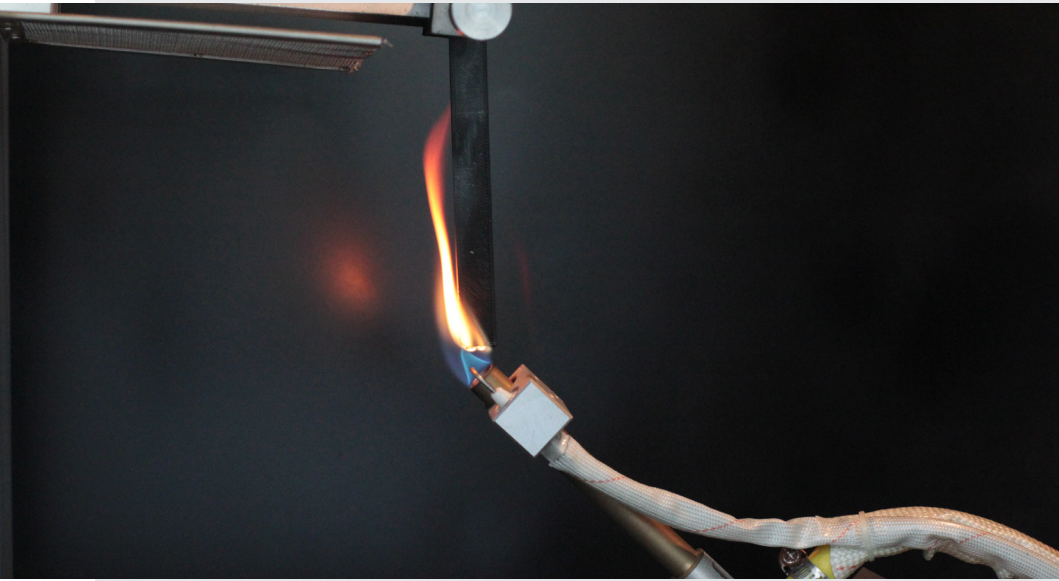
PolyMax™ PC-FR



Industrial

For other languages, please visit
www.polymaker.com

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Printing with PolyMax™ PC-FR

PolyMax™ PC-FR

PolyMax™ PC-FR is a flame retardant PC filament (UL94V-0/1.5 mm) displaying excellent toughness, strength and heat resistance. This filament opens new applications in the automotive, railway and aerospace industries.

Printing settings

Nozzle Temperature:	250-270 ˚C
Bed Temperature:	90-105 ˚C
Chamber Temperature:	90-100 ˚C
Printing Speed:	30-50 mm/s
Cooling Fan:	OFF

Note: Settings are based on 0.4 mm nozzle, and may vary with different printers and nozzle diameters.

Bed surface

PolyMax™ PC-FR can be printed on almost any surface with a thin coat of Magigoo PC. We recommend a flex plate to facilitate the removal of the model from the plate.

High temperature conditions

We recommend a full metal hot end that can maintain a stable temperature of at least 260˚C. We also recommend to use a heated chamber capable of reaching at least 80˚C.

Annealing PolyMax™ PC-FR parts

We recommend annealing all models printed in PolyMax™ PC-FR. This allows users to take full advantage of the mechanical and thermal properties.

The annealing process consists of putting the model in an oven at 100 ˚C for 2 hours.

Support material

PolyDissolve™ S2 is the recommended support material for PolyMax™ PC-FR.

For more information, please visit
www.polymaker.com

PCP: Profile Creation Process

The profile creation process (PCP) allows users to rapidly develop a printing profile for a given material/printer. It is important to consider all of these factors to build a profile.

Geometry
Material
Printer
Environment
Purpose

Polymaker came up with a process which allows you to build your own profile considering the material, printer and environment. This base profile will then be used to create the custom profile taken in account the model geometry and purpose. Indeed the process is also designed to let you learn more about the 3D printing process and therefore give you the skills and knowledge to troubleshoot your prints.

The PCP is available on www.polymaker.com

The PCP is divided in 5 steps:

It uses less than 300g of materials and less than 7h of working time.

Step 1: Extrusion Flow
Step 2: Flow Management
Step 3: Cooling Fan
Step 4: Warpage
Step 5: Fine Details

Each of these steps has a specific objective and introduce an important concept about the FFF 3D printing process. Each step will also give you the possibility to push your test further for more accurate results.

Polymaker PC materials

	Specialty	Specialty	PolyMax™	PolyMax™	PolyLite™
	PC-ABS	PC-PBT	PC-FR	PC	PC
Young's modulus (MPa)	1832	1986	2634	2048	2307
Tensile strength (MPa)	39.9	41.8	67	59.7	62.7
Elongation at break (%)	4.2	4.6	3.9	12.2	3.2
Bending modulus (MPa)	2081	1933	2518	2044	2477
Bending strength (MPa)	66.3	64.4	96.6	94.1	100.4
Charpy impact strength (kJ/m^2)	25.8	21.4	11.7*	25.1	3.4

*The flame retardant will significantly reduce the toughness of the raw PC material, Polymaker found the right balance between the mechanical properties and the flame retardant performance.

