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WANHUA CHEMICAL
GROUP CO., LTD.

www.whchem.com

Polycarbonate Resins & Compounds / Blends

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Performance Material Business Unit

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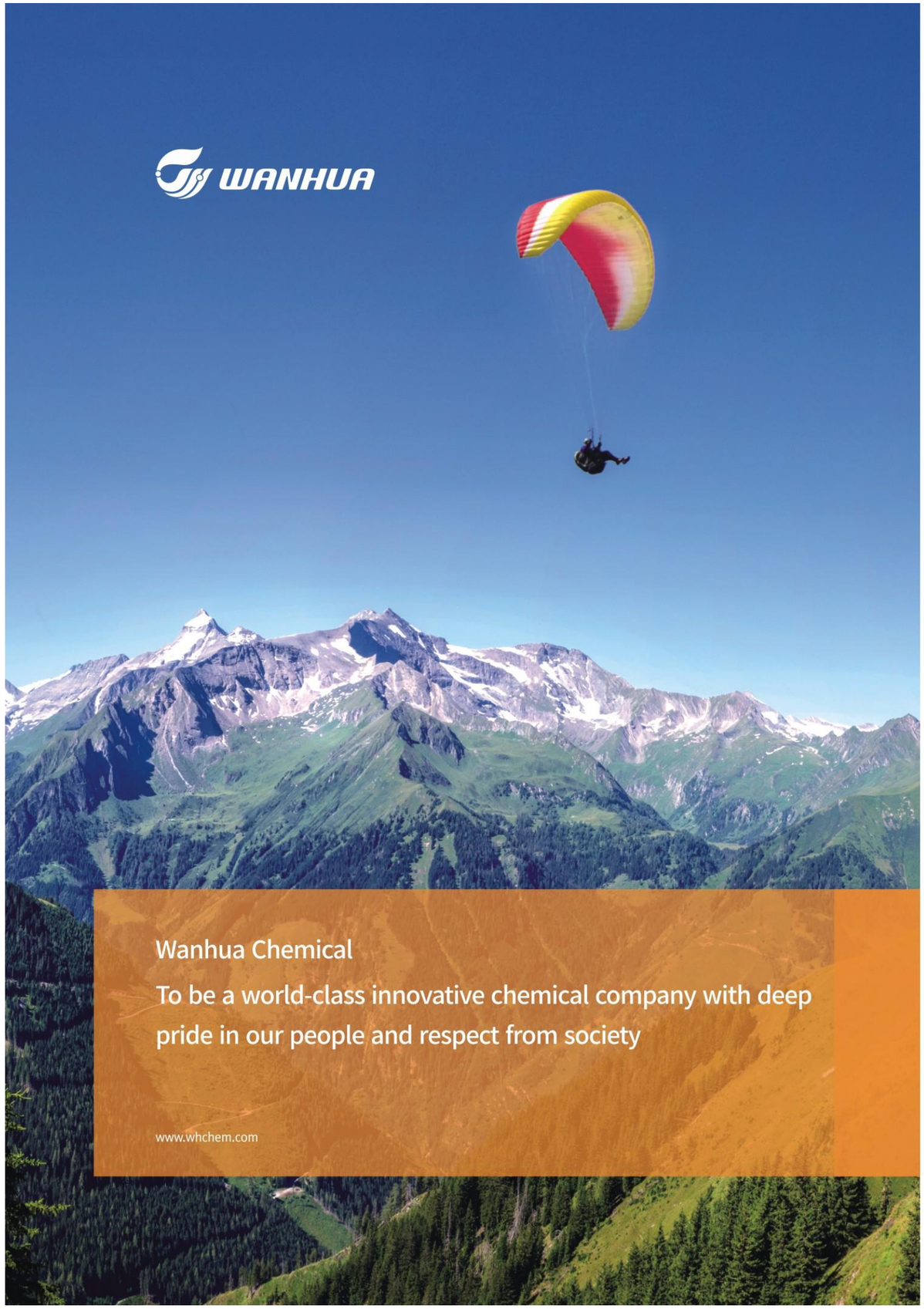
Product Brochure

WeChat

Innovation Creates Excellence



Contents

About Us

Established in 1998 & listed on the Shanghai Stock Exchange in 2001 (Stock No. 600309).

