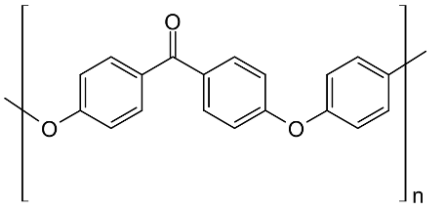
The ENERGY Forum

PORT PLASTICS

WHAT'S THE DIFFERENCE: PEEK vs PPS

The energy market has been using PEEK as its common thermoplastic to solve various applications. Even though PEEK has distinctive properties, the energy market has overlooked the "Poor Man's Peek", PPS, for example has a higher compressive strength than standard Peek among other benefits. PPS in natural or in a filled grade polymer is a good option to support tight tolerance and chemical resistance applications in today's market. Let's review the strengths and limitations of both PEEK and PPS polymers.

PEEK *(POLYETHER ETHER KETONE)*



PEEK is a thermoplastic polymer in the polyaryletherketone (PAEK) family. PEEK is a semi-crystalline thermoplastic with unique mechanical, temperature resistance, and chemical resistance properties that are retained to high temperatures. Ideal for applications where ductility and inertness are critical.

STRENGTHS

- Thermal stability (HDT) to 320°F (160°C)
- Good wear and abrasion resistance
- Excellent dimensional stability
- FDA compliant
- Temperature Range 250°F to 450°F

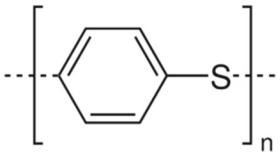
LIMITATIONS

- Lower Chemical Resistance vs PPS
- Chemical Resistance to some high temperature halogens and their acids i.e. Bromine
- Chlorine, Fluorine, HBr and HF

TYPES OF APPLICATIONS

- Compressor seals
- Valves seals
- Backup rings
- Pump bushings
- Wear rings

PPS *(POLYPHENYLENE SULFIDE)*



Polyphenylene sulfide (PPS) thermoplastic is a semi-crystalline heat resistant polymer that has a simple chemical structure made from benzene and sulfur. This resin possess high heat resistance with a melting point of approximately 536°F (280°C) and excellent chemical resistance, along with self-extinguishing without adding flame retardants. PPS is more commonly used when filled with glass or carbon fiber for improved mechanical properties.

STRENGTHS

- Excellent dimensional stability (low moisture abs. and low CLTE)
- Excellent chemical resistance
- Six times better wear resistance than PEEK
- Extends chemical resistance beyond PEEK
- Thermal stability (HDT) to 250°F (120°C)

LIMITATIONS

- Lower heat deflection temperature than PEEK

TYPES OF APPLICATIONS

- Piston rings
- Valves seals
- Pump components
- Wireline products

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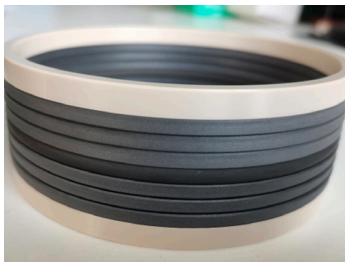
MORE COST-EFFECTIVE WHERE PEEK IS OVER-ENGINEERED



Both PEEK and PPS are available in a engineered polymer grade to combat the challenges of a high PV (pressure / velocity) in seal or bearing applications.

PPS and PEEK are two engineering thermoplastics that are similar in many ways. Both materials are strong, lightweight, and have good high-temperature resistance. The main difference is that PEEK has a higher HDT and a higher tensile strength.

Filled PEEK materials offer improved wear resistance, better chemical resistance using glass fibers and carbon fibers. PPS resin is generally reinforced with various reinforcements materials or blended with other thermoplastics to further improve the thermal and mechanical properties. Common fillers in PPS are glass fibers, carbon fibers, and PTFE.

		PEEK			PPS	
		Unreinforced	30% Glass	30% Carbon	Unreinforced	40% Glass
Polymer		PEEK Nat	Peek GF30	PEEK CF30	PPS Nat	Ryton R4
Flexural Modulus	Mpa	3700	10300	17500	3964	13800
	Kpsi	535	1500	2540	575	2000
Compressive Strength	Mpa	118	169	173	144	265
	Kpsi	17	25	25	21	38
Tensile Strength	Mpa	96	158	201	102	165
	Kpsi	14	23	29	13.5	24
Tensile Elongation	%	40+	5	4	3.6	5
Glass Transition Temp.	°C	150	150	150	-	90
	°F	302	302	302	-	195
Thermal Expansion (CLTE)	ppm/°C	43	17	5.2	50	20
	ppm/°F	24	9	2.9	28	12

Note: data shown above are typical values

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