GE
Plastics

Nylons

GE imagination at work

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GE Plastics manufactures cost-effective, high-performance thermoplastic nylon compounds

Nylon resins are the most widely used of all engineering thermoplastic materials because of their excellent mechanical properties and outstanding resistance to abrasion and chemical attack. The addition of glass fibers to nylon 6/6, 6, 6/10, 11, 12, 6/12, amorphous nylon, PPA, 4/6, and super-tough nylon increases heat deflection temperature and substantially increases stiffness. At the same time, the excellent abrasion and solvent resistance of the base nylon resins are retained.

Glass-fiber reinforced nylon resins may be especially attractive as replacements for metals in engineering applications because of the significant economies provided by lower density, higher strength-to-weight ratios, dielectric properties, corrosion resistance, colorability, and elimination of secondary finishing. Internal lubrication like PTFE can be compounded in for additional wear and friction performance.

LNP* Thermocomp* and Lubricomp* Glass Fiber Reinforced Nylon Compounds; How they compare:

Glass Fiber Reinforced Nylon Series vs. Unreinforced Nylon:

- Stronger and stiffer than unreinforced resin
- Lower water absorption
- Improved heat deflection temperature
- Greater dimensional stability
- Same outstanding resistance to chemical attack and abrasion
- Low coefficient of thermal expansion permits plastic-metal composite structures
- Easily molded

Glass Fiber Reinforced Nylon Series vs. Metals:

- Electrically nonconductive
- Higher strength-to-weight ratio
- Lower specific gravity
- May Eliminate secondary finishing
- Excellent corrosion resistance
- Integral colorability

The following nylon resins are available with a wide range of glass fiber loadings. These reinforced nylons are produced using an extrusion process that fully disperses the glass fibers in each pellet. In addition, many of these resins can also be compounded with internal lubrication for enhanced wear, flame retardants, or carbon fibers. Refer to the LNP Specialty Compounds Design Guide for additional information.

LNP Thermocomp and Lubricomp RF Series Compounds - Nylon 6/6

Glass-fiber reinforced nylon 6/6 resins offer high strength, stiffness, and surface hardness over a wide temperature range.

Heat Stabilized Compounds — PF and RF Series composites are also available in Heat Stabilized (HS) grades which currently carry the following U.L. Thermal Index Listings:

Electrical	Mechanical		
With Impact	Without Impact		
PF Series	130°C	105°C	115°C
RF Series	130°C	115°C	115°C

LNP Thermocomp PF Series — Nylon 6

Glass-fiber reinforced nylon 6 resins offer an outstanding combination of physical properties, surface appearance, and processability of the nylon resins.

LNP Thermocomp and Lubricomp QF Series — Nylon 6/10

Glass-fiber reinforced nylon 6/10 resins are characterized by low moisture absorption, dimensional stability, and high impact strength. QF series compounds also exhibit excellent processing characteristics.

LNP Thermocomp and Lubricomp HF and SF Series — Nylon 11 & 12

Glass-fiber reinforced nylons 11 and 12 also exhibit low moisture absorption and good dimensional stability, but with slightly reduced mechanical properties. SF series (nylon 12) has the lowest moisture absorption of all the nylons.

LNP Thermocomp and Lubricomp IF Series — Nylon 6/12

Glass-fiber reinforced nylon 6/12 resins are very similar to 6/10 versions, and exhibit the same moisture, dimensional stability, and impact characteristics.

LNP Thermocomp and Lubricomp UF Series — PPA

Glass-fiber reinforced polyphthalamide (PPA) and Thermocomp UF Series display a 590°F melt point and heat distortion temperature of 545°F. Also available are glass reinforced grades based upon hot water moldable PPA, enabling the processor to achieve good flow and molding characteristics without the use of hot oil.

Processing

Molding Conditions

Reinforced and filled nylon composites are readily processed on reciprocating screw injection molding machines. Slightly higher injection pressures and barrel temperatures can be anticipated due to the lower melt flow (higher viscosity) of reinforced compounds compared to unfilled nylons. Experience has shown that marginal increases in pressure and/or melt temperature will help control compound melt viscosity and facilitate filling thin-walled cavities. Suggested start-up processing conditions, as well as a summary of processing characteristics, can be found on page 4. Note: additional details are available in LNP Specialty Compound Injection Molding Processing Guide.

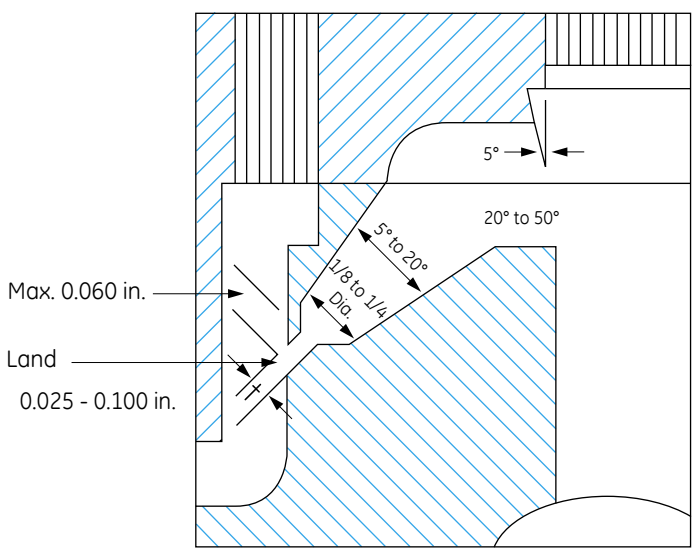
- In-line reciprocating screw injection molding machines work best.
- Reinforcements and fillers will promote short cycles with nylon composites.
- For best results, utilize 40-70% of the rated barrel capacity.
- Nozzles should be heated and provide an unrestrictive flow path. Open channel (full bore) nozzles are preferred over tapered (nylon) type nozzles. A reverse taper discharge design will assist sprue-break.
- "Free-flow" type check rings are preferred. Positive shut-off devices should be avoided.
- Sprue bushings need to be large, well-tapered, and highly polished to promote mold release.
- Short, full-round runners will help maximize cavity pressure and improve part appearance.
- Fast injection rates serve to maximize physical properties and part surface finish.
- Low screw recovery RPM (40-70), and minimal back pressure (25 psig) will help to minimize fiber attrition.

Gating

Gate size and location are extremely important in controlling shrinkage and part dimensions. The following guidelines provide direction toward gating parameters.

- Locate the gate to achieve a balance of flow in all directions, or to achieve flow along the axis of the most critical dimensions.
- Gate into the thickest section of the cavity so material flows from thick to thinner sections.
- Gate thickness should be not less than 50-75% of the adjacent wall, and gate width two to three times the thickness. Tunnel gates should be no smaller than .040" diameter.
- The gate land length should be 060" maximum.

Typical Tunnel Gate Design



Gating design for parts molded from glass reinforced nylons should provide ample processing latitude without creating molded-in stress.

Regrind

Reground nylon-based Thermocomp and Lubricomp composites should be treated in much the same manner as unfilled nylon resins. Sprues and runners may be ground and reused immediately, or they should be kept clean and dry for future reprocessing.

Nylon composites can be redried in dehumidifying driers, under mild conditions, to minimize risk of over drying and discoloration. Drying cycles of four hours to overnight at 160°F and -20°F dew point are suggested. Length of drying time depends on beginning moisture content of the compound.

How much regrind?

The percentage of reground material that can be added depends on the molded part and its application. The reinforcing effect of glass fiber decreases with repeated processing due to fiber attrition. Where molded parts must meet demanding end-use requirements or close tolerances, only virgin compound is recommended; unless thorough testing of a regrind/virgin blend is carried out. Parts have been successfully molded with 20-30% of reground material with only slight decreases in mechanical properties.

Suggested injection molding process start-up conditions for nylon based compounds

	Cylinder		Melt Temp.		Mold Temp.	
	°F	°C	°F	°C	°F	°C
Nylon 6/6	500-570	260-299	570	299	225	107
Nylon 6	400-550	204-288	520	271	200	93
Nylon 6/10	460-525	238-274	520	271	200	93
Nylon 11	400-520	204-271	480	249	120	49
Nylon 12	380-520	193-271	480	249	175	79
Nylon 6/12	460-525	238-274	520	271	200	93
PPA	575-625	302-329	625	329	275	135
Super Tough	480-550	249-288	560	293	225	107

Drying and Storage

All nylon compounds require drying prior to melt processing due to their hygroscopic nature. Once dry, exposure to the atmosphere should be minimized as nylon materials will reabsorb moisture and become too wet to mold in as little as 30 minutes.

