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WANTHANE® TPU

WANHUA CHEMICAL GROUP CO., LTD.

Innovation Empowering Your Technology,
Wanthane® Enriches Your Future.





**A WONDERFUL LIFE
STARTS WITH POLYURETHANES!**

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Introduction

Wanhua Chemical Group Co., Ltd. was established in 1998 and listed to Shanghai Stock Exchange in 2001.

As the biggest MDI and TPU manufacturer in Asia & Pacific region, Wanhua Chemical markets a series of isocyanates products, such as MDI, aromatic diamine and downstream thermoplastic polyurethane etc. In 2014, the company achieved sales of USD 3.6 billion.

Wanhua Chemical has been the leader in polyurethane industry in Asia & Pacific region. From 2004 to 2006, Wanhua Chemical was voted in "The Most Beautiful 50 of China-Top A Listed Enterprise with Sustainable Growth Award" hosted by New Fortune Magazine for 3 consecutive times. We not only won "the Most Valuable Listed Company Award" hosted by CCTV Economic Channel in 2006, but also won "the Best Employers in China Award" hosted by Hewitt in 2009 and 2011. In addition, Wanhua Chemical owns State Certificated Enterprise R & D Center in Polyurethane Industry and won "National First Prize for Progress in Science & Technology" in 2007.

In global market, Wanhua Chemical supplies TPU under the brand name of WANTHANE®, including polyester-based TPU, polyether-based TPU, polycaprolactone-based TPU, polycarbonate-based TPU and aliphatic TPU for broad range of applications, including shoes, hose, film & sheet, wire & cable, conveyor belt and other personal consumption and industrial fields.

In the aspect of responsible care, the ultimate aim of Wanhua Chemical is to pursue harmonious development between enterprise & staff, consumers & society, and to create beautiful life for human beings. While we are pursuing good economic benefits, we give great priority to promoting human development, environment and social progress. Wanhua Chemical has passed ISO9001, ISO 14001, GB/T28001 System Certification etc and performs PDCA operation strictly.

As the biggest TPU manufacturer with various products in Asia & Pacific region, Wanhua Chemical owns the world-class production lines and the State Certificated Enterprise R&D Center in Polyurethane Industry. On this basis, we can provide integrated technical service and business support.

Based on our advanced isocyanate and derivative polyurethane application products and technology, our vision is to create a 1st class chemical new material company. We will insist upon our development strategy of "Innovation Empowering Your Technology, WANTHANE® Enriches Your Future". With sustainable technological innovation and reliable service, Wanhua Chemical is always building win-win relationship with customers, and dedicated to becoming the leading international TPU manufacturer.



POLYESTER-BASED TPU WHT-11 Series

Description: Shore A 80-Shore D 72 Polyester-based TPU
Processing Methods: Injection, Extrusion, Calendering, T-die Extrusion
Special Features: Excellent Mechanical Properties, High Abrasion Resistance, Tear Resistance, Short Cycle Time
Applications: Auto Parts, Profiled Bar, Wire & Cable, High Pressure Oil Tubes, Shoes, Bra Tape, Conveyor Belt, Seal, Film, Compounding
Complying with FDA (21 CFR 177.1680, 177.2600) & RoHS etc.

Items	Method	Unit	WHT-1180EC	WHT-1185EC	WHT-1190	WHT-1195	WHT-1198IC	WHT-1164IC	WHT-1172IC
Hardness	ASTM D2240	Shore A	80	85	90	95	98	-	-
		Shore D	-	-	-	55	60	64	72
Density	ASTM D792	g/cm ³	1.18	1.19	1.19	1.20	1.21	1.21	1.22
100% Modulus	ASTM D412	MPa	5	6	9	12	17	26	28
300% Modulus	ASTM D412	MPa	9	12	20	29	32	40	-
Tensile Strength	ASTM D412	MPa	32	37	42	43	44	45	48
Ultimate Elongation	ASTM D412	%	610	550	440	410	380	340	285
Tear Strength	ASTM D624	N/mm	90	100	120	140	175	225	260
Abrasion Resistance	ISO 4649	mm ³	-	-	-	-	-	45	42
Processing Temperature	-	°C	180-200	185-205	190-210	195-215	195-215	200-220	200-220

These are typical values and should not be used as specifications.



