Celanese
The chemistry inside innovation™

FORTRON® 1140L4 E-R 412

Polyphenylene sulfide

Fortron 1140L4 E-R 412 is a 40% glass-reinforced grade that is the strongest and toughest product available. It exhibits excellent heat and chemical resistance, good electrical properties and is inherently flame-retardant. The high hardness and rigidity at elevated temperatures allows for good load bearing performance. This product has good weldability due to the modest filler level. Applications made of this grade are electronical components (i.e. bobbins, lamp housings, brush holders) and various other components requiring strength and resistance to aggressive chemicals (i.e. automotive heaters, pumps, valves, fuel rails, microwave oven rings and distillation column packings).

Fortron® PPS 1140L4 E-R 412 incorporates 40% of recycled content by weight in the finished product through mass balance allocation. The product is a drop-in replacement to the standard grade with the same performance and processing properties and contributes to the displacement of virgin resources. The recycled source and allocated content in the product are certified according to ISCC PLUS mass balance approach.

Product information

Resin Identification	PPS-GF40	ISO 1043
Part Marking Code	>PPS-GF40<	ISO 11469

Rheological properties

Molding shrinkage, parallel	0.3	%	ISO 294-4, 2577
Molding shrinkage, normal	0.6	%	ISO 294-4, 2577

Typical mechanical properties

Tensile modulus	2.13E6	psi	ISO 527-1/-2
Tensile stress at break, 5mm/min	28300	psi	ISO 527-1/-2
Tensile strain at break, 5mm/min	1.8	%	ISO 527-1/-2
Flexural modulus	2.1E6	psi	ISO 178
Flexural strength	41300	psi	ISO 178
Compressive modulus	2.18E6	psi	ISO 604
Compressive strength	38400	psi	ISO 604
Charpy impact strength, 23°C	25.2	ftlb/in²	ISO 179/1eU
Charpy impact strength, -30°C	25.2	ftlb/in²	ISO 179/1eU
Charpy notched impact strength, 23°C	4.76	ftlb/in²	ISO 179/1eA
Charpy notched impact strength, -30°C	4.76	ftlb/in²	ISO 179/1eA
Izod notched impact strength, 23°C	4.76	ftlb/in²	ISO 180/1A
Izod notched impact strength, -30°C	4.76	ftlb/in²	ISO 180/1A
Izod impact strength, 23°C	16.2	ftlb/in²	ISO 180/1U
Izod impact strength, -30°C	16.2	ftlb/in²	ISO 180/1U
Hardness, Rockwell, M-scale	100		ISO 2039-2

Thermal properties

Melting temperature, 10°C/min	536	°F	ISO 11357-1/-3
Glass transition temperature, 10°C/min	194	°F	ISO 11357-1/-3
Temperature of deflection under load, 1.8 MPa	518	°F	ISO 75-1/-2
Temperature of deflection under load, 8 MPa	419	°F	ISO 75-1/-2
Ball pressure test	500	°F	IEC 60695-10-2
Coefficient of linear thermal expansion (CLTE), parallel	0.09	E-4/°F	ISO 11359-1/-2
Coefficient of linear thermal expansion (CLTE), normal	0.233	E-4/°F	ISO 11359-1/-2

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Thermal conductivity, flow	0.47	W/(m K)	ISO 22007-2
Thermal conductivity, crossflow	0.41	W/(m K)	ISO 22007-2
Thermal conductivity, through plane	0.39	W/(m K)	ISO 22007-2
Effective thermal diffusivity, flow	0	m^2/s	ISO 22007-4
Effective thermal diffusivity, crossflow	0	m^2/s	ISO 22007-4
Effective thermal diffusivity, through plane	0	m^2/s	ISO 22007-4
Specific heat capacity of melt	1040	J/(kg K)	ISO 22007-4

Flammability

Burning Behav. at 1.5mm nom. thickn.	V-0	class	IEC 60695-11-10
Thickness tested	0.0591	in	IEC 60695-11-10
Burning Behav. at thickness h	V-0	class	IEC 60695-11-10
Thickness tested	0.0150	in	IEC 60695-11-10
Burning Behav. 5V at thickness h	5VA	class	IEC 60695-11-20
Thickness tested	0.1181	in	IEC 60695-11-20
Oxygen index	47	%	ISO 4589-1/-2
Glow Wire Flammability Index, 0.4mm	1760[OT]	°F	IEC 60695-2-12
Glow Wire Flammability Index, 0.75mm	1760[PV, OT]	°F	IEC 60695-2-12
Glow Wire Ignition Temperature, 0.75mm	1520[OT]	°F	IEC 60695-2-13
Glow Wire Ignition Temperature, 0.4mm	1520[OT]	°F	IEC 60695-2-12
FMVSS Class	SE		ISO 3795 (FMVSS 302)

