



Material Processing Guide

LOCTITE® 3D 3955 FST

by Henkel

3955 is a halogen free, high performance material with high heat resistance. 3955 material meets UL94 V-0 flammability standards. Parts printed in this material showcase an outstanding surface finish and meets many tight design tolerances.

FEATURE CAPABILITIES

3955 has good green strength with moderate stiffness. Prints can achieve the following qualities without distortion:

Color	Black
Maximum unsupported overhang length	2.5 mm
Maximum span length	13.0 mm
Minimum unsupported overhang angle	15°
Minimum vertical wire diameter:	
• 1mm height	0.5 mm
• 3mm height	0.5 mm
• 5mm height	0.5 mm
Minimum unsupported wall thickness:	
• 5mm height	0.5 mm
• 10mm height	0.5 mm
Minimum hole diameter in z	1.0 mm
Minimum hole diameter in xy	1.0 mm

PRE-PRINT

Support considerations

- The contact point diameter for supports should range from 0.3-0.6; 0.4mm is typical.
- Contact point spacing of 1.5-2.5mm is typical for flat downward facing surfaces. Tighter spacing is useful for flat surfaces, angled surfaces can tolerate wider spacing.
- Supports should be designed with adequate thickness and/or structure to ensure they remain rigid and intact during the print process.
- Tall parts need support structures that are more robust to prevent movement of the part as it grows taller while the build head is moving.
- Support contact points should be large enough so they can sustain the weight of the part and the dynamics of the print process, but always as small as possible to leave the smallest support marks.
- There are many support structures that work well, including bar/tree supports, lattice structures, polylines/fences, and volume supports.
- The optimal support design and type(s) for each print are dependent on part geometry and size.

Printer Preparation

- Use Origin printer UI to set the printer to print at 60 °C as 3955 requires a constant heated environment for printing and post-print.

Software Print Job Preparation

- Use validated material profile for 3955 on the Origin Web App.
- For parts with large cross sections or layers consider the following:
 - Reducing 1st layer exposure time.
 - Incorporate a single layer full build area base into your print/design
- Create a stable support structure (if required) to reduce possibility of layer shifting.

Resin Preparation

- Remove the cap from container, save for re-use.
- WARNING: do not heat resin container with lid or seal still attached.
- Melt resin in oven at 80 °C until fully liquified, approximately 4 hours
- Remove the heated container of resin from the oven using insulated gloves.
- Before printing, inspect for any un-melted resin chunks by stirring with a silicone spatula in the tray. If present, filter heated resin before putting into the tray.
- Pour the melted resin directly into the printer tray and begin the heated print.

POST-PROCESSING

Step One: Part Removal

- With 30 minutes remaining in your print, pre-heat sonicator with Cleaner T to 60 °C
- Allow the completed print to remain on the build head in build chamber with door closed for 15 minutes to allow excess resin to drip off the part. This makes it easier to clean the part.
- WARNING: Use caution when handling the build head as it will be very hot to the touch. Use insulated gloves to handle the heated build head when removing it from the printer.
- Carefully scrape parts off the build head using flat blade tool. 3955 can be fragile in the green state.
 - If parts have fine features or thin walls, considering sonicating with the parts still attached to the build plate. The parts may detach on their own, but will be easier to remove and clean.
- By setting the chamber and glass heater temperature to 60 °C before starting the print, the printer will remain at 60 °C after the print completes.

- Depending on the support structure, it may be easier to remove supports before cleaning or after. Removing before cleaning will extend the life of the solvent .

