

Extruded Nylon Types 66 & 6 (PA66 & PA6)

Technical Datasheet



Hard Wearing Engineering Plastics for many applications

Service. Quality. Value.

The characteristics of Nylon 66 and Nylon 6 are, with a few exceptions, broadly similar to each other. While Nylon 66 is the preferred general-purpose nylon in the UK, and is therefore the principal stocked nylon at Smiths Metals, Nylon 6 is used for the same applications throughout much of mainland Europe. Both types are covered in this datasheet but any significant differences are highlighted.

Typical Applications

Mechanical engineering, automotive and general machinery construction - E.g. plain bearings, coil bodies, guide & clutch parts, gears, cams, rollers, slide bearings, seal rings and guide rails.

Product Description

High-quality general-purpose wear resistant engineering nylons; the chemical name is polyamide, and is available in a range of grades and forms to suit many applications. Nylon 66 is harder and stronger than nylon 6 whereas Nylon 6 absorbs slightly more moisture.

Technical Description

Smiths' range of extruded Nylon includes the following grade options -

Grade	Modification	Purpose
Nylon 66 - natural (off-white) & black PA66	None	Component identification
Nylon 66+30% glass fibre - black PA66GF	Reinforced with 30% glass fibre	Increased strength & stiffness
Nylon 66+MoS ₂ (Molybdenum Disulphide) - black PA66MO	Additive to increase tensile strength & surface hardness. Crystalline structure is also finer.	Improved bearing & wear performance. Improved UV resistance.

Machinability

While not as fine as acetal, the machinability of un-modified nylon is good. Glass-filled grades will require the use of tipped tooling. As with all plastic materials, experience has shown that extra care must be taken with larger diameters, especially in the colder months when plastic materials lose some of their toughness and so have less resistance to machining stresses. It's therefore important to ensure that these materials are not machined while in a chilled condition. Full machining instructions may be supplied on request.

See also...

Cast Nylon: ideal for larger sections and for custom cast components that require less post machining.

Nylon 12: superior impact properties for noise and vibration dampening.

Product Attributes

Range of grades available.

Good mechanical properties.
Good chemical resistance.
Good impact strength.
Natural product may be used in contact with foodstuffs (subject to appropriate limits).

Naturally good damping properties.

Good sliding properties.
High wear resistance.
Good abrasion resistance.

Product sourced from long-standing manufacturer with ISO accreditation.

Customer Benefits

Correct grade selection for each application is optimised.

Very good all-round product for diverse engineering applications.

Reduces machinery noise.

Ideal for use in many industrial bearing, wear and gear applications.

Consistent quality ensures uniform machining and performance characteristics.

Product Availability

Extruded round bar

Natural colour made up to 200mm dia, black available in a range of sizes

Extruded sheet/plate

Natural colour made to 60mm thk and in a range of area formats. Modified grades - please call for quotation.

Strip

Natural from 0.50mm thk

* Sizes not stocked are available on relatively short delivery time. 1, 2 or 3m lengths supplied or cut to customer requirements.

Chemical Resistance

Nylon 66 and 6 are highly resistant to: hydrocarbons, alkalis, fats, oils, fuels, ethers, esters and ketones. But are not resistant to: halogens, mineral acids and certain organic acids, oxidising agents.

Dimensional Stability

Like all polyamides, nylon 66 will slowly absorb / exude moisture from the surrounding atmosphere. This has three significant affects; importantly, a component will change dimension so consideration must be given to this e.g. bearing clearances. Electrical insulation properties will change - consider Nylon 12 as an alternative. Usefully, high humidity will toughen Nylons, with significantly higher impact strength being recorded, although the cost is a lower tensile strength.

