

Technical Quotation



Our **T2018118-APP2 R3**
Your **B2425 AB 1711 019 – SLUDGE COOLING SYSTEM**

Scope

The scope will be the design, manufacturing, supply, assembly and commissioning of a sludge cooling system **based upon APPENDIX 2** consisting of:

- Primary Heat Exchanger for heat transfer from sludge (medium) to glycole-water circuit (service, closed loop).
- Secondary Air-Cooling system to cool the glycole-water service circuit. Commissioning on site of Air Cooler is included.



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Design conditions

Appendix 2 = Cooler1 793 kW + Cooler2 748 kW

Cooler1 793 kW

Calculation T2018118_CT011 18 m³/h sludge from 72°C down to 50°C

Calculation T2018118_CT012 18 m³/h sludge from 50°C down to 34°C

Cooler2 748 kW

Calculation T2018118_CT009 17 m³/h sludge from 72°C down to 50°C

Calculation T2018118_CT010 17 m³/h sludge from 50°C down to 34°C

Thermal design calculations are enclosed.

The primary heat exchanger will be tube-in-tube only one pass designed to cool sludge from 72°C down to 34°C by using a closed glycole-water loop 25°C inlet temperature. All exchangers will have **multiply flexible metal bellows** to minimize stress. **Flanges to be as per ANSI B16.5.**

Shell side design pressure will be 10 bar and Tube side design pressure will be 10 bar. Equipment will be labelled accordingly to process.



Technical specification	APPENDIX 2	
	Heat Exchanger 1	Heat Exchanger 2
heating power [kW]		
temperature warm side [°C]	72 - 50 - 34	72 - 50 - 34
substrate flow rate [m ³ /h]	18	17
flow in water loop [m ³ /h]	106	100
specific heat [kJ/(kg*K)]	3,9701	3,9701
viscosity [mPas]	187 - 262	197 - 276
thermal conductivity [W/(m*K)]	0,684 - 0,649	0,684 - 0,649
temperature water inlet [°C]	25	25
temperature water outlet [°C]	32	32
logarithmic temperature difference [K]	31,9 - 13	31,9 - 13
heat transfer rate [W/m ² *K]	280 - 250	265 - 237
heat exchange area [m ²]	154	154
transferred heat [kW]	748	793
allowance for fouling [m ²] or %	35 - 40	40 - 45
pressure drop of sludge [bar]	4,856	4,804
pressure drop of water [bar]	1,602	1,439

Technical Quotation

Technical specification	Cooler1	Cooler2
Model/Construction	Adiabatic Dry Cooler	Adiabatic Dry Cooler
Coolant type	25% Glycol/75% Water	25% Glycol/75% Water
flow rate substrate [m ³ /h]	18	17
flow rate coolant [m ³ /h]	106	100
heat capacity [kW]	793	748
installed power of ventilators [kW]	25.09 max	25.09 max
sound emission of ventilators [dB(A)]	Max 60 in 10 m	Max 60 in 10 m
Specified design air temperatures [°C] to [°C]	-10 to +30	-10 to +30
Specified air humidity range [%rH] to [%rH]	35 to 86%	35 to 86%
pressure drop of substrate [bar]	4,856	4,804
pressure drop of coolant [bar]	0,96	1,09
specifications of required water for wetting/adiabatic evaporation	Town mains or rainwater	Town mains or rainwater
**max. flow of water for wetting [m ³ /h] when +26°C	2,36 max	2,36 max
**estimated yearly water consumption [m ³] when +26°C	53	49

** Attached calculations showed utility consumptions for ambient points upto +30°C.



Sludge Primary Heat Exchanger Materials

Corrosion due to chloride contents 1.000 ppm have been studied. The tubular exchangers have been designed on stainless steel 304 shell side and 316L tube side as per your indications.

However, special attention must be kept to avoid fouling that results on crevice conditions.

See below critical temperatures for crevice and pitting conditions and wall temperatures along the process.

Crevice Cl-ppm	316L °C	904L °C	Pitting Cl-ppm	316L °C	904L °C
10	122,73	143,32	10	225,60	366,04
100	69,22	89,81	100	120,89	261,33
150	59,80	80,39	150	102,45	242,89
200	53,11	73,70	200	89,36	229,80
300	43,69	64,28	300	70,92	211,36
400	37,00	57,59	400	57,84	198,28
450	34,27	54,86	450	52,48	192,92
576	28,53	49,12	576	41,26	181,70
1000	15,71	36,30	1000	16,17	156,61



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Appendix	Calc	Twall max. (°C)	Twall min. (°C)
2	CT009	44,83	28,91
	CT010	38,59	26,64
	CT011	44,66	28,83
	CT012	38,51	26,61



Primary Heat Exchanger and stainless-steel piping surfaces will be pickled and passivated after hydrotests.



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Air Cooled Secondary Heat Exchanger Materials

Secondary Air-Cooled Heat Exchanger to be **wetted pad** adiabatic cooler. Air velocity is controlled so that no water passes to the finned coils and the cooler cannot emit aerosols. The cooler operates as a dry cooler most of the year. It switches to secondary adiabatic mode only during peak ambient conditions.

It does NOT spray water onto the finned tubes. This is most important because water spray creates aerosols or water droplets in the air and this can create legionella risk. Instead we wet humidifying pads in front of the finned tubes. The intake air is humidified and cooled when passing through the pads so that the effective air temperature onto the finned tubes is lower = higher efficiency.



The wetting is applied inside a closed chamber above the pads and the water stays only in the pads. The finned tubes remain dry and free from corrosion risk.