Drying parameters for nylon composites include four hours minimum drying time at 160-180°F in a desiccant hopper dryer or tray dryer with good air flow and a 0°F or less dew point. Nylon 6/6 and PPA composites can be dried at higher temperatures for shorter time periods as long as some resin discoloration is acceptable. For additional information on drying, refer to the LNP Injection Molding Processing Guide or call LNP Technical Service.

Typical Propertes for Nylon 6/6 "R" Series Compounds — ASTM Methods, English Units

Property	ASTM Method	Units	Thermocomp RF-1002	Thermocomp RF-1004	Thermocomp RF-1006	Thermocomp RF-1008	Thermocomp RF-100-10 HS	Thermocomp RF-100-12
Physical								
Density	D792	g/cm³	1.22	1.30	1.4	1.48	1.57	1.73
Moisture Absorption, 50% RH, 24 hrs	D570	%	0.82	0.89	0.69	0.6	0.44	N/A
Mold Shrinkage, flow, 24 hrs	D955	%	0.8	0.5	0.3 – 0.5	0.3	0.3	0.3
Mold Shrinkage, xflow, 24 hrs	D955	%	1.2	1.2	1.4 – 1.6	1.3	1.2	0.9
Mechanical								
Tensile Stress, break	D638	psi	16420	22620	23925	26680	28565	32915
Tensile Strain, break	D638	%	2.6	3.6	2.4	2.5	2.4	2.2
Tensile Modulus, 50 mm/min	D638	psi	865650	1039650	1548600	1928500	2559250	2900000
Flexural Stress	D790	psi	27260	33350	34075	39875	45240	53070
Flexural Modulus	D790	psi	778650	849700	1368800	1509450	1818300	2788350
Izod Impact, unnotched, 23°C	D4812	ft.-lb./in.	9.29	15.60	12.10	21.29	29.68	20.99
Izod Impact, notched, 23°C	D256	ft.-lb./in.	0.79	1.89	1.09	2.19	2.79	2.49
Instrumented Impact Energy @ peak, 23°C	D3763	in.-lb.	44.3	97.4	53.1	88.5	106.2	N/A
Thermal								
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°F	482	477	491	486	486	487
CTE, -40°C to 40°C, flow	E831	x 10^{-5} 1/°F	2.72	2.17	1.67	1.50	1.56	N/A
CTE, -40°C to 40°C, xflow	E831	x 10^{-5} 1/°F	4.50	4.39	4.06	3.28	2.44	N/A
Flammability	UL Subj. 94	N/A	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm

Typical Propertes for Nylon 6/6 "R" Series Compounds — ASTM Methods, English Units

Property	ASTM Method	Units	Lubricomp RAL-4022	Lubricomp RFL-4036	Lubricomp RFL-4216 HS	Lubricomp RL-4040 HS
Physical						
Density	D792	g/cm³	1.22	1.51	1.41	1.27
Moisture Absorption, 50% RH, 24 hrs	D570	%	0.72	0.62	0.65	0.55
Mold Shrinkage, flow, 24 hrs	D955	%	1.9	0.5	0.3	1.9 – 3.3
Mold Shrinkage, xflow, 24 hrs	D955	%	2	1.1	1.3	1.9 – 3.3
Mechanical						
Tensile Stress, break	D638	psi	11745	20155	23200	9135
Tensile Strain, break	D638	%	8.1	2.1	2.8	6.2
Tensile Modulus, 50 mm/min	D638	psi	498800	1628350	1548600	359600
Flexural Stress	D790	psi	16385	34220	35670	12760
Flexural Modulus	D790	psi	429200	1412300	1219450	329150
Izod Impact, unnotched, 23°C	D4812	ft.-lb./in.	13.90	16.99	16.20	10.69
Izod Impact, notched, 23°C	D256	ft.-lb./in.	2.49	1.99	1.50	0.79
Instrumented Impact Energy @ peak, 23°C	D3763	in.-lb.	53.1	88.5	79.7	26.6
Thermal						
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°F	388	478	480	158
CTE, -40°C to 40°C, flow	E831	x 10^{-5} 1/°F	4.11	2.11	1.78	5.44
CTE, -40°C to 40°C, xflow	E831	x 10^{-5} 1/°F	4.61	3.06	3.50	4.44
Flammability	UL Subj. 94	N/A	N/A	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm

Typical Propertes for Nylon 6 "P" Series Compounds — ASTM Methods, English Units

Property	ASTM Method	Units	Thermocomp PF-1002	Thermocomp PF-1006	Thermocomp PF-1008	Thermocomp PF-1009	Thermocomp PF-100-10
Physical							
Density	D792	g/cm³	1.19	1.37	1.47	1.54	1.57
Moisture Absorption, 50% RH, 24 hrs	D570	%	N/A	0.86	0.98	0.87	0.83
Mold Shrinkage, flow, 24 hrs	D955	%	0.7	0.2 – 0.5	0.2 – 0.4	0.2 – 0.4	0.1 – 0.3
Mold Shrinkage, xflow, 24 hrs	D955	%	1	1 – 1.2	0.6 – 0.8	0.6 – 0.8	0.6 – 0.8
Mechanical							
Tensile Stress, break	D638	psi	15370	18705	26535	27840	30885
Tensile Strain, break	D638	%	3.8	2.8	3.3	3.2	2.8
Tensile Modulus, 50 mm/min	D638	psi	N/A	1268750	1837150	2106850	2478050
Flexural Stress	D790	psi	20735	29145	40310	42485	47560
Flexural Modulus	D790	psi	598850	1009200	1341250	1529750	1782050
Izod Impact, unnotched, 23°C	D4812	ft.-lb./in.	8.00	15.49	N/A	N/A	N/A
Izod Impact, notched, 23°C	D256	ft.-lb./in.	0.69	2.19	2.49	2.88	3.30
Instrumented Impact Energy @ peak, 23°C	D3763	in.-lb.	N/A	79.7	221.3	212.4	159.3
Thermal							
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°F	343	403	383	392	388
CTE, -40°C to 40°C, flow	E831	x 10^{-5} 1/°F	N/A	1.72	0.91	0.88	0.82
CTE, -40°C to 40°C, xflow	E831	x 10^{-5} 1/°F	N/A	3.72	4.23	4.13	3.73
Flammability	UL Subj. 94	N/A	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	N/A

Typical Propertes for Nylon 6/10 "Q" Series Compounds — ASTM Methods, English Units

Property	ASTM Method	Units	Thermocomp QF-1002 HS	Thermocomp QF-1006	Thermocomp QF-1008 HS	Lubricomp QFL-4036	Lubricomp QFL-4536
Physical							
Density	D792	g/cm³	1.16	1.31	1.41	1.46	1.44
Moisture Absorption, 50% RH, 24 hrs	D570	%	N/A	0.2	N/A	0.13	N/A
Mold Shrinkage, flow, 24 hrs	D955	%	N/A	0.2	N/A	0.1	0.2
Mold Shrinkage, xflow, 24 hrs	D955	%	N/A	1	N/A	0.7	0.9
Mechanical							
Tensile Stress, break	D638	psi	12470	21750	24940	21605	19720
Tensile Strain, break	D638	%	N/A	3.6	3.3	2.6	2.8
Tensile Modulus, 50 mm/min	D638	psi	N/A	1219450	1800900	1728400	N/A
Flexural Stress	D790	psi	20010	36250	37625	32045	30740
Flexural Modulus	D790	psi	588700	1139700	1564550	1229600	1248450
Izod Impact, unnotched, 23°C	D4812	ft.-lb./in.	N/A	20.90	20.79	17.58	16.99
Izod Impact, notched, 23°C	D256	ft.-lb./in.	0.69	2.28	2.55	3.30	1.69
Instrumented Impact Energy @ peak, 23°C	D3763	in.-lb.	N/A	79.7	N/A	70.8	N/A
Thermal							
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°F	394	405	405	421	394
CTE, -40°C to 40°C, flow	E831	x 10^{-5} 1/°F	N/A	1.72	N/A	1.61	N/A
CTE, -40°C to 40°C, xflow	E831	x 10^{-5} 1/°F	N/A	4.06	N/A	4.17	N/A
Flammability	UL Subj. 94	N/A	HB @ 1.5 mm	HB @ 1.5 mm	N/A	HB @ 1.5 mm	HB @ 0.75 mm

Typical Propertes for Nylon “H,” "I" and "S" Series Compounds — ASTM Methods, English Units

