What retraction settings should you use on an Ender 3?

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Abstract. Bowden Ender-3, Pro and V2: 4 to 6.5 mm (Cura gives the Ender-3 and V2 5 mm at 45 mm/s). Direct-drive S1, S1 Pro, V3 SE and V3 KE: 0.5 to 1.2 mm.

Keywords: retraction, slicer-settings

Table 1. The number

Model	Extruder	UltiMaker Cura 5.13.0	OrcaSlicer 2.4.2	Creality Print 7.3.0
Ender-3	Bowden	5 mm at 45 mm/s	4 mm at 60 mm/s	6 mm at 40 mm/s
Ender-3 Pro	Bowden	6.5 mm at 25 mm/s, Cura's global default	4 mm at 60 mm/s	No Ender-3 Pro profile
Ender-3 V2	Bowden	5 mm at 45 mm/s, the same profile as the Ender-3	5 mm at 60 mm/s	5 mm at 50 mm/s
Ender-3 S1	Direct drive (Sprite)	0.8 mm at 40 mm/s	1 mm at 60 mm/s	1 mm at 40 mm/s
Ender-3 S1 Pro	Direct drive (Sprite)	0.8 mm at 40 mm/s	0.8 mm at 30 mm/s	1 mm at 40 mm/s
Ender-3 V3 SE	Direct drive	0.8 mm at 40 mm/s	1.2 mm at 40 mm/s	1.2 mm at 40 mm/s from the Hyper PLA profile; the printer profile says 0.8 mm at 30 mm/s
Ender-3 V3 KE	Direct drive	0.8 mm at 40 mm/s	0.5 mm at 30 mm/s	0.8 mm at 30 mm/s

1 What retraction settings should you use on an Ender 3?

Bowden Ender-3, Ender-3 Pro and Ender-3 V2: slicer profiles ship 4 to 6.5 mm of retraction. UltiMaker Cura gives the Ender-3 and V2 5 mm at 45 mm/s. Direct-drive Ender-3 S1, S1 Pro, V3 SE and V3 KE: 0.5 to 1.2 mm, with Cura at 0.8 mm and 40 mm/s. Then run a retraction test.

1.1 The number

Each value is the 0.4 mm nozzle profile with the slicer's default PLA, read at a release tag through its inheritance chain: Cura 5.13.0′s printer definitions and Generic PLA material file, OrcaSlicer v2.4.2′s Creality machine profiles, and Creality Print v7.3.0 on Creality's GitHub. Extruder types are from Creality's Ender series comparison. OrcaSlicer and Creality Print set the push-back (De-retraction Speed) separately: 30 or 40 mm/s on these models.

1.2 Why do the Bowden models need so much more retraction?

Because their drive gear is not on the print head. On the Ender-3, Ender-3 Pro and Ender-3 V2, the extruder pushes filament through a PTFE (polytetrafluoroethylene) tube to the hotend. Creality's conversion guide for those three describes direct drive as mounting the extruder on the hotend, which shortens the filament path from extruder to nozzle. A retraction has to pull back through that whole path before the tip in the nozzle moves.

1.3 What are the best retraction settings for an Ender 3?

The ones a retraction test on your printer picks, starting from your slicer's profile (how to calibrate retraction distance). The profiles disagree on the same hardware: for the Ender-3 Pro, OrcaSlicer ships 4 mm and Cura 6.5 mm. Filament changes the answer too. Creality Print's CR-PETG profile for the Ender-3 raises the length to 8 mm.

1.4 What are the Ender 3 retraction settings in Cura?

Retraction Distance 5 mm and Retraction Speed 45 mm/s, on the printer Cura lists as "Creality Ender-3 / Ender-3 v2" with Generic PLA or PETG. Both values come from a Creality section in Cura's Generic PLA and PETG (1.75 mm) material files, not from the printer definition. Of the Ender-3 family, that section lists only this one definition (where the settings are in Cura).

1.5 What retraction distance should an Ender 3 Pro use?

OrcaSlicer ships 4 mm at 60 mm/s, the same as its Ender-3 profile. Cura's "Creality Ender-3 Pro" printer comes up at 6.5 mm and 25 mm/s, and Creality Print has no Pro profile. Cura's figure is its global default, not a Creality value. Cura applies a material file's printer section only to the exact definition it names, so the Creality section reaches the Ender-3 but not the Pro. Neither the Pro definition nor its parent (`creality_base`) sets a retraction length, so the defaults fill in.

