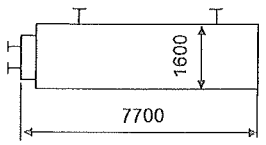
AEL Apparatebau GmbH Leisnig

HEAT EXCHANGER DATA SHEET

1							Job No.	
2	Customer	MAN Diesel & Turbo SE					Reference No.	
3	Address						Proposal No.	914066
4	Plant Location / Project	--- / JOHNCO					Date	06. Jun 14 Rev. 2
5	Service of Unit	IC1		No. of	1		Item No.	2-S
6	Size	1600,0 x 7000,0		Type	E - B1XT.160 x 700 - 0416G			
7	Surf./Unit(Gross)	643,9 m²						
8	PERFORMANCE OF ONE UNIT							
9			Shell Side			Tube Side		
10	Fluid Name		96 Mol% CO2 / 4 Mol% N2 (wet)			Water/Glycol 50/50		
11	Fluid Quantity, Total	kg/h	220047,7			440420,8		
12	Liquid	kg/h				440420,8		
13	Noncondensable	kg/h	219758,4	219758,4				
14	Steam	kg/h	289,3	216,8				
15	Condensate	kg/h		72,4				
16	Temperature (In/Out)	°C	87,6	31,7		26,7		35,0
17	Density	kg/m³	33,638			1075,916		
18	Dyn. Viscosity	cP	0,017			3,193		
19	Molecular Weight, Vapor	kg/kmol	18,020			---		
20	Molecular Weight, Noncondensable	kg/kmol	43,370			---		
21	Specific Heat Capacity	kJ/(kg*K)	0,988			3,360		
22	Thermal Conductivity	W/(m*K)	0,021			0,413		
23	Latent Heat - Vapors	kJ/kg	2453,5			---		
24	Inlet Pressure	bar (a)	19,8			6,0		
25	Velocity	m/s	1,8			1,5		
26	Pressure Drop, Allow./Calc.	mbar	50	/	44	1000	/	978
27	Fouling Resistance (Min.)	(m²*K)/W				0,00009		
28	Heat Exchanged	3428,9 kW		MTD (Corr.)	19,5 K			
29	Transfer Rate Service	273,4	Dirty	283,7	Clean	292,2 W/(m²*K)		

30	CONSTRUCTION OF ONE SHELL				Sketch (Bundle/Nozzle Orientation)
31			Shell Side	Tube Side	The Setting Plan is approximate only!
32	Design/Test Pressure	bar (ü)	26,0 /	10,0 /	
33	Design Temperature	°C	135	100	
34	No. Passes per Shell		1	4	
35	Corrosion Allowance	mm			
36	Connections	In	DN 600	DN 300	
37	Size and	Out	DN 500	DN 300	
38	Rating	Condensate	DN 100		



39	Tube No.	1944	OD	16,000	Thickn.	1,00	Length	7000,0	Pitch	20,00 mm
40	Tube Material (Wld)(Smls)		SS 316L				Fin Material			
41	Fin No.			Fin Pitch				Fin Thickn.		mm
42	Shell		SS 316L				ID	1600,0 mm		
43	Channel		~~Duplex~~ SS 316L				Tubesheet	SS 316L		
44	Tube Supports		Support baffle				Tube-Tubesheet Joint		seal welded, light expanded	
45	Drain Separator		SS 316L				Gaskets			
46	Code	ASME VIII, Div. 1			U-Stamp(Yes)(No)	Yes			TEMA-Class	C
47	Estim. Weights/Shell		26480 kg	Filled with Water		40610 kg			Bundle	7770 kg
48	Remarks									
49	MDMT -17,78 °C									
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AEL Apparatebau GmbH Leisnig

HEAT EXCHANGER DATA SHEET

						Job No.		
Customer	MAN Diesel & Turbo SE					Reference No.		
Address						Proposal No.	914066	
Plant Location / Project	--- / JOHNCO					Date	06. Jun 14	Rev. 2
Service of Unit	IC1		No. of	1		Item No.	2-I	
Size	1600,0 x 7000,0		Type	E - B1XT.160 x 700 - 0416G				
Surf./Unit(Gross)	643,9 m²							

PERFORMANCE OF ONE UNIT

		Shell Side		Tube Side	
Fluid Name		96 Mol% CO2 / 4 Mol% N2 (wet)		Water/Glycol 50/50	
Fluid Quantity, Total	kg/h	220045,0		439726,6	
Liquid	kg/h			439726,6	
Noncondensable	kg/h	219794,4	219794,4		
Steam	kg/h	250,6	214,4		
Condensate	kg/h		36,2		
Temperature (In/Out)	°C	84,6	31,5	26,7	34,6
Density	kg/m³	33,806		1076,039	
Dyn. Viscosity	cP	0,017		3,211	
Molecular Weight, Vapor	kg/kmol	18,020		---	
Molecular Weight, Noncondensable	kg/kmol	43,370		---	
Specific Heat Capacity	kJ/(kg*K)	0,989		3,359	
Thermal Conductivity	W/(m*K)	0,021		0,413	
Latent Heat - Vapors	kJ/kg	2453,5		---	
Inlet Pressure	bar (a)	19,8		6,0	
Velocity	m/s	1,8		1,5	
Pressure Drop, Allow./Calc.	mbar	50 / 44		1000 / 977	
Fouling Resistance (Min.)	(m²*K)/W			0,00009	

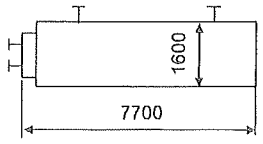
Heat Exchanged	3236,5	kW	MTD (Corr.)	18,8	K	
Transfer Rate Service	268,0	Dirty	279,1	Clean	287,4	W/(m²*K)

CONSTRUCTION OF ONE SHELL

Sketch (Bundle/Nozzle Orientation)

			Shell Side	Tube Side
Design/Test Pressure		bar (ü)	26,0 /	10,0 /
Design Temperature		°C	135	100
No. Passes per Shell			1	4
Corrosion Allowance		mm		
Connections Size and Rating	In		DN 600	DN 300
	Out		DN 500	DN 300
	Condensate		DN 100	

The Setting Plan is approximate only!



Tube No.	1944	OD	16,000	Thickn.	1,00	Length	7000,0	Pitch	20,00 mm
Tube Material (Wld)(Smls)			SS 316L			Fin Material			
Fin No.				Fin Pitch			Fin Thickn.		mm
Shell			SS 316L			ID	1600,0 mm		
Channel			~~Duplex~~ SS 316L			Tubesheet	SS 316L		
Tube Supports			Support baffle			Tube-Tubesheet Joint		seal welded, light expanded	
Drain Separator			SS 316L			Gaskets			
Code	ASME VIII, Div. 1			U-Stamp(Yes)(No)	Yes			TEMA-Class	C
Estim. Weights/Shell		26480 kg		Filled with Water		40610 kg		Bundle	7770 kg

Remarks

MDMT -17,78 °C

AEL Apparatebau GmbH Leisnig

HEAT EXCHANGER DATA SHEET

					Job No.	
Customer	MAN Diesel & Turbo SE				Reference No.	
Address					Proposal No.	914066
Plant Location / Project	--- / JOHNCO				Date	06. Jun 14 Rev. 2
Service of Unit	IC1		No. of 1		Item No.	2-W
Size	1600,0 x 7000,0		Type	E - B1XT.160 x 700 - 0416G		
Surf./Unit(Gross)	643,9 m²					

PERFORMANCE OF ONE UNIT

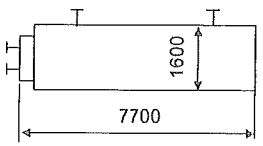
		Shell Side		Tube Side	
Fluid Name		96 Mol% CO2 / 4 Mol% N2 (wet)		Water/Glycol 50/50	
Fluid Quantity, Total	kg/h	220046,7		439948,5	
Liquid	kg/h			439948,5	
Noncondensable	kg/h	219830,4	219830,4		
Steam	kg/h	216,3	210,8		
Condensate	kg/h		5,5		
Temperature (In/Out)	°C	81,8	31,2	26,7	34,2
Density	kg/m³	33,975		1076,152	
Dyn. Viscosity	cP	0,017		3,227	
Molecular Weight, Vapor	kg/kmol	18,020		---	
Molecular Weight, Noncondensable	kg/kmol	43,370		---	
Specific Heat Capacity	kJ/(kg*K)	0,989		3,358	
Thermal Conductivity	W/(m*K)	0,021		0,413	
Latent Heat - Vapors	kJ/kg	2453,5		---	
Inlet Pressure	bar (a)	19,8		6,0	
Velocity	m/s	1,8		1,5	
Pressure Drop, Allow./Calc.	mbar	50 / 43		1000 / 979	
Fouling Resistance (Min.)	(m²*K)/W			0,00009	

