



Sabroe

Refrigeration Plant Computation

Version 18.61B4

File : 250313Q_1	Ref : CMAD	Page : 1
Date : 2009/01/29	Time : 15.07.25	
User : JCI/HOLME - YROE SALES - TEST USE !		
Prog : COMP1/104509	Print : MIE ver. 6.0.2900.2180	

SINGLE STAGE COMPRESSOR

compressor type	SAB 233 S male drive	refrigerant	R 717
number of compressors	2.00	evaporating temperature	6.0 deg.C
compressor load	100.0 %	condensing temperature	53.0 deg.C
drive shaft speed	2985.0 RPM (list)	total suction superheat	0.0 K
internal volume ratio	optimal	suction line superheat	0.0 K
suction line loss	1.0 K	total liquid subcooling	2.0 K
discharge line loss	1.0 K		
total cooling capacity	3118.9 kW	total shaft power req.	841.9 kW
total heating capacity	3531. kW	cooling cap./shaft power ratio	3.70
		cooling cap./line power ratio	3.45
economiser type	none	side load	none
oil cooling system	water cooling	oil specifications	Sabroe PAO 68 354
oil cooler type	XPSH 3HH- 116/2/1	oil inlet temperature	69.0 deg.C
oil cooler load - actual	429.8 kW	total oil flow	41.0 m3/h
oil cooler load - min. cap. 12.0 %	284.9 kW	oil density	804.5 kg/m3
oil separator (SC): OHU 07629		oil specific heat capacity	2.27 kJ/kgK
number of oil separators:	2.0	oil kinematic viscosity	38.9 cSt
number of coalescers:	6	oil heat conductivity	0.139 W/m.K
oil separator load:	51.7 %	oil weight percentage	100.00 %
oil separator speed:	0.32 m/s	total charge of oil	720.0 litre
oil separator max. speed:	0.63 m/s		
discharge check valve 5in_Danfoss_Cold_Sta (1) (s):			
		motor:	Leroy/500kW/400V/50Hz/IP23/355M
operating conditions:			
suction pressure	5.11 bar_a	discharge pressure	22.67 bar_a
suction temperature	5.87 deg.C	discharge temperature	88.76 deg.C
suction specific volume	0.2464 m3/kg	disch. temp. at min. load	82.22 deg.C
enthalpy difference (ref.)	1025.30 kJ/kg	discharge specific volume	0.0683 m3/kg
suction side mass flow	3.0419 kg/s	liquid density	561.1 kg/m3
swept volume	2972.0 m3/h	pressure ratio (p2/p1)	4.44
errors and warnings:	NB: no sound level computation - sound "box" dimensions in error NB: user defined oil data ! NB: motor efficiency is approximate only NB: non standard motor for this compressor - select adapter flange NB: design limits check OK Oil cooler notes: NB: selected oil cooler may be non-standard !		

Full load performance data for chillers and other refrigeration systems are according to ISO-R916.
 Measurement tolerances according to ISO-917.
 Data subject to change without notice.



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OIL COOLER (high stage)

oil cooler type	XPSH 3HH-116/2/1	number of oil coolers	2.00
total capacity	424.0 kW	logarithmic mean temperature diff.	36.90 K
total transfer coefficient	668.0 W/m ² K		
inlet velocity - shell side	1.10 m/s	outlet velocity - shell side	1.10 m/s
inlet velocity - tube side	2.44 m/s	outlet velocity - tube side	2.44 m/s
primary side (temp.drop):	plate-side		
refrigerant (354) Sabroe PAO 68		percentage by weight	100.0 %
inlet temperature	88.8 deg.C		
outlet temperature	68.6 deg.C	total flow	41.0 m ³ /h
pressure loss	9.00 m.b.g.	fouling factor	.000000 m ² .K/W
velocity	2.44 m/s		
density	798.9 kg/m ³	specific heat capacity	2.306 kJ/kg.K
dynamic viscosity	23.737 Cpoise	thermal conductivity	0.138 W/m.K
secondary side (temp. rise):	shell-side		
secondary refrigerant (200) WATER			
inlet temperature	30.0 deg.C		
outlet temperature	50.0 deg.C	total flow	18.4 m ³ /h
pressure loss	0.24 m.b.g.	fouling factor	.000098 m ² .K/W
velocity	1.10 m/s		
density	992.3 kg/m ³	specific heat capacity	4.179 kJ/kg.K
dynamic viscosity	0.652 Cpoise	thermal conductivity	0.629 W/m.K

errors and warnings:

Oil cooler notes:

NB: selected oil cooler may be non-standard !



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EVAPORATOR

evaporator type	EPSH 7HH-308/2/1	number of evaporators	1.00
primary side:			
primary refrigerant	R-717	total capacity	3119.0 kW
evaporating temperature	6.0 deg.C	mean temperature diff.	10.70 K
		fouling factor	0.000035 m2.K/W
connections in/out	DN150 /DN250		
inlet velocity - prim. side	0.20 m/s	outlet velocity - prim. side	5.55 m/s
secondary side:			
secondary refrigerant (200) WATER			
inlet temperature	30.0 deg.C		
outlet temperature	10.0 deg.C	total flow	134.4 m3/h
pressure loss	5.72 m.b.g.		
velocity	1.87 m/s		
density	998.3 kg/m3	specific heat capacity	4.184 kJ/kg.K
dynamic viscosity	1.003 Cpoise	thermal conductivity	0.600 W/m.K
inlet velocity - sec. side	1.87 m/s	outlet velocity - sec. side	1.87 m/s
min. wall temperature	N/A	connections	DN150
special PHE output:			
no. of cassettes and type	1*154 H	service transfer coefficient	2144.0 W/m2K
design/rating mode	design	clean transfer coefficient	2465.6 W/m2K
plate material	AISI-316	refrigerant pressure loss	0.98 mbg
plate thickness	0.7 mm	margin	5.00 %
max. pressure loss sec. side	10.00 mbg	available liquid head	1.05 mbg
primary side connection - in/out	1/2	quality of vapour	0.85
secondary side connection - in/out	1/1	excessive area	8.00 %

errors and warnings:

NB: PAC - oversize liquid separator selected !



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CONDENSER

condenser type	CPSH 7HH-244/2/1	number of condensers	1.00
primary side:			
primary refrigerant	R-717	total capacity	3531.0 kW
condensing temperature	53.0 deg.C	mean temperature diff.	11.80 K
condenser liquid subcooling	2.0 K		
		fouling factor	0.000020 m2.K/W
secondary side:			
secondary refrigerant (200) WATER			
inlet temperature	30.0 deg.C		
outlet temperature	50.0 deg.C	total flow	153.2 m3/h
pressure loss	9.66 m.b.g.		
velocity	2.14 m/s		
density	992.3 kg/m3	specific heat capacity	4.179 kJ/kg.K
dynamic viscosity	0.652 Cpoise	thermal conductivity	0.629 W/m.K
inlet velocity - sec. side	2.14 m/s	outlet velocity - sec. side	2.14 m/s
special PHE output:			
no. of cassettes and type	1*122 H	service transfer coefficient	2908.0 W/m2K
design/rating mode	design	clean transfer coefficient	3344.2 W/m2K
plate material	AISI-316	refrigerant pressure loss	0.18 mbg
plate thickness	0.7 mm	margin	5.00 %
max. pressure loss sec. side	10.00 mbg		
primary side connection - in/out	1/1	superheated vapour temp.	88.76 deg.C
secondary side connection - in/out	1/1	excessive area	10.00 %
errors and warnings:			



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PLANT DATA

plant load percentage	100.0	%
plant cooling capacity	3118.9	kW
plant heating capacity	3531.0	kW
totalt shaft power consumption	841.9	kW
total line power consumption	905.3	kW
capacity/shaft power ratio	3.70	
capacity/line power ratio	3.45	

errors and warnings: