							CLASS: 2	
		DOCUMENT CODE						
		PLAN /PRJ.	UNIT	PHASE	DISC.	DOC. TYPE	SER NO.	REV.	PAGE
		2001	82	ED	PR	DS	H8201	A1	1 of 13

PROCESS DATA SHEET FOR HDS REACTOR HEATER (H-8201) OF RFCC NAPHTHA TREATING UNIT

		ISSUED FOR REVIEW			
		ISSUED FOR REVIEW			
REV.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED

			CLASS: 2
		PROCESS DATA SHEET FOR HDS REACTOR HEATER (H-8201) OF RFCC NAPHTHA TREATING UNIT	PAGE: 2 OF 13

REVISION INDEX

SHEET NO.	REVISION					SHEET NO.	REVISION				
	A1	**A2**	**A3**	**A4**	**A5**		**A1**	**A2**	**A3**	**A4**	**A5**
1											
2											
3	X										
4	X										
5											
6											
7											
8											
9											
10											
11											
12											
13	X										
14	X										

PROCESS DATA SHEET FOR HDS REACTOR HEATER
(H-8201) OF RFCC NAPHTHA TREATING UNIT

UNIT												Rev
	Type of Heater	*Cylinderical*		Manufacturer								
2	Total Heater Absorbed Duty, MW	11.03 (13)										
3	**PROCESS DESIGN CONDITIONS**											
4	Operating Case	10 PPM EOR		50 PPM SOR Turndown		Regeneration						
5	Heater Section	Radiant & Conv.		Radiant & Conv.		Radiant & Conv.						
6	Service	HC+H2+H2S+H2O		HC+H2+H2S+H2O		N2						
7	Heat Absorption, kW	9390 (13)		4370		700 (14)						
8	Fluid											
9	Flow Rate, kg/hr	212924 (12)		78191 (12)		14975						
10	Turndown Max.											
11	Pressure Drop, Allowable (Clean/Fouled), bar		1.0		1.0		(23)					
12	Pressure Drop, Calculated (Clean / Fouled), bar											
13	Avg. Rad. Sect. Flux Density, Allowable, W/m2	37800 ***(16)***		37800 ***(16)***								A1
14	Avg. Rad. Sect. Flux Density, Calculated, W/m2											
15	Max. Rad. Sect. Flux Density, W/m2											
16	Conv. Sect. Flux Density (Bare Tube), W/m2											
17	Velocity Limitation, m/sec											
18	Process Fluid Mass Velocity, kg/sec-m2											
19	Max. Allow. / Calc. Inside Film Temp., °C											
20	Fouling Factor, m2-°K/W	0.00035		0.00035								
21	Coking Allowance, mm											
22	**INLET CONDITIONS :**											
23	Temperature, °C	326		268		30						
24	Pressure, barA	20.8		19.3		7.1						
25	Liquid Flow, kg/hr											
26	Vapor Flow, kg/hr	212924		78191		14975						
27	Liquid Gravity, (Deg. API) (Sp. Gr.@15 °C)											
28	Vapor Molecular Weight	43.5		35.3		28						
29	Viscosity, (Liquid / Vapor), mPaS		0.019		0.019		0.017					
30	Specific Heat, (Liquid / Vapor), kJ/kg-K		2.844		3.178		1.053					
31	Thermal Conductivity, (Liquid / Vapor), W/m-K		0.105		0.122		0.026					
32	**OUTLET CONDITIONS :**											
33	Temperature, °C	380 (15)		330		200						
34	Pressure, barA	(19)		(19)		(23)						
35	Liquid Flow, kg/hr											
36	Vapor Flow, kg/hr	212924		***78191***		14975						A1
37	Liquid Gravity, (Deg. API) (Sp. Gr.@15 °C)											
38	Vapor Molecular Weight	43.5		35.3		28						
39	Viscosity, (Liquid / Vapor), mPaS		0.020		0.021		0.025					
40	Specific Heat, (Liquid / Vapor), kJ/kg-K		2.985		3.344		***1.077***					A1
41	Thermal Conductivity, (Liquid / Vapor), W/m-K		0.122		0.144		0.037					
42	**REMARKS AND SPECIAL REQUIREMENTS :**											
43	Distillation Data or Feed Composition :											
44	Short Term Operating Conditions :											
45												
46	**NOTES :**											
47												
48												
49												
50												
51												

