

JOB TITLE : Pocheon LNG Power Plant	OWNER : Pocheon Power Co., Ltd.
JOB NO. : 100580	VENDOR : 한일중공업
PO NO. : PO-100580-16-119-001	DESCRIPTION : AUXILIARY BOILER
ITEM NO. : 510-M-SG-0-011	DOC NO. : VP-100580-16-119-001-201

EQUIPMENT DATA SHEETS

FINAL

DAELIM INDUSTRIAL CO., LTD.	
JOB NO. :	100580
	A - APPROVED
	AAN - APPROVED AS NOTED
	RFC - RETURNED FOR CORRECTION
	R - REJECTED
	NA - NOT APPLICABLE
SIGNED BY :	DATE :
DAELIM PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITIES OR LIABILITIES UNDER THE PURCHASE ORDER.	

TOTAL 13 PAGES

REV.	DATE	DESCRIPTION	PREPARED	REVIEWED	APPROVED
2	Jun /30 /14	FINAL	J.Y.SEONG <i>[Signature]</i>	D.K.LEE <i>[Signature]</i>	H.KANG <i>[Signature]</i>
1	Mar /13 /14	FOR CONSTRUCTION	J.Y.SEONG	D.K.LEE	H.KANG

EQUIPMENT DATA SHEETS

Doc. No.	VP-100580-16-119-001-201			
Date	2014. 6. 30.			
Rev.	1	2		
Sheet No.	2	of	13	

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BOILER DATA SHEET

1	Project	Pocheon LNG Power Plant	Doc. No.	DS - BLR - 100
2	Client	Pocheon Power Co., Ltd.	Date	2014. 6. 30.
3	Contractor	Daelim Industrial Co., Ltd.	Revision	1 2
4	Code	ASME Sec. I	ASME Stamp	No
5	Service of Unit	Auxiliary Boiler Package	Sheet No.	1 of 4
6	Type	Water Tube	Item No.	***
7	No. of Uints, Operating	1	Stand-by	0
			Total	1

PROCESS DATA of ONE UNIT

Kind of Steam	Superheated	Saturated	Fuels fired	Fuel 1	Fuel 2	Fuel 3
Capacity, MCR *1) kg/h	26,000	0	Kind of Fuel	Gas Fuel	- N/A -	- N/A -
Steam Press. *1) kg/cm ² .g	15	- N/A -	Fuel Name	Natural Gas		
Steam Temp. *1) °C	260	- N/A -	Fuel LHV kcal/kg	11,781		
Turn-down Ratio	10	% of MCR	Fuel HHV kcal/kg	13,045		
Condensate / Demi. Water	Condensate	Demi. Water				
Temperature °C	- N/A -	15	Boiler Efficiency %	91.4		
Pressure kg/cm ² .g		4	* at 100%, base on LHV			
Dearator Press. kg/cm ² .g		0.5	Fuel Consumption kg/h	1,723		
Dearator Temp. °C		111.4				

CONFIGURATION

Type	Natural Circulation	Superheater Primary S/H	Two(2) Stage
	Two Drum	Secondary S/H	Installed
	Front Firing	De-superheater	Installed Spray Type
	Forced Draft	Economizer	Installed Finned Tube Type
Construction	Shop Assembled	Gas Air Heater	- N/A -
	Bottom Supported	Steam Air Heater	- N/A -
Location	In-door	Deaerator with Storage Tank	Spray & Tray Type
	Non-hazardous / Hazardous	Chemical Dosing Unit	Supplied

PERFORMANCE of ONE UNIT

Load ID	MCR		NOR		HALF		Remark
	100 %		75 %		50 %		
Steam Flowrate kg/h	26,000		19,500		13,000		*1)
Steam Press. kg/cm ² .g	15		15		15		*1)
Steam Temp. °C	260		260		260		*1)
Condensate Temperature °C	80		80		80		
Condensate Pressure kg/cm ² .g	4		4		4		
Drum Oper. Pressure kg/cm ² .g	18		18		18		
Drum Oper. Temperature °C	208.9		208.9		208.9		
Flue Gas Temperature °C	180		168		153		* at Stack Inlet
Boiler Efficiency %	91.4		91.7		91.8		* based on LHV
Fuel Consumption *2) kg/h	1,723 / 1,701	1,294 / 1,278	869 / 859				* Natural Gas

OPERATION & CONTROL

Feed Water Control	Three Element	Overload	0 %	for	0 hours
Draft Control	Inlet Vane	Load Change Rate	Nor. 7	Max. 10	%MCR/min.
Steam Temp. Control	Spray Type Inter-stage	Allowance at Battery Limit			
Control Range	50 ~ 100 % MCR	Pressure	- 0 ~ + 2		kg/cm ²
Blowdown		Temperature	- 0 ~ + 10		°C
Steam Drum	Continuous	Start-up Time			Start Condition
	Manual	Cold Start	210 min.	15 °C	
Water Drum	Intermittent	Warm Start	120 min.	100 °C	
	Manual	Hot Start	20 min.	191 °C	12 kg/cm ² .g

Notes

56	*1) at Battery Limit
57	*2) with Steam Injection / without Steam Injection
58	*3)
59	*4)
60	*5)

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3	Contractor	Daelim Industrial Co., Ltd.	Revision	1 2
4	Code/Standard	ASME Sec. I	ASME Stamp	No
5	Service	Auxiliary Boiler Package	Sheet No.	2 of 4
6	Type	Water Tube	Item No.	***
7	No. of Uints, Operating	1	Stand-by	0
			Total	1

SITE CONDITION

Ambient Air				Wind Design Code	KBC 2009	
Pressure	1.0028	bar.a	Basic Wind Speed	90	km/h	25 m/sec
Temperature	Max.	50	°C	Seismic Design Code	KBC 2009	Zone 1
	Min.	5	°C			
Relative Humidity	Design	15	°C	Noise Limit	85	dB(A) at 1 m distance
	Max.	100	%			
Design	60	%				