POLYESTER-BASED TPU WHT-14 Series

Description: Shore A 85-Shore A 97 Polyester-based TPU
Processing Methods: Extrusion, Injection, Blow Molding, Calendering, T-die Extrusion
Special Features: Good Extrusion Stability, High Transparency, Excellent Mechanical Properties
Applications: Air Tube, Auto Parts, Transparent Shoe Sole, Air Cushion, Film & Sheet
Complying with FDA (21 CFR 177.1680, 177.2600) & RoHS etc.

Items	Method	Unit	WHT-1485RV	WHT-1490IV	WHT-1495EC	WHT-1495B	WHT-1495RV
Hardness	ASTM D2240	Shore A	85	90	95	97	95
		Shore D	-	-	55	62	55
Density	ASTM D792	g/cm ³	1.20	1.20	1.21	1.21	1.21
100% Modulus	ASTM D412	MPa	6	7	14	15	13
300% Modulus	ASTM D412	MPa	11	12	28	28	30
Tensile Strength	ASTM D412	MPa	36	37	38	35	40
Ultimate Elongation	ASTM D412	%	580	460	420	440	425
Tear Strength	ASTM D624	N/mm	95	100	148	170	150
Processing Temperature	-	°C	180-200	185-205	190-210	190-210	190-210

These are typical values and should not be used as specifications.



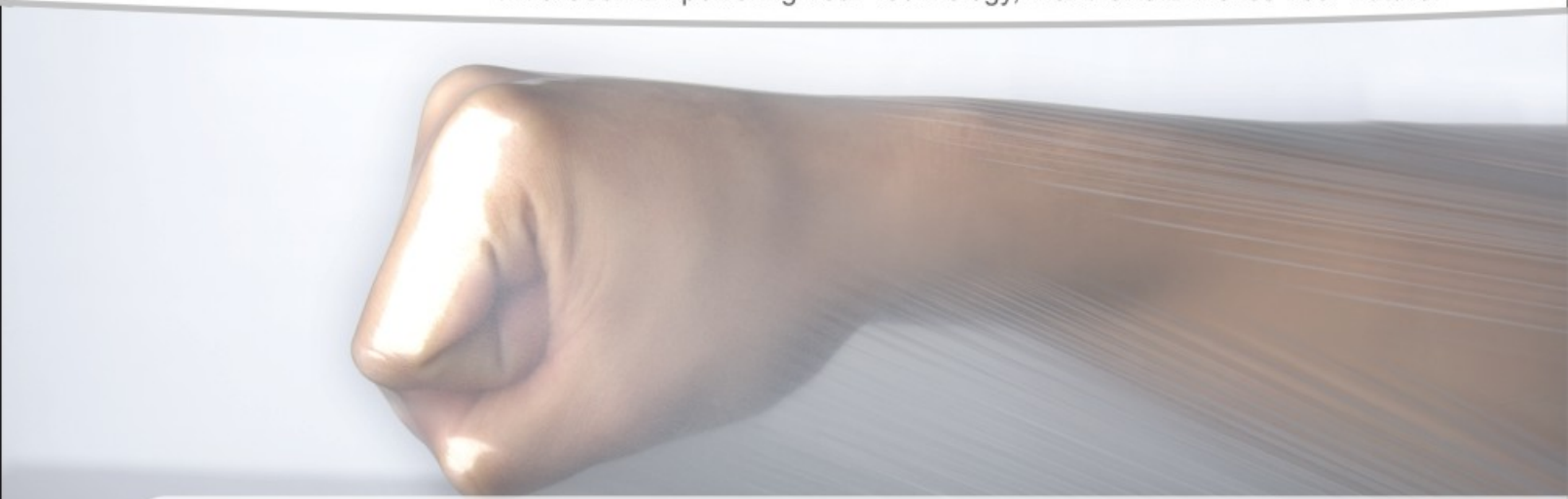


POLYESTER-BASED TPU WHT-15 Series

Description: Shore A 65-Shore A 75
Processing Methods: Injection, Extrusion
Special Features: Plasticizer Free, Excellent Abrasion & Slip Resistance, Low Temperature Flexibility, Good Mechanical Properties, Good Processability
Applications: Safety Shoes, Compounding, etc.
Complying with FDA (21 CFR 177.1680, 177.2600) & RoHS etc.

