Heater Datasheet

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	**PROCESS DESIGN CONDITIONS**					
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	**INLET CONDITIONS:**					
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	**OUTLET CONDITIONS:**					
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:

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.m2]	1.64 / 1.66 / 2.99	
13	DRAFT AT ARCH [mmH2O]	-30.4158	
14	DRAFT AT BURNERS [mmH2O]	-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/m3]	68.9	

FUEL CHARACTERISTICS

20	**GAS TYPE**			**LIQUID TYPE**		**COMBINATION GAS / LIQUID**		
21	LHV [kJ/kg]			LHV [kJ/kg]	40069.71	LHV [kJ/kg]		
22	HHV [kJ/kg]			HHV [kJ/kg]	42447.47	HHV [kJ/kg]		
23	PRESS. @ BURNER [bar]			PRESS. @ BURNER [bar]		PRESS. @ BURNER [bar]		
24	TEMP. @ BURNER [C]			TEMP. @ BURNER [C]	110	TEMP. @ BURNER [C]		
25	MOLECULAR WEIGHT			VISCOSITY [cP]		MOLECULAR WEIGHT		
26				ATOMIZING STEAM TEMP. [C]	150			
27	**COMPOSITION**	**VOL. %**		ATOMIZING STEAM FLOW [kg/hr]	1202.8			
28								
29				**COMPOSITION**	**WT. %**	**COMPOSITION**	**WT. %**	
30				CARBON	84.4	TOTAL CARBON		
31				HYDROGEN	11	TOTAL HYDROGEN		
32				NITROGEN	0	TOTAL NITROGEN		
33				OXYGEN	0	TOTAL OXYGEN		
34				SULFUR	2.6	TOTAL SULFUR		
35				WATER	0	TOTAL IMPURITIES		
36				ASH	2			

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 [mmH2O]				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-Inspirating (2)	Capacity [W]	21980.3 (1)					
45	IGNITION METHOD:								
46	FLAME SCANNERS, LOCATION:				NUMBER:				
47	REQUIRED EMMISIONS:	ppmv(d)	NOX:	300 (2)	CO:	150 (1)	SOX:	580 (2)	
48			UHC:		PARTICULATES:		200 (2)		
49									
50	**NOTE:**								
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	**COIL DESIGN:**					
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/m2.K]	2649.27	2377.57	2381.88	276.35	
16	**COIL ARRANGEMENT:**					
17	TUBE ORIENTATION: VERTICAL OR HORIZONTAL	Horizontal	Horizontal	Horizontal	Horizontal	
18	TUBE MATERIAL (ASTM SPECIFICATION andalso 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 [m2]	1104.07	654.87		264.87	
28	EXTENDED SURFACE TUBES: NUMBER	-		24		
29	TOTAL EXPOSED SURFACE [m2]	-		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	**DESCRIPTION OF EXTENDED SURFACE:**					
36	TYPE: (STUDS) (SOLID FINS)	-	BARE	STUDS	BARE	
37	MATERIAL	-		Carbon St...		
38	DIMENSIONS (HEIGHT x DIA. or HEIGHT x THICK.) [cm]	-		2.54 x 1.27		
39	SPACING (FINS/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	

NOTE:

Burner Datasheet

BURNER DATASHEET

PURCHASER / OWNER: **ITEM NO.:**

SERVICE: **LOCATION:**

	GENERAL DATA		
1	TYPE OF HEATER	Cubical (Twin-Cell)	Rev
2	ALTITUDE ABOVE SEA LEVEL [m]	806.9	
3	AIR SUPPLY		
4	AMBIENT/ PREHEATED AIR/ GAS TURBINE EXHAUST	Preheated Air	
5	TEMPERATURE [C]	285	
6	RELATIVE HUMIDITY [Percent]	0	
7	DRAFT TYPE: FORCED/ NATURAL/ INDUCED/ BALANCED	Balanced	
8	DRAFT AVAILABLE: ACROSS BURNER, [mmH2O]	-34.0464 (1)	
9	DRAFT AVAILABLE: ACROSS PLENUM, [mmH2O]	-	
10	REQUIRED TURNDOWN		
11	BURNER WALL SETTING TICKNESS [m]	By Vendor	
12	HEATER CASING THICKNESS [m]	0.005	
13	FIREBOX HEIGHT (LINING INSIDE) [m]	9.06	
14	TUBE CIRCLE DIAMETER [m]	N/A	
	BURNER DATA		
15	MANUFACTURER		
16	TYPE OF BURNER	Conventional	
17	MODEL / SIZE		
18	DIRECTION OF FIRING	Vertically-Fired	
19	LOCATION (ROOF/ FLOOR/ SIDEWALL)	Floor	
20	NUMBER REQUIRED	48	
21	MINIMUM DISTANCE BURNER CENTERLINE [m]		
22	TO TUBE CENTERLINE (HORIZONTAL)	1.302	
23	TO ADJACENT BURNER CENTERLINE (HORIZONTAL)	0.732 (Estimated)	
24	TO UNSHIELDED REFRACTORY (HORIZONTAL)		
25	BURNER CIRCLE DIAMETER [m]	N/A	
26	PILOTS:		
27	NUMBER REQUIRED	One per Burner (1)	
28	TYPE	Self-Inspirating (2)	
29	IGNITION METHOD	Electrical Portable (2)	
30	FUEL	Fuel Gas (1)	
31	FUEL PRESSURE [bar]	1.265 - 1.954 (2)	
32	CAPACITY [W]	21980.3 (1)	
	OPERATING DATA		
33	FUEL	Fuel Oil	
34	HEAT RELEASE PER BURNER [kW]		
35	DESIGN	1533.9828 (1)	
36	NORMAL	1394.5298	
37	MINIMUM		
38	EXCESS AIR @ DESIGN HEAT RELEASE. %	30	
39	AIR TEMPERATURE [C]	285	
40	DRAFT (AIR PRESSURE) LOSS [mmH2O]		
41	DESIGN		
42	NORMAL	N/A	
43	MINIMUM		
44	FUEL PRESSURE REQUIRED @ BURNER [bar]	N/A	
45	FLAME LENGTH @ DESIGN HEAT RELEASE [m]	0.725	
46	FLAME SHAPE (ROUND, FLAT, ETC.)	N/A	
47	AOMIZING MEDIUM/OIL RATIO [kg/kg]	0.2	

NOTES:

48	*(1) AS PER API STD 535 FOR DESIGN CASE.*	
49	*(2) SUGGESTED BY FHinfinity(C).*	

	GAS FUEL CHARACTERISTICS		
1	FUEL TYPE	NONE	Rev
2	HEATING VALUE (LHV) [kJ/kg]		
3	SPECIFIC GRAVITY (AIR=1)		
4	MOLECULAR WEIGHT		
5	FUEL TEMPERATURE @ BURNER [C]		
6	FUEL PRESSURE @ BURNER [bar]		
7	FUEL GAS COMPOSITION, MOLE %		
8			
9			
10			
11			
12			
13			
14			
15	TOTAL		
	LIQUID FUEL CHARACTERISTICS		
16	FUEL TYPE	Fuel Oil	
17	HEATING VALUE (LHV) [kJ/kg]	40069.71	
18	SPECIFIC GRAVITY/ DEGREE API	0.958 (@ 15 C)	
19	H/C RATIO (BY WEIGHT)	0.1302	
20	VISCOSITY @ [C] (SSU)		
21	VISCOSITY @ [C] (SSU)		
22	VANADIUM, ppm		
23	SODIUM, ppm		
24	POTASSIUM, ppm		
25	NICKEL, ppm		
26	NITROGEN, wt%		
27	SULFUR, wt%	2.59	
28	ASH, wt%	2	
29	LIQUIDS: ASTM INITIAL BOILING POINT [C]		
30	ASTM END BOILING POINT [C]		
31	FUEL TEMPERATURE @ BURNER [C]	110	
32	FUEL PRESSURE @ BURNER [bar]	N/A	
33	ATOMIZING MEDIUM: AIR/STEAM/MECHANICAL	Steam	
34	TEMPERATURE [C]	150	
35	PRESSURE [bar]	4.999	
	MISCELLANEOUS		
36	BURNER PLENUM COMMON/INTEGRAL		
37	MATERIAL		
38	PLATE TICKNESS [cm]		
39	INTERNAL INSULATION		
40	INLET AIR CONTROL DAMPER OR REGISTERS		
41	MODE OF OPERATION		
42	LEAKAGE, %		
43	BURNER TILE: COMPOSITION		
44	MINIMUM SERVICE TEMPERATURE [C]		
45	NOISE SPECIFICATION		
46	ATTENUATION METHOD		
47	PAINTING REQUIREMENTS		
48	IGNITION PORT: SIZE/NO		
49	SIGHT PORT: SIZE/NO		
50	FLAME DETECTION: TYPE		
51	NUMBER/ LOCATION		
52	CONNECTION SIZE		
53	SAFETY INTERLOCK SYSTEM FOR ATOMIZING MEDIUM & OIL		
54	PERFORMANCE TEST REQUIRED (YES or NO)		
55			