[OT]: One time tested

[PV]: Preliminary Value

Electrical properties

Relative permittivity, 1MHz	4.1		IEC 62631-2-1
Dissipation factor, 1MHz	20	E-4	IEC 62631-2-1
Volume resistivity	1E15[OT]	Ohm.m	IEC 62631-3-1
Volume resistivity, at high temperature	>1E13[OT]	Ohm.m	IEC 62631-3-1
Temperature	428[OT]	°F	
Surface resistivity	1E17[OT]	Ohm	IEC 62631-3-2
Surface resistivity, at high temperature	1E12[OT]	Ohm	IEC 62631-3-2
Temperature	428[OT]	°F	
Electric strength	787	kV/in	IEC 60243-1
Electric strength, Direct Current	1020[OT]	kV/in	IEC 60243-2
Electric strength, DC, high temperature	787[OT]	kV/in	IEC 60243-2
Temperature	428[OT]	°F	
Comparative tracking index	125		IEC 60112
Arc Resistance	134	s	UL 746B

[OT]: One time tested

Physical/Other properties

Water absorption, 2mm	0.02	%	Sim. to ISO 62
Water absorption, Immersion 24h	0.02	%	Sim. to ISO 62
Density	0.0596	lb/in^3	ISO 1183
Bulk density	0.026	lb/in^3	ISO 60

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Injection

Drying Recommended	yes	
Drying Temperature	266	°F
Drying Time, Dehumidified Dryer	2 - 4	h
Processing Moisture Content	≤0.02	%
Melt Temperature Optimum	626	°F
Min. melt temperature	590	°F
Max. melt temperature	644	°F
Max. screw tangential speed	0.2 - 0.3	m/s
Mold Temperature Optimum	302	°F
Min. mold temperature	284	°F
Max. mold temperature	320	°F
Hold pressure range	4350 - 10200	psi
Back pressure	435	psi
Ejection temperature	415	°F

Automotive

OEM	STANDARD	ADDITIONAL INFORMATION
BMW	GS93016	
Bosch	N28 BN14-GF010	SD3002
Bosch	N28 BN14-GF010	SD3002(CN)
Bosch	N28 BN14-GF010	SF3001
Dongfeng Motor	SLCLBG2019011	
Ford	WSL-M4D807-A	Natural
Ford	WSL-M4D807-A	Black
Ford	WSL-M4D807-A	Brown
General Motors	GMW17521P-PPS-GF40	Black
General Motors	GMW17521P-PPS-GF40	Natural
Hyundai	MS244-02 Type A-1	Black (Tentative Approval)
Hyundai	MS244-02 Type A-1	Natural (Tentative Approval)
Mercedes-Benz	DBL5420	(5420.00)
Nissan	EV02b	
Nissan	EV02c	
Renault	IP03a, No Spec, Special Part Approval, See Your CE Account Manager.	
Stellantis	MS.50152 / PPS.GF40.14000T.7C.GR-ICE	Natural;CPN3502 BLACK, CPN4241 NATURAL, 61/222E/220M/H115/H0414*/13/C4, 01994_15_00075;ASTMD6358PPS011G40
Stellantis	MS.50152 / PPS.GF40.14000T.7C.GR-ICE	Technical Black;CPN3502 BLACK, CPN4241 NATURAL, 61/222E/220M/H115/H0414*/13/C4, 01994_15_00075;ASTMD6358PPS011G40
Stellantis - Chrysler	MS-DB-570 / CPN-3502	Black;ASTMD6358PPS011G40

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Stellantis - Chrysler	MS-DB-570 / CPN-4241	Natural;ASTMD6358PPS011G40
VW Group	Thermostat Housing, No Spec, Special Part Approval, See Your CE Account Manager.	

Characteristics

Processing	Injection Molding
Additives	Release agent
Special characteristics	Heat stabilized or stable to heat, Chemical resistant
Sustainability	Recycled Content

Additional information

Injection molding

Preprocessing

Predrying in a dehumidified air dryer at 130 - 140 degC/3-4 hours is recommended.

Processing

On injection molding machines with 15-25 D long three-section screws, as are usual in the trade, the FORTRON is processable. A shut-off nozzle is preferred to a free-flow nozzle.

Melt temperature 320-340 degC
Mold wall temperature at least 140 degC

A medium injection rate is normally preferred. All mold cavities must be effectively vented.

