

# Property comparison and ranking guide

Eastman clear medical grade plastics



# Property comparison and ranking guide—Eastman clear medical grade plastics

Physical comparison	ASTM test method	DuraStar™ polymers			Estar™ copolyesters			
		MN611	MN621	MN631	MN058	MN021	MN211	MN006
<b>Physical properties</b>								
Clarity								
Haze (%)	D1003	0.3	0.3	<1	<1	1	0.3	<1.0
Transmittance (%)	D1003	91	91	92	82	84	91	92
Izod impact strength, notched @ 23°C (73°F), J/m (ft-lbf/in.)	D256	80 (1.5)	370 (7.0)	80 (1.5)	51 (1.0)	40 (0.8)	101 (1.9)	NB <sup>c</sup>
Flexural modulus, MPa (10 <sup>5</sup> psi)	D790	2000 (2.9)	1900 (2.8)	1900 (2.7)	2400 (3.5)	2500 (3.6)	2100 (3.0)	1800 (2.6)
Elongation @ break (%)	D638	300	310	270	90	120	110	330
Tensile stress @ break, MPa (psi)	D638	51 (7400)	53 (7700)	43 (6300)	24 (3500)	25 (3600)	28 (4100)	54 (7800)
Tensile stress @ yield, MPa (psi)	D638	47 (6900)	46 (6700)	50 (7200)	58 (8400)	58 (8400)	50 (7300)	44 (6300)
Heat deflection temperature @ 0.455 MPa (66 psi), °C (°F)	D648	74 (165)	73 (164)	70 (163)	69 (156)	69 (156)	70 (158)	73 (163)
Heat deflection temperature @ 1.82 MPa (264 psi), °C (°F)	D648	65 (149)	65 (149)	66 (150)	63 (145)	65 (149)	63 (145)	64 (147)
Specific gravity	D792	1.20	1.20	1.19	1.33	1.33	1.27	1.23
Vicat softening point, °C (°F)	D1525	—	—	86 (186)	80 (176)	—	85 (185)	88(190)
Thermal glass transition temperature, T <sub>g</sub> , °C (°F)	—	87 (189)	87 (189)	87 (189)	80 (176)	80 (176)	81 (178)	85 (185)
<b>Barrier</b>								
Oxygen	—	●	●	●	●	●	●	●
Water	—	●	●	●	●	●	●	●
<b>Processing</b>								
Drying temperature, °C (°F)	—	71 (160)	70 (160)	70 (160)	160 (320)	150–160 (300–320)	71 (160)	71 (160)
Drying time, hrs	—	3–4	3	4	4–6	4–6	4–6	6
Melt temperature, °C (°F)	—	232–277 (450–530)	250–290 (480–550)	230–280 (450–530)	277–293 (530–560)	275–295 (530–565)	249–271 (480–520)	249–271 (480–520)
Mold temperature, °C (°F)	—	16–38 (60–100)	15–30 (60–80)	15–30 (60–80)	16–32 (60–90)	10–30 (50–90)	16–38 (60–100)	16–38 (60–100)
Injection speeds	—	slow to moderate	slow to moderate	slow to moderate	slow to moderate	slow to moderate	slow to moderate	slow to moderate
<b>Product summary</b>								
<b>Sterilization</b>								
Gamma	—	●	●	●	●	●	●	●
EtO	—	●	●	●	●	●	●	●
E-beam	—	●	●	●	●	●	●	●
Gas plasma	—	●	●	●	●	●	●	●
Autoclave	—	○	○	○	○	○	○	○
<b>Joining</b>								
Solvent bonding	—	●	●	●	●	●	●	●
Ultrasonic bonding	—	●	●	●	●	●	●	●
Laser welding	—	●	●	●	●	●	●	●
Adhesives	—	●	●	●	●	●	●	●
Swaging (cold bending)	—	●	●	●	●	●	●	●
Radio frequency welding	—	○	○	○	○	○	○	○
Thermal bonding	—	○	○	○	○	○	○	○
<b>Process</b>								
Injection molded	—	●	●	●	●	●	●	●
Extrusion blow molded	—	○	○	○	○	○	●	○
Injection blow molded	—	●	●	●	○	●	●	○

<sup>a</sup>Not medical grade <sup>b</sup>Film properties <sup>c</sup>No break <sup>d</sup>With special additives <sup>e</sup>UL 94 V-2 flame rating