Heat Exchanged	3066,0	kW	MTD (Corr.)	18,0	K	
Transfer Rate Service	264,1	Dirty	274,0	Clean	282,0	W/(m²*K)

CONSTRUCTION OF ONE SHELL

Sketch (Bundle/Nozzle Orientation)

The Setting Plan is approximate only!



			Shell Side	Tube Side
Design/Test Pressure		bar (ü)	26,0 /	10,0 /
Design Temperature		°C	135	100
No. Passes per Shell			1	4
Corrosion Allowance		mm		
Connections Size and Rating	In		DN 600	DN 300
	Out		DN 500	DN 300
	Condensate		DN 100	

Tube No.	1944	OD	16,000	Thickn.	1,00	Length	7000,0	Pitch 20,00 mm
Tube Material (Wld)(Smls)			SS 316L			Fin Material		
Fin No.				Fin Pitch			Fin Thickn.	mm
Shell			SS 316L			ID	1600,0 mm	
Channel			~~Duplex~~ SS 316L			Tubesheet	SS 316L	
Tube Supports			Support baffle			Tube-Tubesheet Joint	seal welded, light expanded	
Drain Separator			SS 316L			Gaskets		
Code	ASME VIII, Div. 1			U-Stamp(Yes)(No)	Yes		TEMA-Class C	
Estim. Weights/Shell	26480 kg			Filled with Water	40610 kg		Bundle	7770 kg

Remarks

MDMT -17,78 °C

AEL Apparatebau GmbH Leisnig

HEAT EXCHANGER DATA SHEET

					Job No.		
Customer	MAN Diesel & Turbo SE				Reference No.		
Address					Proposal No.	914066	
Plant Location / Project	--- / JOHNCO				Date	06. Jun 14	Rev. 2
Service of Unit	IC1		No. of	1	Item No.	MinPressure	
Size	1600,0 x 7000,0		Type	E - B1XT.160 x 700 - 0416G			
Surf./Unit(Gross)	643,9 m²						

PERFORMANCE OF ONE UNIT

		Shell Side		Tube Side	
Fluid Name		96 Mol% CO2 / 4 Mol% N2 (wet)		Water/Glycol 50/50	
Fluid Quantity, Total	kg/h	163166,1		440497,6	
Liquid	kg/h			440497,6	
Noncondensable	kg/h	162950,0	162950,0		
Steam	kg/h	216,1	176,3		
Condensate	kg/h		39,8		
Temperature (In/Out)	°C	83,7	29,6	26,7	32,5
Density	kg/m³	27,079		1076,591	
Dyn. Viscosity	cP	0,017		3,294	
Molecular Weight, Vapor	kg/kmol	18,020		---	
Molecular Weight, Noncondensable	kg/kmol	43,370		---	
Specific Heat Capacity	kJ/(kg*K)	0,965		3,355	
Thermal Conductivity	W/(m*K)	0,020		0,414	
Latent Heat - Vapors	kJ/kg	2453,5		---	
Inlet Pressure	bar (a)	16,0		6,0	
Velocity	m/s	1,6		1,5	
Pressure Drop, Allow./Calc.	mbar	50 / 31		1000 / 986	
Fouling Resistance (Min.)	(m²*K)/W			0,00009	

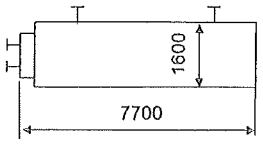
Heat Exchanged	2397,1 kW		MTD (Corr.)	16,1 K	
Transfer Rate Service	231,0	Dirty	239,1	Clean	245,1 W/(m²*K)

CONSTRUCTION OF ONE SHELL

			Shell Side	Tube Side
Design/Test Pressure	bar (ü)		26,0 /	10,0 /
Design Temperature	°C		135	100
No. Passes per Shell			1	4
Corrosion Allowance	mm			
Connections Size and Rating	In		DN 600	DN 300
	Out		DN 500	DN 300
	Condensate		DN 100	

Sketch (Bundle/Nozzle Orientation)

The Setting Plan is approximate only!