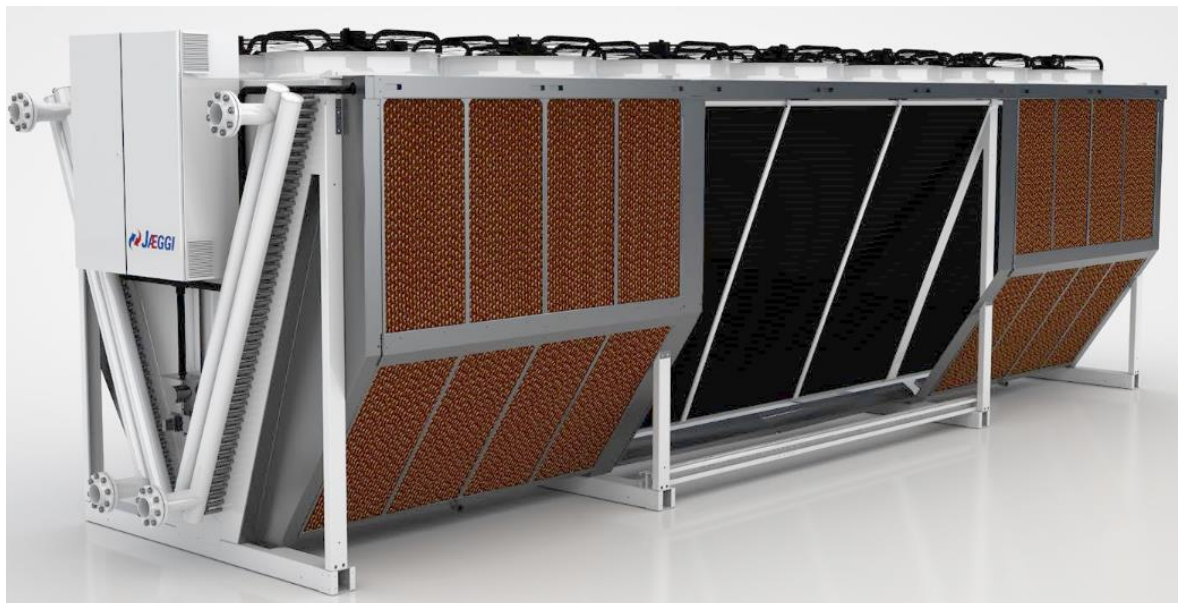


This pad type cooler will achieve **25 years** because the finned tubes are dry and so there is no risk of galvanic corrosion. It fits for medium size industrial and longer life cycle (energy centre, WtE, Bio-energy, larger HVAC, etc) and where legionella protection is important (nearby houses, hospitals, airports, exhibition centres, etc).



No water droplets or aerosols carry into the air stream and no aerosols are either created nor emitted. Means absolutely **no legionella risk**. Adiabatic coolers with pre-cooling pads are inherently safer than coolers which spray water.

Unlike spray coolers where wind can interfere, there is also no risk of overspray contaminating the surrounding ground making it wet, green, and unsafe where operators must walk. Because our fins and tubes remain dry, we can use untreated mains water to wet the pads. But a spray cooler must use softened or reverse osmosis water in order to avoid build up of mineral deposits in the fins.



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Tubes to be copper material with aluminum fins. Casing galvanized steel, RAL 7035. This equipment includes the required accessories:

- Vibration dumpers
- EC fuse box system
- Temperature transmitters
- EC fans with motor management GMM EC/16
- Ball valve for ventilation/drain
- Evaporative cooling system
- Variable velocity
- Control pannel 600x300x132, IP54 mounted and wired on inlet side.



Tests & Certificates

- Material certificate shall be minimum inspection certificate 3.1 All materials used in the fabrication of vessels shall be inspected, tested and identified in accordance with the requirements of the applicable Code.
- All applicable non-destructive testing and documentation according to code and datasheet.
- CE marking as per 2014/68/UE if applicable.
- Hydro-test and water quality. The water used for hydrostatic testing shall not contain toxic or corrosive substances, bacteria, colloidal suspensions or emulsions or any harmful matter which may affect the vessel.
- Welding procedures and welders' qualification according to applicable code.
- Material Controls, manufacture, inspection and workshop tests according to Specifications and Material Requisition.



Documentation

- Manufacturing Data Record Book (MDR) including all necessary certificates and reports. 2 hard copies in English and 1 electronic copy.
- Thermal design.
- Mechanical design according to applicable code.
- Realization of Drawings of the equipment.
- Operation and Maintenance Manual



Spare parts package

1 year's operation package is included.

Preparation for shipment

Preparation for shipment. All Nozzle flanged openings which are not having blind covers shall be protected. Thread openings shall be plugged by silicone. Bolt and nuts shall be coated with waterproof lubricant.

