



## Clean Stream Afterburners, LLC

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May 11, 2023

I am pleased to present this quotation covering the Clean Stream Afterburners, LLC model CSA-400-CAT Catalytic Oxidizer system designed to treat a maximum roast air of 400 CFM. This afterburner will remove >95% of smoke, odor and VOC at 750 F.

We have designed a compact system with functionality and aesthetics in mind. It will operate with a variable air flow and control the fuel separately. Minimal fuel is added to keep the chamber at temperature, in turn maximizing efficiency and reducing operating costs. Included is the stainless steel and black combustion chamber with ceramic fiber refractory insulation, control panel with digital temperature controller, natural gas or propane burner with integrated combustion blower, flame-rod detection, valve train with solenoid shut-off valve and modulating gas valve.

Thank you for the opportunity to present this information. Should you have any questions or require any additional information, please feel free to call or email me at your convenience.

Thank you,

Christopher Parker

*President*  
Clean Stream Afterburners, LLC



### **TYPICAL CATALYTIC OXIDIZER SYSTEM**

The Catalytic Oxidizer is mounted downstream of the chaff collecting cyclone. The system shall raise the temperature of the exhaust gasses from the coffee roaster to the required operating temperature, typically 750 F. This will assure maximum destruction of the vapors and particulate in the exhaust stream. The system shall be packaged complete with natural gas burner, refractory lined chamber, control panel, support base, and the required components as described below:

### **TYPICAL COMBUSTION CHAMBER**

The system will look very similar to the photos above. A 2.75-4.5" layer of Ceramic Fiber refractory insulation lines the entire interior of the system and keeps nearly the entire exterior below 120 F when running. The burner mount, inlet duct and exhaust duct all feature 304 Stainless Steel transition ports for durability and heat resistance. The burner with integrated combustion blower will be concealed on the lower part of the system and fire horizontally into the chamber. The waste gas inlet connection is on the side and will also flow horizontally into the chamber. The burner and inlet duct are tangentially mounted, which will create a swirling inside the chamber and in turn increase

destruction efficiency. The exhaust stack connection duct will be on the top and flow vertically up and can either be a straight duct 3" long or flanged depending on customer preference.

### **PACKAGE BURNER**

The system shall include (1) Midco EC-300 Propane/Natural-gas fired burner with integral combustion blower for raising the temperature of the gasses to operating temperature as required. System shall be complete with flame safety controls and safeties. One (1) modulating motor with a gas valve will regulate the fuel using a digital controller. The burner has a max output of 300k btu/hr, but will typically use appx 150-250k btu/hr. This is not a "low-NOX" burner.

### **INTEGRATED CATALYST MODULE**

The catalyst allows the afterburner to be highly effective at a much lower operating temperature than a normal thermal oxidizer. The lower operating temperatures equate to substantial fuel savings over a traditional thermal oxidizer system. At 750 F, about 95% of smoke, odor, VOC and CO will be removed. The system will include a metallic catalyst module which is accessible and removable for routine cleaning and occasional replacement. Life expectancy of the catalyst is typically 30-40k hours of use or 10 years.



### **CONTROLS**

The package will come standard with a control panel for remote control and monitoring. All controls and safeties are operated from this panel. The Hoffman Nema 4 control panel features a Honeywell UDC-1202 digital temperature, "MAIN POWER" on/off switch, "BURNER ON" illuminated push-button which will light up green when the burner is firing, a "BURNER OFF" illuminated push-button which will light up red when a flame failure is detected, and a Dwyer Mini-Helic differential pressure gauge which will indicate any amount of back-pressure in the combustion chamber.

### **CONTROL OPERATION**

The operator shall start and stop the system from the main panel or from remote inputs. Blower pressure and the customer safety limits must be proven prior to burner ignition. 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 Clean Stream will maintain its pre-set operating temperature of 750 F automatically. A Honeywell UDC-1202 temp controller will continuously read the combustion chamber temp via a Type-K thermocouple temp probe. Then, the Honeywell signals a motorized Belimo gas valve actuator to open or close as needed. The system will shut off automatically if back-pressure gets too high or if the system temp reaches 800 F.

### CONFIGURATION OPTIONS

The customer can choose which side we mount the inlet duct, power cord, and gas connection (left or right when looking directly at the system). The top photos show all connections on the right and the catalyst access door on the top left, which is our standard configuration. The standard inlet duct size is 7". The main system base, control panel and pedestal are typically powder coated flat black, but a different color can be chosen by the customer. When placing your order, please specify your preferences.

### OPTIONAL CONNECTION DUCTING

The system can be furnished with optional 7" Nordfab Quick-Fit ducting to connect the roaster outlet to the afterburner inlet. The galvanized ducting will be powder coated to match the afterburner base and have stainless steel clamps. Kit will typically include: (1) cyclone to duct connection wide clamp, (1) short duct, (1) reducer duct, (2) 90 degree elbows, (1) 45 degree elbow, (1) straight duct section, (1) expansion duct with o-ring, (6) stainless steel clamps, (1) o-ring. A typical duct kit is shown below.