Property	ASTM Method	Units	Thermocomp HF-1006	Thermocomp HF-1008	Thermocomp IF-1006	Lubricomp IFL-4036	Thermocomp SF-1006
Physical			Nylon 11	Nylon 11	Nylon 6/12	Nylon 6/12	Nylon 12
Density	D792	g/cm³	1.26	1.37	1.322	1.46	1.24
Moisture Absorption, 50% RH, 24 hrs	D570	%	0.15	0.14	0.17	0.14	0.14
Mold Shrinkage, flow, 24 hrs	D955	%	0.1 – 0.2	0.1 – 0.3	0.1 – 0.2	0.2	0.2 – 0.3
Mold Shrinkage, xflow, 24 hrs	D955	%	0.6 – 0.7	0.8 – 1.0	0.7 – 0.8	0.8	0.7 – 0.8
Mechanical							
Tensile Stress, break	D638	psi	19430	17826	26390	22406	15370
Tensile Strain, break	D638	%	6.2	4.9			
Tensile Modulus, 50 mm/min	D638	psi	1068650	1346000	3.7	3.2	4.7
Flexural Stress	D790	psi	28275	32200	1389100	1446000	949750
Flexural Modulus	D790	psi	899000	1230000	41295	35394	24650
Izod Impact, unnotched, 23°C	D4812	ft.-lb./in.	26.80	23.00	1348500	1250000	849700
Izod Impact, notched, 23°C	D256	ft.-lb./in.	4.79	4.50	23.18	22.0	17.79
Instrumented Impact Energy					2.58	2.6	2.79
@ peak, 23°C	D3763	in.-lb.	141.6	168.2	123.9	159.3	115.1
Thermal							
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°F	352	352	388	393	325
CTE, -40°C to 40°C, flow	E831	x 10^{-5} 1/°F	1.89	1.70	2.28	1.50	2.44
CTE, -40°C to 40°C, xflow	E831	x 10^{-5} 1/°F	5.50	4.90	4.06	4.30	6.28
Flammability	UL Subj. 94	N/A	N/A	N/A	HB @ 1.5 mm	N/A	N/A

Typical Propertes for PPA “U” Series Compounds — ASTM Methods, English Units

Property	ASTM Method	Units	Thermocomp UF-1002 HS	Thermocomp UF-1006 HS	Thermocomp UF-1008	Thermocomp UF-1009 HS	Thermocomp UF-100-10 HS	Lubricomp UFL-4036 HS
Physical								
Density	D792	g/cm³	1.27	1.43	1.55	1.65	1.60	1.55
Moisture Absorption, 50% RH, 24 hrs	D570	%	0.48	0.25	0.27	0.25	0.23	0.33
Mold Shrinkage, flow, 24 hrs	D955	%	N/A	0.2 – 0.4	0.3	0.2	N/A	0.2
Mold Shrinkage, xflow, 24 hrs	D955	%	N/A	0.5 – 0.7	1.2	0.5	N/A	0.8
Mechanical								
Tensile Stress, break	D638	psi	14065	28565	34220	35090	38425	28420
Tensile Strain, break	D638	%	1.8	2.4	2.1	1.7	2.1	2.5
Tensile Modulus, 50 mm/min	D638	psi	871450	1966200	2338850	2950750	2814450	1799450
Flexural Stress	D790	psi	18705	40310	45095	568840	52635	40600
Flexural Modulus	D790	psi	809100	1480450	1948800	2720200	2480950	1566000
Izod Impact, unnotched, 23°C	D4812	ft.-lb./in.	4.38	13.60	16.29	25.28	17.79	19.38
Izod Impact, notched, 23°C	D256	ft.-lb./in.	0.58	1.69	1.59	3.18	2.10	2.19
Instrumented Impact Energy								
@ peak, 23°C	D3763	in.-lb.	N/A	N/A	44.3	132.8	N/A	53.1
Thermal								
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°F	423	496	538	496	486	498
CTE, -40°C to 40°C, flow	E831	x 10^{-5} 1/°F	5.00	4.72	1.39	1.22	2.00	N/A
CTE, -40°C to 40°C, xflow	E831	x 10^{-5} 1/°F	5.39	6.78	1.67	1.56	2.50	N/A
Flammability	UL Subj. 94	N/A	N/A	HB @ 1.5 mm	N/A	N/A	N/A	N/A

Typical Propertes for Thermotuf* High Impact Series Compounds — ASTM Methods, English Units

Property	ASTM Method	Units	Thermotuf PF-1006 HI	Thermotuf RF-1006 HI	Thermotuf V-1000	Thermotuf VF-1006
Physical						
Density	D792	g/cm^3	1.37	1.38	1.07	1.31
Moisture Absorption, 50% RH, 24 hrs	D570	%	0.87	0.63	0.80	0.69
Mold Shrinkage, flow, 24 hrs	D955	%	0.1 – 0.3	0.3	1.3 – 1.5	0.4
Mold Shrinkage, xflow, 24 hrs	D955	%	0.6 – 0.7	1.1	1.3 – 1.5	1.4
Mechanical						
Tensile Stress, break	D638	psi	20590	27115	7250	16675
Tensile Strain, break	D638	%	3.2	3.2	60.3	3.3
Tensile Modulus, 50 mm/min	D638	psi	1309350	1538450	279850	1139700
Flexural Stress	D790	psi	30595	40890	10730	25085
Flexural Modulus	D790	psi	949750	1428250	279850	1019350
Izod Impact, unnotched, 23°C	D4812	ft.-lb./in.	23.03	20.49	NB	15.49
Izod Impact, notched, 23°C	D256	ft.-lb./in.	3.30	2.88	NB	2.88
Instrumented Impact Energy @ peak, 23°C	D3763	in.-lb.	141.6	150.5	495.6	N/A
Thermal						
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°F	401	482	127	468
CTE, -40°C to 40°C, flow	E831	x 10^{-5} 1/°F	N/A	1.56	7.06	1.28
CTE, -40°C to 40°C, xflow	E831	x 10^{-5} 1/°F	N/A	3.39	7.00	N/A
Flammability	UL Subj. 94	N/A	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 0.75 mm	HB @ 1.5 mm

Typical Propertes for Nylon 6/6 "R" Series Compounds — ASTM Methods, SI Units

Property	ASTM Method	Units	Thermocomp RF-1002	Thermocomp RF-1004	Thermocomp RF-1006	Thermocomp RF-1008	Thermocomp RF-100-10 HS	Thermocomp RF-100-12
Physical								
Density	D792	g/cm³	1.22	1.30	1.48	1.48	1.57	1.73
Moisture Absorption, 50% RH, 24 hrs	D570	%	0.82	0.89	0.69	0.6	0.44	N/A
Mold Shrinkage, flow, 24 hrs	D955	%	0.8	0.5	0.3 – 0.5	0.3	0.3	0.3
Mold Shrinkage, xflow, 24 hrs	D955	%	1.2	1.2	1.4 – 1.6	1.3	1.2	0.9
Mechanical								
Tensile Stress, break	D638	MPa	112	156	165	184	197	227
Tensile Strain, break	D638	%	2.6	3.6	2.4	2.5	2.4	2.2
Tensile Modulus, 50 mm/min	D638	MPa	5970	7170	10680	13300	17650	20000
Flexural Stress	D790	MPa	188	230	235	275	312	366
Flexural Modulus	D790	MPa	5370	5860	9440	10410	12540	19230
Izod Impact, unnotched, 23°C	D4812	J/m	496	833	646	1137	1585	1121
Izod Impact, notched, 23°C	D256	J/m	42	101	58	117	149	133
Instrumented Impact Energy								
@ peak, 23°C	D3763	J	5	11	6	10	12	N/A
Thermal								
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°C	250	247	255	252	252	253
CTE, -40°C to 40°C, flow	E831	x 10^{-5} 1/°C	4.9	3.9	3.0	2.7	2.8	N/A
CTE, -40°C to 40°C, xflow	E831	x 10^{-5} 1/°C	8.1	7.9	7.3	5.9	4.4	N/A
Flammability	UL Subj. 94	N/A	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm

Typical Propertes for Nylon 6/6 "R" Series Compounds — ASTM Methods, SI Units

Property	ASTM Method	Units	Lubricomp RAL-4022	Lubricomp RFL-4036	Lubricomp RFL-4216 HS	Lubricomp RL-4040 HS
Physical						
Density	D792	g/cm³	1.22	1.51	1.41	1.27
Moisture Absorption, 50% RH, 24 hrs	D570	%	0.72	0.62	0.65	0.55
Mold Shrinkage, flow, 24 hrs	D955	%	1.9	0.5	0.3	1.9 – 3.3
Mold Shrinkage, xflow, 24 hrs	D955	%	2	1.1	1.3	1.9 – 3.3
Mechanical						
Tensile Stress, break	D638	MPa	81	139	160	63
Tensile Strain, break	D638	%	8.1	2.1	2.8	6.2
Tensile Modulus, 50 mm/min	D638	MPa	3440	11230	10680	2480
Flexural Stress	D790	MPa	113	236	246	88
Flexural Modulus	D790	MPa	2960	9740	8410	2270
Izod Impact, unnotched, 23°C	D4812	J/m	742	907	865	571
Izod Impact, notched, 23°C	D256	J/m	133	106	80	42
Instrumented Impact Energy						
@ peak, 23°C	D3763	J	6	10	9	3
Thermal						
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°C	198	248	249	70
CTE, -40°C to 40°C, flow	E831	x 10^{-5} 1/°C	7.4	3.8	3.2	9.8
CTE, -40°C to 40°C, xflow	E831	x 10^{-5} 1/°C	8.3	5.5	6.3	8.0
Flammability	UL Subj. 94	N/A	N/A	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm

Typical Propertes for Nylon 6 "P" Series Compounds — ASTM Methods, SI Units

Property	ASTM Method	Units	Thermocomp PF-1002	Thermocomp PF-1006	Thermocomp PF-1008	Thermocomp PF-1009	Thermocomp PF-100-10
Physical							
Density	D792	g/cm³	1.19	1.37	1.47	1.54	1.57
Moisture Absorption, 50% RH, 24 hrs	D570	%	N/A	0.86	0.98	0.87	0.83
Mold Shrinkage, flow, 24 hrs	D955	%	0.7	0.2 – 0.5	0.2 – 0.4	0.2 – 0.4	0.1 – 0.3
Mold Shrinkage xflow, 24 hrs	D955	%	1	1 – 1.2	0.6 – 0.8	0.6 – 0.8	0.6 – 0.8
Mechanical							
Tensile Stress, break	D638	MPa	106	129	183	192	213
Tensile Strain, break	D638	%	3.8	2.8	3.3	3.2	2.8
Tensile Modulus, 50 mm/min	D638	MPa	N/A	8750	12670	14530	17090
Flexural Stress	D790	MPa	143	201	278	293	328
Flexural Modulus	D790	MPa	4130	6960	9250	10550	12290
Izod Impact, unnotched, 23°C	D4812	J/m	427	827	N/A	N/A	N/A
Izod Impact, notched, 23°C	D256	J/m	37	117	133	154	176
Instrumented Impact Energy @ peak, 23°C	D3763	J	N/A	9	25	24	18
Thermal							
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°C	173	206	195	200	198
CTE, -40°C to 40°C, flow	E831	x 10^{-5} 1/°C	N/A	3.1	1.64	1.58	1.48
CTE, -40°C to 40°C, xflow	E831	x 10^{-5} 1/°C	N/A	6.7	7.70	7.43	6.71
Flammability	UL Subj. 94	N/A	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	N/A

Typical Propertes for Nylon 6/10 "Q" Series Compounds — ASTM Methods, SI Units

Property	ASTM Method	Units	Thermocomp QF-1002 HS	Thermocomp QF-1006	Thermocomp QF-1008 HS	Lubricomp QFL-4036	Lubricomp QFL-4536
Physical							
Density	D792	g/cm³	1.16	1.31	1.41	1.46	1.44
Moisture Absorption, 50% RH, 24 hrs	D570	%	N/A	0.2	N/A	0.13	N/A
Mold Shrinkage, flow, 24 hrs	D955	%	N/A	0.2	N/A	0.1	0.2
Mold Shrinkage, xflow, 24 hrs	D955	%	N/A	1	N/A	0.7	0.9
Mechanical							
Tensile Stress, break	D638	MPa	86	150	172	149	136
Tensile Strain, break	D638	%	N/A	3.6	3.3	2.6	2.8
Tensile Modulus, 50 mm/min	D638	MPa	N/A	8410	12420	11920	N/A
Flexural Stress	D790	MPa	138	250	257	221	212
Flexural Modulus	D790	MPa	4060	7860	10790	8480	8610
Izod Impact, unnotched, 23°C	D4812	J/m	N/A	1116	1110	939	907
Izod Impact, notched, 23°C	D256	J/m	37	122	136	176	90
Instrumented Impact Energy @ peak, 23°C	D3763	J	N/A	9	N/A	8	N/A
Thermal							
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°C	201	207	207	216	201
CTE, -40°C to 40°C, flow	E831	x 10^{-5} 1/°C	N/A	3.1	N/A	2.9	N/A
CTE, -40°C to 40°C, xflow	E831	x 10^{-5} 1/°C	N/A	7.3	N/A	7.5	N/A
Flammability	UL Subj. 94	N/A	HB @ 1.5 mm	HB @ 1.5 mm	N/A	HB @ 1.5 mm	HB @ 0.75 mm

Typical Propertes for Nylon “H,” "I" and "S" Series Compounds — ASTM Methods, SI Units

Property	ASTM Method	Units	Thermocomp HF-1006	Thermocomp HF-1008	Thermocomp IF-1006	Lubricomp IFL-4036	Thermocomp SF-1006
Physical			Nylon 11	Nylon 11	Nylon 6/12	Nylon 6/12	Nylon 12
Density	D792	g/cm³	1.26	1.37	1.322	1.46	1.24
Moisture Absorption, 50% RH, 24 hrs	D570	%	0.15	0.14	0.17	0.14	0.14
Mold Shrinkage, flow, 24 hrs	D955	%	0.1 – 0.2	0.1 – 0.3	0.1 – 0.2	0.2	0.2 – 0.3
Mold Shrinkage, xflow, 24 hrs	D955	%	0.6 – 0.7	0.8 – 1.0	0.7 – 0.8	0.8	0.7 – 0.8
Mechanical							
Tensile Stress, break	D638	MPa	134	123	182	155	106
Tensile Strain, break	D638	%	6.2	4.9	3.7	3.2	4.7
Tensile Modulus, 50 mm/min	D638	MPa	7370	9283	9580	9972	6550
Flexural Stress	D790	MPa	195	222	291	244	170
Flexural Modulus	D790	MPa	6200	8483	9300	8621	5860
Izod Impact, unnotched, 23°C	D4812	J/m	1431	1228	1238	1175	950
Izod Impact, notched, 23°C	D256	J/m	256	240	138	138	149
Instrumented Impact Energy							
@ peak, 23°C	D3763	J	16	19	14	18	13
Thermal							
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°C	178	178	198	201	163
CTE, -40°C to 40°C, flow	E831	x 10^{-5} 1/°C	3.4	3.1	4.1	2.6	4.4
CTE, -40°C to 40°C, xflow	E831	x 10^{-5} 1/°C	9.9	8.8	7.3	7.7	11.3
Flammability	UL Subj. 94	N/A	N/A	N/A	HB @ 1.5 mm	N/A	N/A

Typical Propertes for PPA “U” Series Compounds — ASTM Methods, SI Units

Property	ASTM Method	Units	Thermocomp UF-1002 HS	Thermocomp UF-1006 HS	Thermocomp UF-1008	Thermocomp UF-1009 HS	Thermocomp UF-100-10 HS	Lubricomp UFL-4036 HS
Physical								
Density	D792	g/cm³	1.27	1.43	1.55	1.65	1.60	1.55
Moisture Absorption, 50% RH, 24 hrs	D570	%	0.48	0.25	0.27	0.25	0.23	0.33
Mold Shrinkage, flow, 24 hrs	D955	%	N/A	0.2 – 0.4	0.3	0.2	N/A	0.2
Mold Shrinkage, xflow, 24 hrs	D955	%	N/A	0.5 – 0.7	1.2	0.5	N/A	0.8
Mechanical								
Tensile Stress, break	D638	MPa	97	197	236	242	265	196
Tensile Strain, break	D638	%	1.8	2.4	2.1	1.7	2.1	2.5
Tensile Modulus, 50 mm/min	D638	MPa	6010	13560	16130	20350	19410	12410
Flexural Stress	D790	MPa	129	278	311	392	363	280
Flexural Modulus	D790	MPa	5580	10210	13440	18760	17110	10800
Izod Impact, unnotched, 23°C	D4812	J/m	234	726	870	1350	950	1035
Izod Impact, notched, 23°C	D256	J/m	31	90	85	170	112	117
Instrumented Impact Energy								
@ peak, 23°C	D3763	J	N/A	N/A	5	15	N/A	6
Thermal								
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°C	217	258	281	258	252	259
CTE, -40°C to 40°C, flow	E831	x 10^{-5} 1/°C	9.0	8.5	2.5	2.2	3.6	N/A
CTE, -40°C to 40°C, xflow	E831	x 10^{-5} 1/°C	9.7	12.2	3.0	2.8	4.5	N/A
Flammability	UL Subj. 94	N/A	N/A	HB @ 1.5 mm	N/A	N/A	N/A	N/A

