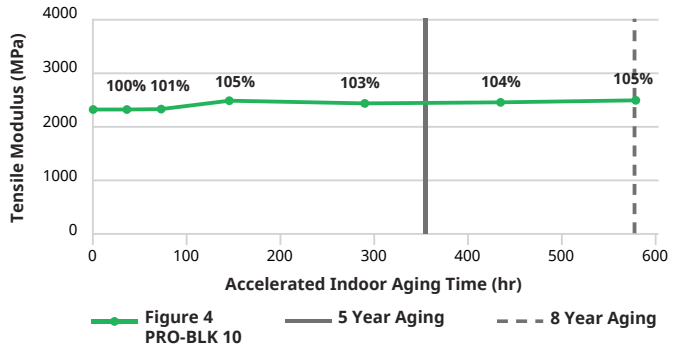
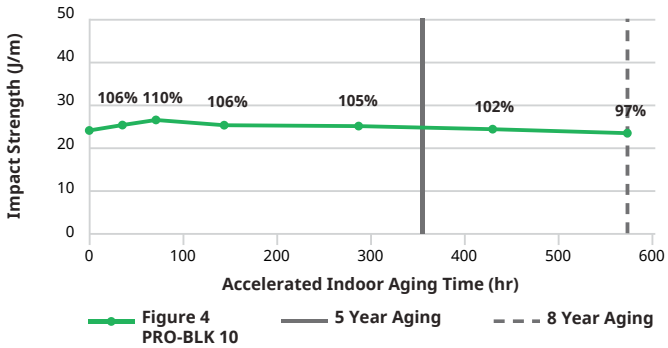


FIGURE 4 PRO-BLK 10



OUTDOOR STABILITY

FIGURE 4 PRO-BLK 10

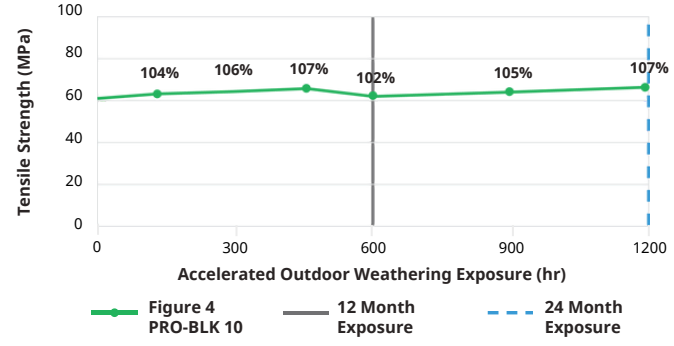
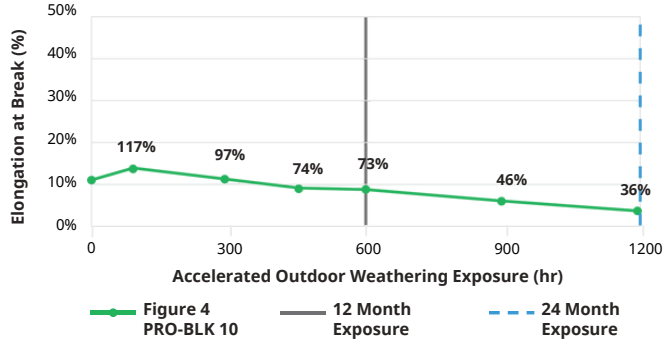


FIGURE 4 PRO-BLK 10



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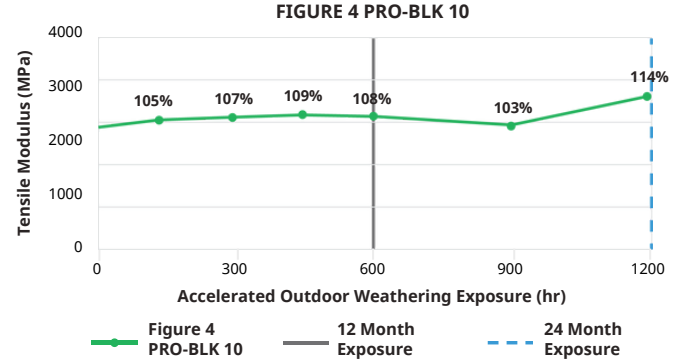