Headquartered in Yantai, Shandong Province; 3 integrated manufacturing sites in Yantai, Ningbo and Hungary; 10+ subsidiaries and offices in Americas, Europe, Japan and India, etc. 8900+ employees.

Dedicated to R&D, production and sales of PU related products, petrochemicals, functional materials and specialty chemicals.

Focusing on customers' needs and innovation; implementing integrated, diversified and refined development strategy in high-tech and high value-added chemicals & materials; committed to growing into world-class chemical company with global operation.

Business Scope

Polyurethanes

- MDI
- TDI
- Polyol
- System House
- MDI/TDI Variant

Petrochemicals

- Propylene
- PO
- MTBE
- AA+AE
- Butanol
- MMA
- SM
- PE
- PVC
- PP

Performance Chemical Materials

- PUD
- PA Emulsion
- TPU
- SAP
- ADI Series
- Specialty Amines Series
- PC Resins/PC Blends
- PMMA
- C3/C4

Global Network

Headquarters · Production Site · R&D Center · Sales Office

Awards & Honors

2007

The first prize of National Science and Technology Progress

2008

National Environment-friendly Project

2010

The second prize of National Science and Technology Progress

2011

China Grand Awards for Industry-Recognition Award

2012

Top 100 Innovative Companies in China

2015

Shandong Governor Quality Award

2009-2017

Five consecutive sessions Award for Hewitt Best Employers in China

Product Portfolio

Wanhua Chemical PC product line includes base resins and compounds/blends. Polycarbonate is an engineering thermoplastic which exhibits outstanding transparency. It shows excellent toughness, heat resistance, dimensional stability and electrical insulation over a wide temperature range, and further functionalization could be realized by compounding. PC series are suitable for injection molding and extrusion, widely used in electronics/electrical, household appliances, construction, automotive, lighting, security & protection, consumer products and medical sectors.

Polycarbonate Resins & Compounds/Blends

- **CLARNATE®**

  PC Resin

- **WanBlend®**

  Flame Retardant PC、Glass Fiber Reinforced PC、Light Diffusion PC、PC/ABS、PC/Polyester、PC/ASA

CLARNATE® General Purpose PC Series

CLARNATE® General Purpose PC Series, in pellet or powder form, cover low to high viscosity with easy release and/or UV stabilized functions, suitable for injection molding and extrusion, widely used in electronics/electrical, household appliances, automotive, construction, security & protection and consumer products sectors.

Features

- Outstanding optical transparency
- Outstanding mechanical properties
- Excellent heat resistance
- Excellent dimensional stability
- Extensive coloring solutions

Applications

- Electronics & Electrical appliances
- Luminaires
- Optical lens
- Furniture & Housewares
- Sheets & Films
- Consumer goods

Typical Values

Properties	Standards	Test Conditions	Units	Product Grades												
				Powder				Pellet								
				Low Viscosity	Medium Viscosity		High Viscosity	Low Viscosity		Medium Viscosity					High Viscosity	
				2220	2150	2100	2070	A1225	A1227	A1150	A1155	A1100	A1105	A1107	A1073	A1077
Physical Properties																
Melt flow rate	ASTM D1238	300°C; 1.2kg	g/10min	20	13	9	7	20	20	13	13	9	9	9	7	7
Density	ASTM D792	23°C	g/cm³	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Water absorption	ASTM D570	23°C	%	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Mold shrinkage	ASTM D955	2mm flow	%	0.5~0.7	0.5~0.7	0.5~0.7	0.5~0.7	0.5~0.7	0.5~0.7	0.5~0.7	0.5~0.7	0.5~0.7	0.5~0.7	0.5~0.7	0.5~0.7	0.5~0.7
Mechanical Properties																
Tensile modulus	ASTM D638	1mm/min	MPa	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300
Tensile strength	ASTM D638	50mm/min	MPa	68	70	72	72	68	68	70	70	72	72	70	72	72
Strain at break	ASTM D638	50mm/min	%	120	120	120	120	120	120	120	120	120	120	120	120	120
Flexural modulus	ASTM D790	2mm/min	MPa	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300
Flexural strength	ASTM D790	2mm/min	MPa	97	96	96	96	97	98	96	97	96	97	98	96	98
Izod notched impact strength	ASTM D256	23°C	J/m	720	750	800	860	720	650	750	750	800	800	780	860	840
Thermal Properties																
Heat distortion temperature	ASTM D648	1.82MPa; 120°C/h	°C	127	128	130	130	127	127	128	128	130	130	128	130	129
Vicat softening temperature	ASTM D1525	50N; 120°C/h	°C	147	148	150	151	147	146	148	148	150	150	149	151	150
Optical Properties																
Haze	ASTM D1003	3mm	%	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Transmission	ASTM D1003	3mm	%	89	89	89	89	89	89	89	89	89	89	89	89	89
Flame Retardant Properties																
Flammability	UL94	3.0mm	Class	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB
Other Properties																
Features				Compounding	Compounding	Compounding	Compounding	Easy release Injection molding	Easy release UV stabilized Injection molding	Compounding	Easy release Injection molding	Compounding	Easy release Injection molding	Easy release UV stabilized Extrusion molding	UV stabilized Extrusion molding	Easy release UV stabilized Extrusion molding

