

BURNER COMPARISONS

Propane burners have been the staple heat source for homebrewers for generations. There have been many new burners developed over the years with a slew of designs and features. One area that seems to vary widely is the published ratings of them. In this review we address that issue as well as other important factors such as materials of construction, operational features, heat protection for valves and thermometers, sound levels, and several more.



RATING MEASUREMENT

The test procedure for doing an accurate side-by-side comparison were as follows:

- 10gal kettle with 6.5 gal of water (typical for a 5 gal batch). Same kettle used for each test.
- Lid on during heating.
- Still air (no wind), ambient room temperature.
- Temperature measurements are taken with calibrated high quality digital thermometers.
- ANVIL scale 0.01lb precision used for fuel usage measurements.
- All burns were 1hr in duration.

The measurement for burner power is BTU's consumed per hour (BTU/hr). That rating is the total heat output of the burner at the maximum rating. Measuring the actual output of a burner is quite simple if you have a scale that is accurate to at least 0.1 lb and can weigh up to 40 lb. Simply weigh the propane tank before lighting your burner, and then run the burner at full power for one hour. Weigh the tank again to measure the amount of fuel burned (starting weight minus ending weight). Make sure you remove the regulator hose for each weighing so that it doesn't influence the measurement. Multiply this by the heat energy in 1 lb. of propane (21,700 BTU/lb.). For example, if your burner burns 1.5 lbs. of fuel in one hour, the rating is $1.5 \times 21,700 = 32,550$ BTU/hr.

RESULTS

The results of this test varied. The ANVIL Forge, Blichmann HellFire™, and Northern Dark Star burners were very close to the published ratings. The LD Element burner rating was recently reduced by the manufacturer to 72,000 BTU/hr, but you still may see the original 150,000 BTU/hr rating on the web. The Adventures in Homebrewing was significantly lower than the published rating — 84,000 BTU/hr vs the published 220,000 BTU/hr rating.

Heating rate is also an important factor. All burners produced acceptable heating rates for 5 gal batches. For 10 gal and larger batches, the higher power level burners are definitely time savers. Note that the higher ratings are not proportionally faster than the lower rated burners. With the high output burners on a small kettle a significant portion of the heat is lost out the sides of the smaller diameter kettles; they become more efficient with larger diameter kettles.

	Blichmann HellFire™	ANVIL Forge	LD Carlson Element	Adventures in Homebrewing	Northern Brewer Dark Star Stainless
Published Rating	140,000 BTU/hr	80,000 BTU/hr	150,000 BTU/hr	220,000 BTU/hr	65,000 BTU/hr
Measured Rating at Max	147,000	80,700	80,300	83,800	61,200
Measured Rating Stable Burn	86,800	29,512	71,610	N/A	27,342
Heating Rate (F/min) @ Max (6.5 gal)	8.9	7.13	8.28	6.06	6.24
Time to Boil 6.5 gal (60-212°F) Min	17.1	21.3	18.4	25.1	24.4





BURNER TYPE is also an important consideration. Cup style burners, such as the Adventures in Homebrewing (AIH) unit, are very inexpensive to manufacture, put out a reasonable amount of heat, but are very loud. Nozzle type burners were used in all but the AIH burner. They are quiet and efficient until you exceed a certain fuel/air flow where the flame lifts and becomes unstable. While you can continue to increase the power output, they do become louder and the efficiency drops.

	Blichmann HellFire™	ANVIL Forge	LD Carlson Element	Adventures in Homebrewing	Northern Brewer Dark Star Stainless
Burner Type	Nozzle	Nozzle	Nozzle	Cup	Nozzle

SOUND LEVEL becomes an important factor the longer you have to be around the burner. At all operating conditions the ANVIL Forge was the quietest at 51 dBA (you can barely hear it). Whereas the AIH burner was the loudest at 71 dBA. While the HellFire™ is the loudest at full power, it also produces double the power of the others. But it was very quiet at the stable burn condition while still being higher output than all the others. The nozzle type burners all get noticeably louder as you exceed the stable burn ratings. (Note that every 3 dBA is double the sound pressure.)