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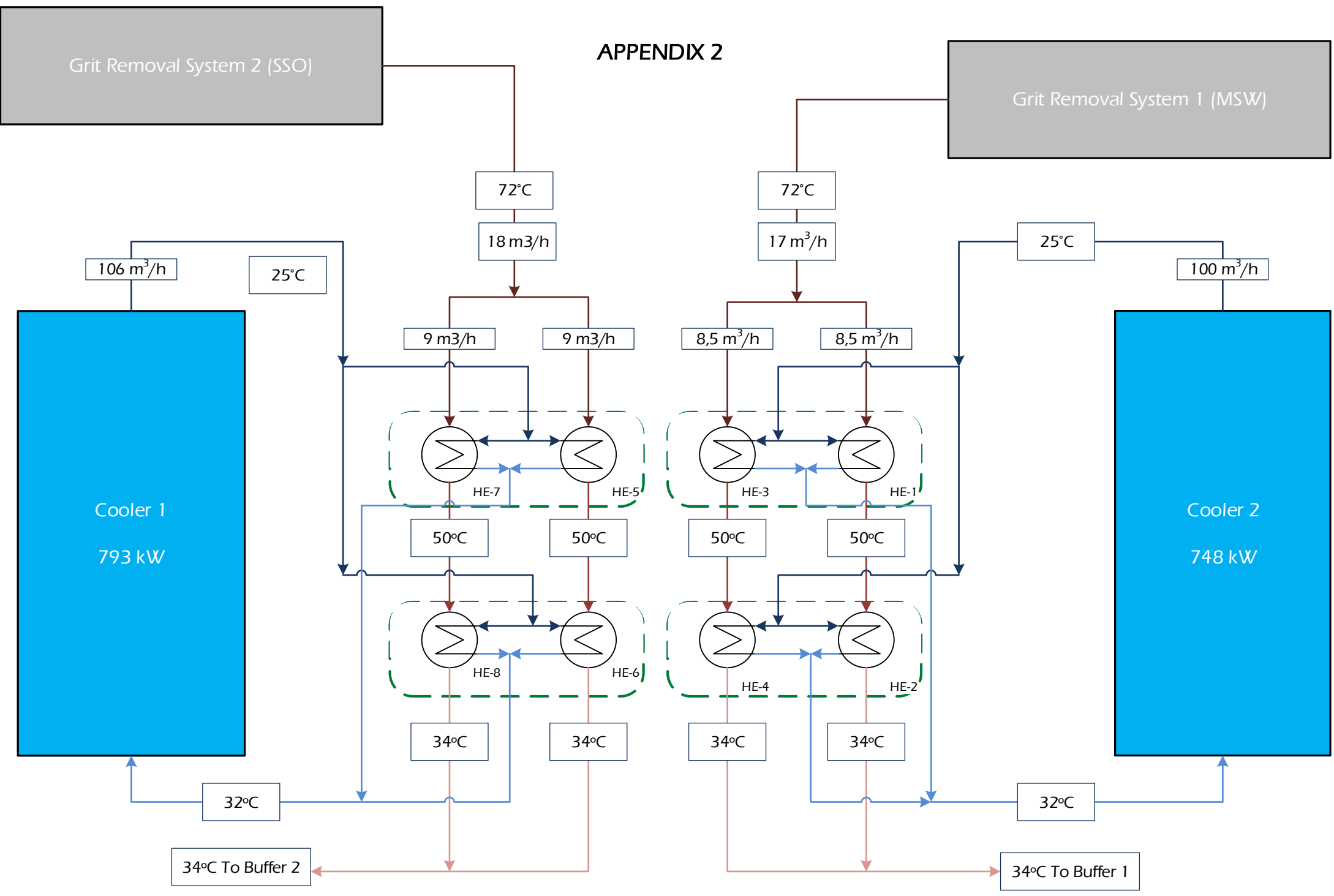
Out of scope

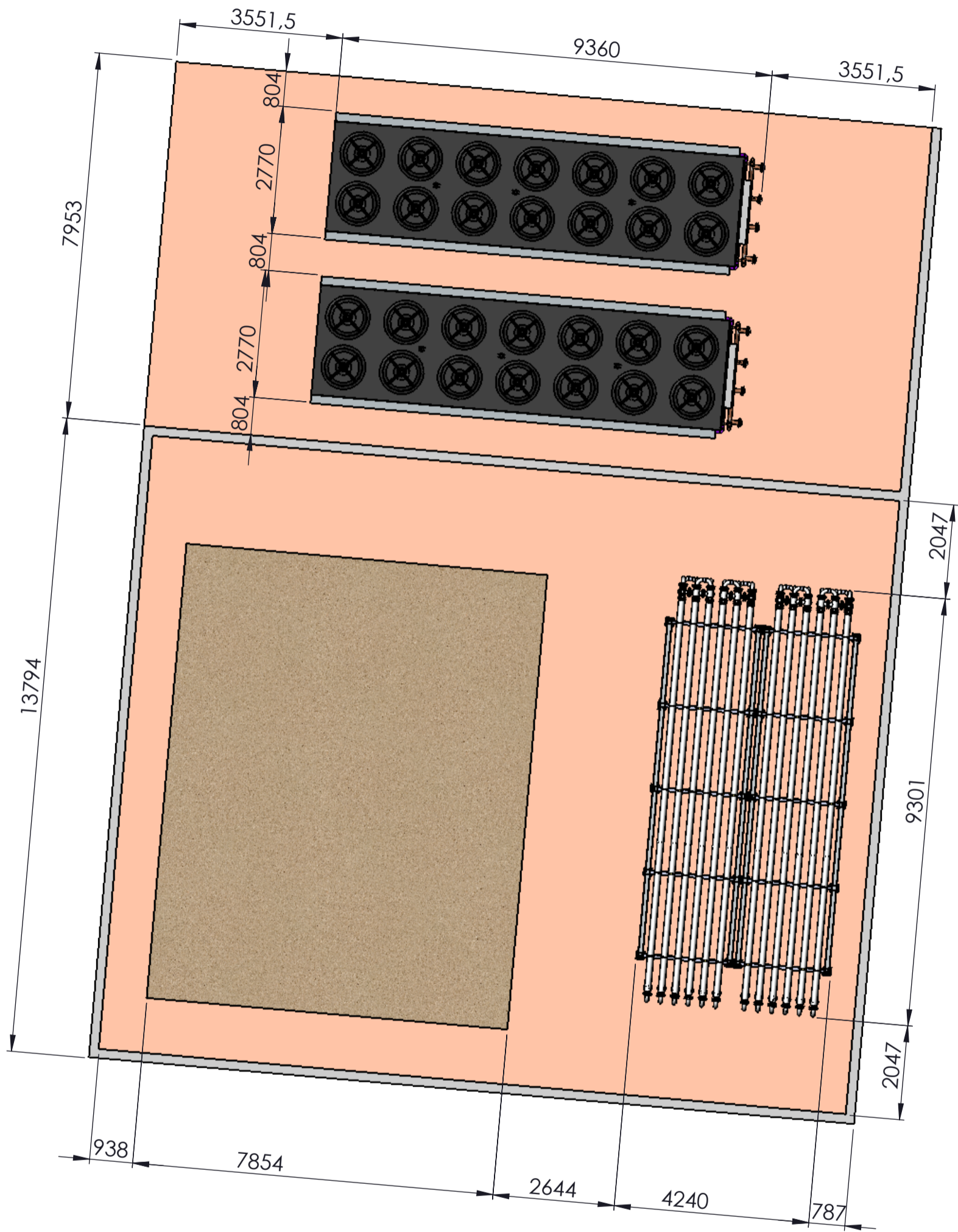
- Insulation of the equipment.
- Pumps, valves or instrumentation.
- Cranes and lifting devices are not included.
- Unloading on site.
- Commissioning on site of Heat Exchanger.
- Maintenance operations. Cleaning of Heat Transfer equipment.
- Import duties and other costs at customs are not included.
- In general, any equipment not described on above scope.



