



## Super, Over The Top, Flag Holder For One Inch Flag Poles.



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## Summary

Over the past few years, my flag holders broke. One was plastic and the other was aluminum. This one will not break.

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I leave my flag out in front of my house all year. The only time it comes down is before a huge storm or tornado warnings. But living in the Midwest, storms can form quickly, and without much warning (especially in the spring.) Twice over the past few years a storm came while I was at work and broke the flag holder. The first one was plastic, so I purchased an aluminum flag holder. It broke as well.

As a 3D maker, I took matters into my own hands. I decided to design one that is so strong that it would never break. Sure, I over designed this thing way beyond what is needed, but that's what we do! Right?

It is big and strong. The base is 5 x 6 Inches (127 x 152mm.) The part has chamfers and fillets along every edge to give it more strength. The chamfers are used on the horizontal axis while printing, since fillets will look bad and can be weaker on a 3D printer (while printing on the X

and Y, not the Z.) Every detail was carefully considered, even the print orientation to take advantage of layer strength.

While this can, and should be printed in ASA, I went even further and printed mine in FibreXTM PA6+GF30 glass fiber reinforced Nylon from 3DXTech. While this costs three times as much as Prusament ASA, I do not want this thing to break!

The first image is a render done in Cinema 4D using the Arnold renderer. The second picture is the one I printed in glass fiber polyamide (Nylon.) The last two images are of a print done in Jesse red PETG.

## **Printing**

Recommended print settings:

- Layer height: 0.3mm
- Parameters: 6
- Bottom and Top Layers: 3 and 4
- Infill: 30%
- No Supports Needed

I have included two files for you to choose. “FlagHolder1 v1” is the main version that I used. The second is called “FlagHolder1Mini v1” that has been modified to print on a Prusa Mini (or other printers that have a 180 x180mm print surface.) The only difference is the length of the tube where the pole is inserted. I do not own a Prusa Mini, so I do not know how well it prints ABS or ASA. Since the bed temperature only goes to 100C on the Mini, I would not attempt a large ABS or ASA print. A better choice is PETG, but please read what I have to say about using prints for outdoor use printed in PETG below.

Be aware that this will take about 20 hours to print on a Prusa MK3/s/+ with my recommended print settings with a 0.4mm nozzle. While not unusual for many of the prints I post here, I do not want anyone to be surprised at how long it will take to print. And of course this uses more filament than printing a small useless statue, and will use approximately 460 grams of filament. That is almost half a spool “for those at home keeping score.”

I have learned that 100% infill does not give much more strength, if any, compared to printing more parameters (outer layers.) So I went with 30% infill but I used six parameters, not the usual two or three. I also used a layer height of 0.3mm and a 0.6mm nozzle. I left the bottom layers at 3 because anymore may cause warping issues with ASA, ABS, and some other materials. The top layers were left at 4.

Realistically, a 0.4mm nozzle at a layer height of 0.3mm is fine, but I would still use an infill of 30% with at least six parameters. Anymore than an infill of 30% may cause a lot of difficulty with warping while printing with ASA and ABS. I have one of my Prusas in an enclosure which probably helped print this (not the one done in PETG.) I did not use a brim but you may want to consider using one, only you know your printer. Finally, you do not need any supports to print this. (Except for very few exceptions, I design most of my prints to not require supports.)

The print is oriented for proper printing. I gave a lot of thought to the layer lines and considered designing it to print in a different orientation. But since the part that will get the most forces is at a 45 degree angle, print orientation will make little difference.

### **Printing This In PETG**

I am sure that this can be printed in PETG and survive the most violent storms, just keep in mind that PETG will fade (and possibly break down) from the sun's UV. (Printing in black helps protect it from the UV rays.) I have used UV spray on some PETG prints I have outside and they have survived three blistering hot summers and bone chilling winters, and still look brand new. I used Krylon K01305 and feel very confident in recommending it. Maybe just test it on a small print to make sure that it does not have any undesirable reaction with the filament you use. Thinking about it, PETG may be a good choice for this since it bends a little, which will relieve some stress from the forces on it. But I will repeat, PETG will not do well with UV exposure and will require some form of UV protection applied to the print. Even then, I am not sure how well PETG will retain its structural integrity after years in sun, heat, and cold.

### **Final Notes**

Included are the STEP files for both the original file and the one sized for the Prusa Mini if you want to make any changes. The opening is for a wood pole with a one inch diameter and can be easily modified for a pole with a smaller diameter.

I am a little concerned with the length of the "tube." I originally designed it much shorter because that is the part that may break. But then I thought that if it was longer it would help transfer some of the stresses to the base. I guess I will need to watch this and update the print in the future. I'm an electrical engineer, not a structural engineer, so any advice would be helpful!

As with most of my prints I post here, I designed this for my own use but felt that others may find it useful. Please let me know if there is anything I

can do to improve this. And as always, good luck with all of your 3D printing!

## Model files



**flagholder1-v1.stl**



**flagholder1-v1.step**



**flagholder1mini-v1.stl**



**flagholder1mini-v1.step**

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