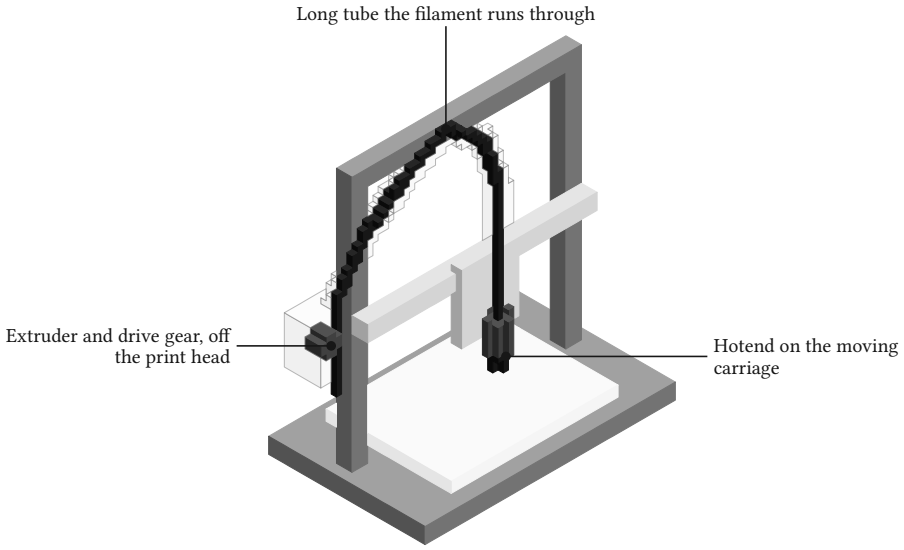


Figure 1. On the Bowden Ender-3, Ender-3 Pro and Ender-3 V2, every retraction pulls filament back through the whole tube from a gear that is not on the print head.

1.6 What retraction settings does the Ender 3 V2 use?

5 mm in all three slicers. Cura uses one profile for both the Ender-3 and V2, at 45 mm/s. OrcaSlicer's V2 profile sets no retraction of its own and inherits 5 mm at 60 mm/s from its shared Creality base. Creality Print ships 5 mm at 50 mm/s.

1.7 What are the Ender 3 V3 SE retraction settings?

0.8 to 1.2 mm at 40 mm/s. Cura ships 0.8 mm; OrcaSlicer, 1.2 mm with a De-retraction Speed of 30 mm/s. Creality Print's printer profile says 0.8 mm at 30 mm/s, but its Hyper PLA profile for the V3 SE replaces that with 1.2 mm at 40 mm/s. A filament profile's setting wins over the printer's.

1.8 Does a direct-drive conversion change the retraction?

Yes. With the drive gear on the print head, the Bowden values above no longer fit; start from the direct-drive rows instead (direct drive vs Bowden distances). Creality's direct-drive conversion guide for the Ender-3, Pro and V2 says to set retraction to around 1 mm at about 27 mm/s afterwards, then fine-tune.

1.9 How to check it on your own print

1. **Read what your slicer sends now.** In Cura: print settings, Custom, Travel section, then Retraction Distance and Retraction Speed. In OrcaSlicer: printer settings, Extruder page, Retraction group (Length, Retraction Speed, De-retraction Speed). A filament's Setting Overrides page replaces those values when ticked.
2. **Print a retraction tower.** In OrcaSlicer, open the Calibration menu and pick Retraction. The dialog defaults to 0 to 2 mm in 0.1 mm steps, which OrcaSlicer's wiki says suits most direct-drive extruders. For a Bowden Ender-3, Pro or V2, the wiki suggests 1 to 6 mm in 0.2 mm steps.
3. **Pick the section with the least stringing.** Measure its height and find the matching `Calib_Retraction_tower` comment in the G-code preview to read the length. Enter it as Retraction Distance in Cura, or Length in OrcaSlicer.
4. **If the top of the tower still strings,** OrcaSlicer's wiki says to dry the filament and check the nozzle for leaks (other causes of stringing).

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