AFTER COOLER MECHANICAL DATA SHEET FOR NITROGEN GAS

Rev.	Date	Purpose of Issue	Prepared	Checked	Approved	AC Code
05	20/06/2022	As Built	KP	CL	JR	
04	09/06/2022	As Built	KP	CL	JR	
03	08/03/2022	Approved for Construction	KP	LdM	JR	
02	07/02/2022	For approval	KP	LdM	JR	
01	14/09/2021	For approval	KP	PW	JR	
00	11/12/2020	For approval	KP	PW	JL	

Class: 1 | Phase: P

TABULATION OF REVISED PAGES

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HEAT EXCHANGER SPECIFICATION SHEET

Released to the following HTRI Member Company: **IWS-Monjé Units**

IWS-Monje
Sebastian Monje

Job No.	17811-CC-0000		
Customer	Airpack Nederland B.V.	Reference No.	104213658
Address		Proposal No.	204201570
Plant Location		Date	March 7th, 2022 Rev 04
Service of Unit	Intercooler (718 kg/h)	Item No.	
Size	133,3 x 1256 mm Type AES Horizontal	Connected In	1 Parallel 1 Series
Surf/Unit (Gross/Eff)	23,618 / 23,517 m2 Shell/Unit 1	Surf/Shell (Gross/Eff)	23,618 / 23,517 m2

PERFORMANCE OF ONE UNIT

Fluid Allocation		Shell Side		Tube Side	
Fluid Name		Nitrogen		Water	
Fluid Quantity, Total	kg/hr	718,00		1714,6	
Vapor (In/Out)		718,00	718,00		
Liquid				1714,6	1714,6
Steam					
Water				1714,6	1714,6
Noncondensables					
Temperature (In/Out)	C	134,00	40,00	35,00	45,00
Specific Gravity				0,9947	0,9909
Viscosity	mPa-s	0,0220	0,0182	0,7193	0,5962
Molecular Weight				18,02	18,02
Molecular Weight, Noncondensables					
Specific Heat	kJ/kg-C	1,0615	1,0634	4,1778	4,1777
Thermal Conductivity	W/m-C	0,0327	0,0264	0,6223	0,6350
Latent Heat	kJ/kg				
Inlet Pressure	bar	14,500		5,513	
Velocity	m/s	1,29		0,35	
Pressure Drop, Allow/Calc	bar		0,018		0,013
Fouling Resistance (min)	m2-K/W	0,000340		0,000340	

Heat Exchanged 19909, Watts MTD (Corrected) 22,6 C

Transfer Rate, Service 37,41 W/m2-K Clean 80,67 W/m2-K Actual 59,02 W/m2-K

CONSTRUCTION OF ONE SHELL

Sketch (Bundle/Nozzle Orientation)

			Shell Side	Tube Side
Design/Test Pressure		barG	25,000 /	10,000 /
Design Temperature		C	210,00	95,00
No Passes per Shell			1	2
Corrosion Allowance		mm	0,000	0,000
Connections	In	mm	1 @ 54,788	1 @ 42,723
Size &	Out	mm	1 @ 54,788	1 @ 42,723
Rating	Intermediate		@	@

Tube No. 72 OD 8,000 mm Thk(Avg) 0,500 mm Length 1256, mm Pitch 11,500 mm

Tube Type Continuous Fin Material Copper/nickel 90/10 Tube patterr 30

Shell 316 Stainless steel (17 Cr, 12 Ni) ID 133,30 OD 139,70 mm Shell Cover Carbon steel Remove.)

Channel or Bonnet Carbon steel Channel Cover Carbon steel

Tubesheet-Stationary Red brass (85 Cu, 15 Zn) Tubesheet-Floating Red brass (85 Cu, 15 Zn)

Floating Head Cover Carbon steel Impingement Plate None

Baffles-Cross 316 Stainless steel (17 Cr Type NTIW-Seg. %Cut (Diam) 17,33 Spacing(c/c) 0,000 Inlet 600,00 mm

Baffles-Long Seal Type None

Supports-Tube U-Bend Type None

Bypass Seal Arrangement pairs seal strips Tube-Tubesheet Joint Expanded (No groove)

Expansion Joint Type None

Rho-V2-Inlet Nozzle 598,35 kg/m-s2 Bundle Entrance 0,00 Bundle Exit 0,00 kg/m-s2

Gaskets-Shell Side Mach. Mtl. (Kammprofile\Flex. Face) Tube Side Mach. Mtl. (Kammprofile\Flex. Face)

- Floating Head Mach. Mtl. (Kammprofile\Flex. Face)

Code Requirements ASME TEMA Class TEMA C

Weight/Shell 120,09 kg Filled with Water 141,57 kg Bundle 31,27 kg

Remarks: Supports/baffle space = 1.

