Owner:		Owner Ref.:		Ftnt
Purchaser:		Purchaser Ref.:		&
Manufacturer:		**THI** Ref.:	/	Rev
Service:		Unit No:		
Number:		Location:		
Process Duty:	**MMBTU/ hr**	Heater Type:		
Total Duty:	**MMBTU/ hr**			

PROCESS DESIGN CONDITIONS

		RADIANT	CONVECTION	CONVECTION	TOTAL
Heater Section	- - -				
Operating Case	- - -				
Service	- - -				
Heat Absorption	MMBTU/ hr				
Process Fluid	- - -				
Process Mass Flow Rate, Total	Lb/ hr				
Process Bulk Velocity (allow. / calc.)	ft/ s	/	/	/	
Process Mass Velocity (min./ calc.)	Lb/ s ft2	/	/	/	
Coking Allowance (dP calcs)	in				
Pressure Drop, Clean (allow. / calc.)	psi		/		
Pressure Drop, Fouled (allow. / calc.)	psi		/		
Average Heat Flux (allowable)	BTU/ hr ft2				
Average Heat Flux (calculated)	BTU/ hr ft2				
Maximum Heat Flux (allowable)	BTU/ hr ft2				
Maximum Heat Flux (calculated)	BTU/ hr ft2				
Fouling Factor, Internal	hr ft2 °F/ BTU				
Corrosion or Erosion Characteristics	- - -				
Max. Film Temperature (allow. / calc.)	°F	/	/	/	
Inlet Conditions:					
Temperature	°F				
Pressure	psig				
Mass Flow Rate, Liquid	Lb/ hr				
Mass Flow Rate, Vapor	Lb/ hr				
Weight Percent, Liquid / Vapor	wt%	/	/	/	
Density, Liquid / Vapor	Lb/ ft3	/	/	/	
Molecular Weight, Liquid / Vapor	Lb/ Lbmole	/	/	/	
Viscosity, Liquid / Vapor	cp	/	/	/	
Specific Heat, Liquid / Vapor	BTU/ Lb °F	/	/	/	
Thermal Conductivity, Liquid/Vapor	BTU/hr ft °F	/	/	/	
Surface Tension, Liquid	dyne/ cm	/	/	/	
Outlet Conditions:					
Temperature	°F				
Pressure	psig				
Mass Flow Rate, Liquid	Lb/ hr				
Mass Flow Rate, Vapor	Lb/ hr				
Weight Percent, Liquid / Vapor	wt%	/	/	/	
Density, Liquid / Vapor	Lb/ ft3	/	/	/	
Molecular Weight, Liquid / Vapor	Lb/ Lbmole	/	/	/	
Viscosity, Liquid / Vapor	cp	/	/	/	
Specific Heat, Liquid / Vapor	BTU/ Lb °F	/	/	/	
Thermal Conductivity, Liquid/Vapor	BTU/hr ft °F	/	/	/	
Surface Tension, Liquid	dyne/ cm	/	/	/	

Rev.00	29-Feb-12	Issued w/ Initial Proposal	JEH	COX	VPS
revision	date	description	by	chk'd	appv'd

TULSA HEATERS INC.

SHO = Superior Quality, Flexibility, Dependability & Modularity

FIRED HEATER DATA SHEET

AMERICAN ENGINEERING SYSTEM of UNITS

Owner Ref.: **Later** THI Ref.: **SHO.2000**

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COMBUSTION DESIGN CONDITIONS

Overall Performance:		**RADIANT**	**CONVECTION**	**CONVECTION**	**TOTAL**
Operating Case	---	**Design Case**	**Design Case**	**Design Case**	**Design Case**
Service	---	Heat Medium	Heat Medium	Service "b"	
Excess Air	mol%				
Calculated Heat Release (LHV)	MMBTU/ hr				
Guaranteed Efficiency	HR%				
Calculated Efficiency	HR%				
Radiation Loss	HR%				
Flow Rate, Combustion Gen./ Imported	Lb/ hr				
Flue Gas Temperature Leaving Section	°F				
Flue Gas Mass Velocity	Lb/ sec ft2				

