Mechanical Data Sheet

For

Auxiliary Boiler

CO_2 Capture Facility

Kårstø, Norway

Rev.	Date	Reason for Revision	By	Check	App	App
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Bechtel Power Corporation

Job No. 25474

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Rev. 0

GASSNOVA

Project No. - Originator - Disc Code - Doc Type - Serial No.

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1	**Design Requirements**		ASME Section I							
2	Net Steam Flow	(kg/hr)	20,000							
3	Steam Temperature / Pressure	(°C / barg)	159				5			
4										
5	**BOILER**									
6	Boiler outlet steam flow / Steam to deaerator	(kg/hr)	20000				*			
7	Pressure at boiler outlet	(barg)	5							
8	Temperature at boiler outlet: 100% MCR / 10% MCR	(°C)	159				159			
9	Moisture in steam	(%)	SATURATED							
10	Steam Quality (TDS / Silica)	(ppm)	*				*			
11	Feedwater temperature / Flue gas exit temperature	(°C)	*				*			
12	Ambient air conditions to FD fan inlet (elev / temp)	(m / °C)	8				-17 +30			
13	Overall boiler efficiency	(%)	*							
14	Fuel Flow Rate	(kg/hr)	*							
15	Aux. power @ MCR (Boiler Feed Pump / FD Fan)	(KW)	*				*			
16	Total installed motor kilowatts	(KW)	*							
17	Heating Surface (Evaporatior / Superheater / Econ/ Air Heater / Total)	(m^2)	*	*	*	*	*	*		
18	Wall construction material (F / R / LS / RS / floor / roof)		*	*	*	*	*	*		
19	Tube material / Diameter / Thickness	(- / mm / mm)	SA-178 Gr. A		*		*			
20	Furnace Dimensions (Width / Height / Volume)	(m / m / m^3)	*		*		*			
21	Steam Drum / Lower Drum Diameter and Length	(cm / m)	*				*			
22	Drum (material / thickness)	(- / cm)	SA-516 Gr. 70				*			
23	Normal water level	(cm)	CENTERLINE OF DRUM							
24	Drum design (pressure / temperature)	(barg / °C)	*				*			
25	Furnace Volumetric Heat Release Rate in HHV	(kJ / hr / m^3)	*							
26	Cross-sectional Net Heat Release Rate in HHV	(kJ/hr/m^2)	*							
27	Furnace Release Rate in HHV	(kJ/hr/m^2)	*							
28	**SUPERHEATER**		N/A							
29	Type / Surface Area	(/ m^2)	N/A				N/A			
30	Tube Material		N/A							
31	Tube Diameter / Thickness	(cm / cm)	N/A				N/A			
32	Design pressure / temperature	(barg / °C)	N/A				N/A			
33	Safety valve (type / quantity / set pressure)	(/ / barg)	N/A		N/A		N/A			
34	Outlet steam temperature at 10% / 100% MCR	(°C)	N/A				N/A			
35										
36	**ECONOMIZER**		By Seller							
37	Type / Surface Area		*				*			
38	Water Temperature Entering / Water Termperature Leaving	(°C)	*				*			
39	Tube Material		*							
40	Tube Diameter / Thickness	(cm / cm)	*				*			
41										
42	**LOWER DRUM HEATING COIL**		By Seller							
43	Supply steam minimum enthalpy	(kJ/kg)	*							
44	Steam required to maintain HSB	(kg/hr)	*							
45	Supply steam temperature / pressure	(°C / barg)	*				*			
46										
47	**FUEL SYSTEM**		By Seller							
48	Burners (Quantity / Type / Manufacturer)		*		*		*			
49	Turndown		*							
50	Natural gas flow, @ pressure	(kg/hr / barg)	*				*			
51	Quantity (Ingitors / Scanners)		*				*			
52	Flame safeguard system manufacturer		*							
53			Feedwater		Feedwater Inlet Stops and Check			Steam Outlet Stops and Check		
54	**VALVES** (By Seller)									
55	Manufacturer		*		*			*		
56	Size / figure number	(cm/)	*	*	*	*		*	*	
57										
58										