The listed values are for reference only.

WanBlend® Flame Retardant PC Series

WanBlend® Flame Retardant PC Series can satisfy flame retardantratings of UL94 V-0(3.0mm) and V-0(1.5mm), available in transparent and opaque colors, mainly used in electronics/electrical sector and other applications with flame retardant requirement.

Features

- Excellent flame resistance
- Halogen free flame retardancy
- Fulfill the glow-wire flammability test
- Excellent mechanical properties
- Good processability
- Multiple colors for selection

Applications

- Switch panel
- Socket
- Flame retardant sheet
- Flame retardant film

Typical Values

Properties	Standards	Test Conditions	Units	Product Grades					
				FR2820	FR3820	FR3730	FR3711	FR3540	FR4330
Physical Properties									
Melt flow rate	ASTM D1238	300°C; 1.2kg	g/10min	11	11	18	10	22	19
Density	ASTM D792	23°C	g/cm³	1.20	1.20	1.20	1.19	1.19	1.19
Mold shrinkage	ASTM D955	2mm flow	%	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7
Mechanical Properties									
Tensile modulus	ASTM D638	1mm/min	MPa	2300	2300	2150	2100	2200	2150
Tensile strength	ASTM D638	50mm/min	MPa	65	65	62	65	62	60
Strain at break	ASTM D638	50mm/min	%	⩾80	⩾80	⩾80	⩾80	⩾80	⩾80
Flexural modulus	ASTM D790	2mm/min	MPa	2300	2300	2100	2200	2100	2100
Flexural strength	ASTM D790	2mm/min	MPa	90	90	90	90	90	90
Izod notched impact strength	ASTM D256	23°C	J/m	740	740	650	750	550	650
Thermal Properties									
Heat distortion temperature	ASTM D648	1.82MPa; 120°C/h	°C	127	126	122	120	110	96
Vicat softening temperature	ASTM D1525	50N; 120°C/h	°C	146	146	145	135	130	110
Flame Retardant Properties									
Flammability	UL94	0.75mm	Class	—	—	—	—	—	V-0
		1.5mm	Class	—	V-0	V-0	V-0	V-0	V-0
		3.0mm	Class	V-0	V-0	V-0	V-0	V-0	V-0
Electrical Properties									
Surface resistivity	ASTM D257	—	Ω	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16
Volume resistivity	ASTM D257	—	Ω•cm	1.0E+17	1.0E+17	1.0E+17	1.0E+17	1.0E+17	1.0E+17
Other Properties									
Features				Transparent	Flame retardant	Flame retardant	Flame retardant Low-temperature impact resistence	Flame retardant High flow	High flame retardant

The listed values are for reference only.

WanBlend® Glass Fiber Reinforced PC Series

WanBlend® PC/GF Series have high stiffness and outstanding dimensional stability, mainly used in household appliances and electronics/electrical products.

Features

- High stiffness and modulus
- High heat resistance
- Excellent dimensional stability
- Excellent processability

