







OWNER:  شرکت سست و سویی توهمه ایرانیان (سایه، ریاض)	BUSHEHR PETROCHEMICAL COMPANY MEG PLANT						EPC CONTRACTOR:  Chagalesh-Enerchimi-Steam Joint Venture BUPC-MEG PLANT PROJECT		
	AFTER COOLER MECHANICAL DATA SHEET FOR NITROGEN GAS						 Netherlands		
MC :  شرکت سست و سویی توهمه ایرانیان (سایه، ریاض)	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
								03	1 of 4

AFTER COOLER MECHANICAL DATA SHEET FOR NITROGEN GAS

 شرکت سست و سویی توهمه ایرانیان  Chagalesh-Enerchimi-Steam Joint Venture BUPC-MEG PLANT PROJECT	BUSHEHR PETROCHEMICAL COMPANY MEG PLANT
Document Review	
Issue Purpose:	AFC
Result Code: AP,AN,CM,RE,NC	AP
Next Status : IFC,IFA,IFI,AFC,AB	AB
Responsible Department	MECHANICAL
Commented Date	Apr/ 11/2022
Approval or review hereunder shall not be construed to relieve Vendor / Subcontractor of his responsibilities and liability under the contract.	

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

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 ² -KW		0,000340		0,000340	

Heat Exchanged	19909, Watts	MTD (Corrected)	22,6 C
Transfer Rate, Service	37,41 W/m ² -K	Clean	80,67 W/m ² -K
		Actual	59,02 W/m ² -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 ²	Bundle Entrance		0,00	Bundle Exit	0,00	kg/m-s ²		
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

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 03	
Service of Unit	Aftercooler (718 kg/h)			Item No.			
Size	133,3 x 856	mm	Type	AES	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	

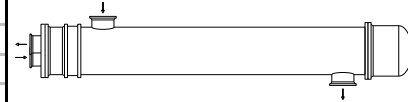
PERFORMANCE OF ONE UNIT

Fluid Allocation		Shell Side		Tube Side	
Fluid Name		Nitrogen		Water	
Fluid Quantity, Total	kg/hr	718,00		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)	m2-K/W	0,000340		0,000340	
Heat Exchanged	2574, Watts			MTD (Corrected)	20,2 C
Transfer Rate, Service	8,13 W/m2-K	Clean	50,89 W/m2-K	Actual	41,33 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	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-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	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