







OWNER:  شرکت سست و سویی آوند ایرانیاان (سایر نامها)	<b>BUSHEHR PETROCHEMICAL COMPANY MEG PLANT</b>						EPC CONTRACTOR:  Chagalesh-Enerchimi-Steam Joint Venture BUPC-MEG PLANT PROJECT		
MC :  شرکت سست و سویی آوند ایرانیاان (سایر نامها)	<b>AFTER COOLER MECHANICAL DATA SHEET FOR NITROGEN GAS</b>								
	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
								04	1 of 4

## AFTER COOLER MECHANICAL DATA SHEET FOR NITROGEN GAS

 شرکت سست و سویی آوند ایرانیاان (سایر نامها)	 Chagalesh-Enerchimi-Steam Joint Venture BUPC-MEG PLANT PROJECT	<b>BUSHEHR PETROCHEMICAL COMPANY MEG PLANT</b>
<b>Document Review</b>		
Issue Purpose:	AB	
Result Code: AP,AN,CM,RE,NC	AN	
Next Status : IFC,IFA,IFI,AFC,AB	AB	
Responsible Department	MECHANICAL	
Commented Date	Jun /19/2022	
<b>Approval or review hereunder shall not be construed to relieve Vendor / Subcontractor of his responsibilities and liability under the contract.</b>		

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	
Rev.	Date	Purpose of Issue	Prepared	Checked	Approved	AC Code
					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			
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 N				
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



**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.	
Plant Location		Date	04.06.2022
Service of Unit	Aftercooler (718 kg/h)	Rev	05
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)		Surf/Shell (Gross/Eff)	15,779 / 15,678 m2

**PERFORMANCE OF ONE UNIT**

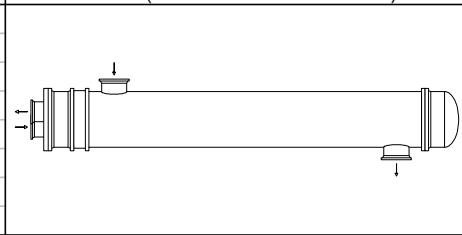
		Shell Side		Tube Side	
Fluid Allocation		Nitrogen		Water	
Fluid Name		718,00		1271,1	
Fluid Quantity, Total	kg/hr	718,00		1271,1	
Vapor (In/Out)		718,00	718,00		
Liquid				1271,1	1271,1
Steam					
Water				1271,1	1271,1
Noncondensables					
Temperature (In/Out)	C	83,00	52,00	35,00	39,50
Specific Gravity				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 & Rating	Out mm	1 @	54,788	1 @	42,723
	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							
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	non-TEMA						
Weight/Shell	96,74	kg	Filled with Water	109,78	kg	Bundle	18,99	kg		

Type **TEMA C**

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