VisiJet® M2S-HT250

High Temp Clear Plastic

Rigid, veryhigh-temperatureplasticwithsemi-translucent clear amberfinishdeliveringhighstrengthandhighHDT

ProJet MJP 2500

VisiJet M2S-HT250 was designed for the highest temperature prototyping and indirect manufacturing applications. It is very strong and stiff, and capable of operation in very high temperatures. It can withstand high tensile and compressive forces, but not bending on high impact. Smooth and blemish free "molding quality" surface is optically clear and has high feature fidelity, sharp corners and edges.

It is an excellent rapid prototyping and indirect manufacturing material for high temperature molds, thermoforming and low-volume injection molds for standard thermoplastics. Able to make extremely small and complex internal structures for microfluidics and flow visualization.

APPLICATIONS

- Ideal material for digital silicone tooling using eggshell molding methods
- Thermal shielding and insulation for tools and fixtures
- Hot fluid and air flow systems, HVAC, consumer appliances, motor enclosures
- Short-term, direct contact with melted solder for fixtures and manufacturing
- Steam sterilization capable and long-term stability in an incubator
- High-temperature thermoforming prototypes
- Low-pressure, high-temperature molding/tooling
- With care, can be drilled, tapped and machined
- Functional printed screw-threads and thin walls
- High temperature medical/dental applications
- Translucent flow visualization
- Medical/dental applications
- Semi-optically clear sight windows in high-temperature fixtures
- Excellent for microfluidics, capillary fluidics and lab-on-a-chip

FEATURES

- High strength and stiffness, 250°C / 482°F with 2% elongation
- Able to make extremely small and complex internal structures
- High accuracy and watertight
- Functional optical clarity, with yellow tint
- Optically clear in thin sections
- Biocompatible USP Class VI

BENEFITS

- Very high temperature
- High fidelity fine features, sharp edges and high accuracy
- Exceptional smooth and consistent surface finish with the ability to create complex surface textures
- Optically clear in thin sections
- No surface cure inhibition of paints or silicones; no sanding required
- Excellent for painting or molding applications

Note: Not all products and materials are available in all countries — please consult your local sales representative for availability.

MATERIAL PROPERTIES

Thefullsuiteofmechanical properties is given per ASTM and ISO standards where applicable. Properties like flammability, dielectric properties and 24-hour water absorption are also provided for better understanding of material capabilities to help design decisions using the material. All parts are conditioned per ASTM recommended standards for a minimum of 40 hrs at 23°C, 50% RH.

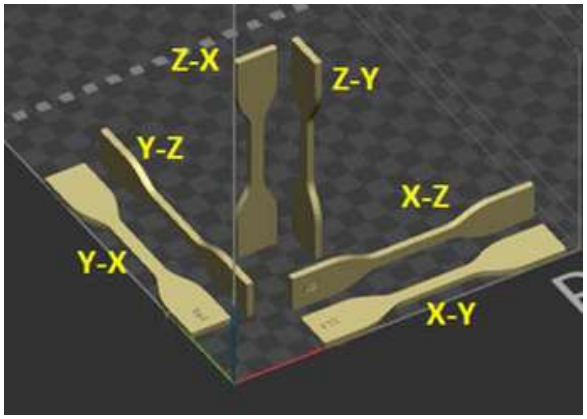
Solid material properties reported were printed along the vertical axis (ZX-orientation). As detailed in the Isotropic Properties section, VisiJet material properties are relatively uniform across print orientations. Parts do not need to be oriented in a particular direction to exhibit these properties.

LIQUID MATERIAL						
Color	Clear Amber					
Package Volume	1.5 kg bottle					
SOLID MATERIAL						
METRIC	**ASTM METHOD**	**METRIC**	**ENGLISH**	**ISO METHOD**	**METRIC**	**ENGLISH**
	PHYSICAL				**PHYSICAL**	
Solid Density	ASTM D792	1.16 g/cm³	0.042 lb/in³	ISO 1183	1.16 g/cm³	0.042 lb/in³
24 Hour Water Absorption	ASTM D570	≤0.22%	≤0.22%	ISO 62	≤0.22%	≤0.22%
	MECHANICAL				**MECHANICAL**	
Tensile Strength Ultimate	ASTM D638 Type IV	46 MPa	6700 psi	ISO 527 -1/2	41 MPa	6000 psi
Tensile Strength at Yield	ASTM D638 Type IV	N/A	N/A	ISO 527 -1/2	N/A	N/A
Tensile Modulus	ASTM D638 Type IV	3400 MPa	500 ksi	ISO 527 -1/2	2800 MPa	403 ksi
Elongation at Break	ASTM D638 Type IV	2 %	2 %	ISO 527 -1/2	1.3 %	1.3 %
Elongation at Yield Flex	ASTM D638 Type IV	N/A	N/A	ISO 527 -1/2	N/A	N/A
Strength Flex Modulus	ASTM D790	92 MPa	13300 psi	ISO 178	90 MPa	13200 psi
Izod Notched Impact Izod	ASTM D790	3600 MPa	520 ksi	ISO 178	3600 MPa	518 ksi
Unnotched impact Shore	ASTM D256	10 J/m	0.2 ft-lb/in	ISO 180-A	1.6 kJ/m²	0.8 ft-lb/in²
Hardness	ASTM D4812	40 J/m	1 ft-lb/in	ISO 180-U		
	ASTM D2240	85 D	85 D	ISO 7619	85 D	85 D
	THERMAL				**THERMAL**	
Tg (DMA E") HDT	ASTM E1640 (E"Peak)	100 °C	209 °F	ISO 6721-1/11 (E" Peak)	100 °C	209 °F
0.455MPa/66PSI	ASTM D648	280 °C	536 °F	ISO 75- 1/2 B	149 °C	300 °F
HDT 1.82MPa/264 PSI	ASTM D648	103 °C	218 °F	ISO 75-1/2 A	98 °C	208 °F
CTE -20 to 70C	ASTM E831	62 ppm/°C	35 ppm/°F	ISO 11359-2	62 ppm/K	35 ppm/F
CTE 95 to 180C	ASTM E831	88 ppm/°C	49 ppm/°F	ISO 11359-2	88 ppm/K	49 ppm/F
UL Flammability Rating		HB				
	ELECTRICAL				**ELECTRICAL**	
Dielectric Strength (kV/mm) @ 3.0 mm thickness	ASTM D149	397				
Dielectric Constant @ 1 MHz	ASTM D150	3.05				
Dissipation Factor @ 1 MHz	ASTM D150	0.012				
Volume Resistivity (ohm-cm)	ASTM D257	7.12E+15				