Items	Method	Unit	WHT-1565IC	WHT-1570IC
Hardness	ASTM D2240	Shore A	66	73
Density	ASTM D792	g/cm ³	1.18	1.19
100% Modulus	ASTM D412	MPa	3	3.5
300% Modulus	ASTM D412	MPa	6	6.5
Tensile Strength	ASTM D412	MPa	25	30
Ultimate Elongation	ASTM D412	%	750	700
Tear Strength	ASTM D624	N/mm	70	75
Abrasion Resistance	ISO 4649	mm ³	50	50
Glass Transition Temperature	ASTM D3418	°C	- 40	- 40
Processing Temperature	-	°C	170-190	180-195

These are typical values and should not be used as specifications.



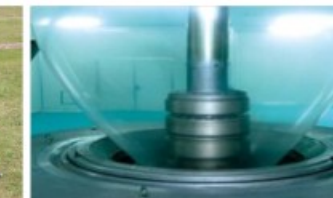
POLYESTER-BASED TPU WHT-16 Series

Description: Shore A 80 -Shore A 95
Processing Methods: Extrusion, Blow Molding, T-die Extrusion
Special Features: Stable Melt Viscosity, Outstanding Toughness & Tear Resistance, Good Workability for High Frequency Welding
Applications: Film & Sheet, Fabric Coating, Sports & Leisure, etc.
Complying with FDA (21 CFR 177.1680, 177.2600) & RoHS etc.

Items	Method	Unit	WHT-1680AB	WHT-1685AD	WHT-1685AB	WHT-1690AB	WHT-1695AB
Hardness	ASTM D2240	Shore A	80	85	85	90	95
		Shore D	-	-	-	-	55
Density	ASTM D792	g/cm ³	1.19	1.19	1.19	1.19	1.20
100% Modulus	ASTM D412	MPa	5	6	7	7	9
300% Modulus	ASTM D412	MPa	9	12	15	13	18
Tensile Strength	ASTM D412	MPa	30	32	40	37	42
Ultimate Elongation	ASTM D412	%	710	610	520	550	460
Tear Strength	ASTM D624	N/mm	80	90	97	102	122
Abrasion Resistance	ISO 4649	mm ³	92	90	68	75	79
Processing Temperature	-	°C	150-170	160-180	185-205	190-205	190-210

These are typical values and should not be used as specifications.

AB: Blow molding AD: High frequency welding





ECONOMICAL POLYESTER-BASED TPU WHT-12 Series

Description: Shore A 85-Shore A 97
Processing Methods: Extrusion
Special Features: Good Mechanical Properties, Good Extrusion Stability, Low Cost
Applications: Hose & Tube, etc.
Complying with FDA (21 CFR 177.1680, 177.2600) & RoHS etc .

Items	Method	Unit	WHT-1285	WHT-1290	WHT-1295	WHT-1295B
Hardness	ASTM D2240	Shore A	85	91	96	97
		Shore D	-	-	56	65
Density	ASTM D792	g/cm ³	1.19	1.19	1.20	1.21
100% Modulus	ASTM D412	MPa	4	8	12	18
300% Modulus	ASTM D412	MPa	6	15	20	25
Tensile Strength	ASTM D412	MPa	25	28	31	32
Ultimate Elongation	ASTM D412	%	600	500	420	480
Tear Strength	ASTM D624	N/mm	80	110	140	180
Abrasion Resistance	ISO 4649	mm ³	-	-	-	60
Processing Temperature	-	°C	175-195	185-205	190-210	195-210

These are typical values and should not be used as specifications.



ECONOMICAL POLYESTER-BASED TPU WHT-15 Series

Description: Shore A 80-Shore D 64
Processing Methods: Injection
Special Features: Low Cost, Good Mechanical Properties, Good Processability.
Applications: Seal, Shoes, Roller Wheel, Compounding, etc.
Complying with FDA (21 CFR 177.1680, 177.2600) & RoHS etc .

Items	Method	Units	WHT-1580	WHT-1585	WHT-1590	WHT-1595	WHT-1564
Hardness	ASTM D2240	Shore A	80	86	92	95	-
		Shore D	-	-	-	-	64
Density	ASTM D792	g/cm ³	1.19	1.19	1.20	1.20	1.21
100% Modulus	ASTM D412	MPa	4	6	8	13	18
300% Modulus	ASTM D412	MPa	8	10	15	27	30
Tensile Strength	ASTM D412	MPa	26	30	34	35	40
Ultimate Elongation	ASTM D412	%	650	630	560	400	400
Tear Strength	ASTM D624	N/mm	80	90	120	130	160
Abrasion Resistance	ISO 4649	mm ³	-	-	68	52	42
Processing Temperature	-	°C	180-200	185-205	190-210	195-215	200-220

These are typical values and should not be used as specifications.