### DESIGN DATA

Flow Rate	400	CFM	680 CMH
Inlet Temp	200-350	F	94-176 C
Outlet Temp	600-1000	F	315-677 C
Operating Temp	750	F	
Outer Shell Temp	<120	F	
Min. Burner Output	100k	Btu/Hr	
Typical Burner Output	150-250k	Btu/Hr at 750 F, estimated	

Max. Burner Output	300k	Btu/Hr	
Min. Natural Gas Pres	6"	Water Column	
Max Natural Gas Pres	13"	Water Column	
Gas Line Size NPT	3/4"	NPT	
Refractory Lining	2.75-4.5"	Thick	11-15 CM
Residence Time	0.5	Second	
Destruction Eff.	>95%	at 750 F	

**Combustion Chamber Specs:**

304 Stainless & Carbon Steel		Composition	
Internal Volume	18	Cubic Feet	.53 Cubic Meters
Inside Diameter	24"		61 CM
Inside Height	53"		134 CM
Exterior skin	12-14 gauge	Thickness	
Overall Height	appx 78"		199 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	8 CM
Weight	appx 900	Lbs	360 KG
Inlet duct height	14.5"		37 CM
Inlet Duct size options	6-8"	OD	13-20 CM
Exhaust Duct	10"	OD	25 CM
Electrical	110/1/60	Voltage	
Maximum Amp Draw	5	Amps	

**PRICE, TERMS & LEASE/FINANCE OPTIONS**

Design, Fabrication, installation assistance, FOB Shops.

**CSA-400-CAT Clean Stream Afterburner  
W/ 95% Destruction Efficiency Catalyst Module** **\$ 21,900.00 USD**

**Optional 7" Connection Ducting** **\$ 1,400.00 USD**

**TERMS:** In order to keep production moving at an ideal pace, full payment via wire transfer is our preferred method of payment. Any sales tax due or import fees and duties is the responsibility of the buyer.

**FINANCING:** Financing can be arranged through your own provider or: Specialty Coffee Finance. Please contact Dan Harris for more details.

Dan Harris  
Sr. Account Executive at Specialty Coffee Finance  
[Danh@specialtycoffeefinance.com](mailto:Danh@specialtycoffeefinance.com)  
303-800-1059

**DELIVERY:** System shall be ready for pickup 6-8 weeks after the receipt of a valid purchase order, payment, and all required approvals. We can assist with freight. Rush fabrication/delivery is available. We will bolt the system to a skid and wrap in layers of cardboard and plastic wrap for safety in transit. Typical freight dimensions are 48" x 48" x 82" and appx 950 lbs. The client is responsible for all freight costs. Our freight contact is:



For freight options, please check out <https://www.freightquote.com/>

**STORAGE:** If needed, we can store the system onsite for up to 1 month after receipt of full payment.

**INSTALLATION:** We shall provide phone assistance and guidance for installation and mounting the unit. Installation should be done in accordance with local codes. Customer will provide on-site labor/contractors for necessary assembly, electrical and gas connections. Installation should adhere to local code requirements. Some main installation points to cover:

- **Gas-** Install an adjustable gas flow regulator which can provide 6-14" Water Column to the afterburner. Run gas from source to the afterburner.
- **Electric-** Connect the supplied 3-prong power cord to a standard outlet with 15 amp breaker. A dedicated breaker is suggested if possible.
- **Connection Duct-** Install quick-clamp style connection duct from chaff collector outlet to afterburner inlet. Adapters may be needed depending on duct sizing. We recommend Nordfab and US-Duct.
- **Exhaust Stack-** Install insulated exhaust stack. We always recommend using a stainless double-walled insulated exhaust stack capable of handling 1000 F continuous. Local code may require a positive pressure system. Metal-Fab "PIC" insulated double wall positive pressure exhaust stack is a good option to consider. An approved roof penetration should be used and a rain cap with plenty of airflow is needed in order to keep any back-pressure at a minimum. A high flow stack termination with minimal restriction would be best. If bends are needed, we suggest using no more than a 45 degree in order to limit back-pressure. Stack should vent above the roofline in accordance with code. For the Metal-Fab positive pressure stack, we recommend:

Brad Grabill - Commercial Products  
813-989-9104  
[bgrabill@cpcwater.com](mailto:bgrabill@cpcwater.com)

**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 THREE 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.

**DOCUMENTATION:** We shall provide operating and maintenance manuals that include operating instructions, component data, and drawings.

**\*SPECIAL NOTES**

1. Customer shall be responsible for freight costs, all emission testing, rigging and placement, field ducting, exhaust stack, piping and wiring, mounting, wiring of remote panels and monitoring equipment. No platform is provided for stack gas sampling.
2. Unit will be palletized and plastic wrapped or crated and shipped FOB shop Tampa Florida. For ocean freight, we can pack the system in a crate and deliver to the Port of Tampa, FLorida USA.

3. If needed, a Clean Stream Afterburners, LLC rep will spend 1-2 days onsite and handle finishing details, temperature controller programming and initial startup. Customer typically covers flight and travel expenses.

4. Costs of any and all emissions testing are extra and are not handled by us. Any additional equipment or controls required above those stated herein shall be provided at an extra charge.

5. Our systems come standard with 110V single phase 60HZ, so a transformer will be needed to use on other power grids. We can supply one at an additional charge if needed.

