



# **Technical Data Sheet**Eastman Spectar™ Clear Copolyester

## **Applications**

- Lenticular
- Liahtina
- Skylights
- Strapping

### **Key Attributes**

- Easy to print and decorate
- Excellent clarity
- · Excellent thermoforming characteristics
- Good chemical resistance
- Odorless
- Outstanding impact resistance
- Outstanding toughness allows downgauging
- Resists chipping and cracking
- Versatile easy to fabricate

### **Product Description**

Eastman Spectar™ Clear is a copolyester, developed by Eastman to achieve measurably improved sheet clarity and edge color while maintaining the performance characteristics for which Eastman Spectar™ copolyester has become known in the industry. It offers the thermoformability and ease of fabrication of Eastman Spectar™ copolyester along with significantly improved clarity. Eastman Spectar™ Clear also offers approximately double the notch impact strength, 50% higher instrumented impact strength and better chemical resistance when compared to traditional Spectar™ Copolyester.

This product has been GREENGUARD INDOOR AIR QUALITY CERTIFIED®.

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## **Typical Properties**

Property <sup>a</sup>	Test Method <sup>b</sup>	Typical Value, Units <sup>c</sup>
General		
Thickness of Sheet Tested		3 mm (0.118 in.)
Intrinsic Viscosity	EMN-A-AC-G-V-1	0.73
Density	D 1505	1.23 g/cm <sup>3</sup>
Water Absorption, 24 h immersion	D 570	0.19 %
<b>Electrical Properties</b>		
Arc Resistance	D 495	130 sec
Static Decay Rate	D 4470	Failed to Discharge
Surface Resistivity	D 257	10 <sup>17</sup> ohms/square
Volume Resistivity	D 257	10 <sup>16</sup> ohm∙cm
Mechanical Properties		
Tensile Strength @ Yield	D 638	48 MPa (6900 psi)
Tensile Strength @ Break	D 638	53 MPa (7700 psi)
Elongation @ Yield	D 638	5 %
Elongation @ Break	D 638	340 %
Tensile Modulus	D 638	1800 MPa (2.6 x 10 <sup>5</sup> psi)

