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PRODUCT MANUAL

WANHUA CHEMICAL GROUP CO., LTD.

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ABOUT WANHUA

Corporate Profile

As a multinational chemical company, with continuous technology innovation, large-scale commercialized facilities and ultra-efficient operation model, Wanhua Chemical Group Co., Ltd provides competitive products and solutions to the clients.

Taking "Advancing Chemistry Transforming Lives" as our mission, Wanhua Chemical has always been adhering to innovation and industry structure optimization.

Product Categories

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- Polyurethanes
- Petrochemicals
- Performance Chemicals
- Emerging Materials
- Future Industry

Fields of Application

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- Homeware and Furniture
- Sports and Leisure
- Automobiles and Transportation
- Building and Construction
- Electronics and Electrical Appliances
- Personal Care
- Green Energy

Global Strategy

Headquarters | R&D Centers | Production Bases | Sales Offices

Honors and Awards

2005 Signing of the Universal Declaration on Safety at the 17th World Congress on Safety and Health

2007 First Prize of National Scientific and Technological Progress Award

2008 National Environmentally Friendly Engineering Project

2015 Signed the Global Charter for Responsible Care

2016 Attended and delivered a keynote speech at the 2nd United Nations Environment Assembly

2019 Joining TFS

2020 Join the Carbon Information Disclosure Program（CDP）

2021 Ecovadis Gold Medal Certification

2022 Ecovadis Gold Medal Certification for the Second Consecutive Year

2023 Fortune China ESG Impact Ranking

Wanhua Chemical

CATALOG FOR POLYURETHANES

ISOCYANATES

MDI series-AUTOMOTIVE

Items	Product	Properties	Application Description
Isocyanates For Seating	WANNATE™ 8007	Modified MDI, good flowability, high foaming ability, suitable for medium and low density seating products	Seats, headrest, armrest
	WANNATE™ 8017	Modified MDI, fast curing, good processing tolerance, suitable for medium and low density seating products	
	WANNATE™ 8019	Modified MDI, latex sensation, good cell openess, suitable for medium and high density seating products	
	WANNATE™ 8221	Modified MDI, high hardness, suitable for medium and low density seating products	
	WANNATE™ 8223B	Modified MDI, high hardness, high foaming ability, suitable for medium and low density density seating products	
	WANNATE™ 7025	MT product (contains little TDI), high hardness, suitable for low density seating products	
	WANNATE™ 7024	MT product (contains little TDI), high foaming ability, suitable for low density seating products	
	WANNATE™ 7050	TM product, high hardness, suitable for low density seating products	
	WANNATE™ 7080	TM product, high foaming ability, suitable for low density seating products	
Carpet System	WANEFLEX™ 531D / WANNATE™ PM-8223	Low density, fast curing, low odor & VOC, suitable for closed process carpet products. Density: 45-55kg/m^3, demould time: 60s	Carpet, inner-dash insulator
	WANEFLEX™ 340 / WANNATE™ PM-8223B	Low density, fast curing, low odor & VOC, suitable for open process carpet products. Density: 55-70kg/m^3, demould time: 110s	
	WANEFLEX™ 338 / WANNATE™ 8038E	VEF system, excellent damping performance; sound insulation; excellent vibration absorption, suitable for high-end vihecle products	
Light Weight Foam System	WANEFLEX™ 589N / WANALTSY™ KC587C / Graphite / WANNATE™ PM-8212	Open cell structure, flame resistance, sound insulation, suitable for engine hood products, typical density: 13-17kg/m^3	Hood

ISOCYANATES

MDI series-AUTOMOTIVE

Items	Product	Properties	Application Description
Seating System	WANEFLEX™ 326N / WANNATE™ PM-8223B	MDI base syetem, low odor, low VOC, high comfort, suitable for medium and hign density seating products. Density: 50-65 kg/m^3, demould time: 3-4min	Seats, headrest, armrest
	WANEFLEX™ 524 / WANNATE™ 7024	MT base syetem, low VOC, excellent physical properties, suitable for low and medium density seating products. Density: 40-55 kg/m^3, demould time: 4-5min	
	WANEFLEX™ 311series / WANNATE™ 7080	TM base syetem, low VOC, excellent physical properties, suitable for low density seating products. Density: 35-50 kg/m^3, demould time: 4-7min	
	WANEFLEX™ 323 / WANNATE™ 8017	Low VOC, low odor, suitable for normal headrest products. Density: 50-60 kg/m^3, demould time: 4min	Normal headrest
	WANEFLEX™ 318 / WANNATE® 8018	Fast curing, beautiful appearance, suitable for PIP process headrest products. Density: 50-60 kg/m^3, demould time: 60-90s	PIP headrest
	WANEFLEX™ 324 / WANNATE™ 8017	Fast curing, high comfort, suitable high density armrest products. Density: 120-180 kg/m^3, demould time: 2-3 min	Armrest
Headliner System	WANEFLEX™ 590F / WANNATE™ PM-8228E	Low VOC, low odor, suitable for 22±3kg/m^3 headliner products	Headliner
	WANEFLEX™ 591F / WANNATE™ PM-8228E	Low VOC, low odor, suitable for 25±3kg/m^3 headliner products	
	WANEFLEX™ 594E / WANNATE™ PM-8228E	Low VOC, low odor, suitable for 28±3kg/m^3 headliner products	
	WANEFLEX™ 595 / WANNATE™ PM-8214	Low VOC, low odor, suitable for 32±3kg/m^3 headliner products	
Glue For Headliner	WANNATE™ 8029	Long potlife, fast curing, low VOC, odor 2.5-3 class (chang an)	Headliner glue
	WANNATE™ 8039	Fast curing, high hardness, low VOC, odor 2.5-3 class (VDA 270 C3)	

ISOCYANATES

MDI series-AUTOMOTIVE

Items	Product	Properties	Application Description
Isocyanates For ISF	WANNATE™ 8626	Fast curing, high hardness of skin, good storage performance at low temperature	Steering wheel, filter and other ISF products
	WANNATE™ 8629	Good dermal sensation, excellent mechanical properties	
	WANNATE™ 8627	Good storage performance at low temperature, high hardness, excellent mechanical properties	
	WANNATE™ 1631	Good cell openess, excellent flowability, good mechanical properties	
	WANNATE™ 1636	Good cell openess, excellent flowability, good processing tolerance	
	WANNATE™ 8623	Good cell openess, good processing tolerance	
Integral Skin Foam System	WANEFLEX™ 379 / WANNATE™ CM1883B	Good flowability, low VOC, suitable for truck steering wheel products	Steering wheel
	WANEFLEX™ 376 / WANNATE™ CM1883B	Low odor, low VOC, good process tolerance, suitable for car steering wheel products	
	WANEFLEX™ AL579A / WANNATE™ AL1579B	Fast curing, low density, low VOC, suitable for car steering wheel products	
	WANEFLEX™ 676 & WANNATE™ 8623	Low odor, low VOC, good process tolerance, long shelf life, suitable for car steering wheel products	
Window Encapsulation System	WANEFLEX™ 678 / WANNATE™ 80678	Fast curing, good process tolerance, low bubble rate, excellent appearance, high bonding strength	One-panel and panoramic sunroof
	WANEFLEX™ 679 / WANNATE™ 80679	Good flowability, good process tolerance, low bubble rate, excellent appearance	Panoramic and fixed panel sunroof

ISOCYANATES

MDI series-AUTOMOTIVE

Product	Appearance	Viscosity @25°C (mPa.s)	Properties	Application Description	Application Process	Foaming / Non foaming
WANELFLEX™ 582H	Black liquid	1300-1700	Excellent process latitude (suitable for open molding and close molding), excellent formability, excellent mechanical properties	Instrument panel, door panel	Open molding and close molding	Foaming
WANELFLEX™ 582N	Black liquid	1300-1700	Excellent aging resistance (120°C500h, mechanical properties vary less than 20%), low VOC (VDA278, VOC＜100μg/g, FOG＜50μg/g)		Open molding and close molding	
WANELFLEX™ 581H	Black liquid	1300-1700	Excellent fast curing (50-70s), even suitable for low mold temp (＜40°C), excellent process latitude (suitable for cold knife weakening and laser weakening)		Close molding	
WANELFLEX™ 584	Black liquid	1300-1700	Excellent flowability and formability, excellent soft touch, suitable for thin wall foaming (3-5mm)		Close molding	

MDI series-AUTOMOTIVE

Product	Appearance	Viscosity @25°C (mPa.s)	Properties	Application Description	Application Process	Foaming / Non foaming
WANELFLEX™ 696	Black liquid	900-1200	Excellent bending resistance, excellent waterproof, excellent wear-resistant, beautiful surface, low VOC, and low odor. Suitable for the production of PU skin	Trunk cover skin, seat back skin	Open molding and close molding	Non foaming

ISOCYANATES

MDI series-AUTOMOTIVE

Product	Appearance	Specification		Properties	Application Description
		Viscosity @25°C (mPa.s)	NCO (wt.%)		
WANNATE™ PM6907	Brown liquid	20-50	31.4-32.4	Modified MDI, low activity, low temperature resistance	Modified polyurethane material with good low-temperature crystallinity, used in the fields of coatings
WANNATE™ PM8219S	Brown liquid	35-55	31.5-32.5	Modified MDI, moderate activity, high hardness	Modified polyurethane material with good low-temperature crystallinity, used in the fields of coatings

ISOCYANATES

MDI series-FURNITURE

Product	Appearance	Specification		Properties
		Viscosity @25°C (mPa.s)	NCO (wt.%)	
WANNATE™ 8019	Brown liquid	140-180	25.7-26.7	Higher open cell percentage, better process ability, suitable for both molded VEF and HRF
WANNATE™ 8122	Brown liquid	20-40	31.7-32.7	Higher 2,4-MDI content, excellent blowing efficiency, softer handfeel, suitable for molded / batchblock VEF with low density
WANNATE™ PM-8135	Brown liquid	20-40	31.7-32.7	Excellent blowing efficiency, higher hardness, suitable for molded / batchblock VEF with low density

Product	Properties	Application Description
WANEFLEX™ 626 / WANNATE™ 8122	Pneumatic handfeel, density of 43-47Kg/m^3, low sensitivity to temperature, low compression set, low odor	Molded VEF
WANEFLEX™ 626G / WANNATE™ 8629	Pneumatic handfeel, density of 43-47Kg/m^3, good skin, low sensitivity to temperature, low compression set, low odor	Molded VEF
WANEFLEX™ 621E / WANNATE™ 8122	Pneumatic handfeel, density of 40-70Kg/m^3, low sensitivity to temperature, low compression set, low odor	Batchblock VEF
WANEFLEX™ 621F / WANNATE™ PM-8135	Density of 40-70Kg/m^3, longer recovery time, low odor	Batchblock VEF
WANEFLEX™ 635 / WANNATE™ 8122	Density of 50-80Kg/m^3, high SAG with good support, latex-like touching, durable and eco-friendly	Batchblock PU foam

ISOCYANATES

Aromatic Isocyanate — TDI Derivatives — TDI Adduct

Product	Specification						Properties	Application
	Solvent	Solid content %	NCO content %	Viscosity (25℃/mPa·s)	Color (Gardner)	Free TDI monomer %		
WANNATE® TL-75E	EA	73.0~77.0	12.9~13.7	1000~2000	≤1.0	<0.5	Low viscosity, easy to apply	Coatings, adhesives
WANNATE® TT-150B	BA	49.0~53.0	7.2~7.6	50~150	≤1.0	<0.5	Fast drying, higher hardness	TT series is mostly applied to formulate rapid drying two-component polyurethane coatings
WANNATE® TT-351B	BA	49.0~53.0	7.7~8.3	500~1800	≤1.0	<0.5	Fast drying, higher hardness	
WANNATE® TT-350B	BA	49.0~53.0	7.7~8.3	500~1800	≤1.0	<0.5	Fast drying, higher hardness	
WANNATE® TT-350Bplus	BA	50.0~54.0	7.6~8.1	500~2000	≤1.0	<0.1	Fast drying, higher hardness	
WANNATE® TT-450B	BA	49.0~54.0	7.7~8.3	500~2000	≤1.0	<0.5	Fast drying, higher hardness	
WANNATE® TT-551B	BA	49.0~53.0	7.5~8.2	500~1800	≤1.0	<0.5	Fast drying, higher hardness	
WANNATE® TT-750Bplus	BA	49.0~54.0	7.7~8.2	1200~2600	≤1.0	<0.1	Fast drying, higher hardness	

THM Series

Product	Specification						Properties	Application
	Solvent	Solid content %	NCO content %	Viscosity (25℃/mPa·s)	Color (Pt-Co)	Free monomer %		
WANNATE® THM-160B	BA	59.0~62.0	9.8~10.4	200~600	≤100	HDI%<0.1 TDI%<0.4	Good yellowing-resistance, fast curing, relatively balanced performance	Wood coatings (glossy and matte paint)
WANNATE® THM-260BE	BA/EA(3:1)	59.0~62.0	10.7~11.3	150~350	≤100	HDI%<0.1 TDI%<0.4		Wood coatings (matte paint and primer)
WANNATE® THM-360B	BA	59.0~62.0	10.5~11.2	500~1000	≤100	HDI%<0.1 TDI%<0.4		Wood coatings (primer and matte paint)

ISOCYANATES

Aliphatic Isocyanate — HDI Derivatives

Product	Specification						Properties	Application
	Solvent	Solid content %	NCO content %	Viscosity @25℃ (mPa.s)	Color (Pt-Co)	Free HDI monomer %		
WANNATE® HT-100	—	100	21.7~22.2	1750~3250	≤40	≤0.2	Outstanding weathering resistance, excellent mechanical performance, good dilution stability	Automotive refinish, rail traffic paint, wood coatings and plastic coatings
WANNATE® HT-90B	BA	89~91	19.5~20.1	350~650	≤40	≤0.2	Outstanding weathering resistance, excellent mechanical performance, good dilution stability	Automotive refinish, rail traffic paint, wood coatings and plastic coatings
WANNATE® HT-90BS	BA/SN (1:1)	89~91	19.5~20.1	350~650	≤40	≤0.2	Outstanding weathering resistance, excellent mechanical performance, good dilution stability	Automotive refinish, rail traffic paint, wood coatings and plastic coatings
WANNATE® HT-75B	BA	74~76	16.0~17.0	60~100	≤40	≤0.2	Outstanding weathering resistance, excellent mechanical performance, good dilution stability	Automotive refinish, rail traffic paint, wood coatings and plastic coatings
WANNATE® HT-75BS	BA/SN (1:1)	74~76	16.0~17.0	60~100	≤40	≤0.2	Outstanding weathering resistance, excellent mechanical performance, good dilution stability	Automotive refinish, rail traffic paint, wood coatings and plastic coatings
WANNATE® HT-200	—	100	20.0~22.0	1300~4000	≤40	≤0.4	Outstanding weathering resistance, excellent mechanical performance, great compatibility	Automotive refinish, rail traffic paint, wood coatings and plastic coatings
WANNATE® HT-790B	BA	89~91	17.3~18.3	1100~2500	≤40	≤0.3	Fast drying, high crosslinking density, better chemical resistance	Automotive refinish, rail traffic paint, wood coatings and plastic coatings
WANNATE® HT-300	—	100	19.0~21.0	200~700	≤40	<0.4	Low viscosity, low VOC emission	Automotive refinish, rail traffic paint, wood coatings and plastic coatings
WANNATE® HT-400	—	100	20.5~22.5	100~280	≤80	<0.5	Low viscosity, low VOC emission	Automotive refinish, rail traffic paint, wood coatings and plastic coatings
WANNATE® HT-500	—	100	22.5~24.5	400~1000	≤80	<0.5	Low viscosity, low VOC emission	Automotive refinish, rail traffic paint, wood coatings and plastic coatings
WANNATE® HTBL-175S	SN	73~77	~11.2 (Blocked NCO)	2500~4500	≤60	≤0.2 (Free NCO content)	Excellent chemical resistance and weatherability. Outstanding gloss retention Excellent Mechanical properties	OME coatings, can coatings, coil coatings, other metal coatings
WANNATE® HTBL-275MS	SN/MPA	73~77	~10.9 (Blocked NCO)	2500~5000	≤100	—	Excellent chemical resistance and weatherability. Outstanding gloss retention Excellent Mechanical properties	Heavy-duty anticorrosion fields like metal, machinery coating, marine and bridge coating
WANNATE® HB-100	—	100	21.7~22.3	7000~11000	≤80	≤0.5	Outstanding gloss and color retention, excellent adhesion and favorable flexibility, high chemical resistance	Heavy-duty anticorrosion fields like metal, machinery coating, marine and bridge coating
WANNATE® HB-200	—	100	22.8~23.8	1200~3500	≤40	≤0.5	Outstanding gloss and color retention, excellent adhesion and favorable flexibility, high chemical resistance	Heavy-duty anticorrosion fields like metal, machinery coating, marine and bridge coating

ISOCYANATES

Aliphatic Isocyanate — HDI Derivatives

Product	Specification						Properties	Application
	Solvent	Solid content %	NCO content %	Viscosity @25°C (mPa.s)	Color (Pt-Co)	Free HDI monomer %		
WANNATE® HB-75BX	BA/X(1:1)	74~76	16.2~16.8	90~210	≤60	<0.5	Outstanding gloss and color retention, excellent adhesion and favorable flexibility, high chemical resistance	Heavy-duty anticorrosion fields like metal, machinery coating, marine and bridge coating
WANNATE® HB-75B	BA	74~76	16.2~16.8	100~200	≤40	<0.5	Outstanding gloss and color retention, excellent adhesion and favorable flexibility, high chemical resistance	Heavy-duty anticorrosion fields like metal, machinery coating, marine and bridge coating
WANNATE® HB-75MX	MPA/X(1:1)	74~76	16.2~16.8	150~300	≤40	≤0.5	Outstanding gloss and color retention, excellent adhesion and favorable flexibility, high chemical resistance	Heavy-duty anticorrosion fields like metal, machinery coating, marine and bridge coating
WANNATE® HB-75M	MPA	74~76	16.2~16.8	150~300	≤40	≤0.5	Outstanding gloss and color retention, excellent adhesion and favorable flexibility, high chemical resistance	Heavy-duty anticorrosion fields like metal, machinery coating, marine and bridge coating

Aliphatic Isocyanate Series — Monomers

Product	Specification						Properties	Application
	Purity %	NCO content %	Viscosity @25°C (mPa.s)	Color (Pt-Co)	Hydrolysable Chlorides (%)	Acidity		
WANNATE® HDI	≥99.5	≥49.7	~3	≤30	—	—	Outstanding anti-yellowing properties improves the flexibility of PU products	Adhesive, electrophoretic paint, TPU
WANNATE® HMDI	≥99.5	≥31.8	~30	≤30	—	—	Moderate reaction rate, outstanding yellowing resistance, high mechanical performance	Waterborne polyurethane dispersions, adhesives and UV resins, TPU
WANNATE® IPDI	≥99.5	≥37.5	~10	≤30	—	—	Yellowing resistance, stability and durability mechanical performance	Waterborne polyurethane dispersions, adhesives and UV resins
WANNATE® X-600	≥99.7	≥43.0	—	≤30	≤0.05	≤0.01	Outstanding optical properties. good yellowing resistance and adhesion	Coatings, Adhesives
WANNATE® X-700	≥99.5	≥44.0	~4	≤30	≤0.05	—	Outstanding optical properties. excellent weatherability and thermal resistance. good adhesion to the substrate	Coatings, Adhesives
WANNATE® XR-2006	≥99.7	≥43.0	—	≤30	≤0.05	≤0.01	Outstanding optical properties. good yellowing resistance and adhesion	Optical lenses, optical materials
WANNATE® XR-2007	≥99.5	≥44.0	~4	≤30	≤0.05	—	Outstanding optical properties. excellent weatherability and thermal resistance. good adhesion to the substrate	Optical lenses, optical materials

ISOCYANATES

Aliphatic Isocyanate — IPDI Derivatives

Product	Specification						Properties	Application
	Solvent	Solid content %	NCO content %	Viscosity @25°C (mPa.s)	Color (Pt-Co)	Free IPDI monomer %		
WANNATE® IT-100	—	100	21.7~22.2	1750~3250	≤40	≤0.2	Excellent physical drying properties. Excellent weather resistance, outstanding gloss and color retention. Outstanding mechanical properties. Low r eactivity, prolonged pot-life. Excellent dilution stability	Automotive refinish and industrial coatings
WANNATE® IT-170B	BA	68.0~72.0	11.0~13.0	200~1000	≤100	<0.5		
WANNATE® IT-170S	SN	68.0~72.0	11.0~13.0	1000~4500	≤100	<0.5		
WANNATE® IT-170BS	BA/SN (1:2)	68.0~72.0	11.0~13.0	500~2500	≤100	<0.5		
WANNATE® IT-170MX	MPA/X	68.0~72.0	11.0~13.0	1000~4000	≤100	<0.5		
WANNATE® ITBL-460S	SN	58.0~62.0	~7(Blocked NCO)	1000~3000	≤100	—	Excellent chemical resistance and weatherability. Outstanding gloss retention. Superb mechanical properties. Good adhesion and flexibility. Low monomer content makes it suitable for food contact applications	Can coatings, coil coatings, other metal coatings

ISOCYANATES

Specialty Amines

Product	Specification					Properties	Application
	Purity %	Color (Pt-Co)	Viscosity (25°C/mPa·s)	Amine value (mgKOH/g)	Water content %		
WANAMINE® IPDA	⩾99.7	⩽15	—	—	⩽0.2	Excellent compatibility with epoxy resin and other curing agents. Balanced reactivity and operating time. Low viscosity and low VOC content. Outstanding mechanical properties.	Elastomor Water-based polyurethane coatings Polyurethane adhesives Polyurethane leather slurry
WANAMINE® 2111	—	⩽30	60-80	520-540	⩽0.1	Endow product with excellent gloss, yellowing resistance and mechanical properties.	Elastomor Water-based polyurethane coatings Polyurethane adhesives Polyurethane leather slurry
WANALINK® 6200	⩾96.0	—	330-360	—	⩽0.05	Liquid, safe and easy handing. Low toxicity-Ames test negative. Improved flowablity and adhesion. Low moisture sensitivity. Compatible with a wide range of polyols, co-curatives and all other polyurethane chemicals	Low activity chain extender for spray polyurea Chain extender for PU elastomer Reinforcing agent for polyurethane foam
WANALINK® 1104	—	—	—	290-370	⩽0.5	Medium activity to meet construction requirements. Ames test negative, health friendly Liquid, convenient and energy saving	Chain extender for tracks, waterproofing and sealant materials Curing agent for sports flooring
WANAMINE® DMCHA	⩾99.0	⩽50	—	—	⩽0.2	—	PU catalyst, polyurethane foams for refrigerators, sandwich panels, slabstock, pipes and synthetic woods

Other Monomer

Product	Specification					Properties	Application
	Purity %	Water content %	Color	Inhibitor MEHQ (mg/kg)	Acidity		
WANATE® HEMA-98	⩾98	⩽0.1	⩽20 (Pt-Co)	180-220	⩽0.1 (Cal.as MMA, %)	Endow acrylic resins with excellent weather resistance, high hardness and diverse reaction selectivity	Adhensives, thermosetting coatings, UV coatings, automotive OME and refinish coatings, industrial coatings
WANACHEM® TMP	⩾99.0	⩽0.05	⩽25 (Hazen)	—	⩽0.002 (Cal.as HCOOH, %)	Three primary hydroxyl groups with balanced activity. High designability of structure, easy controlled process. High purity and excellent stability	Wood, construction machinery, automotive and marine coatings. Surface treatment of titanium dioxide, synthesis of lubricant, polyurethane foam, polyether polyol and PVC plasticizer

AUXILIARIES

Hardeners

Product	Specification			Properties	Application
	Solids (%wt)	Viscosity @25°C (mPa.s)	NCO (%wt)		
Aquolin® 161	100	2000-4000	18-19	Excellent chemical resistane, long pot-life	Waterborne 2k hardener
Aquolin® 268	100	4500-6500	20-21	Excellent dispersability, higher hardness and chemical resistance, excellent compatibility	Waterborne 3k hardener
Aquolin® 269	100	500-2000	18.8-19.8	Excellent water dispersity and hand-mixing, excellent water resistance.	Waterborne 2K harder
Aquolin® 270	100	2500-4500	20.2-21.2	Exellent water dispersability, fast drying and yellow resistance	Waterborne 4k hardener
Aquolin® 280	100	<1000	19.2-20.2	Excellent water resistance, excellent weather resistance, long pot life.	Waterborne 2K harder

AUXILIARIES

Thickeners

Product	Specification	Properties	Application
	Hardness (Shore A)		
Vesmody® U300	20±1	Newtonian rheology, prepared with specific, unicaptmtechnology of wanhua	High shear visco, levelling
Vesmody® U505	40±1	Excellent levelling and anti-sagging performance, microbe resistance	Medium, high shear visco
Vesmody® U601	35±1	Balance between levelling and anti-sagging, water and alkali resistance	Low, medium shear visco
Vesmody® U604	25±1	Pseudoplastic rheology, excellent medium-shear viscosity thickening efficiency	Medium shear visco
Vesmody® U605	40±1	Pseudoplastic rheology, excellent medium-shear viscosity thickening efficiency, stable to pigment, good leveling ability	Medium shear visco
Vesmody® U705	40±1	Excellent levelling and anti-sagging performance, balance between medium and low visco	High, medium and low visco
Vesmody® U902	35±1	Excellent low-shear viscosity thickening efficiency, thixotropy, high gloss and good water resistance	Lower shear visco
Vesmody® U905	40±1	Excellent low-shear viscosity thickening efficiency, thixotropy, high gloss and good water resistance	Lower shear visco

POLYURETHANE PRODUCTS

TPU

Product	Specification					Properties	Application
	Hardness (Shore A)	Hardness (Shore D)	Density (g/cm³)	Tensile Strength (Mpa)	Tear Strength (N/mm)		
WANTHANE® WHT-1164IC	—	64	1.21	45	225	Excellent mechanical properties, good abrasion resistance, short cycle time	Automotive, textile industry, footwear, industrial engineering
WANTHANE® WHT-1172	—	72	1.22	48	260	Eproperties, good abrasion resistance, short cycle time	Automotive, textile industry, footwear, industrial engineering
WANTHANE® WHT-1180	—	80	1.18	32	90	Excellent mechanical properties, good abrasion resistance, short cycle time	Automotive, textile industry, footwear, industrial engineering
WANTHANE® WHT-1185EC	—	85	1.19	37	100	Excellent mechanical properties, good abrasion resistance, short cycle time	Automotive, textile industry, footwear, industrial engineering
WANTHANE® WHT-1190	—	90	1.19	42	120	Excellent mechanical properties, good abrasion resistance, short cycle time	Automotive, textile industry, footwear, industrial engineering
WANTHANE® WHT-1195	95	55	1.2	43	140	Excellent mechanical properties, good abrasion resistance, short cycle time	Automotive, textile industry, footwear, industrial engineering
WANTHANE® WHT-1198IC	98	60	1.21	44	175	Excellent mechanical properties, good abrasion resistance, short cycle time	Automotive, textile industry, footwear, industrial engineering
WANTHANE® WHT-1264	—	64	1.21	38	190	Excellent mechanical properties, outstanding extrusion stability, short cycle time, low cost	Textile industry, footwear, industrial engineering
WANTHANE® WHT-1290	91	—	1.19	28	110	Excellent mechanical properties, outstanding extrusion stability, short cycle time, low cost	Textile industry, footwear, industrial engineering
WANTHANE® WHT-1295	96	56	1.2	31	140	Excellent mechanical properties, outstanding extrusion stability, short cycle time, low cost	Textile industry, footwear, industrial engineering
WANTHANE® WHT-1295B	97	65	1.21	32	180	Excellent mechanical properties, outstanding extrusion stability, short cycle time, low cost	Textile industry, footwear, industrial engineering
WANTHANE® WHT-1485RV	85	—	1.2	36	95	Excellent mechanical properties, outstanding extrusion stability, short cycle time	Textile industry, footwear, industrial engineering

