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EXTRUDED NYLON: Polyamide (PA6)

Polyamide 6 (PA 6) is the best known extruded polyamide and offers a balanced combination of all typical polyamide material properties. Compared to the cast variants however, it absorbs more moisture, has much lower wear resistance and less dimensional strength. Furthermore, because of the manufacturing process, only a limited size range and unit weight can be produced. This restricts the design possibilities of the user.

Standard Colours: White / Black

Mechanical Properties		
Density DIN53 479	g/cm ³	1.14
Yield Stress DIN53 455	MPa	70 45
Elongation at break DIN53 455	%	50 180
Modules of elasticity resulting from tensile test DIN53 457	MPa	2,700 1,800
Modules of elasticity resulting from bending test DIN53 457	MPa	2,500 1,400
Flexural strength DIN53 452	MPa	130 40
Impact strength DIN53 453	KJ/m ²	o. B.
Notched-bar impact strength DIN 53 453	KJ/m ²	>3 o.B.
Ball indentation Hardness H _{358/30} DIN53 456	MPa	160 70
Creep rate stress at 1% elongation DIN53 444	MPa	>8
Sliding friction coefficient against steel (dry running) ³	-	0.38 0.42
Sliding wear against steel (dry running) ³	µm/km	0.23
Thermal Properties		
Melting temperature DIN53 736	°C	+218
Thermal conductivity DIN52 612	W/(k m)	0.23
Specific thermal capacity	J/(g K)	1.7
Coefficient of linear expansion	10 ⁻⁵ - K ⁻¹	8-9
Operating temperature range (long-term)	°C	-30 +100
Operating temperature range (short-term)	°C	+140
Fire behaviour after UL 94 IEC 60695	-	HB
Electrical Properties		
Dielectric constant DIN53 483	-	3.7 7
Dielectric loss factor DIN53 483	-	0.031 0.3
Specific volume resistance DIN53 482	Ω-cm	10 ¹⁵ 10 ¹²
Surface resistance DIN53 482	Ω	10 ¹³ 10 ¹⁰
Dielectric strength DIN53 481	KV/mm	50 20
Creep resistance DIN53 480	-	KA3c KA3b
Miscellaneous data		
Moisture absorption in natural Rubber until saturated DIN53 715	W(H ₂ O)%	3.0
Water absorption until saturated DIN53 495	W _s %	10.0
Specific properties		tough, good vibration damping

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In the production of semi-finished products, a distinction is made between the manufacturing processes of extrusion and casting. The performance of extruded polyamide semi-finished products, however, has various disadvantages. The limits of manufacturing size are reached quickly. In addition, the properties of the extruded materials are negatively affected because this process remoulds the materials under temperature / pressure. The extrusion screw and tooling also cause shearing stress and breaks in the polymer matrix. Polyamides manufactured in monomer casting show a higher degree of crystallinity and thus have much better material properties than the extruded types.

The main properties of PA 6 are:

- Good mechanical strength
- high impact resistance
- good damping properties



Typical application examples are:

- Gears
- hammer heads
- impact and shock resistant components

The key properties of polyamide are:

- High mechanical strength, hardness, rigidity and toughness
- High mechanical damping properties
- Good fatigue resistance
- Very high wear resistance
- Good sliding and emergency running properties
- Good machining properties

Changes in material properties

due to temperature, environmental conditions and moisture content must be considered. An increase in temperature coupled with high moisture content makes the material elastic. Tensile and compressive strength as well as the modulus of elasticity and hardness decrease. Simultaneously, the impact strength and elongation increases. The material assumes a strong, tough, elastic character. The change in length at elevated temperature or increased water content must also be considered. The following charts illustrate the relationship.



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