NYLON (POLYAMIDE) PRODUCT CATALOGUE

Base resins: PA6, PA66, PA12. Filled grades: GF15–GF50, MoS_2, oil-filled. Data given at 23 °C, 50 % RH equilibrium (conditioned) and dry-as-moulded (DAM). Conditioned values reflect moisture saturation in air. DAM values represent performance immediately after processing.

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1. CUSTOM NYLON INJECTION PARTS

Moulded parts per customer geometry. Material selected to match mechanical, thermal, and chemical load.

Weight range per part: 0.2 g to 12 kg.

Mould steel cavity tolerance: ±0.05 mm (per ISO 2768-m for dimensions ≤100 mm).

Wall thickness minimum: 0.5 mm (PA66), 0.4 mm (PA12); maximum recommended: 4.0 mm uniform.

Injection pressure: 70–120 MPa.

Melt temperature window: 260–290 °C (PA66), 230–260 °C (PA6), 190–220 °C (PA12).

Representative mechanical data, PA66 GF30 (DAM): tensile strength 180 MPa, flexural modulus 8.0 GPa, Izod notched impact 10 kJ/m^2, HDT/A (1.82 MPa) 250 °C.

Flammability rating unreinforced grades: HB or V-2 (UL94, 0.8 mm). V-0 achievable with additive package.

Applications:

Engine-bay brackets, intake manifolds, and cooling-system housings (PA66 GF30, PA6 GF30).

Electrical connector bodies, coil bobbins, and circuit-breaker housings (PA66, V-2).

Pneumatic valve bodies and quick-coupling shells (PA12, PA6).

Structural frames for hand-held power tools and appliances.

Characteristics:

Dimensional growth from DAM to equilibrium 50 % RH: 0.5–0.6 % for PA66, 0.3–0.4 % for PA12.

Mould shrinkage PA66 GF30: 0.3–0.5 % in flow direction; tool design compensates.

Weld-line strength retained: ≥60 % of parent tensile (tested on GF30 grade).

Continuous use temperature: 85 °C (PA66 unreinforced), 120 °C (PA66 GF30 heat-stabilised).

Peak short-term: 180 °C.

2. NYLON ROLLER / BEARING SLEEVE

Cylindrical wear components. Machined from cast or extruded stock, or directly injection-moulded.

Outer diameter range: 8 mm to 300 mm.

Bore tolerance: H7 standard; H6 on request.

Stock material: PA6, PA66, PA6G (cast), PA6G-oil (proprietary lubricant dispersion).

Surface finish Ra achievable: 0.4–0.8 µm.

Typical PV limit, unlubricated against steel (0.2–0.4 m/s):

PA6: 0.10 MPa·m/s.

PA6G-oil: 0.25 MPa·m/s.

Dynamic friction coefficient (dry, vs. S355 steel): 0.15–0.30.

Compressive yield stress (PA6G, conditioned): 40 MPa.

Applications:

Guide rollers, tensioning pulleys, and cam followers in packaging lines.

Bearing sleeves in agricultural linkage pins and material-handling trolleys.

Sliding bushes in marine steering systems (low-noise, salt-water tolerance).

Impeller-shaft sleeves in chemical dosing pumps.

Characteristics:

Moisture-induced OD swell at 50 % RH vs. DAM: +0.2 mm on 50 mm diameter (PA6). Design clearance must allow this increase.

Operating temperature range: -30 °C to +85 °C (PA6), -30 °C to +100 °C (PA6G).

Sound damping: 5–8 dB(A) reduction compared to steel roller on same steel rail.

Oil-filled grade shows 40 % lower wear rate than unfilled PA6 in dry sliding (thrust washer test, 0.5 MPa, 0.3 m/s).

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3. NYLON NUTS & FASTENERS

Threaded parts in metric and inch series. Hex nuts, hex bolts, socket-head cap screws, washers, studs, and thumb nuts.

Thread size range: M2.5 to M36; UNC #4 to 1-1/4".

Material: PA66 (natural, black), PA12 (low-moisture grade), PA66 GF30 (high strength).