	Blichmann HellFire™	ANVIL Forge	LD Carlson Element	Adventures in Homebrewing	Northern Brewer Dark Star Stainless
Sound Pressure @ 3ft Max Power	73.3 dBA	68.4 dBA	70 dBA	71 dBA	70.7 dBA
Sound Pressure @ 3ft Stable Burn	59.8 dBA	51.0 dBA	60.2 dBA	N/A	52.2 dBA

STABILITY is another important features of a burner. Supporting the kettle adequately, and also having stability on a surface, are paramount. Choosing a wide stable base with rigid construction is important. All burners had good stability except the Northern Dark Star Stainless 3 leg design. It is not very wide and is more prone to tipping. While the ANVIL Forge is also three leg design, the legs are much wider and therefore more stable.

WIND PROTECTION is necessary for a stable flame that doesn't blow out during outdoor use. Burners in these tests varied from excellent to poor.

	Blichmann HellFire™	ANVIL Forge	LD Carlson Element	Adventures in Homebrewing	Northern Brewer Dark Star Stainless
Wind Ring	11.5" D, 6.5" H	11"D, 5"H	13.5"D, 6.25"H	11.5"D, 2"H	8.5"D, 4" H

HEAT SHIELDING is often overlooked. Excessively heat exiting the burner can melt valve grips and permanently destroy your thermometer. And it can cause severe burns. Only the ANVIL and Blichmann burners passed this critical test. One competitive burner exceeded 900 degrees! The image below is what the thermometer and valve looked like after a total of 10 hours of testing. The valve grip was completely melted, and the thermometer was destroyed.



	Blichmann HellFire™	ANVIL Forge	LD Carlson Element	Adventures in Homebrewing	Northern Brewer Dark Star Stainless
Heat Shield	Patented Integral Vertical	Patented Integral Vertical	None	None	None
Temp at Valve at Max Power	153°F	162°F	950°F	375°F	621°F

OPERATIONAL HEIGHT is key to avoid lifting hot and heavy kettles for draining into your carboy or other fermentor. While pumps are quite handy, there is nothing more simple than using gravity. Only the ANVIL Forge and Blichmann HellFire™ were capable of draining directly into a carboy (optional on the HellFire™).

MATERIAL OF CONSTRUCTION is another important feature. Stainless construction will last a very long time with minimal corrosion, usually just a blue marking from the heat. Painted coatings will eject fumes and may blister and peel over time. The “After Test Images” below shows what the burners look like after a couple hours of use. The ANVIL Forge utilizes a high temp ceramic powder coating that doesn’t blister or peel so it will stay attractive looking and free of corrosion for a long time. The paint on the Element burner had completely burned off the top half of the burner.



PRICING

Most of the burners were in the \$99 price range, but features do vary widely. While the HellFire™ is the most expensive, it also produces nearly twice the power of the others, and includes features the others don’t. If you’re looking for a burner designed specifically for homebrewing, that includes amazing heat shielding, various operation heights, quiet efficient operation, superior wind shielding, and is robustly constructed, the ANVIL Forge and the Blichmann Engineering HellFire™ burners are stand-out performers.

	Blichmann HellFire™	ANVIL Forge	LD Carlson Element	Adventures in Homebrewing	Northern Brewer Dark Star Stainless
MSRP	\$149.99	\$99.99	\$99.99	\$109.99	\$99.99

CONCLUSION

When choosing a burner consider ALL of the factors, not just rating alone. Burners like the ANVIL and HellFire™ were specifically developed for homebrewing and have all the features like excellent heat shields to protect your valve and thermometer, quiet operation, perfect operating heights, optimal materials, and custom designed efficient and powerful burners. Lastly, be cautious about taking published ratings at face value.