Page 1 **System Type** Electric Catalytic Oxidizer

System Specifications & Operating Parameters **250** SCFM

Thermal/Catalytic Oxidizer Specifications

Oxidizer Dimensions

Inside Width	1	Feet	6	Inches
Inside Depth	1	Feet	6	Inches
Outside Width	2	Feet	4	Inches
Outside Depth	2	Feet	4	Inches
Chamber Length	13	Feet	0	Inches
Chamber Retention Time				
Insulation Thickness	5"	Ceramic Fiber Modules		
Stack Exit Diameter	0	Feet	6	Inches
Stack Exit Velocity	12	Feet Per Second		
Mixing Throat Diameter	1	Feet	0	Inches
Throat Velocity	18	Feet Per Second		
Stack Discharge Height	13	Feet	0	Inches

Operating Temperatures

Thermal Mode

Chamber Temp	n/a	Degrees Fahrenheit
Maximum Stack Temp	n/a	Degrees Fahrenheit
Destruction Efficiency	n/a	Percent (%)
Maximum VOC Influent	n/a	ppmv

Catalytic Mode

Chamber Temp	650	Degrees Fahrenheit
Maximum Stack Temp	1150	Degrees Fahrenheit
Destruction Efficiency	98	Percent (%)
Maximum VOC Influent	3000	ppmv
Catalyst Type	Platinum Coated Ceramic Cell	
Catalyst Quantity	1	
Catalyst Size	0.51	Cubic Feet

Pump Package Specifications

Pump Data

Blower Type	Positive Displacement	
Maximum Flow Rate	250	Cubic Feet / Minute
Maximum Vacuum	10	Inches Mercury (" Hg)

Motor Data

Motor Size	10	Horsepower (Hp)
Motor Voltage	230	Volt
Motor Phase	3	Phase
Motor Type	TEFC	Outdoor Rated
Motor RPM	1750	RPM

Required Electricity From Hp to KW

Conversion From Hp to KW Use Multiplier of 0.746

(1) 11.00 * 0.746 **8.21** **KW**

(1) includes 1-hp, 240/480 VAC, 3-phase transfer pump

Page 2 **System Type** Electric Catalytic Oxidizer

System Specifications & Operating Parameters **250** SCFM

Energy Consumption Rates

Electrical Requirements

Voltage	230	Volts
Amperes	200	Amps
Phase	3	Phase
Hertz	60	Hertz
Largest Motor	10	Horsepower (Hp)
KiloWatts/Hour	7.46	KWH

Supplemental Fuel Requirements

Natural Gas

Thermal Mode

Pressure	n/a	Lbs/ Sq. In (PSI)
Flow Rate	n/a	Cubic Feet/ Second (CFS)
Line Size	n/a	NPT

Catalytic Mode

Pressure	n/a	Lbs/ Sq. In (PSI)
Flow Rate	n/a	Cubic Feet/ Second (CFS)
Flow Rate	n/a	NPT

Propane

Thermal Mode

Pressure	n/a	Lbs/ Sq. In (PSI)
Flow Rate	n/a	Cubic Feet/ Second (CFS)
Line Size	n/a	NPT

Catalytic Mode

Pressure	n/a	Lbs/ Sq. In (PSI)
Flow Rate	n/a	Cubic Feet/ Second (CFS)
Line Size	n/a	NPT

Air Sparge Package Specifications

Pump Data

Blower Type		n/a
Maximum Flow Rate	n/a	Cubic Feet / Minute
Maximum Pressure	n/a	Pounds/ Sq. Inches (PSI)

Motor Data

Motor Size	n/a	Horsepower (Hp)
Motor Voltage	n/a	Volt
Motor Phase	n/a	Phase
Motor Type	n/a	Outdoor Rated
Motor RPM	n/a	RPM

Required Electricity Conversion From Btu/Hr to KW

Conversion From Hp to KW Use Multiplier of 0.746

n/a * 0.746

n/a **KW**

Page 3 **System Type** Electric Catalytic Oxidizer w/o HTEX

Thermal Calculations For Thermal Oxidizer Rated For **250** SCFM

Table 1

Enthalpy Of Gas (Air)