UTILITY CONDITION

Electricity				<u>Pressure</u>	<u>Temperature</u>
MV Motor	AC	6,600	V	kg/cm ² .g	°C
		60	Hz		
LV Motor	AC	460	V	Service Water	Nor 4 Nor 35
		60	Hz	Instrument Air	Nor 5 Nor 11
Control	AC	120	V	Plant Air	Nor 5 Nor 11
		60	Hz	Cooling Water	Nor 4 Nor 42
	DC	125 24	V	N ₂	Nor 5.5 Nor 11
* MV Motor	:	above 185	kW		

FUEL SPECIFICATION

Kind of Fuel	Gas Fuel				
Fuel Name	Natural Gas				
Composition :	<u>Component</u>	<u>volume%</u>			
	Methane	91.3			
	Ethane	5.6			
	Propane	2.04			
	i-Butane	0.42			
	n-Butane	0.42			
	i-Pentane	0.01	* Sum 0.02, max.		
	n-Pentane	0.01			
	Nitrogen	0.2			
	Water Vapor	0.25			

WATER & STEAM QUALITY

Aux. BFW	Boiler Water	Steam
pH	8.3 ~ 10	
Dissolved Oxygen	max. 0.007 ppm	TDS max. 1 ppm
Total Iron	max. 0.1 ppm	Total Alkalinity, CaCO ₃ max. 700 ppm
Total Copper	max. 0.05 ppm	Suspended Solids max. 15 ppm
Total Hardness	max. 0.3 ppm	Silica max. 0.08 ppm
Nonvolatile TOC	max. 1 ppm	Silica as SiO ₂ max. 150 ppm
Oily Matter	max. 1 ppm	PO ₄ ³⁻ 20 ~ 40 ppm

Notes

- *1) WATER & STEAM QUALITY : According to ABMA, ASME and JBMA
- *2) Max. Allowable TDS in Feedwater, Fmax

$$F_{max} = (B \times Rd + S \times 100) / (Rd + 100) = 103 \text{ ppm} \rightarrow \text{Divided by } 0.7 = 147 \text{ } \mu\text{S/cm}$$
 Where, TDS Boiler Water B 3,500 ppm Steam S 1.0 ppm
 Design Blowdown Rate Rd 3 %
- *3)
- *4)
- *5)

BOILER DATA SHEET

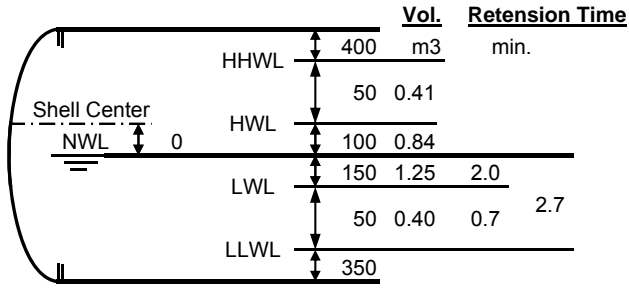
1	Project	Pocheon LNG Power Plant	Doc. No.	DS - BLR - 100
2	Client	Pocheon Power Co., Ltd.	Date	2014. 6. 30.
3	Contractor	Daelim Industrial Co., Ltd.	Revision	1 2
4	Code/Standard	ASME Sec. I	ASME Stamp	No
5	Service	Auxiliary Boiler Package	Sheet No.	3 of 4
6	Type	Water Tube	Item No.	***
7	No. of Uints, Operating	1	Stand-by	0
			Total	1

MECHANICAL DESIGN

Pressure & Temperature Setting				Materials and Size				
		Pressure	Temperature			Designation	OD	Thk * Min
		kg/cm ² .g	°C					
11	Design	Boiler	21	280.0	Furnace Tube	A 178-A	50.8	3.2 mm
12	Test	Boiler	31.5		Bank Tube	A 178-A	50.8	2.9 mm
13	Design	Primary S/H	21	400	Superheater			
14	Design	Secondary S/H	21	450	Primary S/H	A 213-T11	50.8	4 mm
15	Design	Economizer	25	280	Secondary S/H	A 213-T11	50.8	4 mm
16	Setting	Drum PSV1	21	216.3	Economizer	A 178-A	38.1	3.5
17	Setting	Drum PSV2	21.63	217.8				
18	Setting	S/H PSV	20	380				
19							Tube C.A. >	0

Dimensions								
		ID	Thickness	TL - TL				
20	Steam Drum	1,100	32	7,260	mm	Header		NPS
21	Water Drum	950	28	7,260	mm	Furnace Upper	A 106-B	6"
22						Furnace Lower	A 106-B	6"
23	Furnace	Width	2,508		mm	Superheater	Inlet	Outlet
24		Height	2,248		mm	Primary S/H	A 335-P11	A 335-P11 8"
25		Length	6,840		mm	Secondary S/H	A 335-P11	A 335-P11 8"
26	Boiler Proper	Width	4,210		mm	Economizer	A 106-B	A 106-B 5"
27		Height	4,495		mm			
28		Length	7,500		mm			

Furnace Parameters at MCR			Level Setting in Steam Drum		
29	Furnace Volume	40.9	m ³		
30	Heat Input	20,345,162	kcal/h		
31	Furnace Heat Release Rate	497,482	kca/h.m ³		
32	EPRS Heat Release Rate	280,080	kcal/h.m ²		



Heating Surface Area				Steam Drum Internals		
33	Furnace	Projected, Effective	72.6	m ²	Feedwater Distributor	Installed Perforated Pipe
34	Evaporator		315.7	m ²	Chemical Distributor	Installed Perforated Pipe
35	Superheater				Blowdown Collector	Installed Perforated Pipe
36	Primary S/H		12.6	m ²	Steam Separator	
37	Secondary S/H		6.3	m ²	Baffle Plate	Installed Plate
38	Economizer		390.1	m ²	Cyclone	- N/A -

Loading Data						
		Weight				
39	Boiler Proper	Empty	36,850	kg	Demister	Installed Chevron Dryer
40		Oper.	49,760	kg	Dryer Pipe	- N/A -
41		Hydro.	55,590	kg		

