

PURCHASER / OWNER:


ITEM NO.:

SERVICE:

LOCATION:

1	UNIT:		NUMBER REQUIRED:		Rev
2	MANUFACTURER:		REFERENCE:		
3	TYPE OF HEATER:	Cubical (Twin-Cell)			
4	TOTAL HEATER ABSORBED DUTY [kW]	60382.6354			
5	<b>PROCESS DESIGN CONDITIONS</b>				
6	OPERATING CASE	AS SIMULATED	AS SIMULATED	AS SIMULATED	AS SIMULATED
7	HEATER SECTION	Firebox	PROC-BARE	PROC-STUD	LPS-TB
8	SERVICE				
9	HEAT ABSORPTION [kW]	38544.1105	15018.2902	5872.153	948.0816
10	FLUID	To 2H-101	To 2H-101	To 2H-101	LPS
11	MASS FLOW RATE [kg/hr]	566996.3	566996.3	566996.3	12800.1
12	VOLUMETRIC FLOW RATE (Act.) [m3/hr]		794.5	750.2	5451.4
13	PRESSURE DROP, ALLOWABLE (CLEAN /FOULED) [bar]				
14	PRESSURE DROP, CALCULATED [bar]	6.761	0.75	0.15	0.651
15	AVG. RAD. SECT. FLUX DENSITY, ALLOWABLE [kW/m2]				
16	AVG. RAD. SECT. FLUX DENSITY, CALCULATED [kW/m2]	34.911	-	-	-
17	MAX. RAD. SECT. FLUX DENSITY [kW/m2]	60.715	-	-	-
18	CONV. SECT. FLUX DENSITY, (BARE TUBE) [kW/m2]	-	22.933	29.89	3.579
19	PROCESS FLUID VELOCITY (@ OUTLET) [m/s]	62.62	5.86	2.05	54.05
20	PROCESS FLUID MASS VELOCITY [kg/s.m2]	1525.31	1525.31	1525.31	86.58
21	MAX. CALC. INSIDE FILM TEMPERATURE [C]	366.81	293.75	261.76	353.26
22	AVG. FOULING FACTOR (Gas & Process Sides) [m2.K/W]	0	0	0	0
23	AVG. COKE THICKNESS [cm]	0	0	0	0
24	<b>INLET CONDITIONS:</b>				
25	TEMPERATURE [C]	278.68	244.7	229.44	215.56
26	PRESSURE [bar]	10.476	11.227	11.376	5.171
27	LIQUID FLOW [kg/hr]	530861.6	566996.3	566996.3	0
28	VAPOR FLOW [kg/hr]	36134.7	0	0	12800.1
29	LIQUID GRAVITY [@ 15 C]	0.726	0.743	0.756	-
30	VAPOR DENSITY [kg/m3]	24.943	-	-	2.35
31	VISCOSITY (LIQUID/VAPOR) [cP]	0.0679 / 0.0141	0.0728 / -	0.076 / -	- / 0.0167
32	SPECIFIC HEAT (LIQUID/VAPOR) [kJ/kg.K]	2.5442 / 2.4255	2.4506 / -	2.402 / -	- / 2.1215
33	THERMAL CONDUCTIVITY (LIQUID/VAPOR) [W/m.K]	0.0743 / 0.0384	0.0694 / -	0.073 / -	- / 0.0362
34	<b>OUTLET CONDITIONS:</b>				
35	TEMPERATURE [C]	347.2	278.68	244.7	343.18
36	PRESSURE [bar]	3.715	10.476	11.227	4.52
37	LIQUID FLOW [kg/hr]	298534.9	530861.6	566996.3	0
38	VAPOR FLOW [kg/hr]	268461.4	36134.7	0	12800.1
39	LIQUID GRAVITY [@ 15 C]	0.759	0.726	0.743	-
40	VAPOR DENSITY [kg/m3]	11.732	24.943	-	1.602
41	VISCOSITY (LIQUID/VAPOR) [cP]	0.0644 / 0.0139	0.0679 / 0.0141	0.0728 / -	- / 0.022
42	SPECIFIC HEAT (LIQUID/VAPOR) [kJ/kg.K]	2.6669 / 2.5472	2.5442 / 2.4255	2.4506 / -	- / 2.0687
43	THERMAL CONDUCTIVITY (LIQUID/VAPOR) [W/m.K]	0.0857 / 0.0414	0.0743 / 0.0384	0.0694 / -	- / 0.0487