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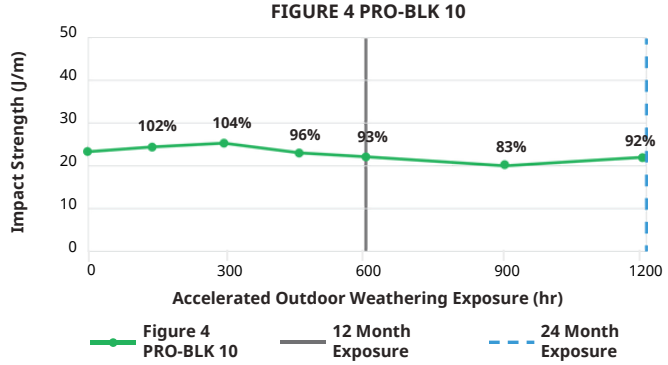


AUTOMOTIVE FLUID COMPATIBILITY

Material compatibility with hydrocarbons and cleaning agents is essential for automotive and industrial applications. Figure 4® PRO-BLK 10 was evaluated under USCAR2 test conditions for both sealed and surface contact performance.

Testing included two evaluation methods:

- 7-day immersion, followed by mechanical property measurement for comparison.
- 30-minute immersion, with post-test mechanical property evaluation after 7 days.

Results represent measured changes in mechanical properties over time, confirming the material's resistance and reliability when exposed to typical automotive fluids.

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 PRO-BLK 10

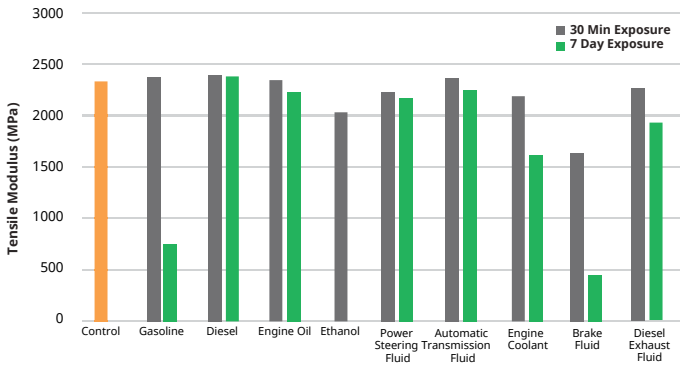
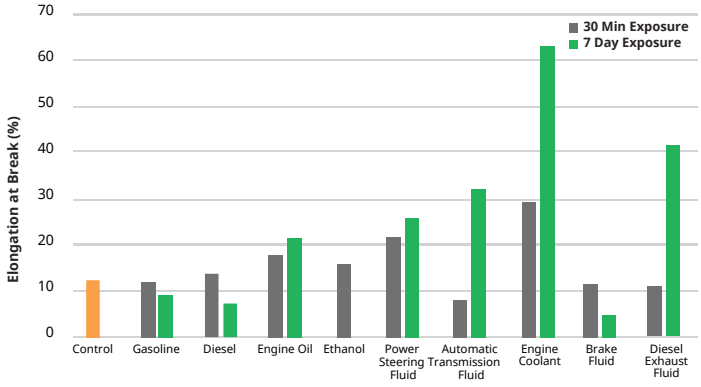