Notes						
42	*1)					
43	*2)					
44	*3)					
45	*4)					
46	*5)					

BOILER DATA SHEET

1	Project	Pocheon LNG Power Plant	Doc. No.	DS - BLR - 100
2	Client	Pocheon Power Co., Ltd.	Date	2014. 6. 30.
3	Contractor	Daelim Industrial Co., Ltd.	Revision	1 2
4	Code/Standard	ASME Sec. I	ASME Stamp	No
5	Service	Auxiliary Boiler Package	Sheet No.	4 of 4
6	Type	Water Tube	Item No.	***
7	No. of Uints, Operating	1	Stand-by	0
			Total	1

AUXILIARY EQUIPMENT SPECIFICATION

9	Burner	Low Nox	Gas Burner	Draft Fan	Forced Draft
10	Quantity	1	set(s) / boiler	Quantity	100 % x 1 set(s) /boiler
11	Gas Burner		Vendor's Standard	Type	Centrifugal driven by Motor
12	Capacity, max.	2,374	Nm ³ /h / burner	Capacity	480 Nm ³ /min
13	Turn-down ratio	10	: 1 (Manual)	Suction Pressure	-30 mmH ₂ O
14		7	: 1 (Auto)	Discharge Pressure	520 mmH ₂ O
15	Oil Burner	- N/A -		Total Head	550 mmH ₂ O
16	Capacity, max.		kg/h / burner	Noise Limit	85 dB(A) at 1 m distance
17	Turn-down ratio	- N/A -	: 1		
18	Sootblower	- N/A -		BFW Pump	Supplied
19	Blowing Medium	- N/A -	Type	Quantity	2 set(s) / boiler
20	Quantity	Furnace	*** set(s) /boiler - N/A -	Type	Centrifugal driven by Motor
21		Tube Bank	*** set(s) /boiler - N/A -	Capacity	41.1 m ³ /h
22		Superheater	*** set(s) /boiler - N/A -	Suction P. / Disch. P.	0.50 25 kg/cm ² .g
23		Economizer	*** set(s) /boiler - N/A -	Differential P.	24.50 kg/cm ²
24		Gas Air Heater	*** set(s) /boiler - N/A -	Total Head	258 mH ₂ O
25					
26	Economizer		Installed	Deaerator with Storage Tank	Spray & Tray Type
27	Quantity	1	set(s) / boiler	Quantity	1 set(s) , Total
28	Type		Finned Tube Type	Storage Capa.	6 m ³
29	Tube	Material	A 178-A	Material	A 516-70
30		Size	OD 38.1 3.5 t mm	Size Deaerator	ID 1,800 x TL-TL 1,800 mm
31				Storage Tank	ID 1,800 x TL-TL 3,500 mm
32					
33					
34					
35					
36					
37					
38					
39					
40				Aux. Boiler Blowdown Tank	Supplied
41				Quantity	1 set(s) /boiler
42				Material	A 516-70
43				Size	ID 1,250 x TL-TL 1,800 mm
44				Volume	2.72 m ³
45					
46	Stack		Supplied	Chemical Dosing Unit	Supplied
47	Quantity	1	set(s) /boiler	Chemical	Phosphate Oxygen Scavenger Ammonia
48	Material	A 283-C		Tank Q'ty /boiler	1 1 1
49	Size	ID 1350	x H 20.0 m	Pump Q'ty /boiler	2 2 2
50					
51					
52					
53					
54					

55	Notes			
56	*1)			
57	*2)			
58	*3)			
59	*4)			
60	*5)			

ECONOMIZER DATA SHEET

1	Project	Pocheon LNG Power Plant	Doc. No.	DS - ECO - 100
2	Client	Pocheon Power Co., Ltd.	Date	2014. 6. 30.
3	Contractor	Daelim Industrial Co., Ltd.	Revision	1 2
4	Code/Standard	ASME Sec. I	ASME Stamp	No
5	Service of Unit	Economizer	Flow Pattern	Cross-Counter
6	Type	Finned	Tube Installation	Horizontal
7	Surface/Unit, Eff.	390.1 m ²	Shell Fluid Flow	Horizontal

PERFORMANCE of ONE UNIT

	Shell Side		Tube Side	
Fluid Name	Flue Gas		Aux. BFW	
	Inlet	Outlet	Inlet	Outlet
Fluid Quantity, Total	27,963	Nm ³ /h	31,445	kg/h
Vapor	27,963	27,963	0	0
Liquid	0	0	31,445	31,445
Condensate		0		
Temperature	285.0	180.0	111.4	143.0
Density	0.61	0.75	950.74	924.27
Viscosity	0.027	0.023	0.252	0.193
Molecular Weight	27.618		18.015	
Specific Heat	0.282	0.276	1.010	1.024
Thermal Conductivity	0.036	0.030	0.587	0.590
Latent Heat		***		452.3
Inlet Pressure	74	mmH ₂ O	19.0	kg/cm ² .g
Velocity, i / m / o	15.31	13.87	12.43	0.76
Pressure Drop		50		0.50
Fouling Resistance		0.0002		0.0002
Heat Duty	1,010,376	kcal/h MTD	100.86	°C
H. T. Rate, Cal'd	28.00	kcal/m ² .h.°C	357.8	m ²
H. T. Rate, Service	25.68	kcal/m.h.°C	390	m ²
		H. T. Area, Req.	30.74	kcal/m ² .h.°C
		H. T. Area, Act.	91.1	%
		H. T. Area Margin	9.0	%

DESIGN, MATERIALS and CONSTRUCTION of ONE UNIT

	Shell Side		Tube Side		SKETCH
Design Pres.	600	kg/cm ² .g	25.0		<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;"> <p>Please refer to GA (VP-100580-16-119-01-101)</p> </div>
Test Press.	900	kg/cm ² .g	32.5		
Design Temp.	335	°C	280		
No. of Passes	1		14		
Corrosion Allowance, mm	2		3	* Tube 0	
Nozzle	Inlet	Outlet	Inlet	Outlet	
Material	A 36	A 36	A 106-B	A 106-B	
Q'ty	1	1	1	1	
Size	1216 x 1600	850 x 1600	3"	3"	
Rating	- N/A -	- N/A -	300 lb	300 lb	

