

## Technical Data

### Product Description

ULTEM 1000 resin is an amorphous, transparent polyetherimide (PEI) plastic offering a glass transition temperature (Tg) of 217°C. This inherently flame retardant resin has UL94 V0, V2 and 5VA ratings and is RoHS compliant. ULTEM 1000 resin is an unreinforced general purpose grade offering high heat resistance, high strength and modulus and broad chemical resistance up to high temperatures.

### General

Material Status	• Commercial: Active		
Literature <sup>1</sup>	• <a href="#">Technical Datasheet</a>		
UL Yellow Card <sup>2</sup>	• <a href="#">E121562-101048254</a>		
Search for UL Yellow Card	• <a href="#">SABIC</a> • <a href="#">ULTEM™ Resin</a>		
Availability	• Latin America	• North America	
Features	• Amorphous • Chemical Resistant	• Flame Retardant • General Purpose	• High Heat Resistance • High Strength
Uses	• Additive Manufacturing (3D Printing) • Aerospace Applications • Appliances • Automotive Applications • Automotive Exterior Parts • Automotive Interior Parts • Automotive Lighting • Automotive Under the Hood	• Construction Applications • Electrical/Electronic Applications • Electronic Displays • Fluid Handling • Industrial Applications • Lawn and Garden Equipment • Lenses • Lighting Applications	• Medical/Healthcare Applications • Non-specific Food Applications • Oil/Gas Applications • Outdoor Applications • Pharmaceuticals • Rail Applications
Automotive Specifications	• FORD WSK-M4D716-A		
Appearance	• Clear/Transparent		
Processing Method	• Extrusion Blow Molding	• Injection Molding	
Multi-Point Data	<ul style="list-style-type: none"> <li>• Coefficient of Thermal Expansion vs. Temperature (ASTM E831)</li> <li>• Compressive Stress vs. Strain (ASTM D695)</li> <li>• Elastic Modulus vs Temperature (ASTM D4065)</li> <li>• Flexural DMA (ASTM D4065)</li> <li>• Instrumented Impact (Energy) (ASTM D3763)</li> <li>• Instrumented Impact (Load) (ASTM D3763)</li> <li>• Pressure-Volume-Temperature (PVT - Zoller Method)</li> <li>• Shear DMA (ASTM D4065)</li> <li>• Specific Heat vs. Temperature (ASTM D3417)</li> <li>• Tensile Creep (ASTM D2990)</li> <li>• Tensile Fatigue</li> <li>• Tensile Stress vs. Strain (ASTM D638)</li> <li>• Thermal Conductivity vs. Temperature (ASTM E1530)</li> <li>• Viscosity vs. Shear Rate (ASTM D3835)</li> </ul>		
Also Available In	• Asia Pacific	• Europe	

Physical	Nominal Value (English)	Nominal Value (SI)	Test Method
Density / Specific Gravity	1.27	1.27 g/cm <sup>3</sup>	ASTM D792
Melt Mass-Flow Rate (MFR) (337°C/6.6 kg)	9.0 g/10 min	9.0 g/10 min	ASTM D1238
Molding Shrinkage - Flow (0.126 in (3.20 mm))	5.0E-3 to 7.0E-3 in/in	0.50 to 0.70 %	Internal Method
Water Absorption			ASTM D570
24 hr	0.25 %	0.25 %	
Equilibrium, 73°F (23°C)	1.3 %	1.3 %	



Mechanical	Nominal Value (English)	Nominal Value (SI)	Test Method
Tensile Modulus <sup>4</sup>	519000 psi	3580 MPa	ASTM D638
Tensile Strength <sup>5</sup> (Yield)	16000 psi	110 MPa	ASTM D638
Tensile Elongation <sup>5</sup>			ASTM D638
Yield	7.0 %	7.0 %	
Break	60 %	60 %	
Flexural Modulus <sup>6</sup> (3.94 in (100 mm) Span)	509000 psi	3510 MPa	ASTM D790
Flexural Strength <sup>6</sup>			ASTM D790
Yield, 3.94 in (100 mm) Span	23900 psi	165 MPa	
Poisson's Ratio	0.36	0.36	ASTM E132
Taber Abrasion Resistance			ASTM D1044
1000 Cycles, 1000 g, CS-17 Wheel	10.0 mg	10.0 mg	
Impact	Nominal Value (English)	Nominal Value (SI)	Test Method
Notched Izod Impact (73°F (23°C))	0.99 ft·lb/in	53 J/m	ASTM D256
Unnotched Izod Impact (73°F (23°C))	25 ft·lb/in	1300 J/m	ASTM D4812
Reverse Notch Izod Impact			ASTM D256
0.126 in (3.20 mm)	25 ft·lb/in	1300 J/m	
Gardner Impact (73°F (23°C))	319 in·lb	36.0 J	ASTM D3029
Hardness	Nominal Value (English)	Nominal Value (SI)	Test Method
Rockwell Hardness (M-Scale)	109	109	ASTM D785
Thermal	Nominal Value (English)	Nominal Value (SI)	Test Method
Deflection Temperature Under Load			ASTM D648
66 psi (0.45 MPa), Unannealed, 0.252 in (6.40 mm)	410 °F	210 °C	
264 psi (1.8 MPa), Unannealed, 0.252 in (6.40 mm)	394 °F	201 °C	
Vicat Softening Temperature	424 °F	218 °C	ASTM D1525 <sup>7</sup>
CLTE			ASTM E831
Flow : -4 to 302°F (-20 to 150°C)	3.1E-5 in/in/°F	5.6E-5 cm/cm/°C	
Transverse : -4 to 302°F (-20 to 150°C)	3.0E-5 in/in/°F	5.4E-5 cm/cm/°C	
Thermal Conductivity	1.5 Btu·in/hr/ft <sup>2</sup> /°F	0.22 W/m/K	ASTM C177
RTI Elec	338 °F	170 °C	UL 746
RTI Imp	338 °F	170 °C	UL 746
RTI Str	338 °F	170 °C	UL 746
Electrical	Nominal Value (English)	Nominal Value (SI)	Test Method
Volume Resistivity	1.0E+17 ohms·cm	1.0E+17 ohms·cm	ASTM D257
Dielectric Strength			ASTM D149
0.0630 in (1.60 mm), in Air	830 V/mil	33 kV/mm	
0.0630 in (1.60 mm), in Oil	710 V/mil	28 kV/mm	
0.126 in (3.20 mm), in Oil	500 V/mil	20 kV/mm	
Dielectric Constant			ASTM D150
100 Hz	3.15	3.15	
1 kHz	3.15	3.15	
Dissipation Factor			ASTM D150
100 Hz	1.5E-3	1.5E-3	
1 kHz	1.2E-3	1.2E-3	
2.45 GHz	2.5E-3	2.5E-3	
Arc Resistance <sup>8</sup>	PLC 5	PLC 5	ASTM D495
Comparative Tracking Index (CTI)	PLC 4	PLC 4	UL 746
High Amp Arc Ignition (HAI) <sup>9</sup>	PLC 3	PLC 3	UL 746
High Voltage Arc Tracking Rate (HVTR)	PLC 2	PLC 2	UL 746
Hot-wire Ignition (HWI)	PLC 1	PLC 1	UL 746



Flammability	Nominal Value (English)	Nominal Value (SI)	Test Method
Flame Rating			UL 94
0.016 in (0.40 mm)	V-2	V-2	
0.030 in (0.75 mm)	V-0	V-0	
0.12 in (3.0 mm)	5VA	5VA	
Oxygen Index	47 %	47 %	ASTM D2863
NBS Smoke Density - Flaming, Ds <sup>10</sup>	0.700	0.700	ASTM E662

Injection	Nominal Value (English)	Nominal Value (SI)
Drying Temperature	302 °F	150 °C
Drying Time	4.0 to 6.0 hr	4.0 to 6.0 hr
Suggested Max Moisture	0.020 %	0.020 %
Suggested Shot Size	40 to 60 %	40 to 60 %
Rear Temperature	626 to 752 °F	330 to 400 °C
Middle Temperature	644 to 752 °F	340 to 400 °C
Front Temperature	653 to 752 °F	345 to 400 °C
Nozzle Temperature	653 to 752 °F	345 to 400 °C
Processing (Melt) Temp	662 to 752 °F	350 to 400 °C
Mold Temperature	275 to 329 °F	135 to 165 °C
Back Pressure	43.5 to 102 psi	0.300 to 0.700 MPa
Screw Speed	40 to 70 rpm	40 to 70 rpm
Vent Depth	9.8E-4 to 3.0E-3 in	0.025 to 0.076 mm

