Nylon 12 Plus
Technical Data Sheet

HIGHEST RATED FILAMENT ON AMAZON
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Description:

rigid.ink Nylon 12 Plus is the structurally-advanced version of our ever-popular Nylon 12.

It contains microscopic glass bubbles that enhance the rigidity of our standard Nylon 12 while still retaining the strength and durability across a wide range of temperatures whilst maintaining that all important very low coefficient of friction (COF).

It is chemical resistant and insensitive to stress cracking.

rigid.ink Nylon 12 Plus blend has an increased resistance to chemical and thermal influences when compared to the more common grades such as Nylon 6.

Suitable for dyeing.

Applications:

End-use parts, gears, bearings, etc., where larger compressive force resistance is required than provided by our normal Nylon 12. Structural supports.

Recommended Print Settings:

Printing Temps 1.75mm	255-270°C
Printing Temps 2.85mm	260-275°C
Heated Bed Temp	100-110°C
Cooling Fans	Off (can be very low for intricate parts ⩽10%)
Ideal Build Volume	Fully enclosed. Volume heated to 90°C if possible
Extrusion Multiplier	x1.0 (100%)
Retraction (direct drive)	Try 2mm as a starting point at 20-30mm/s
Retraction (bowden feed)	Varies per printer, as above, but try 4mm as a starting point
Annealing Process	130-140°C for ~2 hours. Allow to cool slowly.

Print Speed Advisory	None
Print Surface Advisory	Do not 'squish' first layer when printing onto phenolic resin surfaces such as Tufnol. May cause heat damage (melting) to bed materials such as BuildTak when printed at the higher end of the range.
Print Layer Advisory	Print layers as thin as possible (<0.2mm/200µm) so as to keep interlayer distortional stresses to a minimum
Moisture Advisory:	All nylon filaments are extremely sensitive to moisture, so it is important to keep it dry as dry as possible.

General Advice:

Start at the low end of the temperature range and increase if needed for faster print speeds.

Hotter print temperatures give stronger objects by increasing layer bonding, but at the expense of increased object warping.

Keep draughts to a minimum. Consider placing printers that have an unenclosed build volume inside a closed box to help retain heat in the printed object during printing.

Material Properties:

Physical Properties (1)	Value
Density	1.25g/cm^3
Glass Transition Temperature	95-105°C
Melting Temperature	178°C
Annealing Temperature	130-140°C
Annealing Time	~2 hours
Heat Deflection Temperature (2)	170°C
Heat Deflection Temperature (3)	130°C
Vicat Softening Point	170°C
Tensile Strength, Yield	69.0 MPa / 10000psi

(1) NOT to be construed as specifications (2) @0.5MPa (3) @1.8MPa

Strengths:

Even stronger and more durable than our excellent Nylon 12.

Very low coefficient of friction.

Ideal for mechanical parts.

Compatible with most printers that are >255°C-rated, and have a heated bed (an enclosed, heated build volume is highly recommended for all nylon materials).

Can be dyed with nylon dyes.

May be annealed to further improve characteristics such as the Heat Deflection Temperature.

Weaknesses:

Hard to print without warping onto an unheated bed.

Difficult to print in a draughty environment.

Printing layers too thickly and/or too hot can cause excessive warping leading to inter-layer delamination and tearing.

Very hygroscopic – the filament will readily absorb atmospheric moisture as soon as it is removed from its sealed storage container (keep in sealed container with a desiccant when not in use) - it may be necessary to dry the filament before each use.

Releases nanoparticles of plastic and glass when printed.

Can be denatured by exposure to strong ultraviolet radiation (sunlight).

Damaged by exposure to strong acids.

Unhardened nozzles (such as brass) will experience accelerated wear during extrusion.

Other Info:

A full reel can be dried at 60-80°C for 6-10 hours in a temperature-controlled air dryer.

ALWAYS store in an airtight container with fresh desiccant when not in use and return the filament to the container the instant you have finished with it.

Print Surface Materials:

The use of a heated bed is essential in order to reduce the chances of warping.

Bed surfaces must be kept clean with the appropriate cleaning fluid/solvent in order to obtain reliable adhesion.

Adheres well Kapton Tape (Polyimide film) and extremely well to phenolic resin such as Tufnol.

Best bed adhesion - may adhere to phenolic resin surfaces (Tufnol) to the point of destruction of the surface if first layer is 'squished' into bed material.

Acceptable results can sometimes be obtained when using PVA glue onto a bed surface at temperatures of 70-80°C. However, warping is usually more pronounced.

Other methods of securing a print include Extra-Hold vinyl-based hairspray, glue sticks, ABS slurry, and so on.

3DLAC will work on thin parts, but is not that great for keeping nylon parts in place.

There is anecdotal evidence that "Wolfbite Nitro" bed adhesive works well with rigid.ink Nylon 12 on a glass plate heated to 60-80°C.

Does not stick at all well to PEI without the addition of bed surface treatments – coatings, glues, etc.

Some aftermarket bed materials (such as BuildTak) may suffer heat damage when printed at the higher end of the printing temperature range, so please keep this in mind if using this kind of surface.