	Type	Material	Q'ty	OD	Thick	Length
Tube	Finned	A 178-A	224	38.1	Avg. 3.5	1,216 * Effective
Fin	Spiral	A 1008		76.2	1.2	Height 19.05 FPI 5
Header	Pipe	A 106-B	2	141	9.53	1,700 Sch. Sch.80
Tubesheet	- N/A -					
Tube Bundle	No. of Tubes / Row	16	No. of Rows	14	No. of Rows / Header	1
	Support Plate :	A 283-C	2		12	
	Pitch	In-line	Trans.	100	Long.	106.7
Shell		A 36			6	
Transition Duct		A 36			6	
Gasket	Shell Side	Non-asbestos	*1)	Tube Side	Spiral Wound	*2)
Accessories	Safety Valve	N/A -		Expansion Joint	N/A -	
	Insulation	Provided		Ladder	Provided	
Weight	Empty	4,153	Oper.	4,394	Filled with Water	4,410 kg

56	Notes				
57	*1) Ceramic Fiber Square Rope, Th'k : 1/4"				
58	*2) Filler : Graphite, Hoop : 304S.S, Inner Ring : 304 S.S, Outer Ring : C.S, Th'k : t4.5				
59	*3)				
60	*4)				

STACK DATA SHEET

1	Project	Pocheon LNG Power Plant	Doc. No.	DS - STACK - 100
2	Client	Pocheon Power Co., Ltd.	Date	2014. 6. 30.
3	Contractor	Daelim Industrial Co., Ltd.	Revision	1 2
4	Code/Standard	ASME STS-1	Sheet No.	1 of 1
5	Service of Unit	Stack	Item No.	510-M-XX-0-01A
6	Size Shell ID	1350 mm	Height	20 m
7	Location	Out-door	Type	Self-standing
8	DESIGN DATA			

9	Fluid Name	Flue Gas	R.T.	No
10	Flowrate	27,963 Nm ³ /h	Joint Efficiency	0.7
11		Pressure	Temperature	Corrosion Allowance
12		mmH ₂ O	°C	3.2
13	Design	100	250	No. of Pieces
14	Operating, Inlet	-1.0	180	Joint Method
15	Gas Velocity, Exit	9.0	m/sec	Bolting

SITE CONDITION				
Ambient Air				
			Temperature	-17.2 ~ 34.1 °C
			Relative Humidity	67.2 %
			Basic Wind Speed	90 km/h 25 m/sec
			Seismic Zone	KBC 2009 Zone 1

FLUE GAS				
18	Fuel, Used.	Natural Gas		
19	Composition :			
20	Component	volume%		
21	H ₂ O	19.55		
22	CO ₂	8.68		
23	N ₂ a	70.08		
24	O ₂	1.69		
25	SO ₂	0.00		
26	Total	100.0		

MATERIALS	SCHEMATIC DIMENSIONAL OUTLINE
------------------	--------------------------------------

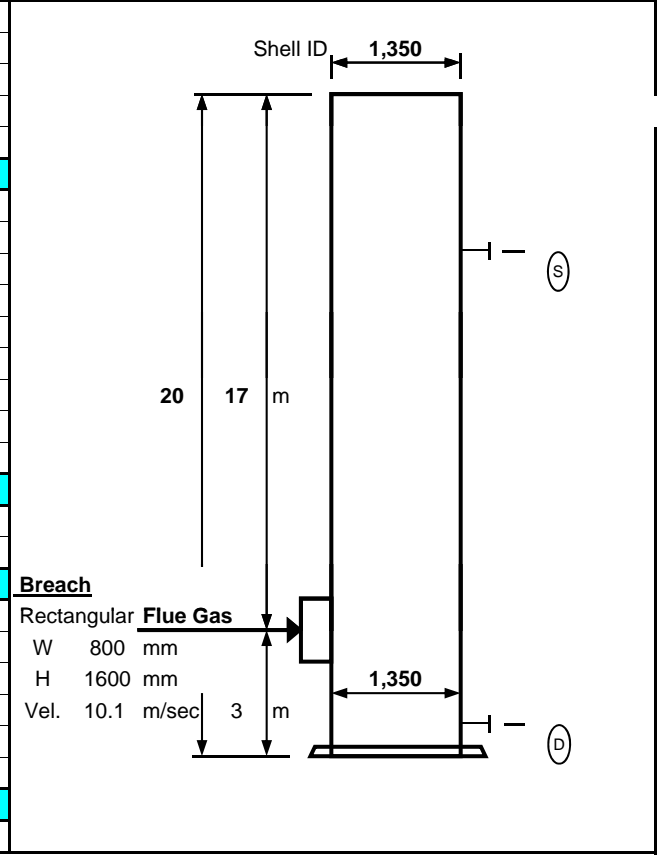
28	Shell	A 283-C	14	~	10 t
29	Base Ring	A 283-C			
30	Bolts / Nuts	A 193-B7, <=2.5"			
31	Gasket	Non-asbestos *1)			

ACCESSORIES		
34	Lightning Rod	Provided
35	Aircraft Light	Provided
36	Manhole	20"
37	Ladder	Provided
38	Platform	Provided
39	Lifting Lug	Provided
40	Earth Lug	Provided
41	Name Plate	Provided
42	Anchor B/N	Provided

PAINTING		
44	Inside	Heat-resistant Acid-resistant
45	Outside	Final

INSULATION & LAGGING			
	Inside	Outside	
48	Insulation	- N/A -	- N/A -
49		- N/A - t	- N/A - t
50	Lagging	- N/A -	- N/A -
51		- N/A - t	- N/A - t
52	Personal Protection	Provided	2.5 m