Continuous Fin Density=2000 fin/meter; Root Diameter=8 mm; Thickness=0,2 mm

HEAT EXCHANGER SPECIFICATION SHEET

Released to the following HTRI Member Company:
IWS-Monje
Sebastian Monje

IWS-Monjé Units

Job No.	17811-CC-0000		
Customer	Airpack Nederland B.V.	Reference No.	104213658
Address		Proposal No.	
Plant Location		Date	04.06.2022 Rev 05
Service of Unit	Aftercooler (718 kg/h)	Item No.	
Size	133,3 x 856 mm Type AEW Horizontal	Connected In	1 Parallel 1 Series
Surf/Unit (Gross/Eff)	15,779 / 15,678 m2 Shell/Unit 1	Surf/Shell (Gross/Eff)	15,779 / 15,678 m2

PERFORMANCE OF ONE UNIT

Fluid Allocation		Shell Side		Tube Side	
Fluid Name		Nitrogen		Water	
Fluid Quantity, Total	kg/hr	718,00		1271,1	
Vapor (In/Out)		718,00	718,00		
Liquid				1271,1	1271,1
Steam					
Water				1271,1	1271,1
Noncondensables					
Temperature (In/Out)	C	83,00	52,00	35,00	39,50
Specific Gravity				0,9947	0,9931
Viscosity	mN-s/m2	0,0199	0,0187	0,7193	0,6592
Molecular Weight				18,02	18,02
Molecular Weight, Noncondensables					
Specific Heat	kJ/kg-C	1,0717	1,0759	4,1778	4,1774
Thermal Conductivity	W/m-C	0,0297	0,0276	0,6223	0,6282
Latent Heat	kJ/kg				
Inlet Pressure	bar	23,500		5,513	
Velocity	m/s	1,30		0,26	
Pressure Drop, Allow/Calc	bar		0,011		5,17e-3
Fouling Resistance (min)	m2-K/W	0,000340		0,000340	

Heat Exchanged 7, kW MTD (Corrected) 27,6 C

Transfer Rate, Service 15,37 W/m2-K Clean 63,27 W/m2-K Actual 49,13 W/m2-K

CONSTRUCTION OF ONE SHELL

Sketch (Bundle/Nozzle Orientation)

			Shell Side	Tube Side
Design/Test Pressure		barG	25,000 /	10,000 /
Design Temperature		C	210,00	95,00
No Passes per Shell			1	2
Corrosion Allowance		mm	0,000	0,000
Connections	In	mm	1 @ 54,788	1 @ 42,723
Size &	Out	mm	1 @ 54,788	1 @ 42,723
Rating	Intermediate		@	@

Tube No. 72 OD 8,000 mm Thk(Avg) 0,500 mm Length 0,856 m Pitch 11,500 mm

Tube Type Continuous Fin Material Copper/nickel 90/10 Tube pattern 30

Shell 316 Stainless steel (17 Cr, 12 Ni) ID 133,30 OD 139,70 mm | Shell Cover

Channel or Bonnet Carbon steel | Channel Cover Carbon steel

Tubesheet-Stationary Red brass (85 Cu, 15 Zn) | Tubesheet-Floating Red brass (85 Cu, 15 Zn)

Floating Head Cover Carbon steel | Impingement Plate None

Baffles-Cross 316 Stainless steel (17 Cr, 1 Type NTIW-Seg. %Cut (Diam) 17,33 Spacing(c/c) 0,000 Inlet 400,00 mm

Baffles-Long Seal Type None

Supports-Tube U-Bend Type None

Bypass Seal Arrangement pairs seal strips Tube-Tubesheet Joint Expanded (No groove)

Expansion Joint Type None

Rho-V2-Inlet Nozzle 322,45 kg/m-s2 Bundle Entrance 0,00 Bundle Exit 0,00 kg/m-s2

Gaskets-Shell Side Mach. Mtl. (Kammprofile\Flex. Face) Tube Side Mach. Mtl. (Kammprofile\Flex. Face)

- Floating Head

Code Requirements ASME TEMA Class TEMA C

Weight/Shell 96,74 kg Filled with Water 109,78 kg Bundle 18,99 kg

Remarks: Continuous Fin Density=2000 fin/meter; Root Diameter=8 mm; Thickness=0,2 mm