



VisiJet® M2R-CL

Rigid general-purpose plastic with translucent clear finish delivering a balance of strength and elongation with a moderate HDT

Clear Plastic

ProJet MJP 2500

Similar to the VisiJet M2R-WT (white) and VisiJet M2R-GRY (gray), VisiJet M2R-CL is a rigid material that is good for a broad range of concept models and functional prototypes. It is optically clear and has high feature fidelity, sharp corners and edges and smooth surface finish. It is a general-purpose material with high accuracy suitable for prototypes, printed assemblies, medical/dental applications and some end-use parts. Able to make extremely small and complex internal structures for microfluidics and flow visualization.



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

APPLICATIONS

- Translucent functional prototypes and some end-use parts
- Rapid prototyping of plastic injection molded thermoplastic parts
- Able to be drilled, tapped and machined and can create moderate functional snap fits
- Functional printed assemblies and injection molded screw bosses
- Functional printed screw-threads and thin walls
- Medical/dental applications like surgical guides
- Translucent flow visualization and dye-tinted applications
- Optically clear sight windows in fixtures
- Excellent for microfluidics, capillary fluidics and lab-on-a-chip

BENEFITS

- High fidelity fine features, sharp edges and high accuracy
- Exceptional smooth and consistent surface finish
- Excellent optical clarity
- No surface cure inhibition of paints or silicones; no sanding required
- Excellent for painting or molding applications

FEATURES

- Moderate strength and stiffness, 20-30% elongation
- Able to make extremely small and complex internal structures
- High accuracy and watertight
- Biocompatible USP Class VI & ISO 10993

MATERIAL PROPERTIES

The full suite of mechanical 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.

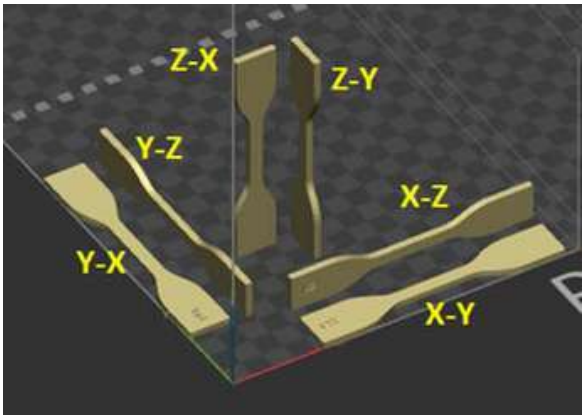
LIQUID MATERIAL						
Color	Clear					

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	≤0.5%	≤0.5%	ISO 62	≤0.5%	≤0.5%
Mechanical				Mechanical		
Tensile Strength Ultimate	ASTM D638 Type IV	50 MPa	7200 psi	ISO 527 -1/2	43 MPa	6200 psi
Tensile Strength at Yield	ASTM D638 Type IV	50 MPa	7200 psi	ISO 527 -1/2	42.8 MPa	6200 psi
Tensile Modulus	ASTM D638 Type IV	2200 MPa	330 ksi	ISO 527 -1/2	2500 MPa	359 ksi
Elongation at Break	ASTM D638 Type IV	11 %	11 %	ISO 527 -1/2	18 %	18 %
Elongation at Yield Flex	ASTM D638 Type IV	4.2 %	4.2 %	ISO 527 -1/2	4 %	4 %
Strength Flex Modulus	ASTM D790	65 MPa	9400 psi	ISO 178	60 MPa	8100 psi
Izod Notched Impact Izod	ASTM D790	1900 MPa	270 ksi	ISO 178	2200 MPa	314 ksi
Unnotched impact Shore	ASTM D256	15 J/m	0.3 ft-lb/in	ISO 180-A	1.9 kJ/m²	0.9 ft-lb/in²
Hardness	ASTM D4812	400 J/m	8 ft-lb/in	ISO 180-U		
	ASTM D2240	79 D	79 D	ISO 7619	79 D	79 D
Thermal				Thermal		
Tg (DMA E") HDT	ASTM E1640 (E"Peak)	40 C	111 F	ISO 6721-1/11 (E" Peak)	40 C	111 F
0.455MPa/66PSI	ASTM D648	49 C	119 F	ISO 75- 1/2 B	43 C	109 F
HDT 1.82MPa/264 PSI	ASTM D648	44 C	112 F	ISO 75-1/2 A	38 C	101 F
CTE -20 to 70C	ASTM E831	94 ppm/C	52 ppm/F	ISO 11359-2	94 ppm/K	52 ppm/F
CTE 95 to 180C	ASTM E831	181 ppm/C	101 ppm/F	ISO 11359-2	181 ppm/K	101 ppm/F
UL Flammability Rating		HB				
Electrical				Electrical		
Dielectric Strength (kV/mm) @ 3.0 mm thickness	ASTM D149	400				
Dielectric Constant @ 1 MHz	ASTM D150	3.15				
Dissipation Factor @ 1 MHz	ASTM D150	0.019				
Volume Resistivity (ohm-cm)	ASTM D257	6.94E+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.