LOADING DATA		
54	Weight	12,919 kg



Notes	
56	*1) Fiber Ceramic Square Rope (1/4")
57	*2)
58	*3)
59	*4)
60	*5)

DEAERATOR SPECIFICATION SHEET

1	Project Pocheon LNG Power Plant	Job No. 100580	
2	Client Pocheon Power Co., Ltd.	Doc. No. SS - DEA - 100	
3	Contractor Daelim Industrial Co., Ltd.	Date 2014. 6. 30.	
4	Code/Standard ASME Sec. VIII Div. 1 / HEI	ASME Stamp No	Revision 1 2
5	Service of Unit Deaerator with Storage Tank	Type Spray-Tray	Item No. 510-M-DA-0-01A
6	Size ID/TL 1800 / 1800, 1800 / 3500	Deaerator Position Vertical	No., Units 1 set(s)
7	Location Indoor	Storage Tank Position Horizontal	Sheet No. 1 of 2

PERFORMANCE

Load ID.	Design (MCR)			75 %MCR			50 %MCR			
Flows	Unit	kg/h	°C	kg/cm ² .g	kg/h	°C	kg/cm ² .g	kg/h	°C	kg/cm ² .g
Condensate Return		0	80.0	4.00	0	80.0	4.00	0	80.0	4.00
Demi. Water		29,286	15.0	4.00	22,468	15.0	4.00	15,642	15.0	4.00
Aux. Steam		4,822	260.0	15.00	3,699	260.0	15.00	2,576	260.0	15.00
Steam from B/D Tk		0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
HP Condensate		0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
LP Condensate		0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Vent Steam		48	111.4	0.50	37	111.4	0.50	26	111.4	0.50
Aux. BFW		34,060	111.4	0.50	26,130	111.4	0.50	18,192	111.4	0.50
Operating Temp. / Press.			111.4	0.50		111.4	0.50		111.4	0.50
<u>Dissolved Gases</u>		<u>O₂</u>	<u>CO₂</u>		<u>Spray Valve</u>					
In	Condensate Return	0.05	0.05	ppm, Max	Q'ty	2	set(s)	<u>One Valve</u>	<u>Total</u>	
	Demi. Water	10.062	10	ppm, Max	Capacity		Maximum	20	40	ton/h
Out	Aux. BFW	0.007	0	ppm	at Load : Design (MCR)			14.6	29.3	ton/h
<u>Water Storage Capacity</u>		<u>LWL ~ NWL</u>	<u>LLWL ~ HWL</u>		<u>Press. Drop</u>		<u>Load : Design (MCR)</u>	0.11		kg/cm ²
	Volume	6.0	8.4	m ³						
	Holding Time	10.0	14.0	min						

CONSTRUCTION

	DEAERATOR			STORAGE VESSEL		
Design Pressure	3 kg/cm ² .g			3 kg/cm ² .g		
Vacuum	F/V			F/V		
Test Pressure	3.9 kg/cm ² .g			3.9 kg/cm ² .g		
Design Temperature	280 °C			280 °C		
Corrosion Allowance	3 mm			3 mm		
Shell ID / Thickness	1,800 / 10	mm		1,800 / 10	mm	
Head Thickness	10 mm			10 mm		
Type Heads	2:1 Ellipsoidal			2:1 Ellipsoidal		
Vacuum Rings	- N/A -			Yes		
Weight : Empty / Operating / Flooded	2,828	2,833	8,935	3,760	11,025	14,193
Radiography : Shell / Head	Spot	/	Full	Spot	/	Full
Magnetic Particle Inspection	Yes			Yes		
Stress Relief (PWHT)	No			No		
Surface Preparation : Internal / External	Refer to " General Assembly (VP-100580-16-119-001-110)"					
Insulation Clips	Yes			Yes		

MATERIALS

	DEAERATOR		STORAGE VESSEL	
Shell / Head	A 516-70	A 516-70	A 516-70	A 516-70
Spray Valves / Trays	316 SS	430 SS		
Support	A 283-C		A 283-C	
Platform / Ladder Provided	A 36		A 36	

MAIN ACCESSORIES

MAIN NOZZLE LIST

	DEAERATOR	Internal	Service	Size	Q'ty	Type	Rating
51	Vent Condenser	Internal					
52	Safety Relief Valve	Provided	Demi. Water	3"	1	Flanged	150 lb
53	Vacuum Breaker	- N/A -	Aux. Steam	10"	1	Flanged	150 lb
54	Press. Gauge	Provided	Vent Steam	1 1/2"	1	Flanged	150 lb
55	Press. Transmitter	Provided	Safety Valve	4"	1	Flanged	150 lb
56	Temp. Gauge	- N/A -	Aux. BFW	6"	1	Flanged	150 lb
57	Temp. Transmitter	- N/A -	Overflow	4"	1	Flanged	150 lb
58	Level Bridle	Provided	Sparger Pipe for Start-up	- N/A -	- N/A -	- N/A -	- N/A -
59	Level Gauge	Provided					
60	Level Transmitter	Provided					
61	Temp. Gauge	Provided					
62	Temp. Transmitter	Provided					
63	Sparger Pipe for Start-up	- N/A -					

Notes

*1)

*2)

