





OWNER:  شرکت سست و سویی توهمه ایران (سهامی خاص)	BUSHEHR PETROCHEMICAL COMPANY MEG PLANT						EPC CONTRACTOR:  Chagalesh-Enerchimi-Steam Joint Venture BUPC-MEG PLANT PROJECT		
	<b>AFTER COOLER MECHANICAL DATA SHEET FOR NITROGEN GAS</b>								
MC :  شرکت سست و سویی توهمه ایران (سهامی خاص)	Project	Area	Phase	Unit	Dis.	Doc.	Seq.	Contract No : 52-98/445	
Owner Document Number: 17811-11B	BU	20	VD	303	ME	DSH	0017	Rev.:	Page
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## AFTER COOLER MECHANICAL DATA SHEET FOR NITROGEN GAS

Rev.	Date	Purpose of Issue	Prepared	Checked	Approved	AC Code
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



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
Surf/Unit (Gross/Eff)	23,618 / 23,517 m <sup>2</sup>	Shell/Unit	1
		Surf/Shell (Gross/Eff)	23,618 / 23,517 m <sup>2</sup>

**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) m <sup>2</sup> -KW		0,000340		0,000340	

Heat Exchanged	19909, Watts	MTD (Corrected)	22,6 C
Transfer Rate, Service	37,41 W/m <sup>2</sup> -K	Clean	80,67 W/m <sup>2</sup> -K
		Actual	59,02 W/m <sup>2</sup> -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 & Rating	Out mm	1 @ 54,788		1 @ 42,723	
	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 pattern	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-s <sup>2</sup>	Bundle Entrance	0,00	Bundle Exit	0,00	kg/m-s <sup>2</sup>			
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	non-TEMA					
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

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 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 03
Service of Unit	Aftercooler (718 kg/h)	Item No.	
Size	133,3 x 856 mm	Type	AES Horizontal
Surf/Unit (Gross/Eff)	15,779 / 15,678 m <sup>2</sup>	Shell/Unit	1
		Surf/Shell (Gross/Eff)	15,779 / 15,678 m <sup>2</sup>

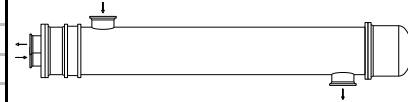
**PERFORMANCE OF ONE UNIT**

Fluid Allocation		Shell Side		Tube Side	
Fluid Name		Nitrogen		Water	
Fluid Quantity, Total kg/hr		718,00		492,63	
Vapor (In/Out)		718,00	718,00		
Liquid				492,63	492,63
Steam					
Water				492,63	492,63
Noncondensables					
Temperature (In/Out) C		64,00	52,00	35,00	39,50
Specific Gravity				0,9947	0,9931
Viscosity mPa-s		0,0192	0,0187	0,7193	0,6592
Molecular Weight				18,02	18,02
Molecular Weight, Noncondensables					
Specific Heat kJ/kg-C		1,0739	1,0759	4,1778	4,1774
Thermal Conductivity W/m-C		0,0284	0,0276	0,6223	0,6282
Latent Heat kJ/kg					
Inlet Pressure bar		23,500		5,513	
Velocity m/s		1,25		9,94e-2	
Pressure Drop, Allow/Calc bar			0,011		8,85e-4
Fouling Resistance (min) m <sup>2</sup> -KW		0,000340		0,000340	
Heat Exchanged		2574, Watts		MTD (Corrected) 20,2 C	
Transfer Rate, Service		8,13 W/m <sup>2</sup> -K		Clean 50,89 W/m <sup>2</sup> -K Actual 41,33 W/m <sup>2</sup> -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		1 @ 54,788		1 @ 42,723	
Size & Rating		1 @ 54,788		1 @ 42,723	
		@		@	



Tube No.	72	OD	8,000 mm	Thk(Avg)	0,500 mm	Length	856, mm	Pitch	11,500 mm	
Tube Type	Continuous Fin		Material			Copper/nickel 90/10				
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	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	304,59	kg/m-s <sup>2</sup>	Bundle Entrance	0,00	Bundle Exit	0,00	kg/m-s <sup>2</sup>			
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	non-TEMA		
Weight/Shell	112,68	kg	Filled with Water	128,91	kg	Bundle 28,25 kg

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

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