



# Carlisle Machine Works, Inc.

## HellCat Burner Instruction Sheet



The HellCat Burner uses propane, natural gas, or hydrogen with oxygen to create a wide range of flame characteristics for flameworking applications. This instruction sheet is designed to provide the user with a working knowledge of the burner to allow for safe and educated use. This instruction sheet is not intended to be a guide for flameworking, but rather a guide for use of the HellCat Burner. Please take the time to thoroughly read through this instruction sheet to help ensure the proper use and maintenance of the burner. This instruction sheet provides information about the HellCat Burner.

### Options and Accessories:

The HellCat Burner has several options and accessories that are available. This section is intended to provide any pertinent information for the options that may be applicable.

- **4 to 2 Inlet Kit:** The HellCat has two separate inlets for fuel gas and two separate inlets for oxygen. This is setup ideally for use with a foot pedal. In the case where the torch is to be setup without a foot pedal, the 4 to 2 inlet kit is used to combine the inlets to a single fuel gas inlet and a single oxygen inlet.
- **EL-2 Foot Controller:** The EL-2 is an electronic foot-actuated positive closing valve system.
- **In-Line Disposable Filters Option:** This is a highly recommended option to filter the fuel gas (except hydrogen) and oxygen gases prior to the burner to reduce the possibility of contaminants from the feed piping and supply sources.
- **Hose Options:** There are three types of hosing recommended for bench burners, Welding hose, Tygon hose, and Stainless Steel Braided hose. Please refer to Bulletin 24D for more information regarding these products.

### Surface Mixed:

The HellCat Burner is surface mixed. Surface mixed burners deliver the gas and oxygen to the face separately so that the mixing of gases happens as they exit the burner face. This produces a safe flame for working with any application. Surface mixed burners do not have the possibility for combustion to take place inside of the burner (this is commonly known as Flashback) since the gas and oxygen are not mixed until they exit the burner. However, certain conditions (such as an internal leak) could cause a Flashback to occur. It is still highly recommended that flashback safety devices, such as flashback arrestors are installed with any surface mixed burner.

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## Control Valves:

There are four control valves which are, located on the back of the HellCat Burner. Two of the control valves feature red handles and are used for metering the gas flow to the burner. Two of the control valves feature green handles and are used for metering the oxygen flow to the burner. The innermost valves control the centerfire of the burner, while the outermost valves control the outerfire of the burner.

These control valves are finely threaded and thus require several full turns to become fully open or fully closed. When using these valves to control the flames, it is best to make small incremental adjustments rather than full turns. Quick or large adjustments could cause the flame to become unstable and even blow off of the face of the burner. In time, the user will learn the best way to control the burner for their application.

The valve stems are threaded and secured into the valve body via a nut. This nut is threaded onto the valve body and the stainless steel stem extends through this nut. Depending on how tightly this nut is threaded down onto the valve body, the stainless steel stem will be harder or easier to turn. If the nut is tightly threaded down onto the valve body, the stem will have more resistance to movement. By loosening this nut, the stem will become easier to adjust. Loosening the nut can also cause a leak to form around the stem from the nut sealing area. Be sure to check for leaks (see *"Checking for Leaks"*) anytime that this nut is adjusted.

**When closing the control valve, the valve should be adjusted only until it seats and stops turning. The valve should not be forced or "torqued" down any further.** By turning the valve handle with force, beyond its seal positioning, once it has seated, great pressure may be placed on the seat. This will cause the seat or valve stem to become deformed and will result in a leak that can not be fixed and will require the replacement of the valve.

## Checking for Leaks:

Before operating the HellCat Burner for the first time and once a month (see *"Maintenance"*) the burner should have the control valves and all connections checked for leaks. Follow the procedure below to check for leaks.

1. Connect air at 25 PSI to the burner.
2. Dip the head of the burner into a bucket of water.
3. Cycle through the control valves turning each one on and then shutting it off. When the control valve is opened there should be a rush of bubbles in the water. After shutting the control valve off, wait about 30 seconds to watch for any new bubbles. If bubbles appear at any rate, this would indicate a leak in the control valve.
4. Remove the head from the water and use the air pressure to blow out any residual water.
5. Mix soap (liquid soap is best for this) and water to form a bubbly mixture for leak detection.
6. Turn on all control valves.
7. Apply the soapy mixture to all threaded connections and valve stems. If any of these areas produces bubbles after applying the soapy mixture, the connection may have a leak.
8. Close all control valves and disconnect the air.

If a leak is detected, contact a Carlisle Representative for assistance.

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## Startup and Shutdown:

To startup the HellCat Burner, follow the procedure below.

1. First open the centerfire gas control valve and ignite the gas with either an open flame or a striker. Be sure that your hands, clothing, and other flammable objects are not near the face of the burner while igniting the flame.
2. Then open the centerfire oxygen control valve to produce a blue focused flame.
3. Adjust the outerfire control valves similarly to steps 1 and 2, to control the outerfire.