Postprocessing

Tool temperature of at least 135 degC is recommended for parts to achieve maximum crystallizable potential.

Processing Notes

Pre-Drying

FORTRON should in principle be predried. Because of the necessary low maximum residual moisture content the use of dry air dryers is recommended. The dew point should be =< - 30° C. The time between drying and processing should be as short as possible.

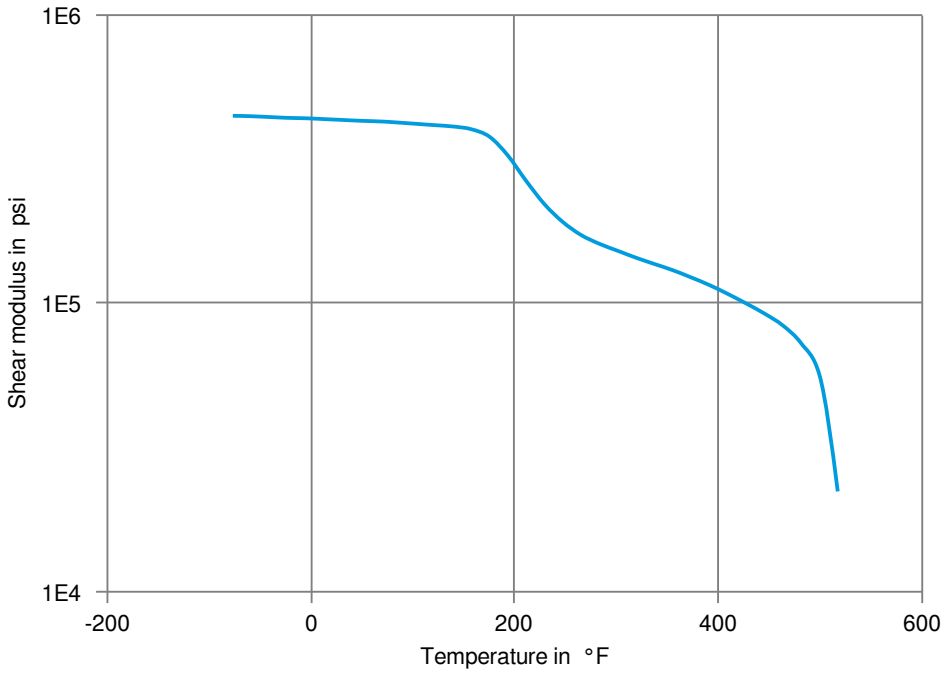
Storage

For subsequent storage the material should be stored dry in the dryer until processed (<= 60 h).

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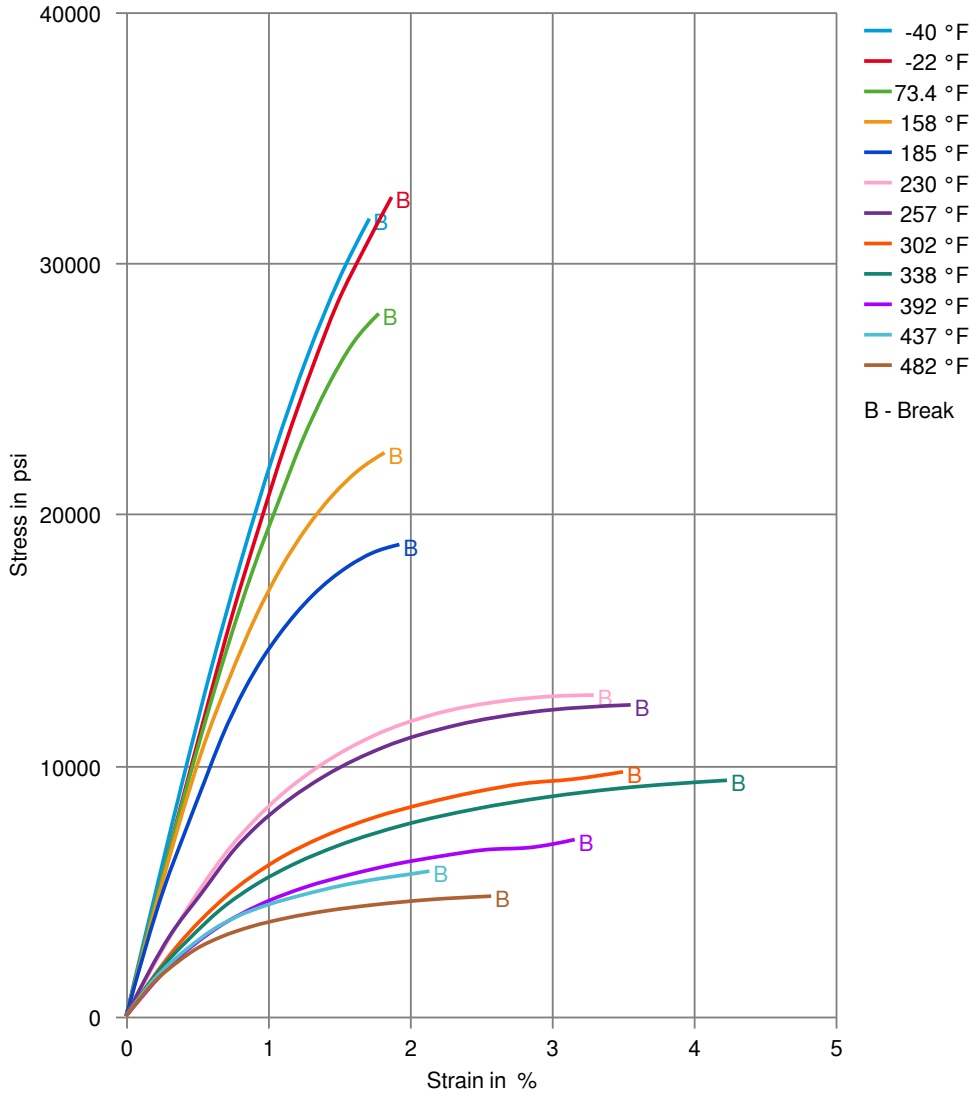
Dynamic Shear modulus-temperature