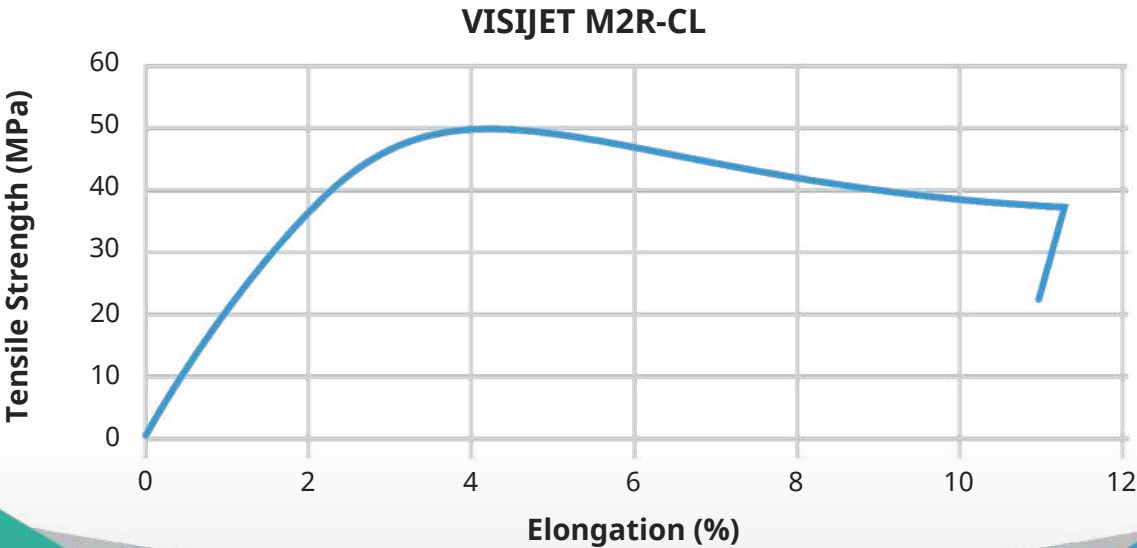
Parts do not need to be oriented to get the highest mechanical properties, further improving the degree of freedom for part orientation for mechanical properties.



SOLID MATERIAL								
Metric	Method	Metric						
Mechanical								
		XY	XZ	YX	YZ	Z45	ZX	ZY
Tensile Strength Ultimate	ASTM D638 Type IV	50 MPa	44 MPa	42 MPa	39 MPa	40 MPa	36 MPa	34 MPa
Tensile Strength at Yield	ASTM D638 Type IV	50 MPa	45 MPa	41 MPa	40 MPa	41 MPa	37 MPa	33 MPa
Tensile Modulus	ASTM D638 Type IV	2200 MPa	2100 MPa	1980 MPa	2120 MPa	1750 MPa	1780 MPa	1700 MPa
Elongation at Break	ASTM D638 Type IV	11 %	14 %	16 %	18.5 %	23.1 %	14 %	15.4 %
Elongation at Yield	ASTM D638 Type IV	4.2 %	4.3 %	4.5 %	4.2 %	4.3 %	4.3 %	4.2 %
Flex Strength	ASTM D790	65 MPa	50 MPa	59 MPa	47 MPa	58 MPa	50 MPa	46 MPa
Flex Modulus	ASTM D790	1900 MPa	1460 MPa	1880 MPa	1400 MPa	1670 MPa	1420 MPa	1330 MPa
Izod Notched Impact	ASTM D256	15 J/m	16 J/m	16 J/m	16 J/m	13 J/m	16 J/m	16 J/m
Shore Hardness	ASTM D2240	79 D	78 D	76 D	78 D	78 D	78 D	78 D

STRESS-STRAIN CURVE

The graph represents the stress-strain curve for Visijet M2R-CL per ASTM D638 testing.

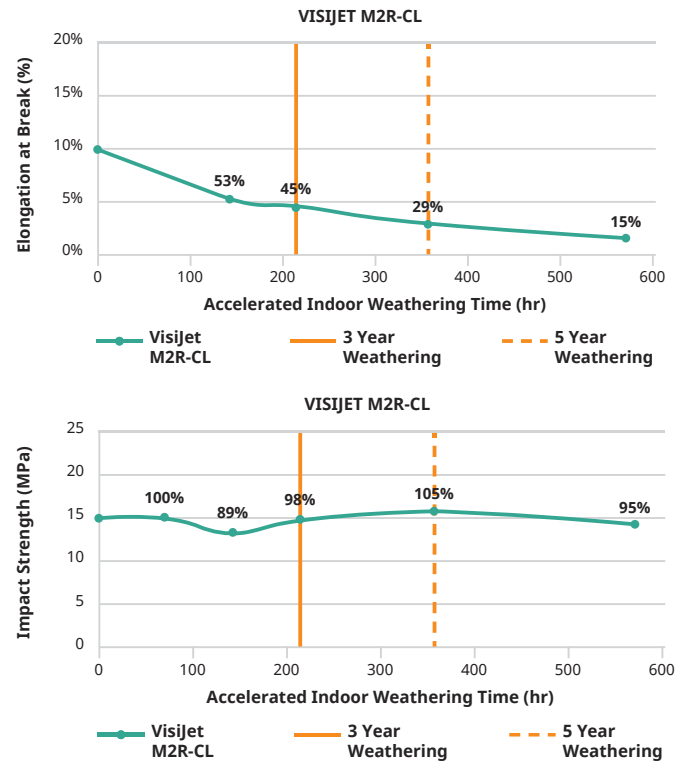
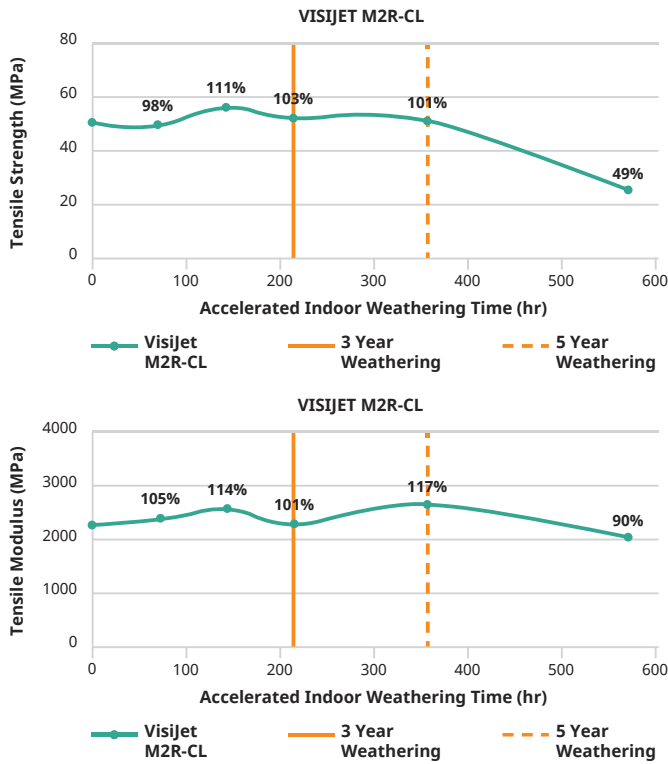


LONG TERM ENVIRONMENTAL STABILITY

VisijetM2R-CL is engineered to give 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.**

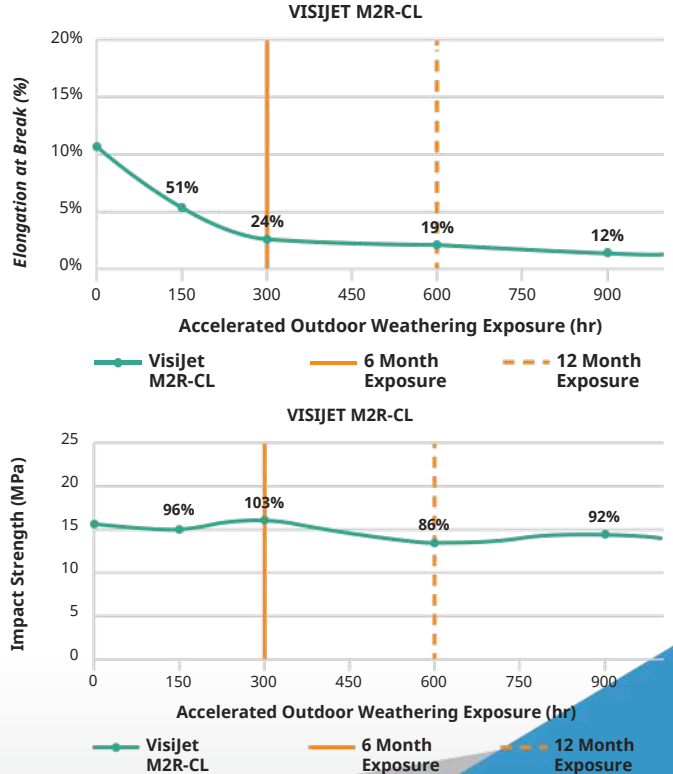
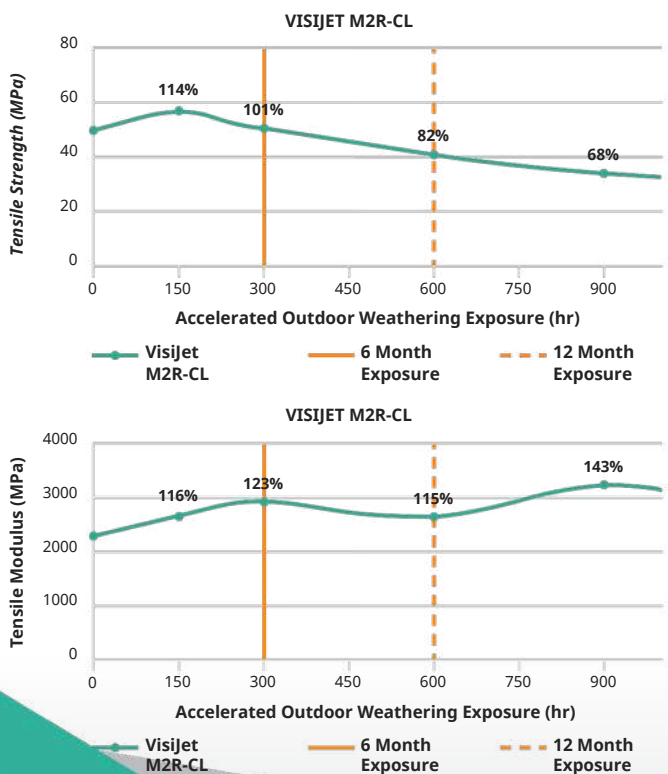
INDOOR STABILITY: Tested per ASTM D4329 standard method.

INDOOR STABILITY



OUTDOOR STABILITY: Tested per ASTM G154 standard method.

OUTDOOR STABILITY



AUTOMOTIVE FLUID COMPATIBILITY

The compatibility of a material with hydrocarbons and cleaning chemicals is critical to part application. Visijet M2R-CL 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.

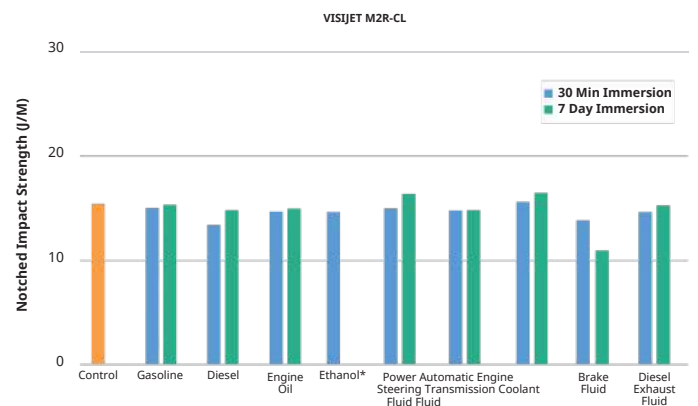
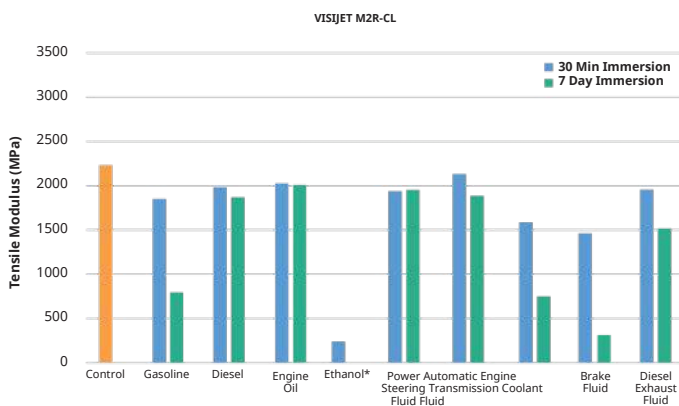
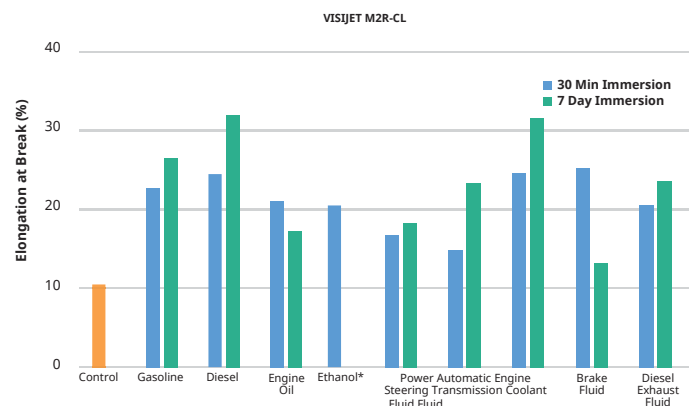
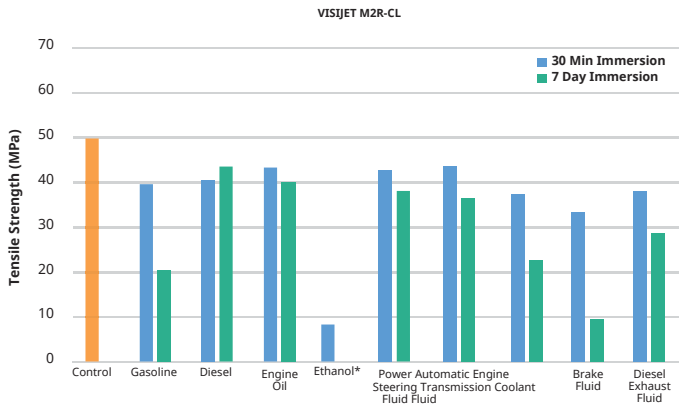
Immerse for 7-days, then take mechanical property data for comparison.