Typical Propertes for Thermotuf High Impact Series Compounds — ASTM Methods, SI Units

Property	ASTM Method	Units	Thermotuf PF-1006 HI	Thermotuf RF-1006 HI	Thermotuf V-1000	Thermotuf VF-1006
Physical						
Density	D792	g/cm^3	1.37	1.38	1.07	1.31
Moisture Absorption, 50% RH, 24 hrs	D570	%	0.87	0.63	0.8	0.69
Mold Shrinkage, flow, 24 hrs	D955	%	0.1 – 0.3	0.3	1.3 – 1.5	0.4
Mold Shrinkage, xflow, 24 hrs	D955	%	0.6 – 0.7	1.1	1.3 – 1.5	1.4
Mechanical						
Tensile Stress, break	D638	MPa	142	187	50	115
Tensile Strain, break	D638	%	3.2	3.2	60.3	3.3
Tensile Modulus, 50 mm/min	D638	MPa	9030	10610	1930	7860
Flexural Stress	D790	MPa	211	282	74	173
Flexural Modulus	D790	MPa	6550	9850	1930	7030
Izod Impact, unnotched, 23°C	D4812	J/m	1230	1094	NB	827
Izod Impact, notched, 23°C	D256	J/m	176	154	NB	154
Instrumented Impact Energy @ peak, 23°C	D3763	J	16	17	56	N/A
Thermal						
HDT, 1.84 MPa, 3.2mm, unannealed	D648	°C	205	250	53	242
CTE, -40°C to 40°C, flow	E831	$\times 10^{-5}$ 1/°C	N/A	2.8	12.7	2.3
CTE, -40°C to 40°C, xflow	E831	$\times 10^{-5}$ 1/°C	N/A	6.1	12.6	N/A
Flammability	UL Subj. 94	N/A	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 0.75 mm	HB @ 1.5 mm

Typical Properties for Nylon 6/6 "R" Series Compounds - ISO Methods

Property	ISO Method	Units	Thermocomp RF-1002	Thermo-comp RF-1004	Thermocomp RF-1006	Thermocomp RF-1008	Thermocomp RF-100-10 HS	Thermocomp RF-100-12 EM HS
Physical								
Density	ISO 1183	g/cm³	1.21	1.29	1.39	1.47	1.56	1.72
Moisture Absorption (23°C / 50% RH)	ISO 62	%	1.7		1.2	0.97	0.74	0.69
Mold Shrinkage, flow, 24 hrs	ISO 294	%	0.7	0.4	0.3 - 0.5	0.2	0.3	0.4
Mold Shrinkage, xflow, 24 hrs	ISO 294	%	1.2	1.2	1.4 - 1.6	1.3	1.2	0.5
Mechancial								
Tensile Stress, break	ISO 527	MPa	90	159	154	188	194	231
Tensile Strain, break	ISO 527	%	2	3.7	2.4	2.7	2.4	1.8
Tensile Modulus, 1 mm/min	ISO 527	MPa	5240	7300	8980	12200	14000	28490
Flexural Stress	ISO 178	MPa	139	241	234	287	300	376
Flexural Modulus	ISO 178	MPa	4580	7000	9220	12100	14500	20900
Izod Impact, unnotched 80*10*4 +23°C	ISO 180/1U	kJ/m2	35	56	52	74	65	79
Izod Impact, notched 80*10*4 +23°C	ISO 180/1A	kJ/m2	5	8	7	13	13	14
Thermal								
HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm	ISO 75/Af	°C	235	221	243	>240	>240	-
CTE, -40°C to 40°C, flow	ISO 11359-2	x 10^{-5} 1/°C	4.9	3.9	3.0	2.7	2.8	N/A
CTE, -40°C to 40°C, xflow	ISO 11359-2	x 10^{-5} 1/°C	8.1	7.9	7.3	5.9	4.4	N/A
UL 94 Flammability	UL Subject 94		HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm

Typical Properties for Nylon 6/6 "R" Series Compounds - ISO Methods

Property	ISO Method	Units	Lubricomp RAL-4022	Lubricomp RFL-4036	Lubricomp RFL-4216 HS	Lubricomp RL-4040 HS
Physical						
Density	ISO 1183	g/cm³	1.22	1.51	1.41	1.27
Moisture Absorption (23°C / 50% RH)	ISO 62	%	1.17	-	1.14	-
Mold Shrinkage, flow, 24 hrs	ISO 294	%	1.9	0.3	0.2	1.8 - 3.2
Mold Shrinkage, xflow, 24 hrs	ISO 294	%	1.9	1.1	1.3	1.8 - 3.2
Mechancial						
Tensile Stress, break	ISO 527	MPa	79	138	162	55
Tensile Strain, break	ISO 527	%	9.5	2.1	3	7.2
Tensile Modulus, 1 mm/min	ISO 527	MPa	3500	9800	9900	2600
Flexural Stress	ISO 178	MPa	117	211	255	84
Flexural Modulus	ISO 178	MPa	3500	9700	9800	2400
Izod Impact, unnotched 80*10*4 +23°C	ISO 180/1U	kJ/m2	48	51	57	39
Izod Impact, notched 80*10*4 +23°C	ISO 180/1A	kJ/m2	5	10	8	4
Thermal						
HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm	ISO 75/Af	°C	193	248	220	65
CTE, -40°C to 40°C, flow	ISO 11359-2	x 10^{-5} 1/°C	7.4	3.8	3.2	9.8
CTE, -40°C to 40°C, xflow	ISO 11359-2	x 10^{-5} 1/°C	8.3	5.5	6.3	8.0
UL 94 Flammability	UL Subject 94		N/A	HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm

Typical Properties for Nylon 6 "P" Series Compounds - ISO Methods

Property	ISO Method	Units	Thermocomp PF-1006	Thermocomp PF-1008	Thermocomp PF-1009	Thermocomp PF-100-10
Physical						
Density	ISO 1183	g/cm³	1.36	1.46	1.54	1.57
Moisture Absorption (23°C / 50% RH)	ISO 62	%	1.53	1.26	1.07	0.97
Mold Shrinkage, flow, 24 hrs	ISO 294	%	0.1 - 0.5	0.2 - 0.3	0.2 - 0.4	0.1 - 0.3
Mold Shrinkage, xflow, 24 hrs	ISO 294	%	1 - 1.2	0.6 - 0.8	0.6 - 0.8	0.6 - 0.8
Mechancial						
Tensile Stress, break	ISO 527	MPa	128	186	201	214
Tensile Strain, break	ISO 527	%	2.9	3.3	3.4	3
Tensile Modulus, 1 mm/min	ISO 527	MPa	8580	12990	15210	17250
Flexural Stress	ISO 178	MPa	203	278	310	318
Flexural Modulus	ISO 178	MPa	7970	9530	11630	12380
Izod Impact, unnotched 80*10*4 +23°C	ISO 180/1U	kJ/m2	55	92	94	94
Izod Impact, notched 80*10*4 +23°C	ISO 180/1A	kJ/m2	8	17	18	18
Thermal						
HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm	ISO 75/Af	°C	203	208	212	210
CTE, -40°C to 40°C, flow	ISO 11359-2	x 10^{-5} 1/°C	3.06	1.64	1.58	1.48
CTE, -40°C to 40°C, xflow	ISO 11359-2	x 10^{-5} 1/°C	6.72	7.70	7.43	6.71
UL 94 Flammability	UL Subject 94		HB @ 1.5 mm	HB @ 1.5 mm	HB @ 1.5 mm	

Typical Properties for Nylon 6/10 "Q" Series Compounds - ISO Methods

Property	Standard	Units	Thermocomp QF-1006	Lubricomp QFL-4036	Lubricomp QFL-4017 ER HS
Physical					
Density	ISO 1183	g/cm³	1.30	1.46	1.42
Moisture Absorption (23°C / 50% RH)	ISO 62	%	0.33	0.22	0.3
Mold Shrinkage, flow, 24 hrs	ISO 294	%	0.1 - 0.1	0.1	0.1 - 0.2
Mold Shrinkage, xflow, 24 hrs	ISO 294	%	0.9 - 0.9	0.7	0.6 - 0.8
Mechancial					
Tensile Stress, break	ISO 527	MPa	153	150	183
Tensile Strain, break	ISO 527	%	3.5	2.6	3.4
Tensile Modulus, 1 mm/min	ISO 527	MPa	8800	9800	10600
Flexural Stress	ISO 178	MPa	219	228	273
Flexural Modulus	ISO 178	MPa	7800	9700	9800
Izod Impact, unnotched 80*10*4 +23°C	ISO 180/1U	kJ/m2	71	65	88
Izod Impact, notched 80*10*4 +23°C	ISO 180/1A	kJ/m2	9	12	17
Thermal					
HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm	ISO 75/Af	°C		211	208
CTE, -40°C to 40°C, flow	ISO 11359-2	x 10^{-5} 1/°C	3.06	2.90	4.48
CTE, -40°C to 40°C, xflow	ISO 11359-2	x 10^{-5} 1/°C	7.27	7.49	5.98
UL 94 Flammability	UL Subject 94		HB @ 1.5 mm	HB @ 1.5 mm	

