

What is PA66X GF50 black

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PA 66X, glass-fibre reinforced 50 %

PA66X GF50 black is a polyamide 66 with aromatic components in the polymer chain, reinforced with 50 % glass fibres. The very high reinforcement and the modified matrix result in a material with near-metal stiffness, the highest creep and fatigue resistance and improved thermal stability – for structural parts permanently exposed to high mechanical and thermal loads.

Properties

PA66X GF50 black achieves a tensile modulus of 8,700 MPa, a yield stress of 115 MPa and a flexural strength of 200 MPa at a continuous service temperature of 130 °C and a glass transition temperature of 78 °C. The coefficient of linear thermal expansion of $40 \cdot 10^{-6}/K$ (23–60 °C) is close to that of aluminium, and moisture absorption of 0.1 % (24 h) is very low for a polyamide – both ensure high dimensional stability. The material is resistant to oils, greases and fuels and easy to machine.

The high glass fibre content makes the material brittle (elongation at break 2 %) and highly abrasive to tools; properties are direction-dependent according to fibre orientation and the density of 1.61 g/cm³ is high. The material is black and not declared for food contact.

Advantages

- Highest stiffness and strength (50 % glass fibre)
- Very high creep and fatigue resistance
- High dimensional stability, low thermal expansion and moisture absorption
- Continuous service up to 130 °C, resistant to oils and fuels

Disadvantages

- Brittle behaviour, very low elongation at break
- Highly abrasive, direction-dependent properties, high density
- Not generally declared for food contact (see FDA declaration)

Processing

PA66X GF50 black can be machined using all conventional cutting methods; carbide tools are required because of the abrasive glass fibres; sharp cutting edges and good cooling via chip removal avoid heat build-up and residual stresses in the part.

For tight tolerances and thick-walled parts, we recommend intermediate annealing to relieve machining stresses; for tight fits, the moisture absorption of the polyamide must be taken into account.

Typical Applications

PA66X GF50 black is used wherever metal parts are to be replaced by a highly stiff, dimensionally stable plastic – for example in mechanical engineering, the automotive industry and the electrical industry.

- Structural parts and brackets as metal replacement
- Gears, cams and coupling parts under high permanent load
- Insulating and carrier parts with high stiffness and heat deflection

Typical Properties

- Highest stiffness and strength
- Very high creep resistance
- High dimensional stability

Product Examples

- Structural parts as metal replacement
- Gears and cams
- Insulating and carrier parts

Typical Industries

- Mechanical Engineering
- Automotive Industry
- Electrical Industry

	Test Method	Unit	Value
General Properties			
Density	DIN EN ISO 1183-1	g / cm ³	1.61
Water absorption (24 h)	DIN EN ISO 62	%	0.10
Water absorption (96 h)	DIN EN ISO 62	%	0.20
Flammability	UL 94		HB
Mechanical Properties			
Yield stress	DIN EN ISO 527-2	MPa	115
Yield strain	DIN EN ISO 527-2	%	2
Elongation at break	DIN EN ISO 527-2	%	2
Tensile modulus of elasticity	DIN EN ISO 527-2	MPa	8.700
Flexural strength	DIN EN ISO 178	MPa	200
Flexural modulus	DIN EN ISO 178	MPa	9.000
Compressive modulus	DIN EN ISO 604	MPa	6.200
Compressive strength (2 % strain)	DIN EN ISO 604	MPa	56
Shore hardness	DIN EN ISO 868	scale D	90
Thermal Properties			
Melting temperature	DIN EN ISO 11357	°C	256
Glass transition temperature	DIN EN ISO 11357	°C	78
Coefficient of linear thermal expansion (23–60 °C)	DIN EN ISO 11359	10 ⁻⁶ / K	40
Coefficient of linear thermal expansion (23–100 °C)	DIN EN ISO 11359	10 ⁻⁶ / K	50
Service temperature, long term	Average	°C	130
Service temperature, short term (max.)	Average	°C	200
Electrical Properties			
Surface resistivity	DIN EN 62631-3-2	Ω	10 ¹⁴
Volume resistivity	DIN EN 62631-3-1	Ω · cm	10 ¹⁴