



DUPONT™ GF ZYTEL® 3D12G30FL BK309 AND CF ZYTEL® 3D10C20FL BK544 HANDLING AND PRINTING GUIDE (PRELIMINARY)

DuPont™ GF Zytel® 3D12G30FL BK309 and CF Zytel® 3D10C20FL BK544 are high-performance materials for 3D printing. They are, respectively, glass-filled and carbon-filled polyamide materials in filament form for fused filament fabrication compatible with a variety of printers in a variety of configurations.

Recommended Printing and Drying Conditions

Variable	Recommendation
Nozzle Temperature	265-320°C: Start at 275°C and increase or decrease the temperature by 5°C until the desired adhesion and mechanical strength are established.
Bed Treatment and Temperature	25°C; 85-110°C: Treating the bed with a PEI adhesive layer enables the use of a room temperature bed for some builds. For surfaces other than PEI and for minimizing warpage, start at 85°C and increase by 5°C until the desired adhesion is established. Treatment of the bed with washable glue stick aids adhesion and release. To facilitate release from the build surface, re-heat the bed to 70-85 °C before removing the printed part.
Percent Flow and Feeding	85-115%: Start at 100% flow. A lower percent flow can aid the printing of fine details and/or dimensional accuracy. If under-extrusion occurs, increase the percent flow. Delivering the filament to the hot-end through a guide tube helps maintain a consistent feeding and flow and protects the filament from bending or snapping.
Printing Speed	15-45 mm/sec: Start at 30 mm/sec and adjust according to desired print quality, time, etc. If under-extrusion occurs, try lowering the speed.
Cooling Fan	0-15%: Minimal use of a fan is recommended due to the potential for delamination and warpage with cooling. Start at 0% and increase up to 15% if improvements in bridging quality and resolution are needed.
Extruder and Nozzles	Compatible with direct- and indirect-drive extruders. Hardened nozzles and drive wheels are highly recommended. Nozzle sizes as small as 0.35 mm have successfully been used with these filaments. If under-extrusion occurs, try increasing the tension on the drive wheels and/or increasing the nozzle diameter to at least 0.5 mm.
Drying Conditions	The filament is packaged dry and can be used for printing without additional drying. If the filament becomes wet, drying is required. 80-90°C: Dry at 80-90°C under vacuum for 12 h or at 80°C in a hot air oven for at least 4 h. Store in a sealed container with fresh desiccant. Use a dry feeding system for longer prints and when printing in humid environments.
Retraction Distance and Speed	1.0 - 1.5 mm at 20 - 30 mm/sec for direct-drive extruders 2.5 - 7 mm at 30 - 35 mm/sec for indirect-drive extruders Start at the lower distances and speeds. If stringing or oozing occurs, increase the retraction distance and/or speed to optimize the printing quality.
Support Materials	These materials have successfully been used as support materials for themselves. For easy removal of the support, select 15% infill, an x/y distance of 0.7 mm or greater and a z distance of 0.15 mm or greater.

Recommendations are based on testing with direct- and indirect-drive Cartesian 3D printers with nozzle sizes varying from 0.35 mm to 0.6 mm.

Material Handling: Zytel® 3D12G30FL and Zytel® 3D10C20FL are vacuum-packaged together with desiccant using moisture-resistant packaging. The supplied packaging should be kept sealed prior to using the filament in order to prevent moisture and dust pick-up. Immediately after printing, place the unused filament back in the original packaging together with the desiccant, resealing the bag. If the filament becomes wet, dry it according to the recommendations given in the table. To prevent moisture pick-up by the filament during long prints, commercial or home-made drying and feeding systems are useful.

Safety: Consult the SDS for the safety properties of the material. Molten material and hot surfaces can cause thermal burns. Therefore, wear personal protective equipment for the hands, eyes, and body. Due to the potentially rough and abrasive surface of materials filled with glass and/or carbon fiber, cut-resistant gloves are recommended when handling the filament and printed parts.

Printing Guidelines:

- Different printers, slicing and/or printing configurations, ambient environments, etc. may give different results. Always consult your printer's manual and follow the recommendations of your filament provider.
- Clean the nozzle surface prior to printing to prevent pick-up of dirt from the nozzle.
- Extrude some material through the nozzle prior to initial printing and following production breaks.
- Remove the filament from the machine prior to shutting down the printer.

Troubleshooting:

- If the printed part has a rough surface, check if the nozzle is worn. If the nozzle is worn, replace it. Always use a hardened nozzle. If the nozzle is not worn, try drying the filament and consider using a dry feeding system for longer prints and if the environment is humid.
- During material purging, if the strand does not exit the nozzle at a steady speed or if the diameter of the strand is too thin, try increasing the hot-end temperature, reducing the printing speed, increasing the tension on the drive wheels, and/or increasing the nozzle diameter. Make sure that the filament is being fed through a guide tube.
- If filament grinding or jamming occurs, retract and remove the filament, cut off the part that is deformed and restart. Reduce the printing speed, raise the hot-end temperature, decrease the retraction speed, lessen the retraction distance, decrease the tension on the drive wheels, and/or make sure that the filament is being fed through a guide tube.
- If stringing/oozing of the filament occurs, decrease the temperature of the hot-end, lengthen the retraction distance and/or raise the retraction speed.
- If warping occurs, add a brim around the printed part.

Visit us at www.3DPrintingSolutions.DuPont.com

Contact DuPont at the following regional locations:

North America
+1-302-999-4592

Latin America
+0800 17 17 15

Europe, Middle East, Africa
+41 22 717 51 11

Greater China
+86-400-8851-888

Japan
+81-3-5521-8600

ASEAN
+65 6586 3688

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Revised: 2018-11-05