ISOTROPIC PROPERTIES

MultiJetPrinting(MJP) technology prints parts that are generally isotropic in mechanical properties meaning the parts printed along either the XYZ axis will give similar results.

Parts do not need to be oriented to get the highest mechanical properties, further improving the degree of freedom for part orientation for mechanical properties.



SOLID MATERIAL								
METRIC	METHOD	METRIC						
MECHANICAL								
		XY	XZ	YX	YZ	Z45	ZX	ZY
Tensile Strength Ultimate	ASTM D638 Type IV	46 MPa	57 MPa	56 MPa	52 MPa	37 MPa	29 MPa	27 MPa
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Tensile Modulus	ASTM D638 Type IV	3400 MPa	3200 MPa	3500 MPa	3300 MPa	3100 MPa	3200 MPa	3100 MPa
Elongation at Break	ASTM D638 Type IV	2 %	2 %	2 %	2 %	1 %	1 %	1 %
Elongation at Yield	ASTM D638 Type IV	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flex Strength	ASTM D790	92 MPa	78 MPa	89 MPa	78 MPa	57 MPa	37 MPa	42 MPa
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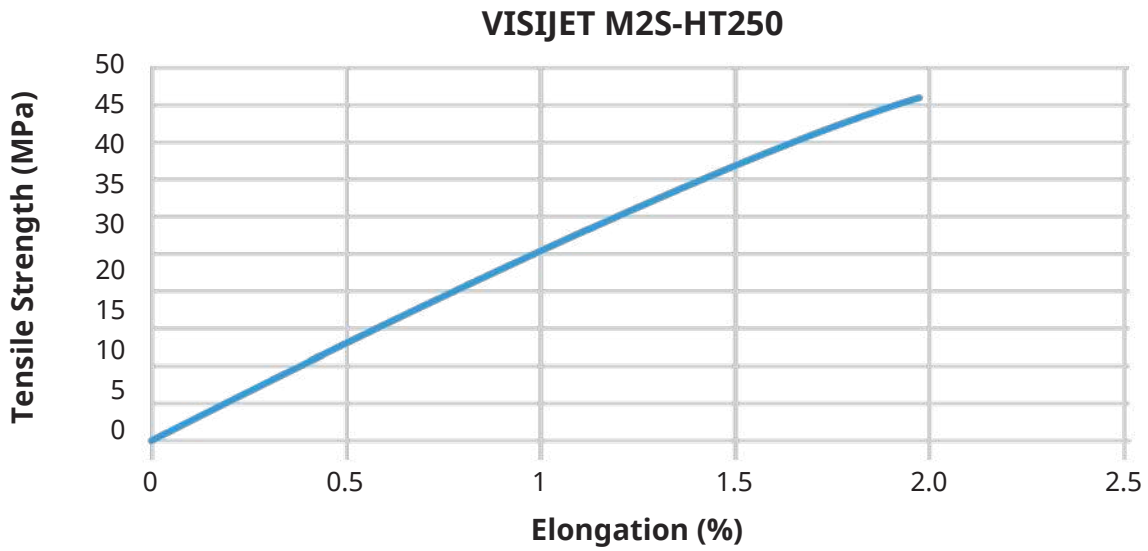
Izod Notched Impact	ASTM D256	10 J/m	10 J/m	10 J/m	9 J/m	10 J/m	9 J/m	9 J/m
Shore Hardness	ASTM D2240	85 D	84 D	85 D	84 D	83 D	84 D	84 D

STRESS-STRAIN CURVE

Thegraphrepresentsthe stress-strain curve for VisiJet M2S-HT250 per ASTM D638 testing.