POLYURETHANE PRODUCTS

TPU

Product	Specification					Properties	Application
	Hardness (Shore A)	Hardness (Shore D)	Density (g/cm³)	Tensile Strength (Mpa)	Tear Strength (N/mm)		
WANTHANE® WHT-1490IV	90	—	1.2	37	100	Outstanding extrusion stability, short cycle time	Textile industry, footwear, industrial engineering
WANTHANE® WHT-1495EC	95	55	1.21	38	148	Excellent mechanical properties, outstanding extrusion stability, short cycle time	Textile industry, footwear, industrial engineering
WANTHANE® WHT-1495RV	95	55	1.21	40	150	Outstanding extrusion stability, short cycle time	Textile industry, footwear, industrial engineering
WANTHANE® WHT-1565IC	66	—	1.18	25	70	Outstanding abrasion resistance, good low temperature flexibility, excellent mechanical properties	Textile industry, footwear
WANTHANE® WHT-1570IC	73	—	1.19	30	75	Outstanding abrasion resistance, good low temperature flexibility, excellent mechanical properties	Textile industry, footwear
WANTHANE® WHT-1580	80	—	1.19	26	80	Outstanding abrasion resistance, good low temperature flexibility, excellent mechanical properties	Textile industry, footwear
WANTHANE® WHT-1585	86	—	1.19	30	90	Outstanding abrasion resistance, good low temperature flexibility, excellent mechanical properties	Textile industry, footwear
WANTHANE® WHT-1680AB	80	—	1.19	30	80	Stable melt viscosity, good workability for high frequency welding	Fabric coating
WANTHANE® WHT-1685AD	85	—	1.19	32	90	Stable melt viscosity, good workability for high frequency welding	Fabric coating
WANTHANE® WHT-1685AB	85	—	1.19	40	97	Stable melt viscosity, good workability for high frequency welding	Fabric coating
WANTHANE® WHT-1690AB	90	—	1.19	37	102	Stable melt viscosity, good workability for high frequency welding	Fabric Coating
WANTHANE® WHT-1695AB	95	—	1.2	42	122	Stable melt viscosity, good workability for high frequency welding	Fabric Coating

POLYURETHANE PRODUCTS

TPU

Product	Specification					Properties	Application
	Hardness (Shore A)	Hardness (Shore D)	Density (g/cm³)	Tensile Strength (Mpa)	Tear Strength (N/mm)		
WANTHANE® WHT-2180	80	—	1.18	24	100	Low compression set, good oil resistance and hydrolysis resistance, excellent abrasion resistance and low temperature flexibility	Electrical engineering, industrial engineering
WANTHANE® WHT-2185	85	—	1.19	26	110	Low compression set, good oil resistance and hydrolysis resistance, excellent abrasion resistance and low temperature flexibility	Electrical engineering, industrial engineering
WANTHANE® WHT-2190	90	—	1.2	29	120	Low compression set, good oil resistance and hydrolysis resistance, excellent abrasion resistance and low temperature flexibility	Electrical engineering, industrial engineering
WANTHANE® WHT-2195	95	55	1.2	31	125	Low compression set, good oil resistance and hydrolysis resistance, excellent abrasion resistance and low temperature flexibility	Electrical engineering, industrial engineering
WANTHANE® WHT-2198	98	60	1.21	32	135	Low compression set, good oil resistance and hydrolysis resistance, excellent abrasion resistance and low temperature flexibility	Electrical engineering, industrial engineering
WANTHANE® WHT-7180	80	—	1.21	30	85	Excellent mechanical properties, good wear resistance, outstanding heat and fungus resistance	Industrial engineering
WANTHANE® WHT-7185	85	—	1.22	35	100	Excellent mechanical properties, good wear resistance, outstanding heat and fungus resistance	Industrial engineering
WANTHANE® WHT-7190	90	—	1.24	40	110	Excellent mechanical properties, good wear resistance, outstanding heat and fungus resistance	Industrial engineering
WANTHANE® WHT-7195	95	—	1.3	45	120	Excellent mechanical properties, good wear resistance, outstanding heat and fungus resistance	Industrial engineering
WANTHANE® WHT-8170	70	—	1.1	25	60	Outstanding hydrolysis resistance, good low temperature flexibility, excellent anti-UV property	Industrial engineering, sports and leisure
WANTHANE® WHT-8180	80	—	1.1	25	75	Outstanding hydrolysis resistance, good low temperature flexibility, excellent anti-UV property	Industrial engineering, sports and leisure
WANTHANE® WHT-8185	85	—	1.11	26	80	Outstanding hydrolysis resistance, good low temperature flexibility, excellent anti-UV property	Industrial engineering, sports and leisure

POLYURETHANE PRODUCTS

TPU

Product	Specification					Properties	Application
	Hardness (Shore A)	Hardness (Shore D)	Density (g/cm^3)	Tensile Strength (Mpa)	Tear Strength (N/mm)		
WANTHANE® WHT-8190	90	—	1.12	28	100	Outstanding hydrolysis resistance, good low temperature flexibility, excellent anti-UV property	Industrial engineering, sports and leisure
WANTHANE® WHT-8195	95	—	1.13	30	110	Outstanding hydrolysis resistance, good low temperature flexibility, excellent anti-UV property	Industrial engineering, sports and leisure
WANTHANE® WHT-8280	80	—	1.1	23	75	Excellent transparency, outstanding hydrolysis resistance, good fungus resistance and anti-UV property	Sports and leisure
WANTHANE® WHT-8285	85	—	1.11	25	80	Excellent transparency, outstanding hydrolysis resistance, good fungus resistance and anti-UV property	Sports and leisure
WANTHANE® WHT-8290	90	—	1.12	28	100	Excellent transparency, outstanding hydrolysis resistance, good fungus resistance and anti-UV property	Sports and leisure
WANTHANE® WHT-8254	85	—	1.13	29	115	Excellent transparency, outstanding hydrolysis resistance, good fungus resistance and anti-UV property	Sports and leisure
WANTHANE® WHT-8264	90	—	1.14	30	120	Excellent transparency, outstanding hydrolysis resistance, good fungus resistance and anti-UV property	Sports and leisure
WANTHANE® WHT-A880	80	—	1.08	14	55	Non-yellowing, high abrasion resistance, low temperature flexibility	Shoes, automotives, electronic Industry
WANTHANE® WHT-A885	85	—	1.09	16	75	Non-yellowing, high abrasion resistance, low temperature flexibility	Shoes, automotives, electronic Industry
WANTHANE® WHT-A890	90	—	1.1	25	85	Non-yellowing, high abrasion resistance, low temperature flexibility	Shoes, automotives, electronic Industry
WANTHANE® WHT-A895	95	—	1.1	30	95	Non-yellowing, high abrasion resistance, low temperature flexibility	Shoes, automotives, electronic industry
WANTHANE® WHT-8280H	80	—	1.15	40	200	Low mold shrinkage, good impact resistance, high mechanical properties, perfect transparency	Industrial engineering, sports and leisure
WANTHANE® WHT-1180H	80	—	1.18	46	237	Low mold shrinkage, good impact resistance, high mechanical properties, perfect transparency	Industrial engineering, sports and leisure

POLYURETHANE PRODUCTS

TPU

Product	Specification					Properties	Application
	Hardness (Shore A)	Hardness (Shore D)	Density (g/cm^3)	Tensile Strength (Mpa)	Tear Strength (N/mm)		
WANTHANE® WHT-F390	90	—	1.19	40	120	Stable melt viscosity, outstanding toughness, strength and impact resistance	Fabric coating
WANTHANE® WHT-1195G	95	55	1.20	45	150	Excellent mechanical properties, good abrasion resistance, short cycle time	Automotive, textile industry, footwear, industrial engineering
WANTHANE® WHT-1190G	—	90	1.20	41	130	Excellent mechanical properties, good abrasion resistance, short cycle time	Automotive, textile industry, footwear, industrial engineering
WANTHANE® WHT-C190	90	—	1.19	35	110	Stable melt viscosity, outstanding toughness, strength and impact resistance	Wire & cable

TPU

Product	Specification				Properties	Application
	Hardness (Shore A)	Density (g/cm^3)	Tensile Strength (Mpa)	Ring-ball softening temperature (°C)		
WANTHANE® WHT-6232	82	1.19	25	145	Wide range of activation temperature, soft touch with high elasticity	Film
WANTHANE® WHT-6236	78	1.19	12	117	Wide range of activation temperature, soft touch with high elasticity	Film
WANTHANE® WHT-6290	96	1.19	23	87	Wide range of activation temperature, soft touch with high elasticity, excellent bonding strength with various substrates	Footwear
WANTHANE® WHT-6228C	95	1.20	22	130	Wide range of activation temperature, soft touch with high elasticity, excellent bonding strength with various substrates	Film
WANTHANE® WHT-MT3	75	1.19	23	130	Wide range of activation temperature, soft touch with high elasticity, excellent bonding strength with various substrates	Film

POLYURETHANE PRODUCTS

Waterborne Polyurethanes

Product	Specification		Properties	Application
	Solids (wt%)	MFFT (°C)		
Lacper® 4220	40±1	13	Very low amount of film forming agent, fast drying, high gloss, good compatibility with acrylic emulsion.	Furniture, home decoration, semi outdoor wood coatings
Lacper® 4211	40±1	47	Solvent free, high fullness, excellent flexibility, good compatibility with acrylic acid, solvent free; The effect of electrostatic spraying is excellent.	Furniture and home decoration wood coatings
Lacper® 4221	40±1	26	High hardness, quick drying, excellent stack resistance, good flexibility, good adhesion to PVC.	Furniture and home decoration wood coatings
Lacper® 4219	40±1	48	High hardness, quick drying, excellent stack resistance, solvent free	Wooden door, furniture, home decoration wood coating
Lacper® 4218	40±1	40	Low odor PUD, high fullness, fast hardness establishment, good compatibility with acrylic acid, solvent free	Furniture and home decoration wood coatings
Lacper® 4101	35±1	49	Excellent permeability, excellent chemical resistance, fast hardness establishment, excellent scratch resistance, solvent-free	Furniture and home decoration wood coatings
Lacper® 4109	38±1	22	High gloss, high fullness, high film hardness, good leveling	Wooden door, furniture, home decoration wood coating
Leasys® 5530	35±1	10	High gloss, good permeability, good film forming property, no cracking in thick coating	Furniture and home decoration wood coatings
Urosin® 4617	40±1	—	Good chemical resistance, easy to mat, high hardness, dust free before uv curing	Industrial coating
Urosin® 4616	38±1	6.0-8.0	Excellent transparency, viscosity and stability	Waterborne UV furniture wood coatings
Urosin® 4633	38±1	6.0-8.0	Excellent transparency, viscosity and stability	Water based UV furniture coatings and floor wood coatings
Crysol® 6130	35±1	—	Good stipping performance on plastic, excellent water resistance, also suitable for Al-Mg alloy, tinplate	Industrial coating
Crysol® 6136	40±1	<60	Excellent boiling water resistance, excellent aluminum powder orientation, recommended for UV matching primer. No APEO, NMP, NEP contained.	Plastics coating

POLYURETHANE PRODUCTS

Waterborne Polyurethanes

Product	Specification		Properties	Application
	Solids (wt%)	MFFT (°C)		
Crysol® 6512	48±1	—	Outstanding building up, flexibility	Soft touch top, good chemical, abrasive and scratch resistance
Crysol® 6140	40±1	<5	Very low VOC possible, good building up, good flexibility	High hardness, good flexibility, quick drying, high gloss, good property of film forming and abrasive resistance
Archsol® 8529	40±1	44	Soft touch top, good chemical, abrasive and scratch resistance	Easy matting, excellent coating permeability, excellent water resistance, and weathering resistance, excellent anti\contamination
Archsol® 8530	35±1	34	Outstanding adhesion, excellent flexibility and weather ability, good effect pigments orientation	High gloss, excellent resistance to yellowing
Archsol® 8558	50±1	—	Excellent adhesion, water resistance, yellow resistance, transparency, high gloss and hardness	Excellent mechanical properties, yellow resistance and hand feeling
Archsol® 8560	50±1	—	Good stipping performance on plastic, excellent water resistance, also suitable for Al-Mg alloy, tinplate	Excellent elongation and soft handls
Carfil® ST11	45.5±1.5	—	Prevention of excessive skin hydration, higher active penetration into skin, 360° fit on skin	Skin transfer mask
Carfil® 9235NP	35±1	—	Easily removable, high gloss, non-irritating	Water-based nail polish
Carfil® H10	29.0-31.0	0	Naturally volumizing effect smooth touch & vivid hair suitable for transparent system	Shampoo

POLYURETHANE PRODUCTS

Waterborne Polyurethanes

Product	Specification		Properties	Application
	Solids (wt%)	MFFT (°C)		
Adwel® 1676	50±1	5	Thermal-activated type, very low heat activated temperature, good tack	Auto interior, 3D lamination adhesive
Adwel® 1665A	50±1	<5	Thermal-activated type, low heat activated temperature, good tack, good manual assembling	Auto interior, 3D lamination adhesive
Adwel® 1630C	50±1	10-15	Thermal-activated type, long open time, good reactivation	Footwear, auto interior, 3D lamination adhesive
Adwel® 1675P	40±1	<5	Thermal-activated type, rapid crystallization, excellent bonding strength	Auto interior, 3D lamination adhesive
Adwel® 1631	48±1	10	Thermal-activated type, 1C application, good tack, excellent hydrolysis & heat resistance	Footwear, auto interior, 3D lamination adhesive
Adwel® 1652	50±1	5-15	Lamination dry activation PUD, also suitable in conveyer belt	Lamination adhesive, heat transfer
Adwel® 1654	49±1	5-15	Thermal-activated type, 1C application, good tack, excellent hydrolysis & heat resistance	Footwear, auto interior, 3D lamination adhesive
Adwel® 1636A	42±1	—	Excellent wet tack, sufficient open time, high cohesion	Waterborne contact adhesive
Leasys® 3459	50±1	—	Polycarbonate polyether type, good resilience and jungle resistance for base coat (automobile)	Textile & leather
Leasys® 3375	39±1	—	Polycarbonate type, well-balanced PUD with excellence resistance for top coat	Textile & leather
Leasys® 3920	33±1	—	Polycarbonate type, weather resistance, high gloss PUD for finishing and top coat	Textile & leather
Leasys® 3102	35±1	—	Polyester type, matt finishing for general purpose	Textile & leather
Leasys® 3458	49±1	—	Polyester type, high solid content PUD for base coat and top coat	Textile & leather

POLYURETHANE PRODUCTS

Waterborne Polyurethanes

Product	Specification		Properties	Application
	Solids (wt%)	MFFT (°C)		
Leasys® 3455	49±1	—	Polyether type, anti-hydrolysis and flexible for base coat and top coat	Textile & leather
Leasys® 3255	35±1	—	Polyether type, flex resistance for shoe printing top coat	Textile & leather
Leasys® 5215	49±1	—	Polyether type, excellent adhesion for general tie coat	Textile & leather
Leasys® 5219	45±1	—	Polyether type, cost-effective PUD for tie coat & lamination	Textile & leather
Leasys® 3661	40±1	—	Polyether type, acid coagulation and anti-hydrolysis for dipping and coating	Textile & leather
Leasys® 3978	40±1	—	High modulus, wear resistance for inner gloves and finishing	Textile & leather
Tekspro® 7377	35±1	—	Polyester type, high gloss PUD for textile finishing	Textile & leather
Tekspro® 7351	55±1	—	Flexible PES-base PUD for shoe printing, coating	Textile & leather
Tekspro® 7357	59±1	—	Flexible PES-base PUD for shoe printing, coating, gloves	Textile & leather
Tekspro® 7358B	40±1	—	Flexible PES-base PUD for cloth printing, coating, gloves	Textile & leather
Tekspro® 7359	49±1	—	Polyether type, high elasticity for cloth printing & coating, soft handle	Textile & leather
Tekspro® 7360	50±1	—	Polyether type, heat activation，soft handle, flexible	Textile & leather
Tekspro® 7316	35±1	—	Polyether type, Flexible and color fastness for ink layer of printing	Textile & leather

CONVENTIONAL POLYESTER POLYOL

Composition	Codes	Mn	Status (25°C)	OH Value (mgKOH/g)	Max Acid Value (mgKOH/g)	Max Moisture (%)	Max Corlor Number (Pt-Co)	60°C Viscosity (mPa·s)	80°C Viscosity (mPa·s)	Melting Point (°C)
EG/AA	WHP-102	1000	Solid	112±6	0.30	0.03	30	275	144	30-50
	WHP-152	1500	Solid	75±4	0.30	0.03	30	550	310	30-50
	WHP-202	2000	Solid	56±3	0.30	0.03	30	1000	454	35-55
	WHP-302	3000	Solid	37±2	0.30	0.03	30	2030	933	35-55
BG/AA	WHP-6004	600	Solid	185±10	0.30	0.03	30	116	72	25-45
	WHP-104	1000	Solid	112±6	0.30	0.03	30	290	145	30-50
	WHP-204	2000	Solid	56±3	0.30	0.03	30	1170	668	35-55
	WHP-304	3000	Solid	37±2	0.30	0.03	30	2850	1490	40-60
	WHP-404	4000	Solid	28±2	0.30	0.03	30	5960	3050	40-60
NPG/AA	WHP-5005	500	Liquid	225±10	0.30	0.03	30	197	91	<25
	WHP-105	1000	Pasty	112±6	0.30	0.03	30	620	254	30-50
	WHP-205	2000	Pasty	56±3	0.30	0.03	30	2540	800	35-55
	WHP-305	3000	Pasty	37±2	0.30	0.03	30	4600	1620	35-55
	WHP-405	4000	Pasty	28±2	0.30	0.03	30	9870	3800	40-60

CONVENTIONAL POLYESTER POLYOL

Composition	Codes	Mn	Status (25°C)	OH Value (mgKOH/g)	Max Acid Value (mgKOH/g)	Max Moisture (%)	Max Corlor Number (Pt-Co)	60°C Viscosity (mPa·s)	80°C Viscosity (mPa·s)	Melting Point (°C)
HDO/AA	WHP-106	1000	Solid	112±6	0.30	0.03	30	241	129	40-60
	WHP-206	2000	Solid	56±3	0.30	0.03	30	912	471	40-60
	WHP-306	3000	Solid	37±2	0.30	0.03	30	2840	1400	40-60
	WHP-356	3500	Solid	32±2	0.30	0.03	30	3970	2000	45-65
DEG/AA	WHP-406	4000	Solid	28±2	0.50	0.03	30	4740	2280	45-65
	WHP-107	1000	Liquid	112±6	0.30	0.03	30	230	122	<25
	WHP-207	2000	Liquid	56±3	0.30	0.03	30	811	395	<25
	WHP-307	3000	Liquid	37±2	0.30	0.03	30	1890	948	<25
	WHP-109	1000	Liquid	112±6	0.30	0.03	30	430	180	<25
MPD/AA	WHP-209	2000	Liquid	56±3	0.30	0.03	30	845	414	<25
	WHP-309	3000	Liquid	37±2	0.30	0.03	30	3510	1430	<25
	WHP-409	4000	Liquid	28±2	0.30	0.03	30	3522	1670	<25
EG+PG/AA	WHP-1521	1500	Pasty	75±4	0.30	0.03	30	602	262	30-50
	WHP-2021	2000	Pasty	56±3	0.30	0.03	30	959	444	30-50

CONVENTIONAL POLYESTER POLYOL

Composition	Codes	Mn	Status (25°C)	OH Value (mgKOH/g)	Max Acid Value (mgKOH/g)	Max Moisture (%)	Max Corlor Number (Pt-Co)	60°C Viscosity (mPa·s)	80°C Viscosity (mPa·s)	Melting Point (°C)
EG+BG/AA	WHP-1024	1000	Liquid	112±6	0.30	0.03	30	346	149	<25
	WHP-1524	1500	Liquid	75±4	0.30	0.03	30	604	334	<25
	WHP-2024	2000	Pasty	56±3	0.30	0.03	30	1120	569	20-40
	WHP-3024	3000	Pasty	37±2	0.30	0.03	30	2800	1360	25-45
	WHP-4024	4000	Pasty	28±2	0.30	0.03	30	5940	2630	30-50
EG+DEG/AA	WHP-1027	1000	Liquid	112±6	0.30	0.03	30	326	133	<25
	WHP-1527	1500	Liquid	75±4	0.30	0.03	30	609	245	<25
	WHP-2027	2000	Liquid	56±3	0.30	0.03	30	1090	440	<25
	WHP-3027	3000	Pasty	37±2	0.30	0.03	30	2560	1080	30-50
BDO+NPG/AA	WHP-1045	1000	Liquid	112±6	0.30	0.03	30	427	179	<25
	WHP-2045	2000	Liquid	56±3	0.30	0.03	30	1400	638	<25
BDO+HDO/AA	WHP-2046	2000	Liquid	56±3	0.30	0.03	30	876	466	<25
NPG+HDO/AA	WHP-1056	1000	Solid	112±6	0.30	0.03	30	380	170	<25
	WHP-1556	1500	Solid	75±4	0.30	0.03	30	568	296	<25
	WHP-2056	2000	Solid	56±3	0.30	0.03	30	993	535	<25
DEG+NPG/AA	WHP-2057	1000	Liquid	56±3	0.30	0.03	30	1430	436	<25

POLYESTER POLYOL FOR PUR

Composition	Codes	Mn	OH Value (mgKOH/g)	Max Acid Value (mgKOH/g)	Tg °C	Softening Point (°C)	Melting Point (°C)	Setting Time (sec)	Viscosity (Pa·s)	°C
SA	WHP-SA1600	3000	35±4	2	30	88	—	1	10	130
AQ	WHP-AQ1605	5500	21±3	2	-50	—	—	—	6	80
AD	WHP-AD1200	3750	30±2	2	—	85	85	35	0.3	130
	WHP-AD1201	3750	30±2	2	-20	87	—	40	4	
	WHP-AD1202	3750	30±2	2	-60	59	55	80	2	80
	WHP-AD1204	3750	30±2	2	—	73	70	20	2	80
	WHP-AD1800	8500	13±1	2	-60	63	57	50	15	80
	WHP-AD1801	5500	20±2	2	-60	61	56	50	5	80
	WHP-AD1802	6500	17±2	2	-60	63	57	50	10	80

AROMATIC POLYESTER POLYOL

Codes	Mn	Status (25°C)	OH Value (mgKOH/g)	Max Acid Value (mgKOH/g)	Max Moisture %	Max Corlor Number (Pt-Co)
WHP-PF3220	350	Liquid	315±10	2.0~3.0	⩽0.05	⩽100
WHP-PF3220LA	350	Liquid	315±10	⩽1	⩽0.05	⩽100
WHP-PF2020	560	Liquid	195±5	⩽1	⩽0.05	⩽100
WHP-P756	2000	Liquid	56±3	⩽0.5	⩽0.05	⩽50
WHP-P511	1000	Solid	110±6	⩽0.5	⩽0.05	⩽50
WHP-P656	2000	Liquid	56±3	⩽0.5	⩽0.05	⩽50

Wanhua Chemical

POLYETHER POLYOLS

POLYETHER POLYOLS

Flexible polyether polyol

Product	Specification							Properties	Application
	Appearance	Viscosity (mPa.s)	Water content (%)	Density (g/cm³)	K+ (ppm)	PH value	OHV (mgKOH/g)		
WANOL® F3135	Colorless	800-1000	⩽0.05	1.00±0.10	⩽3	5-7	34±1.5	A glycerol based polyether polyol with nominal 5000 molecular weight and high reactivity	High-resilience cold -cure PU foam, integral skin, etc
WANOL® F3160	Colorless	1000-1300	⩽0.05	1.00±0.10	⩽3	5-7	28±1.5	A glycerol based polyether polyol with nominal 6000 molecular weight and high reactivity	High-resilience cold -cure PU foam, integral skin foam, etc
WANOL® F3180	Colorless	1100-1500	⩽0.05	1.00±0.10	⩽3	5-7	32±1.5	A glycerol based polyether polyol with high functionality and nominal 8000 molecular weight and high reactivity	High-resilience cold -cure PU foam, integral skin foam, etc
WANOL® F3170A	Colorless	1500-2000	⩽0.05	1.00±0.10	⩽3	7-9	22±1.5	A glycerol based polyether polyol with 7500 molecular weight and high reactivity	High-resilience cold -cure PU foam, integral skin foam, etc
WANOL® F3147D	Colorless	600-800	⩽0.05	1.00±0.10	—	5-7	47.5±1.5	A glycerol based polyether polyol with 3500 molecular weight	Flexible slabstock PU foam
WANOL® F3056	Colorless	400-600	⩽0.05	1.00±0.10	⩽3	5-7	56±1.5	A glycerol based polyether polyol with 3000 molecular weight	Flexible slabstock PU foam, adhesive and coating
WANOL® F3156D	Colorless	450-750	⩽0.05	1.00±0.10	⩽3	5.5-7.5	56±1.5	A glycerol based polyether polyol with 3000 molecular weight	Flexible slabstock PU foam
WANOL® FB340	Colorless	500-800	⩽0.05	1.00±0.10	—	5-8	56±1.5	Bio-based polyether polyol with 36-40% bio content	Flexible slabstock PU foam
WANOL® FB350	Colorless	500-800	⩽0.05	1.00±0.10	—	5-8	76±1.5	Bio-based polyether polyol with 48-52% bio content	Flexible slabstock PU foam
WANOL® FB390	Colorless	520-780	⩽0.05	1.00±0.10	—	6.5-8	145±5	Bio-based polyether polyol with 89-93% bio content	Flexible slabstock PU foam, VE foam
WANOL® S3007	Colorless	190-350	⩽0.05	1.05±0.10	⩽5	5-7	245±15	A conventional viscoelastic polyether polyol	Viscoelastic foam, adhesives