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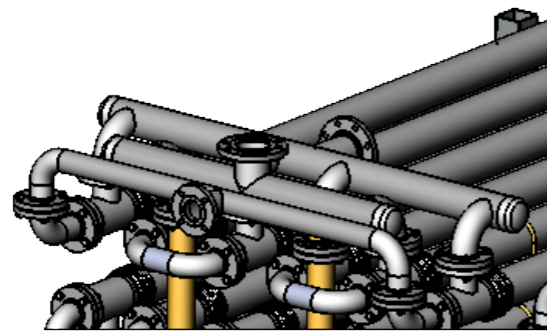
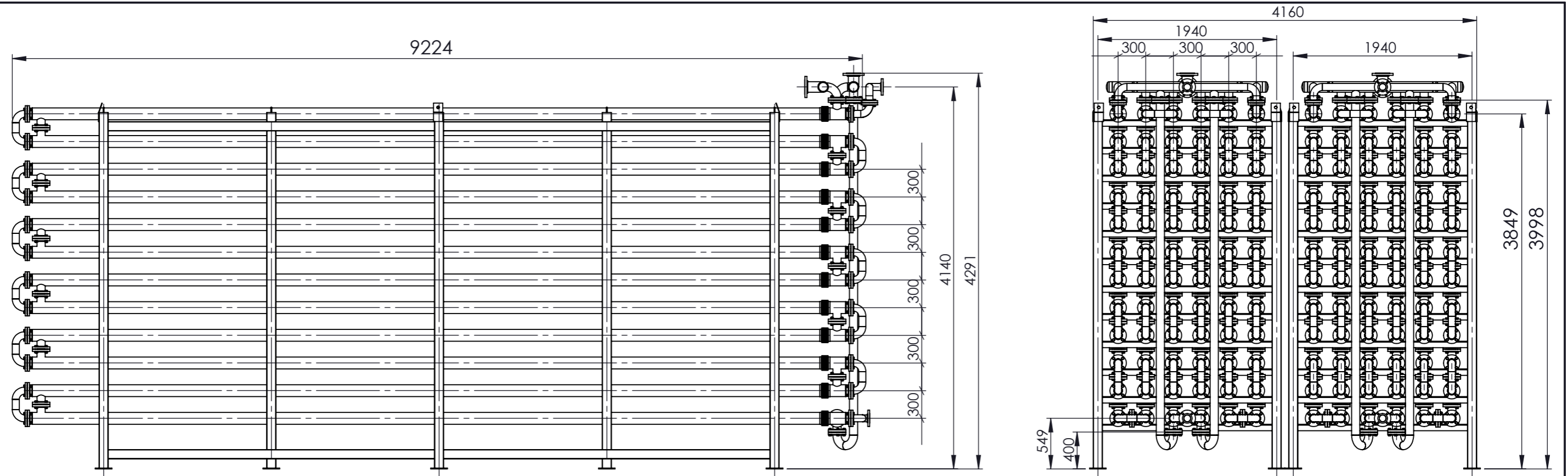
APPENDIX 2



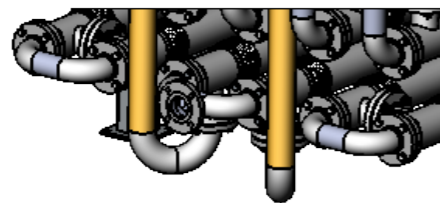


MATERIAL	WELDING EFFICIENCY FACTOR	DATE	NAME	SIGNED	
COOLER & HEAT EXCHANGER LAYOUT		EDITION	10/09/2018	CMB	---
		REVISED	10/09/2018	AM	---
		APPROVED	10/09/2018	ITM	---
CODE No.	CLIENT REF.	ORDER No.	DRAWING No.	SCALE	REV.
---	2425		T2018118-300	1:100	1