			CLASS 2
		PROCESS DATA SHEET FOR HDS REACTOR HEATER (H-8201) OF RFCC NAPHTHA TREATING UNIT	PAGE 4 OF 14

1	Type of Heater	*Cylinderical*		Manufacturer						Rev
2	Total Heater Absorbed Duty, MW	11.03 (13)								
3	**PROCESS DESIGN CONDITIONS**									
4	Operating Case	**Max case polish burning**		**Max case polish burning**		**Sulfiding Case**				A1
5	Heater Section	***Radiant & Conv.***		***Radiant & Conv.***		**Radiant & Conv.**				A1
6	Service	***MP Steam + Air(3% O2)***		***MP Steam + Air(8% O2)***		H2+H2S **(31)**				A1
7	Heat Absorption, kW	***13103(30)***		***13068***		3552				A1
8	Fluid									
9	Flow Rate, kg/hr	90842		***90842***		16923				A1
10	Turndown Max.									
11	Pressure Drop, Allowable (Clean/Fouled), bar		(23)		***(23)***		(23)			A1
12	Pressure Drop, Calculated (Clean / Fouled), bar									
13	Avg. Rad. Sect. Flux Density, Allowable, W/m2									
14	Avg. Rad. Sect. Flux Density, Calculated, W/m2									
15	Max. Rad. Sect. Flux Density, W/m2									
16	Conv. Sect. Flux Density (Bare Tube), W/m2									
17	Velocity Limitation, m/sec									
18	Process Fluid Mass Velocity, kg/sec-m2									
19	Max. Allow. / Calc. Inside Film Temp., °C									
20	Fouling Factor, m2-°K/W									
21	Coking Allowance, mm									
22	**INLET CONDITIONS :**									
23	Temperature, °C	***214***		***171***		198				A1
24	Pressure, barA					17.87 ***(33)***				A1
25	Liquid Flow, kg/hr									
26	Vapor Flow, kg/hr	90842		***90842***		16923				A1
27	Liquid Gravity, (Deg. API) (Sp. Gr.@15 °C)									
28	Vapor Molecular Weight	***19.58***		***22.18***		5.6				A1
29	Viscosity, (Liquid / Vapor), mPaS		***0.018***		***0.019***		0.012			A1
30	Specific Heat, (Liquid / Vapor), kJ/kg-K		***1.92***		***1.61***		6.323			A1
31	Thermal Conductivity, (Liquid / Vapor), W/m-K		***0.036***		***0.033***		0.206			A1
32	**OUTLET CONDITIONS :**									
33	Temperature, °C	***490 (15)***		***500 (15)***		315				A1
34	Pressure, barA	(23)				(23)				
35	Liquid Flow, kg/hr									
36	Vapor Flow, kg/hr	90842		***90842***		16923				A1
37	Liquid Gravity, (Deg. API) (Sp. Gr.@15 °C)									
38	Vapor Molecular Weight	***19.58***		***22.18***		5.6				A1
39	Viscosity, (Liquid / Vapor), mPaS		***0.029***		***0.031***		0.015			A1
40	Specific Heat, (Liquid / Vapor), kJ/kg-K		***1.92***		***1.62***		6.595			A1
41	Thermal Conductivity, (Liquid / Vapor), W/m-K		***0.064***		***0.058***		0.246			A1
42	**REMARKS AND SPECIAL REQUIREMENTS :**									
43	Distillation Data or Feed Composition :									
44	Short Term Operating Conditions :									
45										
46	**NOTES :**									
47										
48										
51										
52										
53										
54										