Step Two: Cleaning Step + UV Post-Cure

Cleaning step:

- Place parts into pre-heated sonicator (60°) with dirty/ used Cleaner T and run a 2-minute cycle.
- Remove parts from solvent and dry with compressed air and inspect parts for residual resin.
- Place parts into pre-heated sonicator with clean Cleaner T and run a 2-minute cycle.
- Remove parts and dry with compressed air and inspect parts for residual resin. If part is not fully clean, repeat second sonication bath with clean Cleaner T.
- When parts are fully cleaned, you can briefly rinse part using squirt bottle of acetone to accelerate Cleaner T evaporation.
- Set fully dry parts aside for 60 minutes before starting thermal post cure to evaporate any residual solvent.
- UV Curing. Post-cure the part in a Dymax ECE 5000, Shelf I, for 60 seconds per side

Step Three: Thermal Cure in Oven

- For thin flat parts, it is recommended to add a weight on top of the part for thermal post cure to limit warping. You can also consider leaving supports on for post curing, or designing a sacrificial stiffening structure for post cure process.
- Thermal post cure cycle
 - Place dried parts in room temperature (~25 °C oven)
 - Start heating oven with 3 °C per minute ramp to 190 °C
 - Hold 190 °C for 6 hours
 - Increase oven temperature by 3 °C ramp from 190 to 210 °C
 - Hold at 210 °C for 1 hour
 - Turn off oven and keep door closed until it cools to room temperature

Step Four: Resin and Tray Cleaning

Prepare to remove tray from heated printer as soon as possible after print completion. Longer exposure to heat can reduce life of material over time.

- Remove tray from printer while it is hot.
- Filter unused resin out of tray back into the same bottle it came from. Replace cap and store.
- Clean warm printer tray with acetone to remove excess resin residue.

Stratasys® Origin One

General material processing best practices

PART AND SUPPORT REMOVAL

- When the print is complete, remove all parts and the build platform from printer. It's helpful to have a lunch tray or other non-reactive portable surface under the printer to transfer the parts and build platform and avoid dripping resin. Clean up any resin that is spilled immediately.
- A razor scraper or a putty knife is helpful for detaching part/supports from platform. Always push scrapers away from your hands.
- Remove all parts from build platform and wipe clean with a paper towel and acetone after each print is completed.
- Large cross sections may be difficult to remove from the platform. Using a metal scraper or razor scraper, slowly work the tool between the print and the build head with gradual, careful movements. Always push the scraper away from your fingers.
- Supports may be removed before cleaning or after.
- Remove supports before cleaning will extend solvent life and accelerate cleaning, as there will be less resin that needs to be removed. Dense supports can be difficult to clean or block areas of the part from being fully cleaned.

PRINTING

- Ensure the glass bottom/membrane of the tray is clean. If smudged, wipe clean with a Kimwipe (or other lint-free wipe) and a small amount of acetone.
- Calibrate if needed using the touchscreen on the front of the machine.
- Fill the tray with enough resin to accommodate the part volume.
- Shake the bottle of resin for 30 seconds before pouring resin into the tray.
- If resin in the tray has been sitting for a while and seems idle, stir resin thoroughly with a flexible silicone spatula.
- If adding fresh resin to an existing tray with resin, stir resin thoroughly with a flexible silicone spatula.
- To achieve the best surface finish for big cross sections, increase model region delay.
- To achieve the best overhangs, increase model region exposure duration.

CLEANING

- Always aim to minimize the part's exposure to solvent during cleaning. All materials will absorb solvent in their green state to some degree and minimizing time in solvent will lessen the impact on mechanical properties.
- Wash parts in two separate solvent baths, first a previously used solvent bath followed by a "clean bath," using clear solvent.
- Keep dedicated solvent containers for each material. Containers should close with an air-tight seal to prevent solvent evaporation.
- Dry parts between baths with compressed air. Take care to avoid damaging delicate features. Always spray away from body, machinery or other parts.
- Dry parts after second bath with compressed air.
- Inspect the part after the second bath. If not fully clean (still appears wet and evaporation is not evident), repeat the clean bath and subsequent air drying.
- Negative features, interior corners, and blind holes may be difficult to clean. A Q-tip soaked in IPA can be helpful.
- Use a clean room wipe wet with IPA to spot-clean resin.



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