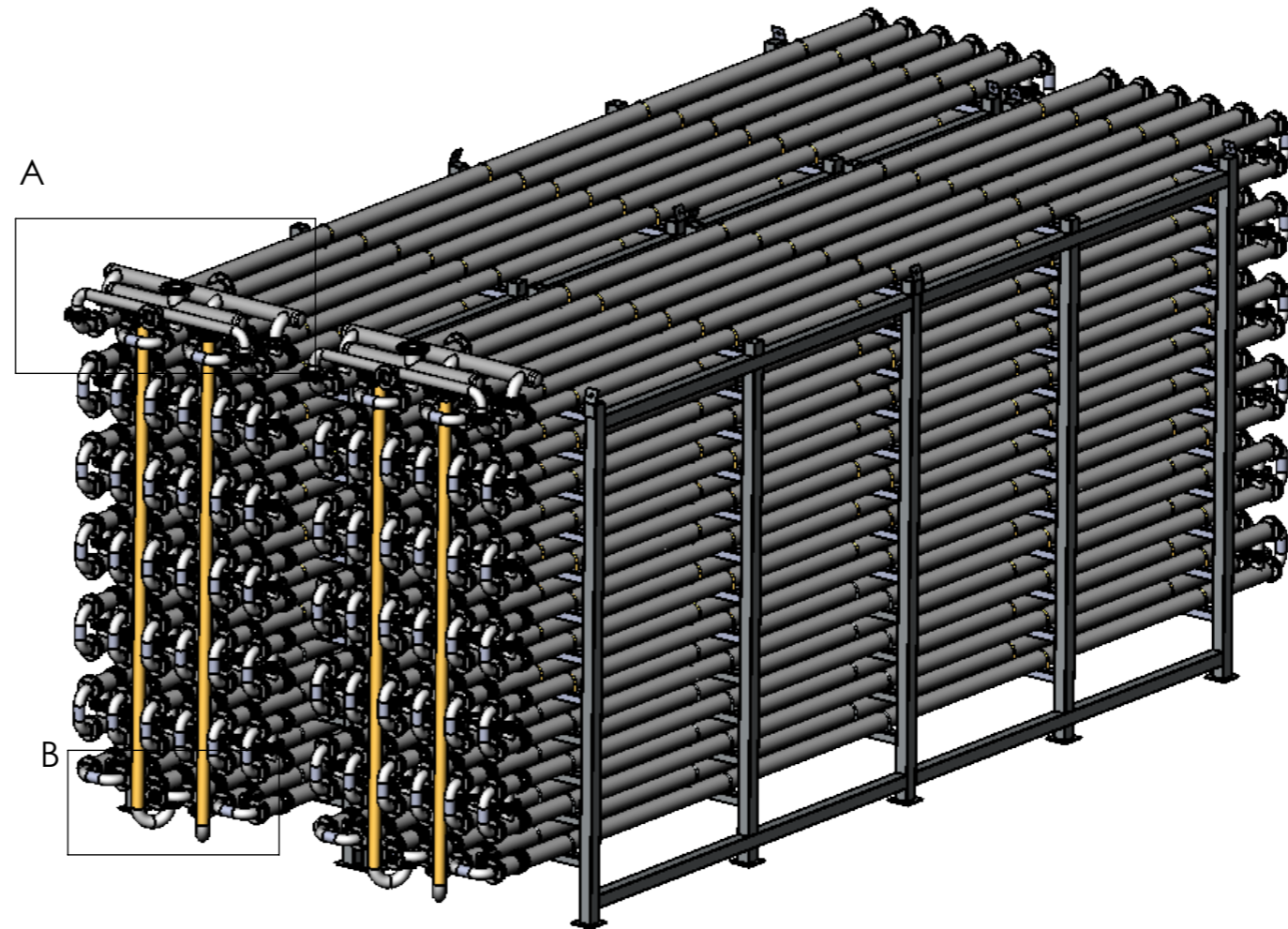

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DETAIL A



DETAIL B

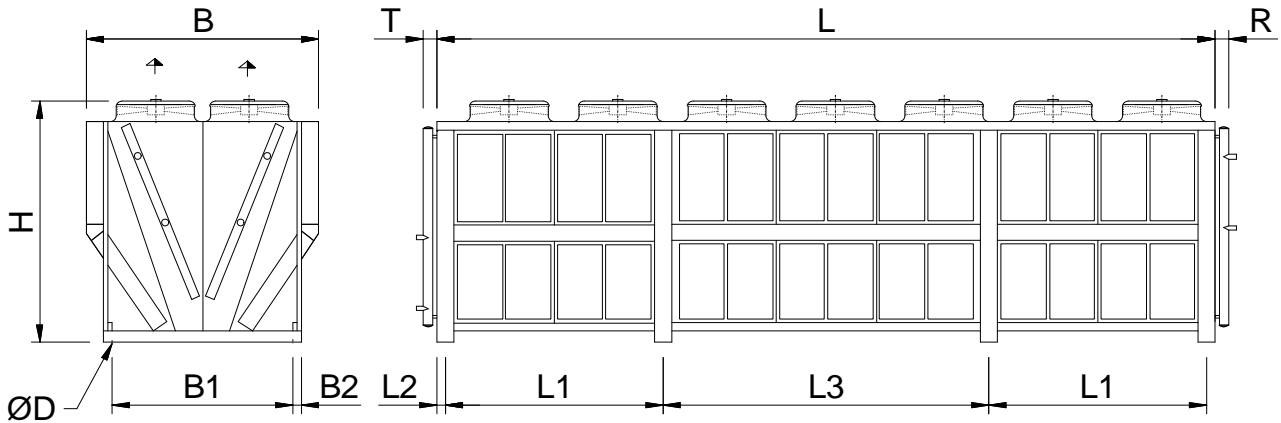


NOZZLE	DESIGNATION	SIZE	SHELL		TUBES		DESIGN-CODE	MATERIAL	WELDING EFFICIENCY FACTOR	EDITION	DATE	NAME	SIGNED		
N1		ANSI 150# SO 2½"	FLUID	GLYCOL 25%	SUBSTRATE	CE CATEGORY		316L/316L	---		27/09/2018	CMB	---		
N2		ANSI 150# SO 2½"	DESIGN PRESSURE (barg)	10	10	DRY WEIGHT (Kg)	18.945	IT20-1--5/3-9000-316L/316L-HARD APPENDIX 2							
N3		ANSI 150# SO 3"	TEST PRESSURE (barg)			WET WEIGHT(Kg)									
N4		ANSI 150# SO 3"	DESIGN TEMPERATURE (°C)	100	100										
			VOLUME (L)												
										CODE No.	CLIENT REF.	ORDER No.	DRAWING No.	SCALE	REV.
										---	---		T2018118-101	1:45	2



2 x ADC 2x7/NS9-D1F-3-3P

Project: Huntstown Dublin
 Quotation-no.: 180908-1
 Item: 2 x Adiabatic Dry Coolers
 Reference:



File: EMF\GVD_CD2x7_cu_UNI.emf

L = 8959 mm	B = 2770 mm	H = 2850 mm
R = 220 mm	L1 = 2505 mm	L2 = 77 mm
L3 = 3795 mm	B1 = 2300 mm	T = 180 mm
ØD = 21 mm		

Attention: Drawing and dimensions not valid for all accessory options!