**Injection Notes**

Injection Molding Parameters

- Drying Time (Cumulative): 24 hrs

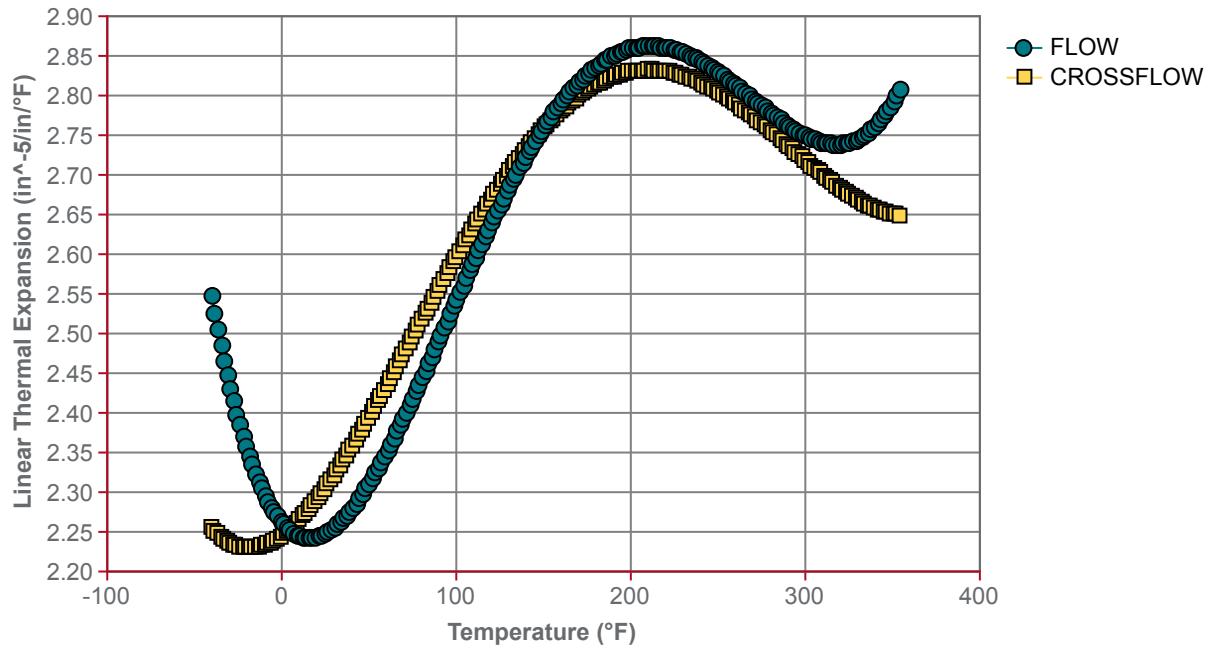
**Extrusion Notes**

Extrusion Blow Molding Parameters

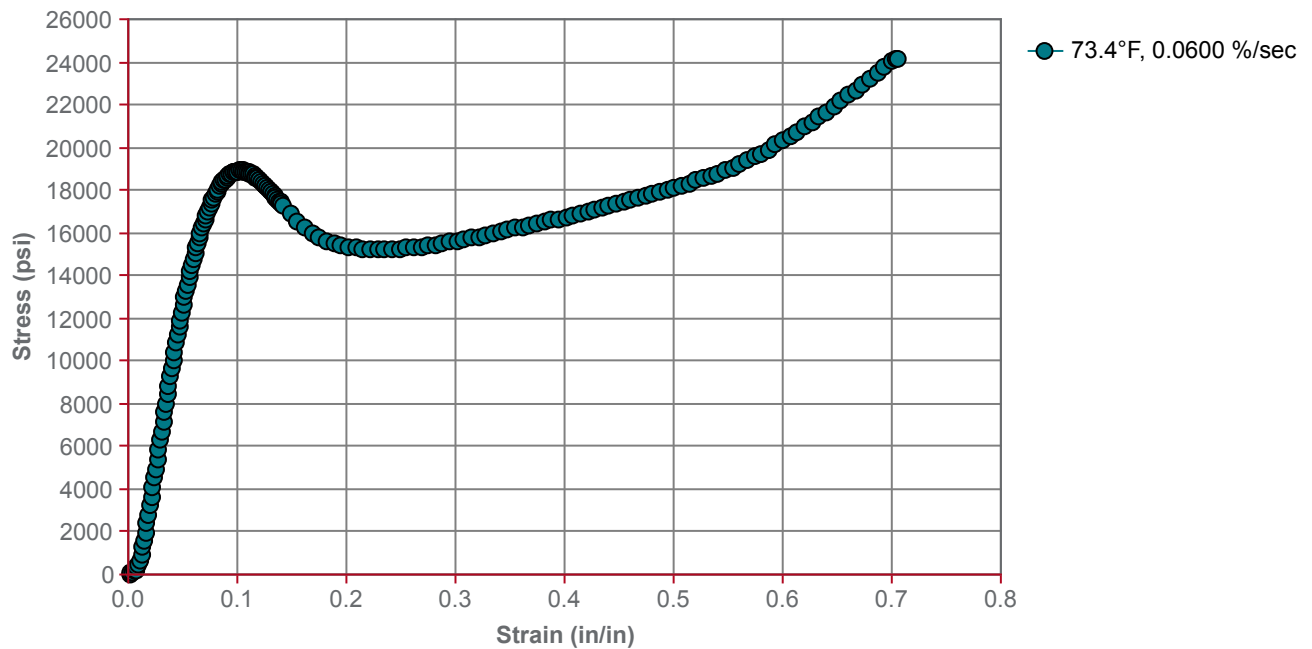
- Drying Temperature: 140 to 150°C
- Drying Time: 4 to 6 hrs
- Drying Time (Cumulative): 24 hrs
- Maximum Moisture Content: 0.01 to 0.02%
- Melt Temperature (Parison): 320 to 355°C
- Barrel - Zone 1 Temperature: 325 to 350°C
- Barrel - Zone 2 Temperature: 330 to 355°C
- Barrel - Zone 3 Temperature: 330 to 355°C
- Barrel - Zone 4 Temperature: 330 to 355°C
- Adapter - Zone 5 Temperature: 330 to 355°C
- Head - Zone 6 - Top Temperature: 330 to 355°C
- Head - Zone 7 - Bottom Temperature: 330 to 355°C
- Screw Speed: 10 to 70 rpm
- Mold Temperature: 65 to 175°C
- Die Temperature: 325 to 355°C



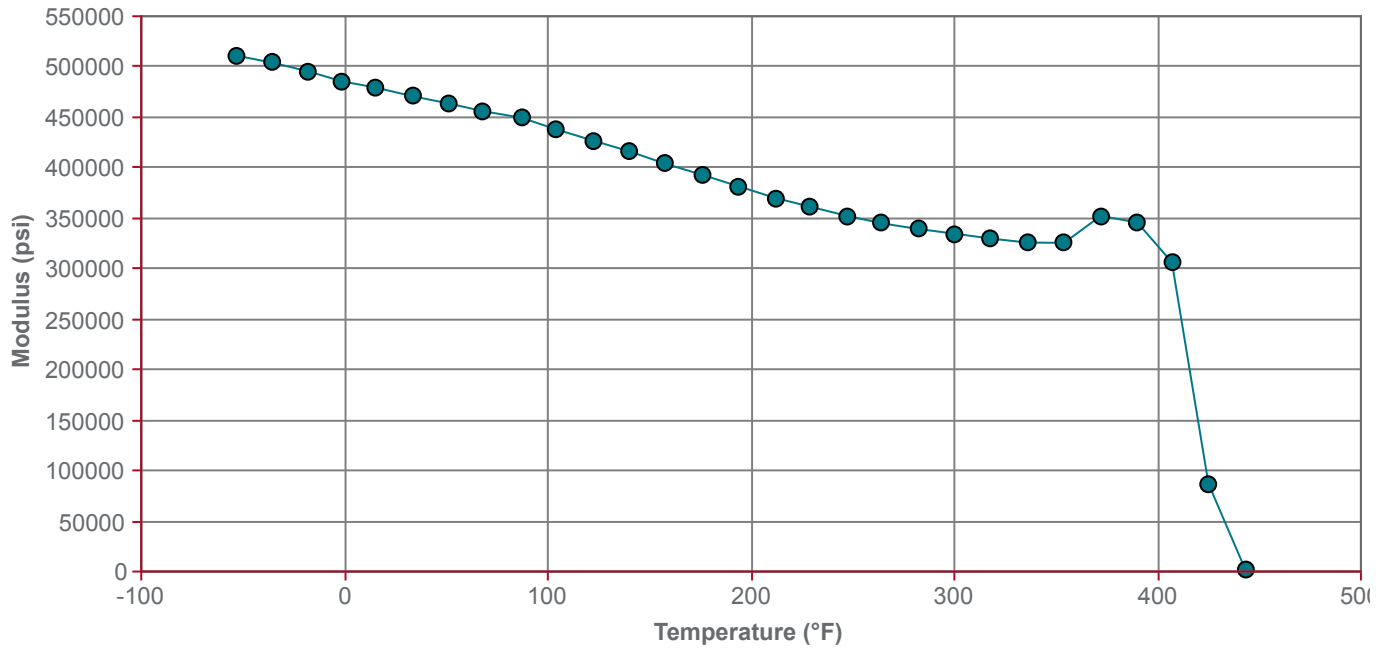
Coefficient of Thermal Expansion vs. Temperature (ASTM E831)