1	**COMBUSTION DESIGN CONDITIONS**											Rev
2	Operating Case			10 PPM EOR								
3	Type of Fuel			Fuel Gas								
4	Excess Air, %			15%								
5	Calculated Heat Release (LHV), KW											
6	Fuel Efficiency Calculated, % (LHV)											
7	Fuel Efficency Guaranteed, % (LHV)			78								
8	Radiation Loss, Percent of Heat Release (LHV)			1.5%								
9	Flue Gas Temp. Leaving : Radiant Sect., °C											
10	Convection Sect., °C											
11	Air Preheater, °C											
12	Flue Gas Quantity, kg/hr											
13	Flue Gas Mass Velocity through Conv. Sect., kg/sec-m2											
14	Draft : at Arch, mm H2O											
15	at Burners, mm H2O											
16	Ambient Air Temp., Efficiency Calculation, °C			25								
17	Ambient Air Temp., Stack Design, °C											
18	Altitude Above Sea Level, mm											
19	Volumetric Heat Release (LHV), kcal/hr-m3											
20	**FUEL CHARACTERISTICS**											
21	LIQUID TYPE			GAS TYPE					OTHER TYPE			
22	Heating Value LHV	kcal/kg		Heating Value LHV	35.4 *(32)*	MJ/Nm3			Heating Value LHV	kcal/kg		A1
23	HHV	kcal/kg		HHV		MJ/Nm3			HHV	kcal/kg		
24	Press. @Burner	barG		Press. @Burner		barG			Press. @Burner	barG		
25	Temp. @Burner	°C		Temp. @Burner		°C			Temp. @Burner	°C		
26	Viscosity @ °C	SSU		Molecular Weight					Molecular Weight			
27	Atomizing Steam Temp.	°C										
28	Pressure	kg/cm2G										
29	**COMPOSITION**	**WT % (Liquid)**		**COMPOSITION**		**VOL % (Gas)**			**COMPOSITION**			
30	Sp.Gr / API Degree			Methane		83.6~88.7						
31	H/C Ratio (by WT)			Ethane		3.7 - 8.8						
32	Sulfur			Propane		1.2 - 2.1						
33	Ash			N2		2.5 ~ 6.8						
34	Nitrogen			n-Butane		Trace~0.5						
35	Metals			i-Butane		0.2 - 1.3						
36	- V (ppm)			n-Pentane		Nil ~ 0.1						
37	- Fe (ppm)			i-Pentane		Nil ~ 0.2						
38	- Ni (ppm)			H2S		Trace						
39	- Na (ppm)			RHS		Trace						
40												
41	**BURNER DATA**											
42	Manufacturer :			Size / Model :					Number :			
43	Type :			Location :					Orientation :			
44	Heat Release per Burner, 10^6 kcal/hr			Design :			Normal :			Minimum		
45	Pressure Drop Across Burner @Design Heat Release, mm H2O :											
46	Distance Burner Center Line to Tube Center Line, mm			Horizontal :					Vertical :			
47	Distance Burner Center Line to Unshielded Refractory, mm			Horizontal :					Vertical :			
48	Pilot , Type :			Capacity, 10^6 kcal/hr :								
49	Ignition Method :											
50	Design Fuel Rate, Guranteed, kg/hr :											
51	Flame Scanners, Location :								Number :			
52	Required Emissions : ppmv(d) (Corrected to 3% O2)			NOx :					CO :			
53	kg/kcal (LHV) (HHV)			UHC :					Particulates :			
54	**NOTES :**											
55												

		CON. NO.: ۲۰۰۱-۰۱-پ پ س ص/۷۳	CLASS 2
		PROCESS DATA SHEET FOR HDS REACTOR HEATER (H-8201) OF RFCC NAPHTHA TREATING UNIT	PAGE 6 OF 14