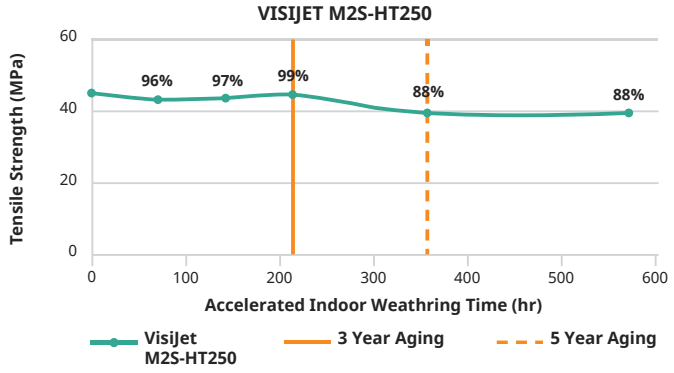


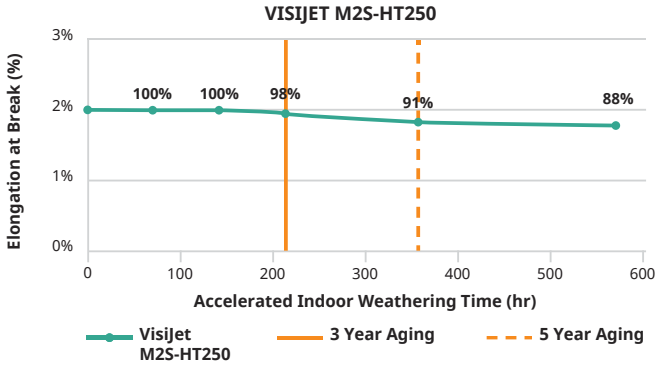
LONG TERM ENVIRONMENTAL STABILITY

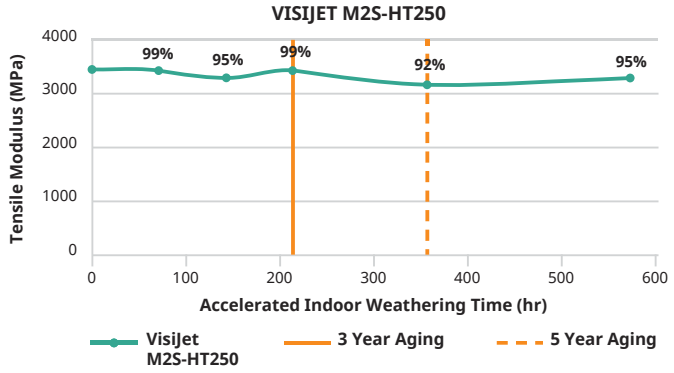
VisiJet M2S-HT250isengineeredtogive long-term environmental UV and humidity stability. This means the material is tested for the ability to retain a high percent of the initial mechanical properties over a given period of time. This provides real design conditions to consider for the application or part. **Actual data value is on Y-axis, and data points are % of initial value.**

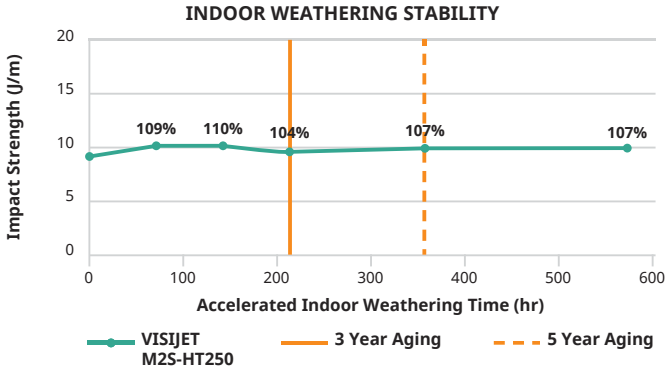
INDOOR STABILITY

INDOOR STABILITY: Tested per ASTM D4329 standard method.



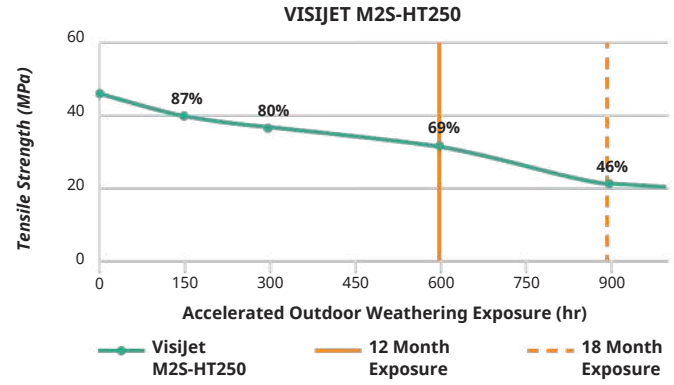


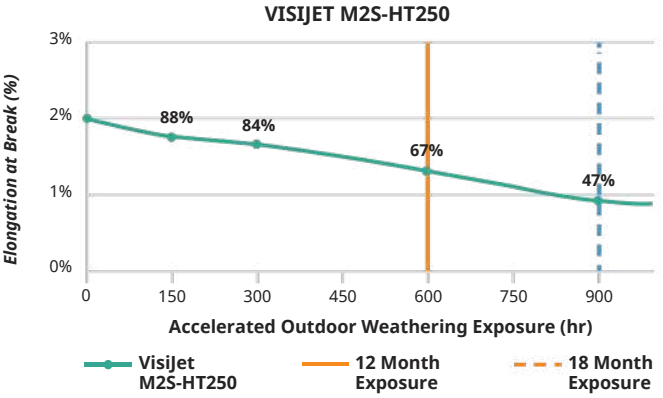


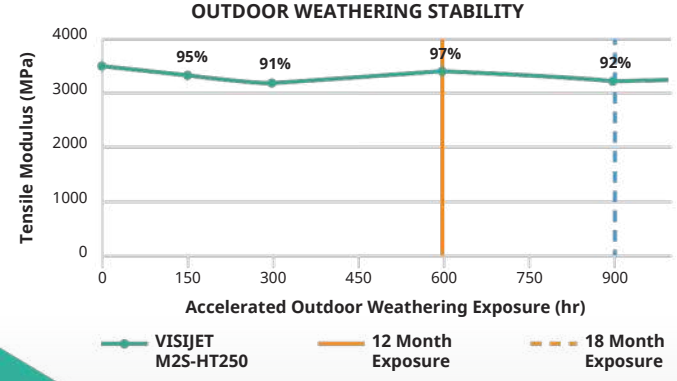


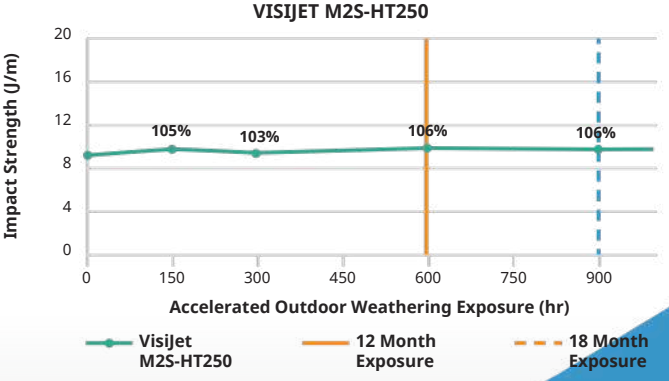
OUTDOOR STABILITY

OUTDOOR STABILITY: Tested per ASTM G154 standard method.