Applications

- Display frame
- Guide stand
- Smart meter housing
- Mobile phone rear cover

Typical Values

Properties	Standards	Test Conditions	Units	Product Grades					
				GF1110	GF1130	GF1111	GF2120	GF3130	GF2210
Physical Properties									
Melt flow rate	ASTM D1238	300°C; 1.2kg	g/10min	8	19	9	12	18	6.5
Density	ASTM D792	23°C	g/cm³	1.27	1.26	1.26	1.27	1.26	1.34
Mold shrinkage	ASTM D955	Vertical	%	0.3-0.5	0.3-0.5	0.3-0.5	0.3-0.5	0.3-0.5	0.3-0.5
		Parallel	%	0.4-0.6	0.4-0.6	0.4-0.6	0.4-0.6	0.4-0.6	0.4-0.6
Mechanical Properties									
Tensile modulus	ASTM D638	1mm/min	MPa	4100	4000	3800	4100	4300	5800
Tensile strength	ASTM D638	5mm/min	MPa	75	55	50	62	62	104
Strain at break	ASTM D638	5mm/min	%	4	8	10	4	4	1.8
Flexural modulus	ASTM D790	2mm/min	MPa	3600	3600	3400	3900	4000	5600
Flexural strength	ASTM D790	2mm/min	MPa	110	90	85	105	100	180
Izod notched impact strength	ASTM D256	23°C	J/m	90	200	300	85	75	165
Thermal Properties									
Heat distortion temperature	ASTM D648	1.82MPa; 120°C/h	°C	135	132	134	140	108	141
Vicat softening temperature	ASTM D1525	50N; 120°C/h	°C	152	141	148	148	130	150
Flame Retardant Properties									
Flammability	UL94	1.5mm	Class	—	—	—	—	V-0	—
		3.0mm	Class	V-2	V-2	V-2	V-0	V-0	V-0
Electrical Properties									
Surface resistivity	ASTM D257	—	Ω	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16
Volume resistivity	ASTM D257	—	Ω•cm	1.0E+17	1.0E+17	1.0E+17	1.0E+17	1.0E+17	1.0E+17
Other Properties									
Features				Standard	High flow Medium impact resistant	Medium impact resistant	Flame retardant	Flame retardant	High GF content

The listed values are for reference only.

WanBlend® Light Diffusion PC Series

WanBlend® Light Diffusion PC Series range from high transmission to high diffusion grades, and achieve excellent balance between light diffusion and transmission, making the light bright and uniform. It is applicable to injection molding and extrusion, mainly used in lighting, advertising appliances and decoration fields.

Features

- Balanced optical performance
- Excellent mechanical properties
- Excellent color stability
- Good appearance
- Excellent processability

Applications

- Tube
- Lamp shade
- Light box
- Light diffusion film

Typical Values

Properties	Standards	Test Conditions	Units	Product Grades					
				LD1811	LD1812	LD1833	LD3711	LD3712	LD3713
Physical Properties									
Melt flow rate	ASTM D1238	300°C; 1.2kg	g/10min	10	10	20	10	10	10
Density	ASTM D792	23°C	g/cm³	1.20	1.20	1.20	1.20	1.20	1.20
Mold shrinkage	ASTM D955	2mm flow	%	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7
Mechanical Properties									
Tensile modulus	ASTM D638	1mm/min	MPa	2400	2400	2400	2400	2400	2400
Tensile strength	ASTM D638	50mm/min	MPa	66	66	66	66	66	66
Strain at break	ASTM D638	50mm/min	%	⩾50	⩾50	⩾50	⩾50	⩾50	⩾50
Flexural modulus	ASTM D790	2mm/min	MPa	2300	2300	2300	2300	2300	2300
Flexural strength	ASTM D790	2mm/min	MPa	98	98	98	98	98	98
Izod notched impact strength	ASTM D256	23°C	J/m	750	750	750	750	750	750
Thermal Properties									
Heat distortion temperature	ASTM D648	1.82MPa; 120°C/h	°C	130	130	128	122	122	122
Vicat softening temperature	ASTM D1525	50N; 120°C/h	°C	148	148	148	144	144	144
Optical Properties									
Transmission	ASTM D1003	2mm	%	47	53	82	49	52	56
Haze	ASTM D1003	2mm	%	99	99	99	99	99	99
Flame Retardant Properties									
Flammability	UL94	1.5mm	Class	—	—	—	V-0	V-0	V-0
		3.0mm	Class	V-2	V-2	V-2	V-0	V-0	V-0
Other Properties									
Features				High diffusion	Medium diffusion	High transmission	Flame retardant High diffusion	Flame retardant Medium diffusion	Flame retardant Medium diffusion

The listed values are for reference only.

WanBlend® PC/ABS Series

WanBlend® PC/ABS Series include general purpose, low VOC, electroplating, flame retardant & filled, high gloss and low gloss grades, which have RoHS and Reach certificates and exhibit excellent comprehensive performance, widely used in automotive, electronics/electrical, household appliances and OA equipment sectors.