1	**MECHANICAL DESIGN CONDITIONS**											Rev
2	Plot Limitations :						Stack Limitations :					
3	Tube Limitations :						Noise Limitations :					
4	Structural Design Data :	Wind Velocity :	33.34m/s				Wind Occurence :					
5		Snow Load :	150kg/sq.m.				Seismic Zone :					
6	Min. / Nor. / Max. Ambient Air Temp., °C :						Relative Humidity, % :					
7	Heater Section :		**Convention**					**Radiant Chamber**				
8	Service :		**Process**					**Process**				
9	**COIL DESIGN :**											
10	Design Basis :	Tube Wall Thick. (Code or Spec.)	API 530					API 530				
11		Rupture Strength (Min. or Avg.)										
12	Design Life, hr											
13	Design Pressure, Elastic / Rupture, barG											
14	Design Fluid Temp., °C											
15	Temperature Allowance, °C											
16	Corrosion Allowance, Tubes / Fittings, mm		3	3				3	3			
17	Hydrostatic Test Pressure, barG											
18	Post Weld Heat Treatment (Yes or No)		As per code					As per code				
19	Percent of Welds Fully Radiographed											
20	Maximum (Clean) Tube Metal Temperature, °C											
21	Design Tube Metal Temperature, °C											
22	Inside Film Coefficient, kcal/hr-m2-°C											
23	**COIL ARRANGEMENT :**											
24	Tube Orientation : Vertical or Horizontal											
25	Tube Material (ASTM Spec. and Grade)		SS 347H					SS 347H				
26	Tube Outside Diameter, mm											
27	Tube Wall Thickness, (Minimum) (Average), mm											
28	Number of Flow Passes											
29	Number of Tubes / Number of Tube Rows											
30	Number of Tubes per Row (Conv. Section)											
31	Overall Tube Length, mm											
32	Effective Tube Length, mm											
33	Bare Tubes :	Number										
34		Total Exposed Surface, m2										
35	Extended Surface Tubes :	Number										
36		Total Exposed Surface, m2										
37	Tubes Layout (In-Line or Staggered)											
38	Tube Spacing, Cent. To Cent. :	Horizontal, mm										
39		Diagonal, mm										
40		Vertical, mm										
41	Spacing Tube Cent. To Furnace Wall, mm											
42	Corbels (Yes or No)											
43	Corbel Width, mm											
44	**DESCRIPTION OF EXTENDED SURFACE :**											
45	Type : (Studs) (Serrated Fins) (Solid Fins)											
46	Material		Stainless Steel					Stainless Steel				
47	Dimensions :	Height, mm										
48		Thickness, mm										
49		Spacing (No./m)										
50	Maximum Tip Temperature (Calculated), °C											
51	Extension Ratio (Total Area / Bare Area)											
52	**PLUG TYPE HEADERS :**											
53	Type											
54	Material (ASTM Spec. and Grade)											
55	Nominal Rating											

1	**MECHANICAL DESIGN CONDITIONS (Continued)**					Rev
2	Heater Section :	**Convention**		**Radiant Chamber**		
3	Service :	Process		Process		
4	**RETURN BENDS :**					
5	Type					
6	Material (ASTM Spec. and Grade)	SS 347H		SS 347H		
7	Nominal Rating or Schedule					
8	Location (F.B. = Fire Box / H.B. = Header Box)					
9	**TERMINALS AND / OR MANIFOLDS :**					
10	Type (BEV.=Beveled, MAN=Manifold, FLG.=Flanged)					
11	Inlet : Material (ASTM Spec. & Grade)	SS 347H		SS 347H		
12	Size	30"		30"		
13	Schedule or Thickness					
14	Number of Terminals					
15	Flange Material (ASTM Spec.& Grade)					
16	Flange Size & Rating	300#		300#		
17	Outlet : Material (ASTM Spec. & Grade)					
18	Size					
19	Schedule or Thickness					
20	Number of Terminals					
21	Flange Material (ASTM Spec.& Grade)					
22	Flange Size & Rating	300#		300#		
23	Manifold to Tube Connection (Welded, Extruded, etc)					
24	Manifold Location (Inside or Outside Header Box)					
25	**CROSSOVERS :**					
26	Welded or Flanged					
27	Pipe Material (ASTM Spec. and Grade)	SS 347H				
28	Pipe Size					
29	Schedule or Thickness					
30	Flange Material					
31	Flange Size / Rating					
32	Location (Internal / External)					
33	Fluid Temp., °C					
34	**TUBE SUPPORTS :**					
35	Location (Ends / Top / Bottom)					
36	Material (ASTM Spec. and Grade)					
37	Design Metal Temp., °C					
38	Thickness, mm					
39	Insulation : Thickness, mm	(5)				
40	Material					
41	Anchor (Material and Type)					
42	**INTERMEDIATE TUBE SUPPORTS :**					
43	Material (ASTM Spec. and Grade)					
44	Design Metal Temp., °C					
45	Thickness, mm					
46	Spacing, mm					
47	**TUBE GUIDES :**					
48	Location					
49	Material					
50	Type / Spacing					
51	**HEADER BOXES :**					
52	Location :			Hinged Door / Bolted Panel :		
53	Casing Material :			Thickness, mm :		
54	Lining Material :			Thickness, mm :		
55	Anchor (Material and Type) :					