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
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 (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

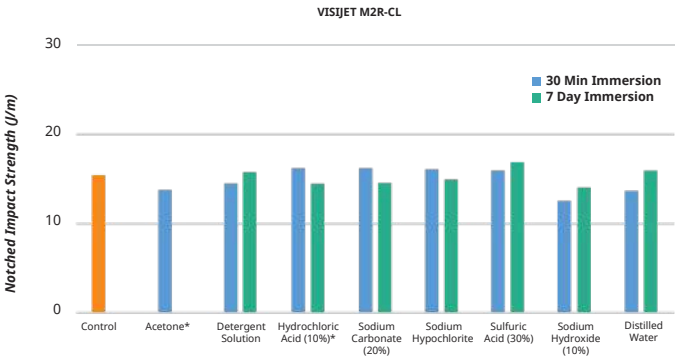
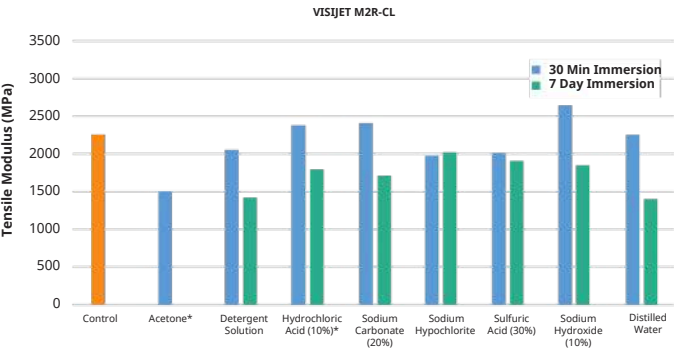
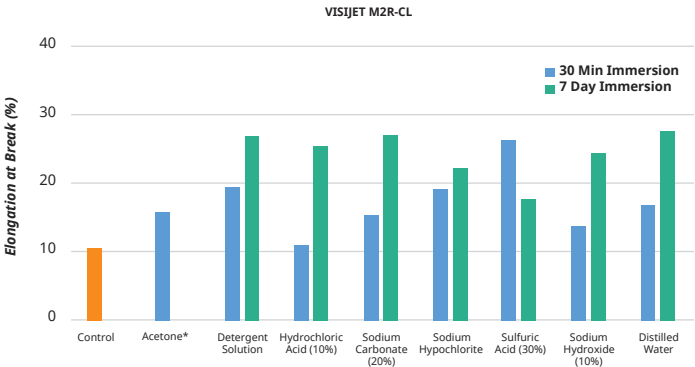
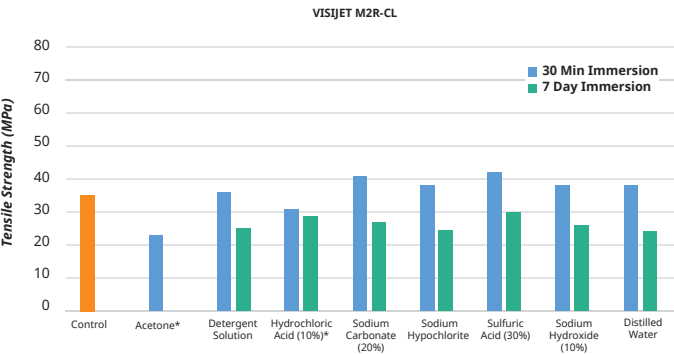
The compatibility of a material with cleaning chemicals is critical to part application. Visijet M2R-CL parts were tested for sealed and surface contact compatibility per ASTM D543 test conditions. The fluids below were tested in two different ways per the specs.

- 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



VISIJET M2R-CL BIOCOMPATIBILITY POST-PROCESS

- 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