Density PA66: 1.14 g/cm³ (DAM).

Typical break load, PA66 hex bolt M10 × 1.5, 40 mm thread engagement:

DAM: 4200 N (tensile).

Conditioned 50 % RH: 2800 N.

Dielectric strength (PA66, 1 mm): 22 kV/mm.

Continuous service temperature: -40 °C to +85 °C (PA66, static load). Short-term peak 130 °C.

Torque for M10 PA66 nut on steel bolt: 4–6 N·m (prevents embedding); clamping force drop after 24 h relaxation ≈15 %.

Applications:

Electrical panel assembly where isolation from live parts is required.

Fastening in electroplating, pickling, and chemical etching tanks.

Medical-device housings and laboratory frames (non-autoclavable; steam cycles degrade PA66).

Lightweight structural joints in unmanned aerial vehicle frames.

Characteristics:

No galvanic corrosion; volume resistivity $>10^{13}$ Ω·cm.

Weight 85 % lower than steel fastener of equal nominal diameter.

PA12 fasteners absorb ≤1.2 % water at saturation; dimension change <0.2 %; suitable for controlled-humidity instruments.

Vibration loosening resistance: breakaway torque after 10^6 cycles on M6 joint ≈60 % of initial tightening torque (no locking compound).

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4. NYLON GEAR

Spur, helical, and worm gears. Produced by hobbing from rod/plate or by injection moulding.

Module range: 0.5, 0.8, 1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0.

Tooth width: 5–80 mm.

Pitch diameter up to 400 mm for machined gears; up to 180 mm for injection-moulded.

Material: PA66, PA66 GF30, PA6G cast, PA12.

Tooth root bending stress allowed (ISO 6336, continuous, oil-lubricated, 40 °C):

PA66 (conditioned): 18 MPa.

PA66 GF30 (conditioned): 28 MPa.

Hardness (ball indentation): 160 MPa (PA66).

Accuracy class: Q8–Q9 (AGMA) for machined; Q10–Q11 for moulded.

Applications:

Printers, copiers, and paper-handling mechanisms.

Food-processing actuators and conveyor-drive sprockets (PA6G, FDA-compliant grades available).

Window-lift actuators and sun-roof drives in vehicles.

Timing gears in low-load fractional-horsepower motors.

Characteristics:

Noise level reduction vs. steel gear pair: 4–9 dB(A) at 1000 rpm, 2 N·m load.

Zero-clearance running possible after short run-in (0.1–0.2 % tooth-thickness wear in first 10^3 cycles).

Pitch-line velocity limit, unlubricated: 3 m/s.

Moisture-induced pitch diameter change from DAM to 50 % RH: +0.2 %; gear centres require design clearance.

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5. NYLON ROD

Extruded and cast stock for machining.

Diameter: 5, 6, 8, 10, 12, 16, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100, 120, 150, 200, 250, 300 mm.

Length: 1000, 2000, 3000 mm. Diameters >150 mm only available as cast PA6G in 1000 mm.

Density:

Extruded PA66: 1.14 g/cm³.

Cast PA6G: 1.15–1.17 g/cm³.

Tensile yield strength, DAM:

PA66 extruded: 85 MPa.

PA6G cast: 80 MPa.

Tensile yield strength, conditioned 50 % RH:

PA66: 55 MPa.

PA6G: 50 MPa.

Modulus of elasticity in flexure, conditioned: 2.0 GPa (PA66), 2.4 GPa (PA6G).

Compressive stress at 10 % strain: 70 MPa (PA66).

Vicat softening point B/50: 200 °C (PA66), 205 °C (PA6G).

Applications:

Machined seals, bushing blocks, and slide rails.

Gear blanks before hobbing.

Insulating pillars and spacers in HV switchgear.

Chemical-tank float guides.

Characteristics:

Diameter tolerance: h9 (ISO 286). Straightness deviation ≤0.5 mm per 1000 mm.

No stress-corrosion cracking in hydrocarbons, oils, and chlorinated solvents.

Thermal expansion coefficient 9×10^{-5} /K (PA66, 0–60 °C).