To shutdown the HellCat Burner, follow the procedure below.

1. Reduce flow of all gases to burner
2. First close off the oxygen control valves.
3. Then close off the gas control valves.

## Heat Build-up and Carbon Build-up:

Some inappropriate working conditions can cause heat build-up in the burner. This heat build-up will cause damage to the burner and also present a danger to the user if a heated area of the burner is touched by the user.

Heat build-up is the cause for carbon build-up. Carbon build-up is the formation of carbon inside of the burner (natural byproduct of fuel gas). This often results in degraded performance of the burner and possibly may cause carbon to expel out of the burner. Carbon that is present in the fuel gas (except hydrogen) effectively causes the flame to have more heat potential. If the stainless steel in the burner becomes heated to a significant level, the carbon from the fuel gas will bond to the walls of the stainless steel. When this occurs, the burner must be cleaned (see "*Maintenance*"). Propane has a very high carbon content and will almost certainly cause carbon build-up.

Below are some of the things the user can do to help retard heat build-up.

- Flames that have higher oxygen content run cooler. Use this type of flame whenever possible.
- Do not run the burner without some oxygen flowing through the burner.
- Do not use short flames that burn close to the face of the burner and can cause the end of tubes to glow red. Carlisle recommends no less than 1/4" flame length of candles.
- Do not use lazy flames that are not directed outward from the face of the burner.

## Maintenance:

Before any maintenance is performed, the user should be sure to use appropriate safety measures such as wearing safety goggles.

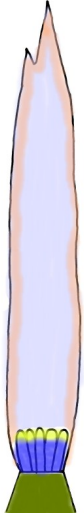
- If the HellCat Burner experiences carbon build-up (see "*Heat Build-up and Carbon Build-up*"), then the burner should be cleaned regularly. The tubes can be cleaned using a **CC cleaning kit**. When cleaning the tubes, it is important to be sure that the user is very careful and gingerly pokes at the carbon. It is very possible to have the cleaning tool get stuck inside the burner. Also, a light amount of air flow through the torch will cause the dislodged carbon to come out of the face of the burner rather than falling back into the body.
- The HellCat Burner should be checked for leaks in the valves and all threaded connections once a month (see "*Checking for Leaks*").

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## Flame Atmospheres:

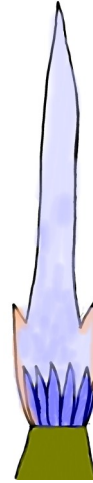
The HellCat has a very unique flame. Please note that based on the operator's prior burner experience, the flame settings may not look or sound as expected. The unique flame properties of the torch demonstrate superior performance. Refer to the illustrations below to achieve the desired flame atmospheres (please note that below illustrations depict a Mini CC Burner, which is identical to the centerfire of the HellCat).



**Neutral**



**Reducing**



**Oxidizing**

## Soft Glass: (COE 90 and higher)

For use with soft glass, Carlisle recommends a candle or focal length of 3/8". On the Neutral setting, this will present a flame that is very hot and provides radiant heat around the flame. This radiant heat lessens the frequency of glass fractures due to temperature changes while moving in and out of the flame.

## Hard Glass (aka Borosilicate COE 33):

For use with hard glass, Carlisle recommends a candle or focal length of 7/8". Please note that the Neutral setting of this flame will produce orange tips on the candles. However, as long as the candles are all the same length, this should not produce reduction on borosilicate colors.

## Oxygen Use:

Once a Neutral flame is achieved, adding more oxygen will produce the Oxidizing flame. An oxidizing flame will make a more narrow flame pattern that can be used for more delicate work. It is important to note that the extra oxygen also has a cooling effect in the flame and will lower the heat potential.

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## Safety Requirements:

Below are the safety requirements for use of the HellCat Burner. These measures will help to ensure the safety of the user.

- Flashback Arrestors should be used with the HellCat Burner. These devices stop a Flashback from traveling upstream through the lines.
- Didymium Glasses should be worn at all times, when working with the HellCat Burner.
- Protective gloves or clothing should be worn when working with the HellCat Burner.
- Long hair should be tied back and loose clothing should not be worn when working with the HellCat Burner.
- The integrity of the burner casing should never be broken. This will cause an internal leak (until repair) that could potentially be very dangerous.

	Natural Gas	Propane	Hydrogen
Recommended Pressures for Gas	.25-3 PSI	2-3 PSI	10 PSI
Recommended Pressures for Oxygen with use of listed gases	4-6 PSI	5-7 PSI	10 PSI

## Warranty and Legal Notice:

This unit is under warranty for 12 months as per the terms and conditions located on the Carlisle Machine Works, Inc. website: [www.carlismachine.com](http://www.carlismachine.com).

The manufacturer strongly objects to anyone but authorized Carlisle personnel breaking the integrity of the burner casing. The manufacturer will declare all warranties null and void and user will be liable for all injuries or damages occurring as a result of the user attempting or succeeding to disassemble, repair, or replace internal parts of the burner .

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