AUTOMOTIVE FLUID COMPATIBILITY

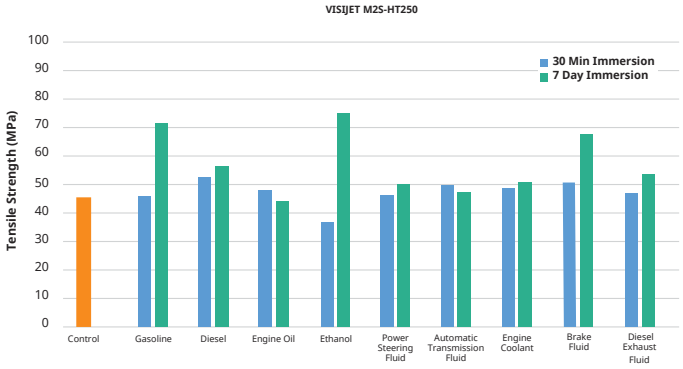
Thecompatibility of amaterialwith hydrocarbons and cleaning chemicals is critical to part application. VisiJet M2S-HT250 parts were tested for sealed and surface contact compatibility per USCAR2 test conditions. The fluids below were tested in two different ways per the specs.

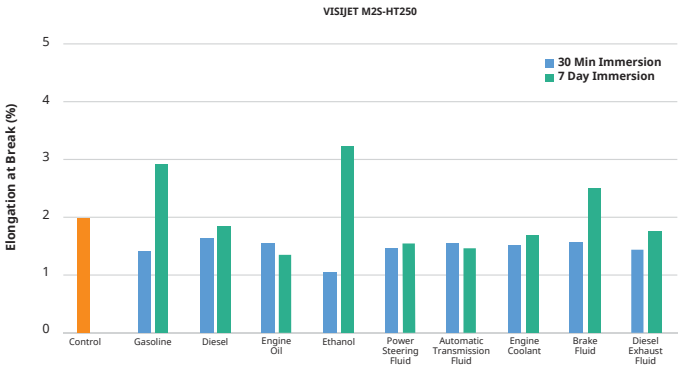
- Immerse for 7-days, then take mechanical property data for comparison.
- Immerse for 30-minutes, remove, and take mechanical property data for comparison in 7-days.

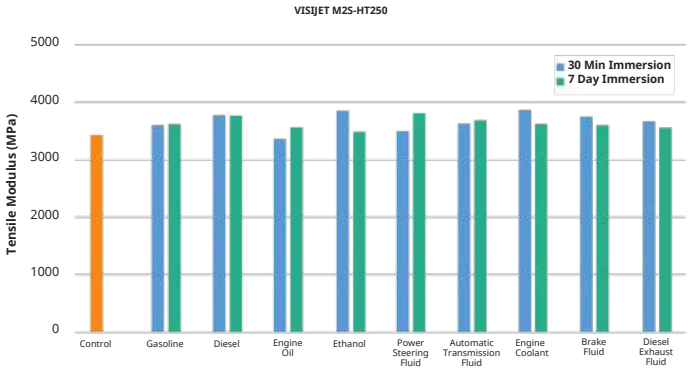
Data reflects the measured value of properties over that period of time.

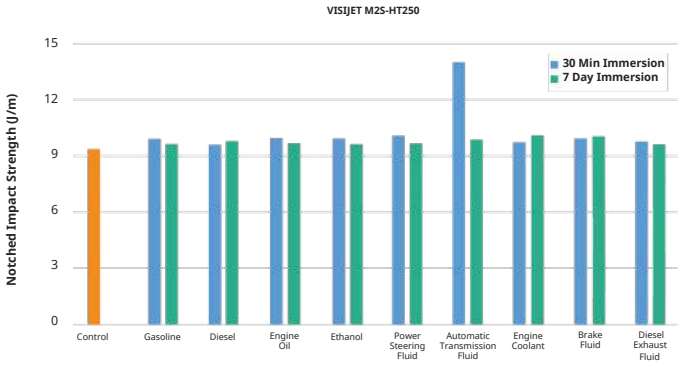
AUTOMOTIVE FLUIDS		
FLUID	**SPECIFICATION**	**TEST TEMP °C**
Gasoline	ISO 1817, liquid C	23 ± 5
Diesel Fuel	905 ISO 1817, Oil No. 3 + 10% p-xylene*	23 ± 5
Engine Oil	ISO 1817, Oil No. 2	50 ± 3
Ethanol	85% Ethanol + 15% ISO 1817 liquid C*	23 ± 5
Power Steering Fluid	ISO 1917, Oil No. 3	50 ± 3
Automative Transmission Fluid	Dexron VI (North American specific material)	50 ± 3
Engine Coolant	50% ethylene glycol + 50% distilled water*	50 ± 3
Brake Fluid	SAE RM66xx (Use latest available fluid for xx)	50 ± 3
Diesel Exhaust Fluid (DEF)	API certified per ISO 22241	23 ± 5

