

DUPONT™ SURLYN® 3D7000FL NC010

HANDLING AND PRINTING GUIDE

DuPont™ Surlyn® 3D7000FL NC010 is a high performance material for 3D printing. It is an ionomer material in filament form for fused filament fabrication. It is capable of being printed on a variety of printers in a variety of configurations.

Recommended Printing and Drying Conditions

Variable	Recommendation
Nozzle Temperature	185-270°C: Start at 240°C and increase or decrease the temperature by 5°C until the desired adhesion, print quality and mechanical strength are established. With dry filament, 230 - 240°C is the recommended printing temperature range.
Bed Treatment and Temperature	25-60°C: Start at 25°C and increase the temperature by 5°C until the desired adhesion is established. Exhibits excellent adhesion to a variety of surfaces. Treating the bed with a PEI adhesive layer enables the use of a room temperature bed for a number of printers and builds, and treatment of the bed with glue stick aids adhesion and release. To facilitate release from the build surface, heat the bed to 60°C before removing the printed part.
Percent Flow	80-120%: A lower percent flow is recommended for fine details and/or dimensional accuracy. A higher percent flow is useful for increasing the transparency of the printed part.
Printing Speed and # Shells	15-60 mm/sec: Start at 30 mm/sec and adjust according to the desired print quality, time, etc. For enhanced dimensional accuracy recommend using 1 shell or perimeter. For preventing the curling up of edges and the subsequent adhesion of plastic to the nozzle and creation of dark specks in the print, recommend using 1 shell or perimeter, a layer-height/nozzle-size ratio of at least 0.7, and/or printing multiple parts at once.
Cooling Fan	100% after printing the first few layers. Turn the cooling fan off while printing the first layer to promote adhesion to the bed.
Extruder	Compatible with direct- and indirect-drive extruders, with direct-drive recommended.
Drying Conditions	55°C: Dry at 55°C under vacuum for 24 h or at 55°C in a hot air oven for at least 4 h. Store in a sealed container with desiccant. Use a room-temperature, dry-feeding system for longer prints and when printing in humid environments.
Retraction Distance and Speed	1 mm at 10 mm/sec for direct-drive extruders 2.5 mm at 30 mm/sec for indirect-drive extruders If stringing or oozing occurs, increase the retraction distance and/or speed in order to optimize the printing quality.
Bridging	Due to excellent bridging properties, support material is often not necessary. Surlyn® 3D7000FL has successfully been used as a support material for itself. For easy removal of the support, select 15% line-infill, an x/y distance of 1 mm and a z distance of 0.25 mm. The support material can often be easily removed in a large piece simply by grasping and twisting the material with a needle-nose pliers.

Recommendations are based on testing DuPont Surlyn® 3D7000FL on direct- and indirect-drive Cartesian 3D printers with nozzle sizes varying from 0.35 mm to 0.6 mm.

Material Handling: Surlyn® 3D7000FL is 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 with tape (e.g., duct tape). 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, room-temperature dry-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.

Printing Guidelines:

- Surlyn® 3D7000FL is capable of being printed on a variety of printers in a variety of configurations. Different printers, slicing and/or printing configurations, test conditions, ambient environments, etc. may give different results. Always consult your printer's manual.
- Clean the nozzle surface prior to printing to prevent pick-up of material from the nozzle.
- Extrude some filament through the nozzle prior to initial printing and following production breaks. When printing the first layer, make sure that the nozzle is not so close to the bed that filament extrusion is hindered or prevented.
- Remove the filament from the machine prior to shutting down the printer.

Troubleshooting:

- If the printed part has a rough surface, if a popping or hissing noise occurs while printing, and/or if the lines pull in while printing, dry the filament and use a dry-feeding system for longer prints and if the environment is humid.
- If the diameter of the strand is too thin during material purging, try increasing the hot-end temperature and/or reducing the printing speed.
- If filament grinding or jamming occurs, retract and remove the filament, cut off the part that is deformed and restart. Reduce the print speed and/or decrease the retraction speed/distance.
- If stringing/oozing of the filament occurs, lengthen the retraction distance and/or raise the retraction speed.
- If black specks occur on the printed part, make sure that the nozzle surface is clean prior to initializing the print. Try using one shell/perimeter. Use a layer-height/nozzle-size ratio of at least 0.7. Consider lowering the percent flow, re-orienting the part on the bed, using support structures, and/or printing multiple parts at once.
- If extrusion is sporadic or stops while printing the first layer, make sure that the nozzle is not too close to the bed.

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