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Cover Sheet
Brine Heater for Filling

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TECHNICAL SPECIFICATION

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2	Plate Heat Exchanger	
3	Process Design Case	
4	Nozzle Sheet	
5	Detail	
6	Applicable Codes & Standards	
7	General Requirements	
8	Documentation	

Rev.	Status	Description	Date	Prepared	Date	Checked	Date	Approved	AC
00	IFI	Issue for Inquiry	12-Mar-24	Langner	19-Mar-24			Gerold Pejril	

PCC ROKITA

Customer Document ID:

Category Code:

Shown on PID: 0653

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Plate Heat Exchanger
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Line	Process Requirements I			IDX	Process Requirements II			Remark	Rev.
2	Quantity Operat. / Stand-by	1	0		Material Process Side	Ti 0.2% Pd	Ti 0.2% Pd		
3	Type	Plate-and-Frame, gasketed			Exchg Surf. per Exchg/Total m²			1)	
4	Arrangement	☐ Parallel ☐ Serial ☐ Stand-by			Qty. of Plate Assembled			2)	
5	Process Fluid, Fluid 1	Ultra Pure Brine		5)	Min Plate Thickness mm	0.6			
6					Insulation Type	Splash Guard			
7	Process Fluid, Fluid 2	Low Pressure Steam							
8		Steam Condensate							
9		**Fluid 1**			**Fluid 2**				
10	pH-Value								
11	Class of Hazard	H290							
12	Physical Condition In/Out	L	L		V	L			
13	Density, Liquid In/Out kg/m³	1184	1164			962			
14	Density, Gas In/Out kg/m³				1.719				
15	H2-Partial Press. In/Out bara								
16	Operating Temp. In/Out °C	55	80		135	95			
17	Operating Press. In/Out bara	3.5		3)	3.1			3)	
18	Allowable Pressure barg		8		-1	6			
19	Allowable Temperature °C	3	170		3	170			
20	MDMT at MAWP °C								
21	Ambient Temperature °C	-25 / 35							
22									

23 Abbreviations for Physical Condition: (S)olid, (L)iquid, (G)as, (V)apour, (IDX) Index for Remarks

Line	Mechanical Requirements			IDX	Material			
24					Part		Materials	Remarks
25	Design Code	PED / EN 13445						
26					Bars/Support Columns		CS	4)
27	Corros. Allow., for Calc. mm	0	0		Covers		CS	4)
28	Joint Efficiency				Plate Pack		Ti 0.2% Pd	4)
29	Test Pressure	Acc. to Code			Plate Gaskets		EPDM	
30	Non-Destructive Test	Acc. to Code			Nozzle Flanges	Fluid 1	Ti 0.2% Pd lining	
31	Insulation mm					Fluid 2	Ti 0.2% Pd lining	
32	Seismic Loads				Nozzle Pipes	Fluid 1		
33	Wind Loads					Fluid 2		
34	Inspection by	Rokita			Bolts / Nuts	Fluid 1	CS	A2E
35	Painting	Manufacturer Standard				Fluid 2	CS	A2E
36	Pickling and Passivation				Gaskets	Fluid 1		
37						Fluid 2		
38					Anchor Bolts			
39					Lifting Lugs / Trunnions			
40					Sliding Plate			
41					Mounting Feet		CS	
42					Tie Bolts / Tie Nuts		CS	
43								
44								
45								
46								

47 Remarks :

48
1) Surface with min 10% safety margin
2) Fram with 20% spare places
3) To be defined in engineering phase according to pressure drop calculation
4) Material certificates 3.1 acc. to EN 10204 are required.

