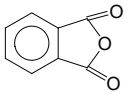
DAP poly(diallyl phthalate)

PARAMETER	UNIT	VALUE	REFERENCES
GENERAL			
Common name	-	poly(diallyl phthalate)	
CAS name	-	1,2-benzenedicarboxylic acid, di-2-propenylester, homopolymer	
Acronym	-	DAP	
CAS number	-	25053-15-0	
HISTORY			
Person to discover	-	Dannenberg, H; Adelson, D E	Dannenberg, H; Adelson, D E, US Patent 2,294,286, Shell, Aug. 25, 1942.
Date	-	1942	
SYNTHESIS			
Monomer(s) structure	-	 $CH_3CH_2CH_2OH$	
Monomer(s) CAS number(s)	-	85-44-9; 71-23-8	
Monomer(s) molecular weight(s)	dalton, g/mol, amu	148.1; 60.1	
Method of synthesis	-	obtained by polycondensation of phthalic anhydride and propylene alcohol	
Mass average molecular weight, M_w	dalton, g/mol, amu	65,000	
Polydispersity, M_w/M_n	-	5.9	
COMMERCIAL POLYMERS			
Some manufacturers	-	Cosmic; Rogers	
Trade names	-	DAP; DAP	
PHYSICAL PROPERTIES			
Density at 20°C	g cm^{-3}	1.22	
Color	-	white, off-white	
Refractive index, 20°C	-	1.572	
Odor	-	odorless	
Melting temperature, DSC	°C	80-110	
Softening point	°C	175	
Decomposition temperature	°C	260	Gu, A, Polym. Plast. Technol. Eng., 45, 8, 957-61, 2006.
Thermal expansion coefficient, 23-80°C	10^{-4} $°C^{-1}$	0.4	
Thermal conductivity, melt	W m^{-1} K^{-1}	0.6	
Glass transition temperature	°C	150-206	
Maximum service temperature	°C	177-204	
Long term service temperature	°C	150-180	
Heat deflection temperature at 0.45 MPa	°C	138-143	

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Heat deflection temperature at 1.8 MPa	°C	143	
Dielectric constant at 1 kHz/1 MHz	-	3.4-3.5/3.1-3.6	
Relative permittivity at 1 MHz	-	5.2	
Dissipation factor at 1 kHz	E-4	80-160	
Dissipation factor at 1 MHz	E-4	120-210	
Volume resistivity	ohm-m	1E8	
Surface resistivity	ohm	1E10	
Electric strength K20/P50, d=0.60.8 mm	kV mm^{-1}	14	
Arc resistance	s	125	
MECHANICAL & RHEOLOGICAL PROPERTIES			
Tensile strength	MPa	21-35	
Tensile stress at yield	MPa	29	
Flexural strength	MPa	70-76	
Compressive strength	MPa	150-200	
Young's modulus	MPa	10,000-15,000	
Izod impact strength, notched, 23°C	J m^{-1}	35-160	
Shrinkage	%	0.1-1.2	
Water absorption, 24h at 23°C	%	0.12-0.4	
FLAMMABILITY			
UL 94 rating	-	HB	
TOXICITY			
Carcinogenic effect	-	not listed by ACGIH, NIOSH, NTP	
PROCESSING			
Typical processing methods	-	injection molding	
Processing temperature	°C	135-166	
Processing pressure	MPa	3.5-55 (injection)	
Additives used in final products	-	Fillers: mineral, glass fibers, polyamide fibers	
Applications	-	aviation, automotive, electronic, electrical, instrumentation industries, machinery, textile industry, production of transistors, resistors and tubes, computers, insulating materials	
Outstanding properties	-	dimensional stability, ease of molding, electrical properties	
BLENDS			
Suitable polymers	-	PMMA, PVAC, PVC (process aid)	