

Vandar[®]

Thermoplastic Polyester Alloys

Short Term
Properties (VN-4)



Vandar®

Thermoplastic Polyester Alloys

Vandar® resins offer outstanding ductility and stiffness, combined with the excellent chemical and environmental resistance properties of thermoplastic polyester. These resins are easy to mold and retain their impact strength, even down to -20°F (-29°C).

Unfilled grades exhibit high impact while providing structural strength and stiffness. Vandar® 8000 is rated V-0 in the UL94 flammability test at 1/32 in. (0.79 mm). Reinforced grades have higher modulus and strength, while maintaining excellent toughness.

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The unreinforced and higher flexibility grades offer high impact with a flexibility between that of thermoplastics and elastomers.

Vandar® – Grade Characteristics

Grade	Description
2100	Unreinforced; high impact at low temperature, paintable, printable
2500	Unreinforced; high impact, good colorability, paintable
4602Z	Unreinforced; good chemical resistance and weatherability
6000	Unreinforced; toughened; excellent low temperature impact resistance
8000	Unreinforced; UL94 V-0 @ 1/32 in. (0.79 mm)
8929	Unreinforced; high flexibility
9116	Unreinforced; highest flexibility
2122	10% mineral filled; good dimensional stability
4612R	7% glass-fiber; high impact and toughness
4632Z	15% glass-fiber; high strength and stiffness
4662Z	30% glass-fiber; highest stiffness

Vandar® – Typical Molding Conditions

	All Grades Except 9829, 9116	Grades 8929, 9116
Cylinder Temperature, °F (°C)		
Rear	470 (243)	470 (243)
Center	480 (249)	480 (249)
Front	490 (254)	490 (254)
Nozzle	490 (254)	490 (254)
Melt Temperature, °F (°C)	470 – 510 (243 – 266)	470 – 510 (243 – 266)
Mold Temperature, °F (°C)	100 – 250 (38 – 121)	80 – 125 (27 – 52)
Injection Pressure, psi (MPa)		
First Stage	15,000 (103)	12,000 (83)
Second Stage	14,500 (100)	11,500 (80)
Screw Speed	30% of machine range (lower if glass reinforced)	
Back Pressure, psi (MPa)	Low, 0 – 50 (0 – 0.3) [none if glass reinforced]	
Cushion, in. (mm)	1/8 (3.2)	
Drying*	Dehumidifying hopper dryer for 3 – 4 hours @ 225°F (107°C) Pellet moisture content not to exceed 0.02%	

*It is extremely important to dry polyester based resins such as Vandar® Thermoplastic Polyester Alloys. Failure to properly dry this resin can lead to degradation during processing and loss of toughness and other physical properties. Desiccating bed hopper dryers capable of dewpoints of -20°F (-29°C) or lower are recommended.

Vandar® Thermoplastic Polyester Alloys – Typical Properties (ASTM)

Property	ASTM Method	Units S.I. (English)	Unreinforced Polymers		
			2100	2500	4602Z
Physical					
Specific Gravity	D792		1.23	1.25	1.25
Water Absorption: 24 hr. Immersion	D570	%	0.10	0.10	0.10
Mold Shrinkage†: Flow Direction @ 1/8 in. thickness		%	1.7 – 2.2	1.7 – 2.2	1.7 – 2.2
Mold Shrinkage†: Transverse Direction		%	1.7 – 2.2	1.7 – 2.2	1.7 – 2.2
Mechanical					
Tensile Strength	D638	MPa (psi)	43 (6,300)	34 (4,900)	34 (5,000)
Elongation at Break	D638	%	150	100	180
Flexural Strength	D790	MPa (psi)	60 (8,700)	50 (7,200)	50 (7,100)
Flexural Modulus	D790	MPa (psi)	1931 (280,000)	1448 (210,000)	1517 (220,000)
Notched Izod Impact @ 23°C (73°F)	D256	J/m (ft-lbs/in.)	NB	NB	NB
Notched Izod Impact @ -29°C (-20°F)	D256	J/m (ft-lbs/in.)	160 (3.0)	133 (2.5)	96 (1.8)
Rockwell Hardness	D785	R Scale	109	104	101
Thermal/Flammability					
Heat Distortion Temperature @ 66 psi	D648	°C (°F)	104 (220)	127 (260)	93 (200)
Heat Distortion Temperature @ 264 psi	D648	°C (°F)	49 (120)	52 (125)	52 (125)
Flammability Rating (UL94) @ 1/16 in.*			HB	HB	HB

*Flammability ratings are based on Ticona laboratory testing except for grades 2100, 4632Z and 8000 which were tested at Underwriters Laboratories facilities.

†Shrinkage values are to be used as a guide only.