1	**MECHANICAL DESIGN CONDITIONS (Continued)**					Rev
2	**REFRACTORY DESIGN BASIS :**					
3	Ambient, °C :	Wind Velocity, m/sec :		Casing Temp., °C :		
4	**EXPOSED VERTICAL WALLS :**					
5	Lining Thickness, mm :	Hot Face Temp. :	Service, °C :	Calculated, °C		
6	Wall Construction :					
7						
8	Anchor (Material & Type) :					
9	Casing Material :	Thickness, mm :		Temp., °C :		
10	**SHIELDED VERTICAL WALLS :**					
11	Lining Thickness, mm :	Hot Face Temp. :	Service, °C :	Calculated, °C		
12	Wall Construction :					
13						
14	Anchor (Material & Type) :					
15	Casing Material :	Thickness, mm :		Temp., °C :		
16	**ARCH :**					
17	Lining Thickness, mm :	Hot Face Temp. :	Service, °C :	Calculated, °C		
18	Wall Construction :					
19						
20	Anchor (Material & Type) :					
21	Casing Material :	Thickness, mm :		Temp., °C :		
22	**FLOOR :**					
23	Lining Thickness, mm :	Hot Face Temp. :	Service, °C :	Calculated, °C		
24	Floor Construction :					
25						
26	Casing Material :	Thickness, mm :		Temp., °C :		
27	Minimum Floor Elevation, mm :			Free Space Below Plenum, mm :		
28	**CONVECTION SECTION :**					
29	Lining Thickness, mm :	Hot Face Temp. :	Service, °C :	Calculated, °C		
30	Wall Construction :					
31						
32	Anchor (Material & Type) :					
33	Casing Material :	Thickness, mm :		Temp., °C :		
34	**INTERNAL WALL :**					
35	Type :	Material :				
36	Dimension, Height / Width, mm :					
37	**DUCTS :**	**FLUE GAS**		**COMBUSTION AIR**		
38	Location	Breeching				
39	Size, m or Net Free Area, m2					
40	Casing Material					
41	Casing Thickness, mm					
42	Lining : Internal / External					
43	Thickness, mm					
44	Material					
45	Anchor (Material & Type)					
46	Casing Temp., °C					
47	**PLENUM CHAMBER (AIR) :**					
48	Type of Plenum (Common or Integral) :					
49	Casing Material :	Thickness, mm :		Size mm :		
50	Lining Material :	Thickness, mm :				
51	Anchor (Material & Type) :					
52	**NOTES :**					
55						