POLYCAPROLACTONE-BASED TPU WHT- 21 Series

Description: Shore A 80-Shore A 98 Polycaprolactone-based TPU
Processing Methods: Injection, Extrusion
Special Features: Low Compression Set, Good Oil Resistance & Hydrolytic Stability, Good Abrasion Resistance, Low Temperature Flexibility
Applications: High Grade Seal, Wheel, Mine Sieve, Cable Sheath, etc.
Complying with FDA (21 CFR 177.1680, 177.2600) & RoHS etc.

Items	Method	Unit	WHT-2180	WHT-2185	WHT-2190	WHT-2195	WHT-2198
Hardness	ASTM D2240	Shore A	80	85	90	95	98
		Shore D	-	-	-	55	60
Density	ASTM D792	g/cm ³	1.18	1.19	1.20	1.20	1.21
100% Modulus	ASTM D412	MPa	4	6	8	10	12
300% Modulus	ASTM D412	MPa	8	9	14	19	27
Tensile Strength	ASTM D412	MPa	24	26	29	31	32
Ultimate Elongation	ASTM D412	%	560	520	500	490	480
Tear Strength	ASTM D624	N/mm	100	110	120	125	135
Processing Temperature	-	°C	180-200	185-205	190-210	195-215	195-215

These are typical values and should not be used as specifications.



POLYCARBONATE-BASED TPU WHT- 71 Series

Description: Shore A 80-Shore A 95 Polycarbonate-based TPU
Processing Methods: Extrusion, Injection, Coating, Calendering etc.
Special Features: Higher Mechanical Strength, Good Hydrolytic Stability & Chemical Resistance, Weather Resistance, Heat & Fungus Resistance
Applications: Fabric Coating, Wire & Cable, Film & Sheet, Hose & Tube, Animal Tag, Fire Hose, Automobile etc.
Complying with FDA (21 CFR 177.1680, 177.2600) & RoHS etc.

Items	Method	Unit	WHT-7180	WHT-7185	WHT-7190	WHT-7195
Hardness	ASTM D2240	Shore A	80	85	90	95
Density	ASTM D792	g/cm ³	1.21	1.22	1.24	1.30
100% Modulus	ASTM D412	MPa	6	8	10	15
300% Modulus	ASTM D412	MPa	19	23	35	39
Tensile Strength	ASTM D412	MPa	30	35	40	45
Ultimate Elongation	ASTM D412	%	400	350	330	310
Tear Strength	ASTM D624	N/mm	85	100	110	120
Processing Temperature	-	°C	185-200	190-210	195-215	200-220

These are typical values and should not be used as specifications.





TPU HOT-MELT ADHESIVES WHT- 62 Series

Description: Polyester-based TPU Hot-melt Adhesives
Processing Methods: T-die extrusion, Melt processing, etc.
Special Features: Wide range of activation temperature, Fast crystallization rate, Outstanding bonding strength for Fabrics, Leathers, Plastics & Rubbers, Wood, etc.
Applications: Toe-Puffs & Counters, Adhesive films & tapes
Complying with FDA (21 CFR 177.1680, 177.2600) & RoHS etc.

Items	Unit	WHT-6236	WHT-6235	WHT-6275	WHT-6233	WHT-6232	WHT-6232B	WHT-6226	WHT-6228	WHT-6290
Hardness	Shore A	73	76	77	78	82	85	88	96	97
Flow Beginning Temperature	°C	95	105	90	115	115	95	115	65	60
Suggested Bonding Temperature	°C	115-140	120-140	110-130	130-150	140-170	120-140	130-160	120-150	70-100
Tack-free Time	Min.	12	8	20	5	10	15	6	8	5

These are typical values and should not be used as specifications.