Flexural Strength

Flexural Modulus	@ 5% strain	D 790	71 MPa (10300 psi)	
© 23°C (73°F)       D 4812       NB         © -30°C (-22°F)       NB         Izod Impact Strength, Notched       113 J/m (2.2 ft·lbf/in.)         © 0°C (32°F)       NB         © -30°C (-73°F)       D 256         ® 3 J/m (1.6 ft·lbf/in.)         Impact Resistance (Puncture), Energy @ Max. Load       42 J (30 ft·lbf)         © 0°C (32°F)       42 J (30 ft·lbf)         © 23°C (73°F)       D 3763       41 J (29 ft·lbf)         © -30°C (-22°F)       52 J (36 ft·lbf)         Rockwell Hardness, R Scale       D 785       107         Optical Properties         Haze       D 1003       0.5 %         Gloss       06°       D 2457       150         Total Transmittance       D 1003       91 %         Yellowness Index       E 313       0.81         Color       -0.15       0.34         a*       -0.15       0.34         L*       E 313       95.74         Thermal Properties         Deflection Temperature       0.455 MPa (66 psi)       77 °C (171 °F)         © 1.82 MPa (264 psi)       D 648       73 °C (163 °F)         Vicat Softening Temperature       D 1525       86 °C (187 °F)         C	Flexural Modulus	D 790	2000 MPa (2.9 x 10 <sup>5</sup> psi)	
© -30°C (-22°F) NB  Izod Impact Strength, Notched  © 0°C (32°F) 113 J/m (2.2 ft·lbf/in.)  © 23°C (73°F) D 256 NB  © -30°C (-22°F) 83 J/m (1.6 ft·lbf/in.)  Impact Resistance (Puncture), Energy © Max. Load  © 0°C (32°F) 42 J (30 ft·lbf)  © 23°C (73°F) D 3763 41 J (29 ft·lbf)  © 23°C (73°F) D 3763 52 J (36 ft·lbf)  Rockwell Hardness, R Scale D 785 107  Optical Properties  Haze D 1003 0.5 %  Gloss  © 60° D 2457 150  Total Transmittance D 1003 91 %  Yellowness Index E 313 0.81  Color  a* -0.15  b* 0.34  L* E 313 95.74  Thermal Properties  Deflection Temperature  © 0.455 MPa (66 psi) 73 °C (163 °F)  Vicat Softening Temperature D 1525 86 °C (187 °F)  Coefficient of Linear Thermal D 696 7.62 x 10⁻5 /°C (mm/mm·°C) (4.26 Expansion x 10°F)	Impact Strength, Unnotched			
Tool Impact Strength, Notched   @ 0°C (32°F)	@ 23°C (73°F)	D 4812	NB	
● 0°C (32°F)       113 J/m (2.2 ft-lbf/in.)         ● 23°C (73°F)       D 256         ● -30°C (-22°F)       83 J/m (1.6 ft-lbf/in.)         Impact Resistance (Puncture), Energy @ Max. Load       42 J (30 ft-lbf)         ● 0°C (32°F)       42 J (30 ft-lbf)         ● 23°C (73°F)       D 3763       41 J (29 ft-lbf)         ● -30°C (-22°F)       52 J (36 ft-lbf)         Rockwell Hardness, R Scale       D 785       107         Optical Properties         Haze       D 1003       0.5 %         Gloss       0 60°       D 2457       150         Total Transmittance       D 1003       91 %         Yellowness Index       E 313       0.81         Color       -0.15       5         a*       -0.15       0.34         L*       E 313       95.74         Thermal Properties         Deflection Temperature       0 0.455 MPa (66 psi)       77 °C (171 °F)         © 1.82 MPa (264 psi)       D 648       73 °C (163 °F)         Vicat Softening Temperature       D 1525       86 °C (187 °F)         Coefficient of Linear Thermal       D 696       7.62 x 10°-5 /°C (mm/mm·°C) (4.26         Expansion       x 10°-5 /°F (in./in.·°F)) <td>@ -30°C (-22°F)</td> <td></td> <td>NB</td>	@ -30°C (-22°F)		NB	
@ 23°C (73°F)       D 256       NB         @ -30°C (-22°F)       83 J/m (1.6 ft·lbf/in.)         Impact Resistance (Puncture), Energy @ Max. Load       42 J (30 ft·lbf)         @ 0°C (32°F)       41 J (29 ft·lbf)         @ 23°C (73°F)       D 3763       41 J (29 ft·lbf)         @ -30°C (-22°F)       52 J (36 ft·lbf)         Rockwell Hardness, R Scale       D 785       107         Optical Properties         Haze       D 1003       0.5 %         Gloss       © 60°       D 2457       150         Total Transmittance       D 1003       91 %         Yellowness Index       E 313       0.81         Color       a*       -0.15         b*       0.34       0.34         L*       E 313       95.74         Thermal Properties         Deflection Temperature       0.455 MPa (66 psi)       77 °C (171 °F)         © 1.82 MPa (264 psi)       D 648       73 °C (163 °F)         Vicat Softening Temperature       D 1525       86 °C (187 °F)         Coefficient of Linear Thermal       D 696       7.62 x 10⁻5 /°C (mm/mm·°C) (4.26 Expansion	Izod Impact Strength, Notched			