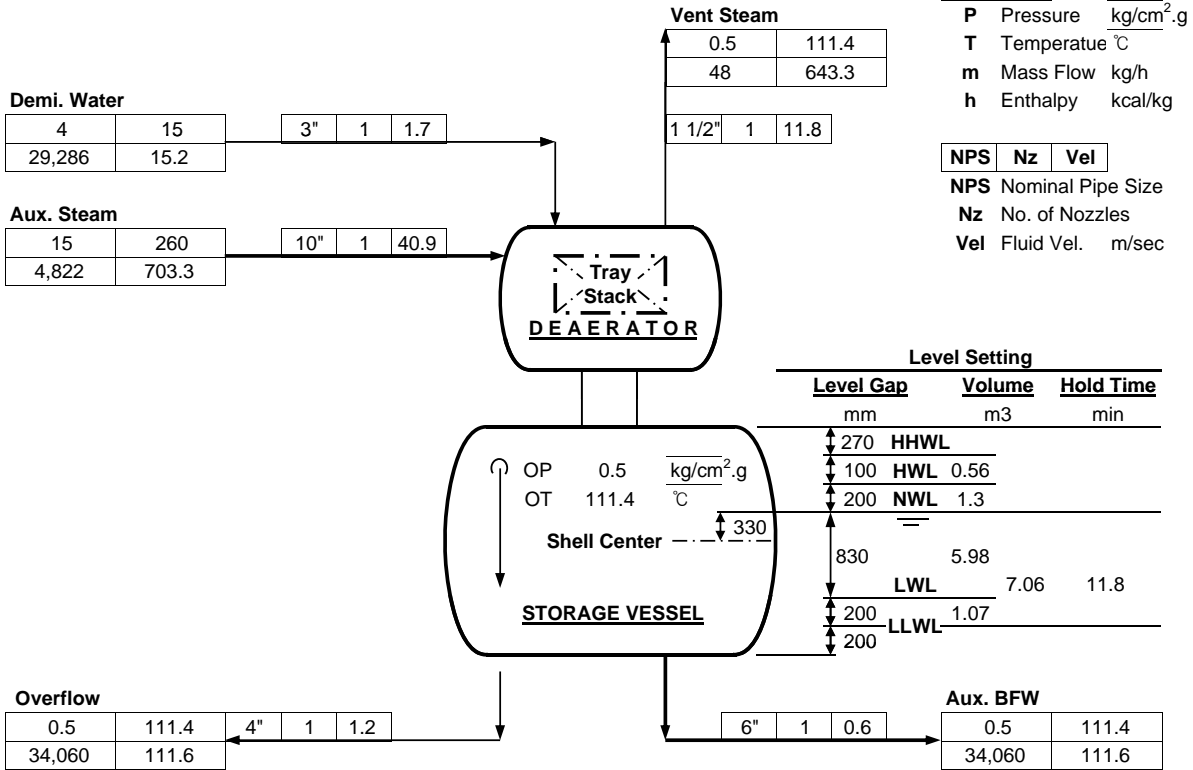
*3)

DEAERATOR SPECIFICATION SHEET

1	Project	Pocheon LNG Power Plant			Job No.	100580	
2	Client	Pocheon Power Co., Ltd.			Doc. No.	SS - DEA - 100	
3	Contractor	Daelim Industrial Co., Ltd.			Date	2014. 6. 30.	
4	Code/Standard	ASME	Sec. VIII Div. 1	/ HEI	ASME Stamp	No	Revision 1 2
5	Service of Unit	Deaerator with Storage Tank		Type	Spray-Tray		Item No. 510-M-DA-0-01A
6	Size	ID/TL 1800 / 1800, 1800 / 3500		Deaerator Position	Vertical		No., Units 1 set(s)
7	Location	Indoor		Storage Tank Position	Horizontal		Sheet No. 2 of 2

HEAT & MASS BALANCE DIAGRAM

Load : Design (MCR)



* for Nozzle Sizing

HEAT & MASS BALANCE

	Flowrate	Enthalpy	Energy
	kg/h	kcal/kg	kcal/h
Input	Demi. Water	29,286 x 15.16	= 443,855
	Aux. Steam	4,822 x 703.35	= 3,391,669
	Steam from B/D Tk	0 x 0.00	= 0
	HP Condensate	0 x 0.00	= 0
	LP Condensate	0 x 0.00	= 0
	Total	34,108	3,835,524
Output	Vent Steam	48 x 643.26	= 31,019
	Aux. BFW	34,060 x 111.63	= 3,802,212
	Total	34,108	3,833,231
Deviation, Input - Output	0.00 %		-0.06 %

- B L A N K -

Notes

- *1)
- *2)
- *3)
- *4)
- *5)

BLOWDOWN TANK DATA SHEET

1	Project	Pocheon LNG Power Plant	Doc. No.	DS - BV - 100
2	Client	Pocheon Power Co., Ltd.	Date	2014. 6. 30.
3	Contractor	Daelim Industrial Co., Ltd.	Revision	1 2
4	Code/Standard	ASME Sec. VIII Div. 1	ASME Stamp	No
5	Service of Unit	Aux. Boiler Blowdown Tank	Type	Cylindrical
6	Size	ID 1250 x TL 1800	Installation	Vertical
7	Location	Outdoor	Volume, LSL ~ NWL	0.98 Full 2.72 m ³