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Stress-strain

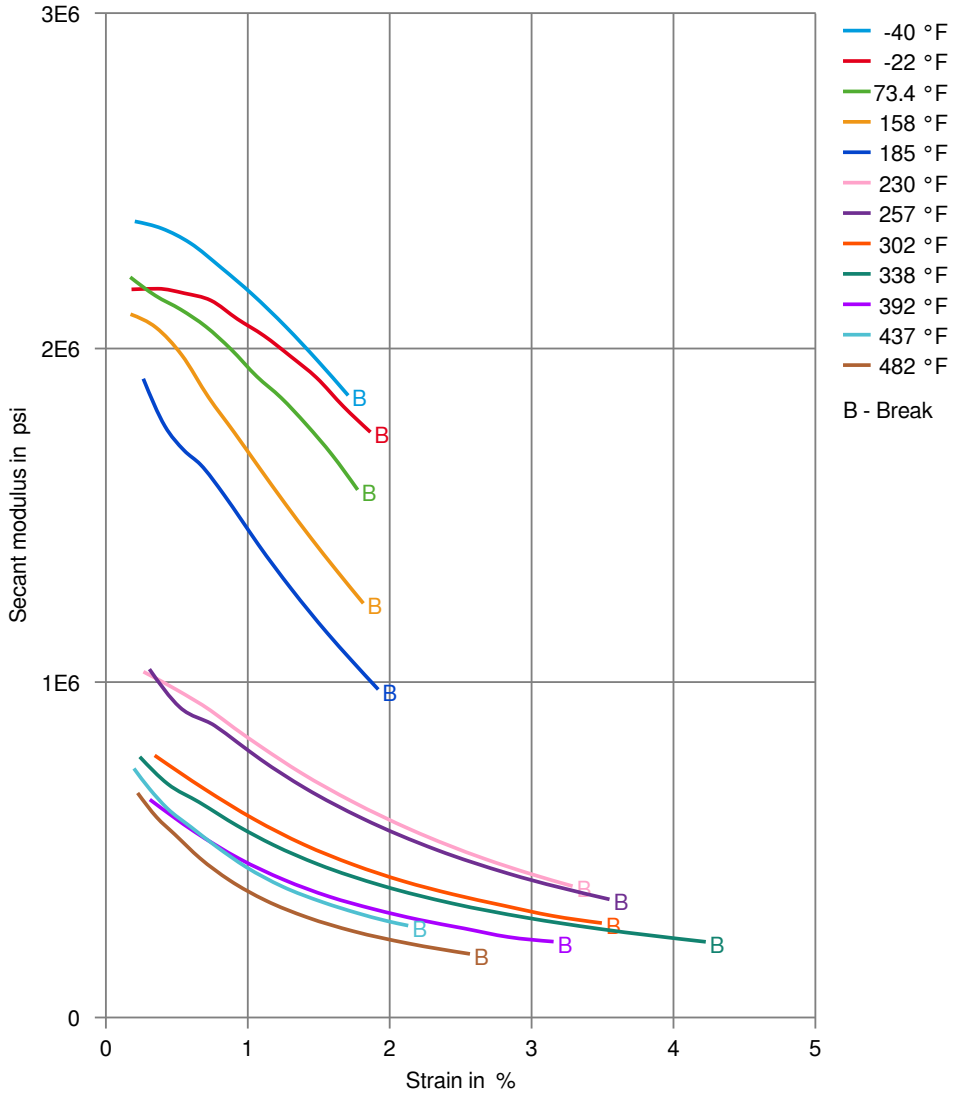