POLYETHER POLYOLS

Flexible polyether polyol

Product	Specification							Properties	Application
	Appearance	Viscosity (mPa.s)	Water content (%)	Density (g/cm³)	K+ (ppm)	PH value	OHV (mgKOH/g)		
WANOL® R2310	Colorless	200-300	⩽0.05	1.00±0.10	⩽5	5-7	168±5	A conventional viscoelastic polyether polyol	Viscoelastic foam, adhesives
WANOL® F3148P	White, opaque, viscous liquid	⩽6000	⩽0.10	1.05±0.10	—	6-9	27±2	A polymer polyol with high solid content Polymer content is 47~51%	Viscoelastic foam, adhesives
WANOL® F3145P	White, opaque, viscous liquid	⩽5000	⩽0.10	1.05±0.10	—	6-9	30±2	A polymer polyol Polymer content is 44~46%	Mattresses, sofas, clothing, shoe cotton and strong cotton, etc
WANOL® F3125P	White, opaque, viscous liquid	⩽1400	⩽0.10	1.05±0.10	—	6-9	39.5±4.5	A polymer polyol Polymer content is 24~26%	Mattresses, sofas, clothing, shoe cotton and strong cotton, etc
WANOL® F3115P	White, opaque, viscous liquid	⩽950	⩽0.10	1.05±0.10	—	6-9	44±4	A polymer polyol Polymer content is 14~16%	Mattresses, sofas, clothing, shoe cotton and strong cotton, etc
WANOL® F3110P	White, opaque, viscous liquid	⩽800	⩽0.10	1.05±0.10	—	6-9	47±4	A polymer polyol Polymer content is 9~11%	Mattresses, sofas, clothing, shoe cotton and strong cotton, etc
WANOL® F2140P	White, opaque, viscous liquid	⩽5500	⩽0.10	1.05±0.10	—	6-9	21±1.5	A polymer polyol with high reactivity Polymer content is 39~43%	High-resilience cold -cure PU foam, integral skin, etc
WANOL® F2140Y	White, opaque, viscous liquid	⩽6500	⩽0.10	1.05±0.10	—	6-9	21±1.5	A polymer polyol with high reactivity Polymer content is 39~43%	High-resilience cold -cure PU foam, integral skin, etc
WANOL® F2130P	White, opaque, viscous liquid	⩽3500	⩽0.10	1.05±0.10	—	6-9	24±3	A polymer polyol with high reactivity Polymer content is 30~32%	High-resilience cold -cure PU foam, integral skin, etc
WANOL® F3150	Colorless	950-1450	⩽0.05	1.00±0.1	⩽7	5-7	35±2	A glycerol based polyether polyol with 5000 molecular weight and high EO content	Pneumatic VE foam Hypersoft foam Cell opener for high resilience foam
WANOL® F3150A	Colorless	1000-1500	⩽0.05	1.00±0.1	⩽7	5-7	34±2	A glycerol based polyether polyol with high EO content and high reactivity	Pneumatic VE foam Hypersoft foam Cell opener for high resilience foam

POLYETHER POLYOLS

Rigid polyether polyol

Product	Specification							Properties	Application
	Appearance	Viscosity (mpa·s)	Water Content (%)	Density (g/cm³)	K+ (ppm)	PH value	OHV (mgkOH/g)		
WANOL® R2303	Clear liquid	400-800	⩽0.08	1.10±0.10	⩽8	5-7	560±15	A glycerol initialized polyether triol used as cross linker or dilute agent in formulations	Rigid foams, coatings, cross linkers, etc
WANOL® R2304	Clear liquid	300-500	⩽0.08	1.05±0.10	⩽8	5-7	415±10	A glycerol initialized polyether triol used as cross linker or dilute agent in formulations	Rigid foams, coatings, cross linkers, etc
WANOL® R2305	Clear liquid	200-400	⩽0.08	1.05±0.10	⩽8	5-7	335±10	A glycerol initialized polyether triol used as cross linker or dilute agent in formulations	Rigid foams, coatings, cross linkers, etc
WANOL® R2307	Clear liquid	190-350	⩽0.15	1.05±0.10	⩽50	4-7	245±15	A glycerol initialized polyether triol used as cross linker or dilute agent in formulations	Rigid foams, coatings, cross linkers, etc
WANOL® R2310	Clear liquid	200-300	⩽0.05	1.00±0.10	⩽5	5-7	168±5	A glycerol initialized polyether triol used as cross linker or dilute agent in formulations	One component adhesives, rigid foams, coatings and sealants
WANOL® R2450A	Light Yellow to Dark Yellow	5200-8200	⩽0.15	1.10±0.10	—	9-11.5	490±15	A propylene oxide adduct initialized with sucrose and ternary alcohol	Rigid foams for building panels, pre-insulated pipes, structural foam, etc
WANOL® R2490	Colorless or Light Yellow	9200-11800	⩽0.15	1.10±0.10	—	9-11.5	500±15	A sorbitol based polyether polyol with high funcionality, products produced by Wanol R2490 have good dimentional stability	Rigid foams for building panels, pre-insulated pipes, structural foam, etc
WANOL® R4040	Light Yellow to Reddish brown	15000-22000	⩽0.07	1.10±0.10	⩽50	7-10	375±15	An aromatic amine based polyether polyol with good compatibility with pentane blowing agents	Rigid foams for insulation applications
WANOL® R4110	Light Yellow to Dark Yellow	2500-3800	⩽0.15	1.10±0.10	—	9-11.5	450±15	A sucrose and diol based polyether polyol with high functionality and good compatibility with pentane series blowing agents	Rigid foam with good physical properties
WANOL® R4110H	Light Yellow to Dark Yellow	3200-4400	⩽0.15	1.10±0.10	—	9-11.5	470±15	A sucrose and diol based polyether polyol	Conventional rigid foams
WANOL® R420	Light Yellow to Dark Yellow	5500-8500	⩽0.15	1.10±0.10	⩽50	4-7	430±15	A sucrose and diol based polyether polyol with high functionality	Rigid foam with good physical properties
WANOL® R6250	Light Yellow to Dark Yellow	25000-39000	⩽0.10	1.10±0.1	800-1100	7.5-10	500±15	A sorbitol based polyether polyol suitable to produce all kind of rigid foams with good dimensional stability	Fridge, building panels, pipe in pipe, .etc
WANOL® R8241	Light Yellow to Dark Yellow	5000-7000	⩽0.15	1.10±0.10	—	9-11.5	410±20	A sucrose and diol based polyether polyol with high functionality and good compatibility with pentane series blowing agents	Rigid foam with good physical properties
WANOL® R8245	Light Yellow to Dark Yellow	28000-36000	⩽0.15	1.10±0.10	⩽50	4.5-7	450±15	A sucrose and diol based polyether polyol with high functionality	Rigid foam with good physical properties

POLYETHER POLYOLS

Rigid polyether polyol

Product	Specification							Properties	Application
	Appearance	Viscosity (mpa·s)	Water Content (%)	Density (g/cm³)	K+ (ppm)	PH value	OHV (mgkOH/g)		
WANOL® R8336	Light Yellow to Dark Yellow	2700-4000	⩽0.15	1.10±0.10	⩽50	4-7	360±15	A sucrose and ternary alcohol based polyether polyol with high functionality and better compatibility with pentane series blowing agents	Rigid foam with good physical properties
WANOL® R8338	Light Yellow to Dark Yellow	7500-10000	⩽0.15	1.10±0.10	⩽50	4.5-7	380±15	A sucrose and ternary alcohol based polyether polyol with high functionality and better compatibility with pentane series blowing agents	Rigid foam with good physical properties
WANOL® R8345B	Yellow to Dark Yellow	4100-5400	⩽0.07	1.10±0.1	⩽50	4.5-7	450±15	A polyether polyol initialized with sucrose and ternary alcohol which is suitable to produce rigid foams with good physical properties	Building panels, pre-insulated pipes, structural foam, .etc
WANOL® R8349	Light Yellow to Dark Yellow	8500-12000	⩽0.15	1.10±0.10	⩽50	4-7	490±20	A propylene oxide adduct initialized with sucrose and ternary alcohol	Rigid foam with good physical properties
WANOL® FR-130	Light Yellow to Yellow. During storage, precipitation may appear.	⩽800	⩽0.15	1.50±0.10	—	—	110±10	A reactive flame retardant with phosphrous and halogen in the molecule, foams produced by FR-130 have both good flame retardancy and physical properties	Flame retardant foam

POLYETHER POLYOLS

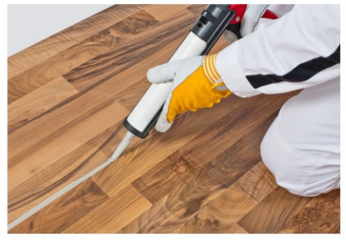
CASE polyether polyol

Product	Specification							Properties	Application
	Appearance	Viscosity (mpa·s)	Water Content (%)	Density (g/cm³)	K+ (ppm)	PH value	OHV (mgkOH/g)		
WANOL® C2004	Colorless	40-140	⩽0.05	1.00±0.10	⩽3	5-7	280±10	A low molecular weight, propanediol based polyether polyol for products with better strength and low odor	Adhesives, OCF
WANOL® C2010	Colorless	100-200	⩽0.03	1.00±0.10	⩽3	5-7	112±3.5	A propanediol based standard polyether polyol for elastomers	Adhesives, elastomers
WANOL® C2010D	Colorless	100-200	⩽0.03	1.00±0.10	⩽3	5-7.5	112±3.5	A propanediol based, DMC catalyzed polyether polyol for elastomers	Adhesives, elastomers
WANOL® C2020	Colorless	270-370	⩽0.03	1.00±0.10	⩽3	5-7.5	56±1.5	A relatively larger molecular polyether polyol used to increase the elongation at break of products	Adhjesives, elastomers, pulp
WANOL® C2020A	Colorless	270-370	⩽0.03	1.00±0.10	⩽3	5-7.5	56±1.5	A relatively larger molecular polyether polyol used to increase the elongation at break of products	Adhjesives, elastomers, pulp
WANOL® C2056	Colorless	270-370	⩽0.03	1.00±0.10	⩽3	5-7	56±1.5	A relatively larger molecular polyether polyol used to increase the elongation at break of products	Adhjesives, elastomers, pulp
WANOL® C2030D	Colorless	500-650	⩽0.03	1.00±0.10	⩽3	5-7.5	37.5±2	A DMC catalyzed polyether polyol for elastomers with larger molecular weight, used to increase the elongation at break of products	Adhesives, pulp
WANOL® C2040D	Colorless	750-1250	⩽0.03	1.00±0.10	⩽3	5-7.5	28±1.5	A high molecular weight, DMC catalyzed polyether polyol for elastomers, can significantly improve the elongation at break of product systems	Adhesives, pulp
WANOL® C2080D	Colorless	2800-3500	⩽0.02	1.10±0.10	—	6-8	14±0.5	A high molecular weight, DMC catalyzed polyether polyol for adhesives, can significantly improve the elongation at break of product systems	Adhesives
WANOL® C2012D	Colorless	5000-9000	⩽0.03	1.10±0.10	⩽3	5-7.5	10±1	A high molecular weight, DMC catalyzed polyether polyol for adhesives, can significantly improve the elongation at break of product systems	Adhesives
WANOL® C2107	Colorless	100-160	⩽0.05	1.00±0.10	⩽5	5-7.5	140±5	A high reactive polyether polyol for adhesives, which increases the product adhesion	Adhesives
WANOL® C2120	Colorless	300-400	⩽0.05	1.00±0.10	⩽5	5-7	57±2	A high reactive polyether polyol for adhesives, which increases the product adhesion	Adhesives
WANOL® C2140	Colorless	750-950	⩽0.05	1.00±0.10	⩽3	5-7	27.5±1.5	A high reactivity polyether polyol for sole materials with faster solidification, less demolding time and low odor	Shoe sole, pulp

POLYETHER POLYOLS

CASE polyether polyol

Product	Specification							Properties	Application
	Appearance	Viscosity (mpa·s)	Water Content (%)	Density (g/cm³)	K+ (ppm)	PH value	OHV (mgkOH/g)		
WANOL® C2140F	Colorless	750-950	⩽0.03	1.00±0.10	⩽3	5-7	28.5±1.5	A polyether polyol with higher reactivity compared to Wanol® C2140	Shoe sole, pulp
WANOL® C2140L	Colorless	750-950	⩽0.05	1.00±0.10	⩽3	5-7	27.5±1.5	A high reactivity polyether polyol for adhesives	Adhesives
WANOL® C3110A	Colorless	220~330	⩽0.05	1.10±0.1	⩽3	5-7	163~173	A high reactive polyether polyol for adhesives, which increases the product adhesion	Adhesives
WANOL® F3056D	Colorless	400~700	⩽0.05	1.10±0.1	⩽3	5-7.5	56±1.5	A DMC catalyzed polyether polyol for elastomers with larger molecular weight, used to increase the elongation at break of products	Adhesives
WANOL® F3330H	Colorless	350~550	⩽0.05	1.0±0.1	⩽3	5-7	56±2	A high reactivity polyether polyol, producing sole materials with higher strength, faster solidification and less demolding time	Shoe sole, pulp
WANOL® F4037	Colorless	500-700	⩽0.05	1.10±0.1	⩽5	8.5-10.5	60±3	An amine initialized polyether polyol. It is suitable to produce PU coatings and adhesives with better physical properties	Coatings, adhesives, sealants and elastomers



POLYETHER POLYOLS

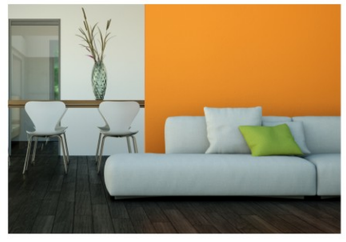
Blended Polyether Polyols

Product	Specification				Properties	Application
	Appearance	Specific gravity 25°C (g/cm³)	Viscosity 25°C (mPa.s)	Water content (%)		
WANEFOAM® Panel Formulated Polyol System	—	1.10±0.10	200-1200	1.0-2.0	Excellent adaptability, thermal insulation property, good flame retardant performance, adhesive, compression strength and weather resistance	Continuous panel
WANEFOAM® Pipe Formulated Polyol System	—	1.10±0.10	200-1000	1.5-4.0	Excellent heat insulation performance and compressive strength, easy process and stable foam quality, CCOT certificate (140°C, 30years)	Pipe insulation
WANEFOAM® Reefer Container Formulated Polyol System	—	1.10±0.10	2000-5000	1.0-2.0	Good flowability, thermal insulation property and low k-factor, good foam quality and less surface defects	Non-appliances
WANEFOAM® Spray Formulated Polyol System	—	1.10±0.10	150-500	0.5-1.5	Good cell structure and excellent heat insulation performance, good adhension and dimensional stability, stable foam quality and have a longer shelf life, High foam yield for high FR system	Spray
WANEFOAM® RCP 5/6 Series	Pale Yellow to Reddish Brown Transparent Liquid	1.08±0.05	2000-8000	1.5-2.5	Excellent operationality and stability, the manufactured foam has good demoulding, dimensional stability, and surface adhesion, low thermal conductivity and surface defects	Refrigerator/ Freezer/ Water heater
WANEFOAM® RCM 5/6 Series	Pale Yellow to Reddish Brown Transparent Liquid	1.08±0.05	2500-9000	1.5-2.5	Excellent operationality and stability, the manufactured foam has good demoulding, dimensional stability, strength distribution, and surface adhesion, low thermal conductivity and surface defects	Refrigerator/ Freezer/ Water heater
WANEFOAM® RCB 5/6 Series	Pale Yellow to Reddish Brown Transparent Liquid	1.08±0.05	3000-10000	1.5-2.5	Applied to co-blowing agent systems, the manufactured foam has good dimensional stability, demoulding, thermal conductivity and strength distribution, surface adhesion, low surface defects	Refrigerator/ Freezer/ Water heater
WANEFOAM® RFO5/6 Series	Pale Yellow to Reddish Brown Transparent Liquid	1.08±0.05	3000-10000	1.5-2.5	Applied to HFO blowing agent systems, the manufactured foam has low thermal conductivity, good dimensional stability, demoulding and surface adhesion, low surface defects	Refrigerator/ Freezer/ Water heater
WANEFOAM® RH5/6 Series	Pale Yellow to Reddish Brown Transparent Liquid	1.08±0.05	300-1200	2.0-4.0	Optimized water blowing agent systems, excellent operationality, stability, and flowability, the manufactured foam has good demoulding, dimensional stability, strength distribution, low surface defects	Refrigerator/ Freezer/ Water heater

POLYETHER POLYOLS

Blended Polyether Polyols

Product	Specification				Properties	Application
	Appearance	Specific gravity 25°C (g/cm³)	Viscosity 25°C (mPa.s)	Water content %		
WANEFLEX™ 50/51/52 High Resilience Series Formulated Polyol	Colorless liquid, whit or light yellow liquid	1.02-1.05	800-2000	—	Excellent physical properties, easy to use, low emission, fast cure	Automotive
WANEFLEX™ 53/54 Acoustic Series Formulated Polyol	Colorless liquid, whit or light yellow liquid	1.02-1.05	400-1600	—	Excellent physical properties, easy to use, low emission, fast cure	Automotive
WANEFLEX™ 56/57 Interal Skin Foam Series Formulated Polyol	Whit or light yellow liquid, black liquid	1.02-1.12	400-1600	—	Excellent physical properties, soft touch, fast cure	Automotive and furniture
WANEFLEX™ 58/59 Semi-rigid Series Formulated Polyol	Colorless or light yellow liquid, black liquid	1.02-1.12	800-2000	—	Light weight, excellent sound absorption, low emission, easy to use	Automotive
WANEFLEX™ 68/69 Composite Series Formulated Polyol	Black liquid, light yellow liquid	1.02-1.12	800-2000	—	Light weight, excellent mechanical properties, good thermostability, short demolded time	Automotive
WANEFLEX™ 60/61/62 Viscoelastic Series Formulated Polyol	Light yellow liquid	1.0-1.1	400-1500	—	Water-blown systems, excellent durability	Furniture



Wanhua Chemical

RUBBER AND PLASTIC

TPU

Polyester-based TPU WHT-11 Series

Item	1180EC	1185EC	1190	1195	1198IC	1164IC	1172IC	Method	Unit
Hardness	80	85	90	95	98	—	—	ASTM D2240	Shore A
	—	—	—	55	60	64	72	ASTM D2240	Shore D
Density	1.18	1.19	1.19	1.20	1.21	1.21	1.22	ASTM D792	g/cm³
Tensile Strength at 100% Elongation	5	6	9	12	17	24	32	ASTM D412	MPa
Tensile Strength at 300% Elongation	9	12	20	24	32	35	42	ASTM D412	MPa
Tensile Strength	32	37	42	45	44	45	48	ASTM D412	MPa
Ultimate Elongation	680	650	550	500	480	420	340	ASTM D412	%
Tear Strength	90	100	120	140	175	225	265	ASTM D624	N/mm
Abrasion Resistance	45	40	35	35	33	30	40	ISO 4649	mm³
Processing Temperature	180-200	185-205	190-210	195-215	195-215	200-220	200-220	—	℃
Applications	Automotive parts, profiles, wire and cable, oil tubes, footwear, elastic bands, conveyor belts, seals, films, compounding, etc.								

TPU

Polyester-based TPU WHT-12 Series

Item	1285	1290	1295	1295B		
Hardness	85	91	96	97	ASTM D2240	Shore A
	—	—	58	62	ASTM D2240	Shore D
Density	1.19	1.19	1.20	1.21	ASTM D792	g/cm³
Tensile Strength at 100% Elongation	6	8	15	18	ASTM D412	MPa
Tensile Strength at 300% Elongation	9	13	24	28	ASTM D412	MPa
Tensile Strength	30	31	35	36	ASTM D412	MPa
Ultimate Elongation	720	680	520	480	ASTM D412	%
Tear Strength	97	115	155	180	ASTM D624	N/mm
Processing Temperature	175-195	185-205	190-210	195-210	—	℃
Applications	Pneumatic hoses, garden tubes, films, etc.					

TPU

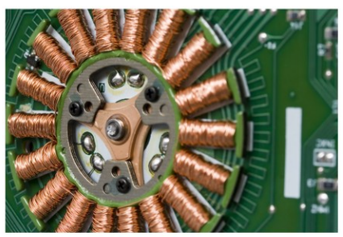
Polyester-based TPU WHT-14 Series

Item	1485RV	1490IV	1495EC	1495RV	1495BM	1495HT	Method	Unit
Hardness	85	90	95	95	92	95	ASTM D2240	Shore A
	—	—	55	55	47	54	ASTM D2240	Shore D
Density	1.20	1.20	1.21	1.21	1.20	1.20	ASTM D792	g/cm^3
Tensile Strength at 100% Elongation	6	7	14	13	8	10	ASTM D412	MPa
Tensile Strength at 300% Elongation	11	12	28	30	17	20	ASTM D412	MPa
Tensile Strength	36	37	38	40	37	38	ASTM D412	MPa
Ultimate Elongation	580	460	420	425	500	425	ASTM D412	%
Tear Strength	95	100	148	150	110	150	ASTM D624	N/mm
Processing Temperature	180-200	185-205	190-210	190-210	190-210	200-220	—	°C
Applications	Pneumatic tubes, auto parts, transparent shoe soles, air cushions, films & sheets, etc.							

TPU

Polyester-based TPU WHT-15 Series

Item	1560	1565	1570	1580	1585	1590	1595C	1598	1564	Method	Unit
Hardness	60	66	73	80	86	92	95	98	—	ASTM D2240	Shore A
	—	—	—	—	—	—	52	59	64	ASTM D2240	Shore D
Density	1.19	1.18	1.19	1.18	1.19	1.20	1.20	1.20	1.21	ASTM D792	g/cm^3
Tensile Strength at 100% Elongation	2	2.5	3	3.5	5	8	13	16	18	ASTM D412	MPa
Tensile Strength at 300% Elongation	3.5	4.5	6	8	10	15	27	29	30	ASTM D412	MPa
Tensile Strength	30	25	28	28	30	34	35	38	40	ASTM D412	MPa
Ultimate Elongation	850	700	650	620	610	560	480	450	400	ASTM D412	%
Tear Strength	50	60	70	85	90	120	130	150	160	ASTM D624	N/mm
Abrasion Resistance	50	50	50	65	60	57	50	47	40	ISO 4649	mm^3
Processing Temperature	170-190	170-190	180-195	180-195	185-200	195-210	195-215	200-220	200-220	—	°C
Applications	Seals, roller wheels, various injection parts, compounding, etc.										



TPU

Polyester-based TPU WHT-16 Series

Item	1680AB	1685AD	1685AB	1685ABH	1690AB	1695AB	Method	Unit
Hardness	80	85	85	85	90	95	ASTM D2240	Shore A
	—	—	—	—	—	55	ASTM D2240	Shore D
Density	1.19	1.19	1.19	1.20	1.19	1.20	ASTM D792	g/cm^3
Tensile Strength at 100% Elongation	5	5	6	6	7	11	ASTM D412	MPa
Tensile Strength at 300% Elongation	8	8	12	10	14	19	ASTM D412	MPa
Tensile Strength	25	25	30	36	35	37	ASTM D412	MPa
Ultimate Elongation	620	710	500	600	522	450	ASTM D412	%
Tear Strength	70	80	95	90	102	120	ASTM D624	N/mm
Processing Temperature	150-170	160-180	185-205	190-210	190-210	195-215	—	°C
Applications	Films & sheets, fabric coating, sports & leisure, etc.							

TPU

Polycaprolactone-based TPU WHT-25 Series

Item	2580	2585	2590	2595	Method	Unit
Hardness	80	85	90	95	ASTM D2240	Shore A
	—	—	—	55	ASTM D2240	Shore D
Density	1.17	1.18	1.18	1.19	ASTM D792	g/cm^3
Tensile Strength at 100% Elongation	4	6	8	10	ASTM D412	MPa
Tensile Strength at 300% Elongation	8	9	14	19	ASTM D412	MPa
Tensile Strength	25	28	32	34	ASTM D412	MPa
Ultimate Elongation	570	530	490	460	ASTM D412	%
Tear Strength	85	95	110	120	ASTM D624	N/mm
Abrasion Resistance	60	53	45	41	ISO 4649	mm^3
Compression Set 25°C/24h	14	15	15	15	ASTM D395	%
Compression Set 70°C/22h	36	34	31	30	ASTM D395	%
Processing Temperature	180-200	185-205	190-210	195-215	—	°C
Applications	High grade seals, wheels, mine screens, cable sheath, etc.					

TPU Solvent-based Adhesives WHT-61/64/67/68 Series

Item	61 Series	64 Series	68 Series	*67 Series	Unit
Viscosity/15% MEK, 25°C	100-3600	400-3300	400-3300	400-3300	MPa·s
Crystallization Rate	★★★★★	★★★	★★★	★★★★	—
Green Strength	★★★★★	★★★	★★★	★★★★	—
Activation Temperature	55-65	55-65	55-65	55-65	°C
Applications	Excellent bonding strength for TPU, PVC, nylon, polyester, fabrics and leathers, etc. Suitable for shoes, textile industry, furniture products, etc.				

★★★★★ Excellent ★★★★ Very Good ★★★ Good

TPU

Hot-Melt Adhesives WHT-62 Series

Item	6290	6227C	6275H	6236	6228C	6235B	6229C	6420C	6229	6232	Unit
Flow Beginning Temperature	60	83	90	100	100	110	110	110	118	120	°C
MFR	10-20	30-50	10-25	10-25	10-25	40-50	20-40	5-35	25-40	15-30	°C
Ring-ball Softening Temperature	—	110	113	121	132	153	150	—	130	150	°C
Applications	Clothes, footwear, furniture, automotive, etc.										

Polycarbonate-based TPU WHT-71 Series

Item	7180	7185	7190	7195	Method	Unit
Hardness	80	85	90	95	ASTM D2240	Shore A
Density	1.20	1.21	1.22	1.22	ASTM D792	g/cm^3
Tensile Strength at 100% Elongation	6	8	10	15	ASTM D412	MPa
Tensile Strength at 300% Elongation	19	23	35	39	ASTM D412	MPa
Tensile Strength	30	35	40	43	ASTM D412	MPa
Ultimate Elongation	450	400	370	340	ASTM D412	%
Tear Strength	85	100	110	120	ASTM D624	N/mm
Abrasion Resistance	60	55	47	42	ISO 4649	mm^3
Processing Temperature	185-200	190-210	195-215	200-220	—	°C
Applications	Fabric coating, wire & cable, films & sheets, animal tags, fire hoses, automobile, etc.					

TPU

Non-yellowish Aliphatic TPU WHT-A Series

Item	A802	A852	A902	A952	A185	A885	Method	Unit
Hardness	80	85	90	95	85	85	ASTM D2240	Shore A
Density	1.14	1.15	1.15	1.16	1.16	1.15	ASTM D792	g/cm^3
Tensile Strength at 100% Elongation	4	6	7	9	5	5	ASTM D412	MPa
Tensile Strength at 300% Elongation	10	12	20	25	11	10	ASTM D412	MPa
Tensile Strength	23	28	33	36	28	25	ASTM D412	MPa
Ultimate Elongation	560	500	440	400	500	550	ASTM D412	%
Tear Strength	73	85	93	105	85	80	ASTM D624	N/mm
Abrasion Resistance	20	18	17	14	70	40	ISO 4649	mm^3
Processing Temperature	170-190	180-195	185-200	195-210	160-180	160-180	—	°C
Applications	Out-door products, shoes, watch belts, auto parts, medical & electronic, etc.							