Fuel(s) Data:		**Design Mol.Wt.**	**Min. Mol.Wt.**	**Max. Mol.Wt.**	**Design Fuel Oil**
LHV	BTU/ scf				---
LHV	BTU/ Lb				
P @ Burner	psig				
T @ Burner	°F				
MW	Lb/ Lbmole				
μ @ ??? °F	cp				
μ @ ??? °F	cp				
Atomizing Media					
Atom. Media P & T					
Components:					
N	wt%				
S	wt%				
Ash	wt%				
Ni	ppm				
Va	ppm				
Na	ppm				
Fe	ppm				
H2	mol%				---
O2	mol%				---
N2 + Ar	mol%				---
CO	mol%				---
CO2	mol%				---
CH4	mol%				---
C2H6	mol%				---
C2H4	mol%				---
C3H8	mol%				---
C3H6	mol%				---
C4H10	mol%				---
C4H8	mol%				---
C5H12	mol%				---
C5H10	mol%				---
C6+	mol%				---
H2S	mol%				---
SO2	mol%				---
NH3	mol%				---
H2O	mol%				---
spare	mol%				---

Burner Design:

OEM	---	
Type	---	
Quantities	---	
Model No.1	---	
Model No.2	---	
Windbox	---	
Location	---	

Pilot Design:

Type	---	
Model	---	
Ignition	---	
Heat Release	--	

Burner Performance:		**Model 1**	**Model 2**
Minimum Heat Release	MMBTU/ hr		
Design Heat Release	MMBTU/ hr		
Maximum Heat Release	MMBTU/ hr		
Burner Turndown	Max:Min		
Volumetric Ht. Release	BTU/ hr ft3	16,370	
Pressure @ Arch	inH2O		
Pressure @ Burner	inH2O		
Combustion Air T @ Burner	°F		
Flue Gas T @ Burner	°F		

Emissions - Estimated:		**<-- Combined -->**	
Basis of Guarantee	---		
NOx Emissions	Lb/MMBTU		
SOx Emissions	Lb/MMBTU		
CO Emissions	Lb/MMBTU		
UHC Emissions	Lb/MMBTU		
VOC Emissions	Lb/MMBTU		
SPM10 Emissions	Lb/MMBTU		
Noise Emissions	dBA @ 3ft		

Combustion System Features:

BMS Functions	
Comb. Controls	
Duty Controls	
Main/ Pilot Trains	
Local Panel	
FD System	
Area Class	

Nominal Flame Clearances: from burner CL ...		**Vertical**	**Horizontal**
to Tube CL, API	ft		
to Tube CL, calc.	ft		
to Refrac., calc.	ft		

Net Flame Clearances:	
Est. Flame Size	
Hor Clearance	
Vert. Clearance	
Axial Clearance	