@ -30°C (-22°F)  Impact Resistance (Puncture), Energy @ Max. Load @ 0°C (32°F) @ 23°C (73°F) @ 23°C (73°F) D 3763 # 1 J (29 ft·lbf) @ -30°C (-22°F)  Rockwell Hardness, R Scale D 785  D 107  Optical Properties  Haze D 1003  Gloss @ 60° D 2457  Total Transmittance D 1003  Yellowness Index E 313  Color  a* -0.15 b* L* E 313  Deflection Temperature @ 0.455 MPa (66 psi) @ 0.455 MPa (66 psi) @ 0.455 MPa (264 psi) D 696  Vicat Softening Temperature D 1525  B 60° C (171°F) Coefficient of Linear Thermal D 696 Expansion  ** ** ** ** ** ** ** ** ** ** ** ** *	@ 0°C (32°F)			
Impact Resistance (Puncture), Energy @ Max. Load       42 J (30 ft·lbf)         @ 0°C (32°F)       41 J (29 ft·lbf)         @ 23°C (73°F)       52 J (36 ft·lbf)         @ -30°C (-22°F)       52 J (36 ft·lbf)         Rockwell Hardness, R Scale       D 785         Optical Properties         Haze       D 1003       0.5 %         Gloss       060°       D 2457       150         Total Transmittance       D 1003       91 %         Yellowness Index       E 313       0.81         Color       -0.15       0.34         b*       0.34       0.34         L*       E 313       95.74         Thermal Properties         Deflection Temperature       0 0.455 MPa (66 psi)       77 °C (171 °F)         © 1.82 MPa (264 psi)       D 648       73 °C (163 °F)         Vicat Softening Temperature       D 1525       86 °C (187 °F)         Coefficient of Linear Thermal       D 696       7.62 x 10⁻⁵ /°C (mm/mm·°C) (4.26         Expansion       x 10⁻⁵ /°F (in./in./ir.)F))	@ 23°C (73°F)	D 256		
© 0°C (32°F)       42 J (30 ft·lbf)         © 23°C (73°F)       D 3763       41 J (29 ft·lbf)         © -30°C (-22°F)       52 J (36 ft·lbf)         Rockwell Hardness, R Scale       D 785       107         Optical Properties         Haze       D 1003       0.5 %         Gloss       0.60°       D 2457       150         Total Transmittance       D 1003       91 %         Yellowness Index       E 313       0.81         Color       -0.15       0.34         b*       0.34       0.34         L*       E 313       95.74         Thermal Properties         Deflection Temperature       0.455 MPa (66 psi)       77 °C (171 °F)         © 1.82 MPa (264 psi)       D 648       73 °C (163 °F)         Vicat Softening Temperature       D 1525       86 °C (187 °F)         Coefficient of Linear Thermal       D 696       7.62 x 10 <sup>-5</sup> /°C (mm/mm·°C) (4.26         Expansion       x 10 <sup>-5</sup> /°F (in./in./in./er))	@ -30°C (-22°F)		83 J/m (1.6 ft·lbf/in.)	
@ 23°C (73°F)				
@ -30°C (-22°F)       52 J (36 ft·lbf)         Rockwell Hardness, R Scale       D 785       107         Optical Properties         Haze       D 1003       0.5 %         Gloss       0.60°       D 2457       150         Total Transmittance       D 1003       91 %         Yellowness Index       E 313       0.81         Color       -0.15       0.34         L*       E 313       95.74         Thermal Properties         Deflection Temperature       0.455 MPa (66 psi)       77 °C (171 °F)         © 1.82 MPa (264 psi)       D 648       73 °C (163 °F)         Vicat Softening Temperature       D 1525       86 °C (187 °F)         Coefficient of Linear Thermal       D 696       7.62 x 10⁻5 /°C (mm/mm·°C) (4.26 Expansion				
Rockwell Hardness, R Scale         D 785         107           Optical Properties         Incompany of the properties           Haze         D 1003         0.5 %           Gloss         Incompany of the properties         Incompany of the properties           Total Transmittance         D 1003         91 %           Yellowness Index         E 313         0.81           Color         a*         -0.15           b*         0.34         -0.15           b*         0.34         95.74           Thermal Properties           Deflection Temperature         0.455 MPa (66 psi)         77 °C (171 °F)           © 1.82 MPa (264 psi)         D 648         73 °C (163 °F)           Vicat Softening Temperature         D 1525         86 °C (187 °F)           Coefficient of Linear Thermal         D 696         7.62 x 10⁻⁵ /°C (mm/mm·°C) (4.26 Expansion	•	D 3763	·	