*Solutions are determined as percent by volume









CHEMICAL COMPATIBILITY

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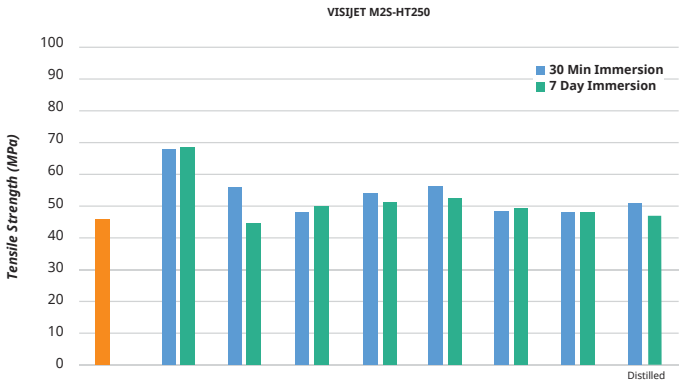
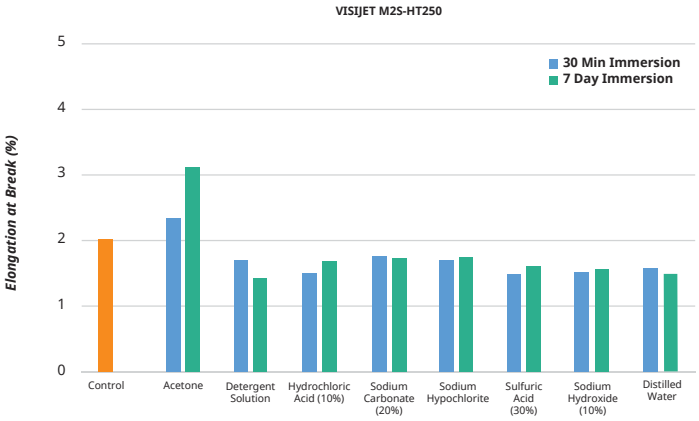
- Immerse for 7-days, then take mechanical property data for comparison.
- Immerse for 30-minutes, remove, and take mechanical property data for comparison in 7-days.

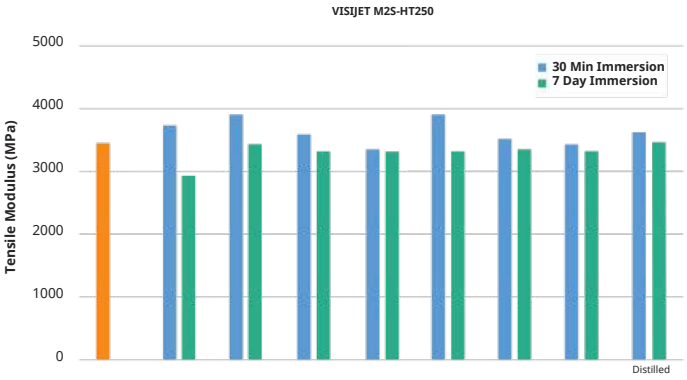
Data reflects the measured value of properties over that period of time.

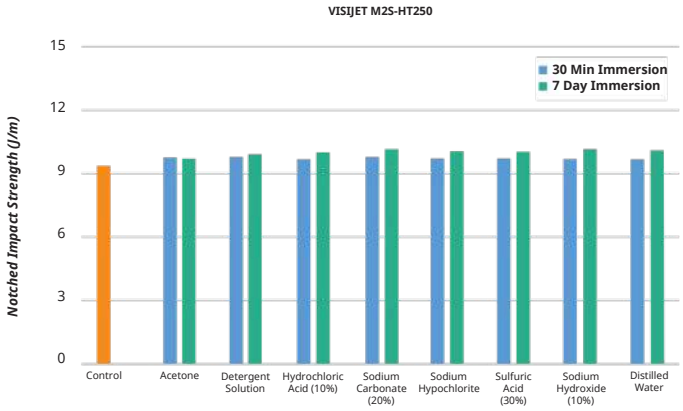
*Denotes materials did not go through 7-day soak conditioning.

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%)
6.3.15 Distilled Water









BIOCOMPATIBILITY POST-PROCESS

OutlineofMJPbiocompatiblecleaningprocedure.

MANUAL CLEANING INSTRUCTIONS

- Remove wax support in an oven
- Clean with EZ Rinse-C or mineral oil
- Ethyl alcohol (ethanol) rinse with sonication
- Second fresh high purity ethanol rinse with sonication
- Air dry

More details can be found in the Post-Processing section of the User Guide.

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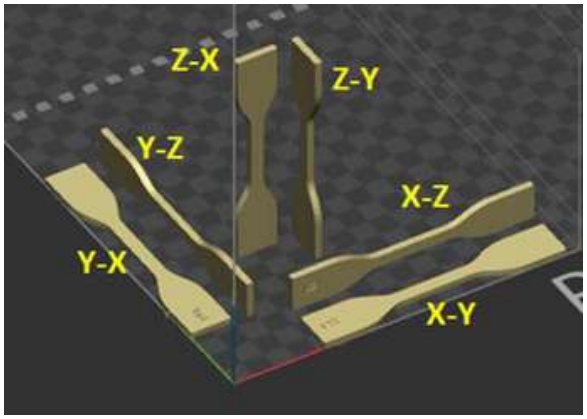

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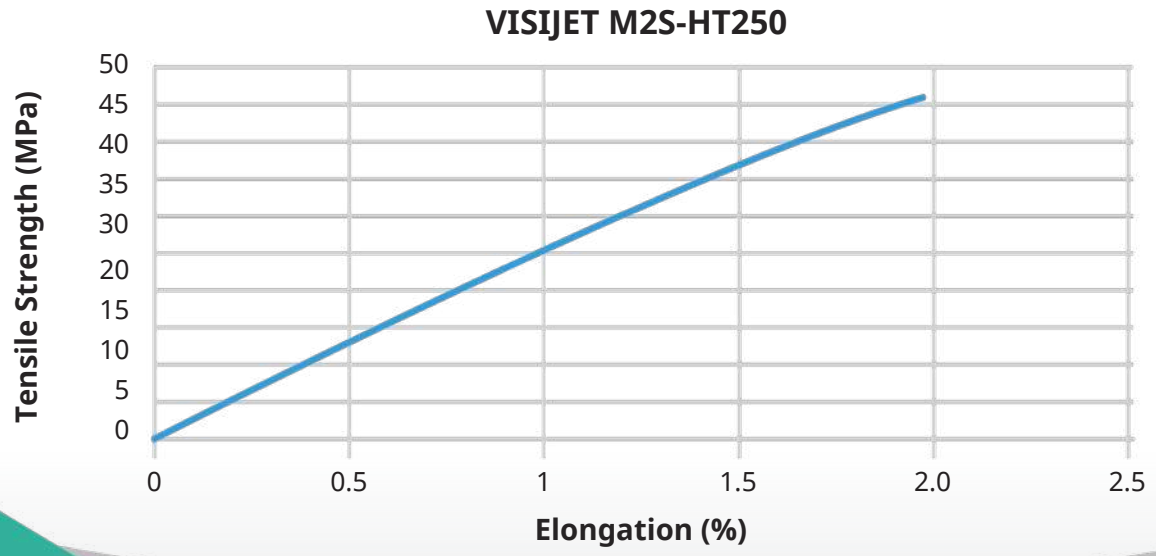