FIGURE 4 PRO-BLK 10



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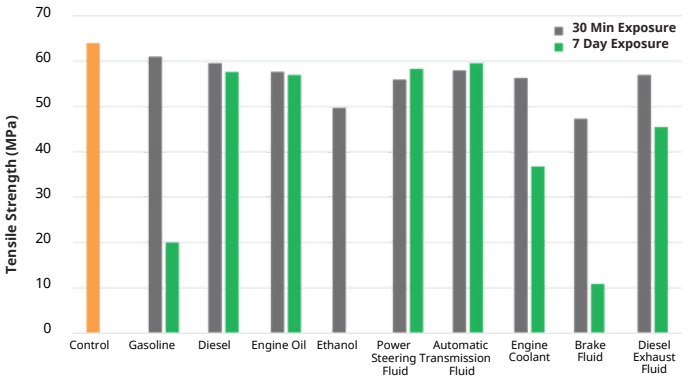

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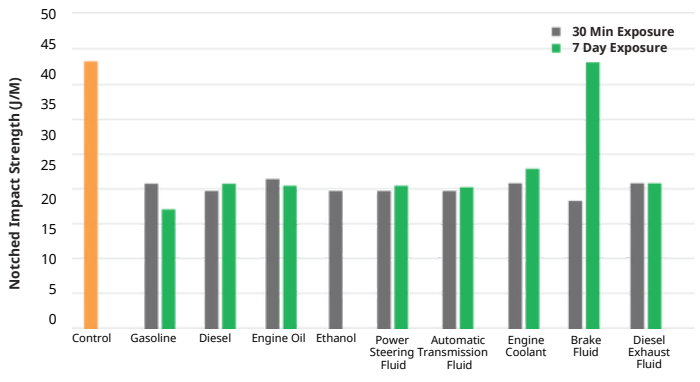


CHEMICAL COMPATIBILITY

Material compatibility with cleaning agents and industrial chemicals is essential for ensuring long-term part performance. Figure 4® PRO-BLK 10 was evaluated under ASTM D543 test conditions for both sealed and surface contact applications.

Testing was conducted using two evaluation methods:

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

The data reflects measured changes in mechanical properties over time, providing a reliable indication of chemical resistance.
*Materials marked with an asterisk were not subjected to 7-day soaking conditioning.