Accessories

	Piece(s)
Vibration Dampers SMA5	16
EC fuse box system ⁽⁵⁾	2
1 x (5209280) Power Distribution Block 3ph+N 63A	
7 x (5209044) Circuit Breaker 3ph, 10A	
1 x (5209359) Interface Module for Modbus Type GMM EC	
1 x (5209288) GHM pad IP65	
1 x (5209039) Circuit Breaker 1ph+N, 6A	
1 x (5209008) GPD Güntner Power Distribution Housing (Plastic) 600x300x132 [mm]	
Temp. sensor with stainless steel pocket	2
Mounting and wiring	2
Lapped flanges DN100/104.5 PN10 with brazing neck ⁽⁶⁾ like DIN 2642	8
EC fans with motor management GMM EC/16	2
Ball valve 1/2" for ventilation/drain	8
Repair switch (single-speed), fans wired to front in pairs	14
Evaporative cooling system ⁽⁷⁾	2



HEAT EXCHANGER SPECIFICATION SHEET

Customer		KRIEG + FISCHER INGENIEURE GmbH		Job No.			
Address				Reference No.		T2018118_CT009	
Plant Location				Proposal No.			
Service of Unit		SUBSTRATE (MSW) 12,5% COOLER. HE1/HE3		Date		04/09/2018 Rev 1	
Size		125,000 x 8924,89 mm		Type		IT20	
Surf/Unit (Gross/Eff)		51,28 / 51,13 m2		Horz.		Connected In 2 Parallel 12 Series	
		Shell/Unit		24		Surf/Shell (Gross/Eff) 2,14 / 2,13 m2	
PERFORMANCE OF ONE UNIT							
Fluid Allocation		Shell Side			Tube Side		
Fluid Name		GLYCOL 25%			SUBSTRATE (MSW)		
Fluid Quantity, Total		kg/hr 57973,2			17850,1		
Vapor (In/Out)							
Liquid		57973,2			57973,2		
Steam					17850,1		
Water					17850,1		
Noncondensables							
Temperature (In/Out)		C 25,00			32,00		
Specific Gravity		1,0286			1,0254		
Viscosity		cP 1,6899			1,4140		
Molecular Weight, Vapor					197,84		
Molecular Weight, Noncondensables					240,75		
Specific Heat		kJ/kg-C 3,8298			3,8444		
Thermal Conductivity		W/m-C 0,5132			0,5152		
Latent Heat		kJ/kg			0,6847		
Inlet Pressure		bar-G 4,000			6,000		
Velocity		m/s 1,02			0,56		
Pressure Drop, Allow/Calc		bar			0,685		
Fouling Resistance (min)		m2-K/W			1,588		
Heat Exchanged kW		433, MTD (Corrected)			31,9 C		
Transfer Rate, Service		265,33 W/m2-K Clean			371,96 W/m2-K Actual		
					371,96 W/m2-K		
CONSTRUCTION OF ONE SHELL				Sketch (Bundle/Nozzle Orientation)			
		Shell Side		Tube Side			
Design/Test Pressure		barG 10,000 /		10,000 /			
Design Temperature		C 100,00		100,00			
No Passes per Shell		1		1			
Corrosion Allowance		mm					
Connections		In mm 1 @ 90,200		1 @ 62,700			
Size & Rating		Out mm 1 @ 90,200		1 @ 62,700			
		Intermediate @		@			
Tube No.		1 OD 76,200 mm		Thk(Avg) 1,500 mm		Length 8,925 m Pitch mm Layout 30	
Tube Type		HARD corrugated		Material		SS 316L	
Shell		SS 316L ID 125,000 mm		OD 129,00 mm		Shell Cover	
Channel or Bonnet		SS 316L		Channel Cover		SS 316L	
Tubesheet-Stationary		SS 316L		Tubesheet-Floating			
Floating Head Cover				Impingement Plate		None	
Baffles-Cross		Type NONE		%Cut (Diam)		Spacing(c/c) 8899,91 Inlet mm	
Baffles-Long				Seal Type			
Supports-Tube				U-Bend		Type	
Bypass Seal Arrangement				Tube-Tubesheet Joint			
Expansion Joint				Type			
Rho-V2-Inlet Nozzle		kg/m-s2		Bundle Entrance		Bundle Exit kg/m-s2	
Gaskets-Shell Side				Tube Side			
-Floating Head							
Code Requirements				TEMA Class			
						kg	
Remarks:							
MODEL: 2 X 12 IT20-1 - 5'3" - 9.000 - 316L/316L - HARD							
Designed by ITM							

Performance is conditioned on the accuracy of customers data and customers ability to supply equipment

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HEAT EXCHANGER SPECIFICATION SHEET