Machining speed recommendation: 300–500 surface m/min with carbide tool; dry cut preferred.

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6. NYLON SHEET

Extruded and cast plate. Flatness critical for automated machining.

Thickness:

Extruded: 0.5, 0.8, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 8.0, 10.0 mm.

Cast: 6, 8, 10, 12, 15, 20, 25, 30, 40, 50, 60, 80, 100 mm.

Standard sheet size: 1000×2000 mm, 1220×2440 mm. 1500×3000 mm available in cast PA6G.

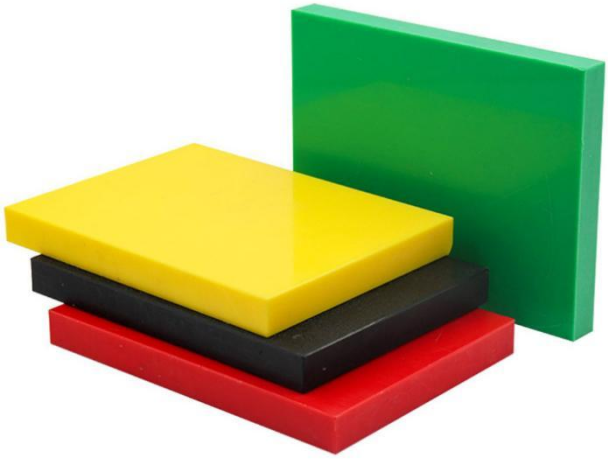
Density: 1.14 (extruded PA66), 1.16 g/cm^3 (cast PA6G).

Ball indentation hardness: 150 MPa (PA66), 170 MPa (PA6G).

Tensile yield, DAM (extruded PA66): 90 MPa.

Impact strength, Charpy unnotched, conditioned: no break (PA66), >250 kJ/m^2.

Dielectric strength (1.0 mm): 20 kV/mm.



Applications:

Wear strips, chain guides, and sliding-table liners.

Star wheels and cams in filling machines.

Insulating base plates in switchboards and transformer assembly.

Prototype parts and short-run functional components via machining.

Characteristics:

Flatness tolerance: 0.5 mm over 1000 mm for cast plate. Warpage after single-side machining ≤0.2 mm per 300 mm length.

Moisture absorption at saturation (23 °C water): 8–9 % (PA66) causes thickness increase ≈2.5 %. Pre-conditioning recommended before finish machining.

Colour available: natural (off-white), black, blue. Black grade contains carbon black for UV resistance.

Service temperature upper limit: 100 °C (cast PA6G continuous), 150 °C short peaks (<1 h).

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7. NYLON TUBE

Extruded mono-layer tube. Standard OD series for pneumatic, fuel, and hydraulic return lines.

OD range: 4.0, 6.0, 8.0, 10.0, 12.0, 15.0, 18.0, 22.0, 28.0 mm.

Wall thickness options: 1.0, 1.5, 2.0, 2.5, 3.0 mm.

Material:

PA12: low-moisture absorption (0.8 % at saturation 23 °C water).

PA6/66 co-polyamide: higher strength, cost-optimised.

Burst pressure at 23 °C (PA12, 6 mm OD × 1.0 mm WT): >4.0 MPa.

Operating temperature:

PA12: -40 °C to +90 °C (air), max 50 °C (water/glycol).

Bend radius minimum without kink: 3× OD for PA12, 4× OD for PA6.

Tensile strength longitudinal: 45 MPa (PA12, conditioned).

Applications:

Truck air-brake tubing (PA12, per SAE J844).

Fuel vapour and liquid fuel lines in small engines (PA12).

Hydraulic oil return and lubrication lines (PA12, PA6).

Protective conduit for fibre-optic bundles in industrial machinery.

Characteristics:

Dimensional change after 168 h in 50/50 water-glycol at 60 °C: ≤1.0 % OD.

Oxygen index: 24–26 % (self-extinguishing in vertical wire test, thin wall).

Burst retention after 1000 h thermal ageing at 100 °C: ≥80 % (PA12).

UV-stabilised black grades available for outdoor routing; exposed life >5 years (Florida-equivalent weathering).