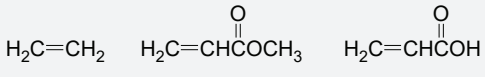
EMA-AA poly(ethylene-co-methyl acrylate-co-acrylic acid)

PARAMETER	UNIT	VALUE	REFERENCES
GENERAL			
Common name	-	poly(ethylene-co-methyl acrylate-co-acrylic acid)	
Acronym	-	EMA-AA	
CAS number	-	41525-41-1	
SYNTHESIS			
Monomer(s) structure	-		
Monomer(s) CAS number(s)	-	74-85-1; 96-33-3; 79-10-7	
Monomer(s) molecular weight(s)	dalton, g/mol, amu	28.05; 86.04; 72.06	
Methyl acrylate content	wt%	6.5-24.0	
Acrylic acid content	wt%	5-6.5	
Number average molecular weight, M_n	dalton, g/mol, amu	16,000	
Mass average molecular weight, M_w	dalton, g/mol, amu	2,000-68,000	
STRUCTURE			
Crystallinity	%	8.48-27	Cerezo, F T; Preston, C M L; Shanks, R A, Composites Sci. Tech., 67, 79-91, 2007; Preston, C M L; Amarasinghe, G; Hopewell, J L; Shanks, R A; Mathys, Z, Polym. Deg. Stab., 84, 533-44, 2004.
Rapid crystallization temperature	°C	53-56	
COMMERCIAL POLYMERS			
Some manufacturers	-	Arkema; DuPont; ExxonMobil	
Trade names	-	Lotader; Nucrel; Escor	
PHYSICAL PROPERTIES			
Density at 20°C	g cm^{-3}	0.92-0.94	
Color	-	clear to opaque, white to off-white	
Odor	-	odorless	
Melting temperature, DSC	°C	60-105	
Storage temperature	°C	20	
Vicat temperature VST/A/50	°C	40-87	
Acid number	mg KOH g^{-1}	45	
MECHANICAL & RHEOLOGICAL PROPERTIES			
Tensile strength	MPa	20-29 (MD); 22-28 (TD)	
Tensile stress at yield	MPa	10 (MD); 3.8 (TD)	
Elongation	%	200-370 (MD); 570-600 (TD)	
Flexural modulus	MPa	30	
Dart drop impact	g	200-600	
Elmendorf tear strength	g	70-420 (MD); 610-1100 (TD)	

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PARAMETER	UNIT	VALUE	REFERENCES
Puncture force	N	50	
Shore A hardness	-	64-80	
Shore D hardness	-	18-44	
Melt index, 190°C/2.16 kg	g/10 min	1.5-20	
FLAMMABILITY			
Ignition temperature	°C	316	
Heat release	kW m^{-2}	1,700	Preston, C M L; Amarasinghe, G; Hopewell, J L; Shanks, R A; Mathys, Z, Polym. Deg. Stab., 84, 533-44, 2004.
Heat of combustion	J g^{-1}	22,400	Preston, C M L; Amarasinghe, G; Hopewell, J L; Shanks, R A; Mathys, Z, Polym. Deg. Stab., 84, 533-44, 2004.
TOXICITY			
NFPA: Health, Flammability, Reactivity rating	-	1/1/0; 1/1/0 (HMIS)	
Carcinogenic effect	-	not listed by ACGIH, NIOSH, NTP	
Oral rat, LD_{50}	mg kg^{-1}	>5,000	
PROCESSING			
Typical processing methods	-	casting, coating, extrusion, laminating, molding	
Additives used in final products	-	antiblock; slip; thermal stabilizer	
Applications	-	adhesion promoter, compatibilizer, film, heat seal layer, lamination film, sealants, tie layers; wire & cable	
Outstanding properties	-	adhesion to polar and non-polar substrates, flexibility, thermal stability	