5) NaCl 305gpl, Na2SO4 10gpl, NaClO3 10gpl, Na2Co3 400 mgpl, Suspended solids < 0,5 mgpl, NaOH < 200 mgpl

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Process Design Case
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Line	Process Requirements		Fluid 1			IDX	Fluid 2			IDX	Rev.
2											
3	Process Fluid		Ultra Pure Brine				Low Pressure Steam				
4							Steam Condensate				
5	Material Process Side		Ti 0.2% Pd				Ti 0.2% Pd				
6	Surf.-Treatm./Coat. (Proc. Side)										
7	Insulation Type		Splash Guard								
8	Physical Condition In/Out		L	L			V	L			
9	Class of Hazard		H290								
10	pH-Value										
11	H2-Partial Pressure In/Out	bara									
12	Max. Operating Temperature	°C	90				160				
13	Max. Operating Pressure	barg	6				5				
14	Allowable Temperature	°C	3	170			3	170			
15	Allowable Pressure	barg		8			-1	6			
16	Mean Metal Temperature	°C									
17	**Abbreviations: (S)olid, (L)iquid, (G)as, (V)apour, (IDX) Index for Remark**										
18	**Operating Conditions per Unit**		**Fluid 1**				**Fluid 2**				
19			Inlet	Outlet			Inlet	Outlet			
20	Mass Flow, Total	kg/h		94720				3296			
21	Mass Flow, Vapour/Gas	kg/h									
22	Mass Flow, Steam	kg/h					3296				
23	Mass Flow, Inerts	kg/h									
24	Mass Flow, Liquid	kg/h	94720	94720							
25	Mass Flow, Water	kg/h						3296			
26	Operating Temperature	°C	55	80			135	95			
27	Operating Pressure	bara	3.5			2)	3.1			2)	
28	**Liquid**										
29	Density	kg/m³	1184	1164			1.719	962			
30	Dynamic Viscosity	mPa*s	0.93	0.64							
31	Specific Heat	kJ/(kg*K)	3.3	3.27				4.21			
32	Thermal Conductivity	W/m*K	0.6120	0.622				0.676			
33	Specific Enthalpy	kJ/kg						0.297			
34	Boiling Point	°C									
35	Solidification Point	°C									
36	Surface Tension	N/m									
37	**Steam/Gas**										
38	Molar Weight	kg/kmol					18.015				
39	Density	kg/m³					1.14				
40	Dynamic Viscosity	mPa*s					0.014				
41	Specific Heat	kJ/(kg*K)					2.086	4.12			
42	Thermal Conductivity	W/m*K					0.029				
43	Condensation Temperature	°C									
44	Condensation Enthalpy	kJ/kg									
45	**Design Requirements**										
46	Number of Passes										
47	Velocity (Mean)	m/s								1)	
48	Pressure Drop, Admiss./Calc.	bar		0.5				0.5			
49	Fouling Factor	Surface in % / m²*K/W		0.0005				0.0001		1)	
50	Corrected Mean Temp. Diff.	°C						47		1)	
51	Heat Duty per Exch. / Total	kW		2171 /							
52	Heat Transf. Coeff, Max./Calc.	W/m²*K		/						1)	
53	Required Liquid Static Head	m									
54	**Remarks :**										
55	1) To be given / confirm by manufacturer 2) To be defined in engineering phase according to pressure drop calculation Line 20,48 ->Pressure Drop has to be calculated for flow rate of 94720 kg/h of Fluid 1 Line 12,14 -> only possible for a short period. Normal conditions: steam temperature 135 °C										