NOTE:

 FIRED HEATER DATA SHEET API STD - 560 (Short Version)	<b>UNIT: Customized SI Units</b>		
	<b>PROJECT NUMBER</b>		<b>SHEET</b>
			1
			<b>REV</b>

# COMBUSTION DESIGN CONDITIONS

1	OPERATING CASE	AS SIMULATED	Rev
2	TYPE OF FUEL	Fuel Oil	
3	EXCESS AIR [Percent]	30	
4	CALCULATED HEAT RELEASE (LHV) [kW]	66937.4324	
5	FUEL EFFICIENCY CALCULATED, % (LHV)	90.21	
6	FUEL EFFICIENCY GUARANTEED, % (LHV)	By Vendor	
7	RADIATION LOSS, % OF HEAT RELEASE (LHV)	3	
8	FLUE GAS TEMPERATURE LEAVING RADIANT SECTION [C]	961.99	
9	FLUE GAS TEMPERATURE LEAVING CONVECTION SECTION [C]	394.27	
10	FLUE GAS TEMPERATURE LEAVING AIR PREHEATER [C]	159.67	
11	FLUE GAS QUANTITY [kg/hr]	113505.3	
12	FLUE GAS MASS VELOCITY THROUGH CONVECTION SECTION [kg/s.m <sup>2</sup> ]	1.64 / 1.66 / 2.99	
13	DRAFT AT ARCH [mmH <sub>2</sub> O]	-30.4158	
14	DRAFT AT BURNERS [mmH <sub>2</sub> O]	-37.8294	
15	AIR TEMPERATURE, EFFICIENCY CALCULATION [C]	285	
16	AIR TEMPERATURE, STACK DESIGN [C]	40.56	
17	ALTITUDE ABOVE SEA LEVEL [m]	806.9	
18	VOLUMETRIC HEAT RELEASE (LHV) [kW/m <sup>3</sup> ]	68.9	


## FUEL CHARACTERISTICS

20	GAS TYPE	LIQUID TYPE	COMBINATION GAS / LIQUID
21	LHV [kJ/kg]	LHV [kJ/kg]	LHV [kJ/kg]
22	HHV [kJ/kg]	HHV [kJ/kg]	HHV [kJ/kg]
23	PRESS. @ BURNER [bar]	PRESS. @ BURNER [bar]	PRESS. @ BURNER [bar]
24	TEMP. @ BURNER [C]	TEMP. @ BURNER [C]	TEMP. @ BURNER [C]
25	MOLECULAR WEIGHT	VISCOSITY [cP]	MOLECULAR WEIGHT
26		ATOMIZING STEAM TEMP. [C]	
27	<b>COMPOSITION</b>	<b>VOL. %</b>	ATOMIZING STEAM FLOW [kg/hr]
28			
29		<b>COMPOSITION</b>	<b>WT. %</b>
30		CARBON	TOTAL CARBON
31		HYDROGEN	TOTAL HYDROGEN
32		NITROGEN	TOTAL NITROGEN
33		OXYGEN	TOTAL OXYGEN
34		SULFUR	TOTAL SULFUR
35		WATER	TOTAL IMPURITIES
36		ASH	

## BURNER DATA

38	MANUFACTURER:	SIZE / MODEL NO:	NUMBER:	48
39	TYPE: Conventional	LOCATION: Floor	ORIENTATION:	Vertically-Fired
40	HEAT RELEASE PER BURNER [kW]	DESIGN: 1533.9828 (1)	NORMAL: 1394.5298	MINIMUM:
41	PRESSURE DROP ACROSS BURNER [mmH <sub>2</sub> O]	N/A		
42	DISTANCE BURNER CENTER LINE TO TUBE CENTER LINE [m]	HORIZONTAL: 1.302	VERTICAL: 7.874	
43	DISTANCE BURNER CENTER LINE TO UNSHIELDED REFRACTORY [m]	HORIZONTAL:	VERTICAL: 9.06	
44	PILOT, TYPE: Self-Inspiring (2)	Capacity [W]	21980.3 (1)	
45	IGNITION METHOD:			
46	FLAME SCANNERS, LOCATION:	NUMBER:		
47	REQUIRED EMISSIONS: ppmv(d)	NOX: 300 (2)	CO: 150 (1)	SOX: 580 (2)
48		UHC:	PARTICULATES:	200 (2)
49				