Nylon 66, unmodified (Nylon 6 un-mod)	Nylon 66+ 30% glass (Nylon 6+30% glass)	Nylon 66+MoS ₂ (Nylon 6+MoS ₂)
--	--	--

Mechanical Properties

	Nylon 66, unmodified (Nylon 6 un-mod)	Nylon 66+ 30% glass (Nylon 6+30% glass)	Nylon 66+MoS ₂ (Nylon 6+MoS ₂)	
Density at 20°C	1.15 (1.14)	1.35 (1.35)	1.15 (1.14)	g/cm ³
Tensile strength @ yield	85 (80)	100 (100)	90 (80)	MPa
Elongation @ break	50 (>50)	5 (5)	20 (>50)	%
Tensile modulus of elasticity	3,300 (3,200)	5,000 (5,000)	3,400 (3,200)	MPa
Notched impact strength (Charpy)	>3 (>3)	6 (6)	>2 (>3)	kJ/m ²
Ball indentation hardness	180 (170)	210 (210)	180 (170)	N/mm ²
Shore – hardness	83 (82)	86 (86)	83 (82)	Scale D

Electrical Properties

	Nylon 66, unmodified (Nylon 6 un-mod)	Nylon 66+ 30% glass (Nylon 6+30% glass)	Nylon 66+MoS ₂ (Nylon 6+MoS ₂)	
Volume resistivity	10 ¹⁵ (10 ¹⁵)	- (-)	- (-)	Ohm cm
Surface resistivity	10 ¹³ (10 ¹³)	- (-)	- (-)	Ohm
Dielectric constant, 50 Hz	3.8 (3.9)	- (-)	- (-)	-
Dielectric dissipation factor, 50 Hz	0.015 (0.02)	- (-)	- (-)	-
Dielectric strength	25 (20)	- (-)	- (-)	Kv/mm
Comparative tracing index (CTI), Solution 'A'	600 (600)	- (-)	- (-)	-

Thermal Properties

	Nylon 66, unmodified (Nylon 6 un-mod)	Nylon 66+ 30% glass (Nylon 6+30% glass)	Nylon 66+MoS ₂ (Nylon 6+MoS ₂)	
Melting temperature	260 (200)	260 (200)	260 (200)	°C
Heat deflection temperature – method A, 1.8 MPa	100 (75)	150 (140)	100 (75)	°C
Coefficient of thermal expansion (Ave. between 20 - 60 °C)	80 (90)	50 (60)	80 (90)	10 ⁻⁶ .K ⁻¹
Specific thermal capacity at 100°C	1.70 (1.70)	1.50 (1.50)	1.70	kJ/(kg · K)
Thermal conductivity at 20°C	0.23 (0.23)	0.24 (0.28)	0.23	W/(m · K)
Service temperatures without high mechanical load – long term	-30 to +95 (-40 to +85)	-20 to +120 (-30 to +110)	-30 to +95	°C
Service temperature – short term (max)	+170 (+160)	+200 (+180)	+170 (160)	°C

Chemical resistance

	Nylon 66, unmodified (Nylon 6 un-mod)	Nylon 66+ 30% glass (Nylon 6+30% glass)	Nylon 66+MoS ₂ (Nylon 6+MoS ₂)
Acid resistance	- (-)	- (-)	- (-)
Alkali resistance	+ (+)	+ (+)	+ (+)
Hydrocarbon resistance	0 (0)	0 (0)	0 (0)
Chlorinated hydrocarbon resistance	- (-)	- (-)	- (-)
Aromatic resistance	0 (0)	0 (0)	0 (0)
Ketone resistance	+ (+)	+ (+)	+ (+)
Resistance to hot water	0 (0)	0 (0)	0 (0)

Other Physical Properties

	Nylon 66, unmodified (Nylon 6 un-mod)	Nylon 66+ 30% glass (Nylon 6+30% glass)	Nylon 66+MoS ₂ (Nylon 6+MoS ₂)	
Moisture absorption	2.8 (3.0)	1.7 (2.0)	2.8 (3.0)	%
Saturation in air @ 23°C and 50% RH				
Flammability according to UL94 (3mm / 6mm thick)	HB/V2 (HB/V2)	HB/V2 (HB/V2)	HB/V2 (HB/V2)	-

UK Service Centres:

Smiths Belfast	02895 908 897
Smiths Biggleswade	01767 604 704
Smiths Birmingham	0121 728 4940
Smiths Bristol	0117 971 2800
Smiths Chelmsford	01245 466 664
Smiths Gateshead	0191 469 5428
Smiths Horsham	01403 261 981

Smiths Leeds	0113 307 5167
Smiths Manchester	0161 794 8650
Smiths Norwich	01603 789 878
Smiths Nottingham	0115 925 4801
Smiths Redruth	01209 315 512
Smiths Verwood	01202 824 347
Main Office	0845 527 3331

Quality & Testing:



www.smithmetal.com info@smithmetal.com