

# Compressor Special Calculation



| Operating conditions  |                           |                     |                                  |
|---|---------------------------|---------------------|----------------------------------|
| <b>System type</b>  |                           | <b>Single stage</b> |                                  |
| <b>Refrigerant</b>  |                           | <b>R508B*</b>       |                                  |
| Evaporating temperature   | [ Dew Point Temperature ] | -90,0 °C            | 0,9 bar(a)                       |
| Useful Suction gas superheat  | 10,0 K                    |                     |                                  |
| Non useful superheat  | 0,0 K                     |                     |                                  |
| Superheat in IHX  | 30,0 K                    |                     |                                  |
| Total superheat   |                           | 40,0 K              | -50 °C                           |
| Condensing temperature  | [ Dew Point Temperature ] | -35,0 °C            | 10,1 bar(a)                      |
| Subcooling after condenser  | 0,0 K                     |                     |                                  |
| Subcooling by IHX   | 15,5 K                    |                     |                                  |
| External subcooling   | 0,0 K                     |                     |                                  |
| Total subcooling  |                           | 15,5 K              | -50,5 °C                         |
| Power supply  |                           | 50 Hz / (400V)      |                                  |
| Capacity control  |                           | -                   |                                  |
| Performance data**  |                           |                     |                                  |
| <b>Product selection</b>  | <b>1 x</b>                | <b>2CES-3Y</b>      |                                  |
| Cooling capacity demand   |                           | 1,6 kW              |                                  |
| Power input   |                           | 1,2 kW              |                                  |
| Current absorption  |                           | 3,7 A /             | 9,1 A                            |
| Refrigerant massflow (HP)   |                           | 43,5 kg/h           |                                  |
| Condenser capacity  |                           | 2,31 kW             |                                  |
| COP (cooling)   |                           | 1,31                |                                  |
| Discharge temperature w/o additional cooling  |                           | 90 °C               |                                  |
| IHX capacity  |                           | 0,2 kW              | Log. Temperature difference 21 K |
| Desuperheater capacity (45°C)   |                           | 0,5 kW              |                                  |
| Condenser capacity w/o desuperheater  |                           | ##### kW            |                                  |
| <p>* Refrigerant data calculated by Aserep library</p> <p>** Listed performance data are based on calculations and measured data. Under worst conditions given values might differ from common tolerances</p> |                           |                     |                                  |

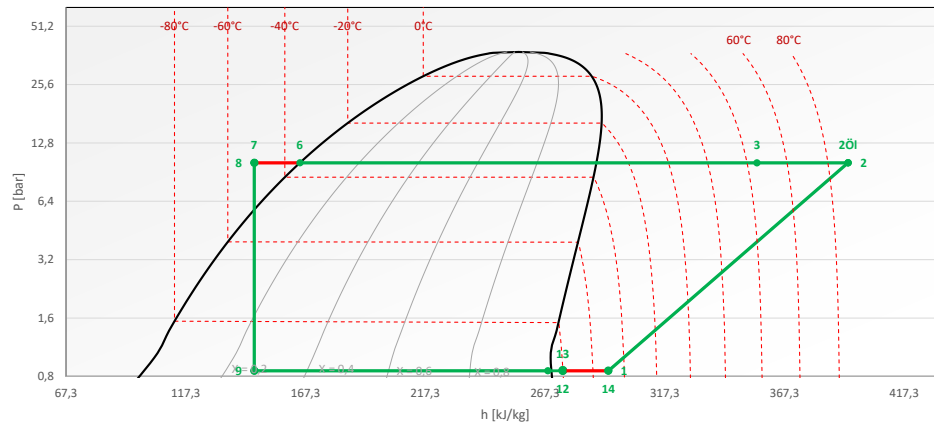
BITZER supplies compressors for applications with the refrigerant R508B exclusively to customers with the necessary experience in this field. Moreover, BITZER supports the development and optimisation of such systems by own investigations.

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 (R508B)



## Legend:

- 1-Compressor inlet
- 2-Compression
- 3-Desuperheating
- 6-Condenser subcooling
- 7-IHX subcooling
- 8-Additional subcooling
- 9-Evaporator in
- 12-Evaporator superheat
- 13-Non useful Superheat
- 14-Superheat IHX

## Specific values of R508B

|                                 |             |
|---------------------------------|-------------|
| Critical temperature            | 11,2 °C     |
| Critical pressure               | 37,7 bar(a) |
| Boiling temperature at 1 bar(a) | -87,4 °C    |
| Safety class                    | A1          |

## Maximum overpressures of the compressor:

|                              |           |   |        |
|------------------------------|-----------|---|--------|
| max. HP (high pressure side) | 32 bar(a) | ⇒ | 5 °C   |
| max. LP (low pressure side)  | 19 bar(a) | ⇒ | -15 °C |

## Preliminary application range

**Application related remarks:**

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.

When heated up to ambient temperature, R508B 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.

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.

Operation below atmospheric pressure - Refrigerant decomposition can occur due to leakage of Air and humidity into the system. Subsequently acidity inside the system can lead to severe wear inside the compressor and the system itself.

BITZER recommends to maintain a superheat of 30 K, reducing the solubility of the refrigerant in the oil and thereby, increase the viscosity of the oil inside the compressor. If necessary, an internal heat exchanger between the suction and liquid line can be installed.

In similar applications BITZER has achieved good results with the oil type BSE32. Depending on the application and system design another oil could be necessary.