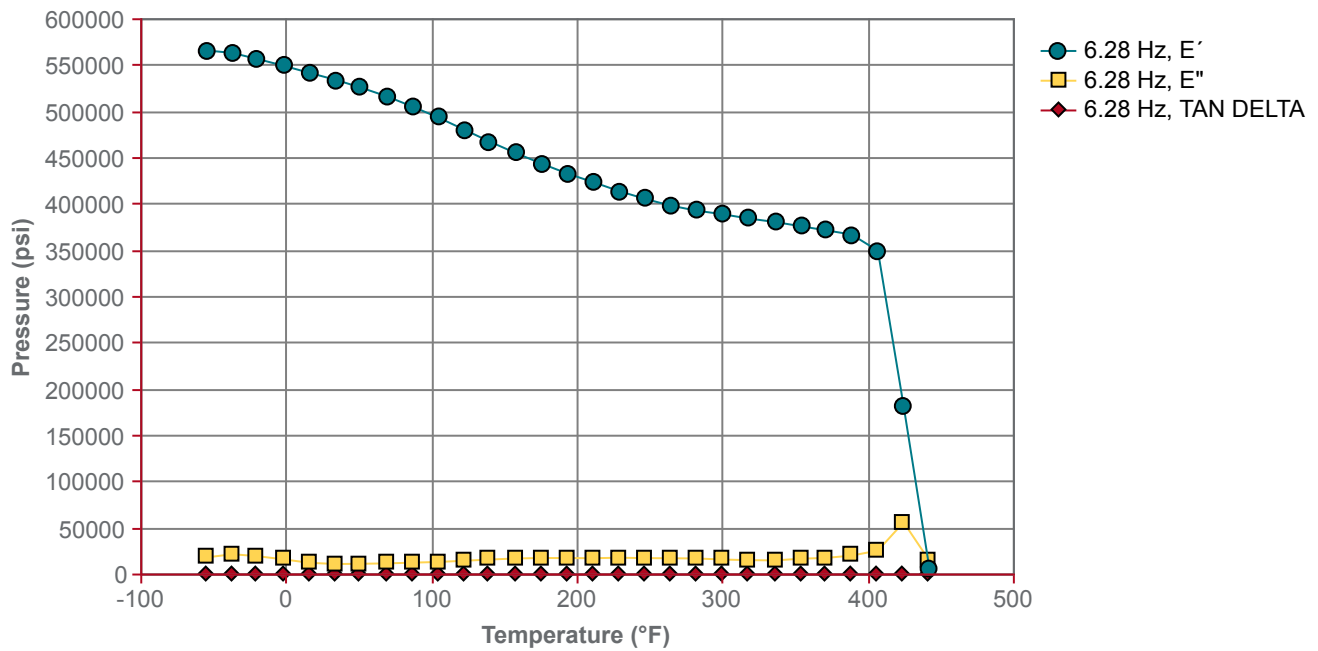
Compressive Stress vs. Strain (ASTM D695)



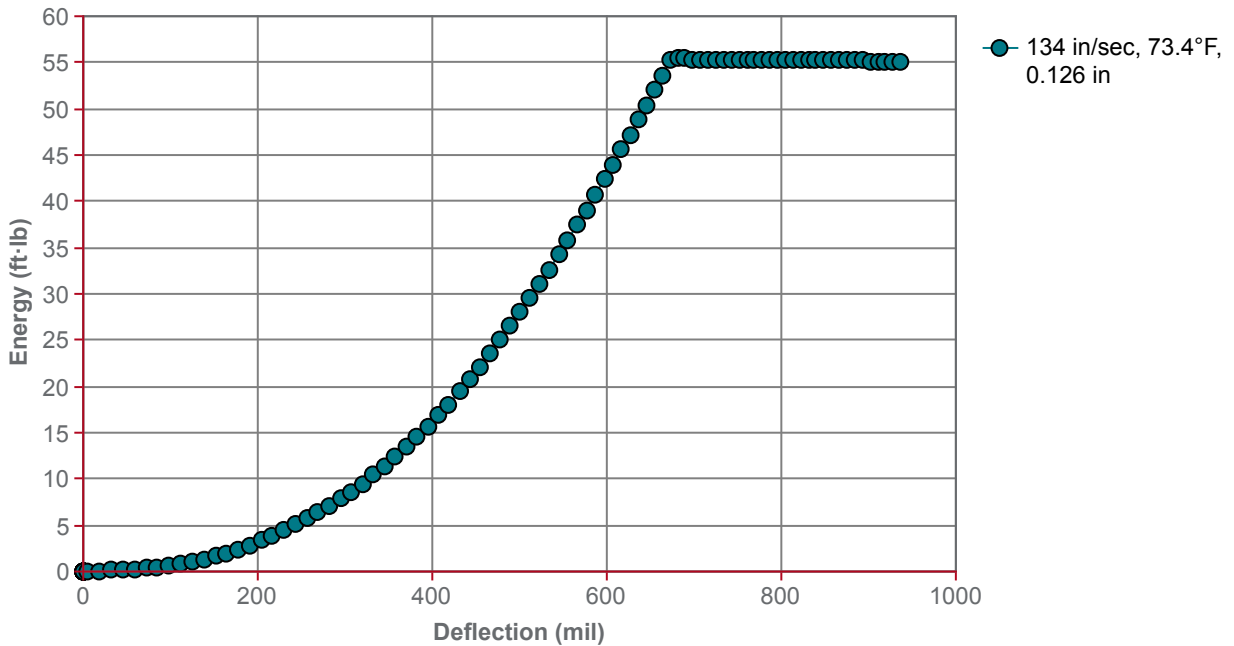
Elastic Modulus vs Temperature (ASTM D4065)



Flexural DMA (ASTM D4065)

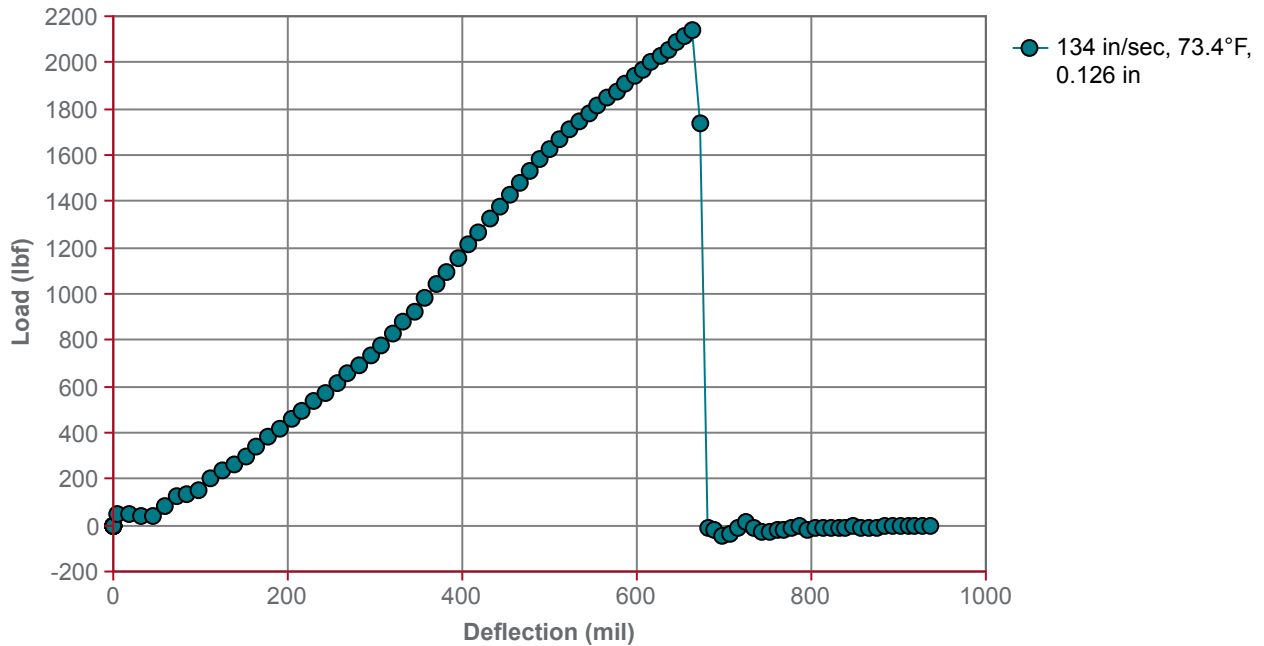


Instrumented Impact (Energy) (ASTM D3763)