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

FIGURE 4 PRO-BLK 10

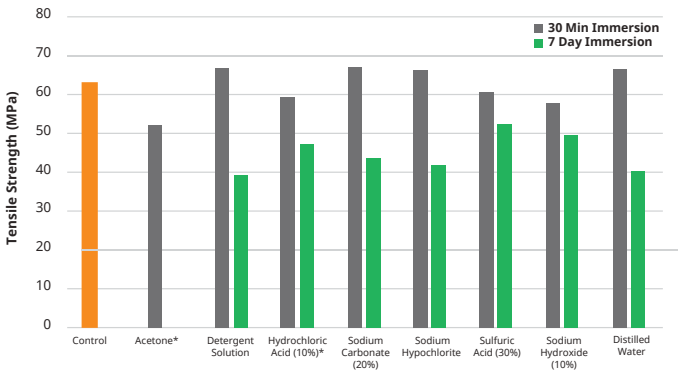


FIGURE 4 PRO-BLK 10

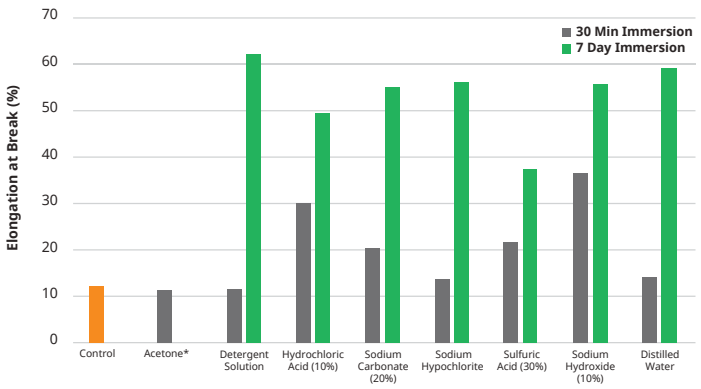


FIGURE 4 PRO-BLK 10

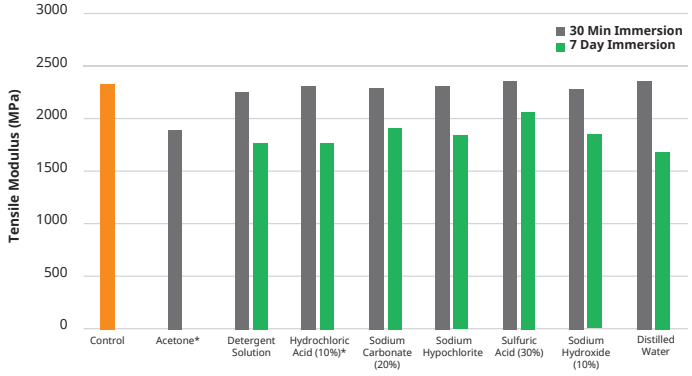
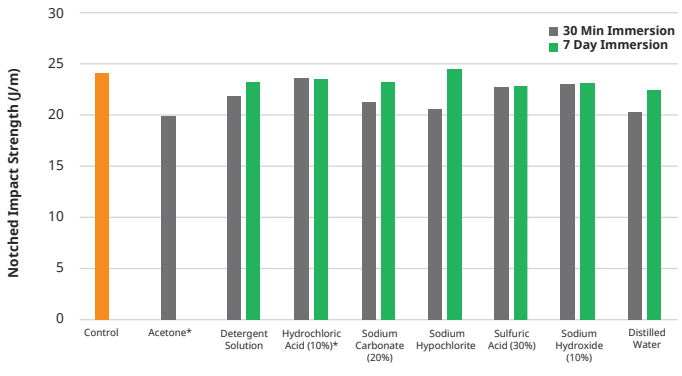


FIGURE 4 PRO-BLK 10



BIOCOMPATIBILITY COMPATIBILITY

Figure 4® PRO-BLK 10 test samples, printed and post-processed as per the specified procedures, were evaluated by an independent biological testing laboratory in accordance with:

- ISO 10993-5: Biological Evaluation of Medical Devices – Tests for In Vitro Cytotoxicity
- ISO 10993-10: Biological Evaluation of Medical Devices – Tests for Irritation and Skin Sensitization (GPMT)

The results confirmed that Figure 4® PRO-BLK 10 meets the biocompatibility requirements defined under the above standards.

It remains the responsibility of each user to determine whether the use of Figure 4® PRO-BLK 10 is safe, compliant, and technically appropriate for their specific application. Users are advised to perform independent validation and periodic verification to ensure ongoing compliance, as regulatory requirements and material properties may evolve.

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

MIXING INSTRUCTIONS

This material contains a pigment that may gradually settle over time. To ensure consistent print performance, proper mixing before use is essential:

For 1 kg Bottle – Figure 4 Standalone:

- Roll the bottle on a 3D Systems LC-3D Mixer for 1 hour before first use.
- Roll for 10 minutes before each subsequent use.

For 2.5 kg Cartridge – Figure 4 Modular:

- Shake the cartridge vigorously for 2 minutes before installation.

Use the Resin Mixer to stir the material in the tray for 30 seconds before starting the next print.

MANUAL CLEANING INSTRUCTIONS

- Clean parts manually using two IPA containers (wash and rinse).
- Submerge in the wash IPA for 5 minutes with gentle agitation.
- Rinse in clean IPA for another 5 minutes with agitation.
- Do not exceed 10 minutes total IPA exposure to maintain mechanical integrity.
- Gentle manual agitation or a soft brush may be used for better cleaning.
- Replace IPA once its cleaning effectiveness decreases.

DRYING INSTRUCTIONS

- Allow parts to air dry for at least 1 hour before UV post-curing.

UV CURE TIME

- Cure the parts under UV light for 90 minutes to achieve the required mechanical and biocompatibility performance.