TPU SOLVENT-BASED ADHESIVES WHT- 61/63/64/65 Series

Description: Polyester-based TPU for Solvent-based Adhesives
Processing Methods: Solution of MEK, Acetone, Ethylene Acetate, DMF, etc. Melt processing for fabric coatings & adhesive films & tapes
Special Features: Wide viscosity range, High crystallization rate, Low activation temperature, Good solvent solubility, Accurate control of viscosity, Outstanding bonding strength for PVC, Polyamide, Polyester, PU, Cotton, leather, etc.
Applications: Shoes, Adhesive films & tapes, Wood adhesives, Fabric coatings, etc.
Complying with FDA (21 CFR 177.1680, 177.2600) & RoHS etc.

Items	Unit	WHT-61 Series	WHT-63 Series	WHT-64 Series	WHT-6420B*	WHT-65 Series
Crystallization Rate	-	★★★★★	★★	★★★	★★	★★
Solution Viscosity(15% in MEK)	mPa·s	100-3600	300-3600	300-3600	1000-3000	300-2500
Initial Bonding Strength	-	★★★★★	★★	★★★	★★	★★
Minimum Activation Temperature	°C	55-65	55-65	55-65	55-65	55-65

★★★★★=Excellent;

★★★=Good;

★★=Common;

WHT-6420B: DMF/MEK=3/7(wt/wt)

These are typical values and should not be used as specifications.

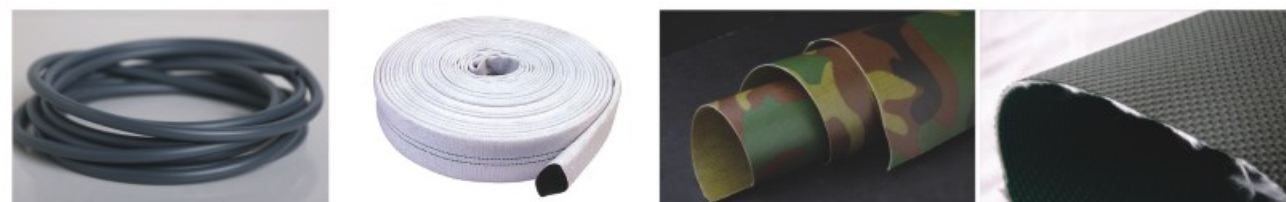


POLYETHER-BASED TPU WHT- 81 Series

Description: Shore A 70-Shore A 95 Polyether-based TPU
Special Features: Excellent Hydrolytic Stability, Fungus Resistance, Low Temperature Flexibility & UV Resistance
Processing Methods: Extrusion, Injection, T-die Extrusion, etc.
Applications: Wire & Cable, Film & Sheet, Hose & Tube, Animal Tag, Fire Hose, Sports Equipments, Medical Products, etc.
Complying with FDA (21 CFR 177.1680, 177.2600) , RoHS, ISO 10993 & USP VI etc .

Items	Method	Unit	WHT-8170RV	WHT-8180RV	WHT-8185RV	WHT-8190RV	WHT-8195RV
Hardness	ASTM D2240	Shore A	70	80	85	90	95
Density	ASTM D792	g/cm ³	1.10	1.10	1.11	1.12	1.13
100% Modulus	ASTM D412	MPa	3	6	7	10	13
300% Modulus	ASTM D412	MPa	7	9	11	15	25
Tensile Strength	ASTM D412	MPa	20	25	28	30	35
Ultimate Elongation	ASTM D412	%	800	750	650	600	450
Tear Strength	ASTM D624	N/mm	70	85	95	110	145
Glass Transition Temperature	ASTM D3418	°C	-60	-45	-45	-40	-40
Processing Temperature	-	°C	180-200	175-190	180-195	185-200	190-210

These are typical values and should not be used as specifications.

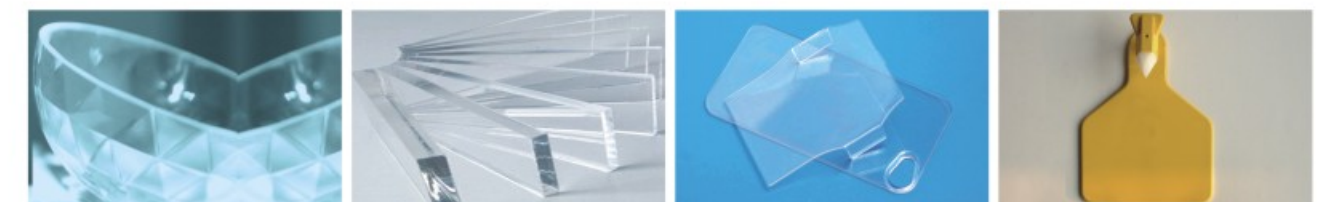


POLYETHER-BASED TPU WHT- 82 Series

Description: Shore A 80-Shore D 64 Polyether-based TPU
Special Features: Excellent Transparency, Short Cycle Time, Hydrolytic Stability, Fungus Resistance, Low Temperature Flexibility & UV Resistance
Processing Methods: Injection, Extrusion, etc.
Applications: Specialized by injection & extrusion for higher transparency applications etc.
Complying with FDA (21 CFR 177.1680, 177.2600) , RoHS, ISO 10993 & USP VI etc .