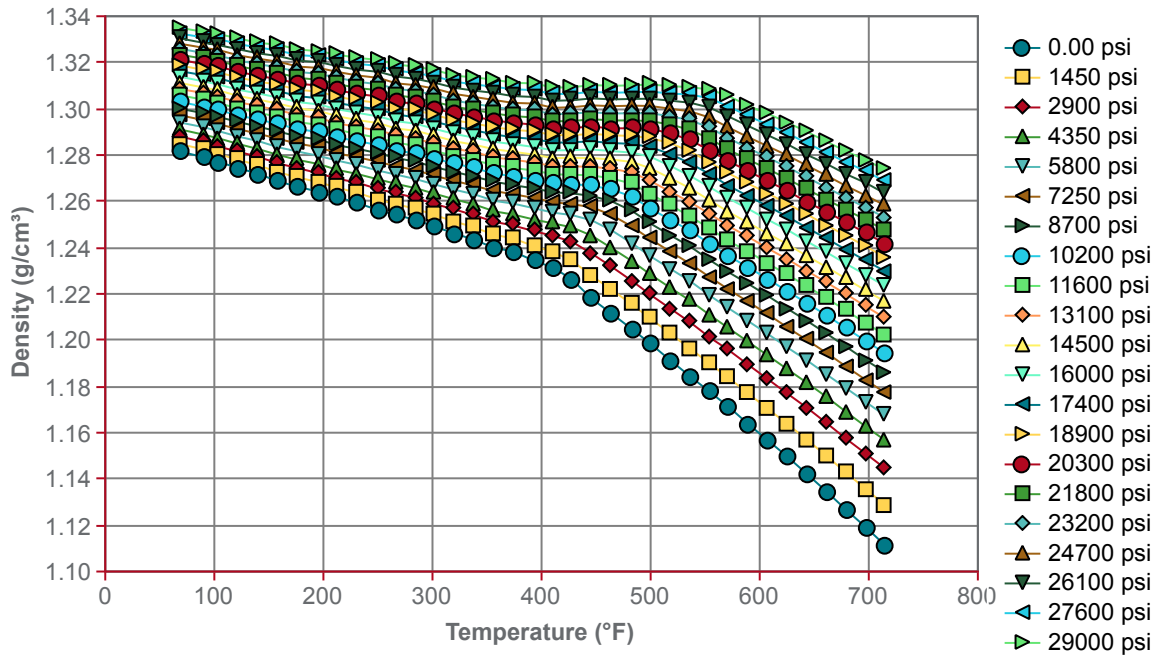




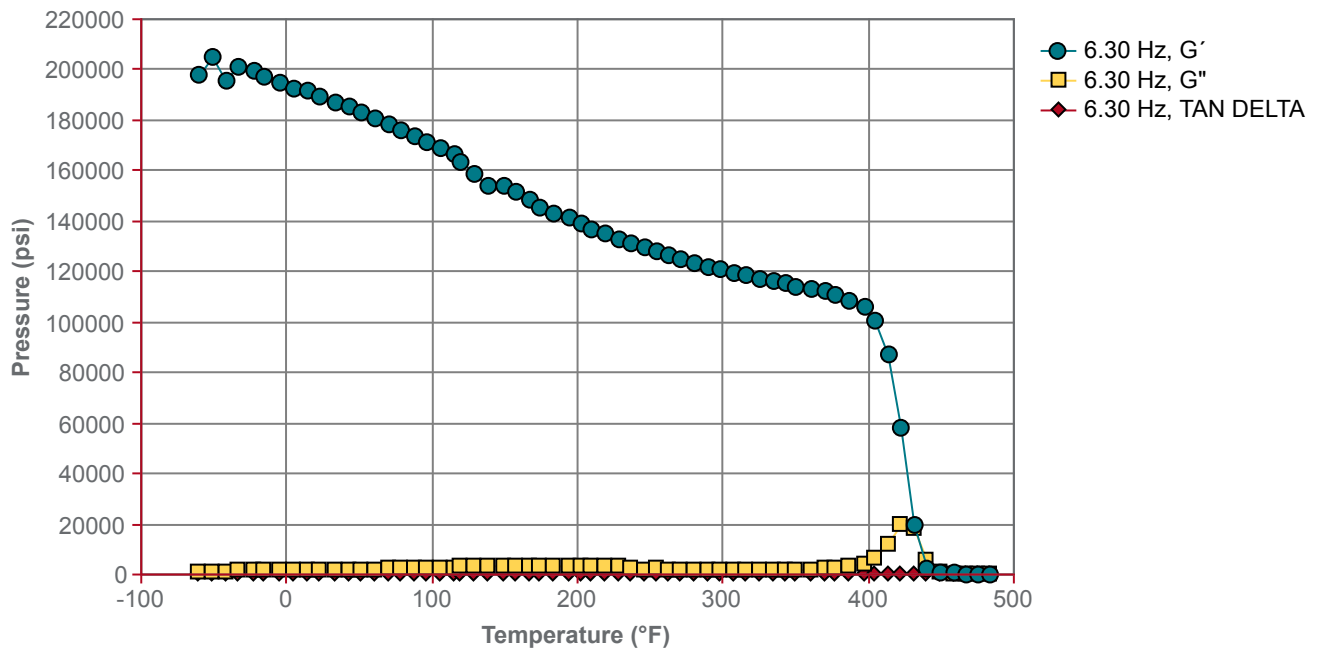
Instrumented Impact (Load) (ASTM D3763)