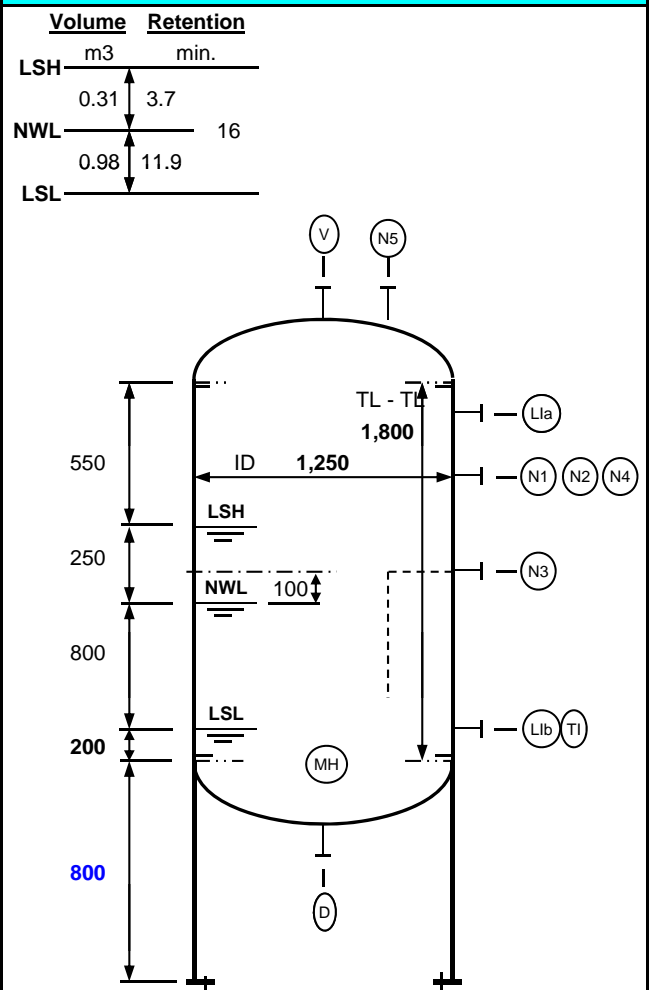
DESIGN DATA

9	Fluid Name	Continuous B/D Water	Intermittent B/D Water	Shell	Head
10	Flowrate	780 kg/h	5,200 kg/h	R.T.	Spot Full
11		<u>Pressure</u>	<u>Temperature</u>	Joint Efficiency	0.85 1
12		kg/cm ² .g	°C	PWHT	No
13	Design	3	143	Corrosion Allowance	3 3
14	Vacuum	- N/A -			
15	Operating	0.0	100	Liquid Level	Yes
16	Test	3.9		Liquid / Vapor Density	958 / 0.6 kg/m ³

MATERIALS

18	Shell	A 516-70	9 t
19	Head	A 516-70 2:1 Ellipsoidal	9 t
20	Leg	A 36	4 ea
21	Nozzle Neck	A 106-B	
22	Nozzle Flange	A 105	
23	Bolts / Nuts	A 193-B7, <=2.5"	
24	Gasket	Spiral Wound, Graphite, 304 SS	
25			
26			
27			

SCHEMATIC DIMENSIONAL OUTLINE



ACCESSORIES

29	Manhole	20"
30	Ladder	Provided
31	Platform	- N/A -
32	Lifting Lug	Provided
33	Earth Lug	Provided
34	Name Plate	Provided
35	Anchor B/N	Provided
36	Vent Silencer	- N/A -

NOZZLE LIST

38	MK	Service	Qty	Size	Type	Rating
39	N1	Continuous B/D Water Inlet	1	2"	Flanged	150 lb
40	N2	Intermittent B/D Water Inlet	1	6"	Flanged	150 lb
41	N3	B/D Water Outlet	1	4"	Flanged	150 lb
42	N4	Drain Inlet	1	6"	Flanged	150 lb
43	N5	Steam Drain	1	1 1/2"	Flanged	150 lb
44						
45	Lia,b	Level Indicator	2	1"	Flanged	150 lb
46	TI	Temperature Indicator	1	1 1/2"	Flanged	150 lb
47						
48						
49	V	Vent	1	6"	Flanged	150 lb
50	D	Drain	1	2"	Flanged	150 lb
51	MH	Manhole	1	20"	Flanged	150 lb

LOADING DATA

53	Surf. Prep.	Inside - N/A -	Outside Sand Blasting	Weight, Empty	1,225	kg
54	Painting	Inside - N/A -	Outside Primer	Weight, Operating	2,646	kg
55	Insulation	Provided	Mineral Wool 50 t	Weight, Full Water	3,945	kg
56	Lagging	Provided	Al 1 t			

Notes

- 58 *1) Data shown above may be changed in acc. with detail design.
- 59 *2) Parts not shown above will be duly provided as far as required.
- 60 *3)

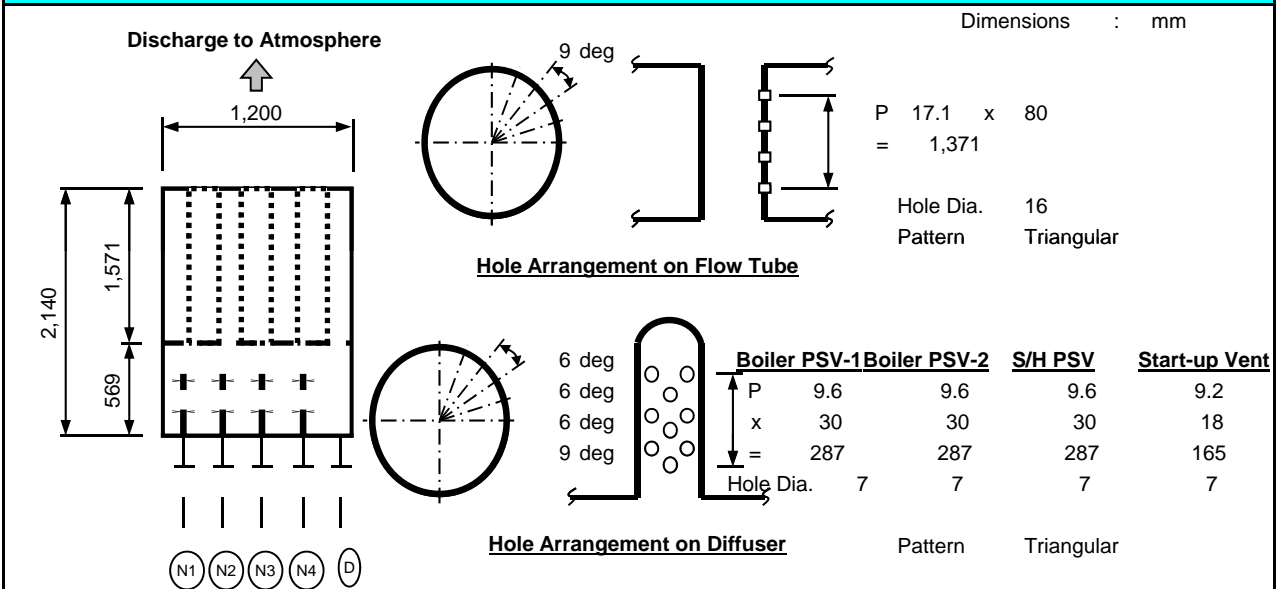
DATA SHEET for SILENCER for BOILER

1	Project	Pocheon LNG Power Plant	Job No.	100580
2	Client	Pocheon Power Co., Ltd.	Doc. No.	DS - SILP2 - 100
3	Contractor	Daelim Industrial Co., Ltd.	Date	2014. 06. 30.
4			Revision	1 2
5	Service of Unit	Vent Silencer	Installation	Vertical
6	Type	Diffuser with Flow Tube	Support	Lug
7			Item No.	510-M-SL-0-01A
			No. of Units	1 set(s)
			Sheet No.	1 of 1