Features

- Excellent ductility over wide temperature
- High heat resistance
- Halogen free flame retardancy
- Improved processability
- Multiple colors for selection

Applications

- Automotive interior and exterior
- Housings
- Suitcase
- Electric vehicle charging station

Typical Values

Properties	Standards	Test Conditions	Units	Product Grades																		
				General Purpose PC/ABS					Low VOC PC/ABS			Electroplating PC/ABS		High Gloss PC/ABS	Low Gloss PC/ABS	Flame Retardant PC/ABS			Flame Retardant & Filled PC/ABS			
				CA 1450	CA 1530	CA 1560	CA 1630	CA 1730	CA 1356	CA 1566	CA 1756	CA 1310PG	CA 1510PG	CA 1741HG	CA 1741LG	CA 3150	CA 3250	CA 3350	CA 8210	CA 8230	CA 8240	CA 8410
Physical Properties																						
Melt flow rate	ASTM D1238	260°C; 5kg	g/10min	12	12	19	12	12	25	24	20	18	14	22	18	—	—	—	—	—	—	—
		260°C; 2.16kg	g/10min	—	—	—	—	—	—	—	—	—	—	—	—	25	17	14	10	8	6	10
Density	ASTM D792	23°C	g/cm³	1.11	1.13	1.13	1.14	1.14	1.08	1.11	1.14	1.08	1.09	1.15	1.13	1.15	1.18	1.19	1.22	1.30	1.34	1.22
Mold shrinkage	ASTM D955	2mm flow	%	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.8	0.5-0.8	0.5-0.8	0.5-0.8
Mechanical Properties																						
Tensile modulus	ASTM D638	1mm/min	MPa	2400	2400	2400	2400	2450	2300	2300	2300	2000	2100	2400	2300	2200	2300	2500	3500	4200	5300	3300
Tensile strength	ASTM D638	50mm/min	MPa	52	55	55	58	55	48	52	54	50	50	57	55	55	60	60	62	58	58	55
Strain at break	ASTM D638	50mm/min	%	⩾50	⩾50	⩾50	⩾50	⩾50	⩾50	⩾50	⩾50	⩾50	⩾50	⩾50	⩾50	⩾50	⩾50	⩾50	⩾50	⩾50	8	⩾50
Flexural modulus	ASTM D790	2mm/min	MPa	2300	2200	2200	2400	2500	2300	2300	2300	2200	2200	2500	2300	2300	2400	2600	3200	4600	5300	3100
Flexural strength	ASTM D790	2mm/min	MPa	80	80	85	90	92	75	75	80	70	72	84	84	90	90	90	105	98	100	95
Izod notched impact strength	ASTM D256	23°C	J/m	550	570	550	650	600	450	500	520	450	550	600	550	600	660	700	180	70	50	300
		-30°C	J/m	350	420	450	410	500	250	300	350	320	350	450	300	—	—	—	—	—	—	—
Thermal Properties																						
Heat distortion temperature	ASTM D648	1.82MPa; 120°C/h	°C	93	98	100	105	110	85	100	105	88	96	110	107	77	82	93	82	88	86	80
Vicat softening temperature	ASTM D1525	50N; 120°C/h	°C	112	118	120	125	130	105	120	125	107	113	132	130	97	102	113	100	105	103	103
Flame Retardant Properties																						
Flammability	UL94	1.5mm	Class	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	V-0	V-0	V-0	V-0	V-0	V-0	V-0
		3.0mm	Class	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	V-0	V-0	V-0	V-0	V-0	V-0	V-0
Electrical Properties																						
Surface resistivity	ASTM D257	—	Ω	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15
Volume resistivity	ASTM D257	—	Ω•cm	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16
Other Properties																						
Features				High flow	High impact resistant	High impact resistant High heat resistant	High impact resistant High flow	Ultra-high heat resistant	High flow	High impact resistant	Ultra-high heat resistant	High flow	High impact resistant	High gloss High heat resistant	Low gloss	Flame retardant	Flame retardant	Flame retardant	Flame retardant High modulus	Flame retardant High modulus	Flame retardant High modulus	Flame retardant High modulus

The listed values are for reference only.

WanBlend® PC/Polyester Series

WanBlend® PC/Polyester Series include PC/PBT and PC/PET blends, which combine impact resistance, dimensional stability of polycarbonate and chemical resistance, stress cracking resistance and flowability of polyester, mainly used in automotive, electronics/electrical and security & protection sectors.