Vandar® Thermoplastic Polyester Alloys – Typical Properties (ISO)

Property	ISO Method	Units	Unreinforced Polymers		
			2100	2500	4602Z
Mechanical					
Tensile Strength at Break	527	MPa	40	35	40
Flexural Strength	178	MPa	60	50	45
Flexural Modulus	178	MPa	1800	1500	1400
Notched Izod Impact @ 23°C	180	kJ/m ²	NB	NB	NB
Rockwell Hardness	2039	R Scale	109	104	101
Thermal					
Distortion Temperature Under Load (DTUL)					
@ 0.45 MPa	75	°C	90	125	102
@ 1.8 MPa	75	°C	50	50	47

††Partial break as defined by ISO Test Method 180.

Unreinforced and Toughened	Unreinforced and Flame-Retarded	Unreinforced and Higher Flexibility		Mineral Filled	Glass Reinforced Polymers		
		6000	8000		8929	9116	2122
—	1.31	1.18	1.14	1.30	1.30	1.34	1.47
—	0.10	0.10	0.10	0.10	0.10	0.11	0.11
—	—	1.5 – 2.0	1.1 – 1.6	1.3 – 1.5	0.6 – 0.8	0.4 – 0.6	0.3 – 0.5
—	—	1.5 – 2.0	1.1 – 1.6	1.3 – 1.5	1.2 – 1.4	1.2 – 1.4	1.2 – 1.4
44 (6,400)	34 (5,000)	22 (3,200)	19 (2,750)	44 (6,400)	50 (7,200)	62 (9,000)	83 (12,000)
185	50	180	350	80	8.0	5.0	4.5
61 (8,900)	59 (8,500)	28 (4,000)	11 (1,650)	63 (9,200)	85 (12,400)	97 (14,000)	131 (19,000)
1793 (260,000)	1792 (260,000)	758 (110,000)	310 (45,000)	2241 (325,000)	2724 (395,000)	3448 (500,000)	6378 (925,000)
694 (13)	NB	NB	NB	160 (3.0)	160 (3.0)	149 (2.8)	219 (4.1)
—	—	128 (2.4)	NB	58 (1.0)	48 (0.9)	59 (1.1)	96 (1.8)
—	105	—	—	104	111	109	112
—	116 (240)	—	—	132 (270)	193 (379)	207 (405)	214 (417)
—	54 (130)	—	—	49 (120)	77 (170)	154 (309)	190 (374)
—	V-0 @ 1/32 in.	HB	HB	HB	HB	HB	HB

Unreinforced and Toughened	Unreinforced and Flame-Retarded	Unreinforced and Higher Flexibility		Mineral Filled	Glass Reinforced Polymers		
		6000	8000		8929	9116	2122
35	30	25	20	30	45	60	80
55	30	30	15	55	75	100	130
1600	1650	800	400	1900	2700	3800	6700
56P††	NB	NB	NB	15	13	17	21
106	105	N/A	N/A	104	111	109	112
74 106	127 52	70 50	54 43	128 53	200 92	210 154	218 175

Vandar® – Typical Areas of Application

Application Areas

Benefits

Appliances

- Lids
 - Power Tool Housings
 - Panels
- Excellent chemical resistance
 - Outstanding impact strength
 - Sublimation printing possible
-

Automotive

- Brake and fuel-line clips
 - Bumper facias
 - Headlamp bezels/covers
 - Strut dust covers
 - Vertical body parts
 - Wheel covers
- Excellent chemical resistance
 - Outstanding impact resistance
 - Negligible moisture absorption
 - Excellent environmental and temperature resistance
 - Dimensional stability
 - Class A paintable surface
-

Electrical/Electronic

- Telephone-line splice cases
 - Switches
 - Connectors
 - Housings
- UL94 V-0 rating
 - Excellent surface finish
 - Colorable
 - Good environmental resistance
-

Furniture

- Seat backs and bottoms
 - Kick panels
 - End caps
 - Lateral panels
- Structural strength and stiffness
 - Outstanding impact strength
 - Good processability
 - Dimensional stability
-

Lawn and Garden

- Air cleaner housings
 - Shrouds
 - Tractor hoods and panels
- Good environmental and chemical resistance
 - Outstanding impact strength
 - Good processability
 - Dimensional stability
-

Recreation

- Ski boots
 - Jet ski hulls
 - Snowmobile and golf cart cowls
 - Ski tops
- Excellent low temperature impact resistance
 - High strength and toughness
 - Excellent chemical and environmental resistance
 - Sublimation printing possible
-

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Vandar® thermoplastic polyester alloys are not intended for use in medical or dental implants.

Products Offered by Ticona

Celcon® and **Hostaform®** acetal copolymer (POM)

Celanese® Nylon 6/6

Celanex® thermoplastic polyester

Impet® thermoplastic polyester

Vandar® thermoplastic polyester alloys

Riteflex® thermoplastic polyester elastomer

Celstran®, **Fiberod®**, and **Compel®** long fiber reinforced thermoplastics

Encore® recycled thermoplastic molding resins

Fortron® polyphenylene sulfide (PPS)

GUR® ultra-high molecular weight polyethylene (UHMWPE)

GHR® specialty high density polyethylene (HDPE)

Topas® cyclic olefin copolymer (COC)

Vectra® liquid crystal polymer (LCP)

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