



Thermoplastics

All thermoplastics are resins designed to soften and melt when exposed to heat. Utilizing an injection molding process, thermoplastics are melted at high temperature and injected into the mold. It is then cooled causing the plastic to solidify. If high heat is introduced again, the molded part will melt. The molecules of thermoplastics are held together by physical bonds rather than chemical bonding.

Engineered Resins

Engineered resins such as Nylons and P.E.E.K., sometimes called hard plastics, are generally categorized as compounds with hardness measured on the Rockwell M or R scale. These compounds exhibit high tensile and compressive strength and are typically used in wear rings for bearing support and in auxiliary devices for extrusion resistance. For typical physical properties, see Table.

Engineered Resins — Nylons

W4650 - MolyGard

Heat stabilized, internally lubed, 30% glass-reinforced nylon for standard tolerance wear rings.

W4655 - Nylatron

Wear resistant nylon loaded with molybdenum disulfide (MoS₂) for reduced friction. This compound is ideally suited for use in back-up rings. Nylatron is susceptible to water absorption.

W4733 - WearGard

Heat stabilized, internally lubricated, 35% glass reinforced nylon for tight-tolerance wear rings. WearGard is a dimensionally stable compound with high compressive strength and is featured in Parker's distinctive green color.

Engineered Resins — UltraCOMPTM (PEEK)

UltraCOMP engineered thermoplastics are semi crystalline materials manufactured for extreme temperatures, chemicals and pressures. Their excellent fatigue resistance and stability in high temperature environments make them the material of choice where other materials fail. With a melt temperature of over 600°F, UltraCOMP can be used at continuous operating temperatures of -65° up to 500° F. Superior strength and wear resistance properties make it an ideal alternative to metal or metal alloys in applications where weight, metal-to-metal wear or corrosion issues exist. Such capabilities translate into reduced equipment down time and increased productivity. For example, UltraCOMP back-up rings exhibit optimum strength-flexibility for ease of installation and high tensile strength

properties for premiere extrusion resistance. UltraCOMP is available in molded geometries, machined geometries and tube stock.

W4685 – UltraCOMP HTP

An unfilled engineered thermoplastic material specified for use in extreme conditions spanning multiple industries. Its excellent tensile strength facilitates its successful use as back-up rings and anti-extrusion devices. In addition, UltraCOMP HTP's elongation properties (>60% per ASTM D638) allow it to be flexed and twisted without breaking.

W4686 – UltraCOMP GF

30% glass filled blend provides enhanced compressive strength over UltraCOMP HTP.

W4737 – UltraCOMP CF

30% carbon fiber blend provides enhanced tensile and compressive strength over UltraCOMP GF.

W4738 – UltraCOMP CGT

10% carbon, 10% glass, and 10% PTFE blend for enhanced compressive strength and reduced friction.

Parker Material Code	Material	Color	Typical Applications & Description	Service Temperature Range °F (°C)	Tensile Strength at Break psi (MPa)	Flexural Strength Kpsi (MPa)
Nylons						
W4650	MolyGard	Gray	Heat stabilized, internally lubed 30% glass-reinforced nylon for standard tolerance wear rings.	-65 to +275 (-54 to +135)	17500 (121.0)	22600 (156.0)
W4655	Nylatron	Gray	Wear resistant nylon with molybdenum disulfide for lower friction, suited for back-up rings.	-65 to +275 (-54 to +135)	13000 (89.6)	16000 (110.3)
W4733	WearGard	Green	High compressive strength, 35% glass-reinforced nylon for tight tolerance wear rings.	-65 to +275 (-54 to +135)	18300 (126.0)	25500 (176.0)
UltraCOMP						
W4685	UltraCOMP HTP	Tan	A homogenous engineered thermoplastic used for extreme conditions in many markets.	-65 to +500 (-54 to +260)	14000 (97.0)	23600 (163.0)
W4686	UltraCOMP GF	Tan	30% glass filled engineered thermoplastic with enhanced compressive strength.	-65 to +500 (-54 to +260)	22600 (156.0)	30700 (212.0)
W4737	UltraCOMP CF	Black	30% carbon fiber blend, provides enhanced tensile and compressive strength.	-65 to +500 (-54 to +260)	32400 (224.0)	43200 (298.0)
W4738	UltraCOMP CGT	Gray	Thermoplastic material blended with carbon, glass and PTFE for reduced friction.	-65 to +500 (-54 to +260)	20400 (141.0)	26900 (186.0)
Composite Resins						
0871-0874	Composite Fabric-Reinforced Resins	Multiple	Fabric-reinforced resins to handle severe side loads, high heat and swell from moisture.	-40 to +250 (-40 to +121)	9500 (65.5)	-

Table 3-2. Typical Physical Properties: Thermoplastics — Engineered Resins (cont'd)

Parker Material Code	Rockwell Hardness		Notched IZOD Impact Strength Ft-Lbs/in.	Tensile Modulus Kpsi (MPa)	Shear Strength psi (MPa)	Flexural Modulus Kpsi (MPa)	Compressive Strength psi (MPa)	Permissible Compressive Load psi (MPa)	Water Absorption (24 Hour) %
	M	R							
Nylons									
W4650	77	114	1.37	952 (6.6)	9390 (65.0)	860 (5929.0)	21000 (145.0)	21700 (150.0)	0.80
W4655	-	119	1.69	536 (3.7)	9,500 (65.5)	406 (2.8)	12000 (82.7)	-	0.50
W4733	87	117	1.15	899 (6.2)	9820 (68.0)	1,100 (7584.0)	21500 (148.0)	21700 (150.0)	
UltraCOMP									
W4685	-	126	2	507 (3.5)	7687 (53.0)	579 (4.0)	17100 (118.0)	-	0.50
W4696	-	124	2	1653 (114.0)	14068 (97.0)	1334 (9.2)	31100 (215.0)	-	0.11
W4737	-	124	2	3234 (22.3)	12328 (85.0)	2697 (18.6)	34900 (240.0)	-	0.06
W4738	-	100	2	1464 (10.1)	-	1189 (8.2)	21700 (150.0)	-	0.06
Composite Resins									
0871-0874	100	-	10	470 (3.24)	-	280 (1.9)	35000 (241.3)	65200 (449.54)	0.10