

Build a Gas Forge

By

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I have been building gas forges for several years and this tutorial will show you what I have learned and how I build gas forges. Keep in mind that this is the way that I do it and I have never had any problems in using any of these procedures. With this said, because you are dealing with flammable and explosive gases and are doing things beyond my control I deny any liability for any injuries or damage that you may experience.

Because of the recent laws on gas bottles there is an abundance of 20 and 30 pound propane bottles and Freon bottles available. Generally speaking the Freon bottles are smaller and are made of thinner metal, therefore are a little easier to cut. When using a $\frac{3}{4}$ " burner in a naturally aspirated forge the fire box, or volume of space inside the forge, should be no more than 350 cubic inches or you could add additional burners. You may want to build a forge that goes beyond this limitation and reduce the fire box volume when welding by placing fire brick inside the forge, reducing the number of cubic inches. You can, of course, use a blown blower and this size limitation becomes irrelevant. There are a number of cylinder calculators on the internet. I typically use: <http://www.online-calculators.co.uk/volumetric/cylindervolume.php>.



The dragon on top of the forge was originally 1" square.

There are other pictures under Customer Feedback on www.hybridburners.com. Scroll down to "Dragon forge in Tennessee". It labels the plumbing parts.

When building a forge (my way) using a 20 pound propane bottle the volume of the fire box is 583.4 cubic inches and with a typical Freon bottle it is about 259.2.

The thing that is a little different about my forges is that I cut the tank in two laterally, then put it back together with regular door hinges. This does two things:

1. it is a whole lot easier to cast a nice, neat, smooth inside, and:
2. when you have some odd shaped piece of forging that will not fit into the 7" or 5" door, you can knock out the hinge pin on the side away from the burner, open the forge up and prop it open with a fire brick or you can knock out both hinge pins and raise the top using fire bricks. This is a much more versatile forge.

CONSTRUCTION

1. First open the valve to release any gas remaining in the tank. If the propane tank is one of the newer type merely opening the valve will not release any gas. You must take something to insert into the valve opening and depress the "stopper".
2. Now drill a hole in the end of the tank, within the area that is going to be cut out. With a propane tank you will smell a strong odor. This is the oil put in the tank to give the propane an odor. I have done this numerous times and had no problems. I have even used a cutting torch to open a tank. Once after drilling a hole I held a lighter over the hole and got a little "poof".
3. On a propane tank remove the top and bottom collar by grinding out the welds. If using a Freon bottle there is no collar on the bottom. With a sharpie draw a line where the collars were, straightening out across the bottom and about 7" long (the diameter of the ends of the collar). Both circles should be the same size. The circles should resemble a "D". Then straight across, from end to end in order to intersect the circles drawn. This leaves about 2" between the opening and the outside of the shell. Make the front and back marks the same and with the same orientation.
4. Using either a saber saw or a reciprocating saw, insert the blade in the hole drilled and cut along the lines drawn.
5. Drill, or cut, a hole in the top (larger part) 2" down vertically from the top and if using one burner centered front to back. If using two burners put one about 1/3rd back and the other about 2/3rd back. By making this hole down 2" vertically from the top of the form you will have this hole positioned so that the burner can enter the fire box at a tangent or level to the floor, causing the burning gases to swirl within the forge.
6. Weld a pipe for a burner bracket large enough for the burner tube, with the flare attached, to slide through after drilling and tapping three clamping bolts around it.
7. Cut your insulating blanket (I use 1" thick Inswool). I put 2 layers in the bottom and 1 layer in the top.
8. You will need a piece of pipe as large as possible to slide into the burner bracket and act as a form when casting the inside shell. This should be just barely larger than the burner flare and long enough to reach through the casting, blanket and burner tube. After the casting is set tap and slide this form out.
9. Mix up the castable (I use Kast-O-Lite 3000) to the consistency of mortar. One 5 pound bag is about right for a propane bottle forge bottom, about 1/3rd less for a Freon bottle forge. Screed it across for a level surface. When casting the top, this takes about two 5 pound bags, (open side up) prop the shell so that the casting is to the burner side and pour and screed about 2/3's and let set and firm up some, then prop the other side down and cast the remaining 1/3rd. Work the joint well to form a good monolithic pour. The total castable used for a Freon bottle forge is two 5 pound bags.

10. Let the forge parts set overnight and get good and hard. There is still a lot of moisture in the casting. If the forge is lit off at this stage there is a good chance of the casting spalling, or steam building up and blowing chunks out of the casting. I have a convection kitchen oven in my shop so I put the two pieces in the oven, set it on about 500 degrees and leave it for a couple of hours.

11. Paint the interior with an infrared reflective product (I use Plistix, or Metrikote these products are similar to ITC 100 but is a whole lot cheaper). Mix the IR product to a thin soup consistency. It does not dissolve so must be continually stirred during use. I built one of these forges for one of my students and on the first firing I heated a piece of 1" square to forging temperature. It took 11 minutes. The next day, after painting it with Plistix it took 6 minutes for the same piece of metal to come up to forging temperature. I would suggest that any forge will benefit from an application of an IR product.

This forge is suitable for a side arm burner or the Z burner available from Larry Zoeller at www.zoellerforge.com,

Side arm burners are also available from www.hightemptools.com. High Temp calls this his ¾" Venturi burner.

The T-Rex Burner in the ¾" size available from Rex Price at <http://www.hybridburners.com/>. The 1" T-Rex Burner will require a larger burner bracket.

Both Larry and High Temp sell regulator kits.

I have recently built a new forge using a Ribbon Burner. I am very impressed with this new burner and strongly encourage anyone considering building a forge to consider it. It does require a blower. John Emmerling wrote an article for the Hammer's Blow Winter, 2006 issue which gives detailed instructions for building this burner.