Owner Ref.: **Later** THI Ref.: **SHO.2000**

PRESSURE PARTS DESIGN

			RADIANT	SHIELD	CONVECTION	CONVECTION
Coil Design:						Ftnt & Rev
Service		---				Service "b"
Design Basis for Tube Temperature		---				
Design Basis for Tube Wall Thickness		---				
Design Life		hr				
Design Pressure (elastic / rupture)		psig	/	/	/	
Design Fluid Temperature		°F				
Design Temperature Allowance		°F				
Design Corrosion Allowance (tubes/fittin		in	/	/	/	/
Maximum Tube Temperature (clean)		°F				
Maximum Tube Temperature (fouled)		°F				
Design Tube Temperature		°F				
Inside Film Coefficient		BTU/ hr ft2 °F				
Weld Inspection		RT or Other				
Weld Heat Treatment		s.rel., t.stab. or none				
Hydrostatic Test Pressure		psig				
Coil Arrangement:						
Coil Type		---				
Tube Material (pipe or tube spec)		ASTM				
Supplementary Mfg Requirements		ASTM				
Tube Outside Diameter		in				
Tube Wall Thickness (aw / mw)		in	/	/	/	/
Number of Cells (radiant or convection)		---				
Number of Flow Passes (total / cell)		---	/	/	/	/
Number of Tubes per Row (total / cell)		---		/	/	/
Overall Tube (1 turn in radiant) Length		ft				
Effective Tube Length / Helix Diameter		ft	/			
Number of Turns or Tubes (total / pass)		---	/	/	/	/
Total Exposed Surface		ft2				
Number of Ext.Surf. Tubes (total / cell)		---	/	/	/	/
Total Exposed Surface		ft2				
Tube Spacing (horizontal / tube centers)		in	/	/	/	/
Tube Spacing (horizontal to refractory)		in				
Coil Fittings:						
Fitting Type		---				
Fitting Material		ASTM				
Supplementary Mfg Requirements		ASTM				
Fitting Outside Diameter		in				
Fitting Wall Thickness (aw / mw)		in	/	/	/	/
Fitting Location		internal or external				
Tube Attachment		welded or rolled				
Coil Terminals:						
Terminal Type		beveled or flanged				
Flange Material		ASTM				
Supplementary Mfg Requirements		ASTM				
Flange Size and Rating		NPS/ ASME				
Flange Type		RFWN or RTJ				
Location		---				
Extended Surface:				CONVECTION	CONVECTION	CONVECTION
Service		---				
Fin or Stud Row Number		starting @ bottom		/	/	/
Ext. Surface Type		seg.fins, solid fins, studs				
Fin/Stud Material		---		/	/	/
Fin/Stud Dimensions		H x T, in				
Fin/Stud Density		fin/ in or stud/ plane		/	/	/
Maximum Fin/Stud Temperature		°F		/	/	/

PRESSURE PARTS DESIGN (continued)

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	RADIANT	SHIELD	CONVECTION	CONVECTION
Crossovers:				
Type, location / connections ---				
Tube / Fittings Material ASTM				
Tube & Fitting OD / Thickness (aw) in				
Inlet Manifold(s): type				
Location ---				
Pipe Material ASTM				
Fittings Material ASTM				
Design Basis for Manifold Thickness ---				
Design Conditions (temp./press.) °F/ psig				
Outside Diameters, each Branch in				
Wall Thickness(es); aw ~~or mw~~ in				
Tube Connection Type extrusion, olet, etc.				
End Types (terminal/ dead) beveled or flanged				
Terminal Flange Material ASTM				
Terminal Flange Size and Rating NPS/ ASME				
Terminal Flange Style RFWN or RTJ				
Outlet Manifold(s): type				
Location ---				
Pipe Material ASTM				
Fittings Material ASTM				
Design Basis for Manifold Thickness ---				
Design Conditions (temp./press.) °F/ psig				
Outside Diameters, each Branch in				
Wall Thickness(es); aw ~~or mw~~ in				
Tube Connection Type extrusion, olet, etc.				
End Types (terminal/ dead) beveled or flanged				
Terminal Flange Material ASTM				
Terminal Flange Size and Rating NPS/ ASME				
Terminal Flange Style RFWN or RTJ				

COIL & MANIFOLD SUPPORTS DESIGN

	RADIANT	SHIELD	CONVECTION	CONVECTION
Tube Supports:				
Service ---				
Location Top, Bottom, Ends				
Support Type casting, tubesht, spring, etc.				
Support Thicknesses in				
Support Materials ASTM				
Support Temperatures (calc./ design) °F / °F				
TbSht Ferrules Thickness / Materials in/ ASTM				
Refractory & Anchor Materials & Types ---				
Intermediate Guides & Supports:				
Location ---				
Guide/ Support Type casting, spring, etc.				
Material ASTM				
Spacing, average ft				
Tube Guides: Top, Bottom, Ends				
Material ASTM				
Manifold Supports:				
Material ASTM				
Materials Design & Supply ---				
Location Top, Bottom, Ends				
Support Type roller, shoe, spring, etc.				
Number of Supports ---				

