



Clean Stream Afterburners, LLC

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I am pleased to present this proposal outlining the Clean Stream Afterburners, LLC model CSA-600-CAT Catalytic Oxidizer system designed to treat a maximum roast air of 600 CFM. This afterburner will remove >95% of smoke, odor and VOC at 750 F.

Included is the stainless steel and black combustion chamber with integrated catalyst module with access door, 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. 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.

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 700-750 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 CSA-600-CAT will be a larger version of the above photos. A 3-4" layer of Ceramic Fiber refractory insulation lines the entire interior of the system. The burner mount, inlet duct and exhaust duct all feature 304 Stainless Steel transition ports for durability and heat resistance. The burner assembly will be concealed on 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 which in turn increases 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 one (1) Midco Propane/Natural-gas fired burner with integral combustion blower (similar to photo) for raising the temperature of the gasses to operating temperature as required. System shall be complete with flame safety controls and safeties. One (1) gas valve with an attached modulating motor will regulate the fuel using a digital controller. Typical fuel consumption would be appx 250-300k 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. At 750 F, >95% of smoke, odor, VOC and CO will be removed. The system will include a ceramic catalyst module featuring a platinum and palladium substrate. The catalyst module will be accessible and removable for routine cleaning and occasional replacement. Life expectancy of the catalyst is typically 30-40k hours of use or 10 years. The lower operating temperatures equate to substantial fuel savings over a traditional thermal oxidizer system.



CONTROLS

The package will come standard with a control panel for remote control and monitoring. All controls and safeties are operated from this panel. Combustion chamber temperature is read by a type-k thermocouple. A Honeywell UDC-1200 digital temperature controller is used to maintain a pre-set temperature by use of a motorized Belimo actuator with gas valve. Contacts will be provided for remote start and stop and pressure limit switch.

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 system is designed to operate with a variable waste gas input. Natural gas/propane will be controlled to maintain a pre-set temperature. The system will be able to self regulate the fuel input to both maintain temperature and adjust conditions to match the flow of the waste gas stream.

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 bottom photo shows the Right configuration. The main system base, control panel and pedestal are typically powder coated black, but a different color can be chosen by the customer. When placing your order, please specify your preferences.

STEP-DOWN TRANSFORMER

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

DESIGN DATA

Flow Rate	600	CFM	1020 CMH
Inlet Temp	200-350	F	94-176 C
Outlet Temp	600-900	F	315-427 C
Min. Burner Output	100k	Btu/Hr	
Max. Burner Output	300k	Btu/Hr	
Min. Natural Gas Pres	8"	Water Column	
Max Natural Gas Pres	15"	Water Column	
Gas Line Size NPT	1"		
Refractory Lining	3-4" Thick	6-9 CM	
Residence Time	0.5-.8	Second	
Destruction Eff.	>95	% at 750 F	

Combustion Chamber Specs:

304 Stainless & Carbon Steel		Composition	
Internal Volume	22.5	Cubic Feet	.64 Cubic Meters
Inside Diameter	30"		76.2 CM
Inside Height	55"		140 CM
Exterior skin	12-14 gauge	Thickness	
Overall Height	appx 77"		196 CM
Overall Width	appx 39"	Width	99 CM
Overall Length	appx 53"	Width	134 CM
Weight	appx 1100	Lbs	500 KG
Support Legs	3.5"	Height	9 CM
Inlet duct Center height	14.5"		37 CM
Inlet Duct	8-10"	OD	20-25.4 CM
Exhaust Duct	12"	OD	(12" ID Exhaust Needed)
Electrical	110/1/60	Voltage	
	8	Amps	

PRICE, TERMS & LEASE/FINANCE OPTIONS

Design, Fabrication, installation assistance, FOB Shops.

CSA-600-CAT Clean Stream Afterburner

W/ 95% Destruction Efficiency Catalyst Module

\$ 25,900.00 USD

TERMS: In order to keep production moving at an ideal pace, full payment with order via wire transfer is preferred.

FINANCING: Financing can be arranged through your own provider or:

Specialty Coffee Finance. Please contact Dan Harris for more details.
Danh@specialtycoffeefinance.com
Direct: 303-800-1059

Providence Capital Funding - Contact Alan Mireles
Alan.Mireles@providencecapitalfunding.com
Direct: 714-985-6221

DELIVERY: System shall be ready for pickup 4-5 weeks after the receipt of a valid purchase order, payment, and all required approvals. We can assist with freight. Rush fabrication/delivery is available. Typical freight dimensions are 48" x 60" x 82" and appx 1150 lbs. For crate, add 200 lbs

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 1000F 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 should be used. 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.

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.

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.

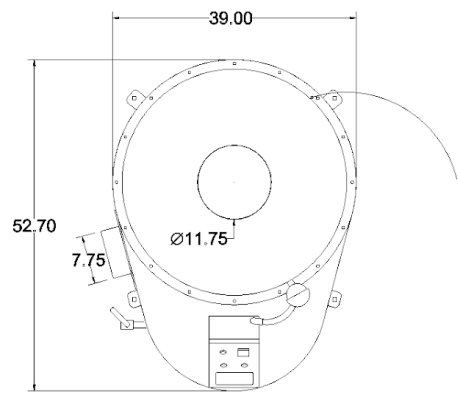
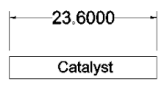
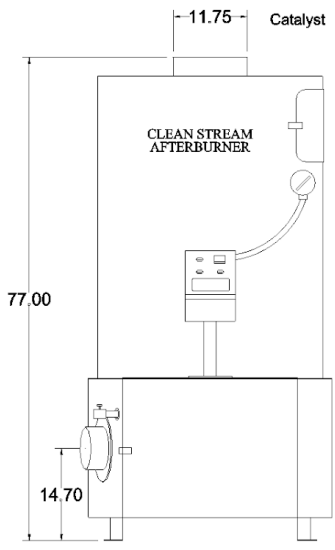
3. If needed, a Clean Stream Afterburners, LLC rep will spend 1-2 days onsite and handle finishing details, temperature controller programming and initial startup. Customer typically covers flight and travel expenses.

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 many foreign power grids. We can supply one at an additional charge if needed.



CSA-600-CAT with Probat 45 KG roaster
The connection ducting shown is 10" galvanized Nordfab ducting



<p>Clean Stream Afterburners, LLC Chris Parker - President HitempChris@Gmail.com 813-298-8989</p>	
CSA-600-CAT	6-9-2021