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59	**STACK**		By Seller				
60	Inlet diameter / height / velocity	(cm / m / mps)	*		40		*
61	Height of EPA test ports	(m)	*				
62							
63							
64	**POWER OPERATED STACK DAMPENER**		By Seller				
65	Type / Manufacturer / Model Number		*		*		*
66	Power Requirements (Volts / Amps)		*			*	
67							
68	**BLOWDOWN TANK**		By Seller				
69	Diameter / Material / Volume	(cm / / l)	*		*		*
70							
71	**CHEMICAL FEED SYSTEM**		By Seller				
72	Tank (material / volume)	(/ l)	*			*	
73	Pumps and motors:		Phosphate		Oxygen Scavenger		Neutralizing Amine
74	Quantity		*		*		*
75	Capacity	(lps)	*		*		*
76	Maximum Discharge Pressure	(barg)	*		*		*
77	Piping material between pump and tank		*		*		*
78							
79	**Boiler Feed Water Pump**		By Seller				
80	Manufacturer		*				
81	Quantity / % Capacity		2			100	
82	Inlet Capacity / Inlet Pressure / NPSH	(lps / barg / m))	*		*		*
83	Discharge Pressure	(barg)	*				
84	Pump Speed	(rpm)	*				
85	Pump Brake Horse Power / Efficiency	(bhp / %)	*			*	
86	Motor Size / Motor Speed / Motor Service Factor / Enclosure	(hp / rpm / /)	*	*	*	*	*
87	Impeller Diameter: Rated / Minimum / Maximum	(cm / cm / cm)	*		*		*
88	Inlet Size / Discharge Size	(cm / cm)	*			*	
89							
90	**Forced Draft Fan**		By Seller (2 X 100%)				
91	Manufacturer		*				
92	Fan Type / Material		*			*	
93	Shaft Type / Material		*			*	
94	Inlet Damper / Silencer		*			*	
95	Air Flow	(acmm / scmm))	*			*	
96	Static Pressure	(mm w.g.)	*				
97	Fan Speed / Critical Speed	(rpm)	*			*	
98	Fan Brake Horse Power / Efficiency	(BHP / %)	*			*	
99	Motor Size / Motor Speed / Motor Service Factor / Enclosure		*	*	*	*	*
100	Propeller Diameter: Rated / Minimum / Maximum	(cm / cm / cm)	*		*		*
101	Inlet Size / Discharge Size	(cm / cm)	*			*	
102							
103	**Deaerator**		By Seller				
104	Manufacturer/Type		*			SPRAY SCRUBBER	
105	Design Capactiy	(lpm)	*				
106	Design Temperature	(°C)	180				
107	Design Pressure / Operating Pressure	(barg / barg)	*			*	
108	Make-up Water Flow / Temperature	(lpm / C)	*			5 MIN	
109	Steam Inlet Flow @ temp	(kg/hr @ C)	*				
110	Normal Storage Level	(cm)	*				
111	Maximum O_2 Level	(ppb)					
112	Internal Component Material		Stainless steel				
113	Storage Time (between normal and feedwater trip level)	(min.)	*				
114							
115	**MISC INFORMATION:**						
116	Maximum Load Change Rate	(% change/min)	*				
117	Time required to reach operating temperature from cold iron	(min)	*				
118	Time required to develop MCR load from 10% load	(min)	*				
119	Time required to reach 10% load from hot standby (HSB)	(min)	*				
120	Air Requirements (Instrument / Service)	(acmm)	*			*	
121	Minimum stable load	(kg/hr)	*				
122	Furnace release rates	(kJ/m^3 hr)	*				
123							

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124	**WEIGHTS**							
125	Boiler Skid (dry / hydro)	(mtons)	*		*			
126	Chemical Skid / Dearator Skid	(mtons)	*		*			
127	Largest piece to be handled during erection	(mtons)	*					
128								
129	**HEAT LOSSES**							
130	Dry Gas / Hydrogen in Fuel / Moisture in Air	(%)	*	*	*			
131	Radiation: Unaccounted & Manufacturer's Margin	(%)	*		*			
132								
133	**FLOW LOSSES (IN H_2O)**							
134	Air Side Loss through SCAH / Burner / Superheater		*	*	*			
135	Gas Side Loss through Superheater / Boiler / Economizer		*	*	*			
136	Gas Side Loss through Boiler Out. Flue/Economizer Out. Flue/Free Stand. Stack		*	*	*			
137	Air & Gas Side Losses Total		*					
138								
139	**FUEL GAS SPECIFICATION**							
140	Pressure (Maximum / Minimum)	(barg)	3.9		2			
141	Temperature (Maximum / Minimum / Average)	(°C)			20			
142			% Volume		Range, % Volume			
143	Methane C_1		0.856					
144	Ethane C_2		0.11					
145	Propane I-C_3		0.0048					
146	I-Butane I-C_4							
147	N-Butanen-C_4		0.0004					
148	I-Pentane I-C_5							
149	Hexane + C_6							
150	Nitrogen N_2		0.006					
151	Oxygen O_2							
152	CO_2		0.022					
153	H_2O							
154	H_2S							
155	Heating Value, dry base (Higher, HHV / Lower, LHV)	(kJ/kg)			50000 (38.31 MJ/Sm3)			
156	Specific Gravity / Air Density (std. conditions: 20°C, 1.01325 bar)	(/ kg/m^3)	0.626		1.226			
157								
158	**EMISSION GUARANTEES**							
159	NOx / CO / VOC / PM 10 / SO_2 / Opacity	(ppm)	*	*	*	*	*	*
160								
161	**Noise Requirements**							
162	Required / Guaranteed	(dBA @ m)	85 @ 1 m		*			
163								
164	**GUARANTEES**							
165	Net Steam Capacity @ MCR, Pressure and Temperature	(kg/hr / barg/ °C)	20000	5	159			
166	Fuel consumption @ MCR	(kJ/hr, LHV)	*					
167	Steam quality, Superheat or Saturated (Dry / TDS / Silica)	(% / ppm / ppb)	*	*	*			
168	Total aux. power @ MCR (Boiler Feed Pump and FD Fan)	(KW)	*					
169								
170	**SEISMIC DESIGN**		Yes;Basis-IBC 2006 Section 1613; Ss =0.07g; Site Class B					
171	**WIND LOADING DESIGN**		Yes; Basis-EN 1991-1-14; Wind Speed = 43 m/s; Terrain =0					

NOTES:

1. The Seller shall replace all * (asterisks) with the appropriate information.
2. The Seller shall assume the electrical supply is at 400 V, 3 Phase, and 50 Hz.
3. The auxililary boiler is located outdoors and is to be supplied with an enclosure. Any heat tracing required will be by the Buyer.

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