Polyether-based TPU WHT-82 Series

Item	8170	8180	8185	8190	8195	Method	Unit
Hardness	70	80	85	90	95	ASTM D2240	Shore A
Density	1.10	1.10	1.11	1.12	1.13	ASTM D792	g/cm^3
Tensile Strength at 100% Elongation	3.5	4.5	6	8	12	ASTM D412	MPa
Tensile Strength at 300% Elongation	6	7	10	13	24	ASTM D412	MPa
Tensile Strength	23	25	28	30	36	ASTM D412	MPa
Ultimate Elongation	700	650	650	500	400	ASTM D412	%
Tear Strength	65	80	90	100	120	ASTM D624	N/mm
Abrasion Resistance	60	50	45	40	35	ISO 4649	mm^3
Processing Temperature	170-190	155-170	170-185	180-195	190-205	—	°C
Applications	cable, films, coatings, fire hoses, animal ear tags, sports equipment, etc.						

TPU

Polyether-based TPU WHT-82 Series

Item	8280	8285	8290	8254	8264	Method	Unit
Hardness	80	85	90	—	—	ASTM D2240	Shore A
	—	—	—	54	64	ASTM D2240	Shore D
Density	1.10	1.11	1.12	1.14	1.16	ASTM D792	g/cm^3
Tensile Strength at 100% Elongation	5	7	8	14	18	ASTM D412	MPa
Tensile Strength at 300% Elongation	8	11	12	24	29	ASTM D412	MPa
Tensile Strength	23	28	30	32	45	ASTM D412	MPa
Ultimate Elongation	650	650	550	420	400	ASTM D412	%
Tear Strength	75	90	100	135	160	ASTM D624	N/mm
Abrasion Resistance	60	50	45	50	35	ISO 4649	mm^3
Processing Temperature	160-180	170-185	180-195	190-210	195-215	—	°C
Applications	Specialized by injection & extrusion for higher transparency applications, etc.						

Bio-based TPU WHT-ECO Series

Item	ECO 12565	ECO 12575	ECO 14085	ECO 13790	ECO 11595	ECO 87560	ECO 86575	ECO 86085	ECO 84095	Method	Unit
Hardness	65	75	85	90	95	65	80	85	95	ASTM D2240	Shore A
Density	1.18	1.18	1.16	1.17	1.18	1.11	1.14	1.15	1.17	ASTM D0792	g/cm^3
Bio Content	25	25	40	37	15	75	60	60	40	ASTM D6866	W/W %
Tensile Strength	25	30	35	38	41	28	26	28	35	ASTM D412	MPa
Ultimate Elongation	750	650	540	500	450	750	550	500	450	ASTM D412	%
Tear Strength	60	75	95	105	130	65	75	80	125	ASTM D624	N/mm
Abrasion Resistance	75	60	48	43	40	80	80	70	45	ISO 4649	mm^3
Processing Temperature	185-195	175-185	195-205	200-210	205-215	180-200	160-180	185-200	200-215	—	°C
Applications	Shoes, films, roller wheels, auto parts, compounding, etc.										

TPU

Super-hard TPU

Item		8602	1180H	Method	Unit
Hardness		84	80	ASTM D2240	Shore D
Density		1.20	1.18	ASTM D792	g/cm^3
Tensile Strength at 100% Elongation		50	33	ASTM D638	MPa
Tensile Strength at 300% Elongation		—	40	ASTM D638	MPa
Tensile Strength		70	55	ASTM D638	MPa
Ultimate Elongation		130	400	ASTM D638	%
Tensile Modulus		2100	1650	ASTM D638	MPa
Flexural Strength		105	85	ASTM D790	MPa
Flexural Modulus		2300	1750	ASTM D790	MPa
Izod Impact Strength	3.2 mm/23°C	101	90	ASTM D256	J/m
	3.2 mm/-30°C	50	42	ASTM D256	J/m
HDT/B (1.82 MPa, annealed)		136	118	ASTM D648	°C
Vicat Temperature (50N)		145	125	ASTM D1525	°C
Mould Shrinkage		0.4-0.6	0.4-0.6	ASTM D955	%
Water Absorption		0.1	0.08	ASTM D570	%
Light Transmission		90	90	ASTM D1003	%
Processing Temperature		235-240	220-230	—	°C
Applications		Automobile oil collecting pump, mobile phone window, engineering parts, alternative of transparent PC, Toys, etc.			

TPU

WanColor® Masterbatches

WanColor® is dedicated to providing high-quality, covering full color scheme, environmental friendly color selection and customized service.

Products and Services

- TPU matrix color masterbatch
  Panchromatic masterbatches
  Black masterbatches
  White masterbatches
- Dyed TPU & TPU compound
  Panchromatic, customized
- TPU functional masterbatch
  Release masterbatches
  UV-resistant masterbatches

WanBlend® Abrasion Resistance TPU

Polyester series and polyether series, hardness between Shore 70A and 65D

WANTHANE® WHT-C Series

WANTHANE® WHT-C series include polyester-based and polyether-based TPUs, with hardness ranging from Shore 60A to 98A

WanBlend® Flame Retardant TPU

WanBlend® flame retardant TPU products include polyester-based and polyether-based TPUs, the hardness of products range from Shore 60A to 55D

WanBlend® Matt Surface and Low Gloss TPU

WanBlend® matt surface and low gloss TPU products include polyester-based and polyether-based TPUs, the hardness of products range from Shore 70A to 55D

WanBlend® Antistatic TPU

WanBlend® Antistatic TPU with surface resistivity ranging from 102-1011 Ω/□, including both polyester-based and polyether-based TPU with hardness from Shore 55 A to 95 A
It is mainly applied to tackle electrostatic problems to further avoid dust contamination, processing difficulty, electrical discharge, fire or even explosion

WanBlend® Reinforced TPU

Polyester series and polyether series, hardness between Shore 65D and 85D, GF content 10-50wt%

PP

Item	Homopolymer propylene	Impact copolymer polypropylene				Random copolymer polypropylene		Standards	Unit
	HP648T	EP300H	EP548R	EP649U	EP648V	RP340R	RP348R		
Melt flow rate (230°C/2.16kg)	70	2.5	30	60	105	25	25	GB/T 3682.1	g/10min
Tensile yield strength	36	23	24	29	31	27	27	GB/T 1040.2	g/cm³
Flexural modulus	1700	1000	1250	1600	1700	1000	1000	GB/T 9341	MPa
Impact strength of notched cantilever beam (23°C)	—	45	9	5	4	5	5	GB/T 1843	MPa
Impact strength of notched cantilever beam (0°C)	—	—	—	—	—	—	—	GB/T 1843	%
Impact strength of notched cantilever beam (-20°C)	—	5.5	4.5	2	2	1.5	1.5	GB/T 1843	g
Impact strength of simply supported beam (23°C, notch)	2	—	—	—	—	—	—	GB/T 1843	%
Load deformation temperature	108	75	90	—	110	70	72	GB/T 1634.2	°C
Rockwell hardness	—	80	85	—	100	—	—	GB/T 3398.2	—
Haze	—	—	—	—	—	9	9	GB/T 2410	%
Main applications	Thin-walled containers, Modification	Wide-mouth buckets, Battery box, tray, Plate, Turnover boxes, FRPP pipe	Home appliance, Automotive modification, Daily chemical packaging, furniture	Home appliance, Automotive modification, Daily chemical packaging, furniture	Thin-wall injection molding, Automotive modification, Glass fiber modification	Household utensils, Medical syringes, Modified materials	Daily chemical packaging, Housewares, Storage box, Thin-wall injection molding		

LDPE

Item	2420D	2420H	2426H	2426K	2220H	Standards	Unit
Melt flow rate (190°C，2.16kg)	0.3	2	2	4	2	GB/T 3682.1	g/10min
Density (23°C)	0.924	0.924	0.924	0.924	0.922	GB/T 1033.2	g/cm³
Tensile yield strength	10	11	11	11	11	GB/T 1040.2	MPa
Tensile breaking strength	—	—	—	—	—	GB/T 1040.2	MPa
Tensile fracture nominal strain	—	—	—	—	—	GB/T 1040.2	%
Elastic modulus	240	260	260	260	240	GB/T 1040.2	MPa
Vicat softening temperature	97	93	93	93	93	GB/T 1633	°C
Melting temperature	111	110	110	111	110	GB/T 16582	°C
Main applications	Agricultural film, heavy-duty packaging bags, Heat shrink film, hose	Daily packaging, Protective film, Paper coating, EPE foaming	Daily packaging, Composite packaging, EPE foaming	Daily packaging, The inner layer of the composite package	Cable material		

HDPE

Item	23050	CRP 100 BLACK	ACP 4731B	WH 5731K	WH 7000F	Standards	Unit
Melt flow rate (190°C，2.16kg)	—	—	—	0.45	0.22	GB/T 3682.1	g/10min
Melt flow rate (190°C，5kg)	0.23	0.23	0.45	—	0.232	GB/T 3682.1	g/10min
Density (23°C)	0.949	0.959	0.947	0.956	0.952	GB/T 1033.2	g/cm³
Tensile yield stress	22	22	21.5	23	28/28	GB/T 1040.2	MPa
Tensile fracture nominal strain	⩾600	⩾600	⩾500	850	420/580	GB/T 1040.2	%
Flexural modulus	1000	1000	1000	—	—	GB/T 9341	MPa
Impact strength of simply supported beam	24	24	21	—	—	GB/T 1043.1	kJ/m²
Strength of the dart impact (20um)	—	—	—	—	190	GB/T 9639.1	g
Vicat softening temperature	—	—	—	—	—	GB/T 1633	°C
Shore hardness	—	—	—	—	—	GB/T 2411	—
Oxidation induction time (210°C)	＞60	＞60	＞60	—	—	GB/T 19466.6	min
Resistant to rapid crack propagation	⩾10	⩾10	—	—	—	GB/T 19280	bar
Main applications	PE100 tubing	Mix ingredients for water supply pipes	Underfloor heating pipes, Central heating pipes	Bottle caps	Load-bearing bags, shopping bags, packaging film		

LLDPE

Item	DFDA 7047	WH 5161	DFDA 7042	DFDC 7050	DFDC 7050K	WH 2235	Standards	Unit
Melt flow rate (190°C，2.16kg)	1.0	1.0	2.0	2.0	2.0	3.5	GB/T 3682.1	g/10min
Density (23°C)	0.918	0.918	0.919	0.920	0.920	0.922	GB/T 1033.2	g/cm^3
Tensile yield strength	10/9.8	10/9.8	10/10	10/9.6	10/9.5	9/8	GB/T 1040.3	MPa
Tensile breaking strength	45/42	45/42	38/34	30/26	30/26	40/25	GB/T 1040.3	MPa
Tensile fracture nominal strain	850/1000	850/1000	860/950	800/800	800/820	900/1000	GB/T 1040.3	%
Strength of the dart impact	110	110	97	97	105	180	GB/T 9639.1	g
Haze	9	8	12	12.5	15	2 (tape casting process)	GB/T 2410	%
Coefficient of dynamic friction	—	—	—	0.100	0.070	—	GB/T 10006	—
Main applications	Shed film，heavy-duty packaging bags, ordinary packaging film	PO film, heavy-duty packaging bags, ordinary packaging film	packaging film, agricultural film, lining film, cables	Food packaging, Multi-layer co-extruded film, Daily chemical packaging, Agricultural film	Food packaging, Daily chemical packaging, Industrial packaging, Garment packaging	Food packaging, Daily chemical packaging, High-speed stretch film		

PVC

Item	WH700	WH800	WH1000F	WH1000G	WH1300	WH1800	Unit
Degree of Polymerization	700±30	780±30	1030±30	1030±30	1300±50	1700-1800	—
The number of impurities and foreign particles	20	20	16	16	16	16	pcs, ⩽
Volatile Matter	0.3	0.3	0.3	0.4	0.3	0.3	%, ⩽
Bulk Density	0.52	0.52	0.49	0.51	0.46	0.44	g/ml, ⩾
Residue on 250μm sieve screenings	1.6	1.6	1	1.6	1.6	1.6	%, ⩽
Residue on 63μm sieve screenings	95	97	97	97	97	97	%, ⩾
The number of "fish eyes"	20	20	20	20	20	20	$pcs/400cm^2$, ⩽
Plasticizer absorption of 100g PVC resin	14	18	24	20	29	30	g, ⩾
Whiteness (160°C , 10min)	75	75	78	78	80	80	%, ⩾
Water extract Conductivity	—	—	—	—	5	—	μs/(cm·g), ⩽
VCM Residual	5	1	1	5	1	3	μg/g, ⩽

Note: Typical Values in sheet（Not Warranted Values）

Product designation	K-value	Special Features	Typical Applications
WH700	55-59	• High apparent density • Good dry flow characteristics • Good heat stability • Excellent formability and processability	• Rigid calendered sheets • Injection products • Foamed boards • Rigid fittings
WH800	60-61	• Highly porous particle structure • High apparent density • Good melt flow and fusion properties • Excellent formability and processability	• Rigid calendered sheets • Rigid plates • Flexible calendered films • Hollow blowing molded bottles • Injection products
WH1000F	66-67	• Good miscibility with plasticizers and liquid stabilizers • Excellent plasticizer absorption • High transparency • Good process stability	• Flexible calendered films • Artificial leather • Flexible hoses • Injection shoe soles • Wires & cables • Blowing shrink films
WH1000G	65-67	• High apparent density • Good extrusion processability • Good dry flow characteristics • Excellent physical properties	• Rigid piple • Floor substrate • Rigid profile • Wainscot
WH1300	71-72	• Good miscibility with plasticizers and liquid stabilizers • Excellent plasticizer absorption • High transparency • Excellent thermal stability • Good process stability	• Flexible calendered films • flexible hoses • Artificial leather • Wires & cables • Waterproof sheet
WH1800	77-78	• Good miscibility with plasticizers and liquid stabilizers • Excellent plasticizer absorption • High transparency • Excellent thermal stability • Good process stability	• Medical catheters • Super heat resistant wires & cables • Highly elastic sealing strips • High pressure hose • Heat/Cold resistant artificial leathers

PC

CLARNATE® General Purpose PC - Powder

Item	2030B	2070	2100	2150	Standards	Test Conditions	Unit
	High Viscosity, Branched, High Melt Strength	High Viscosity	Medium Viscosity	Medium Viscosity			
Physical Properties							
Melt mass-flow rate (MFR)	3	6.5	9.5	16	ASTM D1238	300°C; 1.2kg	g/10min
Mold Shrinkage	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	ASTM D955	—	%
Water Absorption	0.2	0.2	0.2	0.2	ASTM D570	23°C	%
Density	1.2	1.2	1.2	1.2	ASTM D792	—	g/cm³
Mechanical Properties							
Tensile Strength	72	72	72	70	ASTM D638	50mm/min	MPa
Tensile Modulus	2200	2300	2300	2300	ASTM D638	1mm/min	MPa
Strain at Break	120	120	120	120	ASTM D638	50mm/min	%
Flexural Strength	96	96	96	96	ASTM D790	2mm/min	MPa
Flexural Modulus	2200	2300	2300	2300	ASTM D790	2mm/min	MPa
Izod Notched Impact Strength	85	86	80	75	ASTM D256	23°C	KJ/m²
Thermal Properties							
Heat Distortion Temp.	133	131	130	128	ASTM D648	1.82Mpa; 3.2mm	°C
Vicat Softening Temp.	154	151	150	148	ASTM D1525	120°C/h; 50N	°C
Optical Properties							
Haze	<0.8	<0.8	<0.8	<0.8	ASTM D1003	3mm	%
Light Transmittance	90	90	90	90	ASTM D1003	3mm	%
Flammability Properties							
Flame Rating	HB	HB	HB	HB	UL94	3mm	—
	V2	V2	V2	V2	UL94	1.5mm	—

The typical values listed are for reference only.

PC

CLARNATE® General Purpose PC - Powder

Item	2220	2280	2350	2600	2850	Standards	Test Conditions	Unit
	Low Viscosity	Low Viscosity	Low Viscosity	Low Viscosity	Low Viscosity			
Physical Properties								
Melt mass-flow rate (MFR)	20	27	34	60	88	ASTM D1238	300°C; 1.2kg	g/10min
Mold Shrinkage	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	ASTM D955	—	%
Water Absorption	0.2	0.2	0.2	0.2	0.2	ASTM D570	23°C	%
Density	1.2	1.2	1.2	1.2	1.2	ASTM D792	—	g/cm³
Mechanical Properties								
Tensile Strength	68	62	62	61	65	ASTM D638	50mm/min	MPa
Tensile Modulus	2300	2300	2300	2200	2300	ASTM D638	1mm/min	MPa
Strain at Break	120	115	115	—	50	ASTM D638	50mm/min	%
Flexural Strength	97	90	90	90	100	ASTM D790	2mm/min	MPa
Flexural Modulus	2300	2300	2250	2300	2350	ASTM D790	2mm/min	MPa
Izod Notched Impact Strength	72	65	60	—	20	ASTM D256	23°C	KJ/m²
Thermal Properties								
Heat Distortion Temp.	127	125	124	124	121	ASTM D648	1.82Mpa; 3.2mm	°C
Vicat Softening Temp.	147	148	146	146	142	ASTM D1525	120°C/h; 50N	°C
Optical Properties								
Haze	<0.8	<0.8	<0.8	<0.8	<0.8	ASTM D1003	3mm	%
Light Transmittance	90	90	90	90	90	ASTM D1003	3mm	%
Flammability Properties								
Flame Rating	HB	HB	HB	HB	HB	UL94	3mm	—
	V2	V2	V2	V2	V2	UL94	1.5mm	—

The typical values listed are for reference only.

PC

CLARNATE® General Purpose PC –Granule

Item	A1070	A1073	A1075	A1077	A1100	A1105	A1107	Standards	Test Conditions	Unit
	High viscosity	High viscosity, UV stabilized	High viscosity, easy release	High viscosity, easy release, UV stabilized	Medium viscosity	Medium viscosity, easy release	Medium viscosity, easy release, UV stabilized			
Physical Properties										
Melt mass-flow rate (MFR)	7	7	7	7	9.5	9.5	10	ASTM D1238	300°C; 1.2kg	g/10min
Mold Shrinkage	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	ASTM D955	—	%
Water Absorption	0.2	0.2	0.2	0.2	0.2	0.2	0.2	ASTM D570	23°C	%
Density	1.2	1.2	1.2	1.2	1.2	1.2	1.2	ASTM D792	—	g/cm^3
Mechanical Properties										
Tensile Strength	72	72	72	72	72	72	70	ASTM D638	50mm/min	MPa
Tensile Modulus	2300	2300	2300	2300	2300	2300	2300	ASTM D638	1mm/min	MPa
Strain at Break	120	120	120	120	120	120	120	ASTM D638	50mm/min	%
Flexural Strength	96	96	98	98	97	97	98	ASTM D790	2mm/min	MPa
Flexural Modulus	2300	2300	2300	2300	2300	2300	2300	ASTM D790	2mm/min	MPa
Izod Notched Impact Strength	86	86	84	84	80	80	78	ASTM D256	23°C	KJ/m^2
Thermal Properties										
Heat Distortion Temp.	130	130	129	129	130	130	128	ASTM D648	1.82Mpa; 3.2mm	°C
Vicat Softening Temp.	151	151	150	150	150	150	149	ASTM D1525	120°C/h; 50N	°C
Optical Properties										
Haze	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	ASTM D1003	3mm	%
Light Transmittance	89	89	89	89	89	89	89	ASTM D1003	3mm	%
Flammability Properties										
Flame Rating	HB	HB	HB	HB	HB	HB	HB	UL94	3mm	—
	V2	V2	V2	V2	V2	V2	V2	UL94	1.5mm	—

The typical values listed are for reference only.

PC

CLARNATE® General Purpose PC –Granule

Item	A1150	A1155	A1220	A1225	A1227	A1157	A1350	A1357	Standards	Test Conditions	Unit
	Medium viscosity	Medium viscosity easy release	Low viscosity	Low viscosity, easy release	Low viscosity, easy release, UV stabilized	Medium viscosity, easy release, UV stabilized	Low viscosity	Low viscosity, easy release, UV stabilized			
Physical Properties											
Melt mass-flow rate (MFR)	16	16	20	20	21	17	34	34	ASTM D1238	300°C; 1.2kg	g/10min
Mold Shrinkage	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	ASTM D955	—	%
Water Absorption	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	ASTM D570	23°C	%
Density	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	ASTM D792	—	g/cm^3
Mechanical Properties											
Tensile Strength	70	70	68	68	68	70	62	62	ASTM D638	50mm/min	MPa
Tensile Modulus	2300	2300	2300	2300	2300	2300	2300	2300	ASTM D638	1mm/min	MPa
Strain at Break	120	120	120	120	120	120	115	115	ASTM D638	50mm/min	%
Flexural Strength	97	97	97	97	97	97	90	90	ASTM D790	2mm/min	MPa
Flexural Modulus	2300	2300	2300	2300	2300	2300	2250	2250	ASTM D790	2mm/min	MPa
Izod Notched Impact Strength	75	75	72	72	65	72	58	68	ASTM D256	23°C	KJ/m^2
Thermal Properties											
Heat Distortion Temp.	128	128	127	127	127	127	124	124	ASTM D648	1.82Mpa; 3.2mm	°C
Vicat Softening Temp.	148	148	147	147	146	147	146	146	ASTM D1525	120°C/h; 50N	°C
Optical Properties											
Haze	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	ASTM D1003	3mm	%
Light Transmittance	89	89	89	89	89	90	90	90	ASTM D1003	3mm	%
Flammability Properties											
Flame Rating	HB	HB	HB	HB	HB	HB	HB	HB	UL94	3mm	—
	V2	V2	V2	V2	V2	V2	V2	V2	UL94	1.5mm	—

The typical values listed are for reference only.

PC

CLARNATE® Special Grade PC

Item	Automotive Lighting Grade		Optical Lens Grade				Light Grade	Standards	Test Conditions	Unit
	HL6157	HL6227	OL1605	OL1107	OL1058	OL2078	LED1355			
	Medium Viscosity, Easy Release, UV Stabilized	Low Viscosity, Easy Release, UV Stabilized	Low Viscosity, Easy Release, High Transparency	Medium Viscosity, Easy Release, UV Stabilized	Medium-high Viscosity, Easy Release, UV Stabilized	UV 400nm Cut-off,Medium-high Viscosity, Easy Release	Low Viscosity, Easy Release, Optical Grade			
Physical Properties										
Melt mass-flow rate (MFR)	17	20	61	10	6	7	35	ASTM D1238	300°C; 1.2kg	g/10min
Mold Shrinkage	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	ASTM D955	—	%
Water Absorption	0.2	0.2	0.2	0.2	0.2	0.2	0.2	ASTM D570	23°C	%
Density	1.2	1.2	1.2	1.2	1.2	1.2	1.2	ASTM D792	—	g/cm^3
Mechanical Properties										
Tensile Strength	70	68	63	70	75	72	62	ASTM D638	50mm/min	MPa
Tensile Modulus	2300	2300	2350	2300	2350	2300	2300	ASTM D638	1mm/min	MPa
Strain at Break	120	120	100	120	130	120	115	ASTM D638	50mm/min	%
Flexural Strength	97	97	98	98	95	95	90	ASTM D790	2mm/min	MPa
Flexural Modulus	2300	2300	2350	2300	2400	2300	2250	ASTM D790	2mm/min	MPa
Izod Notched Impact Strength	72	72	51.5	78	88	80	68	ASTM D256	23°C	KJ/m^2
Thermal Properties										
Heat Distortion Temp.	127	127	123	128	128	128	124	ASTM D648	1.82Mpa; 3.2mm	°C
Vicat Softening Temp.	147	147	145	149	148	148	146	ASTM D1525	120°C/h; 50N	°C
Optical Properties										
Haze	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	—	ASTM D1003	3mm	%
Light Transmittance	90	89	90	90	88	87	89	ASTM D1003	3mm	%
Flammability Properties										
Flame Rating	HB	HB	HB	HB	—	HB	HB	UL94	3mm	—
	V2	V2	V2	V2	—	V2	V2	UL94	1.5mm	—

The typical values listed are for reference only.

PC

CLARNATE® Special Grade PC

Item	Film Grade		Transparent Flame Retardant Grade				Infrared Control Grade		Standards	Test Conditions	Unit
	FL5073	FL5105	FR3730T	FR2720T	FR2820T	FR3710T	A1077IR	A1225IR			
	High Viscosity, UV Stabilized	High Cleanliness, Medium Viscosity, Easy Release	High Viscosity, Flame Retardant	Halogen Free, Medium-high Viscosity, Easy Release	Halogen Free, Medium Viscosity, Easy Release	Halogen Free, High Viscosity, Easy Release	IR-Absorbing, High Viscosity, UV Stabilized	IR-Absorbing, Low Viscosity, Easy Release			
Physical Properties											
Melt mass-flow rate (MFR)	7	10	3	8	11	3	7	20	ASTM D1238	300°C; 1.2kg	g/10min
Mold Shrinkage	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	ASTM D955	—	%
Water Absorption	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	ASTM D570	23°C	%
Density	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	ASTM D792	—	g/cm^3
Mechanical Properties											
Tensile Strength	72	72	60	70	70	70	72	65	ASTM D638	50mm/min	MPa
Tensile Modulus	2300	2300	2000	2200	2250	2200	2300	2300	ASTM D638	1mm/min	MPa
Strain at Break	120	120	80	130	100	130	120	90	ASTM D638	50mm/min	%
Flexural Strength	96	97	80	95	95	95	98	90	ASTM D790	2mm/min	MPa
Flexural Modulus	2300	2300	2100	2300	2300	2300	2300	2200	ASTM D790	2mm/min	MPa
Izod Notched Impact Strength	86	80	90	90	65	90	84	65	ASTM D256	23°C	KJ/m^2
Thermal Properties											
Heat Distortion Temp.	130	130	126	129	126	129	129	127	ASTM D648	1.82Mpa; 3.2mm	°C
Vicat Softening Temp.	151	150	146	150	146	150	150	147	ASTM D1525	120°C/h; 50N	°C
Optical Properties											
Haze	<0.8	<0.8	0.8	0.2	<0.8	<0.8	<3	—	ASTM D1003	3mm	%
Light Transmittance	89	89	90	90	89	87	—	—	ASTM D1003	3mm	%
Flammability Properties											
Flame Rating	HB	HB	—	—	—	—	HB	HB	UL94	3mm	—
	V2	V2	V0	3.0mm V0	3.0mm V0	1.5mm V0	—	—	UL94	1.5mm	—

The typical values listed are for reference only.