○ = Poor ● = Fair ● = Average ● = Good ● = Excellent

Injection molded properties

MB002	Eastman Tritan™ copolyester				Eastman Provista™ copolymer	Tenite™ cellulotics			Ecdel™ elastomers		
	MX711	MX731	MX811	MXF121 <sup>e</sup>	MP002	350A-14 <sup>a</sup>	360A-7	360A-16	9965	9966	9967
1.3	<1	<1	<1	—	1.3	<8.5	<8.5	<8.5	1 <sup>b</sup>	1 <sup>b</sup>	1 <sup>b</sup>
91	90	91	92	—	91	>90	>90	>90	93 <sup>b</sup>	93 <sup>b</sup>	94 <sup>b</sup>
NB <sup>c</sup>	980 (18.4)	860 (16.1)	650 (12.2)	416 (7.5)	NB <sup>c</sup>	416 (7.8)	203 (3.8)	>533 (>10)	NB <sup>c</sup>	NB <sup>c</sup>	NB <sup>c</sup>
1900 (2.7)	1550 (2.25)	1575 (2.28)	1585 (2.28)	1748 (2.53)	1900 (2.7)	1517 (2.2)	1862 (2.7)	1241 (1.8)	150 (2.2)	150 (2.2)	150 (2.2)
300	210	210	140	133	300	40	50	45	300	400	400
48 (7000)	53 (7700)	52 (7500)	53 (7700)	47 (6780)	48 (7000)	37 (5300)	41 (5900)	30 (4400)	20 (2900)	22 (3200)	23 (3300)
47 (6900)	43 (6200)	43 (6200)	44 (6400)	43 (6200)	47 (6900)	32 (4600)	41 (6000)	27 (3900)	14 (2030)	14 (2030)	13 (1900)
73 (163)	99 (210)	94 (201)	109 (228)	94 (201)	73 (163)	84 (183)	92 (198)	80 (176)	58 (136)	58 (136)	58 (136)
63 (145)	85 (185)	81 (178)	92 (198)	83 (181)	63 (145)	76 (169)	82 (180)	72 (162)	46 (115)	44 (111)	42 (108)
1.25	1.18	1.18	1.17	1.19	1.25	1.20	1.21	1.19	1.13	1.13	1.13
85 (185)	—	—	—	—	85 (185)	100 (212)	107 (225)	92 (198)	170 (338)	170 (338)	170 (338)
85 (185)	110 (212)	110 (212)	120 (248)	106 (223)	85 (185)	110 (230)	118 (244)	97 (207)	-3 (27)	-3 (27)	-3 (27)
●	●	●	●	●	●	○	○	○	●	●	●
●	●	●	●	●	●	○	○	○	○	○	○
70 (160)	88 (190)	88 (190)	88 (190)	88 (190)	70 (160)	70 (160)	70 (160)	70 (160)	65 (150)	65 (150)	65 (150)
4-6	4-6	4-6	4-6	4-6	4-6	4	4	4	4	4	4
220-235 (430-450)	260-282 (500-540)	260-282 (500-540)	260-282 (500-540)	260-282 (500-540)	210-225 (415-440)	200-225 (390-430)	200-225 (390-430)	200-225 (390-430)	225-260 (435-500)	225-260 (435-500)	225-260 (435-500)
5-32 (40-90)	38-66 (100-150)	38-66 (100-150)	38-66 (100-150)	38-66 (100-150)	15-40 (60-100)	55-60 (130-140)	55-60 (130-140)	55-60 (130-140)	50-80 (120-180)	50-80 (120-180)	50-80 (120-180)
slow to moderate	slow to moderate	slow to moderate	slow to moderate	slow to moderate	slow to moderate	slow to moderate	slow to moderate	slow to moderate	slow to moderate	slow to moderate	slow to moderate
●	●	●	●	●	●	●	●	●	●	●	●
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●	●	●	●	●	●	●	●	●	●	●	●
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●	●	●	●	●	●	●	●	●	○	○	○
●	●	●	●	●	●	●	●	●	● <sup>d</sup>	● <sup>d</sup>	● <sup>d</sup>
●	●	●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	○	○	○
○	○	○	○	○	○	○	○	○	●	●	●
○	○	○	○	○	○	○	○	○	●	●	●
●	●	●	●	●	●	●	●	●	●	●	●
●	○	○	●	○	●	○	○	○	●	●	●
●	●	●	●	●	●	○	○	○	●	●	●

# EASTMAN

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