

NYLATRON® Cast Products

Polyamides (PA)

Main Characteristics:

- High mechanical strength, stiffness, hardness and toughness
- Good fatigue resistance
- Excellent resilience
- High mechanical damping ability
- Good sliding properties
- Excellent wear resistance
- Good electrical insulating properties
- Good resistance to high energy radiation (gamma and X rays)
- Good machinability

Within the Polyamides, commonly referred to as 'nylons', we distinguish different types. The most important ones are: PA6, PA66, PA11 and PA12.

The differences in physical properties which exist between these types are mainly determined by the composition and the structure of their molecular chains.

NYLATRON® GSM

(PA6+MoS₂)

Colour: Grey black

NYLATRON® GSM contains finely divided particles of Molybdenum Disulphide to enhance its bearing and wear behaviour without impairing the impact and fatigue resistance inherent to unmodified cast nylon grades. It is a very commonly used grade for gears, bearings, sprockets and sheaves.

NYLATRON® MC901

(PA6)

Colour: Blue

This modified cast nylon grade 6 with its distinctive blue colour exhibits higher toughness, flexibility and fatigue resistance than ERTALON® 6PLA. It has proved to be an excellent material for large gears, racks and pinions.

NYLATRON® NSM

(PA6 Solid Lubricants)

Colour: Grey

NYLATRON® NSM is a proprietary cast nylon 6 formulation containing solid lubricant additives, which grant this material self-lubricity, excellent frictional properties, superior wear resistance and outstanding Pressure-Velocity capabilities (up to 5 times higher than conventional cast nylons). Being particularly suited for higher velocity, un-lubricated moving parts applications, it is the perfect complement to the oil-filled grade ERTALON® LFX.

NYLATRON® GSM

Cast Nylon 6 + Molybdenum Disulphide (PA6G+MoS₂)

NYLATRON® GSM is MoS₂ filled giving excellent wear resistance, self lubrication and low friction characteristics. It is an ideal material for dynamic bearing applications, even at elevated temperatures.

- High impact strength
- High mechanical damping
- Good alkaline resistance (up to pH 11)
- Very high strength / stiffness
- Good fatigue resistance
- Low weight (1/6 vs Steel)
- Excellent wear resistance
- Continuous temperature 90°C (max 170°C)

Common Applications:

Racks; Pinions; Gears; Bearings; Rollers; Wheels; cable sheaves; Cams; Nuts; Valve seats; Pulleys; Gaskets; Electrical insulators.

Delivery Programme

	min	max
Rod 3m long diameter (mm)	50	150
Rod 1m long diameter (mm)	50	500
Rod 500mm long diameter (mm)	210	500
Tube 2m long outer diameter (mm)	50	150
inner diameter (mm)	20	135
Tube 1m long outer diameter (mm)	155	260
inner diameter (mm)	50	235
Tube 600mm long outer diameter (mm)	220	600
inner diameter (mm)	70	570
Plate thickness (mm)	10	100
sizes (mm)	610 x 1220 / 1220 x 2000 / 1220 x 2440	
Colour: Grey black		

Technical Specification

Property	ISO Method	Units	Values
Density	1183	g/cm ³	1.16
Water absorption			
· Saturation in air (23°C/50% RH)	~	%	2.40
· Saturation in water (23°C)	~	%	6.70
Tensile strength* ¹	527	N/mm ²	78
Tensile modulus of elasticity* ¹	527	N/mm ²	3300
Elongation at break* ¹	527	%	25
Impact - Charpy* ¹	179/1eU	kJ/m ²	no break
Impact - Izod notched* ¹	180/2A	kJ/m ²	3.5
Hardness	Rockwell	~	M84
	Shore D	~	~
Melt point	~	°C	220
Max allowable service temperature in air			
· for short periods	~	°C	170
· continuously for 20,000 hrs	~	°C	90
Linear thermal expansion coefficient	~	K ⁻¹ x 10 ⁻⁵	8.0
Thermal conductivity	~	W/(K.m)	0.30
Flammability* ² (6mm thickness)	~	~	HB
Volume resistivity* ¹	IEC93	Ω.cm	>10 ¹⁴
Dielectric strength* ¹	IEC243	kV/mm	24
Outside applications			
· UV resistance	~	~	A
Acids - strong (pH<3)	~	~	C
Alkalis - strong (pH>11)	~	~	B/C
Chlorinated hydrocarbons	~	~	A/B
Hot water	~	~	B

'A' - Acceptable service

'B' - Limited service

'C' - Unacceptable

*¹ - Measured on dry test specimens (where applicable)

*² - Tests completed by DSM EPP using UL test methods

NYLATRON® MC901 Cast Nylon 6 (PA6G Heat Stabilised)

NYLATRON® MC901 is a tough, heat stabilised cast nylon 6 grade. It has better impact strength and fatigue resistance compared with other cast nylons. It has proved an outstanding material for large gears, racks and pinions, successfully replacing phosphor bronze and cast iron in many applications.