PC

CLARNATE® Special Grade PC

Item	Food Contact Grade		Water Bottle Grade	Standards	Test Conditions	Unit
	FC3105	FC3155	LED1355			
	Food Contact Certification, Medium Viscosity, Easy Release	Food Contact Certification, Low Viscosity, Easy Release	Branched Structure, High Viscosity, Food Contact			
Physical Properties						
Melt mass-flow rate (MFR)	10	15	3	ASTM D1238	300°C; 1.2kg	g/10min
Mold Shrinkage	0.5-0.7	0.5-0.7	0.5-0.7	ASTM D955	—	%
Water Absorption	0.2	0.2	0.2	ASTM D570	23°C	%
Density	1.2	1.2	1.2	ASTM D792	—	g/cm^3
Mechanical Properties						
Tensile Strength	75	70	70	ASTM D638	50mm/min	MPa
Tensile Modulus	2300	2300	2200	ASTM D638	1mm/min	MPa
Strain at Break	130	130	130	ASTM D638	50mm/min	%
Flexural Strength	95	95	95	ASTM D790	2mm/min	MPa
Flexural Modulus	2400	2400	2300	ASTM D790	2mm/min	MPa
Izod Notched Impact Strength	80	80	90	ASTM D256	23°C	KJ/m^2
Thermal Properties						
Heat Distortion Temp.	128	127	129	ASTM D648	1.82Mpa; 3.2mm	°C
Vicat Softening Temp.	149	148	149	ASTM D1525	120°C/h; 50N	°C
Optical Properties						
Haze	—	—	0.8	ASTM D1003	3mm	%
Light Transmittance	88	88	60	ASTM D1003	3mm	%
Flammability Properties						
Flame Rating	—	—	—	UL94	3mm	—
	—	—	—	UL94	1.5mm	—

The typical values listed are for reference only.

PC

CLARNATE® Special Grade PC

Item	Medical Grade						Standards	Test Conditions	Unit
	ME075	ME105	ME155	ME205	MR076	MR156			
	ETO & Steam Sterilization, High Viscosity, Easy Release	ETO & Steam Sterilization, Medium Viscosity, Easy Release	ETO & Steam Sterilization, Medium Viscosity, Easy Release	ETO & Steam Sterilization, Low Viscosity, Easy Release	γ& e-Beam Sterilization, High Viscosity, Easy Release	γ& e-Beam Sterilization, Medium Viscosity, Easy Release			
Physical Properties									
Melt mass-flow rate (MFR)	7	9	16	20	7	16	ASTM D1238	300°C; 1.2kg	g/10min
Mold Shrinkage	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7	ASTM D955	—	%
Water Absorption	0.2	0.2	0.2	0.2	0.2	0.2	ASTM D570	23°C	%
Density	1.2	1.2	1.2	1.2	1.2	1.2	ASTM D792	—	g/cm^3
Mechanical Properties									
Tensile Strength	70	70	70	68	70	70	ASTM D638	50mm/min	MPa
Tensile Modulus	2300	2300	2300	2300	2300	2300	ASTM D638	1mm/min	MPa
Strain at Break	120	120	120	120	120	120	ASTM D638	50mm/min	%
Flexural Strength	95	95	95	95	95	95	ASTM D790	2mm/min	MPa
Flexural Modulus	2300	2300	2300	2300	2300	2300	ASTM D790	2mm/min	MPa
Izod Notched Impact Strength	85	85	75	72	85	75	ASTM D256	23°C	KJ/m^2
Thermal Properties									
Heat Distortion Temp.	130	130	128	127	127	125	ASTM D648	1.82Mpa; 3.2mm	°C
Vicat Softening Temp.	151	150	148	147	148	145	ASTM D1525	120°C/h; 50N	°C
Optical Properties									
Haze	—	—	—	—	—	—	ASTM D1003	3mm	%
Light Transmittance	75	75	75	75	75	75	ASTM D1003	3mm	%
Flammability Properties									
Flame Rating	—	—	—	—	—	—	UL94	3mm	—
	—	—	—	—	—	—	UL94	1.5mm	—

The typical values listed are for reference only.

PMMA

ACRYPLAS® Heat Resistance & Extrusion Series

Item	HD01	HD01A	HD01B	HD01L	HD08L	Standards	Test Conditions	Unit
Optical Properties								
Transmittance	>92	>92	>92	>92	>92	ISO 13468	3mm	%
Haze	<0.5	<0.5	<0.5	<0.5	<0.5	ISO 14782	3mm	%
Refractive index	1.49	1.49	1.49	1.49	1.49	ISO 489	—	—
Thermal Properties								
Melt flow rate	2	2	2	2	1.5	ISO 1133	230°C/3.8kg	g/10min
Vicat softening temperature	107	107	107	107	102	ISO 306	B50	°C
Heat distortion temperature	101	101	101	101	94	ISO 75	1.8MPa	°C
Thermal expansion coefficient	$6x10^{-5}$	$6x10^{-5}$	$6x10^{-5}$	$6X10^{-5}$	$6X10^{-5}$	ISO 11359	—	1/°C
Mechanical Properties								
Tensile strength	77	77	77	77	75	ISO 527	5mm/min	MPa
Elongation	6	6	6	6	7	ISO 527	5mm/min	%
Tensile modulus	3300	3300	3300	3300	3300	ISO 527	1mm/min	MPa
Flexural strength	135	135	135	135	120	ISO 178	2mm/min	MPa
Flexural modulus	3300	3300	3300	3300	3300	ISO 178	2mm/min	MPa
Charpy impact strength	20	20	20	20	20	ISO 179	1eU unnotched	KJ/m^2
	1.4	1.4	1.4	1.4	1.4	ISO 179	1eA Vnotched	KJ/m^2
Rockwell hardness	100	100	100	100	100	ISO 2039	M scale	—
Electrical Properties								
Surface resistivity	$>10^{16}$	$>10^{16}$	$>10^{16}$	$>10^{16}$	$>10^{16}$	ASTM D527	—	Ω
Volume resistivity	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	ASTM D527	—	Ω•m
Dielectric strength	20	20	20	20	20	ASTM D149	4kV/sec	kV/mm
Dielectric constant	3.7	3.7	3.7	3.7	3.7	ASTM D150	60HZ	—
Physical Properties								
Density	1.19	1.19	1.19	1.19	1.19	ISO 1183	—	g/cm^3
Shrinkage	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	ISO 294	—	%
Water absorption	0.3	0.3	0.3	0.3	0.3	ISO 62	24hr	%
Flammability	HB	HB	HB	HB	HB	UL94	3.0mm	Class

PMMA

ACRYPLAS® Medium Flowability Series

Item	HD03	HD04	MG01	Standards	Test Conditions	Unit
Optical Properties						
Transmittance	>92	>92	>92	ISO 13468	3mm	%
Haze	<0.5	<0.5	<0.5	ISO 14782	3mm	%
Refractive index	1.49	1.49	1.49	ISO 489	—	—
Thermal Properties						
Melt flow rate	3.5	3.7	7	ISO 1133	230°C/3.8kg	g/10min
Vicat softening temperature	107	109	105	ISO 306	B50	°C
Heat distortion temperature	101	101	95	ISO 75	1.8MPa	°C
Thermal expansion coefficient	$6x10^{-5}$	$6x10^{-5}$	$6x10^{-5}$	ISO 11359	—	1/°C
Mechanical Properties						
Tensile strength	77	77	75	ISO 527	5mm/min	MPa
Elongation	6	6	3	ISO 527	5mm/min	%
Tensile modulus	3300	3300	3300	ISO 527	1mm/min	MPa
Flexural strength	125	135	120	ISO 178	2mm/min	MPa
Flexural modulus	3300	3300	3300	ISO 178	2mm/min	MPa
Charpy impact strength	20	20	20	ISO 179	1eU unnotched	KJ/m^2
	1.3	1.4	1.3	ISO 179	1eA Vnotched	KJ/m^2
Rockwell hardness	100	100	100	ISO 2039	M scale	—
Electrical Properties						
Surface resistivity	$>10^{16}$	$>10^{16}$	$>10^{16}$	ASTM D527	—	Ω
Volume resistivity	$>10^{13}$	$>10^{13}$	$>10^{13}$	ASTM D527	—	Ω•m
Dielectric strength	20	20	20	ASTM D149	4kV/sec	kV/mm
Dielectric constant	3.7	3.7	3.7	ASTM D150	60HZ	—
Physical Properties						
Density	1.19	1.19	1.19	ISO 1183	—	g/cm^3
Shrinkage	0.2-0.6	0.2-0.6	0.2-0.6	ISO 294	—	%
Water absorption	0.3	0.3	0.3	ISO 62	24hr	%
Flammability	HB	HB	HB	UL 94	3.0mm	Class

PMMA

ACRYPLAS® High Flowability Series

Item	SF01	OD01	OD02	Standards	Test Conditions	Unit
Optical Properties						
Transmittance	>92	>92	>92	ISO 13468	3mm	%
Haze	<0.5	<0.5	<0.5	ISO 14782	3mm	%
Refractive index	1.49	1.49	1.49	ISO 489	—	—
Thermal Properties						
Melt flow rate	14	10	20	ISO 1133	230°C/3.8kg	g/10min
Vicat softening temperature	89	101	100	ISO 306	B50	°C
Heat distortion temperature	84	94	93	ISO 75	1.8MPa	°C
Thermal expansion coefficient	$6X10^{-5}$	$6X10^{-5}$	$6X10^{-5}$	ISO 11359	—	1/°C
Mechanical Properties						
Tensile strength	67	59	55	ISO 527	5mm/min	MPa
Elongation	4	5	2	ISO 527	5mm/min	%
Tensile modulus	3300	3300	3300	ISO 527	1mm/min	MPa
Flexural strength	110	110	90	ISO 178	2mm/min	MPa
Flexural modulus	3300	3300	3300	ISO 178	2mm/min	MPa
Charpy impact strength	18	19	19	ISO 179	1eU unnotched	KJ/m^2
	1.3	1.3	1.3	ISO 179	1eA Vnotched	KJ/m^2
Rockwell hardness	90	94	90	ISO 2039	M scale	—
Electrical Properties						
Surface resistivity	$>10^{16}$	$>10^{16}$	$>10^{16}$	ASTM D257	—	Ω
Volume resistivity	$>10^{13}$	$>10^{13}$	$>10^{13}$	ASTM D257	—	Ω•m
Dielectric strength	20	20	20	ASTM D149	4kV/sec	kV/mm
Dielectric constant	3.7	3.7	3.7	ASTM D150	60HZ	—
Physical Properties						
Density	1.19	1.19	1.19	ISO 1183	—	g/cm^3
Shrinkage	0.2-0.6	0.2-0.6	0.2-0.6	ISO 294	—	%
Water absorption	0.3	0.3	0.3	ISO 62	24hr	%
Flammability	HB	HB	HB	UL94	3.0mm	class

PMMA

ACRYPLAS® Color products

Item	HD03 color series					Standards	Test Conditions	Unit
Description								
—	Red	Grey	Amber	High glossy black	Laser welding black	—	—	—
Thermal Properties								
Melt flow rate	3.5	3.5	3.5	3.5	3.5	ISO 1133	230°C, 3.8kg	g/10min
Vicat softening temperature	107	107	107	107	107	ISO 306	B50	°C
Heat distortion temperature	100	100	100	101	101	ISO 75	1.8MPa	°C
Thermal expansion coefficient	$6x10^{-5}$	6×10^{-5}	6×10^{-5}	6×10^{-5}	6×10^{-5}	ISO 11359	—	1/°C
Mechanical Properties								
Tensile strength	70	70	70	70	70	ISO 527	5mm/min	MPa
Elongation	6	6	6	6	6	ISO 527	5mm/min	%
Tensile modulus	3300	3300	3300	3300	3300	ISO 527	1mm/min	MPa
Flexural strength	135	135	135	135	135	ISO 178	2mm/min	MPa
Flexural modulus	3300	3300	3300	3300	3300	ISO 178	2mm/min	MPa
Charpy impact strength	20	20	20	20	20	ISO 179	1eU unnotched	KJ/m^2
	1.4	1.4	1.4	1.4	1.4	ISO 179	1eA Vnotched	KJ/m^2
Rockwell hardness	100	100	100	100	100	ISO 2039	M scale	—
Electrical Properties								
Surface resistivity	$>10^{16}$	$>10^{16}$	$>10^{16}$	$>10^{16}$	$>10^{16}$	ASTM	—	Ω
Volume resistivity	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	$>10^{13}$	ASTM	—	Ω•m
Dielectric strength	20	20	20	20	20	ASTM	4kV/sec	kV/mm
Dielectric constant	3.7	3.7	3.7	3.7	3.7	ASTM	60HZ	—
Physical Properties								
Density	1.19	1.19	1.19	1.19	1.19	ISO 1183	—	g/cm^3
Shrinkage	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6	ISO 294	—	%
Water absorption	0.3	0.3	0.3	0.3	0.3	ISO 62	24hr	%
Flammability	HB	HB	HB	HB	HB	UL 94	3.0mm	Class

PMMA

ACRYPLAS® High Impact Series

Item	MT1260	MT1270	MT1330	Standards	Test Conditions	Unit
Description						
—	Transparent	Transparent	Transparent	—	—	—
Optical Properties						
Transmittance	91	91	91	ISO 13468	3mm	%
Thermal Properties						
Melt flow rate	2	1	3	ISO 1133	230°C, 3.8kg	g/10min
Vicat softening temperature	100	82	92	ISO 306	B50	°C
Heat distortion temperature	96	73	83	ISO 75	1.8MPa	°C
Mechanical Properties						
Tensile strength	62	43	60	ISO 527	5mm/min	MPa
Elongation	24	22	12	ISO 527	5mm/min	%
Flexural strength	88	60	70	ISO 178	2mm/min	MPa
Flexural modulus	2300	1700	2300	ISO 178	2mm/min	MPa
Charpy impact strength	43	80	50	ISO 179	1eU unnotched	KJ/m^2
	4	7	3	ISO 179	1eA Vnotched	KJ/m^2
Physical Properties						
Density	1.17	1.14	1.16	ISO 1183	—	g/cm^3
Water absorption	0.3	0.3	0.3	ISO 62	24hr	%
Flammability	HB	HB	HB	UL 94	3.0mm	Class

PMMA

ACRYPLAS® PMMA Alloy

Item	BM1480	BM1650	Standards	Test Conditions	Unit
Description					
—	Black	Black	—	—	—
Thermal Properties					
Melt flow rate	4	6	ISO 1133	230°C, 3.8kg	g/10min
Vicat softening temperature	96	100	ISO 306	B50	°C
Heat distortion temperature	85	90	ISO 75	1.8MPa	°C
Mechanical Properties					
Tensile strength	50	58	ISO 527	5mm/min	MPa
Tensile modulus	2200	2500	ISO 527	1mm/min	MPa
Elongation	35	35	ISO 527	5mm/min	%
Flexural strength	75	82	ISO 178	2mm/min	MPa
Flexural modulus	2350	2550	ISO 178	2mm/min	MPa
Charpy impact strength	8	5	ISO 179	1eU unnotched	KJ/m^2
Physical Properties					
Density	1.15	1.16	ISO 1183	—	g/cm^3
Shrinkage	0.4-0.6	0.4-0.6	ISO 62	24hr	%
Flammability	HB	HB	UL 94	3.0mm	Class

POE

Photovoltaic Grade

Item	9057	9147	69057	69147	Standards	Unit
Physical						
Melt index (2.16kg/190°C)	5	14	5	14	ASTM D1238	g/10min
Density	0.872	0.873	0.875	0.875	ASTM D792	g/cm^3
Mechanical						
Tensile strength at break (500mm/min)	10	4	5	3.3	ASTM D638	MPa
Elongation at break (500mm/min)	1000	1000	800	800	ASTM D638	%
Tear strength (Type C)	40	37	35	30	ASTM D624	MPa
Hardness (Shore A, 1 sec)	70	70	70	70	ASTM D2240	—
Hardness (Shore D,1 sec)	20	18	18	18	ASTM D2240	—
Thermal						
Melting temperature (DSC)	70	65	59	57	Wanhua method	°C
DSC Glass transition temperature	-52	-53	-51	-51	Wanhua method	°C
Electrical						
Volume resistivity	>1.0E+15	>1.0E+15	>1.0E+15	>1.0E+15	IEC60093	Ω•cm

POE

General Grade

Item	5007	5017	5057	65016	65056	65057	Standards	Unit
Physical								
Melt index (2.16kg/190°C)	0.5	1	5	1	5	5	ASTM D1238	g/10min
Density	0.868	0.870	0.870	0.862	0.865	0.875	ASTM D792	g/cm^3
Mechanical								
Tensile strength at break (500mm/min)	10	10	6	2	2	5	ASTM D638	MPa
Elongation at break (500mm/min)	850	950	1000	700	650	800	ASTM D638	%
Tear strength (Type C)	40	39	40	25	25	35	ASTM D624	MPa
Hardness (Shore A, 1 sec)	70	69	70	55	63	70	ASTM D2240	—
Hardness (Shore D,1 sec)	20	19	20	15	17	18	ASTM D2240	—
Thermal								
Melting temperature (DSC)	60	65	67	34	35	59	Wanhua method	°C
DSC Glass transition temperature	-55	-53	-54	-57	-53	-49	Wanhua method	°C

The typical values listed are reference only. Properties measured on product without the partitioning agent.

PEBA

General type

Item	3011	4011	5011	6011	7211	Standards	Unit
Physical property							
Density	1	1.01	1.01	1.01	1.01	ISO1183	g/cm³
MFR (235°C/2.16kg)	40	40	35	28	20	ISO1133	g/10min
Mechanical property							
Tensile strength (100% modulus)	5	8	13	16	25	ISO527	MPa
Bending modulus	20	80	160	300	600	ISO178	MPa
Elongation	>500	>500	>400	>300	>300	ISO527	%
Un-notched Charpy impact strength (-30°C)	N	N	N	N	N	ISO179/1eA	KJ/m²
Notched charpy impact strength (-30°C)	N	N	N	18	8	ISO179/1eA	KJ/m²
Shore D (15s)	30	40	50	58	67	ISO 868	—
Heat property							
Melting point (10°C/min)	144	148	161	169	174	ISO11357	°C

PEBA

Functional type

Item	4021	Standards	Unit
Physical properties			
Density	1.07	ISO1183	g/cm³
MFR (235°C/2.16kg)	33	ISO1133	g/10min
Mechanical properties			
Tensile strength (100% modulus)	10	ISO527	MPa
Bending modulus	100	ISO178	MPa
Elongation	>500	ISO527	%
Un-notched Charpy impact strength (-30°C)	N	ISO179/1eA	KJ/m²
Notched charpy impact strength (-30°C)	N	ISO179/1eA	KJ/m²
Shore D (15s)	40	ISO 868	—
Heat properties			
Melting Point (10°C/min)	158	ISO11357	°C
Electrical property			
Surface resistivity	E10	IEC 60093	Ohm/sq
Mass resistivity	E9	IEC 60093	Ohm.cm

PA12

Wanamid® PA12 resin

Item	L1000	L1020	L2000	L3000	Method	Unit
Features						
—	Low viscosity	Low viscosity, high flow	Medium viscosity	High viscosity	—	—
Physical						
Density	1.01	1.01	1.01	1.01	ISO 1183	g/cm³
Water Absorption (23°C; 50%RH)	0.7	0.7	0.7	0.7	ISO62	%
Melt Mass-Flow Rate	22 190°C, 2.16kg	53 190°C, 2.16kg	12 235°C, 2.16kg	14 235°C, 5kg	ISO 1133	g/10min
Mechanical						
Stress at Yield	46	46	45	47	ISO527	MPa
Stress at Break	46	46	45	47	ISO527	MPa
Tensile Modulus	1400	1400	1400	1400	ISO527	MPa
Charpy Impact Strength (23°C)	4C	4C	6C	15C	ISO179/1eA	KJ/m²
Charpy Impact Strength (-30°C)	4C	4C	6C	7C	ISO179/1eA	KJ/m²
Thermal						
HDT (1.8 MPa)	50	50	50	50	ISO75	°C
Melting temperature (10°C/min)	178	178	178	178	ISO11357	°C
Electrical Properties						
Electric Strength	27	27	27	27	IEC 60243-1	KV/mm
Comparative Tracking Index	600	600	600	600	IEC 60112	—
Volume Resistivity	1E15	1E15	1E15	1E15	IEC 60093	Ω•cm
Flame Characteristics						
Burning behavior Ul94 (3.2mm)	HB	HB	HB	HB	UL94	—

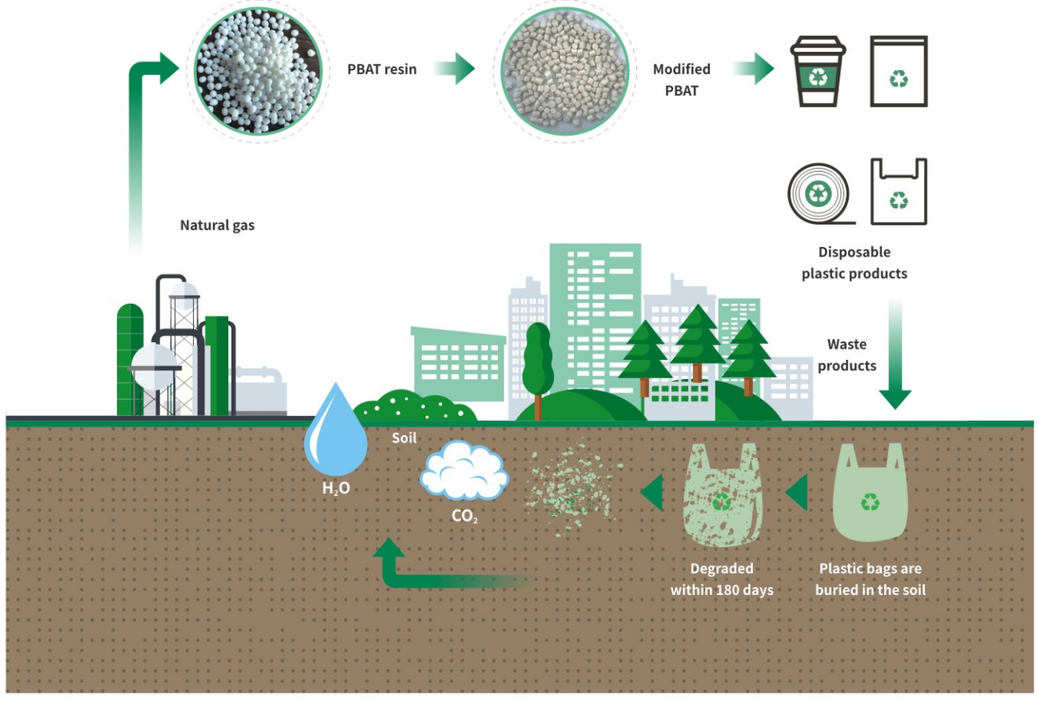
Biodegradable Plastic

Waneco® PBAT resin

Waneco® PBAT resin is a fully biodegradable polymer with good ductility, heat resistance and impact resistance, mainly used in packaging and film fields. Under composting conditions, PBAT resin can be decomposed into carbon dioxide, water and other small molecules by micro-organisms within 180 days. No toxic residues are generated during the whole process, which is totally environment-friendly.

Wanhua Chemical PBAT production plant is located in Meishan, Sichuan Province with annual capacity of 60,000 metric tons. Wanhua Meishan industrial park takes natural gas as the source and hydropower as clean energy, providing customers with stable, high-quality products and specialized technical service.

Waneco® modified PBAT/PLA can be customized for various end-use applications while ensuring 100% biodegradation.



Waneco® PBAT

Item	T16	T18	Standards	Test Conditions	Unit
Physical					
Melt Mass-flow Rate	3-5	3-5	ISO 1133	190°C/2.16Kg	g/10min
Melt Point	120.2	118.5	DSC	—	°C
Moisture Content	<0.1	<0.1	—	—	%
End COOH	19.5	17.4	—	—	mol/t
End COOH	1.09	0.97	—	—	mgKOH/g
Density	1.20-1.25	1.20-1.25	ISO 1183	—	g/cm^3
Mechanical					
Stress at Break (25μm film)	>35	>35	ISO 527	200mm/min	MPa
Strain at Break (25μm film)	>500	>500	ISO 527	200mm/min	%
Shore Type D Hardness	>30	>30	ISO 868	—	—
Thermal					
Vicat Softening A/50	>80	>80	ISO 306	50°C/h; 10N	°C
Optical					
Light Transmittance (25μm film)	>80	>85	ASTM D1003	25μm	%

Rubber Additive Raw Materials

Product	Typical Indicators			Properties	Application
	Purity (%)	Color (Pt-Co)	粘度 (mPa·s)		
Aniline	⩾99.8	⩽100	⩽0.1	Improve rubber performance, retard aging process, and extend service life	Synthesis of M, DM, 6PPD, TMQ
WANKENTONE® MIBK	⩾99.5	⩽15	⩽0.1		Synthesis of 6PPD
WANAMINE® CHA	⩾99.7	⩽50	⩽0.1	Increase the speed of vulcanization, extend time of processing safety, improve the property of rubber.	Synthesis of CBS
WANAMINE® DCHA	⩾99.0	⩽50	⩽0.1	Excellent scorch resistance, make the sulfur-vulcanization process safer and more efficient	Synthesis of DCBS
WANAMINE® t-BA	⩾99.5	⩽15	⩽0.1	Excellent scorch resistance, processing safety, increase the speed of vulcanization	Synthesis of TBBS, TBSI

Polyamide Monomer

Product	Typical Indicators					Properties	Application
	Purity (%)	Color (Pt-Co)	Viscosity (mPa·s)	Amine value/ (mgKOH/g)	Water content (%)		
WANAMINE® IPDA	⩾99.7	⩽15	—	—	⩽0.2	High gross, good adhesion, thermostability, fast drying, low odor	Solvent polyamide resin for inks and pigments
WANAMINE® 2111	—	⩽30	60-80	520-540	⩽0.1	Low density and lightweight, excellent transparency, good resistance to chemicals	Spectacles Optical materials Transparent container
WANAMINE® MXDA	⩾99.0	⩽20	⩽10	824	—	Good mechanical properties, high-barrier, water resistance	Automotive components High barrier nylon food packaging

Wanhua Chemical

CATALOG FOR COATINGS


Construction Coatings

Interior & Exterior Wall Coatings & Road Marking Paints

Product	Chemistry	Solids (%)	MFFT (°C)	Viscosity (mPa.s)	pH	Application	Key Features
Archsol® 8015A	Styrene acrylic	52±1	<2	<700	7.5-8.5	Exterior	Good mechanical property, excellent low temperature elongation and early water resistance.
Archsol® 8042S	Styrene acrylic	50±1	18	300-5000	6.5-8.0	Interior	Aqueous styrene-acrylate copolymer for building coatings.
Archsol® 8042E	Styrene acrylic	50±1	18	300-5000	6.5-8.0	Interior	Low odor, Ammonia free version of Archsol® 8042S.
Archsol® 8119	Styrene acrylic	48±1	28	100-1200	7.0-9.0	Interior	Outstanding scrub resistance in high PVC paint. Excellent filler loading capability.
Archsol® 8164	Pure acrylic	52±1	<5	50-1000	7.0-9.0	Interior	Odorless, low VOC, good stain resistance, excellent formadehyde purification efficiency.
Archsol® 8169	Styrene acrylic	48±1	2	10-1000	7.5-9.5	Interior	Odorless, low VOC, good stain resistance, excellent formadehyde purification efficiency, good stability.
Archsol® 8210E	Pure acrylic	30±1	0	⩽500	7.0-9.0	Exterior	Low odor, Ammonia free, Nano particle size, outstanding penetrability. Excellent salting-out & alkali resistance.
Archsol® 8223	Styrene acrylic	44±1	32	200-2500	7.0-9.0	Exterior	Excellent masking tape resistance; excellent efflorescence resistance.
Archsol® 8061	Pure acrylic	50±1	21	50-1000	7.0-9.0	Exterior	Excellent outdoor durability, outstanding DPUR. Good colorant compatibility.
Archsol® 8061E	Pure acrylic	50±1	21	50-1000	7.0-9.0	Exterior	Low odor, Ammonia free version of Archsol® 8061.
Archsol® 8453	Pure acrylic	50±1	20	50-800	8.0-10.0	Road marking	Used in road marking paints, fast dry/ Fast dry-to-no-pickup and resistance to early rain showers under a wide range of climatic conditions.