Optical Properties           Haze         D 1003         0.5 %           Gloss         0 60°         D 2457         150           Total Transmittance         D 1003         91 %           Yellowness Index         E 313         0.81           Color         -0.15           b*         0.34           L*         E 313         95.74           Thermal Properties           Deflection Temperature         0 0.455 MPa (66 psi)         77 °C (171 °F)           © 1.82 MPa (264 psi)         D 648         73 °C (163 °F)           Vicat Softening Temperature         D 1525         86 °C (187 °F)           Coefficient of Linear Thermal         D 696         7.62 x 10⁻⁵ /°C (mm/mm·°C) (4.26           Expansion         x 10⁻⁵ /°F (in./in.·°F))	@ -30°C (-22°F)			
Haze       D 1003       0.5 %         Gloss       © 60°       D 2457       150         Total Transmittance       D 1003       91 %         Yellowness Index       E 313       0.81         Color       -0.15       0.34         b*       0.34       0.34         L*       E 313       95.74         Thermal Properties         Deflection Temperature       77 °C (171 °F)         © 1.82 MPa (66 psi)       77 °C (163 °F)         Vicat Softening Temperature       D 1525       86 °C (187 °F)         Coefficient of Linear Thermal       D 696       7.62 x 10⁻⁵ /°C (mm/mm·°C) (4.26         Expansion       x 10⁻⁵ /°F (in./in.·°F))		D 785	107	
Gloss	Optical Properties			
@ 60°       D 2457       150         Total Transmittance       D 1003       91 %         Yellowness Index       E 313       0.81         Color         a*       -0.15         b*       0.34         L*       E 313       95.74         Thermal Properties         Deflection Temperature       0.455 MPa (66 psi)       77 °C (171 °F)         @ 1.82 MPa (264 psi)       D 648       73 °C (163 °F)         Vicat Softening Temperature       D 1525       86 °C (187 °F)         Coefficient of Linear Thermal       D 696       7.62 x 10⁻⁵ /°C (mm/mm·°C) (4.26         Expansion       x 10⁻⁵ /°F (in./in.·°F))	Haze	D 1003	0.5 %	
Total Transmittance         D 1003         91 %           Yellowness Index         E 313         0.81           Color         -0.15           a*         -0.15           b*         0.34           L*         E 313         95.74           Thermal Properties           Deflection Temperature         77 °C (171 °F)           @ 0.455 MPa (66 psi)         77 °C (171 °F)           @ 1.82 MPa (264 psi)         D 648         73 °C (163 °F)           Vicat Softening Temperature         D 1525         86 °C (187 °F)           Coefficient of Linear Thermal         D 696         7.62 x 10⁻⁵ /°C (mm/mm·°C) (4.26           Expansion         x 10⁻⁵ /°F (in./in.·°F))	Gloss			
Yellowness Index         E 313         0.81           Color         -0.15           b*         0.34           L*         E 313         95.74           Thermal Properties           Deflection Temperature         77 °C (171 °F)           @ 0.455 MPa (66 psi)         77 °C (163 °F)           @ 1.82 MPa (264 psi)         D 648         73 °C (163 °F)           Vicat Softening Temperature         D 1525         86 °C (187 °F)           Coefficient of Linear Thermal         D 696         7.62 x 10⁻⁵ /°C (mm/mm·°C) (4.26 Expansion	@ 60°	D 2457		
Color       a*       -0.15         b*       0.34         L*       E 313       95.74         Thermal Properties         Deflection Temperature       77 °C (171 °F)         @ 0.455 MPa (66 psi)       77 °C (163 °F)         @ 1.82 MPa (264 psi)       D 648       73 °C (163 °F)         Vicat Softening Temperature       D 1525       86 °C (187 °F)         Coefficient of Linear Thermal       D 696       7.62 x 10⁻⁵ /°C (mm/mm·°C) (4.26         Expansion       x 10⁻⁵ /°F (in./in.·°F))	Total Transmittance	D 1003		