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Nozzle Sheet
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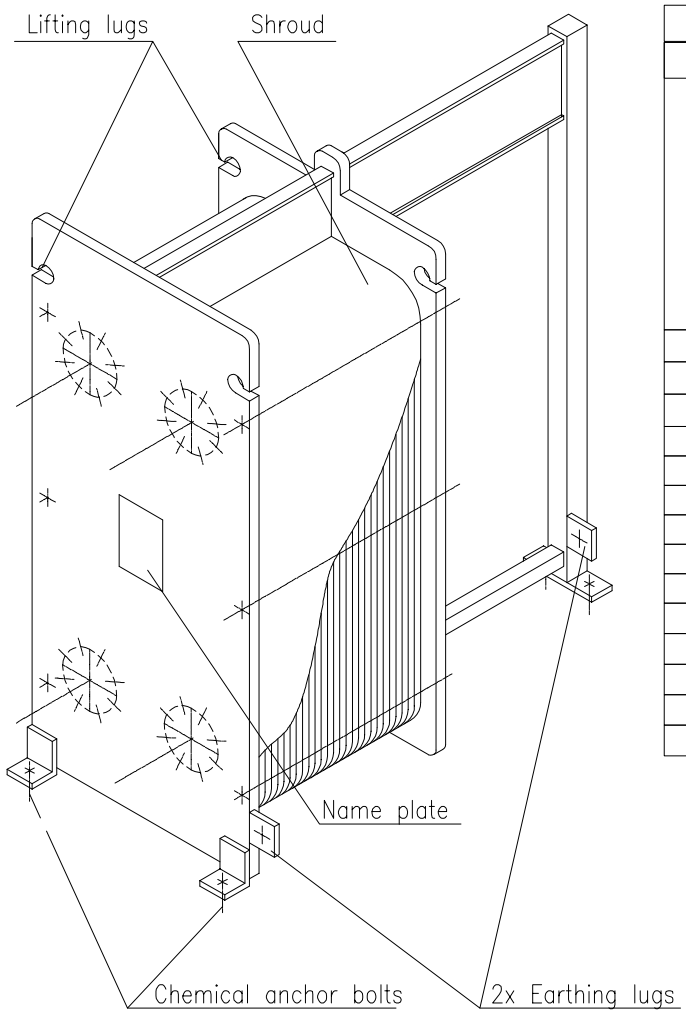
Nozzle Symbol	Designation	DN mm	PN	Standard DIN	Flange Type	Flange Facing	Pipe Dimensions mm	Remarks	Rev.
N01	Brine Inlet	1)	10	EN 1092-1		A			
N02	Brine Outlet	1)	10	EN 1092-1		A			
N03	Steam Inlet	1)	10	EN 1092-1		A			
N04	Condensate Outlet	1)	10	EN 1092-1		A			

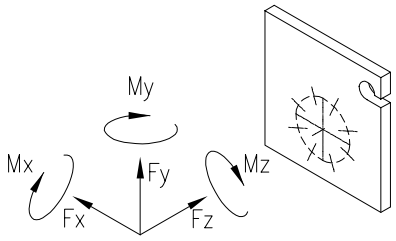
Remark:

1) To be given by manufacturer



Connection loads / moments

Direction of forces on connections



Nozzle loading

Nom. size		F	M
DN	NPS (in)	N	N•m
50	2	1039	378
80	3	1826	1148
100	4	2386	1788
150	6	3882	3750
200	8	5482	6178
250	10	7166	9047
300	12	8918	12353
350	14	10730	16101
400	16	12595	20301
450	18	14507	24965
500	20	16462	30107

Supplies shall include the following items:

- Name plate. Material: S.S.
- Chemical anchor bolts. Material: S.S.
- 2 separate earthing connections. Material: S.S.
- Sleeves for tie bolts. Material: plastic (manufacturer standard).
- Shroud Material: S.S.