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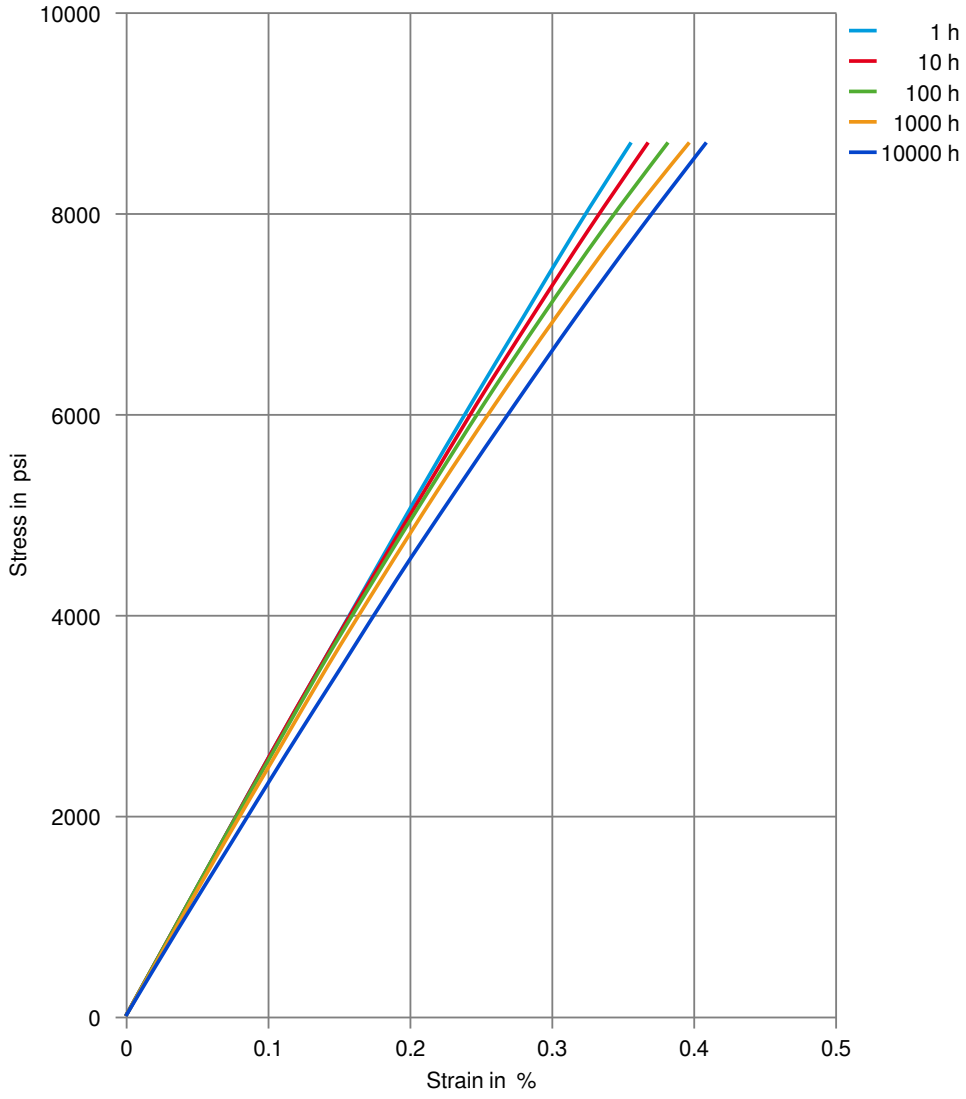
Secant modulus-strain



