



Clean Stream Afterburners, LLC

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Clean Stream Afterburner CSA-200-CAT Owner's Manual



Introduction

This CSA-200-CAT Owner's Manual is meant to act as a guide for installation, normal use and routine maintenance. Please contact Clean Stream Afterburners, LLC with any questions or concerns you may have regarding your system.

The system should be installed by qualified contractors/personnel in accordance with local codes and requirements. Please be sure to operate the system as specified and use caution.

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WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death.

WARNING: If you smell gas, shut off the main gas valve, leave the building and call the fire department.

WARNING: Some Afterburner surfaces and ducts MAY BE HOT. Use caution.

NOTE: To prevent afterburner damage, afterburner "MAIN POWER" must be "ON" while the roaster is running.

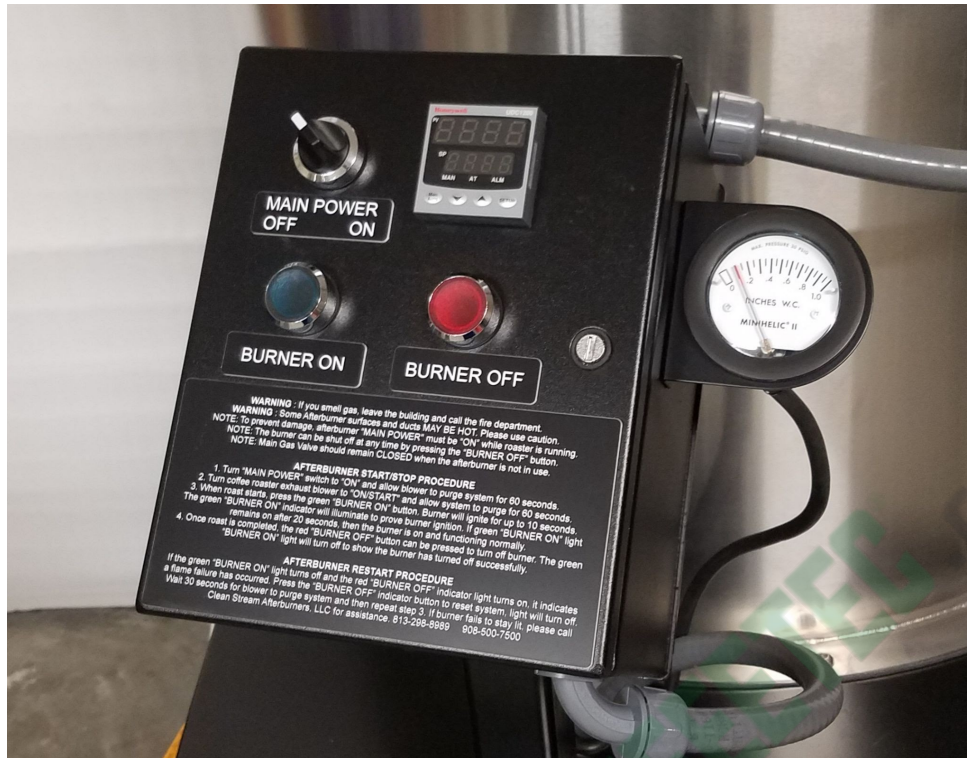
NOTE: The burner can be shut off at any time by pressing "BURNER OFF".

NOTE: Main Gas Valve should remain CLOSED when the system is not in use.

I. CSA-200-CAT Clean Stream Afterburner Design and Features

- A. The CSA-200-CAT Clean Stream Afterburner Catalytic Oxidizer is mounted downstream of the chaff collecting cyclone. The main function of the afterburner is to reduce the smoke, odor, VOC and CO content of the roaster exhaust by 95%. The system shall raise the temperature of the exhaust gases from the coffee roaster to the required operating temperature, typically 700-800f. This will assure maximum destruction of the vapors and particulate in the exhaust stream. The burner tip, inlet duct and exhaust duct all feature 304 Stainless Steel transition ports for durability and heat resistance. The burner assembly is safely concealed in the lower part of the system and will fire horizontally into the chamber. The waste gas inlet connection is on the side and will flow horizontally into the chamber. The inlet is tangentially mounted which creates a swirling inside the chamber. The exhaust stack connection duct will be on the top and flow vertically up.
- B. The CSA-200-CAT is controlled from the main control panel. The panel consists of a "MAIN POWER - ON/OFF", "BURNER ON" green illuminated push button, a "BURNER OFF" red illuminated push button and a Honeywell UDC-1200 digital temperature controller. Component failures will shut down the system and alert the operator. Indicator lights will display when the burner is firing and if there is an ignition fault. The Honeywell controller acts as the brain of the system. It works by reading the afterburner combustion chamber temperature with a type-k thermocouple, then calculates whether the fuel valve should be opened more or throttled back to maintain the pre-set operating temperature. The UDC-1200 also has a high temp limit switch, which will shut off the burner the second the high temp condition is detected. On the right side of the control panel is the

Minihelic differential pressure gauge, which will read any back-pressure inside the combustion chamber. The gauge should read around .2 inches water column under normal operating conditions. If the reading reaches .4 inches water column, then the catalyst module may be clogged with residue and needs to be cleaned. In the event that the pressure reaches .5 inches water column, the system will automatically shut down for safety.