Features

- High impact strength
- High heat resistance
- Excellent chemical resistance
- Excellent processability

Applications

- Bumper
- Power tool
- Safety toe

Typical Values

Properties	Standards	Test Conditions	Units	Product Grades					
				PC/PBT			PC/PET		
				CB1221	CB3410	CB5250	CE1631	CE3620	CE6810
Physical Properties									
Melt flow rate	ASTM D1238	250°C; 5kg	g/10min	12	8	10	—	—	—
		265°C; 5kg	g/10min	—	—	—	11	12	8
Density	ASTM D792	23°C	g/cm³	1.19	1.25	1.41	1.19	1.30	1.35
Mold shrinkage	ASTM D955	2mm flow	%	0.7-1.1	0.5-0.8	0.3-0.6	0.6-0.9	0.5-0.8	0.4-0.8
Mechanical Properties									
Tensile modulus	ASTM D638	1mm/min	MPa	2000	2250	7000	2200	2200	4500
Tensile strength	ASTM D638	50mm/min	MPa	54	57	110	53	55	60
Strain at break	ASTM D638	50mm/min	%	120	100	3	100	100	5
Flexural modulus	ASTM D790	2mm/min	MPa	2100	2350	6000	2200	2150	4300
Flexural strength	ASTM D790	2mm/min	MPa	80	90	155	84	90	100
Izod notched impact strength	ASTM D256	23°C	J/m	710	730	110	650	650	100
		-30°C	J/m	650	—	—	550	—	—
		-40°C	J/m	570	—	—	300	—	—
Thermal Properties									
Heat distortion temperature	ASTM D648	1.82MPa; 120°C/h	°C	84	95	120	105	105	114
Vicat softening temperature	ASTM D1525	50N; 120°C/h	°C	115	120	165	136	135	141
Flame Retardant Properties									
Flammability	UL94	3.0mm	Class	HB	V-0	HB	HB	V-0	HB
Electrical Properties									
Surface resistivity	ASTM D257	—	Ω	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15	1.0E+15
Volume resistivity	ASTM D257	—	Ω•cm	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16	1.0E+16
Other Properties									
Features				Low temperature toughness	Flame retardant High heat resistant	High modulus	Low temperature toughness	Flame retardant	High modulus

The listed values are for reference only.

WanBlend® PC/ASA Series

WanBlend® PC/ASA combines impact resistance of polycarbonate and weather resistance of ASA, mainly used in automotive, outdoor products.

Features

- High impact strength
- High heat resistance
- Excellent weather resistance
- Excellent processability

Applications

- Sun visor
- Skylight cover

Typical Values

Properties	Standards	Test Conditions	Units	Product Grades	
				General Purpose PC/ASA	
				CS1530	CS1730
Physical Properties					
Melt flow rate	ASTM D1238	230°C;10kg	g/10min	18	12
Density	ASTM D792	23°C	g/cm^3	1.12	1.15
Mold shrinkage	ASTM D955	2mm flow	%	0.5-0.9	0.5-0.9
Mechanical Properties					
Tensile modulus	ASTM D638	1mm/min	MPa	2100	2100
Tensile strength	ASTM D638	50mm/min	MPa	52	54
Strain at break	ASTM D638	50mm/min	%	50	60
Flexural modulus	ASTM D790	2mm/min	MPa	2300	2200
Flexural strength	ASTM D790	2mm/min	MPa	82	92
Izod notched impact strength	ASTM D256	23°C	J/m	450	500
		-30°C	J/m	150	150
Thermal Properties					
Heat distortion temperature	ASTM D648	1.82MPa;120°C/h	°C	98	106
Vicat softening temperature	ASTM D1525	50N;120°C/h	°C	108	126
Flame Retardant Properties					
Flammability	UL94	3.0mm	Class	HB	HB
Electrical Properties					
Surface resistivity	ASTM D257	—	Ω	1.0E+15	1.0E+15
Volume resistivity	ASTM D257	—	Ω•cm	1.0E+16	1.0E+16
Other Properties					
Features				Weather resistent	Weather resistent

The listed values are for reference only.

Certificates

Quality Management System Certificate

Occupational Health and Safety Management System Certificate

Environmental Management System Certificate

National Laboratory Accreditation Certificate

Products Disclaimer

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