Compressor Special Calculation

Operating conditions / given values			
Type of system	**Single stage**		
Refrigerant	**R14***		
Evaporating temperature		-110,0 °C	(3,1 bar(a))
Superheat evaporator	8,0 K		
Superheat suction line	4,0 K		
Superheat int. heat. exch.	38,0 K		
Superheat total		50,0 K	(-60 °C)
Desuperheater outlet temperature		10,0 °C	
Condensing temperature		-55,0 °C	(28,2 bar(a))
Subcooling condenser	2,0 K		
Subcooling int. heat. exch.	17,3 K		
Subcooling external	0,0 K		
Subcooling total		19,3 K	(-74,3 °C)
Power supply frequency		50 Hz	

Performance data**			
Compressor model		**2GES-2**	
Cooling capacity, compressor (4 -> 1)		2,3 kW	
Cooling capacity, evaporator		**2,2 kW**	
Power input		1,9 kW	
Current (400 V)		3,7 A	
COP / EER		1,16	
Condenser capacity		3,1 kW	
Refrigerant mass flow		90 kg/h	
Discharge gas temp. without cooling		62 °C	
Int. heat exch. - Capacity / ΔTlog		0,6 kW	/ 10,0 K
Desuperheater capacity		1,0 kW	

* Refrigerant data calculated by Aserep library

** Listed performance data are based on calculations and measured data. Under worst conditions given values might differ from common tolerances

In case of a compressor failure, the decision on a potential warranty claim remains reserved to a diagnosis and examination of the compressor at the BITZER factory. Design, operation, and monitoring of the system is in the responsibility of the designer or executing company.

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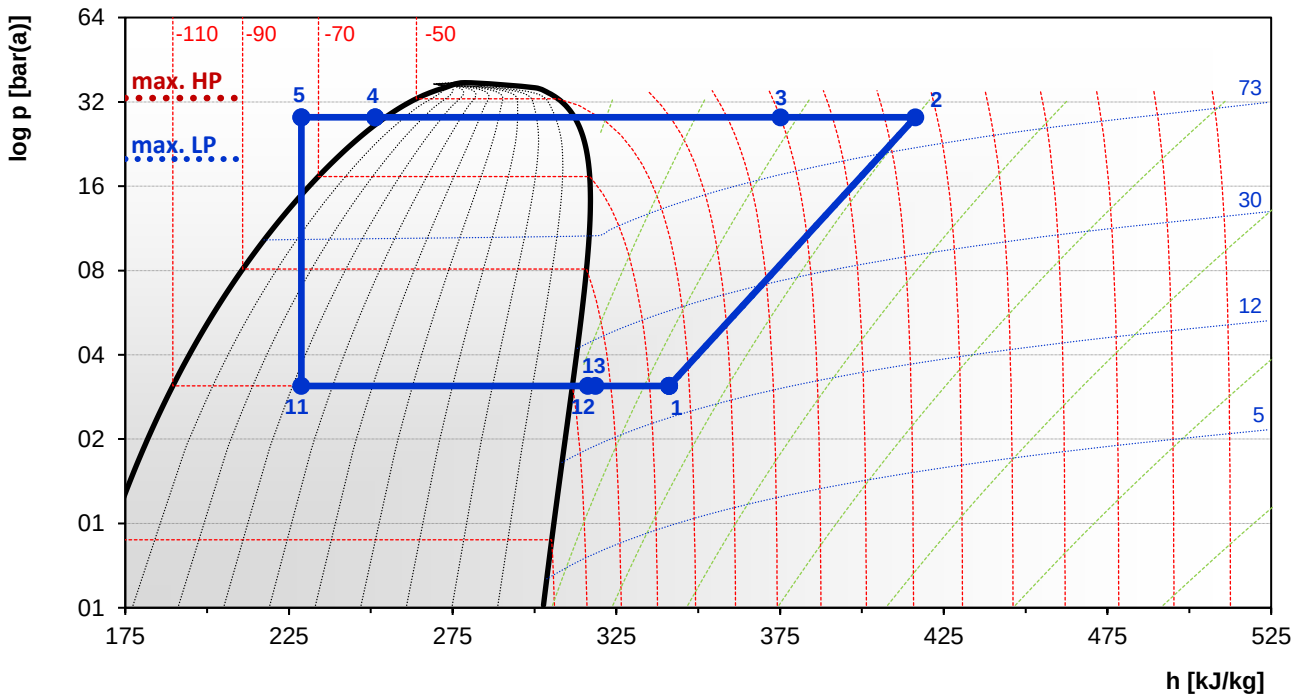
log p, h - diagram (R14)



Legend:

1	-> 2:	Compressor(s)
2	-> 3:	Desuperheater
3	-> 4:	Condenser
4	-> 5:	Subcooler (int. heat. exch.)
5	-> 11:	Expansion valve
11	-> 12:	Evaporator
12	-> 13:	Suction pipe
13	-> 1:	Superh. (int. heat. exch.)

Specific values of R14:

Critical temperature:	-45,7 °C
Critical pressure:	37,5 bar(a)
Boiling temperature at 1 bar(a):	-128,1 °C
Isentropic compression index (1 bar(a) / 0 °C):	1,16
Safety class*:	A1
GWP value related to 100 years*:	5700

Maximum overpressures of the compressor:

max. HP (high pressure side):	32 bar	⇨	-50 °C
max. LP (low pressure side):	19 bar	⇨	-66 °C

* EN 378-1:2008+A2:2012; (GWP value: Third IPCC Report 2001)

Application range

Not defined so far

Application related remarks:

According to the standard EN-378, the high-pressure switch must shut off the compressor at 1,0 times the maximum operating pressure in case no pressure relief valve is used. If a pressure relief valve is used, the compressor must be shut off at 0,9 times the maximum operating pressure. The maximum operating pressure corresponds to a saturated condensing temperature of -50 °C without and -53 °C with relief valve.

In order to reduce the risk of difficulties associated with the oil return from the evaporator, a highly efficient coalescent oil separator is recommended to limit the amount of oil circulating in the system.

With respect to the cast iron used for the compressor housing, please keep in mind that the minimum suction gas temperature must not fall below -60 °C.

Due to the high temperature difference between discharge gas and condensing temperature, BITZER recommends to install a desuperheater in order to reduce the thermal stress on the cascade heat exchanger. Thereby, the required cooling capacity of the upper stage is reduced and simultaneously, the overall system efficiency is increased.

When heated up to ambient temperature, R14 will generate relatively high pressures levels. This has to be taken into consideration e.g. by using additional pressure vessels or a stillstand cooling unit.