1	**MECHANICAL DESIGN CONDITIONS (Continued)**						Rev
2	**STACK OR STACK STUB :**						
3	Number :	Self-Supported or Guyed		Location :			
4	Casing Material :	Thickness, mm :		Minimum Thickness, mm :			
5	Inside Metal Dia., mm :	Height Above Grade, m :		Stack Length, mm :			
6	Lining Material :			Thickness, mm :			
7	Anchor (Material & Type) :						
8	Extent of Lining :		Internal or External :				
9	Design Flue Gas Velocity, m/sec :		Flue Gas Temp., °C :				
10	**DAMPERS :**						
11	Location						
12	Type (Control / Tight Shut-off / etc.)						
13	Material : Blade						
14	Shaft						
15	Multiple / Single Leaf						
16	Provision for Operation (Manual or Automatic)						
17	Type of Operator (Cable or Pneumatic)						
18	**PLATFORMS :**						
19	Location	Number	Width, mm	Length / Arc	Stairs / Ladder Acess From		
22							
23							
24							
25	Type of Flooring :						
26	**DOORS :**						
27	Type	Number	Location	Size, mm Bolted / Hinged			
28	Access						
29	Explosion						
30	Observation						
31	Tube Removal						
32	**MISCELLANEOUS :**						
33	Instrument Connections :		Number	Size, mm Type			
34	Process Fluid Temperature, Cross over and Radiant outlet						
35	Pressure						
36	Blank-off						
37	Combustion Air Temperature						
38	Pressure						
39	Flue Gas Temperature, Below conv,section & above damper						
40	Pressure						
41	Draft Connections (10)						
42	Flue Gas Sample						
43	Snuffing Steam / Purge , Radiant floor. Conv. And header boxes						
44	O2 Analyzer, Below conv,section & below damper						
45	CO / NOx Analyzer						
46	Vents / Drains						
47	EPA Connections						
48	Tube Skin Thermocouples, Radiant wall.Steam coil and lowest shield row						
49	Flame Scanner						
50	Painting Requirements :						
51	Internal Coating :						
52	Galvanizing Requirements :						
53	Are Painters Trolley and Rail Included (Yes or No) :						
54	Special Equipment : Sootblowers :						
55	Air Preheater :						

			CLASS 2
		PROCESS DATA SHEET FOR HDS REACTOR HEATER (H-8201) OF RFCC NAPHTHA TREATING UNIT	PAGE 10 OF 14

1	**GENERAL DATA**			Rev
2	Type of Heater	***Cylinderical***		
3	Altitude Above Sea Level, mm			
4	Air Supply :			
5	Ambient / Preheated Air / Gas Turbine Exhaust			
6	Temperature, °C (Min. / Max. / Design)			
7	Relative Humidity, %			
8	Draft Type : Forced / Natural / Induced			
9	Draft Available : Across Burner, mm H2O			
10	Across Plenum, mm H2O			
11	Required Turndown			
12	Burner Wall Setting Thickness, mm			
13	Heater Casing Thickness, mm			
14	Firebox Height, mm			
15	Tube Circle Diameter, mm			
16	**BURNER DATA**			
17	Manufacturer			
18	Type of Burner	Natural Draft - Low Noise and Ultra Low Nox		
19	Model / Size			
20	Direction of Firing			
21	Location (Roof / Floor / Sidewall)			
22	Number Required (23, 24)			
23	Minimum Distance Burner Centerline, mm			
24	to Tube Centerline (Horizontal / Vertical)			
25	to Adjacent Burner Centerline (Horizontal / Vertical)			
26	to Unshieled Refractory (Horizontal / Vertical)			
27	Burner Circle Diameter, mm			
28	Pilots :			
29	Number Required			
30	Type			
31	Ignition Method			
32	Fuel			
33	Fuel Pressure, barG			
34	Capacity, 10^6 kcal/hr			
35	**OPERATING DATA**			
36	Fuel			
37	Heat Release per Burner, 10^6 kcal/hr (LHV)			
38	Design			
39	Normal			
40	Minimum			
41	Excess Air @ Design Heat Release, %			
42	Air Temperature, °C			
43	Draft (Air Pressure) Loss, mmH2O			
44	Design			
45	Normal			
46	Minimum			
47	Fuel Pressure Required @ Burner, barG			
48	Flame Length @ Design Heat Release, mm			
49	Flame Shape (Round, Flat, etc)			
50	Atomizing Medium / Oil Ratio, kg/kg			
51	**NOTES :**			
55				