50	<b>NOTE:</b>
51	(1) AS PER API STD 560 FOR DESIGN CASE.
52	(2) SUGGESTED BY FHinfinity.
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## MECHANICAL DESIGN CONDITIONS

1	HEATER SECTION:	Firebox	PROC-BARE	PROC-STUD	LPS-TB
2	<b>COIL DESIGN:</b>				
3	DESIGN BASIS: TUBE WALL THICKNESS (CODE OR SPECIFICATION)	API STD. 530	API STD. 530	API STD. 530	API STD. 530
4	DESIGN BASIS: RUPTURE STRENGTH (MINIMUM OR AVERAGE)				
5	DESIGN LIFE [hr]	100,000 (1)	100,000 (1)	100,000 (1)	100,000 (1)
6	DESIGN PRESSURE, ELASTIC / RUPTURE [bar]				
7	DESIGN FLUID TEMPERATURE [C]	374.98	306.46	272.48	370.96
8	TEMPERATURE ALLOWANCE (MIN.) [C]	15 (1)	15 (1)	15 (1)	15 (1)
9	CORROSION ALLOWANCE, TUBES / FITTINGS [cm]				
10	HYDROSTATIC TEST PRESSURE [bar]				
11	POST WELD HEAT TREATMENT (YES OR NO)				
12	PERCENT OF WELD FULLY RADIOGRAPHED				
13	MAXIMUM TUBE METAL TEMPERATURE [C]	380.55	301.77	269.69	353.62
14	DESIGN TUBE METAL TEMPERATURE [C]	408.32	329.55	297.46	381.39
15	MINIMUM INSIDE FILM COEFFICIENT [W/m <sup>2</sup> .K]	2649.27	2377.57	2381.88	276.35
16	<b>COIL ARRANGEMENT:</b>				
17	TUBE ORIENTATION: VERTICAL OR HORIZONTAL	Horizontal	Horizontal	Horizontal	Horizontal
18	TUBE MATERIAL (ASTM SPECIFICATION and also GRADE)	ASTM A335...	ASTM A335...	ASTM A335...	ASTM A106...
19	TUBE OUTSIDE DIAMETER [cm]	14.13	14.13	14.13	11.43
20	TUBE WALL THICKNESS, (AVERAGE) [cm]	0.655	0.655	0.655	0.602
21	NUMBER OF FLOW PATHS	8	8	8	5
22	NUMBER OF TUBES	136	80	24	40
23	NUMBER OF TUBES PER ROW (CONVECTION SECTION)	-	8	8	10
24	STRAIGHT TUBE LENGTH [m]	18.44	18.44	18.44	18.44
25	EFFECTIVE TUBE LENGTH [m]	18.288	18.44	18.44	18.44
26	BARE TUBES: NUMBER	136	80		40
27	TOTAL EXPOSED SURFACE [m <sup>2</sup> ]	1104.07	654.87		264.87
28	EXTENDED SURFACE TUBES: NUMBER	-		24	
29	TOTAL EXPOSED SURFACE [m <sup>2</sup> ]	-		569.59	
30	TUBE LAYOUT (IN-LINE OR STAGGERED)	In-Line	Staggered	Staggered	Staggered
31	TUBE SPACING, CENT. TO CENT.: HORZ. x DIAG. [cm]	25.4	25.4 x 25.399	25.4 x 25.399	20.32 x 20.32
32	SPACING TUBE CENT. TO FURNACE WALL [cm]	22.225			
33	CORBELS (YES OR NO)	No	No	No	No
34	CORBEL WIDTH [cm]	-	0	0	0
35	<b>DESCRIPTION OF EXTENDED SURFACE:</b>				
36	TYPE: (STUDS) (SOLID FINNS)	-	BARE	STUDS	BARE
37	MATERIAL	-		Carbon St...	
38	DIMENSIONS (HEIGHT x DIA. or HEIGHT x THICK.) [cm]	-		2.54 x 1.27	
39	SPACING (FINNS/cm) (PLANE/cm x STUDS/PLANE)	-		1.56 x 13	
40	MAXIMUM TIP TEMPERATURE, (CALCULATED) [C]	-		309.67	
41	EXTENSION RATIO	-	1	2.9	1

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