Note: Tested with 3D printed specimens.

PolyMax™ PC-FR

"FR" stands for Flame Retardant which refers to the substance added to PolyMax™ PC-FR to prevent fires from spreading.

UL 94 is a plastics flammability standard used to measure the material's tendency to either extinguish or spread the flame once the specimen has been ignited.

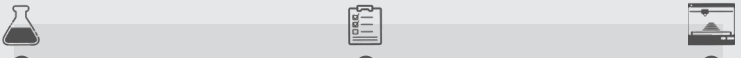
PolyMax™ PC-FR satisfies UL 94 with the highest grading "V-0"

Sample thickness 1.5mm:	Sample 1: 6.3s/12.4s
	Sample 2: 9.3s/10.6s
	Sample 3: 6.0s/7.9s
longest single burning time/ total burning time	Sample 4: 4.7s/6.6s
	Sample 5: 3.4s/4.8s

1) None of the five samples can have flaming combustion for more than 10 seconds after each of two 10-second flame applications.
2) Total flaming combustion time for 5 samples may not exceed 50 seconds.
3) None of the five samples may burn with flaming or glowing combustion up to the holding clamp.
4) None of the five samples may drip flaming particles which ignite dry absorbent cotton located 305mm below the sample.
5) None of the five samples may have glowing combustion which persists for more than 30 seconds after the second removal of the flame.

Material Development

If your application requires a specific material that is not yet available in the market, consider our custom development service. With our talented material scientists and application engineers, we are ready to develop the needed material to enable your unique application.



Material development

-Twin-screw compounding
-Single-screw extrusion
-Torque rheometry
-Wet chemistry
-Other polymer processing equipment

Testing and characterization

-Thermal characterization (DSC, softening point)
-Mechanical testing (tensile, 3-point bending)
-Optical microscopy
-Capillary rheometry
-FTIR-ATR

3D Printing

-3D printing
-Post-processing
-Application development

Our state-of-the art R&D facilities, allow us to engineer materials at different levels and fully optimize them for 3D printing. Our goal is to deliver materials with right combination of properties/functions, processability and form to suit your needs!

Application

Processability technologies

Printing thechnologies
Post-processing
Other

Properties & functions

Mechanical
Thermal
Electrical
Other

Form

Pellet
Filament
Powder
Other

Polymaker products

PolyLite™

PLA
PETG
ABS
PC
ASA

PolyMax™

PLA
PETG
PC
⚙ PC-FR

PolyFlex™

TPU95

PolyMide™

CoPA
⚙ PA6-CF
⚙ PA6-GF

PolyDissolve™

S1
S2

Specialty

PolyWood™
PolySmooth™
PolySupport™
PolyCast™
⚙ Polymaker™ PC-PBT
⚙ Polymaker™ PC-ABS

Hardware

PolyBox™
Polysher™

More products coming soon...

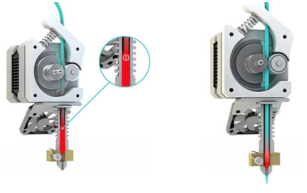
Industrial range: ⚙

Technologies

JAM-FREE™

Regular PLA

With Jam-Free™



ASH-FREE™

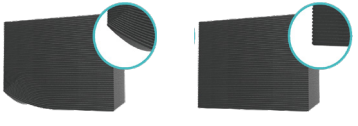
Without Ash-Free™
Ash content: 0.5%

With Ash-Free™
Ash content: 0.003%

WARP-FREE™

Regular Nylon

With Warp-Free™



STABILIZED FOAMING™

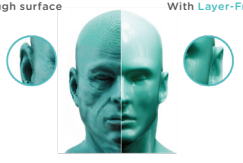
Wood

Stabilized Foaming™

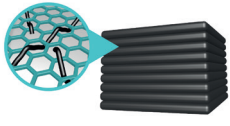
LAYER-FREE™

Rough surface

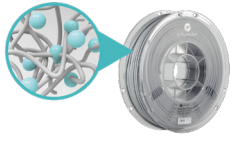
With Layer-Free™



FIBER ADHESION™



NANO-REINFORCEMENT



About Polymaker

Our Values

Customer Oriented

Responsible

Entrepreneurial

Embracing Innovation

Mission

Polymaker is committed to lowering the barriers to innovation and manufacturing, by continuously developing advanced 3D printing material technologies for industries and consumers.

Contact us

For any inquiries please contact:

inquiry@polymaker.com

For technical support please contact:

support@polymaker.com

The information provided in this document is intended to serve as basic guidelines on how particular product can be used. Users can adjust the printing conditions based on their needs and actual situations. It is normal for the product to be used outside of the recommended ranges of conditions. Each user is responsible for determining the safety, lawfulness, technical suitability, and disposal/recycling practices of Polymaker materials for the intended application. Polymaker makes no warranty of any kind, unless announced separately, to the fitness for any particular use or application. Polymaker shall not be made liable for any damage, injury or loss induced from the use of Polymaker materials in any particular application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