- C. The CSA-200-CAT has an integrated catalyst module for efficiency. The catalyst module is composed of a CPSI 230 oxidation catalyst wrapped in a stainless steel casing. It looks sort of like a honeycomb which air can pass through. The typical catalyst lifespan is 10-15 years or 40,000 hours of use. Over time, the catalyst may accumulate a build up of residue which can block the airflow through the catalyst. Therefore, occasional removal and cleaning may be required.
- D. The powerplant of the CSA-200-CAT Clean Stream Afterburner is a Midco Midco EC-300 Propane/Natural-gas fired burner with integral combustion blower and modulating gas valve. This burner is designed to introduce enough heat to increase the combustion chamber temperature to 700-750 F. The Belimo modulating gas valve is controlled by the Honeywell temperature controller and will open or close in order to allow only as much fuel as is needed to maintain the required chamber temperature. The burner has a max output of 300k

btu/hr, but will typically use appx 150-300k btu/hr. This is not a "low-NOX" burner.



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II. CSA-200-CAT Installation Guide

- A. The CSA-200-CAT will arrive via freight and will be lowered with a liftgate or removed from the truck with a forklift. The system will arrive wrapped in layers of cardboard and shrink wrap and bolted to a wooden skid. Once unloaded, the afterburner can be carefully unwrapped and be unbolted from the skid. The afterburner will need to be lifted off the skid with a forklift and can then be maneuvered into place with a basic pallet-jack. The system will need to be placed a minimum of 20" from other machinery and combustibles. The system connections and front door should be easily accessible. Once the

system is in place and the exhaust is connected, the system can be bolted down to the floor for stability.

- B. The exhaust stack should be installed by local contractors and in accordance with local codes. The stack should be double walled, stainless steel lined, insulated with ceramic fiber or similar, and capable of handling 1000 F continuously. It will need to be connected on the top of the afterburner and vent vertically up through an approved roof penetration. The afterburner exhaust duct is 9.75" OD, which means the exhaust stack with an OD of 10" should be able to slip over the exhaust duct and clamp down or screw into place. If elbows must be used, they should be 45 degrees if possible and the exhaust should vent vertically up. A rain cap with a bird screen that allows for plenty of exhaust flow should be used. Avoid restrictive mushroom style rain caps.
- C. The connection duct going from the chaff collecting cyclone discharge to the CSA-200-CAT inlet duct should be "quick clamp" or "quick-connect" style ducting. Nordfab and other companies manufacture it. The ducting should have clamps with silicone high temperature seals for heat resistance.
- D. The gas connection should be performed by a qualified local contractor and in accordance with local code. An adjustable gas flow regulator should be used to provide between 6 and 12" water column to the burner. The burner may need up to 300K BTU/HR to run properly. We recommend installing an inline 0-30" WC gas pressure gauge.
- E. The 6' power cord is a basic 3-prong which can be plugged into a standard 15 amp grounded outlet. A dedicated circuit breaker is suggested.

III. Initial Startup and Routine Operation

- A. Once the system is installed as per local code and guidelines, the initial startup can be performed. The system will come pre-programmed and should be ready to run as designed. The system should ramp up to the pre set temperature in a matter of minutes. Occasionally, there may be programming adjustments, adjustable flow regulator adjustments, or modulating gas valve adjustment required for optimal operation. Please call or email us for any questions.
- B. Routine start and stop procedure:

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NOTE: Main Gas Valve should remain CLOSED when the system is not in use.

AFTERBURNER START/STOP PROCEDURE

1. Open Main Gas Valve
2. Turn "MAIN POWER" switch to "ON" and allow the blower to purge the system for 60 seconds.
3. Turn the coffee roaster exhaust blower to "ON/START" and allow the system to purge for 60 seconds.
4. When roast starts, press the green "BURNER ON" button. Burner will ignite for up to 10 seconds.
The green "BURNER ON" indicator will illuminate to prove burner ignition. If green "BURNER ON" light remains on after 20 seconds, then the burner is on and functioning normally.
5. Once the roast is completed, the red "BURNER OFF" button can be pressed to turn off the burner. The green "BURNER ON" light will turn off to show the burner has turned off successfully.
6. When the roast day is over, close the Main Gas Valve

AFTERBURNER RESTART PROCEDURE

If the green "BURNER ON" light turns off and the red "BURNER OFF" indicator light turns on, it indicates a flame failure has occurred. Press the "BURNER OFF" indicator button to reset the system, light will turn off. Wait 30 seconds for the blower to purge the system and then repeat step 3. If the burner fails to stay lit, please contact Clean Stream Afterburners, LLC for assistance.