EMISSION REQUIREMENTS

1	FIREBOX TEMPERATURE [C]	961.99	Rev
2	BRIDGEWALL TEMPERATURE [C]	961.99	
3	* NOx, ppmv	300 (2)	
4	* CO, ppmv	150 (1)	
5	* UHC, ppmv		
6	* PARTICULATES, mg/Nm3	200 (2)	
7	* SOx, ppmv	580 (2)	
8			
9	** CORRECTED TO 3% O2*		
10			
11	**NOTES:**		
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ID Fan Datasheet

FAN DATASHEET

PURCHASER / OWNER:				**ITEM NO.:**				
SERVICE:				**LOCATION:**				
1	FAN MANUFACTURER:		MODEL/SIZE		ARRANGEMENT:			Rev
2	SERVICE:	Induced Draft Fan	NUMBER REQUIRED:					
3	DRIVE SYSTEM:	Electric Motor	FAN ROTATION FROM DRIVEN END:		CW		CCW	
3	GAS HANDLED:	Flue Gas	RELATIVR MOLECULAR MASS:		29.07			
5	SITE ELEVATION [m]	806.9	FAN LOCATION:		Look I.D.Z. Duct Layout			

OPERATING CONDITION

1	**OPERATING CASE:**	**AS SIMULATED**	Rev
2	CAPACITY [kg/hr]	113505.3	
3	VOLUME FLOW RATE [NCMH]	87511.2	
4	Actual VOLUME FLOW RATE [m3/hr]	157020.6	
5	DENSITY [kg/m3] (Operating)	0.723	
6	OPERATING TEMPERATURE [C]	159.67	
7	RELATIVE HUMIDITY [%]	0	
8	STATIC PRESSURE AT INLET [mmH2O_g]	-224.0584	
9	STATIC PRESSURE AT OUTLET [mmH2O_g]	0.8714	
10	**PERFORMANCE:**		
11	ABSORBED POWER [kW] (All Lossed Included)	121.2217 (1)	
12	FAN ROTATIONAL SPEED [rpm]	750	
13	STATIC PRESSURE RISE ACROSS FAN [mmH2O]	224.9298	
14	INLET DAMPER/ VANE POSITION		
15	DISCHARGE DAMPER POSITION		
16	FAN STATIC EFFICIECNY [%]	83	
17	STEAM RATE (TURBINE ONLY) [kg/Kw*h]		

18	**FAN CONTROL:**					**DRIVE:**						
19	AIR SUPPLY:					MAKE		TYPE:				
20	FAN CONTROL/ FURNISHED BY:					RATED kw		r/min				
21	METHOD:		INLET DAMPER		OUTLET DAMPER	ELECTRICAL AREA CLASSIFCATION:						
22			INLET GUIDE VANES:		VARIABLE SPEED:	CLASS		GROUP		DIVISION		
23	STARTING METHOD					POWER		VOLTS		ph		Hz

NOTES:

24	*(1) Effect of Summer and Winter Temperature is Ignored. Drivre Load Factor is Assumed to be 1.05.*
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FD Fan Datasheet

FAN DATASHEET

PURCHASER / OWNER:				**ITEM NO.:**					
SERVICE:				**LOCATION:**					
1	FAN MANUFACTURER:		MODEL/SIZE		ARRANGEMENT:				Rev
2	SERVICE:	Forced Draft Fan	NUMBER REQUIRED:						
3	DRIVE SYSTEM:	Electric Motor	FAN ROTATION FROM DRIVEN END:		CW		CCW		
3	GAS HANDLED:	Air	RELATIVR MOLECULAR MASS:		28.96				
5	SITE ELEVATION [m]	806.9	FAN LOCATION:		Look F.D.Z. Duct Layout				