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CASING / REFRACTORY SYSTEMS DESIGN

Radiant Section Design:		**BURNER ENDWALL**	**BURNER FIREWALL**	**SHIELDED SIDEWALLS**	**ARCH ENDWALL**
Total Refractory Thickness	in				
Hot Face Temperature (design)	°F				
Hot Face Temperaure (calculated)	°F				
Hot Face Layer	in/ - - -				
Back-Up Layer No.1	in/ - - -				
Back-Up Layer No.2	in/ - - -				
Foil Vapor Barrier	in/ - - -				
Castable Reinforcement (SS Needles)	wt%				
Anchors / Tie Backs:	- - -				
Material	- - -				
Attachment	- - -				
Casing:					
Material	in/ ASTM				
Internal Coating	- - -				
External Temperature, Typical	°F				
Comments / Clarifications	- - -				
		SHOP Installed	SHOP Installed	SHOP Installed	SHOP Installed

		SIDEWALLS		**ENDWALLS**	
Convection Section Design:		**SHIELD**	**FINNED**	**TUBESHEETS**	**HEADER BOXES**
Total Refractory Thickness	in				
Hot Face Temperature (design)	°F				
Hot Face Temperaure (calculated)	°F				
Hot Face Layer	in/ - - -				
Back-Up Layer No.1	in/ - - -				
Back-Up Layer No.2	in/ - - -				
Foil Vapor Barrier	in/ - - -				
Castable Reinforcement (SS Needles)	wt%				
Anchors / Tie Backs:	- - -				
Material	- - -				
Attachment	- - -				
Casing:					
Material	in/ ASTM				
Internal Coating	- - -				
External Temperature, Typical	°F				
Comments / Clarifications	- - -				
	- - -	SHOP Installed	SHOP Installed	SHOP Installed	SHOP Installed

		FLUE GAS DUCTS			
Stack & Uptakes Design:		**BREECHING**	**15° TRANSITION**	**DISCH. DUCT**	
Quantity					
Type / Location	- - -				
Length / Metal Outside Diameter (top)	ft/ ft				
Discharge Elev., minimum/ calculated	ft/ ft				
Total Refractory Thickness	in				
Hot Face Temperature (design)	°F				
Hot Face Temperaure (calculated)	°F				
Hot Face Layer	in/ - - -				
Back-Up Layer No.1	in/ - - -				
Castable Reinforcement (SS Needles)					
Anchors / Tie Backs:	- - -				
Material	- - -				
Attachment	- - -				
Casing:					
Minimum Thickness/ Material	in/ ASTM				
Corrosion Allowance	in				
Internal Coating	- - -				
External Temperature, Typical	°F				
Comments / Clarifications	- - -	SHOP Installed			

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MECHANICAL / STRUCTURAL DESIGN BASIS

Refractory & Coatings Design:

Refractory Design	
Refractory Dryout	
Coating, Internal	
Coating, External	

Applicable Standards:

API		AISC	
API		AWS	
ASME		ASTM	
ASME		ASTM	
ASME		NFPA	

Wind Design:

Spec. or Standard	
Velocity/ Imp. Factor	
Site Exposure	

Seismic Design:

Spec. or Standard	
Zone/ Imp. Factor	
spare	

Physical Design:

Plot Limitations	
Tube Limitations	
Firebox Pressure	
Ambient Temp's	

Site Design Basis:

Site Elevation	
Stack Design Temp.	
FG Discharge Elev., min.	
Area Classification	

MAJOR SUBSYSTEMS & ACCESSORIES

Major Services & Subsystems

Process Design	
Mechanical Design	
Structural Design	
Radiant Section	
Convection Section	
Burner Management	
Burner Piping	
Forced Draft System	