Tube No.	1944	OD	16,000	Thickn.	1,00	Length	7000,0	Pitch	20,00 mm
Tube Material (Wld)(Smls)		SS 316L		Fin Material					
Fin No.			Fin Pitch			Fin Thickn.			mm
Shell	SS 316L			ID	1600,0 mm				
Channel	~~Duplex~~ SS 316L			Tubesheet	SS 316L				
Tube Supports	Support baffle			Tube-Tubesheet Joint	seal welded, light expanded				
Drain Separator	SS 316L			Gaskets					
Code	ASME VIII, Div. 1		U-Stamp(Yes)(No)	Yes		TEMA-Class	C		
Estim. Weights/Shell	26480 kg		Filled with Water	40610 kg		Bundle	7770 kg		

Remarks

MDMT -17,78 °C

AEL Apparatebau GmbH Leisnig

HEAT EXCHANGER DATA SHEET

						Job No.		
Customer	MAN Diesel & Turbo SE					Reference No.		
Address						Proposal No.	914066	
Plant Location / Project	--- / JOHNCO					Date	06. Jun 14	Rev. 2
Service of Unit	IC1		No. of	1		Item No.	MaxPressure	
Size	1600,0 x 7000,0		Type	E - B1XT.160 x 700 - 0416G				
Surf./Unit(Gross)	643,9 m²							

PERFORMANCE OF ONE UNIT

		Shell Side		Tube Side	
Fluid Name		96 Mol% CO2 / 4 Mol% N2 (wet)		Water/Glycol 50/50	
Fluid Quantity, Total	kg/h	220045,0		440430,9	
Liquid	kg/h			440430,9	
Noncondensable	kg/h	219794,4	219794,4		
Steam	kg/h	250,6	184,7		
Condensate	kg/h		65,9		
Temperature (In/Out)	°C	84,7	31,7	26,7	34,8
Density	kg/m³	40,248		1075,985	
Dyn. Viscosity	cP	0,017		3,203	
Molecular Weight, Vapor	kg/kmol	18,020		---	
Molecular Weight, Noncondensable	kg/kmol	43,370		---	
Specific Heat Capacity	kJ/(kg*K)	1,011		3,359	
Thermal Conductivity	W/(m*K)	0,021		0,413	
Latent Heat - Vapors	kJ/kg	2453,5		---	
Inlet Pressure	bar (a)	23,2		6,0	
Velocity	m/s	1,5		1,5	
Pressure Drop, Allow./Calc.	mbar	50 / 37		1000 / 979	
Fouling Resistance (Min.)	(m²*K)/W			0,00009	

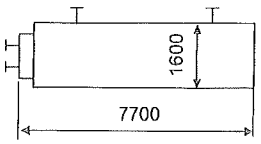
Heat Exchanged	3323,3 kW		MTD (Corr.)	18,9 K	
Transfer Rate Service	273,5	Dirty	285,2	Clean	293,9 W/(m²*K)

CONSTRUCTION OF ONE SHELL

			Shell Side	Tube Side
Design/Test Pressure		bar (ü)	26,0 /	10,0 /
Design Temperature		°C	135	100
No. Passes per Shell			1	4
Corrosion Allowance		mm		
Connections Size and Rating	In		DN 600	DN 300
	Out		DN 500	DN 300
	Condensate		DN 100	

Sketch (Bundle/Nozzle Orientation)

The Setting Plan is approximate only!



Tube No.	1944	OD	16,000	Thickn.	1,00	Length	7000,0	Pitch	20,00 mm
Tube Material (Wld)(Smls)		SS 316L		Fin Material					
Fin No.			Fin Pitch			Fin Thickn.			mm
Shell		SS 316L		ID	1600,0 mm				
Channel		~~Duplex~~ SS 316L		Tubesheet	SS 316L				
Tube Supports		Support baffle		Tube-Tubesheet Joint	seal welded, light expanded				
Drain Separator		SS 316L		Gaskets					
Code	ASME VIII, Div. 1		U-Stamp(Yes)(No)	Yes		TEMA-Class	C		
Estim. Weights/Shell	26480 kg		Filled with Water	40610 kg		Bundle	7770 kg		

Remarks

MDMT -17,78 °C