Construction Coatings

Waterproofing Coatings

Product	Chemistry	Solids (%)	MFFT (°C)	Viscosity (mPa.s)	pH	Application	Key Features
Archsol® 8316	Styrene acrylic	55±1	<2	500-1500	7.0-9.0	Cementitious	No formaldehyde added. excellent mechanical property and water resistance.
Archsol® 8355	PUD	50±1	-	10-1000	6.0-9.0	Waterproof PUD	Excellent mechanical property and flexibility. Good acid and alkali resistance. Suitable for interior and exterior waterproof coatings.

Flooring Coatings-1K&2K PU

1K PU

Products	Chemistry	Solids (%)	pH	Tensile strength (Mpa)	100% Elongation modulus (Mpa)	Elongation at break (%)	Application	Features
Leasys® 3900	PUD	38±1	7.0-9.0	35	16	300	Topcoat	Good hardness/toughness balance. High abrasion resistance. Excellent chemical, black heel mark and scuff resistance & Scratch resistance.
Leasys® 5531	PUD	35±1	7.0-9.0	60	12	400	Sportive flooring coating	Small particle size, good solvent stability and good film formation.
Archsol® 8210E	Pure acrylic	30±1	7.0-9.0	-	-	-	Penetration primer, bonding to concrete floor	Odorless, low VOC.

2K PU

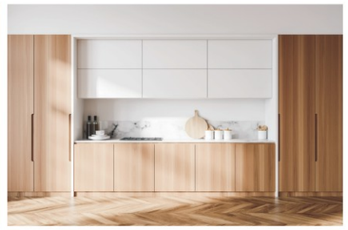
Product	Chemistry	Solids (%)	OH content% (on solid)	Viscosity (mPa.s)	pH	MFFT (°C)	Features
Archsol® 8573	OH-PA emulsion	40	4.80	⩽500	7.0-8.0	13	Pencil hardness is 2H, excellent chemical resistance, wear resistance and anti-graffiti property, for matt effect.
Archsol® 8563	OH-PA dispersion	50	3.80	50-4000	7.0-8.0	0	Low solvent content, excellent stain resistance and anti-graffiti property, high gloss.
Antkote® 2042	OH-PA dispersion	46	4.20	50-2500	7.0-9.0	47	Higher hardness and good in comprehensive performance.



Wood Coatings

Interior Furniture & Cabinet

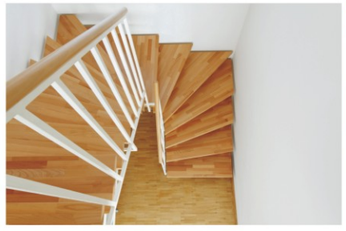
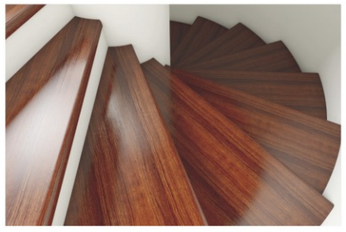
Product	Solid (%)	Viscosity (mPa.s)	pH	MFFT (°C)	OH content% (on solid)	Chemistry	Main feature
Lacper® 4906	40±1	10-200	7.0-9.0	44	/	Acrylic emulsion	Good chemical resistance, good compatibility, good hardness, excellent film-forming property.
Lacper® 4501	40±1	10-200	7.0-9.0	32	/	Acrylic emulsion	Good chemical resistance, good sandability and blocking resistance. Good comprehensive property.
Lacper® 4507	40±1	10-500	7.0-9.0	35	/	Acrylic emulsion	Excellent clarity, good wood warming, fast film hardness development, excellent chemical resistance.
Lacper® 4511	40±1	10-500	7.0-9.0	16	/	Acrylic emulsion	Excellent clarity, wide adhesion, fast drying and early blocking resistance.
Lacper® 4601	40±1	10-1000	7.0-9.0	32	/	Acrylic emulsion	39% biobase content, good clarity, fast hardness development, good chemical resistance.
Lacper® 4219	40±1	10-500	7.0-9.0	48	/	Acrylic modified PU dispersion	Fast hardness development and high hardness, excellent stacking resistance.
Lacper® 4211	40±1	10-200	7.0-9.0	47	/	Acrylic modified PU dispersion	Solvent free, excellent film-building, good flexibility, good adhesion.



Wood Coatings

Interior Furniture & Cabinet

Product	Solid (%)	Viscosity (mPa.s)	pH	MFFT (°C)	OH content% (on solid)	Chemistry	Main feature
Lacper® 4101	35±1	10-500	7.0-9.0	49	/	Oil modified PUD	BB content 31%, Good wetting ability on wood substrates, fast film hardness development, good compatibility with alcohol.
Urosin® 4616	37±1	10-500	7.0-9.0	-	/	Aliphatic urethane acrylate dispersion	Excellent clarity, good chemical resistance, easy to matt.
Lacper® 4708	40±1	10-2500	7.0-9.0	47	1.6	Hydroxyl acrylic emulsion	High hardness, fast film hardness development, good film clarity, excellent chemical resistance.
Lacper® 4703	40±1	10-1000	7.0-9.0	54	2.2	Hydroxyl acrylic emulsion	Faster hardness established, high gloss and higher building up, excellent resistance to chemical.
Antkote® 2702	45±1	50-3000	7.0-9.0	-	3.9	Hydroxyl acrylic secondary dispersion	No 100# solvent oil, used in 2K bright white/varnish system, high gloss, building up, hardness.
Lacper® 4166	35±1	100-2000	7.0-9.0	-	3	Hydroxyl polyurethane dispersion	High gloss and film building, excellent leveling ability, high film hardness, excellent compatibility with PU/PA/OH-PA.
Leasys® 3102	35±1	200-1200	6.0-10.5	-	/	Anionic aliphatic polyester-polyurethane dispersion	Self matt resin, haptic effect, free of organic solvent, heavy metal.


Wood Coatings

Exterior & Joinery

Product	Solid (%)	Viscosity (mPa.s)	pH	MFFT (°C)	OH content% (on solid)	Chemistry	Main feature
Lacper® 4571	40±1	1000-6000	7.0-9.0	24	/	Acrylic emulsion	Solvent free，good early water resistance, outdoor weather resistance, wide bonding.
Lacper® 4572	42.5±1	10-500	7.0-9.0	7	/	Acrylic emulsion	Good blocking resistance, good water resistance, non yellowing, good adhesion, good flexibility.

Parquet

Product	Solid (%)	Viscosity (mPa.s)	pH	MFFT (°C)	OH content% (on solid)	Chemistry	Main feature
Lacper® 4211	40±1	10-200	7.0-9.0	47	/	Acrylic modified PU dispersion	Solvent free, excellent film-building, good flexibility, good adhesion.
Leasys® 3900	38±1	20-1000	7.0-9.0	-	/	Anionic aliphatic polyester-polyurethane dispersio	High gloss, yellowing resistance, good abrasion resistance, good flexibility.
Leasys® 5531	35±1	20-300	7.0-9.0	10	/	Anionic aliphatic polyester-polyurethane dispersio	High gloss, yellowing resistance, good abrasion resistance, good flexibility.
Lacper® 4215	40±1	10-500	7.0-9.0	47	/	Fatty acid modified PUD	25% Bio-based. High hardness & scratch resistance. Very good wood wetting property. Excellent chemical resistances & black heel mark resistance.
Urosin® 4616	37±1	10-500	7.0-9.0	-	/	Aliphatic urethane acrylate dispersion	Excellent clarity, good chemical resistance, easy to matt.
Urosin® 4620	40±1	10-500	7.0-9.0	-	/	Aliphatic urethane dispersion	Physical dry before UV cure, high hardness, good chemical resistance.

Industrial Coatings

Light Duty

Product	Solid (%)	Viscosity (mPa.s)	pH	MFFT (°C)	OH content% (on solid)	Chemistry	Main feature
Wantipro® 0612	43±1	10-200	7.0-9.0	37	/	Acrylic emulsion	Good gloss and hardness, chemical resistance.
Wantipro® 0616Z	40±1	10-300	7.0-9.0	48	/	Acrylic emulsion	Excellent weather ability and anti-cracking.
Wantipro® 0620	45±1	10-200	7.0-9.0	55	/	Acrylic emulsion	Fast hardness development, anti- blocking.
Wantipro® 0622	46±1	1500-4500	7.0-9.0	23	/	Acrylic emulsion	High gloss, good mechanical stability.
Wantipro® 0626	47±1	100-1500	7.0-9.0	37	/	Acrylic emulsion	High gloss, salt spray resistance.
Wantipro® 0628	48±1	10-2000	7.0-9.0	24	/	Acrylic emulsion	Excellent flash rust resistance and stability in high PH system.

2K PU for ACE/Commercial Vehicles

Product	Solid (%)	Viscosity (mPa.s)	pH	MFFT (°C)	OH content% (on solid)	Chemistry	Main feature
Antkote® 2032	45±1	50-3000	7.0-9.0	35	3.3	Hydroxyl acrylic dispersion	Excellent appearance and polyisocyanates compatibility, good comprehensive performance.
Antkote® 2033	46±1	50-1850	7.0-9.0	32	3.3	Hydroxyl acrylic dispersion	Standard, balanced performance.
Antkote® 2035	43±1	50-2500	7.0-9.0	48	3	Hydroxyl acrylic dispersion	Excellent polyisocyanates compatibility and weathering resistance.
Antkote® 2042	46±1	50-2500	7.0-9.0	47	4.2	Hydroxyl acrylic dispersion	Higher hardness and good in comprehensive performance.
Antkote® 2702	45±1	50-3000	7.0-9.0	47	3.9	Hydroxyl acrylic dispersion	Fast dry, excellent appearance and polyisocyanates compatibility.

Industrial Coatings

Baking Coatings

Product	Solid (%)	Viscosity (mPa.s)	pH	MFFT (°C)	OH content% (on solid)	Chemistry	Main feature
Antkote® 2504	44±1	500-6500	7.0-9.0	/	4.2	Hydroxyl acrylic dispersion	Excellent flexibility, adhesion, chemical resistance, weather resistance, suitable for pigmented primer and topcoat.
Antkote® 2057	37±1	10-8000	7.0-9.0	/	2.6	Hydroxyl acrylic dispersion	Excellent orientation of aluminum powder, High gloss, High thixotropy, Excellent water resistance, suitable for pigmented topcoat and vanish.
Wantipro® 0678	26±1	100-500	6.0-7.5	/	1.2	Hydroxyl acrylic emulsion	High thixotropy, Excellent orientation of metallic pigment, Fast drying, High hardness, suitable for metallic paint.
Antkote® 2365	50±2	5000-15000	7.5-9.5	/	2.8	Water soluble hydroxyl acrylic copolymer	Good resistance to liquor, alcohol and boiling water. High gloss and hardness. Good recoatability.
Antkote® 2367	50±2	3000-9000	7.5-9.5	/	3.8	Water soluble hydroxyl acrylic copolymer	Excellent adhesion to glass. High gloss and good hardness. Good resistance to chemical, boiling water, liquor and alcohol.

Plastic/3C

Product	Solid (%)	Viscosity (mPa.s)	pH	MFFT (°C)	OH content% (on solid)	Chemistry	Main feature
Crysol® 6319	40±1	10-200	7.0-9.0	>90	/	Acrylic emulsion	Good adhesion to various plastic substrates, Good alcohol resistance, Hard and high gloss, Recommended for silver paints
Antkote® 2702	45±1	50-3000	7.0-9.0	47	3.9	Hydroxyl acrylic dispersion	Excellent appearance and polyisocyanates compatibility

Industrial Coatings

Liquid Applied Sound Damping

Product	Solid (%)	Viscosity (mPa.s)	pH	Tg (°C)	Chemistry	Main feature
Antamp® 0656	50±1	10-300	7.0-9.0	5	Acrylic emulsion	Excellent damping effect at room temperature, excellent construction performance and good performance of resisting bulge.
Antamp® 0657	53±1	10-800	7.0-9.0	20	Acrylic emulsion	Excellent damping effect at high temperature, can be mixed to improve the high temperature compound damping factor.
Antamp® 0658	50±1	100-1500	7.0-9.0	3	Acrylic emulsion	Excellent damping effect at room temperature, good workability and wide damping temperature range.

Glass Fiber Sizing PUD

Product	Solid (%)	Viscosity (mPa.s)	pH	100% Modulus Mpa	Hydrophilic character	Main feature
Glisiz® 3136	35±1	10-500	6.0-9.0	2.5-3.5	Nonionic type	Excellent hydrolysis resistance. PUD film former with additional crosslinking function.
Glisiz® 3137	50±1	10-3500	6.0-9.0	1.8-2.5	Anionic and nonionic type	Universal product with balanced properties for various application, Food contact acc. to EU 10/2011.
Glisiz® 3238	45±1	10-500	6.0-9.0	1.8-2.3	Anionic and nonionic type	Universal product with balanced properties for various application.
Glisiz® 3239	40±1	10-3000	6.0-8.0	7.5-8.3	Anionic and nonionic type	High modulus, Low thermal yellowing, Excellent hydrolysis resistance. Food contact acc. to EU 10/2011.
Glisiz® 3240	35±1	10-500	6.0-9.0	2.5-3.5	Anionic and nonionic type	Universal product with balanced properties for various application.

Hydrophilic Polyisocyanate

Hydrophilic Polyisocyanate Plus

Product	NCO content (%)	Viscosity (mPa.s)	Color (Apha)	Modification	HDI Monomer (%)	Key Features	Metal	Wood	Plastic	Wall	Concrete	Glass
Aquolin® 161plus	18.5	2000-4000	<60	Polyether	<0.1	HDI based water dispersable polyisocyanate for use in waterborne coatings and adhesives products.	X		X			
Aquolin® 163plus	17.5	1500-3500	<60	Polyether	<0.1	HDI based water dispersable polyisocyanate for use in waterborne coatings and adhesives products with good flexibility.	X	0	X			
Aquolin® 168plus	16.2	2000-5000	<60	Polyether	<0.1	HDI based water dispersable (hydrophilic) polyisocyanate for use in waterborne coatings for its clarity, high gloss, good outdoor durability and long potlife.	0	X	0			
Aquolin® 268plus	20.5	5000-7000	<80	Sulfonic	<0.1	HDI based water dispersable (hydrophilic) polyisocyanate for use in waterborne coatings for its high gloss and body and good water resistance.	0	X	0	X		
Aquolin® 270plus	21.5	1500-3500	<80	Sulfonic	<0.1	HDI based water dispersable (hydrophlic) polyisocyanate for use in waterborne coatings and adhesives for high gloss.	X	X	X	0	0	X
Aquolin® 278plus	22.5	1500-3500	<80	Sulfonic	<0.1	HDI based water dispersable (hydrophobic) polyisocyanate for use in waterborne coatings. Hardener can be used without adding solvents and gives egg-shell gloss (especially in emulsion coatings).	0	0		X	X	
Aquolin® 269plus	19.3	500-2000	<80	Sulfonic	<0.1	HDI based water dispersable (hydrophilic) polyisocyanate for use in waterborne coatings to give higest gloss, body and water resistance. Hardener can be used without adding additional solvent.	X	X	X	0	0	X
Aquolin® 280plus	19.2	<1000	<80	Sulfonic	<0.1	HDI based water dispersable (hydrophobic) polyisocyanate for use in wateborne coatings. Hardener can be used without adding solvents and will give lower gloss due to its hydrophobicity.	X	0	0	X	X	

X Recommended 0 Possible

Additive



Product	Type	Shear rate	Solid content (%)	Active (%)	Viscosity (mPa.s)	Solvent	pH	Key Features
Vesmody® A401	HASE	Medium	30	30	<100	Water	2-4	Hydrophobically modified alkali swellable thickener designed to give medium shear rate viscosity. It improves gloss and levelling and anti-splash property. It has good compatibility in many coating types. 20% bio-based.
Vesmody® A406	HASE	Low-Medium	30	30	<100	Water	2-4	Hydrophobically modified alkali swellable thickener designed to give low to medium shear rate viscosity. It supports scrub and water resistance and has good thermal stability. 20% bio-based.
Vesmody® A801	ASE	Low	29	29	<100	Water	2-4	Alkali swellable thickener to improve low shear rate viscosity (e.g. avoid settlement). It has high thickening efficiency and good thixotropic behavior as well as thermal stability. 20% bio-based.
Vesmody® U300E	HEUR	High Shear	20	20	3000-8000	Water	6-7	Nonionic urethane rheology modifier suitable for any waterborne coating, perpared with Unicap™ technolgy, in high shear rate viscosity. It gives excellent flow and levelling. It supports water and alkali resistance and can be used in wide pH range.
Vesmody® U505E	HEUR	Medium-High	40		3000-8000	DBGE/Water	6-7	High solid nonionic urethane rehology modifier for medium to high shear rate viscosity. It allows to formulate an excellent balance between flow and sag properties and supports water and alkali resistance.
Vesmody® U604E	HEUR	Medium	25	15	12000-17000	Water	6-7	Nonionic urethane rheology modifier suitable for any waterborne coating, efficient pseudoplastic behavior, in medium shear rate viscosity. It gives excellent levelling, sag water and alkali resistance. Can be used in wide pH range and is very stable in combination with all kind of colorants.
Vesmody® U605E	HEUR	Medium	40	40	30000-38000	DBGE/Water	6-7	High solids nonionic urethane rheology modifier suitable for any waterborne coating, efficient pseudoplastic behavior, in medium shear rate viscosity. It gives excellent levelling, sag water and alkali resistance. Can be used in wide pH range and is very stable in combination with all kind of colorants.
Vesmody® U902E	HEUR	Low	35	20	15000-20000	Water	6-7	Nonionic urethane rheology modifier suitable for any waterborne coating, efficient pseudoplastic behavior, in medium shear rate viscosity. It gives excellent levelling, sag water and alkali resistance. Can be used in wide pH range and is very stable in combination with all kind of colorants.
Vesmody® U905E	HEUR	Low	40	40	30000-38000	DBGE/Water	6-7	High solids nonionic urethane rheology modifier suitable for any waterborne coating, efficient pseudoplastic behavior, in medium shear rate viscosity. It gives excellent levelling, sag water and alkali resistance. Can be used in wide pH range and is predominantly used in pigmented systems.
Vesmody® C20	Dispersant		42		⩽1000		6.0-8.0	Sodium salt of polymeric carboxylic acid.It can be used for a wide variety of coating formulations. Very low foaming dispersant and high efficient to disperse mineral slurries.
Vesmody® H400	Opaque polymer		31		⩽1000		7.0-9.0	Acrylic copolymer emulsion to provide the opacity of emulsion paints. Offers partial replacement of TiO_2 and lowers TiO_2 demand, optimize the formulation cost. Enhance paint scrub resistance and stain removability. Wide formulation latitude.



Specialty Isocyanates

Aromatic Isocyanate — TDI Derivatives

Product	Solvent	Solid content (%)	NCO content (%)	Viscosity (25°C/mPa.s)	Color (Pt-Co)	Free TDI monomer (%)	Properties	Application
WANNATE® TL-75E	EA	73.0~77.0	12.9~13.7	1000~2000	≤1.0	<0.5	Low viscosity, easy to apply	Coatings, adhesives
WANNATE® TT-150B	BA	49.0~53.0	7.2~7.6	50~150	≤1.0	<0.5	Fast drying，higher hardness	TT series is mostly applied to formulate rapid drying two- component polyurethane coatings
WANNATE® TT-350B	BA	49.0~53.0	7.7~8.3	500~1800	≤1.0	<0.5	Fast drying，higher hardness	TT series is mostly applied to formulate rapid drying two- component polyurethane coatings
WANNATE® TT-351B	BA	49.0~53.0	7.7~8.3	500~1800	≤1.0	<0.5	Fast drying，higher hardness	TT series is mostly applied to formulate rapid drying two- component polyurethane coatings
WANNATE® TT-350Bplus	BA	50.0~54.0	7.6~8.1	500~2000	≤1.0	<0.1	Fast drying，higher hardness	TT series is mostly applied to formulate rapid drying two- component polyurethane coatings
WANNATE® TT-450B	BA	49.0~54.0	7.7~8.3	500~2000	≤1.0	<0.5	Fast drying，higher hardness	TT series is mostly applied to formulate rapid drying two- component polyurethane coatings
WANNATE® TT-551B	BA	49.0~53.0	7.5~8.2	500~1800	≤1.0	<0.5	Fast drying，higher hardness	TT series is mostly applied to formulate rapid drying two- component polyurethane coatings
WANNATE® TT-750Bplus	BA	49.0~54.0	7.7~8.2	1200~2600	≤1.0	<0.1	Fast drying，higher hardness	TT series is mostly applied to formulate rapid drying two- component polyurethane coatings

Specialty Isocyanates

Aromatic Isocyanate — THM Series

Product	Solvent	Solid content (%)	NCO content (%)	Viscosity (25°C/mPa.s)	Color (Pt-Co)	Free monomer (%)	Properties	Application
WANNATE® THM-160B	BA	59.0~62.0	9.8~10.4	200~600	≤100	HDI%＜0.1 TDI%＜0.4	Good yellowing-resistance, fast curing, relatively balanced performance	Wood coatings (glossy and matte paints)
WANNATE® THM-260BE	BA/EA(3:1)	59.0~62.0	10.7~11.3	150~350	≤100	HDI%＜0.1 TDI%＜0.4	Good yellowing-resistance, fast curing, relatively balanced performance	Wood coatings (matte paint and primer)
WANNATE® THM-360B	BA	59.0~62.0	10.5~11.2	500~1000	≤100	HDI%＜0.1 TDI%＜0.4	Good yellowing-resistance, fast curing, relatively balanced performance	Wood coatings (primer and matte paint)

Aliphatic Isocyanate — Monomers

Product	Purity (%)	NCO content (%)	Viscosity (25°C，mPa.s)	Color (Pt-Co)	Hydrolysable Chlorides (%)	Acidity	Properties	Application
WANNATE® HDI	≥99.5	≥49.7	~3	≤30	—	—	Outstanding anti-yellowing properties improves the flexibility of PU products	Adhesives, electrophoretic paints, TPU
WANNATE® HMDI	≥99.5	≥31.8	~30	≤30	—	—	Moderate reaction rate outstanding yellowing resistance high mechanical performance	Waterborne polyurethane dispersions, adhesives and UV resins, TPU
WANNATE® IPDI	≥99.5	≥37.5	~10	≤30	—	—	Yellowing resistance, stability and durability mechanical performance	Waterborne polyurethane dispersions, adhesives and UV resins
WANNATE® X-600	≥99.7	≥43.0	—	≤30	≤0.05	≤0.01	Outstanding optical properties. good yellowing resistance and adhesion	Coatings Adhesives
WANNATE® X-700	≥99.5	≥44.0	~4	≤30	≤0.05	—	Outstanding optical properties. excellent weatherability and thermal resistance. good adhesion to the substrate	Coatings Adhesives

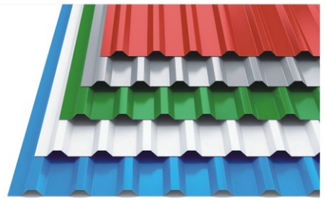


Specialty Isocyanates

Aliphatic Isocyanate — HDI Derivatives

Product	Solvent	Solid content (%)	NCO content (%)	Viscosity (25°C/mPa.s)	Color (Pt-Co)	Free HDI monomer (%)	Properties	Application
WANNATE® HT-100plus	—	100	21.7~22.2	1750~3250	⩽40	＜0.1	Low residual monomer content. Outstanding weathering resistance, excellent mechanical performance, good dilution stability	Automotive refinish, rail traffic paints, wood coatings and plastic coatings
WANNATE® HT-100Aplus	—	100	21.7~22.2	1750~3250	⩽40	＜0.1	Low residual monomer content. Outstanding weathering resistance, excellent mechanical performance, good dilution stability	Automotive refinish, rail traffic paints, wood coatings and plastic coatings
WANNATE® HT-3100Bplus	—	100	21.7~22.7	600-1000	⩽60	＜0.1	Low residual monomer content. Outstanding weathering resistance, excellent mechanical performance, good dilution stability	Automotive refinish, rail traffic paints, wood coatings and plastic coatings
WANNATE® HT-90Bplus	BA	89~91	19.5~20.1	350~650	⩽40	＜0.1	Low residual monomer content. Outstanding weathering resistance, excellent mechanical performance, good dilution stability	Automotive refinish, rail traffic paints, wood coatings and plastic coatings
WANNATE® HT-90BSplus	BA/SN (1:1)	89~91	19.5~20.1	350~650	⩽40	＜0.1	Low residual monomer content. Outstanding weathering resistance, excellent mechanical performance, good dilution stability	Automotive refinish, rail traffic paints, wood coatings and plastic coatings
WANNATE® HT-75Bplus	BA	74~76	16.0~17.0	60~100	⩽40	＜0.1	Low residual monomer content. Outstanding weathering resistance, excellent mechanical performance, good dilution stability	Automotive refinish, rail traffic paints, wood coatings and plastic coatings
WANNATE® HT-790Bplus	BA	89~91	17.3~18.3	1100~2500	⩽40	＜0.1	Fast drying, Low residual monomer content, high crosslinking density, better chemical resistance	Automotive refinish, rail traffic paints, wood coatings and plastic coatings
WANNATE® HT-300	—	100	19.0~21.0	200~700	⩽40	＜0.4	Low viscosity, low VOC emission	Automotive refinish, rail traffic paints, wood coatings and plastic coatings
WANNATE® HT-400	—	100	20.5~22.5	100~280	⩽80	＜0.5	Low viscosity, low VOC emission	Automotive refinish, rail traffic paints, wood coatings and plastic coatings