a*	Yellowness Index	E 313	0.81	
b* L* E 313  Thermal Properties  Deflection Temperature	Color			
L*       E 313       95.74         Thermal Properties         Deflection Temperature       0.455 MPa (66 psi)       77 °C (171 °F)         @ 1.82 MPa (264 psi)       D 648       73 °C (163 °F)         Vicat Softening Temperature       D 1525       86 °C (187 °F)         Coefficient of Linear Thermal Expansion       D 696       7.62 x 10⁻⁵ /°C (mm/mm·°C) (4.26 x 10⁻⁵ /°F (in./in.·°F))	a*		-0.15	
Thermal Properties           Deflection Temperature         (a) 0.455 MPa (66 psi)         77 °C (171 °F)           (a) 1.82 MPa (264 psi)         (b) 0.455 MPa (264 psi)         (c) 0.455 MPa (264 psi)           Vicat Softening Temperature         (c) 0.425 MPa (264 psi)         (c) 0.426 MPa (264 psi)           Vicat Softening Temperature         (c) 0.426 MPa (264 psi)         (c) 0.426 MPa (264 psi)           Vicat Softening Temperature         (c) 0.426 MPa (264 psi)         (c) 0.426 MPa (264 psi)           Vicat Softening Temperature         (c) 0.426 MPa (264 psi)         (c) 0.426 MPa (264 psi)           Vicat Softening Temperature         (c) 0.426 MPa (264 psi)         (c) 0.426 MPa (264 psi)           Vicat Softening Temperature         (c) 0.426 MPa (264 psi)         (c) 0.426 MPa (264 psi)           Vicat Softening Temperature         (c) 0.426 MPa (264 psi)         (c) 0.426 MPa (264 psi)           Vicat Softening Temperature         (c) 0.426 MPa (264 psi)         (c) 0.426 MPa (264 psi)           Vicat Softening Temperature         (c) 0.426 MPa (264 psi)         (c) 0.426 MPa (264 psi)           Vicat Softening Temperature         (c) 0.426 MPa (264 psi)         (c) 0.426 MPa (264 psi)           Vicat Softening Temperature         (c) 0.426 MPa (264 psi)         (c) 0.426 MPa (264 psi)           Vicat Softening Temperature         (c) 0.426 MPa (264 psi)	b*		0.34	
Deflection Temperature       @ 0.455 MPa (66 psi)       77 °C (171 °F)         @ 1.82 MPa (264 psi)       D 648       73 °C (163 °F)         Vicat Softening Temperature       D 1525       86 °C (187 °F)         Coefficient of Linear Thermal Expansion       D 696       7.62 x 10⁻⁵ /°C (mm/mm·°C) (4.26 x 10⁻⁵ /°F (in./in.·°F))		E 313	95.74	
@ 0.455 MPa (66 psi)       77 °C (171 °F)         @ 1.82 MPa (264 psi)       D 648       73 °C (163 °F)         Vicat Softening Temperature       D 1525       86 °C (187 °F)         Coefficient of Linear Thermal Expansion       D 696       7.62 x 10⁻⁵ /°C (mm/mm·°C) (4.26 x 10⁻⁵ /°F (in./in.·°F))	Thermal Properties			
@ 1.82 MPa (264 psi)       D 648       73 °C (163 °F)         Vicat Softening Temperature       D 1525       86 °C (187 °F)         Coefficient of Linear Thermal Expansion       D 696       7.62 x 10⁻⁵ /°C (mm/mm·°C) (4.26 mm/mm·°C)	Deflection Temperature			
Vicat Softening TemperatureD 152586 °C (187 °F)Coefficient of Linear Thermal ExpansionD 696 $7.62 \times 10^{-5}$ /°C (mm/mm·°C) (4.26	@ 0.455 MPa (66 psi)			
Coefficient of Linear Thermal D 696 $\times 10^{-5}$ /°C (mm/mm·°C) (4.26 Expansion $\times 10^{-5}$ /°F (in./in.·°F))	@ 1.82 MPa (264 psi)	D 648	,	
Expansion		D 1525		
· · · · · · · · · · · · · · · · · · ·		D 696	, , , , , , , , , , , , , , , , , , , ,	
UL Flammability Classification UL 94 HB	Expansion		x 10 <sup>-5</sup> /°F (in./in.·°F))	
	UL Flammability Classification	UL 94	НВ	

<sup>&</sup>lt;sup>a</sup>Unless noted otherwise, all tests are run at 23°C (73°F) and 50% relative humidity.

#### **Comments**

Properties reported here are based on limited testing. Eastman makes no representation that the material in any particular shipment will conform exactly to the values given.

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<sup>&</sup>lt;sup>b</sup>Unless noted otherwise, the test method is ASTM.

<sup>&</sup>lt;sup>c</sup>Units are in SI or US customary units.