Major Accessories:

Casing/ Tube Seals	
Observation Doors	
Observation Doors	
Access Doors	
Access Doors	
Tube Pulling Doors	
Pressure Relief Doors	
Expansion Joints	

Casing Penetrations

Fbox Purge/ Snuff	
CA Temperature	
CA Pressure	
FG Temperature	
FG Pressure	
FG Composition	
FG Comp. (AE - O2)	
FG Comp. (AE - CO)	
FG Comp. (AE - EPA)	
FG Comp. (AE - CEM	

Pressure Part Penetrations

Coil TSTC's, Radiant	
Coil TSTC's, Convection	
Process TI conn's	
Process PI conn's	
Velocity Steam conn's	
S/A Decoking conn's	
Vent / Drain conn's	
spare	
spare	
spare	

Dampers:	**FD Fan** ref. page 7	**Uptake Ducts** quantity =	**Stack** quantity =
Function			Note: O2 Control is provided by
Design			Forced Draft Fan's Damper / VFD
Materials			
Bearings			
Operator			
Positioner			
Instruments			

Sootblowers:	Qty.	Type	Location	FG T	Material	Steam T & P	O.E.M. / Ref.
Lane 1:	None						
Lane 2 :	None						

MAJOR SUBSYSTEMS & ACCESSORIES (continued,

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Fan Assemblies:		**Forced Draft Fan Assembly**		**Induced Draft Fan Assembly**		
FD / ID Fans Design Basis	mass.flow.%	115% of Heater Design Mass Flows				
Quantity of Assemblies	- - / %	One (1) Forced Draft Fan Assembly		None Induced Draft Fan Assembly		
Location(s)	- - -	@ Grade, adjacent to Burner Endwall				
Area Classification	NEC	area class:				
Process Design:		**Heater Design**	**FD Fan Design or "Test Block"**			
Mass Flow Rate/ % Htr Design	Lb/ hr					
Volumetric Flow/ % Htr Design	aft3/ min					
Density, @ Suction & noted T & P	Lb/ ft3					
Design Allowances, Temp./ SP	°F/ %					
Temperature @ Suction, Design	°F					
Static Pressure @ Suction, Design	inH2O					
Site Elevation/ Atm. Pressure	ftAMSL/ psia					
Static Pressure Rise (min./ guar.)	inH2O					
Static Efficiency (min./ guar.)	%					
Fan Speed (allowable/ actual)	RPM					
Sound Pressure (allowable/ guar.)	dBA					
Fan Mechanical Design:	fan OEM					
OEM Reference	- - -					
OEM Model &/or Type-Size	- - -					
Arrangement	- - -					
Brake Power (calculated)	HP					
Temperature, Maximum Operating	°F					
Casing Description	- - -					
Casing Material(s)	- - -					
Blade Description	- - -					
Blade & Rotor Assembly Material(s)	- - -					
Shaft Description	- - -					
Shaft Seals Description	- - -					
Bearings Description	- - -					
Bearing Instrumentation Description	- - -					
Coupling Description	- - -					
Silencer Description	- - -					
External Insulation Provisions	- - -					
External Coatings & Surface Prep.	- - -					
Purchase Specifications	- - -					
Fan Control Design:	OEM					
VFD Description	- - -					
VFD Rating	- - -					
Damper Description	- - -					
Actuator Description	- - -					
Actuator Operation	- - -					
External Coatings & Prep.	- - -					
Motor Design:	mtr OEM					
OEM Reference	- - -					
Motor Type / Frame Size	- - -					
Rated Power w/ SF @ Speed	NEMA					
Local Power	V/ Hz/ ph					
Rotor Description	- - -					
Shaft Seals Description	- - -					
Bearings Description	- - -					
Insulation Description	- - -					
spare	- - -					
External Coatings & Surface Prep.	- - -					
Purchase Specifications	- - -					