						Rev
1	**GAS FUEL CHARACTERISTICS**					
2	Fuel Type		**Fuel Gas**			
3	Heating Value (LHV), MJ/Nm3		35.4 ***(32)***			
4	Specific Gravity (Air=1.0)					
5	Molecular Weight					
6	Fuel Temperature @ Burner, °C		21.06			
7	Fuel Pressure; Available @ Burner, barG		2.8 (25)			
8	Fuel Gas Composition, Vol%					
9		CH4	83.6~88.7			
10		C2H6	3.7 - 8.8			
11		C3H8	1.2 - 2.1			
12		n-C4H10	Trace ~ 0.5			
13		i-C4H10	0.2 - 1.3			
14		n-C5H12	Nil ~ 0.1			
15		i-C5H12	Nil ~ 0.2			
16		H2S	Trace			
17						
18		N2	2.5 - 6.8			
19		RHS	Trace			
20		Total	100			
21						
22						
23						
24	**LIQUID FUEL CHARACTERISTICS**					
25	Fuel Type					
26	Heating Value (LHV), kcal/kg					
27	Specific Gravity / Degree API					
28	H / C Ratio (by Weight)					
29	Viscosity, @ °C, SSU					
30	@ °C, SSU					
31	Vanadium, ppm					
32	Sodium, ppm					
33	Potassium, ppm					
34	Nikel, ppm					
35	Fixed Nitrogen, ppm					
36	Sulfur, %wt					
37	Ash, %wt					
38	Liquids :	ASTM Initial Boiling Point, °C				
39		ASTM End Point, °C				
40	Fuel Temperature @ Burner, °C					
41	Fuel Pressure; Available / Required @ Burner, barG					
42	Atomizing Medium	Air / Steam / Mechanical				
43		Temperature, °C				
44		Pressure, barG				
45	**NOTES :**					
46						
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48						
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1	**MISCELLANEOUS**						Rev
2	Burner Plenum :	Common / Integral					
3		Material					
4		Plate Thickness, mm					
5		Internal Insulation					
6	Inlet Air Control :	Damper or Registers					
7		Mode of Operation					
8		Leackage, %					
9	Burner Tile :	Composition					
10		Minimum Service Temperature, °C					
11	Noise Specification						
12	Attenuation Method						
13	Painting Requirements						
14	Ignition Port :	Size / No.					
15	Sight Port :	Size / No.					
16	Flame Detection :	Type	**UV Scanner**				
17		Number / Location					
18		Connection Size					
19	Safety Interlock System for Atomizing Medium & Oil						
20	Performance Test Required (Yes or No)						
21	**EMISSION REQUIREMENTS- Dry Flue Gas at 3 % 02 (17)**						
22	Firebox Temperature, °C						
23	Nox		432 mg/Nm3, 210 ppmv				
24	CO		130 ppmv				
25	UHC						
26	Particulates		50 mg/Nm3				
27	Sox		800 ppmv				
28							
29	* Corrected to 3% O2 (Dry Basis @ Design Heat Release)						

30 **NOTES :**

31 1. At design conditions, minimum of 90% of the available draft with air register fully open shall be utilized across the burner.

32 In addition, a minimum of 75% of the air side pressure drop with air registers full open shall be utilized across burner throat.

33 2. Vendor to guarantee burner flame length.

34 3. Vendor to guarantee excess air, heat release and draft loss across burner.

NOTES

(1) Dampers are to be failure open. Dampers shall be provided with external position indicator and transmitter to indicate positions in the control room. Damper bearing shall be located external to casing. Manual override to be provided.

(2) Tube wall thickness shall be calculated in accordance with API530.

(3) Design temp. for calculating tube wall thickness shall be 27 °C above the max. calculated tube wall temperature.

(4) End tubesheet shall be insulated on the hot side and shall equiped with 18/8 Cr/Ni sleeves to protect insulation from damaged by tubes

(5) Min. end tubesheet thickness shall be 12.5mm and intermediate tubesheets 16mm.

(6) Header boxes and firebox shall be provided with a 2" flanged connections c/w blinds for snuffing steam connections.

