



A Division of Fintube Technologies, Inc.

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20067168

EQUIPMENT DATA

PREPARED FOR Superior Boiler Works
 REFERENCE 600 HP

PROPOSAL 294-60091-0-0
 DATE 1-23-2006

DESIGN

ASME CODE SECTION	I	CYLINDRICAL ECONOMIZER	MODEL 421241
TUBE SIDE FLUID	WATER	GAS SIDE FUEL	NATURAL GAS
FLUID FLOW	DOWN	GAS FLOW	VERTICAL
DESIGN TEMPERATURE (°F)	700	FLOW TYPE	COUNTER-CURRENT
DESIGN PRESSURE (psi)	490	EFFECTIVE SURFACE (ft ²)	1,127

PERFORMANCE

	<u>TUBE</u>	<u>SHELL</u>		
FLOW RATE (lb/hr)	20,075	20,752	HEAT EXCHANGED (Btu/hr)	737,961
TEMP IN (°F)	227	416	U EXTERNAL (Btu/hr-ft ² -°F)	7.713
TEMP OUT (°F)	263.5	281.8	LMTD (°F)	84.9
PRES IN (psi)	190	14.7	U BARE (Btu/hr-ft ² -°F)	72.112
PRES DROP (psi & in WC)	11.0	0.90	BARE TUBE SURFACE (ft ²)	121
VELOCITY (ft/sec)	5.4	34.5	MAX FIN TEMP (°F)	341
SPEC HEAT (Btu/lb-°F)	1.0082	0.2703	MAX TUBE WALL TEMP (°F)	286
FOULING (hr-ft ² -°F/Btu)	0.001	0.001	FLUID SAT TEMP (°F)	361

CONSTRUCTION

<u>TUBE SIDE</u>		<u>SHELL SIDE</u>	
NUMBER OF WRAPS	12	CASING	C/STL
NUMBER OF RINGS	2	INSULATION	2 in. CERAMIC FIBER
STREAMS	1	LAGGING	30 GA GALVANIZED
EFFECTIVE LENGTH (ft)	9.588		
NOZZLE SIZE	1.5 in. NPT	SOOTBLOWER TYPE	BUILT IN
TUBE MATERIAL	SA-178-A		
TUBE OD (in)	2.00	DRAWING NUMBER	CFE-V4
TUBE MIN WALL (in)	0.105		
TUBE PITCH	4.5 in. SQUARE	DIM A (OVERALL HEIGHT)	8'-0 3/4"
TUBE TYPE	FINNED	DIM B (NOZZLE C-C)	0'-5 1/2"
FIN MATERIAL	C/STL	DIM C (DIAMETER)	4'-3 1/2"
FIN TYPE	SERRATED		
FIN PITCH (fins per inch)	4		
FIN HEIGHT (in)	0.75	UNIT WEIGHT - DRY (lb)	3,636
FIN THICKNESS (in)	0.06	UNIT WEIGHT - WET (lb)	3,945
FIN SERRATION (in)	0.172		***NOP***

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ALTERNATE PERFORMANCE

TUBE DATA

FLOW (lb/hr)	15,073	10,045	5,000
TEMP IN (°F)	227	227	227
TEMP OUT (°F)	263.8	264.8	265.7
PRES DROP (psi)	6.3	2.9	0.8

SHELL DATA

FLOW (lb/hr)	15,564	10,376	5,188
TEMP IN (°F)	407	399	387
TEMP OUT (°F)	271.3	259.7	245.2
PRES DROP (in WC)	0.5	0.3	0.1

HEAT DUTY (Btu/hr)	559,641	383,055	194,955
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**EFFICIENCY &
 PAYBACK**

294-60091-0-0

100% Load					
IMPROVED EFFICIENCY			REPAYMENT BALANCE SHEET		
Enthalpy of steam at boiler operating pressure	1,199	Btu/lb	Btu recovered with economizer	0.7380	MMBtu
Steam produced by boiler	20,075	lb/hr	Steam produced by boiler	20,075	lb/hr
Btu produced by boiler	20,458,781	Btu	Fuel Cost	\$ 8.50	\$/MMBtu
Btu recovered with economizer	737,961	Btu	Hours boiler is operated	8,000	hrs/yr
% fuel saved	3.61%		Economizer Price	\$ 8,025	
% efficiency of boiler	83.05%		Installation Costs	\$ -	
Btu input into boiler	24,634,294	Btu	Freight	\$ -	
% Efficiency increase in boiler	3.00%		Fuel Saved per year	\$ 60,423	
Total Efficiency	86.05%		Payback Time	1.59	months

75% Load					
IMPROVED EFFICIENCY			REPAYMENT BALANCE SHEET		
Enthalpy of steam at boiler operating pressure	1,199	Btu/lb	Btu recovered with economizer	0.5535	mmBtu
Steam produced by boiler	15,056	lb/hr	Steam produced by boiler	15,056	lb/hr
Btu produced by boiler	15,344,086	Btu	Fuel Cost	\$ 8.50	\$/mmBtu
Btu recovered with economizer	553,471	Btu	Hours boiler is operated	8,000	hrs/yr
% fuel saved	3.61%		Economizer Price	\$ 8,025	
% efficiency of boiler	82.82%		Installation Costs	\$ -	
Btu input into boiler	18,527,029	Btu	Freight	\$ -	
% Efficiency increase in boiler	2.99%		Fuel Saved per year	\$ 45,443	
Total Efficiency	85.81%		Payback Time	2.1	months

50% Load					
IMPROVED EFFICIENCY			REPAYMENT BALANCE SHEET		
Enthalpy of steam at boiler operating pressure	1,199	Btu/lb	Btu recovered with economizer	0.3690	mmBtu
Steam produced by boiler	10,038	lb/hr	Steam produced by boiler	10,038	lb/hr
Btu produced by boiler	10,229,391	Btu	Fuel Cost	\$ 8.50	\$/mmBtu
Btu recovered with economizer	368,981	Btu	Hours boiler is operated	8,000	hrs/yr
% fuel saved	3.61%		Economizer Price	\$ 8,025	
% efficiency of boiler	82.80%		Installation Costs	\$ -	
Btu input into boiler	12,354,336	Btu	Freight	\$ -	
% Efficiency increase in boiler	2.99%		Fuel Saved per year	\$ 30,303	
Total Efficiency	85.79%		Payback Time	3.2	months

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