OPERATING CONDITION

1	**OPERATING CASE:**	**AS SIMULATED**	Rev
2	CAPACITY [kg/hr]	106288.6	
3	VOLUME FLOW RATE [NCMH]	82253.9	
4	Actual VOLUME FLOW RATE [m3/hr]	98836.7	
5	DENSITY [kg/m3] (Operating)	1.075	
6	OPERATING TEMPERATURE [C]	23.33	
7	RELATIVE HUMIDITY [%]	0	
8	STATIC PRESSURE AT INLET [mmH2O_g]	-49.5806	
9	STATIC PRESSURE AT OUTLET [mmH2O_g]	449.9387	
10	**PERFORMANCE:**		
11	ABSORBED POWER [kW] (All Lossed Included)	171.5187 (1)	
12	FAN ROTATIONAL SPEED [rpm]	1109	
13	STATIC PRESSURE RISE ACROSS FAN [mmH2O]	499.5192	
14	INLET DAMPER/ VANE POSITION		
15	DISCHARGE DAMPER POSITION		
16	FAN STATIC EFFICIECNY [%]	82	
17	STEAM RATE (TURBINE ONLY) [kg/Kw*h]		

18	**FAN CONTROL:**					**DRIVE:**							
19	AIR SUPPLY:					MAKE		TYPE:					
20	FAN CONTROL/ FURNISHED BY:					RATED kw		r/min					
21	METHOD:		INLET DAMPER		OUTLET DAMPER	ELECTRICAL AREA CLASSIFCATION:							
22			INLET GUIDE VANES:		VARIABLE SPEED:	CLASS		GROUP		DIVISION			
23	STARTING METHOD					POWER		VOLTS		ph		Hz	

NOTES:

24	*(1) Effect of Summer and Winter Temperature is Ignored. Drivre Load Factor is Assumed to be 1.05.*
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APH
Datasheet

AIR PREHEATER DATASHEET

PURCHASER / OWNER: **ITEM NO.:**

SERVICE: **LOCATION:**

1	MANUFACTURER:		Rev
2	MODEL:		
3	NUMBER REQUIRED:		
4	RADIATION LOSS [Percent]	2	
5	NOMINAL AIR PREHEATER LMTD [C]	97.51	
6	NOMINAL AIR PREHEATER UA VALUE [kW/C]	81.8006	

PERFORMANCE DATA

8	OPERATING CASE:	**AS SIMULATED**	
9	AIR SIDE: FLOW RATE ENTERING [kg/hr]	98354.6	
10	INLET TEMPERATURE [C]	23.33	
11	OUTLET TEMPERATURE [C]	307.9	
12	PRESSURE DROP: ALLOWABLE, [mmH2O]	By Vendor	
13	PRESSURE DROP: CALCULATED, [mmH2O]	N/A	
14	HEAT ABSOREBED, [kW]	7976.5958	
15	FLUE GAS SIDE: FLOW RATE ENTERING [kg/hr]	105559.9	
16	INLET TEMPERATURE [C]	387.41	
17	OUTLET TEMPERATURE [C]	141.37	
18	PRESSURE DROP: ALLOWABLE, [mmH2O]	By Vendor	
19	PRESSURE DROP: CALCULATED, [mmH2O]	N/A	
20	HEAT EXCHANGED, [kW]	8139.3835	
21	AIR BYPASS RATE [kg/hr]	9136.8	
22	TOTAL AIR FLOW RATE TO BURNERS [kg/hr]	107491.3	
23	MIX AIR TEMPERATURE [C]	285	
24	TOTAL FLUE GAS FLOW RATE TO STACK / ID FAN [kg/hr]	113505.3	
25	MIX FLUE GAS TEMPERATURE [C]	159.67	
26	FLUE GAS COMPOSITION, Mole Fraction, (O2/N2/H2O/CO2/SOx) [Percent]	4.5506 / 73.4581 / 10.1191 / 10.8745 / 0.1246	
27	FLUE GAS SPECIFIC HEAT [kJ/kg.K]	1.1056	
28	FLUE GAS ACID DEW-POINT TEMPERATURE [C]	141.78	
29	MINIMUM METAL TEMPERATURE: ALLOWABLE [C]	155.78 (1)	
30	MINIMUM METAL TEMPERATURE: CALCULATED [C]	155.78 (1)	

MISCELLANEOUS:

32	MINIMUM AMBIENT AIR TEMPERATURE [C]	23.33	
33	SITE ELEVATION ABOVE SEA LEVEL [m]	806.9	
34	RELATIVE HUMIDITY [Percent]	0	
35	EXTERNAL COLD-AIR BYPASS (YES/NO)	By Vendor	
36	COLD-END THERMOCOUPLES (YES/NO): NUMBER REQUIRED	By Vendor	
37	ACCESS DOORS: NUMBER / SIZE / LOCATION	By Vendor	
38	INSULATION (INTERNAL / EXTERNAL)	By Vendor	
39	CLEANING MEDIUM: STEAM OR WATER	By Vendor	
40	PRESSURE, [bar]		
41	TEMPERATURE, [C]		