(7) Inspection doors shall be provided to permit 100% observation of radiant tubes, including convection tubes exposed to radiant heat.

(8) Peep holes shall be located so that the burner flames can be adjusted while observing burners.

(9) Provide max possible access door in arch for tube removal and 600mm x600mm access door in radiant floor.

(10) The Flue gas Pressure gauges shall be located at ***burners, below*** convection section***,*** below and above stack damper. A1

(11) Provide 2.5mm thick erosion resistant stainless steel shroud in place for future sootblower lane.

(12) Design flowrate: 256976 kg/hr (120.7 % of 10 ppm SOR flowrate). Turndown flowrate during regeneration: ***5.4 %*** of normal flowrate (11477 kg/hr corresponding of burning phase during catalyst HR-845 regeneration). Turndown flowrate in normal operation: 54 % of normal flowrate (corresponding of turndown of 50 ppm SOR run case). A1

(13) Design Duty 11.03 MW (absorbed)

(14) Turndown value during regeneration (correspondending of heating phase during catalyst HR-841 regeneration).

(15) *Design values of piping for normal/regeneration cases are given.*

Normal Inlet : 26.0/FV (at ambient) barg @ 350 °C, Normal Outlet : 26.0/FV (at ambient) barg @ 405 °C

Regeneration outlet : 8.0 barg @ 525 °C. A1

Steam-out: Operating conditions is 190°C at ATM, and its design conditions is 265°C at ATM. A1

Full Vacuum @ 212 °C (MP steam saturation temperature)

Operation	Fluid Composition	P inlet in barg	T inlet °C	T outlet	Mw	State
Sulfiding	H2 + H2S	17.05	198	315	5.6	V
Regeneration	N2 + CO2 + O2+ H2O	6.3	260	500	18	V

(16) Max. allowable heat flux for single firing heater: 37.8 kW/m2

Max. allowable heat flux for double firing heater: 58.6 kW/m2

(17) According to EPPC Standard

(18) Header will also receive polluted air from Merox Unit (25 kg/hr,***0.05 barg (will be finalized later)*** , ***46*** °C) for combustion in the firebox. The contain ~ 88.5 vol.% N2 and 11.5 vol.% O2, as well as traces of mercaptans. A1

(19) Max. allowable pressure drop: 1 bar

(20) Max. continuous hydrogen partial pressure: 13.1 bar Max. continuous hydrogen sulfide content: 0.04 mol%

During sulfiding procedure H2S content can be as high as 2 mol% during 12 hours every 3 years.

(21) Max. capacity of one burner shall not exceed 3 MW for design duty as per note 13

(22) MDMT : -15 °C

(23) Vendor to specify the allowable pressure drop for each case

(24) Combustion Air Condition

- Temperature : -15 / 41 degc (Min./Max.)
- Relative Humidity : 73 / 85 % (Average / Design)
- Altitude above sea level : 1685 m

(25) Fuel Gas B/L Pressure ***(will be finalized later)*** and vendor to provide required fuel gas pressure at burner. A1

(26) Materials shall be specified in accordance with API 560.

(27) Hydrogen Service.

(28) for all instruments: Instrument specification and nozzle size shall meet the requirements of project specification: JOB SPECIFICATION FOR INSTRUMENTATION Doc. No: "2001-00-ED-IN-SP-7001" and references standards.

(29) CEMS shall be considered by vendor. A1

(30) Max. value during regeneration (correspondending of polish burning phase during catalyst HR-841 regeneration). A1

NOTES

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(31) Fluid Composition in sulfiding case:

	%mol
Hydrogen	***89.95***
Water	***0***
Nitrogen	***0***
Carbon Dioxide	***0***
Hydrogen Sulfide	***0.5***
Methane	***2.89***
Ethane	***2.69***
Propane	***1.89***
i-Butane	***1.79***
Pentane	***0.7***

A1

(32) As Fuel gas Composition is variable, LHV will be in range of 33.3~36.

(33) Will be finalized later.