IV. Cleaning and Routine Maintenance

- A. The connection duct between the chaff collecting cyclone and afterburner inlet should be cleaned regularly. Refer to your roaster handbook for an appropriate cleaning interval.
- B. Exhaust stack should be inspected regularly and cleaned when necessary, perhaps every few years. Be sure to remove the catalyst

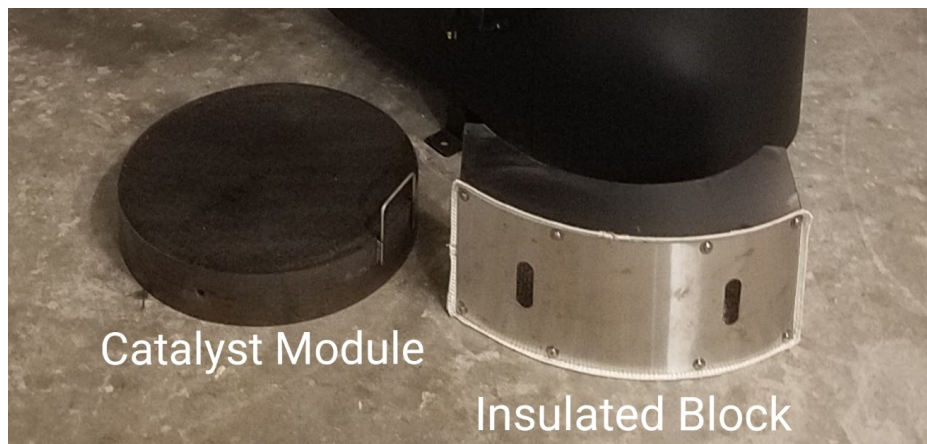
module prior to having the exhaust stack cleaned. A piece of plywood with a collection bin on top can be placed in the catalyst compartment in order to prevent debris from falling into the afterburner.

- C. Burner maintenance is outlined in the Midco EC-300 manual. One thing to note is that dust and lint can form on the inlet grill of the burner's combustion blower. This can be cleaned up with a shop-vac and brush attachment. The grill on the bottom of the afterburner will also need to be cleaned with the shop-vac on occasion.
- D. The interior of the afterburner combustion chamber may need to be cleaned after a few years of use. It should be checked regularly for residue buildup. Cleaning the interior of the afterburner can be done with a shop-vac and brush attachment. Be sure to wear a N95 mask and gloves since the insulation and chaff particles can be irritating if it comes loose. You'll typically be able to reach in through the inlet duct or the catalyst module opening for cleaning. The stainless steel internals may have sharp edges, so be sure to wear a long sleeve thick shirt for arm protection.
- E. Over time, the catalyst may accumulate a build up of residue which can block the airflow through the catalyst. Therefore, occasional removal and cleaning may be required. This will restrict the airflow and increase the back-pressure inside the afterburner. For that reason, we've installed a Minihelic gauge on the side of the control panel to monitor the back pressure inside the afterburner. Over time, the gauge may have a higher reading, which means the back-pressure has increased and the catalyst may need to be removed, cleaned with compressed air and/or a shop-vac with a brush attachment, and reinstalled. It should only take 10-15 minutes to remove, clean, and replace the catalyst module. It's important to note that if the catalyst gets caked with residue often, then it is indicative of poor chaff separation in the cyclone. A more efficient cyclone may be needed. To perform the catalyst cleaning procedure, you'll mainly need gloves, an N95 mask, flashlight, and a shop-vac with a brush attachment. When the afterburner is up and running at its typical operating temperature, take note of the reading of the Minihelic gauge on the control panel. This will serve as a starting point. The catalyst cleaning may seem intimidating, but it's really quite simple.

Here's a detailed step-by-step of the catalyst cleaning procedure. The system should be OFF and have had plenty of time to cool down.

1. Put on some gloves and an N95 mask to prevent breathing in insulation or chaff particles.
2. Unlatch the curved stainless catalyst access door near the top of the afterburner.

3. Remove the stainless steel insulated block and set it somewhere, be careful not to damage the seals. It weighs about 10 lbs.
4. Chaff residue will accumulate on the bottom of the catalyst. Therefore, you'll want to grab the handle attached to the catalyst module and lift the handle up a couple inches, then slide out the catalyst. This will keep the residue on the catalyst loosely and not scrape it into the catalyst holes. You can support the bottom of the catalyst with your other hand while removing it. The catalyst weighs about 25-30 lbs.
5. Inspect the catalyst, mainly the bottom. If the holes look clogged, then use a shop-vac with a brush attachment to clean them out. You can also use compressed air. Be careful not to damage the metal substrate/fins of the catalyst module.
6. Slide the catalyst module back in and push it all the way to the back.
7. Reinstall the insulated block, be sure to push it in as far as it will go.
8. Re-latch the curved stainless door and make sure the latch "locks".



