

envisionTEC

Technical Guide

E-Rigidform Charcoal Best Practices

E-RigidForm Charcoal is a polyurethane-like resin that 3D prints strong, hard and stiff parts that can be used for prototypes and end use. With a hardness value of Shore D 87, the same value as a cast urethane plastic, E-RigidForm is a versatile and tough material that is ideal for a wide range of industrial and consumer applications. This material is available in three colors: Charcoal, Amber, and Black.

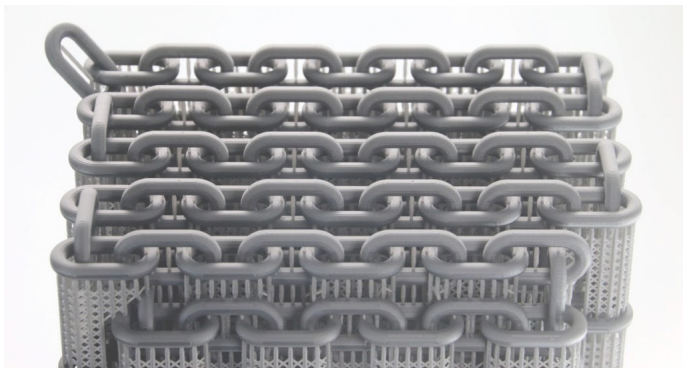
This technical guide details the best practices for preparing models, post-processing, and material handling.

Applicable Printers: Envision One cDLM series

Primary Supplies

- 99% isopropyl alcohol (IPA)
- Air compressor
- Cone-shaped paint filter (from Starter Kit)
- Convection oven
- Nitrile gloves
- Paint brush
- Paper towels
- Paint scraper (from Starter Kit)
- Plastic funnel
- 3 Post-processing containers, 1 qt each
- Rubber spatula (from Starter Kit)
- Spray bottle (for 99% IPA)
- Storage containers for material - sealable and opaque
- Heat resistant gloves (optional)

Fig. 1 MODEL PRINTED IN E-RIGIDFORM CHARCOAL



Getting Started

1 Designing models for E-Rigidform

Models printed in E-Rigidform must have a **minimum wall thickness of 500µm**. Thin geometries of less than 500µm should be avoided.

Read this technical guide in full before starting a print in E-Rigidform material.

Software

2 Orienting models in RP software

Spacing: place models a **minimum of 3 mm apart**.

Level at build platform for models with supports: place models **4 mm** from the build platform if using supports.

Resolution: only print at **100 µm Z resolution**.

3 Supporting models in RP software

Some approved applications require supports. Always use **E-Rigidform Base.ini** file for supports-

Minimum support base: 1.0 mm

Minimum contact tip: 0.75 mm

Minimum support beam height: 4 mm

Material Preparation

4 Storing the material between prints

E-Rigidform should be stored at a standard room temperature of 70° F (21° C) to 75° F (24° C). This material works best in a space with a minimum ambient temperature of 73° F (23° C). See the [Safety Data Sheet](#) for material safety information.

5 Mixing the material

Loctite E-IND405 mixing requirements:

Mix the sealed material bottle on a bottle roller for a **minimum of 30 min** prior to adding material to the printer.

6 Filling the material tray

The material tray should not be filled more than half way to prevent overflow at the start of a print job.

To add more material to the printer, carefully pour material into the material tray between print jobs. Adding material while the print is paused, or during a print, will cause a small shift line in the model.

7 Printing with E-Rigidform material

Mix the material in the material tray gently with the rubber spatula from the Starter Kit before each print. Make sure there are no small cured particles in the material.

If cured particles are found in the material, then the material must be filtered. See [Maintaining EnvisionTEC Materials](#) or the [Maintenance guide](#) for instructions for filtering the material.

Post-Processing

8 Setting up the Post Processing Zone

After the print job is complete and the models have been removed from the build platform, the models must be cleaned, dried, the supports removed (when applicable), and the models post cured. This process is referred to as "Post Processing."

Set up the three post-processing containers in the Post Processing Zone. Refer to the three post-processing containers as follows -

"Dirty Bath" - This is the first the models will be placed in for cleaning. It is referred to as the "dirty bath" because this solution will receive the most uncured material.

"Medium Bath" - This is the second the models will be placed in during the cleaning cycle.

"Clean Bath" - This is the third the models will be placed in. It will receive the least uncured material.

9 Cleaning the printed models

E-Rigidform material requires a three-phase cleaning process.

Always wear gloves when handling uncured material.

- 1 Place the models in the **Dirty Bath** for 5 min. Agitate with the paint brush as needed.
- 2 Remove the models from the **Dirty Bath**. Spray the models with the spray bottle of 99% IPA, then spray with compressed air.
- 3 **Remove any supports** from the model using snips, if applicable.
- 4 Place the models in the **Medium Bath** for **3 min**, brushing if necessary.
- 5 Remove the models from the **Medium Bath**. Spray the models with the spray bottle of 99% IPA, then spray with compressed air.
- 6 Place the models in the **Clean Bath** for **1 min**, brushing if necessary.
- 7 Remove the models from the **Clean Bath**. Spray the models with the spray bottle of 99% IPA, then spray with compressed air. Use compressed air to remove all IPA from the surface of the model and dry the models.

Do not expose E-Rigidform material to alcohol for longer than 30 minutes. Excess exposure to alcohol will cause curling issues.

10 Drying the models

Preheat the convection oven to 98.5° F (37° C). Place the models in the convection oven for 60 min to dry.

Caution: Models will be **warm** after drying cycle. Heat resistant gloves are recommended, but not required.

11 Post curing models

Cure the models using one of the following methods -

PCA 4000: 00:04:00 / 20° C / 100% power

See the [PCA 4000 technical guide](#) for instructions on setting a custom curing program.

Otoflash G171: 2 x 1000

See the [Otoflash section in Support Center](#) for instructions on setting a custom curing program.

UVCA 2000: 40 min at room temperature

See the *UVCA 2000 User Manual* for instructions on setting a custom curing program.

UVCA 3000: 2 x 30 min at room temperature

See the *UVCA 3000 User Manual* for instructions on setting a custom curing program.

Place models into the curing machine with as much space between models as possible. Models should never touch one another while post curing. Let models cool completely before handling them after the final post-curing cycle.

Curing options vary, based on chosen methods. EnvisionTEC only supports EnvisionTEC curing units. Any other post curing oven has to be calibrated by the client. It is not the responsibility of EnvisionTEC to support third party curing units.

12 Finishing the models

Finishing involves using sandpaper and other tools to smooth the supported surfaces of models. Initially, rough areas left by supports can be carefully sanded using a fine Dremel bit followed by sandpaper. Sand beginning with 80 grit sand paper.

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Fig. 2 POST-PROCESSING CONTAINERS