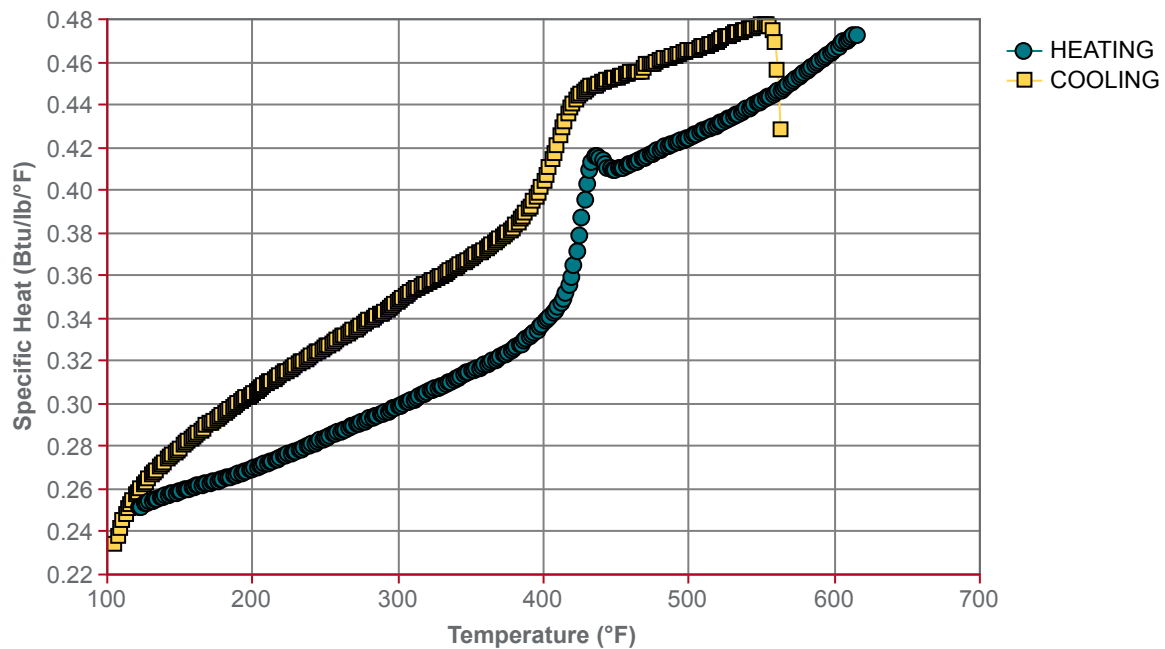
Pressure-Volume-Temperature (PVT - Zoller Method)



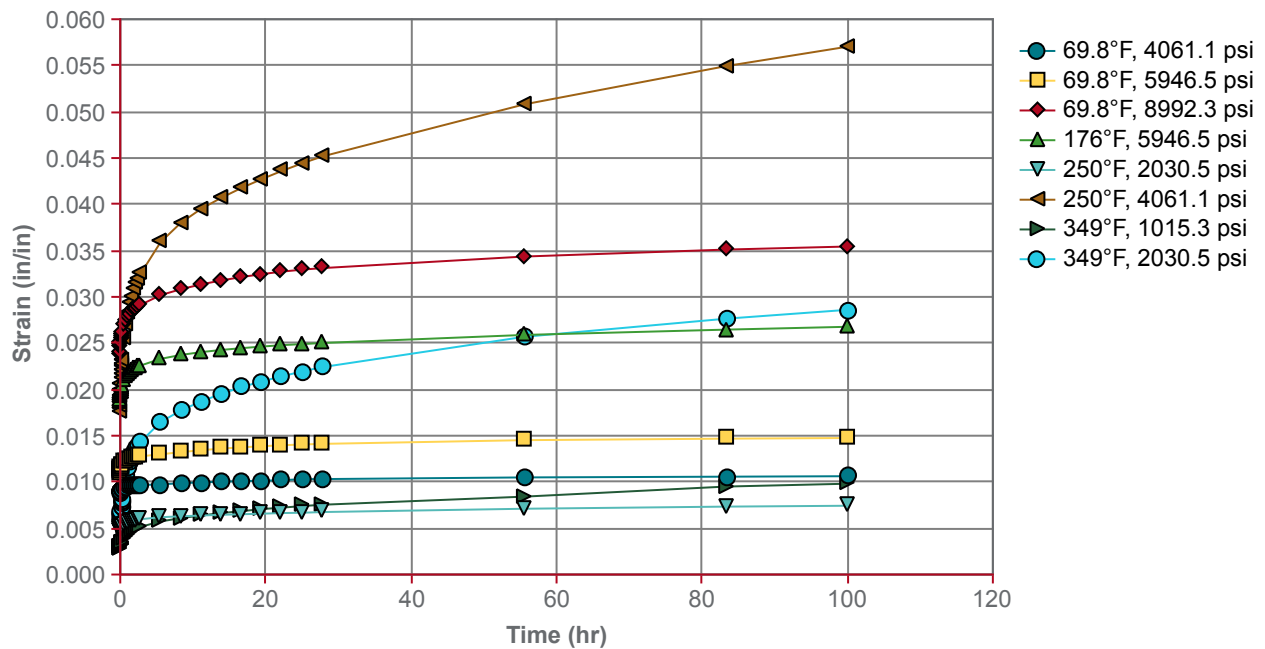
Shear DMA (ASTM D4065)