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INDOOR STABILITY

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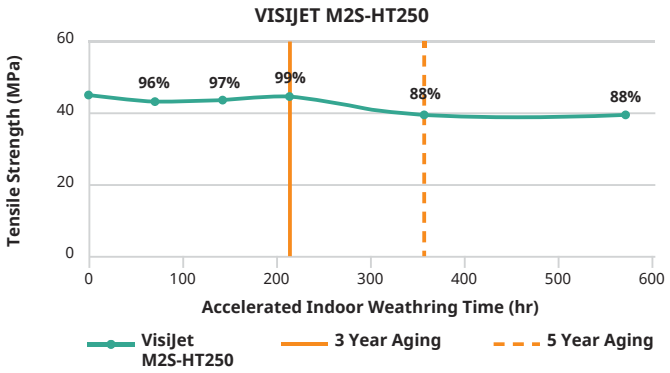
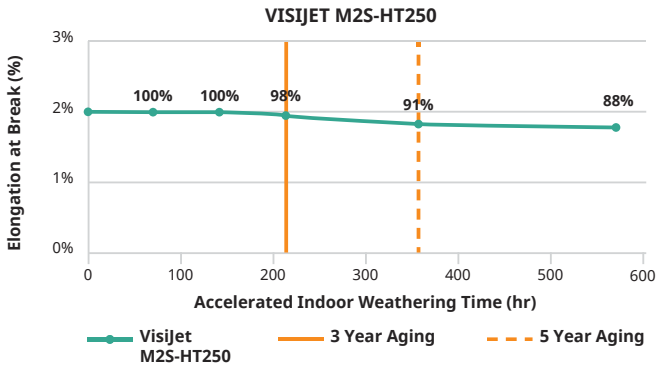
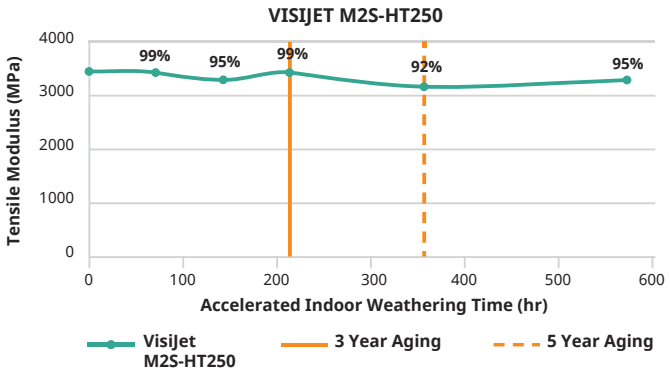
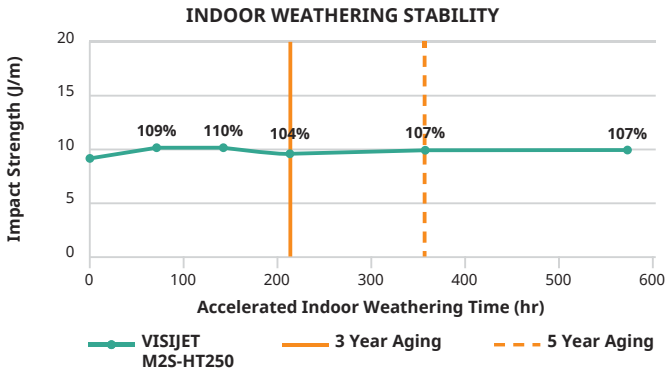