Items	Method	Unit	WHT-8280	WHT-8285	WHT-8290	WHT-8254	WHT-8264
Hardness	ASTM D2240	Shore A	80	85	90	-	-
		Shore D	-	-	-	54	64
Density	ASTM D792	g/cm ³	1.10	1.11	1.12	1.13	1.14
100% Modulus	ASTM D412	MPa	6	7	9	14	18
300% Modulus	ASTM D412	MPa	10	11	15	25	29
Tensile Strength	ASTM D412	MPa	23	25	28	32	35
Ultimate Elongation	ASTM D412	%	600	650	400	400	380
Tear Strength	ASTM D624	N/mm	75	85	100	130	160
Glass Transition Temperature	ASTM D3418	°C	-50	-45	-42	-30	-25
Processing Temperature	-	°C	175-190	180-195	185-200	190-210	195-215

These are typical values and should not be used as specifications.





NON-YELLOWISH ALIPHATIC TPU

Description: Shore A 80-Shore A 95 Polyether-based Aliphatic TPU
Processing Methods: Extrusion, Injection, etc.
Special Features: Non-yellowish, High Tensile Strength, Good Abrasion Resistance, Excellent Hydrolytic Stability, Fungus Resistance, Low Temperature Flexibility
Applications: Shoes, Auto Parts, Film & Sheet, Watch Belt, Medical & Electronic etc.
Complying with FDA (21 CFR 177.1680, 177.2600) & RoHS etc.

Items	Method	Unit	WHT-A180	WHT-A185	WHT-A190	WHT-A195
Hardness	ASTM D2240	Shore A	80	85	90	95
Density	ASTM D792	g/cm ³	1.08	1.09	1.10	1.11
100% Modulus	ASTM D412	MPa	4	5	6	11
300% Modulus	ASTM D412	MPa	7	10	21	25
Tensile Strength	ASTM D412	MPa	14	16	25	30
Ultimate Elongation	ASTM D412	%	550	500	450	400
Tear Strength	ASTM D624	N/mm	55	75	85	95
Glass Transition Temperature	ASTM D3418	°C	-55	-45	-40	-35
Processing Temperature	-	°C	170-190	180-200	185-205	190-210

These are typical values and should not be used as specifications.

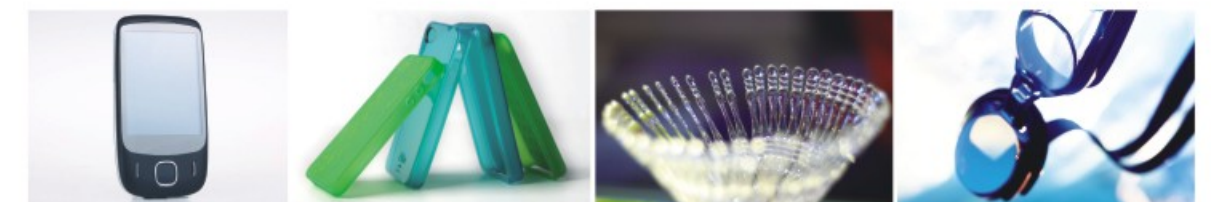


SUPER-HARD TPU

Description: Shore D 80 polyether and polyester-based TPU
Special Features: Low Mold Shrinkage, Good Impact Resistance, Perfect Transparency, Good Mold Release, Fatigue Resistance, Chemical & Hydrolytic Resistance
Applications: Engineering Parts, Mobile Phone Window, Alternative of Transparent PC, Personal Care & Cosmetics, Toys, etc.
Complying with FDA (21 CFR 177.1680, 177.2600) & RoHS etc.

