How to seal a 3D printed mold for casting

Asked 3D Content Team
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Abstract. Brush a cured coat of XTC-3D epoxy over the cavity, then the release agent your casting maker names. Test platinum silicone on a sealed scrap: it can stay tacky.

Keywords: pla, petg

Table 1. Sealer and release agent by casting material

Casting material	Seal the print with	Release agent	Cure-inhibition risk	Maker's document
Platinum-cure silicone, such as Mold Star	XTC-3D, cured until a fingernail cannot dent it	Ease Release 200	High: newly cast epoxy, urethane rubber, tin-cure silicone, latex and sulfur clays inhibit it	Smooth-On sealer guide; Mold Star 15, 16 and 30 bulletin
Tin-cure silicone, such as OOMOO	XTC-3D	Ease Release 200	Low: Smooth-On names sulfur clays and latex	Smooth-On sealer guide; OOMOO 25 and 30 bulletin
Urethane casting resin, such as Smooth-Cast 300	XTC-3D	Universal Mold Release or Ease Release 200, dried 30 minutes	None listed; the mixed resin passes 100 °C (212 °F)	Smooth-Cast 300 Series bulletin
Epoxy casting resin	XTC-3D	Ease Release 205, dried 10 minutes	None listed	Ease Release 205 data sheet

1 How do you seal a 3D printed mold for casting?

Brush a thin coat of print sealer, such as Smooth-On's XTC-3D epoxy, over every cavity surface and let it cure fully. Then apply the release agent your casting material's maker names: Ease Release 200 for silicone, Universal Mold Release or Ease Release 200 for urethane resin. Before a platinum-cure silicone pour, test a patch on a sealed scrap.

1.1 Sealer and release agent by casting material

Smooth-On's Sealer and Release Agent Reference Guide lists XTC-3D, then Ease Release 200, for "3D Print Media (FDM, ABS, PLA, etc.)" under every silicone; the release agents in the resin rows come from each product's own sheet. The guide does not pair XTC-3D with resin casting, so the sealer in those two rows rests on the XTC-3D bulletin's general claim that it fills print striations. Smooth-On's AquaCon concrete release names rubber molds, melamine, metal and sealed wood but not printed plastic. Run the release test below before a concrete pour.

1.2 Why seal the layer lines first?

Liquid casting material copies every groove between the layers. Prusa Research says print layers "will be visible on the final cast", and Formlabs says FDM (fused deposition modeling) molds leave "visible impressions of printer layer lines". A rigid casting that fills the grooves then has to slide out past every ridge. XTC-3D "fills in 3D print striations", according to its bulletin.

The sealer does not replace the release agent: Smooth-On says mold rubbers "will adhere to cured XTC-3D". Put release on every surface the casting touches, parting faces included. Prusa warns the halves stick together otherwise. For the brush-on method, see how to seal 3D prints with epoxy.

1.3 Why does platinum silicone stay tacky on a print?

Platinum-cure silicone stops curing on contact with certain chemicals. Smooth-On's Mold Star bulletin describes the result as "tackiness at the pattern interface or a total lack of cure throughout the mold". Its list of causes includes newly cast epoxy, so let the XTC-3D coat cure fully. Latex is on it too, so wear vinyl gloves.

Resin (SLA, stereolithography) printed molds add a risk: Smooth-On says they inhibit platinum silicone unless UV cured for at least 6 hours, rotated. It also says tin-cure silicone is "far less likely to be inhibited".

1.4 Will the casting heat soften a PLA mold?

Fast urethane can. Smooth-On says mixed Smooth-Cast 300 passes 100 °C (212 °F) and heavy castings come out hot. Prusa Research says PLA (polylactic acid) deforms above 60 °C (140 °F) and rates PETG (glycol-modified PET) for use below 80 °C (176 °F). Test the full casting thickness in a scrap mold first. For silicone, skip the 60 °C heat cure Smooth-On offers for Mold Star 16: that is where PLA starts to deform.

1.5 How to check it before the real pour

1. **Make a test piece.** Print a small offcut in the same filament. Seal it and apply release exactly as on the

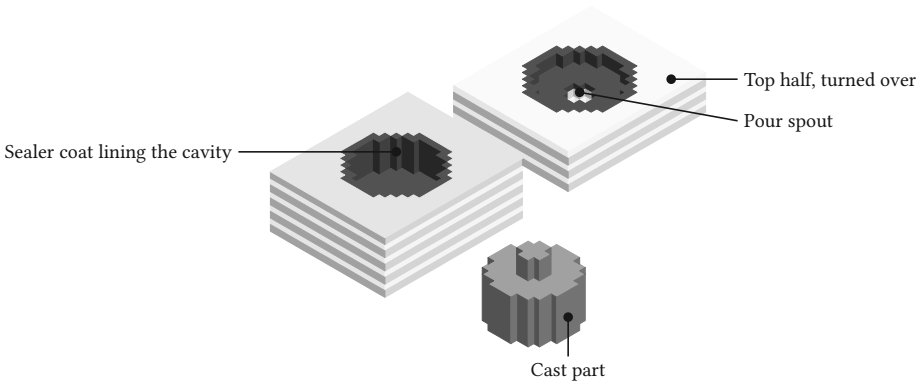


Figure 1. The sealer coat lines the cavity in both halves, so the casting copies a smooth surface instead of the layer lines.

mold. Smooth-On says not to wipe it with alcohol before silicone.

2. **Run an inhibition patch** for platinum silicone. Pour a little onto the scrap and wait the bulletin's full cure time: 4 hours for Mold Star 15 SLOW, 6 for Mold Star 30, at 73 °F (23 °C). Gummy or uncured rubber means inhibition.
3. **Run a release test.** Cast a small sample into the scrap and demold it. If it sticks, reapply Smooth-On's way: light mist, brush over the detail, second mist, let dry.
4. **If the patch stays tacky,** let the sealer dry longer and retest. If it still fails, switch to tin-cure silicone or try Smooth-On's Inhibit X, made for platinum silicone only.

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