DESIGN DATA

Description	Boiler PSV-1	Boiler PSV-2	S/H PSV	Start-up Vent
Fluid Name	Exh. Steam	Exh. Steam	Exh. Steam	Vent Steam
Flowrate	12,237	12,237	6,118	3,900 kg/h
Press., Discharge	21	21.63	20	15 kg/cm ² .g
Temp., Discharge	216.3	217.8	380.0	260.0 °C

SCHEMATIC with DIMENSION



MATERIALS

NOZZLE LIST

Description	Specification	MK	Service	Q'ty	Size	Type	Rating
Shell	A 283-C	9 t	N1 Boiler PSV-1	1	8"	Flanged	150 lb
Head	A 283-C Flat	9 t	N2 Boiler PSV-2	1	8"	Flanged	150 lb
Diffuser	A 106-B	8.1 t	N3 S/H PSV	1	8"	Flanged	150 lb
Flow Tube	A 240 304 ID 250 x 5	2 t	N4 Start-up Vent	1	5"	Flanged	150 lb
Acoustic Material	Mineral Wool	100 kg/m ³					
Wrapping Material	Fiber Glass Cloth	1 t	D Drain	1	2"	Flanged	150 lb

PERFORMANCE > HYDRAULIC

	Boiler PSV-1		Boiler PSV-2		S/H PSV		Start-up Vent		Flow Tube
	Inlet Noz.	Diffuser Hole	Inlet Noz.	Diffuser Hole	Inlet Noz.	Diffuser Hole	Inlet Noz.	Diffuser Hole	
Fluid Velocity	188.8	88.0	188.9	88.0	139.0	64.7	176.4	82.2	67.9 m/sec
Press. Drop	0.101	0.008	0.101	0.008	0.037	0.003	0.076	0.006	0.004 kg/cm ² .g

PERFORMANCE > NOISE EMISSION

Overall Sound Power Level by Valve, Boiler PSV-1 / Boiler PSV-2 / S/H PSV	129 / 129 / 134 dB										
Octave Band center Frequency	31.5	63	125	250	500	1,000	2,000	4,000	8,000	16,000	
Noise Emission, Unsilenced	A-weighted										
Sound Pressure Level at 1 m	87	98	104	110	113	112	110	101	87	76	116 dBA
Noise Emission, Silenced											
Sound Pressure Level at 1 m	58	66	69	75	78	77	75	66	51	44	81 dBA

Notes

- *1) Total Flowrate : 60,037 m³/h
- *2)
- *3)

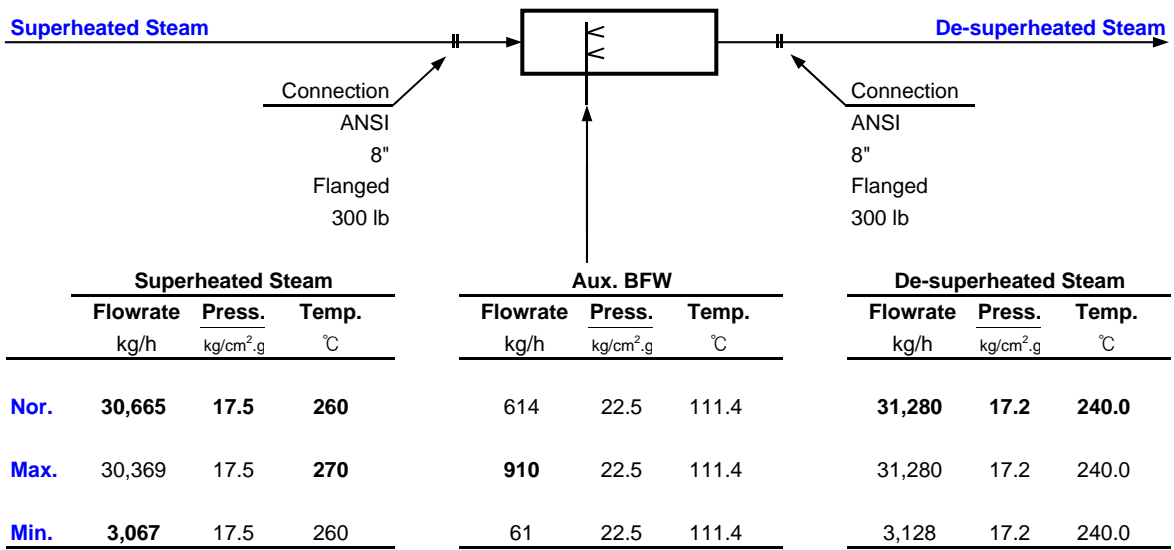
DE-SUPERHEATER DATA SHEET

1	Project	Pocheon LNG Power Plant	Job No.	100580
2	Client	Pocheon Power Co., Ltd.	Doc. No.	DS - DSH - 100
3	Contractor	Daelim Industrial Co., Ltd.	Date	2014. 6. 30.
4	Code/Standard	ASME	Revision	1 2
5	Service of Unit	De-superheater	Item No.	510-M-DS-001
6	Type	Vendor's Standard	Quantity	1 set(s)
7			Sheet No.	1 of 1

DESIGN DATA

9	Design Pressure	21	kg/cm ² .g	
10	Design Temperature	350	°C	
11				
12				
13				

PROCESS DATA



- B L A N K -

Notes

- 56 *1) De-superheater vendor's data sheet with cal., construction, etc will be duly attached just after a vendor has been selected.
- 57 *2)
- 58 *3)
- 59 *4)
- 60 *5)