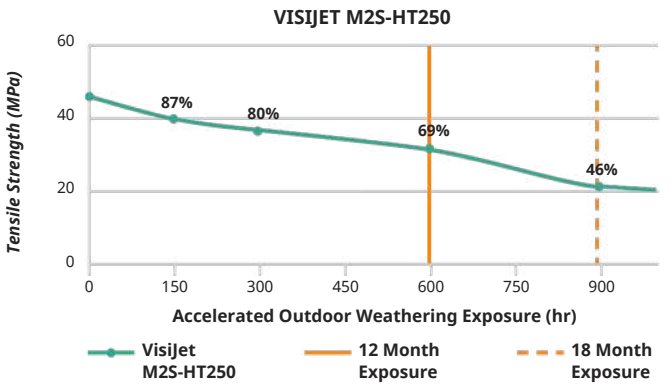


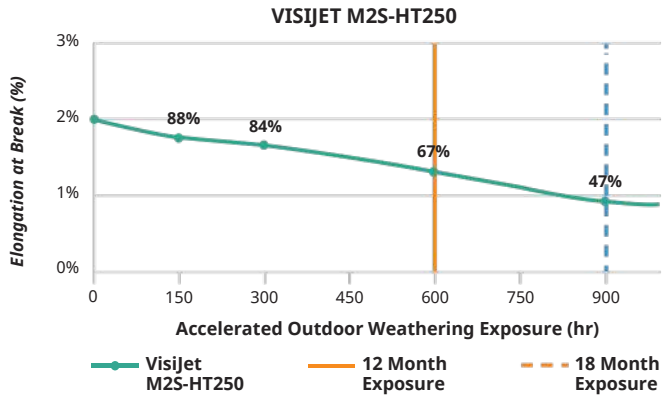


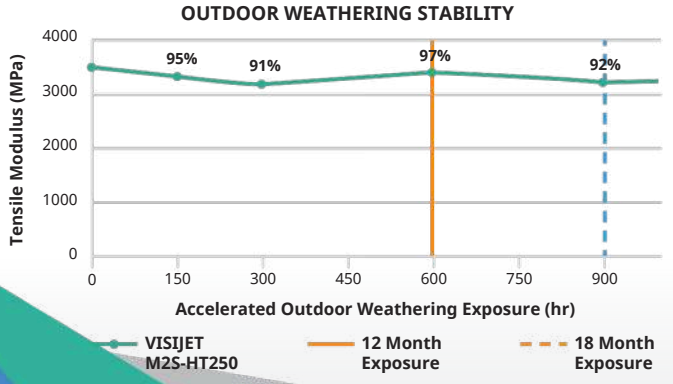


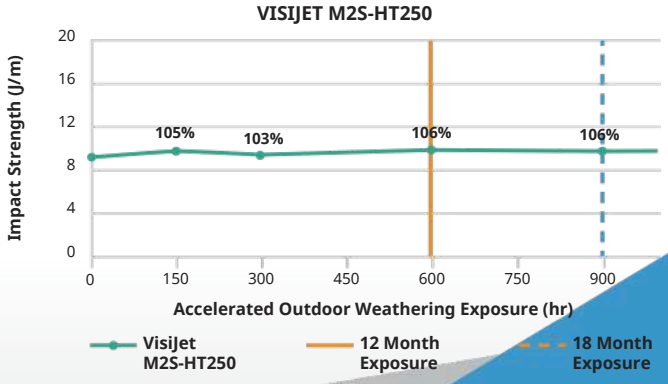
OUTDOOR STABILITY

OUTDOOR STABILITY: Tested per ASTM G154 standard method.









AUTOMOTIVE FLUID COMPATIBILITY

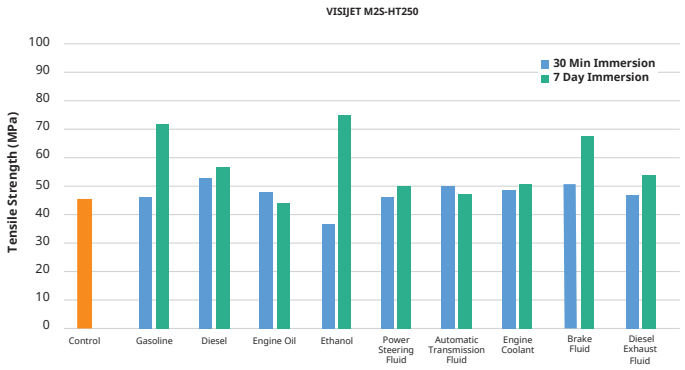
Thecompatibility of amaterialwith hydrocarbons and cleaning chemicals is critical to part application. VisiJet M2S-HT250 parts were tested for sealed and surface contact compatibility per USCAR2 test conditions. The fluids below were tested in two different ways per the specs.

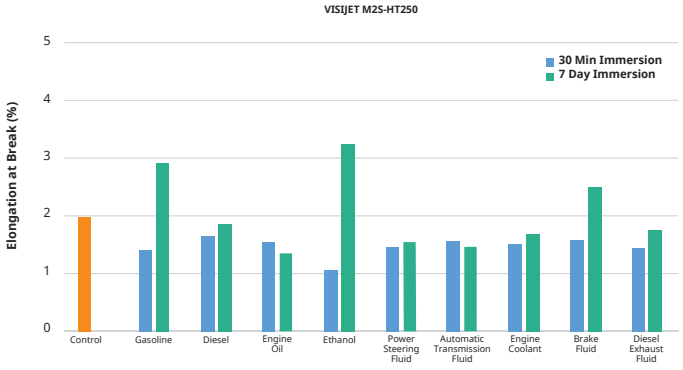
- Immerse for 7-days, then take mechanical property data for comparison.
- Immerse for 30-minutes, remove, and take mechanical property data for comparison in 7-days.

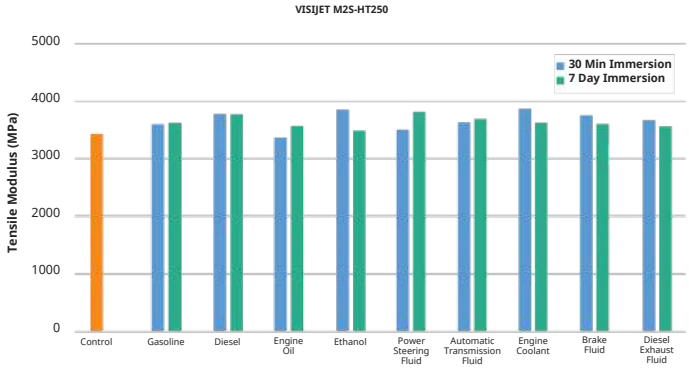
Data reflects the measured value of properties over that period of time.