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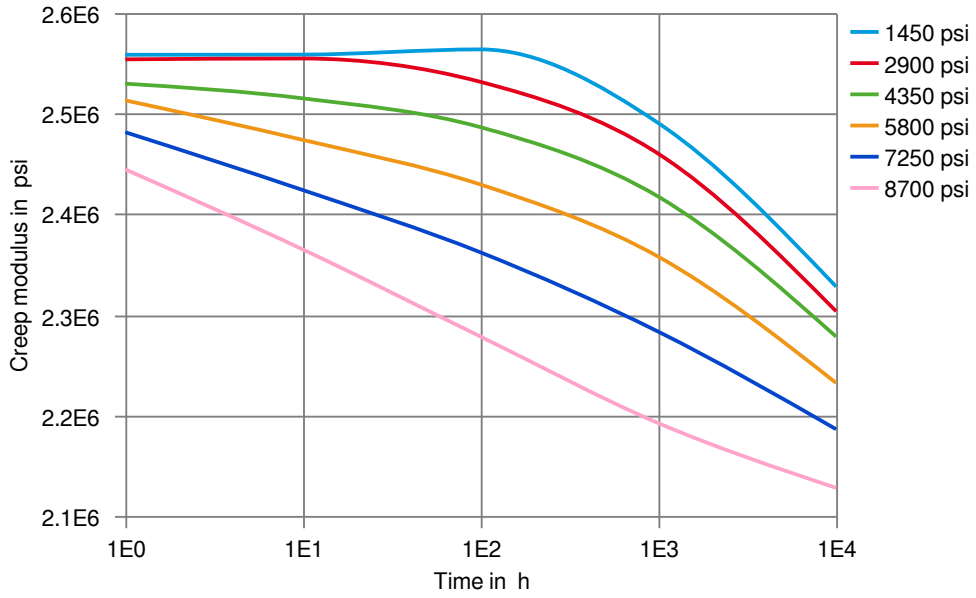
Stress-strain (isochronous) 73.4 °F



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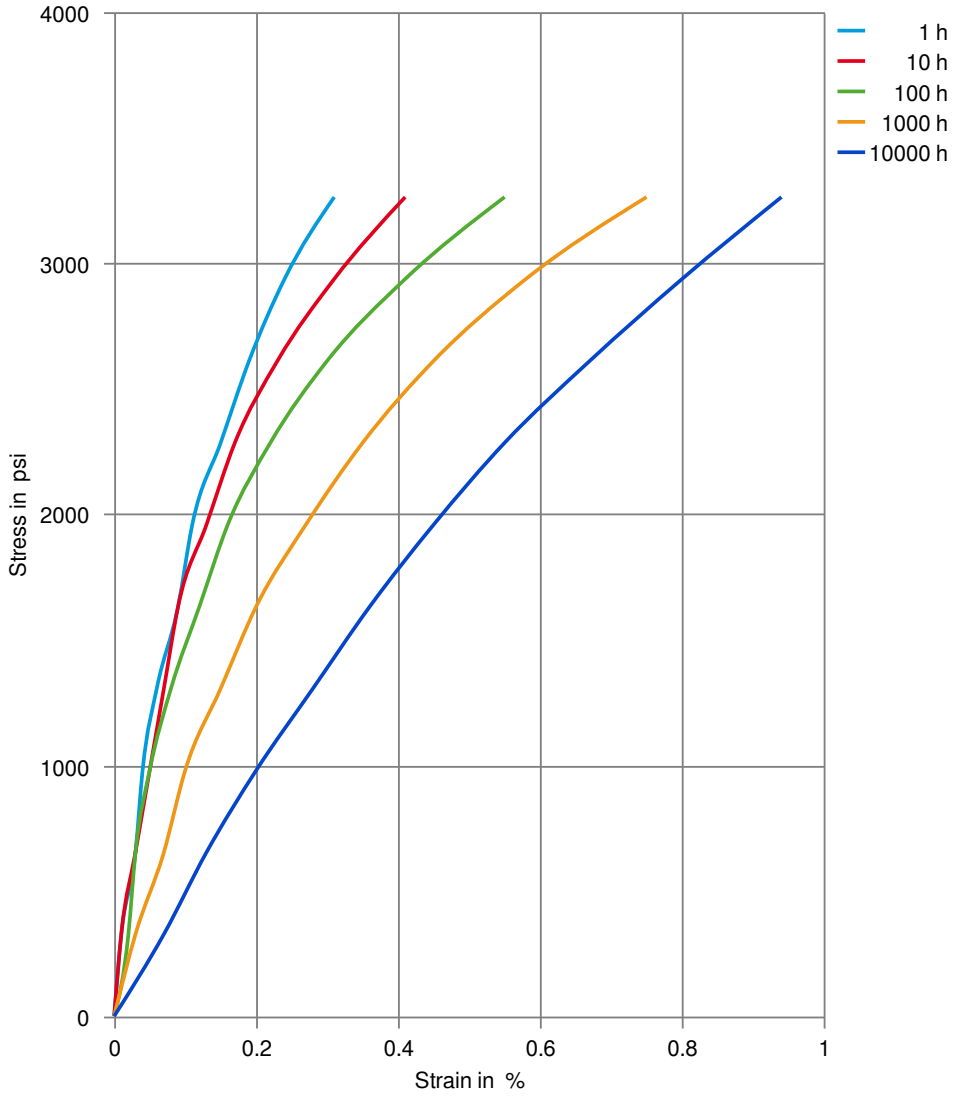
Creep modulus-time 73.4 °F