- High impact strength
- High mechanical damping
- Good alkaline resistance (up to pH 11)
- High strength / stiffness
- Good fatigue resistance
- Low weight (1/6 vs Steel)
- Excellent wear resistance
- Continuous temperature 90°C (max 170°C)

Common Applications:

Racks; Pinions; Gears; Bearings; Rollers; Wheels; Cams; Nuts; Valve seats; Pulleys; Gaskets; Electrical insulators.

Delivery Programme

	min	max
Rod 3m long diameter (mm)	50	150
Rod 1m long diameter (mm)	50	500
Rod 500mm long diameter (mm)	210	500
Tube 2m long outer diameter (mm)	50	150
inner diameter (mm)	20	135
Tube 1m long outer diameter (mm)	155	260
inner diameter (mm)	50	235
Tube 600mm long outer diameter (mm)	220	600
inner diameter (mm)	70	570
Plate thickness (mm)	10	100
sizes (mm)	610 x 1220 / 1220 x 2000 / 1220 x 2440	
Colour:	Blue	

Technical Specification

Property	ISO Method	Units	Values
Density	1183	g/cm ³	1.15
Water absorption			
• Saturation in air (23°C/50% RH)	~	%	2.30
• Saturation in water (23°C)	~	%	6.60
Tensile strength* ¹	527	N/mm ²	81
Tensile modulus of elasticity* ¹	527	N/mm ²	3200
Elongation at break* ¹	527	%	35
Impact - Charpy* ¹	179/1eU	kJ/m ²	no break
Impact - Izod notched* ¹	180/2A	kJ/m ²	3.5
Hardness	Rockwell	~	M85
	Shore D	~	~
Melt point	~	°C	220
Max allowable service temperature in air			
• for short periods	~	°C	170
• continuously for 20,000 hrs	~	°C	90
Linear thermal expansion coefficient	~	K ⁻¹ x 10 ⁻⁵	8.0
Thermal conductivity	~	W/(K.m)	0.29
Flammability* ² (6mm thickness)	~	~	HB
Volume resistivity* ¹	IEC93	Ω.cm	>10 ¹⁴
Dielectric strength* ¹	IEC243	kV/mm	25
Outside applications			
• UV resistance	~	~	B
Acids - strong (pH<3)	~	~	C
Alkalis - strong (pH>11)	~	~	B/C
Chlorinated hydrocarbons	~	~	A/B
Hot water	~	~	B

'A' - Acceptable service

'B' - Limited service

'C' - Unacceptable

*¹ - Measured on dry test specimens (where applicable)

*² - Tests completed by DSM EPP using UL test methods

NYLATRON® NSM

Cast Nylon 6 (PA6G Internally lubricated)

NYLATRON® NSM is a proprietary cast nylon grade 6 containing solid lubricant additives, giving the material self-lubrication, excellent friction properties, superior wear resistance and outstanding Pressure-Velocity capabilities.

- Good chemical resistance (pH 5 - 11)
- Self lubricating
- Excellent wear resistance
- Dark grey colour
- Continuous temperature 90°C (max 165°C)
- High strength / stiffness
- Low weight (1/6 vs Steel)
- Excellent dynamic bearing material

Common Applications:

Bearings; Thrust washers; Slides.

Delivery Programme

	min	max
Rod 3m long diameter (mm)	50	150
Rod 1m long diameter (mm)	50	500
Rod 500mm long diameter (mm)	210	500
Tube 2m long outer diameter (mm)	50	150
inner diameter (mm)	20	135
Tube 1m long outer diameter (mm)	155	260
inner diameter (mm)	50	235
Tube 600mm long outer diameter (mm)	220	600
inner diameter (mm)	70	570
Plate thickness (mm)	10	100
sizes		
610 x 1220 / 1220 x 2000 / 1220 x 2440		
Colour: Grey		

Technical Specification

Property	ISO Method	Units	Values
Density	1183	g/cm ³	1.15
Water absorption			
• Saturation in air (23°C/50% RH)	~	%	2.00
• Saturation in water (23°C)	~	%	6.30
Tensile strength* ¹	527	N/mm ²	76
Tensile modulus of elasticity* ¹	527	N/mm ²	3100
Elongation at break* ¹	527	%	25
Impact - Charpy* ¹	179/1eU	kJ/m ²	>100
Impact - Izod notched* ¹	180/2A	kJ/m ²	4
Hardness	Rockwell	~	M81
	Shore D	~	~
Melt point	~	°C	220
Max allowable service temperature in air			
• for short periods	~	°C	165
• continuously for 20,000 hrs	~	°C	90
Linear thermal expansion coefficient	~	K ⁻¹ x 10 ⁻⁵	8.0
Thermal conductivity	~	W/(K.m)	0.29
Flammability* ² (6mm thickness)	~	~	HB
Volume resistivity* ¹	IEC93	Ω.cm	>10 ¹⁴
Dielectric strength* ¹	IEC243	kV/mm	25
Outside applications			
• UV resistance	~	~	B
Acids - strong (pH<3)	~	~	C
Alkalis - strong (pH>11)	~	~	B/C
Chlorinated hydrocarbons	~	~	A/B
Hot water	~	~	B

