B

POLYPROPYLENE (PPR AND PPH)

Asahi/America is the pioneer of piping systems made of polypropylene in the United States. For over 15 years, polypropylene systems have been successfully applied for a wide variety of applications. Polypropylene is used in double containment systems, chemical piping, and pure water systems. It is chemically resistant to many strong and weak acids. In addition, it is one of the few materials that is recommended for strong bases such as sodium hydroxide. It is not ideal for strong oxidizing acids, aromatics, and chlorinated hydrocarbons. An all inclusive chemical resistant table is available in Section E. Polypropylene has an extended operating range up to a maximum temperature of 200° F. See Appendix A for pressure rating charts on all materials.

Polypropylene is a fairly ductile material at ambient temperatures and it demonstrates good impact strength. Polypropylene is available in two grades: copolymer and homopolymer. Homopolymer polypropylene is a Type I resin according to ASTM D 4101 and is produced from 100% propylene monomer. Copolymer polypropylene is a blend of (6%) ethylene and (94%) propylene. Copolymer resins generally exhibit better mechanical strength and offer higher safety factors into a system design. In addition, copolymer PP shows a greater purity level when tested in a static leach test, making it the ideal material for pure water systems. Table B-1 shows the differences between the two types of polypropylenes. Asahi/America uses both types of material based on the application.

Copolymer is referred to as PPR, with the R designating the term random copolymer. PPH is the standard designation for homopolymer polypropylene.

Toxicity

Polypropylene (PPR and PPH materials) comply with the relevant food stuff regulations as defined by ONÖRM B 5014, Part 1, FDA, BGA, KTW guidelines. Other modified polypropylenes are not compliant due to additives. Such materials include PPH-s, PPR-el, and PPR-s-el, which have been modified for improved fire ratings and electro-conductivity. These are discussed in the next section.

Table B-1. Polypropylene Physical Properties

Characteristic	Standard	Units	PPR	PPH
Density	ISO/R 1183	g/cm^3	0.91	0.91
Melt Flow Index	MFI 190/5 Code T ISO 1133 DIN 53 735	g/10 min	0.50	0.50
Tensile Strength at Yield	ISO/R 527 DIN 53 455	psi N/mm^2	3625 25	4350 30
Tensile Strength at Break	ISO/R 527 DIN 53 455	psi N/mm^2	5800 40	6525 45
Percent Elongation at Break	ISO/R 527 DIN 53 455	%	>50	>50
Modulus Elasticity (tensile test)	ISO 178 DIN 53 457	psi N/mm^2	108750 750	166750 1150
Charpy Impact Strength 23° C, notched	ISO 179/2C DIN 53 453	kJ/m^2	20	50
Charpy Impact Strength -30° C, notched	ISO 179/2D DIN 53 453	kJ/m^2	50	35
Coefficient of Thermal Expansion	DIN 53 752	1/° C 1/° F	1.5×10^{-4} 8.33×10^{-5}	1.5×10^{-4} 8.33×10^{-5}
Crystallinity Melt Temperature	DIN 53 736	° C ° F	150 - 154 302 - 309	160 - 165 320 - 329
Deflection Temperature Under Load Method A Method B	 DIN 53 461 ISO 75	 ° C/° F ° C/° F	 45/113 68/154	 50/122 90/194
UL 94 Fire Rating	UL 94	—	94-HB	94-HB
Thermal Conductivity (23° C)	DIN 52 612	W/mK	0.24	0.22
Surface Resistivity	DIN 53 482	Ohm	$>10^{13}$	$>10^{13}$
Specific Volume Resistivity	DIN 53 482 part 1	Ohm cm	$>10^{16}$	$>10^{16}$
Dielectric Strength	DIN 53 481	kV/mm	75	75
Color	RAL	—	gray	gray

P.O. Box 653 • 35 Green Street, Malden, MA 02148 • Tel: (800) 343-3618, (781) 321-5409
Fax: (800) 426-7058 • Internet: http://www.asahi-america.com • Email: asahi@asahi-america.com