Typical Propertes for Nylon “H,” "I" and "S" Series Compounds - ISO Methods

Property	Standard	Units	Thermocomp HF-1006	Thermocomp HF-1008	Thermocomp IF-1006	Lubricomp IFL-4036	Thermocomp SF-1006	Thermocomp SC-1006
Physical			**Nylon 11**	**Nylon 11**	**Nylon 6/12**	**Nylon 6/12**	**Nylon 12**	**Nylon 12**
Density	ISO 1183	g/cm³	1.26	1.37	1.31	1.45	1.24	1.24
Moisture Absorption (23°C / 50% RH)	ISO 62	%		0.19		0.17	0.22	
Mold Shrinkage, flow, 24 hrs	ISO 294	%	0.1 - 0.2	0.1 - 0.3	0.1 - 0.1	0.2	0.2 - 0.3	
Mold Shrinkage, xflow, 24 hrs	ISO 294	%	0.6 - 0.7	0.8 - 1	0.6 - 0.7	0.8	0.7 - 0.8	
Mechancial								
Tensile Stress, break	ISO 527	MPa	130	123	178	157	108	142
Tensile Strain, break	ISO 527	%	6.3	3.9	3.4	3	4.6	3
Tensile Modulus, 1 mm/min	ISO 527	MPa	7080	7600	10320	10310	6580	
Flexural Stress	ISO 178	MPa	193	192	250	231	169	210
Flexural Modulus	ISO 178	MPa	6640	7970	8830	7920	6240	12100
Izod Impact, unnotched 80*10*4 +23°C	ISO 180/1U	kJ/m2	87	75	78	73	58	52
Izod Impact, notched 80*10*4 +23°C	ISO 180/1A	kJ/m2	25	21	14	12	15	17
Thermal								
HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm	ISO 75/Af	°C	174	175		198	162	
CTE, -40°C to 40°C, flow	ISO 11359-2	x 10^{-5} 1/°C	3.4	3.04	4.1	2.63	4.37	
CTE, -40°C to 40°C, xflow	ISO 11359-2	x 10^{-5} 1/°C	9.9	8.87	7.3	7.69	1.13	
UL 94 Flammability	UL Subject 94				HB @ 1.5 mm			

Typical Properties for PPA “U” Series Compounds - ISO Methods

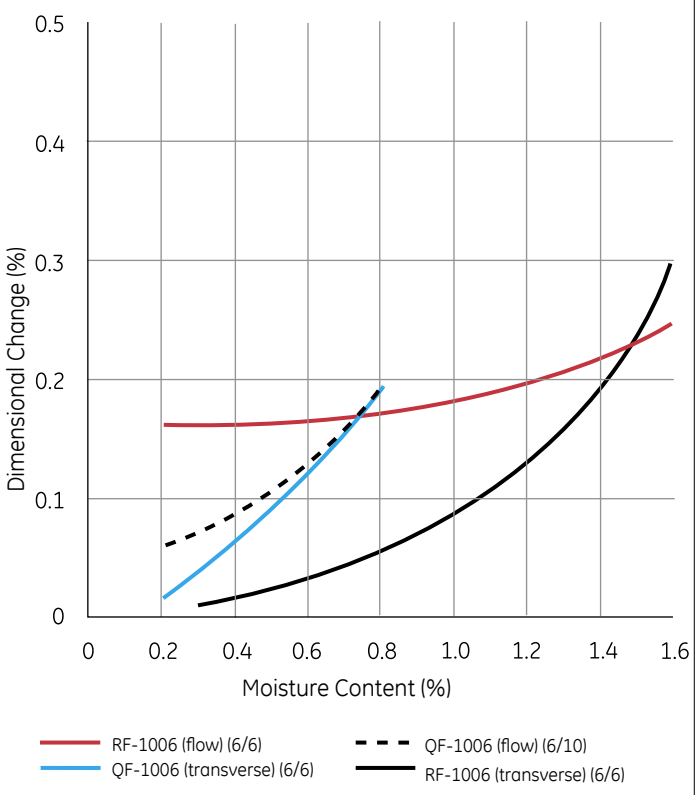
Property	ISO Method	Units	Thermocomp UF-1006 A HS	Thermocomp UF-1008	Thermocomp UF-1009 HS	Thermocmp UF-100-10 HS	Lubricomp UFL-4036 HS
Physical							
Density	ISO 1183	g/cm³	1.45	1.54	1.64	1.6	1.55
Moisture Absorption (23°C / 50% RH)	ISO 62	%	0.41	0.42	0.37		-
Mold Shrinkage, flow, 24 hrs	ISO 294	%	0.2 - 0.4	0.2	0.1	0.3 - 0.5	0.2
Mold Shrinkage, xflow, 24 hrs	ISO 294	%	0.9 - 0.7	1.2	0.4	0.4 - 0.6	0.8
Mechancial							
Tensile Stress, break	ISO 527	MPa	167	205	253	274	196
Tensile Strain, break	ISO 527	%	1.6	2	1.8	2.2	2.5
Tensile Modulus, 1 mm/min	ISO 527	MPa	14790	14340	22740		9880
Flexural Stress	ISO 178	MPa	255	321	386	406	285
Flexural Modulus	ISO 178	MPa	11220	13800	18330	17000	11220
Izod Impact, unnotched 80*10*4 +23°C	ISO 180/1U	kJ/m2	30	51	82	87	70
Izod Impact, notched 80*10*4 +23°C	ISO 180/1A	kJ/m2	7	9	14	17	12
Thermal							
HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm	ISO 75/Af	°C	260	272	-		263
CTE, -40°C to 40°C, flow	ISO 11359-2	x 10^{-5} 1/°C	8.5	2.48	2.2	3.6	-
CTE, -40°C to 40°C, xflow	ISO 11359-2	x 10^{-5} 1/°C	12.2	3.01	2.8	4.5	-
UL 94 Flammability	UL Subject 94		HB @ 1.5 mm				

Typical Properties for Thermotuf High Impact Series Compounds - ISO Methods

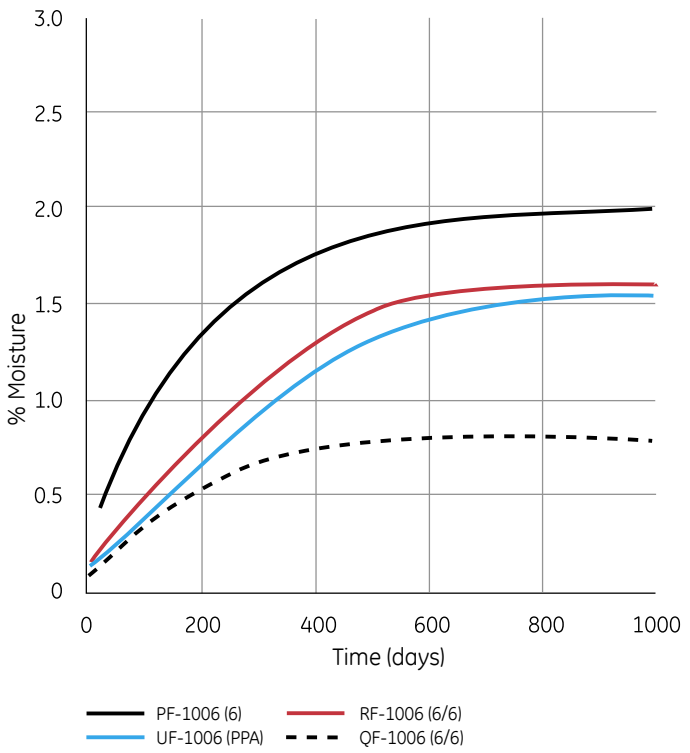
Property	ISO Method	Units	Thermotuf PF-1006 HI	Thermotuf RF-1006 HI	Thermotuf V-1000	Thermotuf VF-1006
Physical						
Density	ISO 1183	g/cm³	1.37	1.37	1.07	1.31
Moisture Absorption (23°C / 50% RH)	ISO 62	%			1.37	
Mold Shrinkage, flow, 24 hrs	ISO 294	%	0.1 - 0.3	0.2	1.3 - 1.5	0.4
Mold Shrinkage, xflow, 24 hrs	ISO 294	%	0.6 - 0.6	1.1	1.3 - 1.5	1.4
Mechancial						
Tensile Stress, break	ISO 527	MPa	138	179	50	94
Tensile Strain, break	ISO 527	%	3.8	2.9	168.1	2.25
Tensile Modulus, 1 mm/min	ISO 527	MPa	8700	10840	1800	6890
Flexural Stress	ISO 178	MPa	224	266	64	134
Flexural Modulus	ISO 178	MPa	8100	9480	1700	6800
Izod Impact, unnotched 80*10*4 +23°C	ISO 180/1U	kJ/m2	79	75	137	39
Izod Impact, notched 80*10*4 +23°C	ISO 180/1A	kJ/m2	16	14	84	13
Thermal						
HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm	ISO 75/Af	°C	203	-	56	234
CTE, -40°C to 40°C, flow	ISO 11359-2	x 10^{-5} 1/°C	N/A	2.8	12.7	
CTE, -40°C to 40°C, xflow	ISO 11359-2	x 10^{-5} 1/°C	N/A	6.1	12.6	N/A
UL 94 Flammability	UL Subject 94		HB @ 1.5 mm	HB @ 1.5 mm	HB @ 0.75 mm	HB @ 1.5 mm