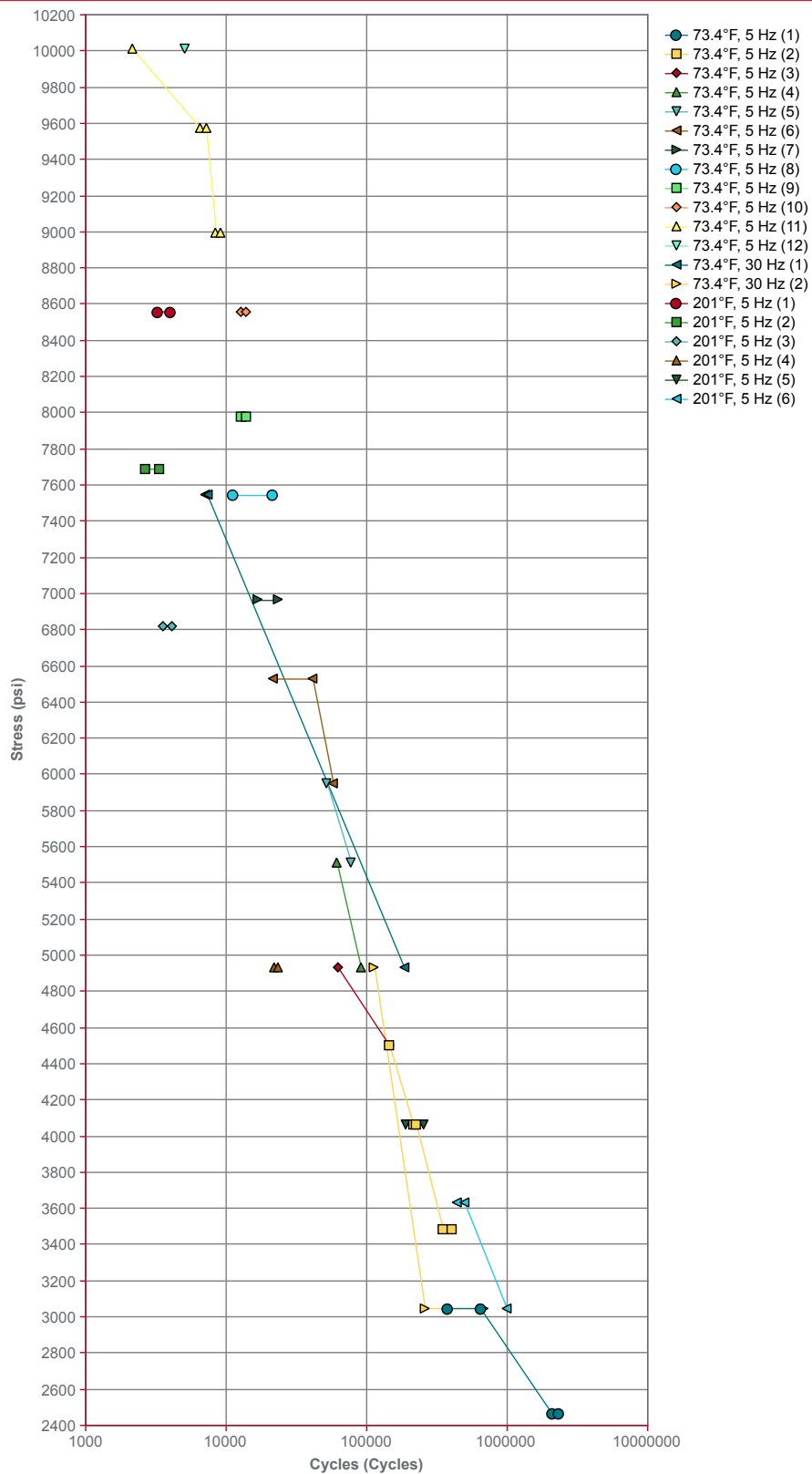
Specific Heat vs. Temperature (ASTM D3417)



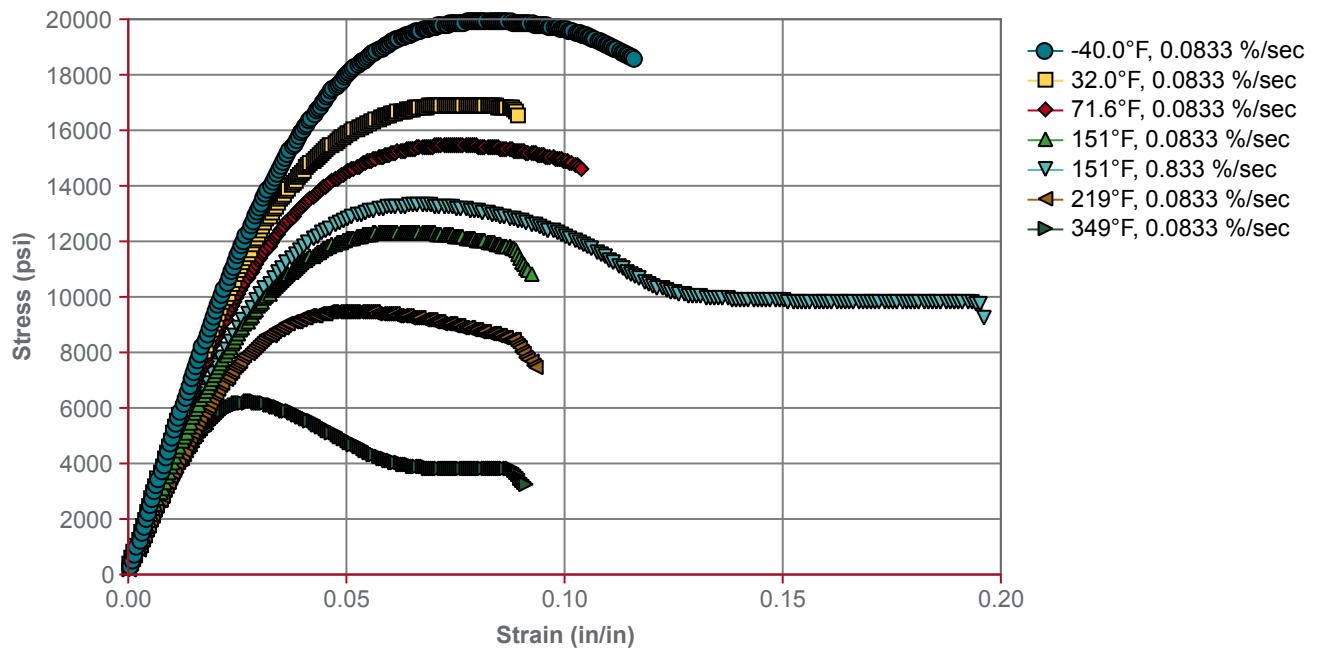
Tensile Creep (ASTM D2990)



