High-Quality PA6 (Nylon 6) Technical Data Sheet(TDS)

High-quality PA6 (Polyamide 6, also known as Nylon 6) is a semi-crystalline engineering plastic with high strength,high toughness,good wear resistance and self-lubrication,widely used in automotive, electronics, machinery, textile and other fields. The following is a systematic parameter table, including the comparison between pure resin and modified (glass fiber reinforced) versions. All data are from the technical manuals of mainstream manufacturers.

1.Basic Physical Properties

Property Item	Unit	Pure PA6 (Dry State)	Pure PA6 (Wet State)	30% Glass Fiber Reinforced PA6	Test Standard
Density	g/cm3	1.13-1.15	1.14-1.16	1.35-1.40	ISO 1183-1
Equilibrium Water Absorption	%	3.0-3.5	-	1.2-1.8	ISO 62
Melting Point	℃	215-225	215-225	215-225	DSC Test
Glass Transition Temperature	℃	45-55	40-50	50-60	DSC Test
Crystallinity	%	30-40	25-35	40-50	X-ray Diffraction
Appearance	-	Translucent/Off-white Granules	Translucent/Off-white Granules	Opaque/Grayish White Granules	Visual Inspection

2. Core Mechanical Properties (Key Indicators)

Performance Indicator	Unit	Pure PA6 (Dry State)	Pure PA6 (Wet State)	30% Glass Fiber Reinforced PA6	Test Standard
Tensile Strength	MPa	70-95	55-65	140-180	ISO 527-1/-2
Elongation at Break	%	20-40	150-300	3-5	ISO 527-1/-2
Flexural Strength	MPa	110-130	70-90	200-240	ISO 178
Flexural Modulus	GPa	2.8-3.3	1.2-1.8	7.0-9.0	ISO 178
Notched Impact Strength	kJ/㎡	4.5-7.0	15-30	10-15	ISO 179-1
Unnotched Impact Strength	kJ/㎡	50-80	100-200	80-120	ISO 179-1
Rockwell Hardness	R	110-120	90-100	120-130	ISO 2039-2
Coefficient of Friction	-	0.15-0.30	0.10-0.25	0.12-0.28	ASTM D1894

3. Thermal Properties

Thermal Performance Indicator	Unit	Pure PA6	30% Glass Fiber Reinforced PA6	Test Standard
Heat Deflection Temperature (HDT)	℃	60-70 (1.82MPa)140-150 (0.45MPa)	190-200 (1.82MPa)210-220 (0.45MPa)	ISO 75-1/-2
Continuous Service Temperature	℃	80-100	120-140	Long-term Test
	℃	150	180	

Short-term Peak Temperature				Instant Thermal Shock
Brittleness Temperature	℃	-40	-40	ISO 974
Coefficient of Thermal Expansion	10-5/℃	8-10 (Transverse)15-18 (Longitudinal)	2-4 (Transverse)4-6 (Longitudinal)	ISO 11359-2
Thermal Conductivity	W/(m·K)	0.24-0.28	0.35-0.40	ISO 22007-2
Decomposition Temperature	℃	>300	>300	TGA Test

4.Electrical Properties

Electrical Performance Indicator	Unit	Pure PA6	Test Standard
Dielectric Constant	-	3.5-4.0(1MHz)	ASTM D150
Dielectric Loss Factor	-	0.02-0.04(1kHz)	ASTM D150
Volume Resistivity	Ω·cm	$> 10^{14}$	ASTM D257
Surface Resistivity	Ω/sq	$> 10^{12}$	ASTM D257
Arc Resistance	sec	150-180	ASTM D495
Dielectric Strength	kV/mm	18-22	IEC 60243-1
Flame Retardant Rating	-	UL94 HB	UL94 Test

5. Chemical Properties & Environmental Resistance

Medium Type	Corrosion Resistance	Remarks
Mineral Oil/Fuel Oil	Excellent	Almost no swelling,can be in long-term contact
Water/Water Vapor	Medium	Water absorption causes dimensional change and wet strength decrease

Weak Acid(pH>4)	Good	Little impact with short-term contact
Strong Acid(pH<4)	Poor	Prone to hydrolysis and degradation
Weak Alkali (pH<10)	Good	Little impact with short-term contact
Strong Alkali (pH>10)	Poor	Prone to hydrolysis and degradation
Alcohol Solvents	Good	Almost no swelling
Ester/Ketone Solvents	Poor	Prone to swelling or dissolution
Aromatic Hydrocarbons/Chlorinated Hydrocarbons	Medium	Partial swelling
Ultraviolet (UV)	Poor	UV stabilizer is required

6.Processing Properties (Injection Molding Application)

Processing Parameter	Unit	Pure PA6	30% Glass Fiber Reinforced PA6	Remarks
Processing Temperature Range	℃	230-280	240-290	Barrel Temperature
Mold Temperature	℃	40-80	60-100	Affects crystallinity and appearance
Melt Flow Index (MI)	g/10min	10-50	5-30	230℃/2.16kg Load
Injection Pressure	MPa	80-120	100-150	Adjust according to product thickness
Holding Pressure	MPa	40-60	50-70	Prevent shrinkage marks
Cooling Time	sec	15-30	20-40	

				Extended for thick-walled products
Drying Condition		*80°C × 4–6h*	*80°C × 6–8h*	Moisture<0.1%, avoid hydrolysis

7.Key Quality Indicators of High-Quality PA6 (Purchase Standard)

· Molecular Weight Control: Number-average molecular weight 18,000-25,000,relatively stable viscosity(RV=2.4-3.0)

· Low Impurity Content: Ash contentt<0.1%,black spotss<10pieces/kg,ensuring product appearance and performance stability

Thermal Stability:Yellowing indeex<2.0,no obvious degradation during long-term high-temperature processing

Consistency:Batch-to-batch performance fluctuation<5%,,meeting precision injection molding requirements

· Environmental Certification: Compliance with RoHS, REACH and other standards;food grade requires FDA certification

8. Common Modified PA6 Types & Performance Improvement Directions

Modification Type	Key Performance Improvement	Typical Applications
Glass Fiber Reinforced	Strength +100%,Modulus +200%, HDT +100℃	AutomotiveStructural Parts, Electronic Enclosures
Mineral Filled	Improved dimensional stability,reduced warpage,lower cost	Home Appliance Enclosures,Daily Necessities
Toughened Modification	Notched impact strength +300%,improved low-temperature toughness	Impact-Resistant Components, Sports Goods
Flame Retardant Modification	Flame retardant rating up to UL94 V0	Electronic and Electrical Components,Automotive Interior
Weather-Resistant Modification	Improved UV resistance,extended outdoor service	Outdoor Products, Automotive Exterior

	life	
Lubrication Modification	Reduced coefficient of friction,improved wear resistance	Gears,Bearings,Guide Rails

Important Notes

1. PA6 has significant hygroscopicity: Environmental humidity will affect performance.It needs to be fully dried before use, and humidity conditioning treatment can be performed after molding to balance performance.
2. Sources of data differences: Different manufacturers, test standards (ISO/ASTM), and test conditions (dry/wet state) will cause parameter fluctuations. The above are industry general ranges.
3. Customization requirements: High-quality PA6 can adjust the formula according to application scenarios,such as medical grade,food grade,high-temperature resistant grade and other special specifications.