Effects of Moisture on 30% Glass Fiber Reinforced Nylon Resins

Dimensional Change vs. Moisture Content at 73°F(23°C) and 50% RH Conditions



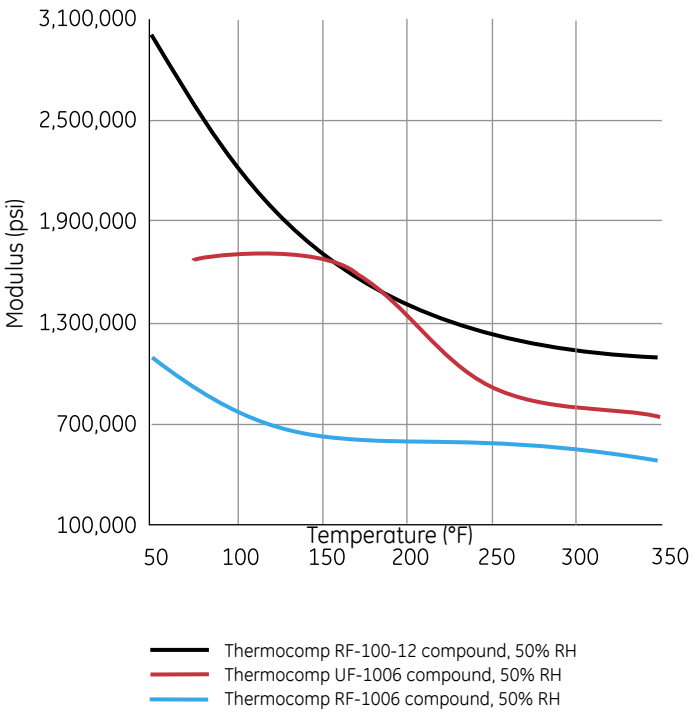
Moisture content vs. time at 73°F (23°C) and 50% RH conditions for 0.125" thick plaques



Note: The change in the flow and the transverse direction is due to stress relief and moisture absorbtion in fan gated 4.0" x 6.0" x 0.125" thick plaques.

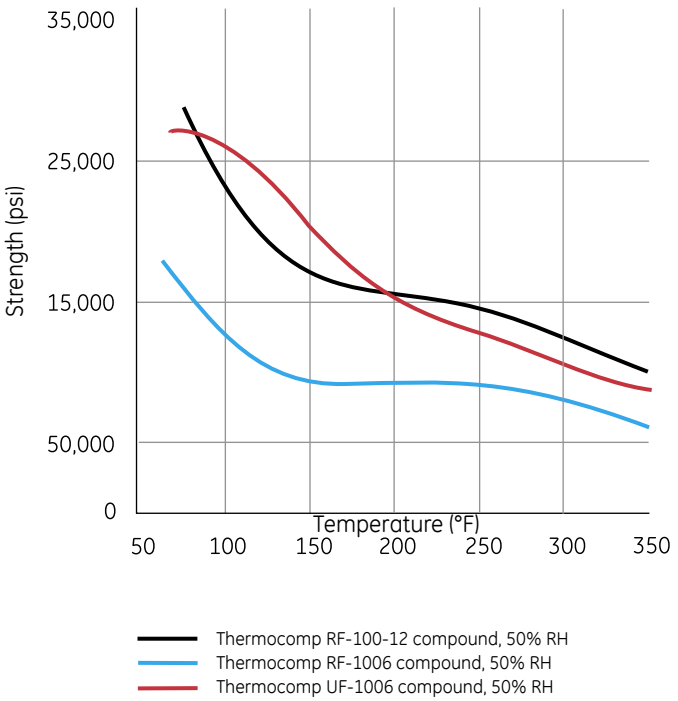
Engineering Data

Tensile Modulus (E) vs. Temperature



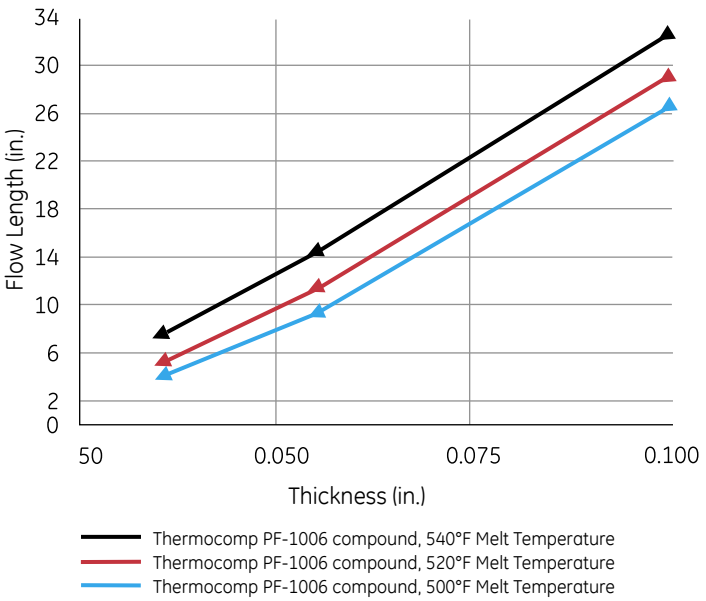
The modulus is the property that determines the stiffness of the final product. These curves show how this property varies with temperature for nylon 6/6, (R) and PPA (U) composites reinforced with 30% glass fiber compound. Also shown is a 60% glass fiber reinforced nylon 6/6 compound with the highest values at elevated temperatures.

Tensile Strength vs. Temperature



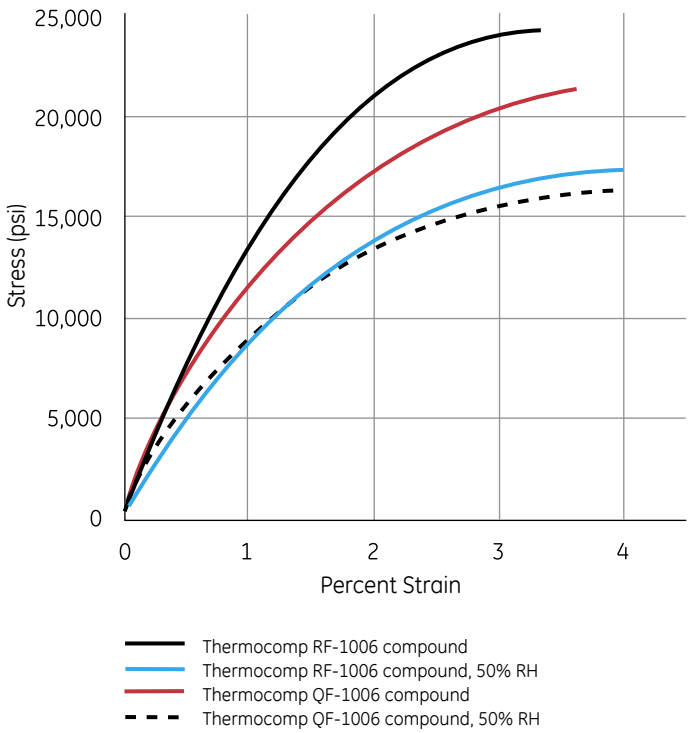
Strength is the unique stress level at which a material fails when a force is applied. These curves compliment the curves to the left.