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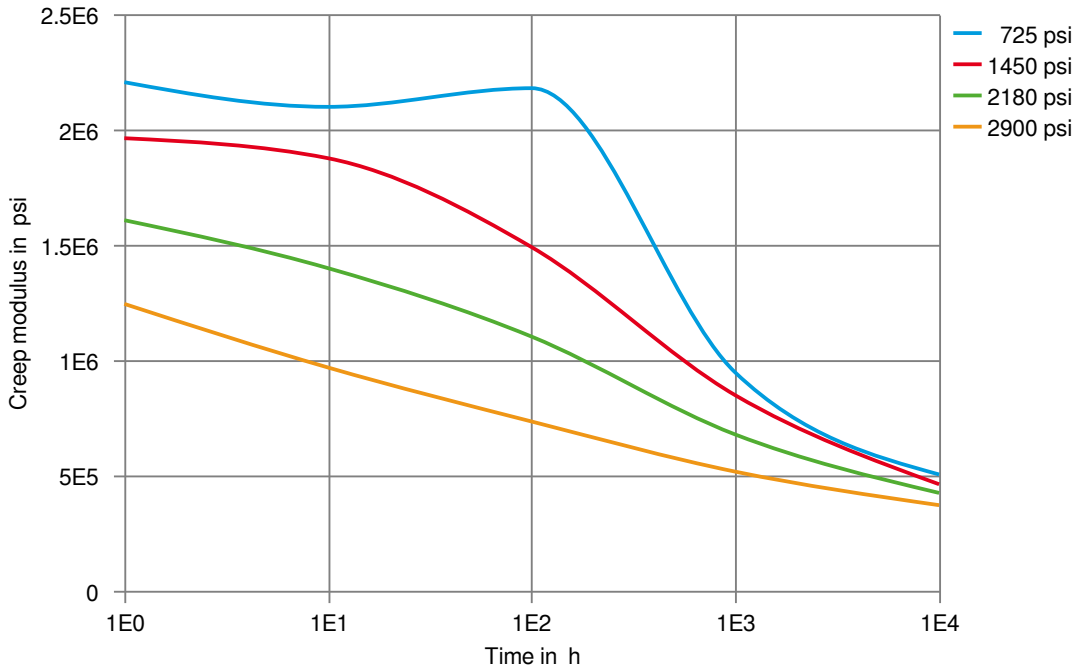
Stress-strain (isochronous) 248 °F