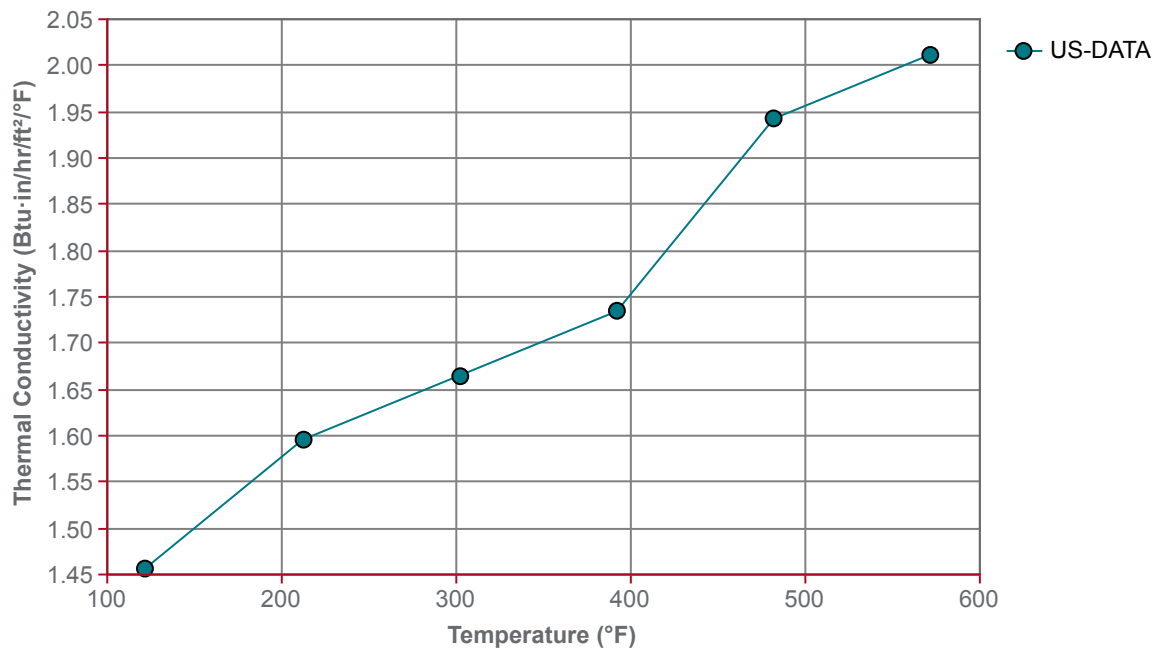
Tensile Fatigue



Tensile Stress vs. Strain (ASTM D638)

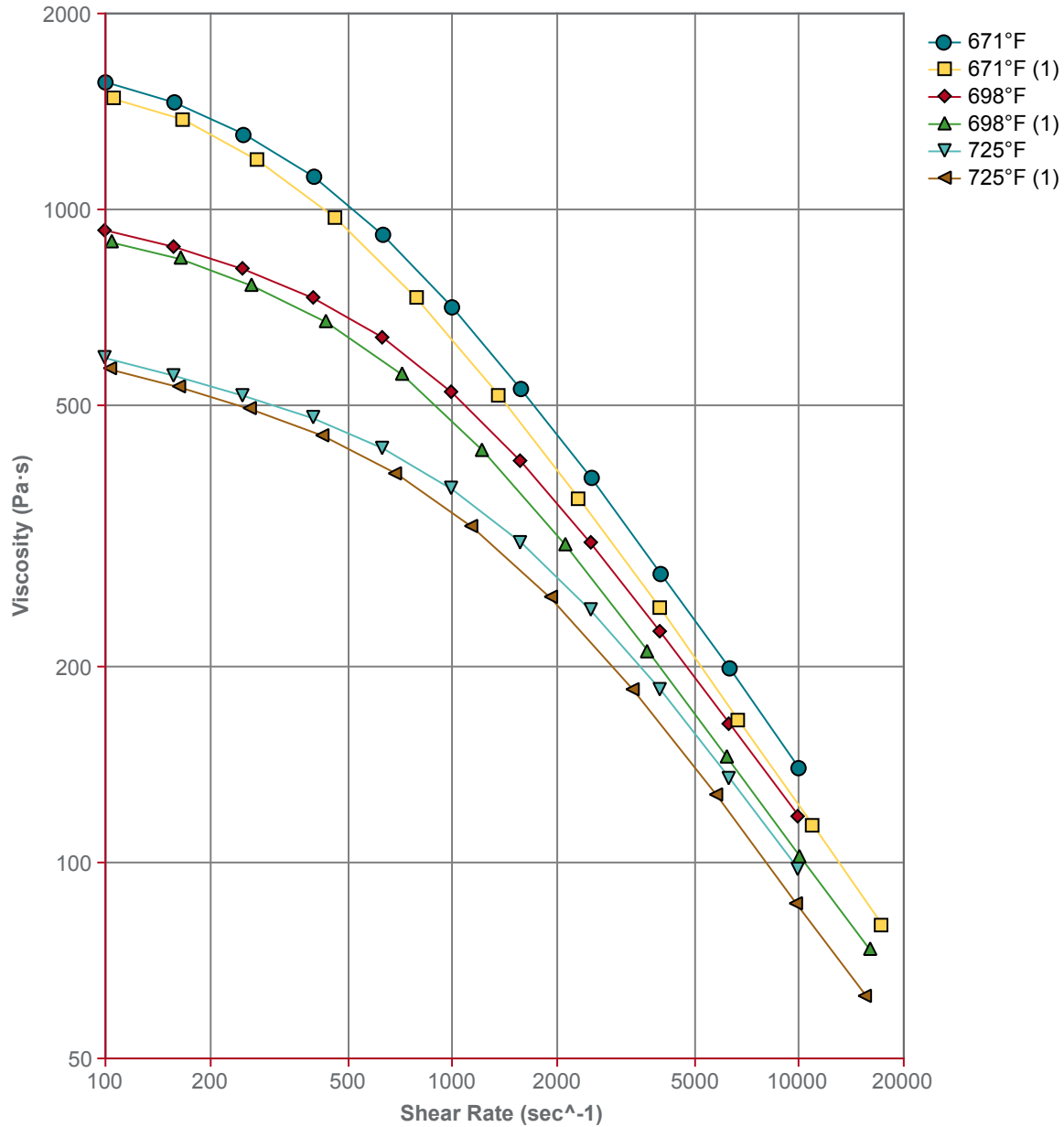


Thermal Conductivity vs. Temperature (ASTM E1530)





Viscosity vs. Shear Rate (ASTM D3835)



Data Notes  
(1) - Rab. Corrected Data



**Notes**

<sup>1</sup> These links provide you with access to supplier literature. We work hard to keep them up to date; however you may find the most current literature from the supplier.

<sup>2</sup> A UL Yellow Card contains UL-verified flammability and electrical characteristics. UL Prospector continually works to link Yellow Cards to individual plastic materials in Prospector, however this list may not include all of the appropriate links. It is important that you verify the association between these Yellow Cards and the plastic material found in Prospector. For a complete listing of Yellow Cards, visit the UL Yellow Card Search.

<sup>3</sup> Typical properties: these are not to be construed as specifications.

<sup>4</sup> 0.20 in/min (5.0 mm/min)

<sup>5</sup> Type I, 0.20 in/min (5.0 mm/min)

<sup>6</sup> 0.10 in/min (2.6 mm/min)

<sup>7</sup> Rate A (50°C/h), Loading 2 (50 N)

<sup>8</sup> Tungsten Electrode

<sup>9</sup> Surface

<sup>10</sup> 4 min