Specialty Isocyanates

Aliphatic Isocyanate — HDI Derivatives

Product	Solvent	Solid content (%)	NCO content (%)	Viscosity (25°C/mPa.s)	Color (Pt-Co)	Free HDI monomer (%)	Properties	Application
WANNATE® HT-500	—	100	22.5~24.5	400~1000	⩽80	＜0.5	Low viscosity, low VOC emission	Automotive refinish, rail traffic paint, wood coatings and plastic coatings
WANNATE® HTBL-175S	SN	73~77	~11.2(Blocked NCO)	2500~4500	⩽60	⩽0.2 (Free NCO content)	Excellent chemical resistance and weatherability, Outstanding gloss retention Excellent Mechanical properties	OME coatings, can coatings, coil coatings, other metal coatings
WANNATE® HTBL-275MS	SN/MPA	73~77	~10.9(Blocked NCO)	2500~5000	⩽100	—	Excellent chemical resistance and weatherability, Outstanding gloss retention Excellent Mechanical properties	OME coatings, can coatings, coil coatings, other metal coatings
WANNATE® HB-100	—	100	21.7~22.3	7000~11000	⩽80	⩽0.5	Outstanding gloss and color retention, excellent adhesion and favorable flexibility, high chemical resistance	Heavy-duty anticorrosion fields like metal, machinery coatings, marine and bridge coatings
WANNATE® HB-200	—	100	22.8~23.8	1200~3500	⩽40	⩽0.5	Outstanding gloss and color retention, excellent adhesion and favorable flexibility, high chemical resistance	Heavy-duty anticorrosion fields like metal, machinery coatings, marine and bridge coatings
WANNATE® HB-75B	BA	74~76	16.2~16.8	100~200	⩽40	＜0.5	Outstanding gloss and color retention, excellent adhesion and favorable flexibility, high chemical resistance	Heavy-duty anticorrosion fields like metal, machinery coatings, marine and bridge coatings
WANNATE® HB-75MX	MPA/X(1:1)	74~76	16.2~16.8	150~300	⩽40	⩽0.5	Outstanding gloss and color retention, excellent adhesion and favorable flexibility, high chemical resistance	Heavy-duty anticorrosion fields like metal, machinery coatings, marine and bridge coatings
WANNATE® HB-75M	MPA	74~76	16.2~16.8	150~300	⩽40	⩽0.5	Outstanding gloss and color retention, excellent adhesion and favorable flexibility, high chemical resistance	Heavy-duty anticorrosion fields like metal, machinery coatings, marine and bridge coatings



Specialty Isocyanates

Aliphatic Isocyanate — IPDI Derivatives

Product	Solvent	Solid content (%)	NCO content (%)	Viscosity (25°C/mPa.s)	Color (Pt-Co)	Free IPDI monomer (%)	Properties	Application
Wannate® IT-100	—	100	21.7~22.2	1750~3250	⩽40	⩽0.2	Excellent physical drying properties. Excellent weather resistance, outstanding gloss and color retention. Outstanding mechanical properties. Low reactivity, prolonged pot-life. Excellent dilution stability	Automotive refinish and industrial coatings
Wannate® IT-170B	BA	68.0~72.0	11.0~13.0	200~1000	⩽100	＜0.5	Excellent physical drying properties. Excellent weather resistance, outstanding gloss and color retention. Outstanding mechanical properties. Low reactivity, prolonged pot-life. Excellent dilution stability	Automotive refinish and industrial coatings
Wannate® IT-170S	SN	68.0~72.0	11.0~13.0	1000~4500	⩽100	＜0.5	Excellent physical drying properties. Excellent weather resistance, outstanding gloss and color retention. Outstanding mechanical properties. Low reactivity, prolonged pot-life. Excellent dilution stability	Automotive refinish and industrial coatings
Wannater® IT-170BS	BA/SN (1:2)	68.0~72.0	11.0~13.0	500~2500	⩽100	＜0.5	Excellent physical drying properties. Excellent weather resistance, outstanding gloss and color retention. Outstanding mechanical properties. Low reactivity, prolonged pot-life. Excellent dilution stability	Automotive refinish and industrial coatings
Wannater® IT-170MX	MPA/X	68.0~72.0	11.0~13.0	1000~4000	⩽100	＜0.5	Excellent physical drying properties. Excellent weather resistance, outstanding gloss and color retention. Outstanding mechanical properties. Low reactivity, prolonged pot-life. Excellent dilution stability	Automotive refinish and industrial coatings
Wannater® ITBL-460S	SN	58.0~62.0	~7(Blocked NCO)	1000~3000	⩽100	—	Excellent chemical resistance and weatherability. Outstanding gloss retention. Superb mechanical properties. Good adhesion and flexibility. Low monomer content makes it suitable for food contact applications	Can coatings, coil coatings, other metal coatings

Other Monomer

Product	Purity (%)	Water content (%)	Color	Inhibitor MEHQ (mg/kg)	Acidity	Properties	Application
WANNATE® HEMA-98	⩾98	⩽0.1	⩽20 (Pt-Co)	180-220	⩽0.1 (Cal.as MMA, %)	Endow acrylic resins with excellent weather resistance, high hardness and diverse reaction selectivity.	Adhensives, thermosetting coatings, UV coatings, automotive OME and refinish coatings, industrial coatings
WANACHEM® TMP	⩾99.0	⩽0.05	⩽25 (Hazen)	—	⩽0.002 (Cal.as HCOOH, %)	Three primary hydroxyl groups with balanced activity High designability of structure, easy controlled process High purity and excellent stability	Wood, construction machinery, automotive and marine coatings.Surface treatment of titanium dioxide, synthesis of lubricant, polyurethane foam, polyether polyol and PVC plasticizer.

Specialty Amines

Product	Purity (%)	Color (Pt-Co)	Viscosity (mPa·s)	Amine value (mgKOH/g)	Water content (%)	Properties	Application
WANAMINE® MDA-100	⩾99.0	—	—	—	—	Excellent mechanical properties, electric insulation, heat resistance, radiation resistance and wear resistance	Insulating paint, bismaleimide resin, epoxy curing agent, chain extender
WANAMINE® MDA-100H	⩾99.5	—	—	—	—	Excellent mechanical properties, adjustable curing times	Insulating paint, bismaleimide resin, epoxy curing agent, chain extender
WANAMINE® MDA-100L	⩾98.5	—	—	—	—	Excellent mechanical properties, adjustable curing times	Insulating paint, bismaleimide resin, epoxy curing agent, chain extender
WANAMINE® MDA-75	50-75	—	—	—	⩽0.1	Excellent mechanical properties, adjustable curing times	Insulating paint, bismaleimide resin, epoxy curing agent, chain extender
WANAMINE® MDA-60R	55-63(2,4+4,4)	—	9000-11000(40°C)	—	⩽0.1	Excellent mechanical properties, adjustable curing times	Insulating paint, bismaleimide resin, epoxy curing agent, chain extender
WANAMINE® IPDA	⩾99.7	⩽15	—	—	⩽0.2	Excellent compatibility with epoxy resin and other curing agents. Balanced reactivity and operating time. Low viscosity and low VOC content. Outstanding mechanical properties	Flooring, Anti-corrosion coatings, Composites, Adhesives
WANAMINE® 2111	—	⩽30	60-80	520-540	⩽0.1	Endow product with excellent gloss, yellowing resistance and mechanical properties.	Flooring, Anti-corrosion coatings, Composites, Adhesives
WANAMINE® 2300	—	—	—	435-490	—	High hardness. Good wear resistance, scratch resistance. Chemical resistance. Water resistance. Long life span	Flooring, Anti-corrosion coatings, Composites, Adhesives
WANAMINE® MXDA	⩾99.0	⩽20	⩽10	824	—	Excellent resistant to water, chemicals Outstanding mechanical properties High reactivity	Flooring, Anti-corrosion coatings, Composites, Adhesives
WANAMINE® 1,3-BAC	—	⩽20	⩽10	786	—	High reactivity Outstanding mechanical properties Good appearance	Flooring, Anti-corrosion coatings, Composites, Adhesives
WANAMINE® 8100	—	⩽25	—	455-490	⩽0.2	Excellent mechanical properties Good operational performance	Flooring, Water-based coatings
WANALINK® 6200	⩾96.0	—	330-360	—	⩽0.05	Liquid, safe and easy handing. Low toxicity-Ames test negative. Improved flowablity and adhesion. Low moisture sensitivity. Compatible with a wide range of polyols, co-curatives and all other polyurethane chemicals	Low activity chain extender for spray polyurea

Acrylic Monomers

Product	Specification						Properties	Application
	Acidity (wt%)	Color (APHA)	Purity (wt%)	Water (wt%)	Aldehyde (ppm)	Inhibitor (MEHQ)(ppm)		
Acrylic Acid	/	⩽15	⩾99.5	⩽0.10	/	200±20	Reactive, flammable, volatile liquid monomers which can be synthesized into varieties of mono/copolymers	SAP, acrylic ester, water treatment
Methyl Acrylate	⩽0.01	⩽10	⩾99.5	⩽0.05	/	15±5	Impart end products chemical stability, weatherability, compatibility, durability, proper hardness and tackiness, etc	Intermediate of pesticide, acrylic fibers, adhesives
Butyl Acrylate	⩽0.01	⩽10	⩾99.5	⩽0.05	/	15±5	Impart end products chemical stability, weatherability, compatibility, durability, proper hardness and tackiness, etc	Coatings, adhesives
Methacrylic Acid	/	⩽10	⩾99.5	⩽0.10	/	245±20	Liquid. Mixes with water. Corrosive. Acid.Combustilble. Vapours/gas heavier than air Toxic smoke/fumes in a fire. Attacks metals toliberate hydrogen.	Methyl methacrylate, synthetic rubber

Battery
ENERGY STORAGE

Wanhua Chemical

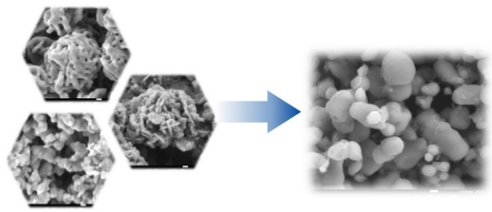
BATTERY INDUSTRY

Technology Name

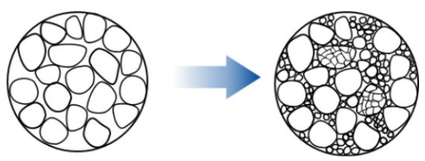
To address the issues of low capacity, high polarization and poor rate performance of high pallet density LFP, a comprehensive technical solution has been adopted. LFP with excellent low temperature performance has also been developed.

Technical Solution

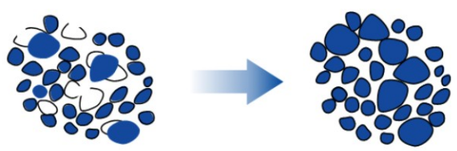
- Based on the structure-function relationship between Iron Phosphate (FP) and LFP, adjustable iron phosphate ratio and specific surface area has been achieved, thereby achieving controllable lithium iron phosphate grain size.



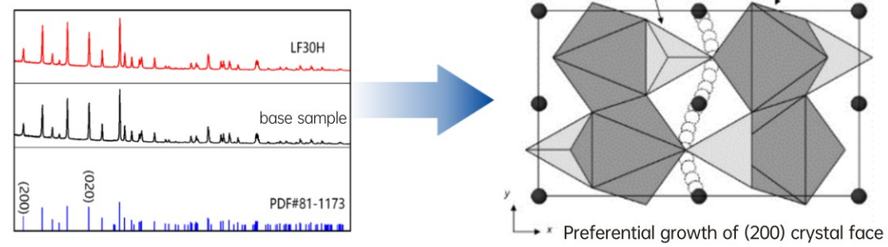
- Optimized particle size distribution is achieved based on controllable grain size, which in turn improves the pallet density of the material or provides better energy efficiency performance at the same pallet density.



- Carbon coating technology of composite carbon source is used to create a uniform carbon coating layer and to reduce free carbon. It improves the degree of graphitization and enhances electronic conductivity.



- Elemental doping and morphology control agents are used to regulate size distribution and shorten lithium ion diffusion distance, thereby improving material energy efficiency and rate performance.



Typical value

Item		base	WH100E	WH101E	WH200H	LF13R
Tapped Density (g/cm³)		0.74	1.22	1.18	1.15	1.14
BET %		12.5	11.1	12.3	12.1	13.2
C (%)		1.38	1.35	1.38	1.24	1.84
pH		9.5	9.4	9.4	9.5	9.5
Magnetic flux (ppm)		766	669	377	501	483
Pallet density (g/cm³)		2.49	2.50	2.56	2.62	2.31
PSD (μm)	D10	0.38	0.39	0.38	0.39	0.32
	D50	1.12	0.99	1.03	1.07	0.63
	D90	2.63	3.60	3.81	3.56	4.74
	D99	6.41	7.26	8.31	6.10	11.06
Capacity&efficiency 2.0~3.75V	0.1C Cdischarge mAh/g	158.5	159.7	158.3	158.8	161.8
	0.1C Cefficiency %	97.5	98.4	98.5	97.8	99.9
	1C Cdischarge mAh/g	143.4	144.1	145.3	143.4	150.6
	-20°C retention %	-	-	-	-	46.4

With above-mentioned technical means, Wanhua Chemical has achieved excellent performance of LFP with high pallet density, high capacity, and high energy efficiency.

LFMP Specification

Project	PD g·cm⁻³	D50 μm	01Ccharge capacity mAh·g⁻¹	01Cdischarge capacity mAh·g⁻¹	Efficiency %	1Cdischarge capacity mAh·g⁻¹	Carbon content %	Specific surface area m²·g⁻¹
LM64B	2.35	1.05	161.29	154.84	96.0	142.74	1.73	17.02
LM64A	2.37	1.05	158.45	148.40	93.7	136.01	1.64	18.58
Competitive product	2.36	1.15	156.11	146.82	94.1	133.51	2.00	18.88

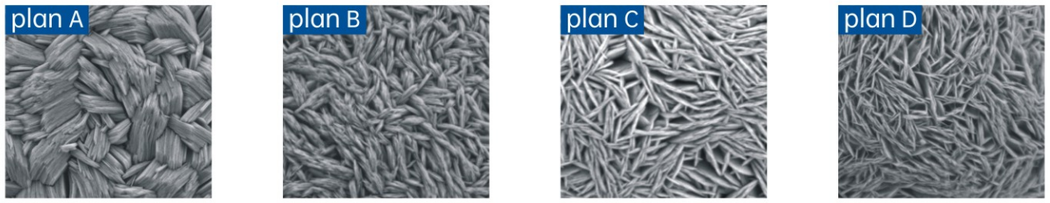
Rich-Nickel NCM

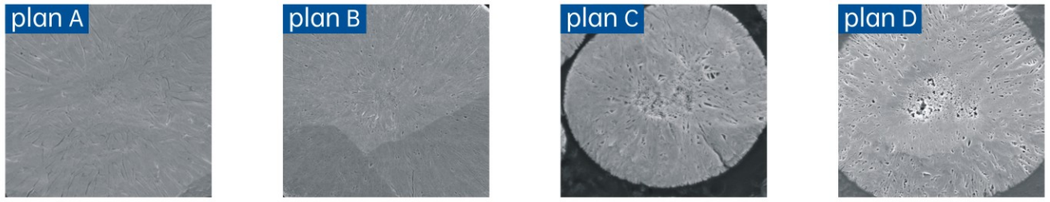
Technology Name

Through the comprehensive solution provided by the 3M technology platform (multi-scale precursor optimization, multi-site doping, multi-morphology coating), the pain points of using ultra-high nickel materials are addressed, and a series of high-capacity and high-stability ultra-high nickel cathode materials are developed.

Technical Solution

Multi-Scale Precursor Optimization Platform

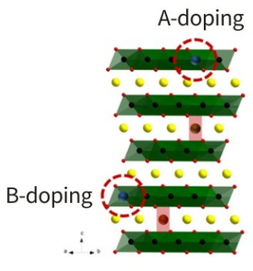


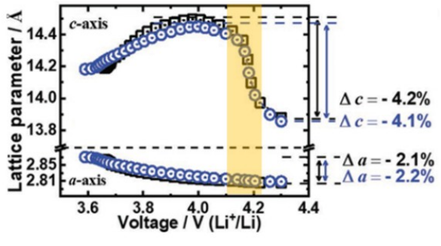


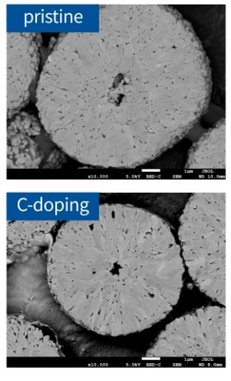
Establish a database correlating precursor structure (primary particle shape and stacking mode, pore distribution, crystal structure, precursor doping) with cathode material performance (particle strength, specific capacity, rate capability, cycling performance).

Rapidly optimize and develop matrices based on customer requirements.

Multi-Site Doping Modification Technology







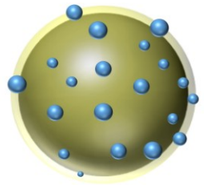
Transition metal site doping A: Enhance the binding energy of transition metals to oxygen in the high lithium-extraction state.

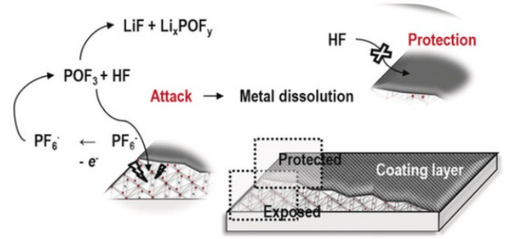
Lithium site doping B: Inhibit the contraction and expansion behavior in the C-axis direction and the slip of the transition metal layer during phase transition.

Grain boundary doping C: Create an internal structure with a slender radial shape to mitigate stress concentration during phase transition.

Multi-Morphology Interface Modification Technology

Determine the optimal process conditions, precisely control the state of element coating and the depth of interface penetration, reduce surface phase transition and side reactions with the electrolyte.

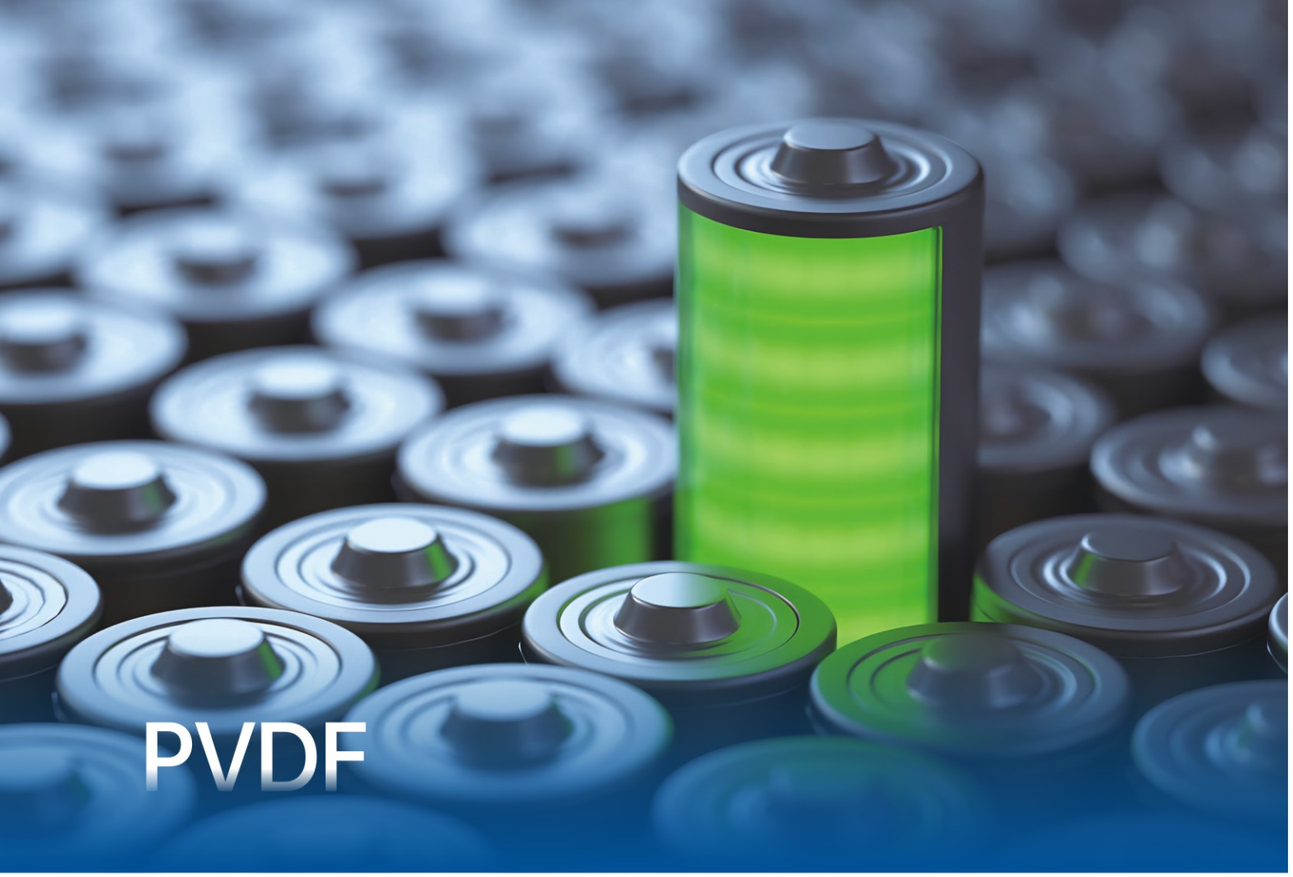




Specification

Item		C8310	C9010	S9305	C9310	C9510
Ni	mol%	82.9	89.9	92.5	92.7	94.7
Co	mol%	11.9	4.9	3.6	3.6	4.2
Mn	mol%	5.2	5.2	3.9	3.7	1.1
Li/Me	/	1.03	1.03	1.04	1.03	1.04
D10	μm	5.6	3.8	2.3	5.1	4.8
D50	μm	10	8.1	4.4	9.9	9.6
D90	μm	17.3	13.3	7.8	18	18.1
D100	μm	28.8	19.1	12.7	31	29.2
LiOH	ppm	3529	3161	3400	3955	4093
Li_2CO_3	ppm	1251	711	2067	1992	2138
pH	/	11.65	11.53	11.6	11.62	11.86
PD	g/cm^3	2.74	2.73	1.3	2.6	2.6
BET	m^2/g	0.51	0.64	0.64	0.59	0.61
H_2O	ppm	131	98	161	111	155
Capacity	mAh/g	210.9	225.54	234.5	241.73	242.99
initial efficiency	%	90	91.1	92.8	95.3	95.57

By utilizing the multi-scale precursor optimization platform, multi-site doping technology, and multi-morphology interface modification technology, the developed ultra-high nickel materials achieve a balance between capacity utilization and stability performance



PVDF

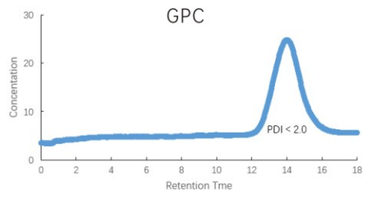
Technology Name

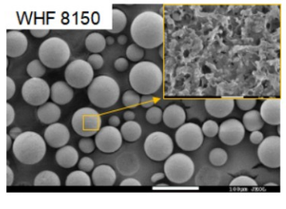
Wanhua PVDF adopts a low-temperature, high-pressure suspension polymerization process.

The product has high molecular weight, structural regularity, and purity. The molecular chain can contain various functional monomers, greatly improving the adhesion performance and alkali resistance while maintaining excellent flexibility. It effectively prevents issues such as slurry gelation and electrode cracking, reduces the amount used in the formulation, and improves energy density and cycling performance by reducing internal resistance.

Technical Solution

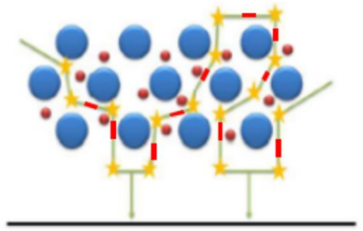
- Low-Temperature, High-Pressure Suspension Polymerization Technology By using a low-temperature, high-pressure suspension polymerization process and a reactor with a special structure design, the product has a narrow molecular weight distribution and high structural regularity. Special polymerization stabilizers and process control result in spherical particles with excellent size distribution, a porous structure that facilitates rapid dissolution, and high purity without emulsifiers.

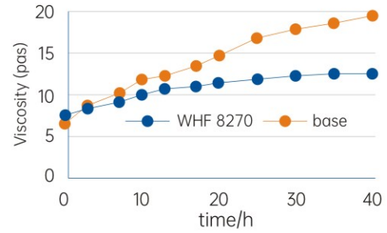




- Copolymerization with Polar Monomers

Copolymerization with Polar Monomers, the product exhibits excellent alkali resistance and slurry stability, as well as outstanding adhesion performance. This allows for a reduction in the amount used in the formulation, leading to lower internal resistance and improved energy density and cycling performance.



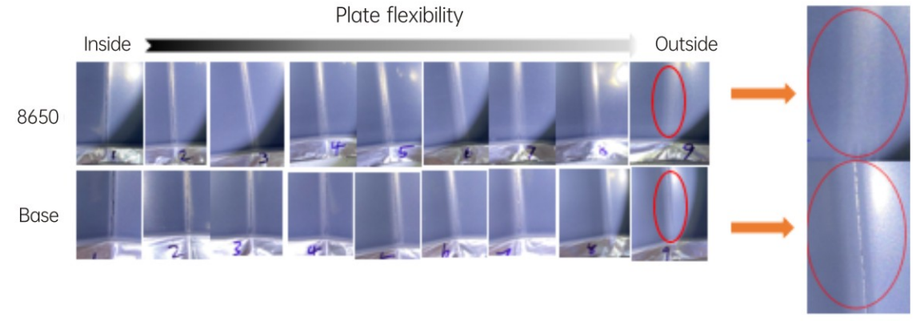


condition: NCM811:SP:PVDF=96.5:2.0:1.5

Note: The tested formulation is NCM811:SP:PVDF=96.5:2.0:1.5.

- Multi-copolymerization Technology

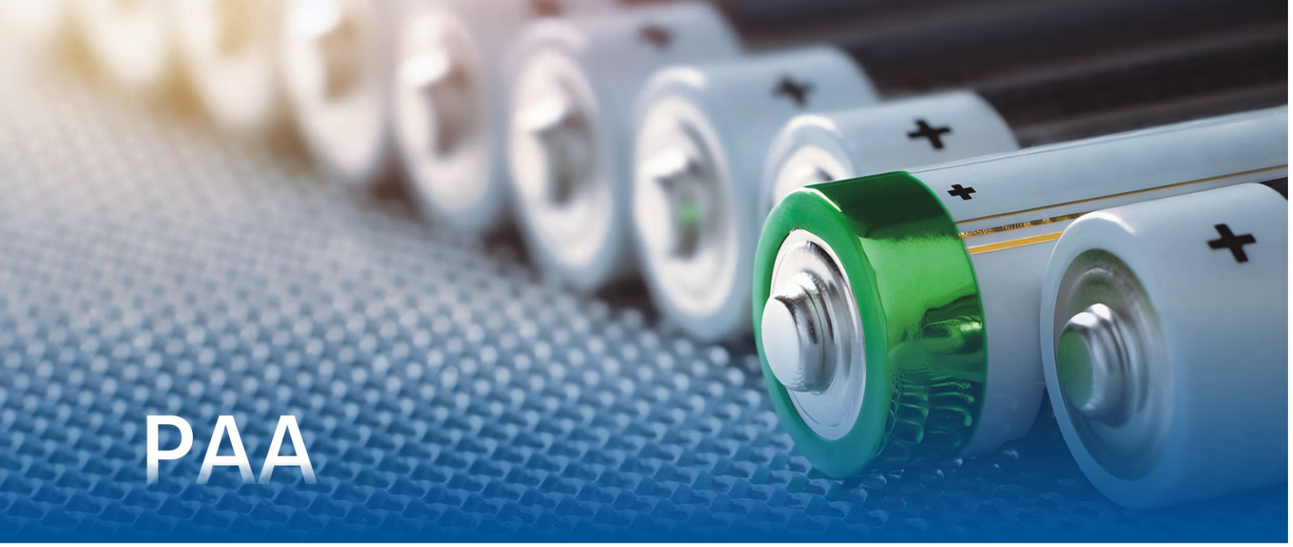
The molecular chain contains multiple functional groups, providing excellent flexibility and adhesion performance. This technology effectively solves issues such as cracking and brittleness in thick-coated, high-compaction electrodes. It also reduces the amount used in the formulation and the internal resistance, and improves energy density. It is particularly suitable for high-energy density LFP and LMFP power batteries.