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Applicable Codes & Standards
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	Info	Type	Description	Issue Date	Rev.
2		**Global Codes & Standards**			
3		☒ PED 2014/68/EU	Pressure Equipment Directive	latest issue	
4		☒ EN 13445	Unfired pressure vessel	latest issue	
5		☐ EN 13121	GRP tanks and vessels for used above ground	latest issue	
6		☒ Manufacturer Standard			
7					
8		**Company Standards: tk Uhde Project Engineering Specifications**			
9		☐ PDEL-EQS-G000-EC-0001	ES Vessels and Equipment of GRP		
10		☒ PDEL-EQS-G000-EC-0002	ES for Plate Heat Exchanger		
11		☒ PDEL-EQS-G000-EC-0003	Process vessel and equipment>0.5bar(g) (based on PED)		
12					
13		**Company Standards: UN**			
14		☐ UN 2000-06 Part 2	Clips for ladders and platforms		
15		☐ UN 2000-09 Part 1	Name plate for vessel		
16		☐ UN 2000-10 Part 1	Title blocks for manufactures drawing		
17		☐ UN 2002-05 Part 1	Manufacturing defects at glass reinforsed thermosetting plastics vessel and equipment		
18		☐ UN 2002-03 Part 1	Vessel and equip. of glass-fibre-reinforced plastics; Typical configuration		
19		☐ UN 2002-04	Transport and erection for vessel and tanks of GRP		
20		☒ UN 2003-01	Earthing connections for vessels and equipment		
21		☒ UN V416-04	Water quality for pressure tests and flushing of equipment and other components		
22		☒ UN 8281-02 Part 7	Foundation and anchoring, type F		
23		☐ ES-Y1	Painting		
24					
25		**Remarks :**			
26					

1	Info	Description	Rev.
2		**General**	
3		☒ Stress analysis shall be performed by the manufacturer in accordance with design specifications	
4		☐ Specified wall thicknesses are minimum values and shall be increased if required by stress calculation	
5		☐ Nozzle necks shall be least DN 50/ 2". They shall be reduced to the required nominal flange size if necessary.	
6		☒ Bolts, nuts and gaskets for joints with tapped holes have to be supplied by the vessel manufacturer.	
7			
8		**Supplies Shall Include the following Items**	
9		☐ Clips, pads and ladders for vessel	
10		☐ Additional 2 sets gaskets for flanges with cover and blind flanges	
11		☐ Additional 10% of bolts and nuts, as spare	
12		☒ Lifting lugs for erection	
13		☒ 2 separate earthing connections to be provided 180 degree apart resp. 1 per saddle, if not otherwise specified	
14		☐ All internals	
15		☒ Spare parts for 2 years to be quoted separately	
16		☒ Anchor Bolts	
17		☒ For applicable standards see page ' Index of Applicable Codes and Standards'	
18			
19		**Remarks :**	
20			

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Documentation

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	For Information		**For Review**		**For Approval**		**Erection Doc.**		**Final Doc.**	
	Dispatch of Documents	No. of copies	Dispatch of Documents	No. of copies	Dispatch of Documents	No. of copies	Dispatch of Documents	No. of copies	Dispatch of Documents	No. of copies
Priced spare parts list	2 weeks after order	e								
Fabrication schedule	4 weeks after order/each month	e								
Material status report	8 weeks after order/each month	e								
Stress calculation			6 weeks after order	e					with delivery	4
Foundation loads Foundation drawing 1)	3 weeks after order	e								
General arrangement drawing (1st issue)					**4** weeks after order	e	2 months before delivery	e	with delivery	4
General arrangement drawing (rev. issue)					2 week after receipt of comments	e				
Detail drawing with part list (1st issue)					**4** weeks after order	e	2 months before delivery	e	with delivery	4
Detail drawing with part list (rev. issue)					2 weeks after receipt of comments	e				
Welding procedure specification (WPS) and qualification record (PQR)			8 weeks after order	e					with delivery	4
Quality plan and testing schedule			**4** weeks after order	e			2 months before delivery	e	with delivery	4
Transportation sketch			8 weeks after order	e			2 months before delivery	e	with delivery	4
Operation and maintenance instruction 2)			8 weeks after order	e			2 months before delivery	e	with delivery	4
Storage instruction			8 weeks after order	e			2 months before delivery	e		
Certificates (material test, test/inspection, quality, welder/ laminator qualification, etc.)									with delivery	4

1) penalized data 2) in English and Polish language

e-> electronic format