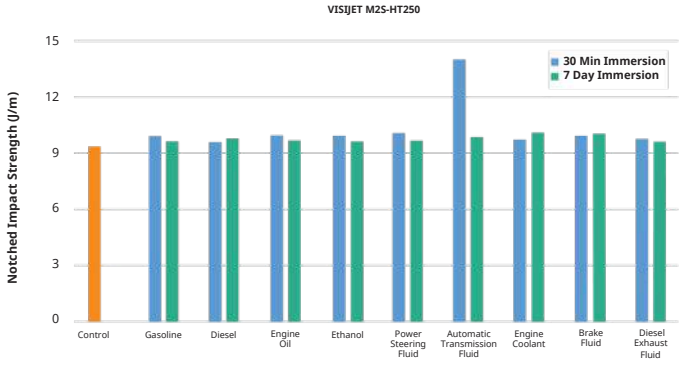
AUTOMOTIVE FLUIDS		
FLUID	**SPECIFICATION**	**TEST TEMP °C**
Gasoline	ISO 1817, liquid C	23 ± 5
Diesel Fuel	905 ISO 1817, Oil No. 3 + 10% p-xylene*	23 ± 5
Engine Oil	ISO 1817, Oil No. 2	50 ± 3
Ethanol	85% Ethanol + 15% ISO 1817 liquid C*	23 ± 5
Power Steering Fluid	ISO 1917, Oil No. 3	50 ± 3
Automative Transmission Fluid	Dexron VI (North American specific material)	50 ± 3
Engine Coolant	50% ethylene glycol + 50% distilled water*	50 ± 3
Brake Fluid	SAE RM66xx (Use latest available fluid for xx)	50 ± 3
Diesel Exhaust Fluid (DEF)	API certified per ISO 22241	23 ± 5

*Solutions are determined as percent by volume









CHEMICAL COMPATIBILITY

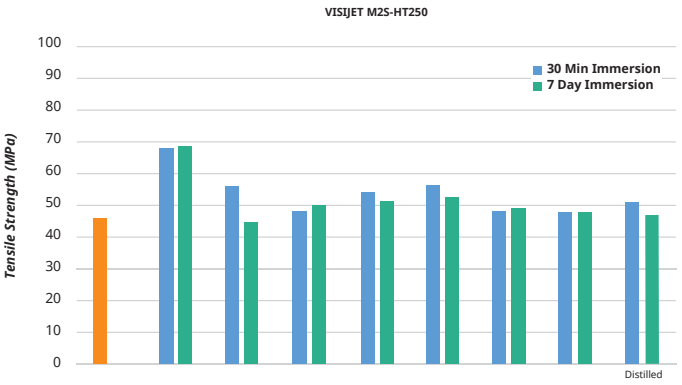
Thecompatibility ofamaterial with cleaning chemicals is critical to part application. VisiJet M2S-HT250 parts were tested for sealed and surface contact compatibility per ASTM D543 test conditions. The fluids below were tested in two different ways per the specs.

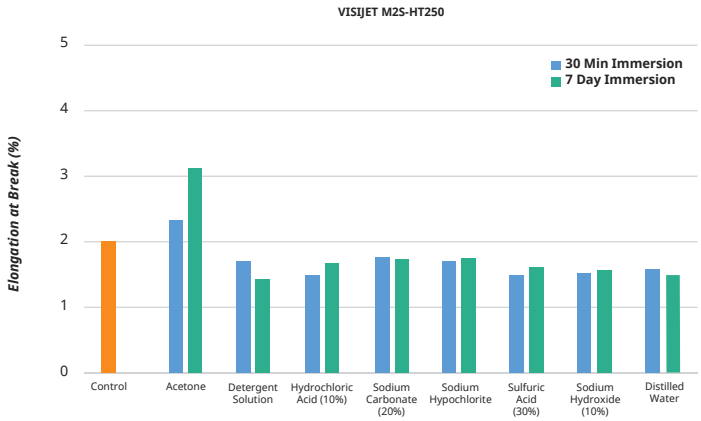
- Immerse for 7-days, then take mechanical property data for comparison.
- Immerse for 30-minutes, remove, and take mechanical property data for comparison in 7-days.

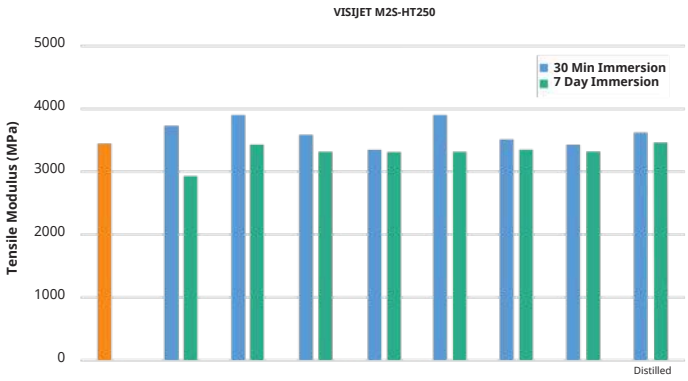
Data reflects the measured value of properties over that period of time.

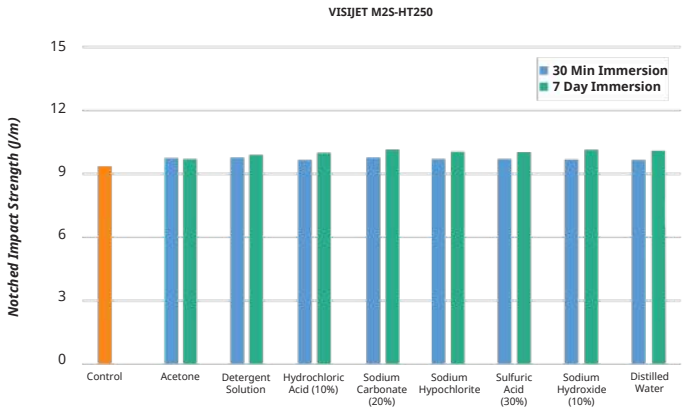
*Denotes materials did not go through 7-day soak conditioning.

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%)
6.3.15 Distilled Water









BIOCOMPATIBILITY POST-PROCESS

OutlineofMJPbiocompatiblecleaningprocedure.

MANUAL CLEANING INSTRUCTIONS

- Remove wax support in an oven
- Clean with EZ Rinse-C or mineral oil
- Ethyl alcohol (ethanol) rinse with sonication
- Second fresh high purity ethanol rinse with sonication
- Air dry

More details can be found in the Post-Processing section of the User Guide.