Customer		KRIEG + FISCHER INGENIEURE GmbH		Job No.			
Address				Reference No.		T2018118_CT010	
Plant Location				Proposal No.			
Service of Unit		SUBSTRATE (MSW) 12,5% COOLER. HE2/HE4		Date		04/09/2018 Rev 1	
Size		125,000 x 8924,89 mm		Type		IT20	
Surf/Unit (Gross/Eff)		102,55 / 102,27 m2		Shell/Unit		48	
				Surf/Shell (Gross/Eff)		2,14 / 2,13 m2	
PERFORMANCE OF ONE UNIT							
Fluid Allocation		Shell Side			Tube Side		
Fluid Name		GLYCOL 25%			SUBSTRATE (MSW)		
Fluid Quantity, Total		kg/hr			42126,0		
Vapor (In/Out)					17850,1		
Liquid		42126,0			42126,0		
Steam					17850,1		
Water					17850,1		
Noncondensables							
Temperature (In/Out)		C			25,00		
Specific Gravity		1,0286			1,0254		
Viscosity		cP			1,6899		
Molecular Weight, Vapor					1,4140		
Molecular Weight, Noncondensables					240,75		
Specific Heat		kJ/kg-C			3,8298		
Thermal Conductivity		W/m-C			0,5132		
Latent Heat		kJ/kg			0,5152		
Inlet Pressure		bar-G			4,000		
Velocity		m/s			0,74		
Pressure Drop, Allow/Calc		bar			0,754		
Fouling Resistance (min)		m2-K/W					
Heat Exchanged kW		315,			MTD (Corrected)		
					13,0 C		
Transfer Rate, Service		237,00 W/m2-K			Clean		
					344,64 W/m2-K		
					Actual		
					344,64 W/m2-K		
CONSTRUCTION OF ONE SHELL				Sketch (Bundle/Nozzle Orientation)			
		Shell Side		Tube Side			
Design/Test Pressure		barG		10,000 /		10,000 /	
Design Temperature		C		100,00		100,00	
No Passes per Shell		1		1			
Corrosion Allowance		mm					
Connections		In mm		1 @ 90,200		1 @ 62,700	
Size & Rating		Out mm		1 @ 90,200		1 @ 62,700	
		Intermediate		@		@	
Tube No.		1		OD 76,200 mm		Thk(Avg) 1,500 mm	
						Length 8,925 m	
						Pitch mm	
						Layout 30	
Tube Type		HARD corrugated		Material		SS 316L	
Shell		SS 316L		ID 125,000 mm		OD 129,00 mm	
Shell Cover							
Channel or Bonnet		SS 316L		Channel Cover		SS 316L	
Tubesheet-Stationary		SS 316L		Tubesheet-Floating			
Floating Head Cover				Impingement Plate		None	
Baffles-Cross		Type NONE		%Cut (Diam)		Spacing(c/c) 8899,91	
Baffles-Long				Seal Type		Inlet mm	
Supports-Tube				U-Bend		Type	
Bypass Seal Arrangement				Tube-Tubesheet Joint			
Expansion Joint				Type			
Rho-V2-Inlet Nozzle		kg/m-s2		Bundle Entrance		Bundle Exit	
						kg/m-s2	
Gaskets-Shell Side				Tube Side			
-Floating Head							
Code Requirements				TEMA Class			
						kg	
Remarks:							
MODEL: 2 X 24 IT20-1 - 5'3" - 9.000 - 316L/316L - HARD							
Designed by ITM							

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HEAT EXCHANGER SPECIFICATION SHEET

Customer		KRIEG + FISCHER INGENIEURE GmbH		Job No.	
Address				Reference No. T2018118_CT011	
Plant Location				Proposal No.	
Service of Unit		SUBSTRATE (SSO) 12,5% COOLER. HE5/HE7		Date 04/09/2018 Rev 1	
Size		125,000 x 8924,89 mm Type IT20		Horz. Connected In 2 Parallel 12 Series	
Surf/Unit (Gross/Eff)		51,28 / 51,13 m ²		Shell/Unit 24 Surf/Shell (Gross/Eff) 2,14 / 2,13 m ²	
PERFORMANCE OF ONE UNIT					
Fluid Allocation		Shell Side		Tube Side	
Fluid Name		GLYCOL 25%		SUBSTRATE (SSO)	
Fluid Quantity, Total		kg/hr 61382,8		18900,1	
Vapor (In/Out)					
Liquid		61382,8		18900,1	
Steam					
Water					
Noncondensables					
Temperature (In/Out)		C 25,00 32,00		72,00 50,00	
Specific Gravity		1,0286 1,0254		1,0426 1,0505	
Viscosity		cP 1,6899 1,4140		187,82 228,48	
Molecular Weight, Vapor					
Molecular Weight, Noncondensables					
Specific Heat		kJ/kg-C 3,8298 3,8444		3,9701 3,9701	
Thermal Conductivity		W/m-C 0,5132 0,5152		0,6847 0,6495	
Latent Heat		kJ/kg			
Inlet Pressure		bar-G 4,000		6,000	
Velocity		m/s 1,08		0,60	
Pressure Drop, Allow/Calc		bar 0,763		1,607	
Fouling Resistance (min)		m ² -K/W			
Heat Exchanged kW		459, MTD (Corrected)		31,9 C	
Transfer Rate, Service		280,94 W/m ² -K Clean		379,66 W/m ² -K Actual 379,66 W/m ² -K	
CONSTRUCTION OF ONE SHELL				Sketch (Bundle/Nozzle Orientation)	
		Shell Side		Tube Side	
Design/Test Pressure		barG 10,000 /		10,000 /	
Design Temperature		C 100,00		100,00	
No Passes per Shell		1		1	
Corrosion Allowance		mm			
Connections		In mm 1 @ 90,200		1 @ 62,700	
Size & Rating		Out mm 1 @ 90,200		1 @ 62,700	
		Intermediate @		@	
Tube No.		1 OD 76,200 mm Thk(Avg) 1,500 mm		Length 8,925 m Pitch mm Layout 30	
Tube Type		HARD corrugated		Material SS 316L	
Shell		SS 316L ID 125,000 mm OD 129,00 mm		Shell Cover	
Channel or Bonnet		SS 316L		Channel Cover SS 316L	
Tubesheet-Stationary		SS 316L		Tubesheet-Floating	
Floating Head Cover				Impingement Plate None	
Baffles-Cross		Type NONE %Cut (Diam)		Spacing(c/c) 8899,91 Inlet mm	
Baffles-Long		Seal Type			
Supports-Tube		U-Bend		Type	
Bypass Seal Arrangement		Tube-Tubesheet Joint			
Expansion Joint		Type			
Rho-V2-Inlet Nozzle		kg/m-s ²		Bundle Exit kg/m-s ²	
Gaskets-Shell Side		Tube Side			
-Floating Head					
Code Requirements		TEMA Class		kg	
Remarks:					
MODEL: 2 X 12 IT20-1 - 5'3" - 9.000 - 316L/316L - HARD					
Designed by ITM					

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HEAT EXCHANGER SPECIFICATION SHEET