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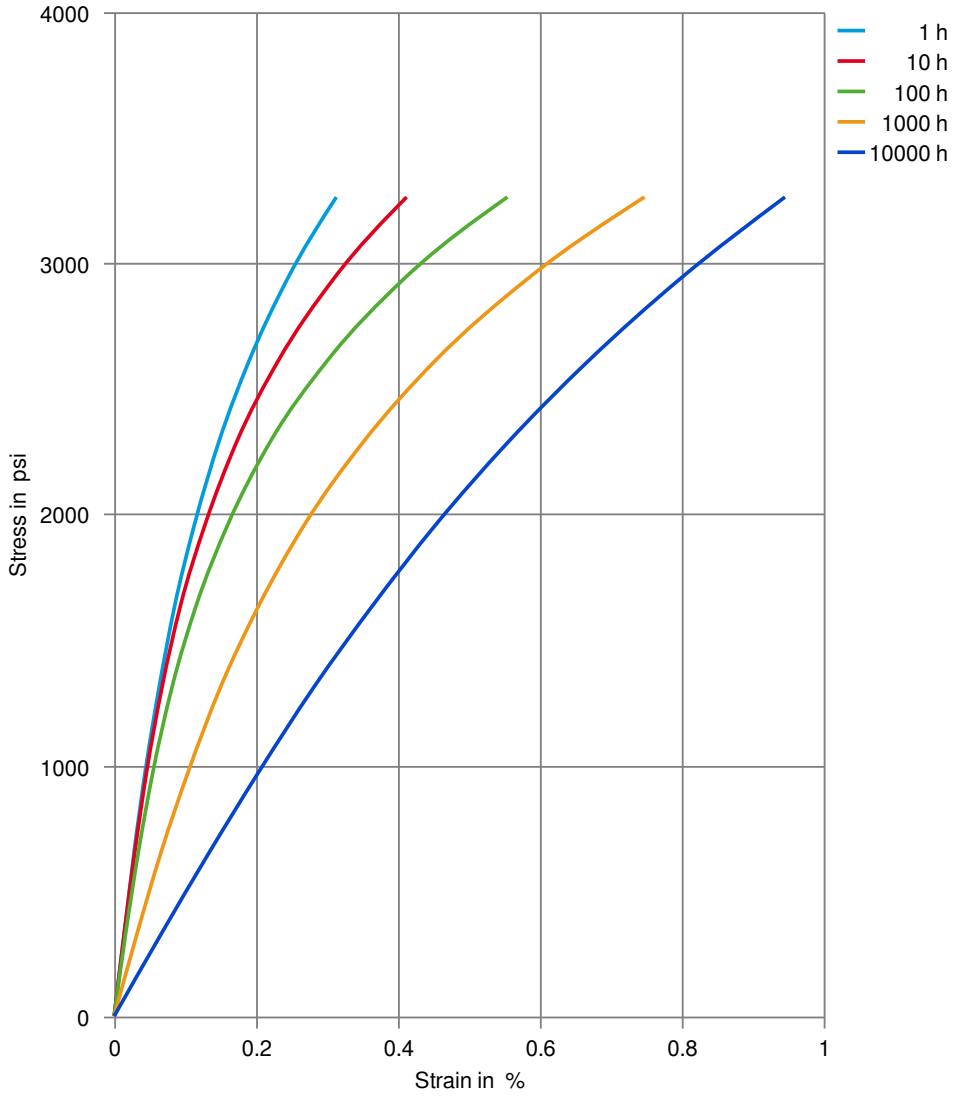
Creep modulus-time 248 °F



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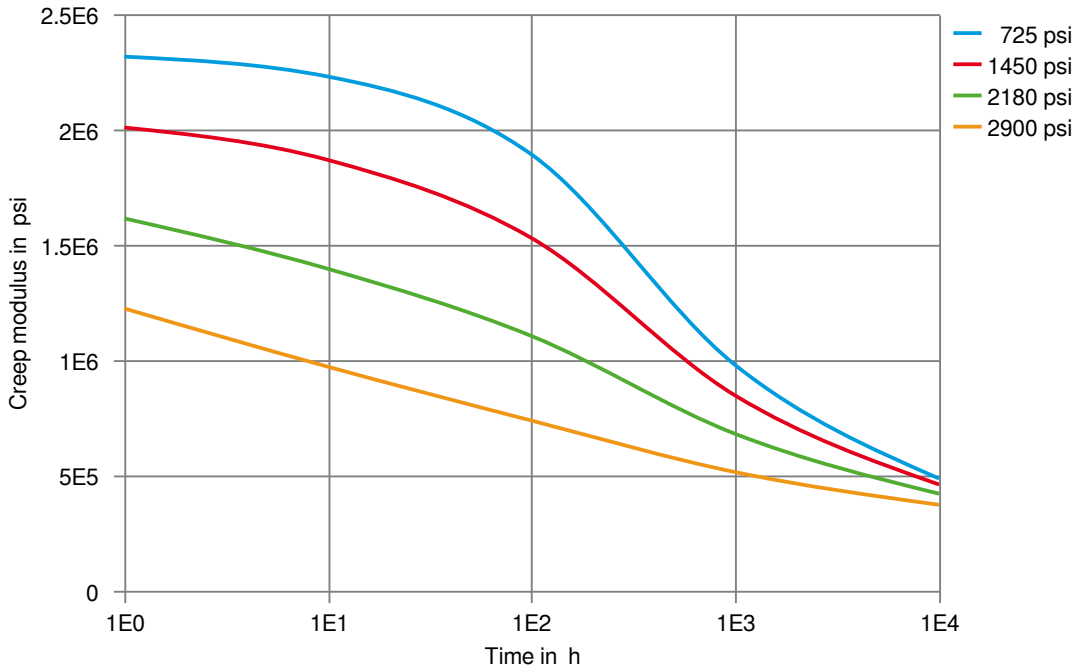
Stress-strain (isochronous) 302 °F



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Creep modulus-time 302 °F



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