# Harken Carbo Line Guard Instructions

1. Decide which carbo line guard styles you want to print.

   There are four options:

   a. The half guard for 57 mm Harken Carbo Air blocks.

   b. The full guard for 57 mm Harken Carbo Air blocks.

   c. The half guard for 75 mm Harken Carbo Air blocks.

   d. The full guard for 75 mm Harken Carbo Air blocks.

2. Download your desired 3D printing (STL) files by accessing the Google Drive files here: https://bit.ly/line-guard-download. These files should work on most 3D systems.

3. After you have opened an STL file, it is important that you orient the Carbo line guard so that it prints correctly. Correct printing orientation makes each line guard stronger, which can prevent the plastic from easily bending and/or snapping during use. To do this, manipulate the 3D image of the line guard so that its longest side is vertically situated on the printed surface. See the example images for reference:
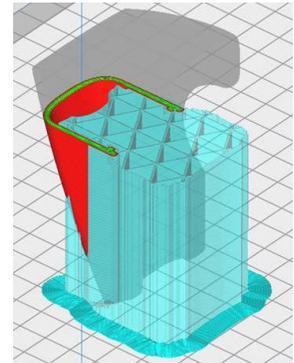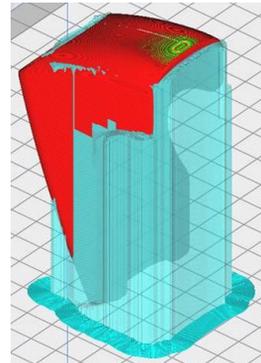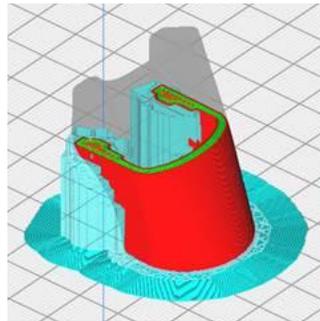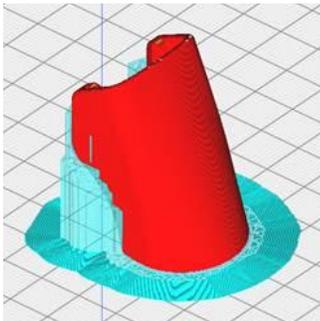
   Once the 3D files are orientated correctly, click print.

4. When printing is completed, clean up the carbo line guards so that they are smooth and ready for use. Sometimes it's best to put them on and go sailing. Expect that your sheet might chafe at first. Come in from sailing and sand/file away material to minimize that. Or do nothing and let the line wear its own ideal path.

Harken Carbo Line Guard Notes

Line Guard Types

- The half line guards are smaller and more accommodating for a wider angle of trim, while the full line guards are larger and better for blocks with fewer changes in trimming angle.

Material

- At Harken we have used a type of plastic called "PLA Tough" to print sample guards, which is more of a structural material as opposed to a cosmetic material.
- Using PLA Tough is not necessary. We use black. You can use any material and color you can access. Experiment!

Printing Details

- When we printed carbo line guards it generally took about 6 hours to print one half guard and about 12 hours to print one full guard.
- We have primarily printed Carbo line guards using a mid-level printing resolution.
- We used the Ultimaker S5 3D printer, but many other brands and levels of 3D printers should work well.
- Some 3D printers use structural material like PVA to help print objects, but using structural material is not necessary. You can see that we used this type of material in the light blue parts of the above images. This structure material can be removed by dissolving it in a soluble substance or by using wire snippers, your hands, or other tools.

These line guard files probably won't be perfect. That's a big part of why they're free. To change the angle of trim, opening size, etc., use tools like a Dremel to modify.

These notes are, by no means, the only ways to create your own line guards. In fact, there are probably more and better ways to make these designs work. If you decide to experiment with material, orientation, design, or anything else, let us know how it goes! We'd love to hear from you at blockheads@harken.com.