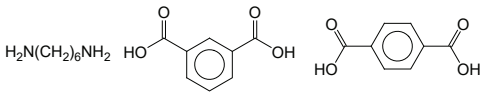
PA-6I,6T polyamide-6I/6T

PARAMETER	UNIT	VALUE	REFERENCES
GENERAL			
Common name	-	polyamide-6I/6T, copolymer of 1,6-hexamethylene diamine and isophthalic acid (6I) (70 wt %) and terephthalic acid (6T) (30 wt %)	
Acronym	-	PA-6I,6T	
CAS number	-	25750-23-6	
HISTORY			
Person to discover	-	Schlack, P	Schlack, P, US Patent 2,356,702, Alien Property Custodian, Aug. 22, 1944.
Date	-	1944	
Details	-	production of synthetic linear condensation polyamides	
SYNTHESIS			
Monomer(s) structure	-		
Monomer(s) CAS number(s)	-	124-09-4; 121-91-5; 100-21-0	
Monomer(s) molecular weight(s)	dalton, g/mol, amu	116.21; 166.13; 166.13	
Method of synthesis	-	manufactured by the condensation of hexamethylenediamine, terephthalic acid, and isophthalic acid such that 65 to 80 percent of the polymer units are derived from hexamethylene isophthalamide	
STRUCTURE			
Crystallinity	%	close to amorphous	
COMMERCIAL POLYMERS			
Some manufacturers	-	DuPont; EMS	
Trade names	-	Selar; Grivory	
PHYSICAL PROPERTIES			
Density at 20°C	g cm^{-3}	1.06-1.19	
Odor	-	odorless	
Melting temperature, DSC	°C	125-140	
Decomposition temperature	°C	340	
Thermal expansion coefficient, 23-80°C	10^{-4} $°C^{-1}$	0.6; 0.1-0.15 (20-60% glass fiber, parallel); 0.9-1 (20-60% glass fiber, normal)	
Glass transition temperature	°C	125-127	
Maximum service temperature	°C	70; 100-120 (20-60% glass fiber)	
Long term service temperature	°C	220 (20-60% glass fiber)	
Heat deflection temperature at 0.45 MPa	°C	115	
Heat deflection temperature at 1.8 MPa	°C	105; 230-235 (20-60% glass fiber)	
Volume resistivity	ohm-m	1E11 to 1E12; 1E12 (20-60% glass fiber)	
Surface resistivity	ohm	1-1.2E12; 1E13 (20-60% glass fiber)	

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Electric strength K20/P50, d=0.60.8 mm	kV mm^{-1}	27-35; (20-60% glass fiber)	
Comparative tracking index, CTI, test liquid A	-	575-600 (20-60% glass fiber)	
Permeability to oxygen, 25°C	cm^3 m^{-2} s^{-1} bar^{-1} 24 h^{-1}	10-30	
Permeability to water vapor, 25°C	g m^{-2} 24 h^{-1}	7	
MECHANICAL & RHEOLOGICAL PROPERTIES			
Tensile strength	MPa	85; 145-260 (20-60% glass fiber)	
Tensile modulus	MPa	3,000; 8,200-22,000 (20-60% glass fiber)	
Tensile stress at yield	MPa	100; 2-4 (20-60% glass fiber)	
Elongation	%	50-300	
Tensile yield strain	%	5	
Tear strength	N m^{-1}	50	
Charpy impact strength, unnotched, 23°C	kJ m^{-2}	NB to 50-80; 50-90 (20-60% glass fiber)	
Charpy impact strength, unnotched, -30°C	kJ m^{-2}	35-80 (20-60% glass fiber)	
Charpy impact strength, notched, 23°C	kJ m^{-2}	6.9-11; 7-14 (20-60% glass fiber)	
Charpy impact strength, notched, -30°C	kJ m^{-2}	2-8; 6-13 (20-60% glass fiber)	
Ball indention hardness at 358 N/30 S (ISO 2039-1)	MPa	145; 225-315 (20-60% glass fiber)	
Shrinkage	%	0.3-0.5; 0.1-0.8 (20-60% glass fiber)	
Intrinsic viscosity, 25°C	dl g^{-1}	0.72-0.82	
Melt volume flow rate (ISO 1133, procedure B), 275°C/5 kg	cm^3/10 min	25	
Melt index, 230°C/3.8 kg	g/10 min	12-100	
Water absorption, equilibrium in water at 23°C	%	7; 3.5-5 (20-60% glass fiber)	
Moisture absorption, equilibrium 23°C/50% RH	%	2; 1.2-1.5 (20-60% glass fiber)	
CHEMICAL RESISTANCE			
Acid dilute/concentrated	-	not resistant	
Alcohols	-	resistant to higher alcohols	
Alkalis	-	resistant (dilute	
Aliphatic hydrocarbons		resistant	
Aromatic hydrocarbons	-	resistant	
FLAMMABILITY			
Volatile products of combustion	-	aldehydes, ammonia, CO, CO_2, oxides of nitrogen	
UL 94 rating	-	V-2; HB (20-60% glass fiber)	

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TOXICITY			
Carcinogenic effect	-	not listed by ACGIH, NIOSH, NTP	
PROCESSING			
Typical processing methods	-	extrusion, coextrusion, injection molding, blow molding	
Processing temperature	°C	240-250; 310 (max)	
Applications	-	appliance components, automotive parts, blown containers, cast film, cosmetic packaging, flexible and rigid packaging, paper coatings, tubing	
Outstanding properties	-	transparency, barrier properties to gases water and solvents	
BLENDS			
Suitable polymers	-	other PA	