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Address				Reference No.		T2018118_CT012	
Plant Location				Proposal No.			
Service of Unit		SUBSTRATE (SSO) 12,5% COOLER. HE6/HE8		Date		04/09/2018 Rev 1	
Size		125,000 x 8924,89 mm		Type		IT20	
Surf/Unit (Gross/Eff)		102,55 / 102,27 m2		Shell/Unit		48	
				Surf/Shell (Gross/Eff)		2,14 / 2,13 m2	
PERFORMANCE OF ONE UNIT							
Fluid Allocation		Shell Side			Tube Side		
Fluid Name		GLYCOL 25%			SUBSTRATE (SSO)		
Fluid Quantity, Total		kg/hr 44604,2			18900,1		
Vapor (In/Out)							
Liquid		44604,2			18900,1		
Steam							
Water							
Noncondensables							
Temperature (In/Out)		C 25,00 32,00			50,00 34,00		
Specific Gravity		1,0286 1,0254			1,0505 1,0562		
Viscosity		cP 1,6899 1,4140			228,48 262,41		
Molecular Weight, Vapor							
Molecular Weight, Noncondensables							
Specific Heat		kJ/kg-C 3,8298 3,8444			3,9701 3,9701		
Thermal Conductivity		W/m-C 0,5132 0,5152			0,6495 0,6239		
Latent Heat		kJ/kg					
Inlet Pressure		bar-G 4,000			6,000		
Velocity		m/s 0,78			0,59		
Pressure Drop, Allow/Calc		bar 0,839			3,249		
Fouling Resistance (min)		m2-K/W					
Heat Exchanged kW		334, MTD (Corrected)			13,0 C		
Transfer Rate, Service		250,93 W/m2-K Clean			352,31 W/m2-K Actual		
					352,31 W/m2-K		
CONSTRUCTION OF ONE SHELL				Sketch (Bundle/Nozzle Orientation)			
		Shell Side		Tube Side			
Design/Test Pressure		barG 10,000 /		10,000 /			
Design Temperature		C 100,00		100,00			
No Passes per Shell		1		1			
Corrosion Allowance		mm					
Connections		In mm 1 @ 90,200		1 @ 62,700			
Size & Rating		Out mm 1 @ 90,200		1 @ 62,700			
		Intermediate @		@			
Tube No.		1 OD 76,200 mm Thk(Avg) 1,500 mm		Length 8,925 m		Pitch mm Layout 30	
Tube Type		HARD corrugated		Material		SS 316L	
Shell		SS 316L ID 125,000 mm OD 129,00 mm		Shell Cover			
Channel or Bonnet		SS 316L		Channel Cover		SS 316L	
Tubesheet-Stationary		SS 316L		Tubesheet-Floating			
Floating Head Cover				Impingement Plate		None	
Baffles-Cross		Type NONE		%Cut (Diam)		Spacing(c/c) 8899,91 Inlet mm	
Baffles-Long				Seal Type			
Supports-Tube				U-Bend		Type	
Bypass Seal Arrangement				Tube-Tubesheet Joint			
Expansion Joint				Type			
Rho-V2-Inlet Nozzle		kg/m-s2		Bundle Entrance		Bundle Exit kg/m-s2	
Gaskets-Shell Side				Tube Side			
-Floating Head							
Code Requirements				TEMA Class			
						kg	
Remarks:							
MODEL: 2 X 24 IT20-1 - 5'3" - 9.000 - 316L/316L - HARD							
Designed by ITM							

Performance is conditioned on the accuracy of customers data and customers ability to supply equipment

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Duty: 793kW

Date: 2018-09-07
 Enquiry dated: 6th Sept 2018
 Project: Huntstown Dublin
 Quotation-no.: 180908-1
 Item: 2 x Adiabatic Dry Coolers

Advanced dry cooler 2 x ADC 2x7/NS9-D1F-3-3P

Capacity:	793.0 kW	Medium:	Ethylene glycol 25 Vol. %
Surface reserve:	3.6 %	Inlet:	32.0 °C
Air flow:	345896 m³/h	Outlet:	25.0 °C
Air velocity:	2.2 m/s	Velocity in coil:	1.34 m/s
Air inlet:	26.0 °C / 55.0 %	Pressure drop:	1.09 bar
Altitude:	80 m	Volume flow:	102.26 m³/h
Changeover point:	21.1 °C	Mass flow:	106347 kg/h
Fans:	14 Piece(s) 3~400V 50-60Hz	Noise pressure level:	60 dB(A) ⁽¹⁾
Data per motor (nominal data):		at a distance of:	10.0 m
Speed:	1000 min-1	Noise power level:	93 dB(A)
Capacity:	2.25 kW	ErP:	Compliant ⁽²⁾
Current:	3.25 A		
Total el. powerconsumption:	25.09 kW	Max. water consumption due to design point:	2404.8 kg/h
Casing:	Galv. Steel, RAL 7035	Tubes:	Copper ⁽³⁾
Surface:	4979.2 m²	Fins:	Aluminum ⁽³⁾
Tube volume:	651.0 l	Connections per unit:	
Fin spacing:	2.40 mm	Inlet:	2 x 104.0 * 2.00 mm
Dry weight:	6194 kg ⁽⁴⁾	Outlet:	2 x 104.0 * 2.00 mm
Max. operating pressure:	10.0 bar		
Dimensions:⁽⁴⁾			
Length:	9359 mm	Outlet header:	2 x 104.0 * 2.00 mm
Width:	2770 mm	Inlet header:	2 x 104.0 * 2.00 mm
Height:	2850 mm ⁽⁴⁾	Passes:	3
No. of legs:	8	Circuits:	2N
		Distributions:	2 * 96

The calculation is based on the following fluid data:

Medium:	Ethylene glycol 25 Vol. %
Density:	1039.9 kg/m³
Heat capacity:	3.83 kJ/(kg·K)
Dyn. viscosity:	1.752e-03 Pa·s
Heat conduct.:	0.50467 W/(m·K)