Temp Deg F	Air
100	9.60
180	28.80
200	33.60
300	57.80
400	82.10
500	106.70
700	156.70
1000	234.10
1100	261.08

$$H(Ti) = H(T1) + \frac{(Ti-T1)}{(T2-T1)}(H(T2)-H(T1))$$

Variables

H = Enthalpy
Ti = Temperature Of gas stream
T1 = Lower Temperature In Enthalpy Table
T2 - Higher Temperature In Enthalpy Table

A Total Flow Calculation

0 CFM Combustion Air + 250 CFM Process Air = **250** **SCFM**

B Mass Flow Of Contaminated Gases

$$\frac{250 \text{ CFM} \times 60 \text{ Min/Hr}}{13.1 \text{ Lbs/Cubic Ft Air}} = \textbf{1145.04 Lbs/Hr}$$

(A)

C Heat Required To Increase The Temperature Of The Gases From T1 to T2

See Table 1 For Calculating Enthalpy Of Gases

Enthalpy Of Gas at T2	650	Deg F	=	132.5 Btu/Lb
Enthalpy Of Gas at T1	100	Deg F	=	9.6 Btu/Lb

132.5 - 9.6 = 122.9 Btu/Lb

C1

1145.04 Lbs/Hr (B) * 122.9 Btu/Lb (C) = **140,725.19** **Btu/Hr**

D Heat Losses From Oxidizer due to Radiation, Convection, And Conduction

Calculate a 10% value of Required Btu/Hr

140725.19 Btu/Hr (C1) * 0.1 = **14072.52** **Btu/Hr**

E Total Heat Required by Oxidizer

140,725.19 Btu/Hr (C1) + 14072.52 Btu/Hr (D) = **154,797.71** **Btu/Hr**

F1 Required Electricity Conversion From Btu/Hr to KW

Conversion From Btu/Hr to KW Use Multiplier of .00029

154,797.71 * 0.00029 = **44.89** **KW**

Page 4 **System Type** Electric Catalytic Oxidizer w/ HTEX

Thermal Calculations For Thermal Oxidizer Rated For **250** SCFM

Table 1

Enthalpy Of Gas (Air)

Temp Deg F	Air
100	9.60
180	28.80
200	33.60
300	57.80
400	82.10
500	106.70
700	156.70
1000	234.10
1100	261.08

$$H(Ti) = H(T1) + \frac{(Ti-T1)}{(T2-T1)}(H(T2)-H(T1))$$

Variables

H = Enthalpy
Ti = Temperature Of gas stream
T1 = Lower Temperature In Enthalpy Table
T2 - Higher Temperature In Enthalpy Table

A Total Flow Calculation

0 CFM Combustion Air + 250 CFM Process Air = **250** **SCFM**

B Mass Flow Of Contaminated Gases

$$\frac{250 \text{ CFM} \times 60 \text{ Min/Hr}}{13.1 \text{ Lbs/Cubic Ft Air}} = \textbf{1145.04 Lbs/Hr}$$

(A)

C Heat Required To Increase The Temperature Of The Gases From T1 to T2

See Table 1 For Calculating Enthalpy Of Gases

Enthalpy Of Gas at T2	650	Deg F	=	132.5 Btu/Lb
Enthalpy Of Gas at T1	300	Deg F	=	57.5 Btu/Lb

132.5 - 57.5 = 75 Btu/Lb

C1

1145.04 Lbs/Hr (B) * 75 Btu/Lb (C) = **85,877.86** **Btu/Hr**

D Heat Losses From Oxidizer due to Radiation, Convection, And Conduction

Calculate a 10% value of Required Btu/Hr

85877.86 Btu/Hr (C1) * 0.1 = **8587.79** **Btu/Hr**

E Total Heat Required by Oxidizer

85,877.86 Btu/Hr (C1) + 8587.79 Btu/Hr (D) = **94,465.65** **Btu/Hr**

F1 Required Electricity Conversion From Btu/Hr to KW

Conversion From Btu/Hr to KW Use Multiplier of .00029

94,465.65 * 0.00029

27.40 **KW**

Total Power Usage (KW)	
CATOX	
With 50% Efficient HTEX	**27.42 KW/hour**
W/O HTEX	**44.89 KW/hour**

Total Power Costs				
CATOX				
With 50% Efficient HTEX	**$36.17**	per day	**$13,201.32**	per year
W/O HTEX	**$59.18**	per day	**$21,599.09**	per year

HTEX - Heat Exchanger (pre-heat)