



Part geometry courtesy of Alstom

Kimya PC-FR

Part Numbers

Filament Canisters

355-70010	PC-FR, 92.3 cu. in. – Fortus Plus
355-03120	SR-100™ Soluble Support, 92.3 cu. in. – Fortus Plus

Printer Consumables

511-10401	T16 tip
511-10100	T12 SR-100 tip
325-00100	Low temperature build sheet, 0.02 x 16 x 18.5 in. (0.51 x 406 x 470 mm)

Machine is a Fortus 450mc with hardened components.

Description of Kimya PC-FR

Kimya PC-FR is a polycarbonate (PC) based material with flame-retardant properties that was developed specifically for additive manufacturing. It retains the beneficial characteristics of standard polycarbonate such as dimensional stability, high glass transition temperature and high impact resistance but also meets railway fire safety standards EN 45545-2 and NFPA 130.

Key Attributes

- Flame-resistant material
- Electrical insulator
- Good dimensional stability
- Meets or exceeds the mechanical performance of Stratasys PC material
- Compatible with soluble support
- Meets EN 45545-2 and NFPA 130 standards
- Slice heights: 10

Primary Applications

- Passenger and commercial rail – replacement of obsolete parts

Challenges customers have with current solutions:

- Long lead times and availability, especially for replacement of obsolete parts
- Cost of existing FST additive manufacturing materials

Benefits of Kimya PC-FR on the Fortus 450mc™

- FST: Lower-cost flame retardant material
- Performance: Meets or exceeds mechanical performance of standard PC
- Design flexibility: Paired with a soluble support

Printing Challenges and Tips

Kimya PC-FR is a Stratasys Validated Material. Validated materials are developed by Stratasys or a third-party provider, meet Stratasys quality standards, and have received basic reliability testing for use with Stratasys FDM® printers. They also undergo a less extensive tuning and testing process than a Stratasys Preferred Material. More extensive tuning would help compensate for difficult printing geometries or conditions. To better prepare the user for what the build experience may include, this section outlines tips and known difficulties with this material.

- Support-to-model adhesion is lower than other materials. This can be mitigated with more robust support structures, such as using basic or surround supports and increasing the self-supporting angle. The best tested support structure was basic supports with 'Grow supports' set at 'All' and the 'Support growth angle' set at 5° support grow angle. (This is the default support structure in Insight™ software.)
- Warp can be a concern on printers that run on the warmer side. Curl can be a concern on machines that run on the cool side. Thin-wall and brick mode can be utilized to help compensate for these concerns.
- Seams may be a bit rougher, particularly resulting in some open seams on posts, and poor contour printing within holes.
- Part print time is longer than most Stratasys materials due to slower print speed and higher support material usage.
- The model tip life is set to 1008 in³. For a validated material, the tip life was tested to 185 in³ and from prior experience with similar materials, the tip is anticipated, but not guaranteed, to print well until the tip life is reached.