Typical value

Properties	Test method	WHF 8150	WHF 8270	WHF 8290	WHF 8650
Water absorption /%	ASTM D543	≤0.1	≤0.1	≤0.1	≤0.1
Particle size distribution (D50)/μm	ISO 13321	≤90	≤90	≤90	≤90
Rotational viscosity /cp	0.1gPVDF/1gNMP	8000-12000	6000-10000	4000-8000	1000-5000
Molecular weight /104Da	GPC	≥100	≥100	≥100	≥80
Intrinsic viscosity (dl/g)	ISO 1628	≥3.0	≥3.0	≥3.0	≥2.5
Melting temperature /℃	ASTM D3418	160-170	160-170	155-165	155-165
Trace metals /ppm	ISO 24047	≤20	≤20	≤20	≤20

By applying the above mentioned technology, Wanhua Chemical has achieved excellent performance in PVDF cathode binder, including excellent slurry stability, outstanding adhesion performance, and excellent electrode flexibility.



PAA

Technology Name

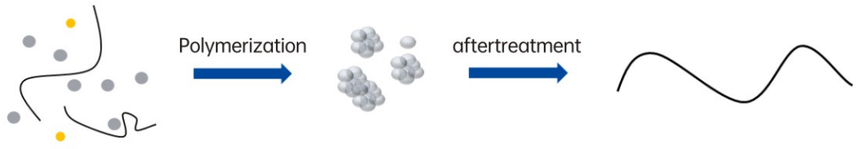
▪ High Bonding Strength Long Cycle Technology

Addressing the issues of low bonding strength and rapid cycle decay in the current market for anode adhesives, Wanhua Chemical has employed a unique high-molecular-weight polymerization technology route to improve the shortcomings of current anode adhesives in the mentioned performance aspects. This technology achieves high bonding strength and excellent electrochemical performance even at low addition levels, particularly demonstrating advantages in long cycle and high-temperature cycling.

Technical Solution

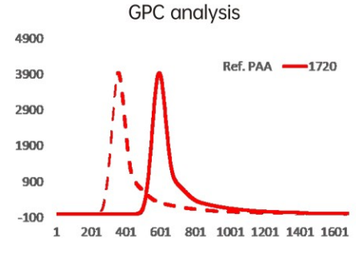
▪ Ultra-High Molecular Weight Acrylic Polymer Synthesis Technology

Using a unique acrylic copolymer synthesis method, Wanhua Chemical has achieved the synthesis of ultra-high molecular weight water-based solution polymers, significantly enhancing the adhesive strength of the product and effectively suppressing physical and chemical rebound of the electrode.



▪ Molecular Weight and Molecular Weight Distribution Control

Technology Drawing on years of experience in water-based resin process control, Wanhua Chemical has achieved a balance between high molecular weight and narrow molecular weight distribution, reducing the defects caused by low molecular weight polymers and further improving the long-term cycling performance of the battery.

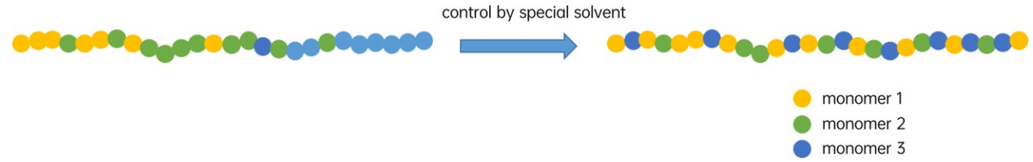


1720:
Mw=1274000
Mw/Mn=1.64

Ref. PAA:
Mw=1248000
Mw/Mn=6.06

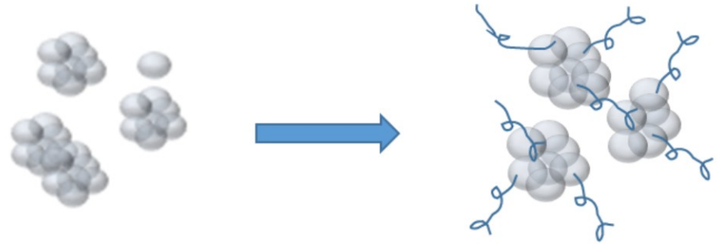
▪ Controlled Copolymerization through Special Functional

Additives By utilizing special functional additives, controlled copolymerization of monomers is achieved, thereby enhancing the orderliness and uniformity of the polymer structure and improving the overall performance of the product.



▪ Regulation of Polymer Secondary Structure for Low Viscosity and High Bonding Strength Balance

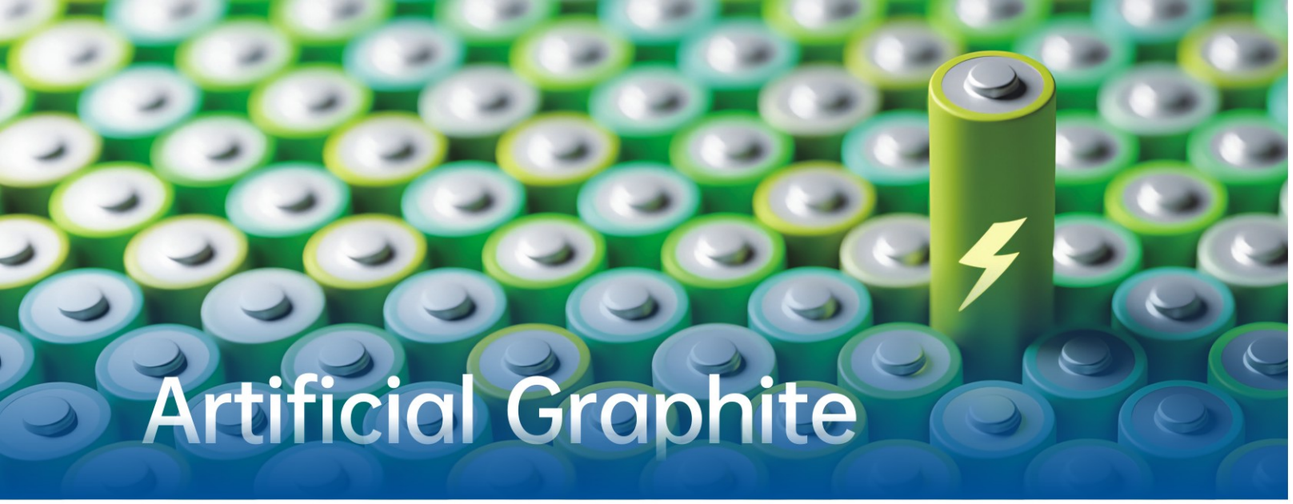
Adjusting the secondary topological structure of the polymer weakens the intermolecular interactions while maintaining high molecular weight, significantly reducing the viscosity of the product while maintaining high bonding strength.



Typical value

Properties	1720	Ref. PAA	Test Method
Solid content/%	6±0.3	6±0.3	120℃, 120min
pH	7.0-9.0	6.5-9.0	GB 8325-87
viscosity 25℃/mPa·s	10000-25000	10000-28000	Brookfield LV, 64#/12rpm, 25℃
swelling 60℃, 48h	<10%	<10%	60℃ 48h, EC:EMC:DEC=3:5:2
adhesive (N/m)	7.3	5.6	180°
Spring back (90℃, 12h)	6.00%	6.62%	-
Formation spring back	13.19%	14.78%	-

By applying the above-mentioned technical means, Wanhua Chemical has achieved excellent performance in their high-performance anode adhesive 1720, including high bonding strength, long cycle life, and low rebound.



Artificial Graphite

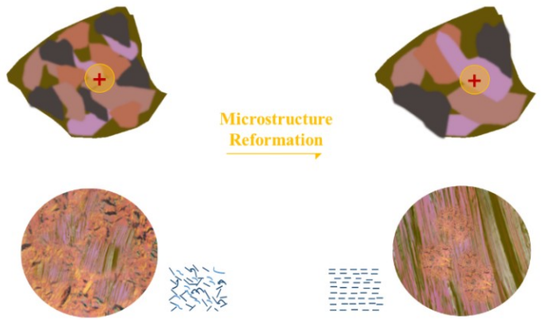
Technology Name

Addressing the issues of poor cycling performance, low capacity, and low press density faced by artificial graphite materials, Wanhua has adopted a comprehensive technical solution. This solution resolves the challenges of long cycling problem for ESS artificial graphite and enables the mutual achievement of capacity press density for fast-charging artificial graphite materials. Additionally, Wanhua has developed artificial graphite materials suitable for low-temperature environments, achieving breakthrough performance in multiple application fields.

Technical Solution

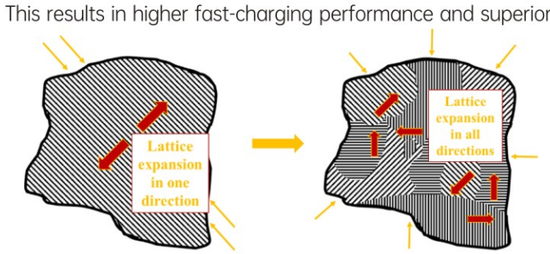
▪ LTT Technology

By pre-processing the raw materials and restructuring the microstructure, the true density of the raw materials is improved, and achieving greater performance in capacity and press density.



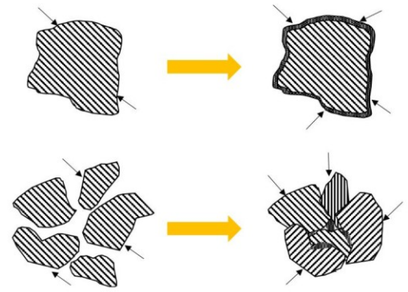
▪ Material Microcrystalline Structure Control Technology

Using unique graphite microcrystal growth control technology, rapid intercalation and extraction of lithium ions are achieved. In the mean time, the stability of the graphite structure is maintained during the intercalation-deintercalation process. This results in higher fast-charging performance and superior cycling performance.



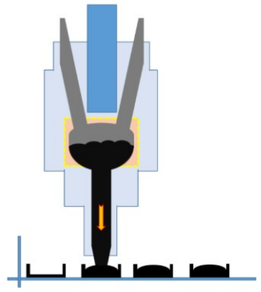
▪ Low-Temperature Carbon Coating Technology

This technology effectively enhances the isotropy of graphite, shortens the lithium ion diffusion path, increases numbers of lithium ion transfer channels, reduces expansion, and lowers the resistance of lithium ion transferring through the surface of graphite. This leads to improved fast-charging performance, reduced DCR, and enhanced low-temperature performance.



▪ Continuous Graphitization Technology

Wanhua uses proprietary continuous graphitization technology to realize environmentally friendly manufacturing of artificial graphite. This technology also effectively improves consistency of product quality, and meanwhile achieves high capacity, high press density, and long-cycle performance of artificial graphite.



By applying the above-mentioned technical means, Wanhua Chemical has achieved high-performance artificial graphite with long-cycle capability, high energy density, and fast-charging characteristics.

Specification

Item	CS1	CS2	CS3	CS5	CV4	CV14	CV18	CF12	CF8
Capacity (mAh/g)	345.3	345.0	340.1	350.5	356.2	351.9	352.5	353.1	357.2
ICE (%)	94.3	93.9	94.5	94.2	94.7	93.9	94.0	94.5	93.8
D50 (um)	15.0	14.1	10.2	10.1	16.5	14.1	10.4	12.5	12.7
TD (g/cm^3)	1.15	1.31	1.29	1.15	1.15	1.13	1.14	1.11	1.01
BET (cm^2/g)	1.30	1.41	1.49	1.52	1.56	1.47	1.68	1.10	0.92
PD (g/cm^3)	1.50-1.55	1.45-1.50	1.40-1.45	1.50-1.60	1.70-1.80	1.60-1.70	1.60-1.65	1.50-1.60	1.50-1.60
Charging Rate (C)	1C-1.5C	1C	1C-1.5C	1C-1.7C	1C-1.2C	1.5C	2C-3C	>4C	>5C
Cycle Life	~8000	~10000	~15000	~10000	-	-	-	-	_

Technology Name

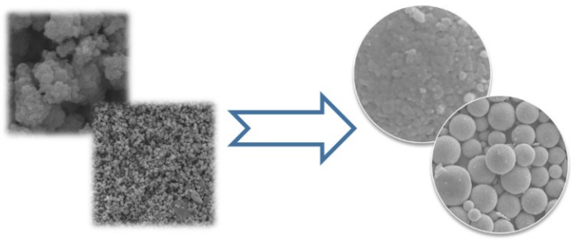
Long-cycle, high-power, low-cost, and high-capacity customized electrolyte development

Addressing the issues of low compacted densty, low capacity, and low phase purity faced by sodium iron phosphate materials, Wanhua Chemical has adopted a comprehensive technology to solve the problem of pure-phase preparation of sodium iron phosphate materials, which affects the capacity utilization. Additionally, Wanhua Chemical has developed sodium iron phosphate positive electrode materials with high compaction density, achieving a breakthrough in material performance.

Technical Solution

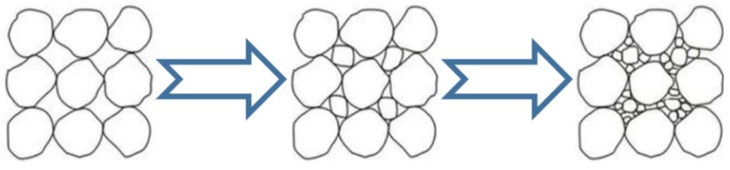
Controllable Crystal Growth Based on the Relationship between Iron Phosphate Precursors and Sodium Iron Phosphate

From the perspective of element ratio and controllable crystal growth, the iron-phosphate-to-sodium-iron-phosphate ratio of iron phosphate precursors can be adjusted, and the grain size of sodium iron phosphate can be controlled.



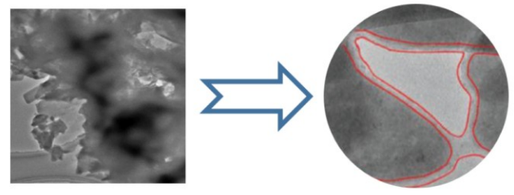
Optimized Particle Size Distribution for Capacity and Compacted Density

Based on controllable grain size, the particle size distribution is optimized to improve material compacted density, or to achieve higher energy density under the same compacted density.



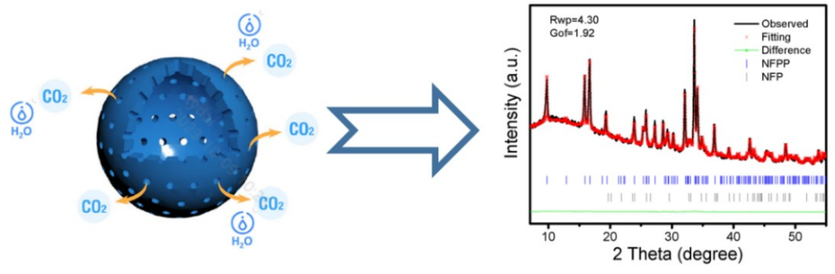
Secondary Carbon Coating Optimization Technology

The secondary carbon coating technology is used to create an efficient Fe-C-Fe three-dimensional conductive network, reduce free carbon, and improve the quality of carbon coating.



Suppression of Impurities Using a Molecular-level Mixing Process and Quasi-precursor Synthesis Technology

High-temperature synthesis gas atmosphere is controlled, and the rearrangement of Na, Fe, P, and O atoms effectively suppresses the formation of impurities such as NFP, achieving high phase purity of NFPP products.



Typical value

	project	unit	DF10A	DP10A
Main element	Na	wt%	14.76	14.69
	Fe	wt%	27.35	27.19
	P	wt%	23.58	20.92
Particle size	D10	μm	0.79	6.13
	D50	μm	2.20	12.25
	D90	μm	4.37	23.57
	D100	μm	7.63	28.65
Physical properties	pH	/	9.05	9.12
	PD	g/cm³	2.07	2.05
	H_2O	ppm	507	460
	C	wt%	1.48	1.44
Electrochemical performance 2.0~4.0V	0.2C DC	mAh/g	113	113.68
	0.2C DC	mAh/g	112.65	118.02
	efficiency	%	99.69	103.81

Conclusion

By applying the above-mentioned technical means, Wanhua Chemical has achieved excellent performance of sodium iron phosphate materials, including high compacted density, high capacity, and high efficiency.

Technology Name

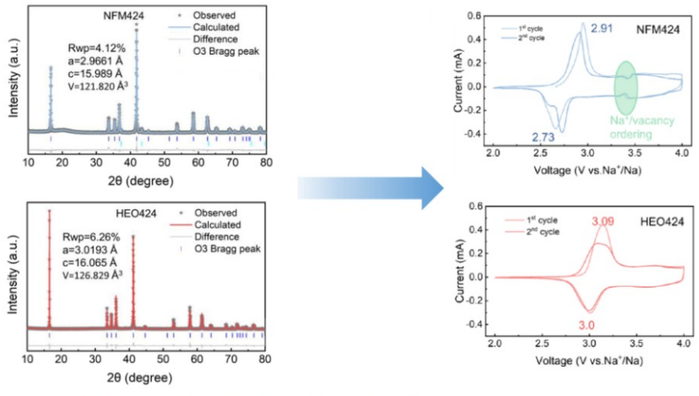
- **High-voltage and high-compaction-density material development technology**

Addressing the issues of low compaction density and severe structural degradation faced by sodium layered oxide cathode materials under high voltage, Wanhua Chemical has analyzed the failure mechanisms of layered oxide materials and adopted a series of technical means to modify and improve the cathode materials. These include bulk doping, surface coating, and microstructure control, achieving significant results.

Technical Solution

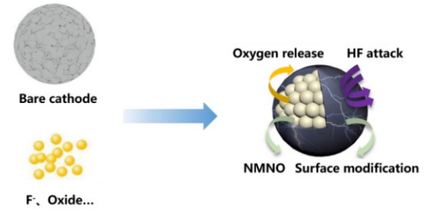
- **Multielement High-Entropy Doping to Alleviate Irreversible Phase Transition under High Voltage**

By introducing multivalent metal ions to construct high-entropy layered oxide materials, the interaction between TMO_2 and NaO_2 layers is more stable, delaying the irreversible phase transition from O3 to P3, and improving the cycling stability under high voltage.



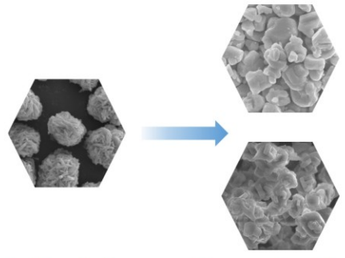
- **Special Surface Coating to Enhance Material Interface Stability**

Using diverse surface coating methods, a uniform protective layer is formed to optimize air stability and processing performance, reduce interface side reactions, and improve structural stability.



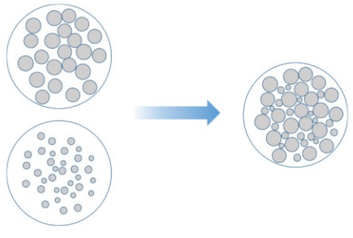
- **Optimization the Proportion of Morphology Control Agent to Regulate the Grain Size of Cathode Material**

By adjusting the proportion of morphology control agents in the cathode material, the grain size can be controlled, optimizing the particle's active surface area and improving the interface stability.



- **Optimization of Particle Size Distribution to Increase Compaction Density**

By adjusting the proportion of different-sized particles and analyzing the particle size distribution curve, the composition law of particle size is determined, optimizing the compaction density of the cathode material while considering discharge capacity.



Typical value

Item		Unit	Base	WH10CZ	WH20A	NS10C
PSD	D10	μm	3.25	5.88	2.32	4.22
	D50	μm	6.07	9.96	4.34	9.25
	D90	μm	10.90	16.47	7.95	16.79
	D100	μm	21.10	30.87	9.79	29.87
residual alkali	NaOH	ppm	1365	360	607	665
	Na_2CO_3	ppm	1365	8906	6967	1783
	Free Na+	ppm	7146	4070	3327	1314
physical property	pH	/	13.26	11.80	12.10	11.85
	TD	g/cm^3	1.69	2.33	2.07	2.36
	PD	g/cm^3	2.90	3.27	3.17	3.33
	BET	m^2/g	0.46	0.24	0.61	0.36
	H_2O	ppm	265	111	280	185
Electrochemistry 2.0~4.0V	0.2C discharge	mAh/g	128.1	140.0	143.5	135.7
	0.2C efficiency	%	91.9	95.3	94.5	93.6
	1C discharge	mAh/g	114.9	132.4	133.3	126.5
	25℃@35Cy. retention	%	97.6	96.5	97.1	97.8

Conclusion: By applying the above-mentioned technical means, Wanhua Chemical has achieved excellent performance of sodium layered oxide cathode materials, including high voltage and high compaction density.

Battery Recycling

Introduction of Hydrometallurgical in China

Battery-grade nickel sulfate

Battery-grade cobalt sulfate

Battery-grade manganese sulfate

■ Integration advantage

Global multi-park layout, superior acid, alkali, public auxiliary support

■ R&D advantage

· Continuous acid leaching process
· Tower extraction technology
· wastewater treatment process
· bipolar membrane

Introduction of Battery Recycling in Europe

■ Integration Advantage

Resoucre: Integrate Industrial park

■ Recycling Technoology

A. Sulfate sodium operational capacity
B. Extraction of lithuim
C. Nicklle and cobalt recycling capacity
D. Iron phosphate recycling capacity

Battery-grade Nickel Sulfate

Product properties	Odorless blue-green crystal, with no visible impurities
Use	Prepare battery cathode precursor
Packing specification	850×850×1100 ton bags
Storage and transportation conditions	Store in a cool and ventilated warehouse, keep away from fire and heat sources. It should be separated from the oxidizer. Storage areas should be equipped with suitable materials to contain leaks.
Shelf life	12 months

Quality Index

Item	Unit	Indicator	Testing method
Appearance	/	Blue-green crystal	Visual
Ni	%	⩾22.00	HG/T 5919-2021
Ca	%	⩽0.0010	HG/T 5919-2021
Cd	%	⩽0.0005	HG/T 5919-2021
Cr	%	⩽0.0005	HG/T 5919-2021
Cu	%	⩽0.0005	HG/T 5919-2021
Mg	%	⩽0.0015	HG/T 5919-2021
Pb	%	⩽0.0010	HG/T 5919-2021
Si	%	⩽0.0010	HG/T 5919-2021
Zn	%	⩽0.0005	HG/T 5919-2021
Fe	%	⩽0.0005	HG/T 5919-2021
K	%	⩽0.0040	HG/T 5919-2021
Al	%	⩽0.0010	HG/T 5919-2021
Cl	%	⩽0.0100	GB_T_3050-2000
Mn	%	⩽0.0005	HG/T 5919-2021
Na	%	⩽0.0015	HG/T 5919-2021
F	%	⩽0.0100	GYYH-FX-SFYJ-8
Co	%	⩽0.0020	HG/T 5919-2021
TOC	ppm	⩽50	GYYH-FX-SFYJ-28
Water insoluble matter	%	⩽0.0100	HG/T 5919-2021
Magnetic foreign matter	ppb	⩽80	HG/T 5919-2021
Oil content	ppm	⩽10	HG/T 5919-2021
pH	/	4.5-6.5	GYYH-FX-SFYJ-26

Wanhua Chemical

Aroma&Nutrition--
Nutrition Technology

AROMA

Citrus

Product	CAS-No.	Appearance	Purity（%）	Aroma	Application
Citral	5392-40-5	Colorless or slightly yellow transparent liquid	≥ 96.0	Fresh/citrus/fruity	Widely used in fragrances
Citronellal	106-23-0	Colorless or slightly yellow transparent liquid	≥ 96.0	Citrus/green/citronella	

Rose

Product	CAS-No.	Appearance	Purity（%）	Aroma	Application
Phenyl ethyl alcohol-pure	/	Colorless liquid	≥ 99.5	Floral-rosy	Widely used in fragrances
Bio- Phenyl ethyl alcohol	/	Colorless liquid	≥ 99	Floral-rosy	
Citronellol	106-22-9	Colorless to yellowish transparent liquid	≥ 95.0	Floral-rosy/slightly citrus	
Geraniol 60	106-24-1	Colorless liquid	59.0~61.0	Floral-rosy	
Geraniol 98		Colorless liquid	≥ 98.0	Floral-rosy	

Mint

Product	CAS-No.	Appearance	Purity（%）	Aroma	Application
L-Menthol-FG	2216-51-5	White fakes or solid mass	≥ 99.7	Mint colling	Widely use in oralcare products, favors and fragrances
DL-Menthol-FG	89-78-1	Colorless melt or liquid	≥ 98.0	Mint colling	

ADVANCED INTERMEDIATE

Product	CAS-No.	Appearance	Purity（%）	Aroma	Application
Acetophenone	98-86-2	Colorless or yellowish liquid	≥ 99.5	Hawthorn	Applied in PVC auxiliar heat stabilizers, aroma, pharmaceuticals and agrochemicals, ect.
Styrene Oxide	96-09-3	Colorless to light yellow liquid	≥ 97.5	/	Used as medicine and perume intermediate.
Cyclododecanone	830-13-7	Colorless to white solid	≥ 99.9	/	Used as an intermediate in the preparation of high perormance materials and aroma chemicals.
Cyclododecanol	1724-39-6	White solid	≥ 99.9	/	
Cyclooctadiene	111-78-4	Clear liquid	≥ 99.0	/	Applied in low temperature resistant plasticizier, fame retardant, etc.

NUTRITION

Product	Specifcation	Application
Vitamin A acetate paricles	1,000,000 IU/g	Feed
Vitamin A acetate paricles	500,000 IU/g	

APPENDIX

Product	Estimated time of production	Product	Estimated time of production
Citral	2024Q3	Geraniol 60	2024Q3
Citronellal	2024Q4	Geraniol 98	2025Q3
Citronellol	2024Q3	Vitamin A acetate paricles	2024Q4