'A' - Acceptable service

'B' - Limited service

'C' - Unacceptable

*¹ - Measured on dry test specimens (where applicable)

*² - Tests completed by DSM EPP using UL test methods

NYLATRON® 703XL Cast Nylon 6

Extreme Performance From A Proprietary Cast Nylon 6 Formulation

- Zero “slip-stick” for precise and accurate motion control.
- Dynamic lowest coefficient of friction.
- Unique formulation resulting in best wear performance.
- No lubrication needed.

Common Applications:

Precise motion control applications - sliding elements; linings; conveyor systems.

Heavy wear applications -wear pads; bearing blocks; wear guides; linear bearings and bushings.

Delivery Programme:

NYLATRON® 703 XL is standard available in plates at different thicknesses: 10, 16, 20, 30, 40, 60 & 80mm at the maximum size 3050 x 1220mm.

Legend

- *1 - According to method 1 of ISO 62 and done on discs 50 x 3mm.
- *2 - Only for short time exposure (a few hours) in applications where no or only a very low load is applied to the material.
- *3 - Temperature resistance over a period of 5,000/20,000 hours. After these periods of time, there is a decrease in tensile strength of about 50% as compared with the original value. The temperature values given here are thus based on the thermal-oxidative degradation which takes place and causes a reduction in properties. Note however, that, as for all thermoplastics, the maximum allowable service temperature depends in many cases essentially on the duration and the magnitude of the mechanical stresses to which the material is subjected
- *4 - Impact strength decreasing with decreasing temperature, the minimum allowable service temperature is practically mainly determined by the extent to which the material is subjected to impact. The value given here is based on unfavourable impact conditions and may consequently not be considered as being the absolute practical limit.
- *5 - These estimated ratings are not intended to reflect hazards presented by the material under actual fire conditions. There are no UL yellow cards available for NYLATRON 703XL stock shapes.
- *6 - Test specimens: Type 1 B.
- *7 - Test speed: 20mm/min.
- *8 - Test speed: 1mm/min.
- *9 - Test specimens: cylinders (12 x 30mm).
- *10 - Pendulum used: 4 J.
- *11 - Test specimens: 10mm thick.

Technical Specification

Property	Test Method ISO / IEC	Units	Values
Density	1183	g/cm ³	1.11
Water Absorption			
• after 24/96 hours immersion in water of 23°C*1	62	mg	40/76
	62	%	0.61/1.16
• Saturation in air (23°C/50% RH)	~	%	2
• Saturation in water (23°C)	~	%	6.3
Thermal Properties			
Melting Temperature	~	°C	220
Thermal Conductivity at 23°C	~	W/(K.m)	0.30
Coefficient of Linear Thermal Expansion:			
• average value between 23 and 60°C	~	m/(m.K)	85 x 10 ⁻⁶
• average value between 23 and 100°C	~	m/(m.K)	100 x 10 ⁻⁶
Temperature of Deflection under Load			
• method A: 1.8 MPa	75	°C	70
Max. Allowable Service Temperature in Air			
• for short periods*2	~	°C	160
• continuously for 5,000/20,000 hrs*3	~	°C	105/90
Min. Service Temperature*4	~	°C	-20
Flammability*5			
• "Oxygen Index"	4589	%	<20
• according to UL94 (3/6mm thickness)	~	~	HB/HB
Mechanical Properties at 23°C (dry material)			
Tension Test*6			
• Tensile stress at yield*7	527	MPa	62
• Tensile strain at break*7	527	%	10
• Tensile modulus of elasticity*8	527	NPa	2750
Compression Test*9			
• Compressive stress at 1/2/5% nominal strain*8	604	MPa	20.5/40/67
Creep Test in Tension*6			
• Stress to produce 1% strain in 1,000h (s _{1/1,000})	899	MPa	16
Charpy Impact Strength - Unnotched*10	179/1eU	kJ/m ²	≥25
Charpy Impact Strength - Notched	179/1eA	kJ/m ²	3
Izod Impact Strength - Notched	180/2A	kJ/m ²	3
Ball Indentation Hardness*11	2039-1	N/mm ²	120
Rockwall Hardness*11	2039-2	~	R109 (M59)
Electrical Properties at 23°C (dry material)			
Volume Resistivity	(60093)	Ohm.cm	>10 ¹²
Surface Resistivity	(60093)	Ohm	>10 ¹²