V. GENERAL SPECIFICATIONS

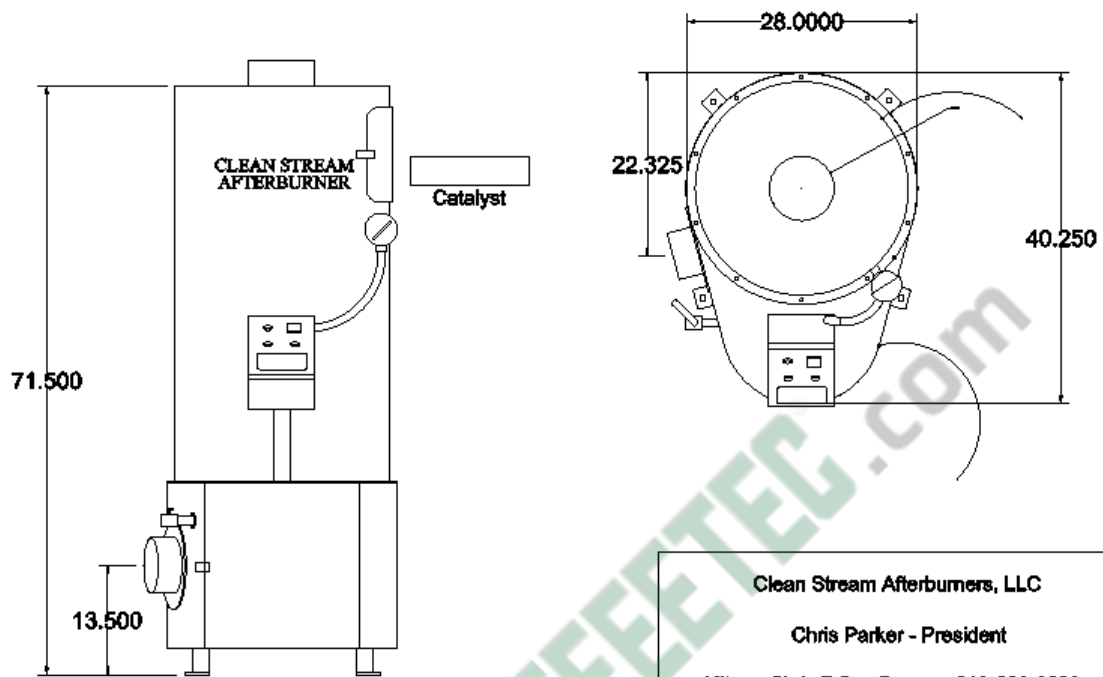
Flow Rate	200	CFM	680 CMH
Inlet Temp	200-350	F	94-176 C
Outlet Temp	600-1000	F	315-677 C
Operating Temp	700-800	F	371-427 C
Min. Burner Output	100k	Btu/Hr	
Typical Burner Output	150-300k	Btu/Hr at 700 F, estimated	
Max. Burner Output	300k	Btu/Hr	
Min. Natural Gas Pres	6"	Water Column	
Max Natural Gas Pres	14"	Water Column	
Gas Line Size NPT	3/4"		
Refractory Lining	2-3.5"	Thick	5-9 CM
Residence Time	0.5	Second	
Destruction Eff.	>95%	at 700-800F	
Combustion Chamber Specs:			
304 Stainless & Carbon Steel		Composition	
Internal Volume	12	Cubic Feet	.34 CM
Inside Diameter	24"		61 CM
Inside Height	42"		107 CM
Exterior skin	12-14 gauge	Thickness	
Overall Height	appx 77"		196 CM
Overall Width	appx 33"	Width	84 CM
Overall Width(w/duct)	appx 35"	Width	89 CM
Overall Length	appx 48"	Width	122 CM
Support Legs	3.5"	Height	9 CM
Weight	appx 950	Lbs	430 KG
Inlet duct height	14.5"		37 CM
Inlet Duct size	6.85"	OD	174 MM
Exhaust Duct	9.85"	OD	250 MM
Electrical	110/1/60	5 Amps	

VI. WARRANTY

Clean Stream Afterburners, LLC shall warrant that the system described shall meet all pertinent emissions codes per the submitted documentation. We shall warrant that the equipment furnished shall be free of defects in materials and workmanship. This warranty shall cover parts manufactured by Clean Stream for a period of FIVE YEARS. We shall extend warranties for parts not manufactured by us. Defective components shall be repaired or replaced per the manufacturer's warranty to be installed by customer's personnel.

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