Items	Method	Unit	WHT-8280H	WHT-1180H
Hardness	ASTM D2240	Shore D	80	80
Density	ASTM D792	g/cm ³	1.15	1.18
100% Modulus	ASTM D638	MPa	35	33
300% Modulus	ASTM D638	MPa	-	38
Tensile Strength	ASTM D638	MPa	40	46
Ultimate Elongation	ASTM D638	%	150	430
Tear Strength	ASTM D624	N/mm	200	240
Processing Temperature	-	°C	190-220	190-220

WHT-8280H is polyether-based TPU, WHT-1180H is polyester-based TPU.
 These are typical values and should not be used as specifications.



WANTHANE® TPU

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WANTHANE® PRODUCT NOTICE

STORAGE

Prolonged contact with water can lead to hydrolysis of certain types of TPU resins because of its high moisture absorbing property. For this reason, it must be stored in tightly closed containers in a dry, cool and shady area. Never make TPU be contacted with water, nor put them at humid locations. Never put opened packages in open air for prolonged periods of time. During processing, moisture in TPU resins will lead to degradation and defective finished products, so it is recommended to remove moisture to make its content below 0.03% prior to processing.

SAFETY

It is possible that someone is allergic to TPU, if so, please stop contacting with raw material or finished products immediately. With severe cases, call for prompt medical care. During processing, avoid direct contact with melting TPU or finished product at high temperature to prevent scald. Avoid inhalation of decomposition vapor at high temperature. Local and mechanical ventilation in workshops is a must so as to prevent inhalation of hazardous gas.

HAZARDS OF COMBUSTION AND EXPLOSION

The theoretical flash point of TPU products is over 250°C. Hazardous decomposition products: include CO, isocyanate vapor, trace amount of hydrogen cyanide gas (if combusted). This product poses almost no danger of explosion. However, when heated or exposed to flames, it may cause fire. Extinguishing media may be water, sand, or CO₂. Fire fighting personnel must be equipped with personal protection devices against CO and CO₂.

ENVIRONMENT

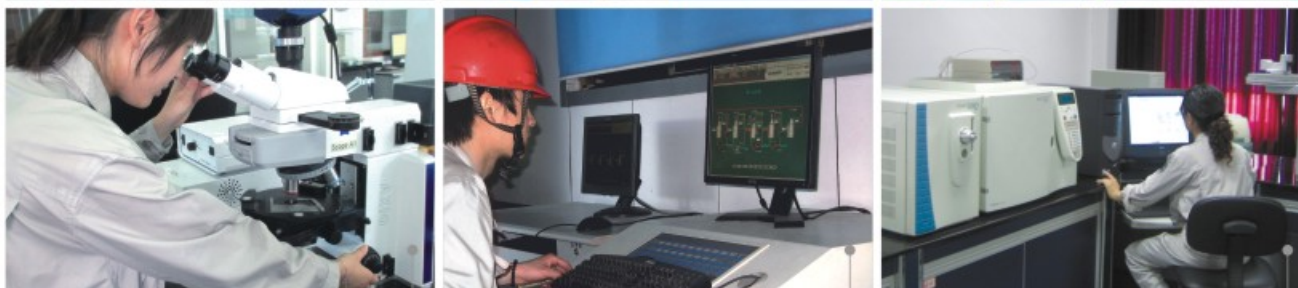
Spilled pellets must be cleared up. According to environmental laws and regulations, TPU are common non-controlled wastes, which means they can be buried or combusted under permission. Classification and recovery of TPU packages made of paper and plastics after use is recommended to avoid wastes of resources and environmental pollution.



GPC

DSC TGA

FTIR



Hot Stage PLM

DCS Room

GC-MS



QUALITY MANAGEMENT SYSTEM CERTIFICATE



OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM CERTIFICATE



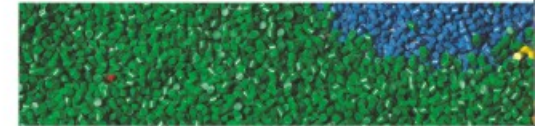
ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATE



LABORATORY ACCREDITATION CERTIFICATE

WANTHANE® TPU

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WANTHANE® DISCLAIMER

The information provided here is for reference only, and the specification will be provided in the sales contract. It is the user's responsibility to test the material and its suitability for the processing. It is out of company's control of various factors of the processing and applications of our product, and we can not take any responsibility for another party's action, nor will we be responsible for any indirect damages while using our products. The user is welcome to contact our customer and technical service center with questions on our products.