Spiral Flow Length vs. Molding Thickness



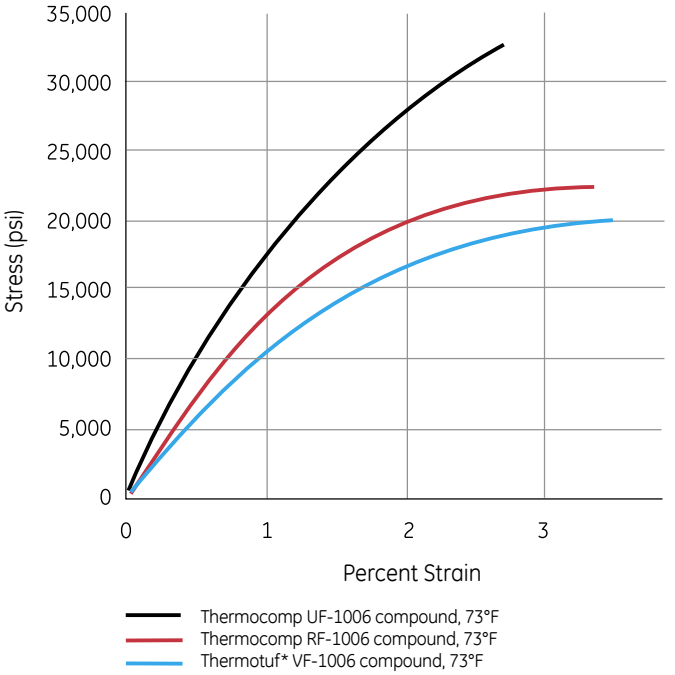
Spiral flow is a practical way to determine the number of gates for a part. This example shows that 30% glass fiber reinforced nylon 6 flows extremely well.

Tensile Stress-Strain



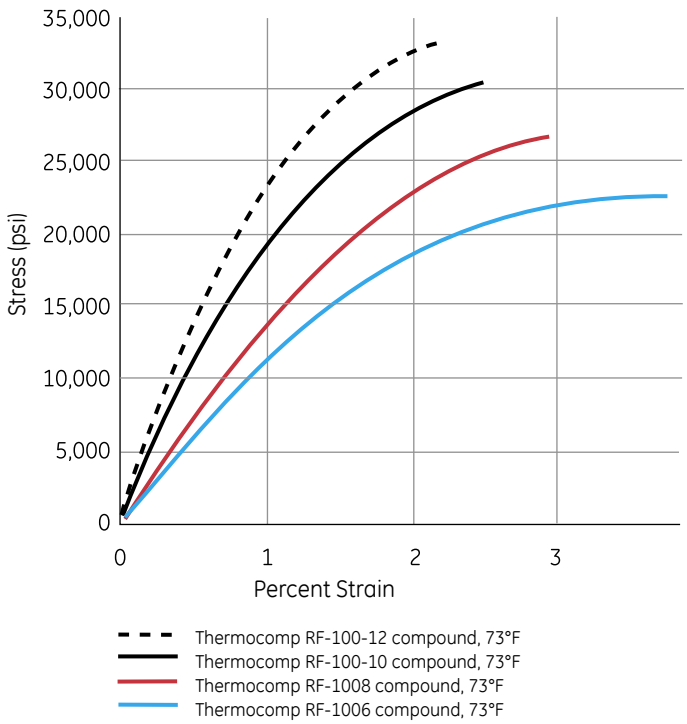
Stress-strain curves are the most fundamental mechanical descriptions of a material. The curve shows the modulus (the slope) at all stress levels, the strength and the elongation. The curves on the left illustrate the effect of moisture on 30% glass fiber reinforced nylon 6/6 (R) and nylon 6/10 (Q).

Tensile Stress-Strain



These curves show the mechanical response of 30% glass fiber reinforced PPA (U), nylon 6/6 (R) and Super Tough nylon (V).

Tensile Stress-Strain



These curves show the effect of glass fiber reinforcement percentage for nylon 6/6 at room temperature.

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LNP Product Code Listing

First Letter (Base Resin)

A	ABS
B	SAN
C	Polystyrene
D	Polycarbonate
E	Polyetherimide
F	Polyethylene (H.D.)
G	Polysulfone
H	Nylon 11
I	Nylon 6/12
J	Polyethersulfone (PES)
K	Acetal
L	Polyetherether-ketone (PEEK)
M	Polypropylene
O	Polyphenylene Sulfide (PPS)
P	Nylon 6
Q	Nylon 6/10
R	Nylon 6/6
S	Nylon 12
T	Polyurethane
U	Polyphthalamide (PPA)
V	Super Tough Nylon
W	Thermoplastic Polyester (PBT)
X	Amorphous Nylon
Y	Polyester Elastomer
Z	Modified Polyphenylene Oxide
LCP	Liquid Crystal Polymer
PCA	Polycarbonate/ ABS

Second Letter (Primary Filler)

A	Aramid Fiber
B	Glass Beads
C	Carbon Fiber Reinforcement
F	Glass Fiber Reinforcement
L	Lubricant
M	Mineral
S	Stainless Steel Fiber
T	Thermal Filler

Third Letter (Secondary Filler)

A	Aramid
B	Glass Beads
C	Carbon Fiber Reinforcement
F	Glass Fiber Reinforcement
L	Lubricant
M	Mineral

First Two Numbers (Description of Mineral or Lubricant)

10	Aramid, Glass and/or Carbon Fiber Reinforcement Only
20	Thermal Carbon Fiber
21	Thermal Filler
31	Calcium Carbonate
32	Wollastonite
33	Mica
34	Clay
36	Talc
37	Barium Sulfate
40	PTFE Lubricant
42	MoS_2 Lubricant
43	Graphite Powder
44	Silicone
45	PTFE/Silicone
47	Binary Bearing Lubricant
70	Verton* Long Fiber (Glass Fiber Reinforcement Only)
80	Verton Long Fiber (+PTFE Lubricant)
82	Verton Long Fiber (+MoS_2 Lubricant)

Third Number (Wt% of Secondary Filler in Increments of 5%)

Fourth Number (Wt% of Primary Filler in Increments of 5%)

Letter Suffixes Description of Base Resin or Other Special Additives

AS	Aluminum Stearate
CCS	Clean Compound System
E	Extrusion Grade
ECO	Non-Brominated, Non-Chlorinated FR
EM	Easy Molding
EP	Exceptional Processing
ER	Easy Release
FR	Flame Retardant
HI	High Impact
HR	Hydrolysis Resistant
HS	Heat Stabilized
LE	Low Extractible Content
LP	Low Plateout
LW	Low Warpage
M	Milled Fiber
MB	Mechanical Blend
MG	Mixed Glass
MR	Mold Release
N	Nucleated
RM	Reduced Moisture
PC	Pitch Carbon
SF	Structural Foam
SM	Superior Molding
ZS	Zinc Stearate
94V-O	U.L. Grade
94V-1	U.L. Grade

Starflam Flame Retardant Systems (= Z xxx suffix)
First two xx:
Z10 to Z20: with Halogen
Z21 to Z30: Halogen-free
Z59 to Z99: with Halogen
X1 and X2: Red Phosphorous
Third x:
0 = UL 94 V-0
1 = UL 94 V-1
2 = UL 94 V-2

Trade Names

Colorcomp*	Pre-Colored Unfilled Resins
Faradex*	EMI/RFI Shielding Compounds
Konduit*	Thermally Conductive Compounds
Lubricomp*	Internally Lubricated Compounds
Lubriloy*	Non-PTFE Internally Lubricated Alloys
Starflam*	Flame Retardant Nylons
Stat-Kon*	Electrically Conductive Compounds
Stat-Loy*	Colorable Permanent Anti-Static Alloys
Thermocomp*	Glass, Carbon or Mineral Reinforced Composites
Thermotuf*	Impact Modified Compounds
Verton	Long Fiber Reinforced Composites

Examples
Colorcomp A-1000-FR: Pre-colored ABS, flame retardant
Lubricomp ECL-4036: 55 wt% Polyetherimide, 30 wt% carbon fiber reinforcement, 15 wt% PTFE lubricant
Stat-Kon RC-1008: 60 wt% Nylon 6/6, 40 wt% carbon fiber reinforcement
Thermocomp OF-1006: 70 wt% PPS, 30 wt% glass fiber reinforcement

GE imagination at work