



**More than an alternative -
GEA Bock Compressors for the new refrigerant R407F**

For highly efficient and environmentally friendly refrigeration systems.

More than an alternative. GEA Bock & R407F

Due to a higher efficiency than R404A, a 50 % lower GWP (Global Warming Potential) and its usage possibility as a Drop-In solution regarding the retooling of a R22 plant, R407F is an interesting refrigerant for commercial refrigeration.

GEA Refrigeration Technologies has now approved Bock HG and HA compressors for operation with R407F.

In the course of this admission, laboratory experiments showed that the use of R407F guarantees a significant increase in the energy efficiency of plants compared to R404A.

Experiments with R407F indicated a lower refrigerating capacity compared to R404A (especially in the field of deep freezing), but at the same time, the power consumption is reduced by 22 %. Solely related to the compressor, significant increases in the COP could be achieved, which can be seen in the graph on the following page.

The new hydrofluorocarbon (HFC) R407F is comparable with R22 in many respects, but requires fewer equipment modifications than other R22 alternatives. The experiments of GEA Refrigeration Technologies indicated a higher energy efficiency and a significant lower GWP in comparison to other HFCs. However, the already mentioned reduced refrigeration capacity of the plant R407F has to be taken into account.

A disadvantage of R407F – a parallel to R22 – is the high discharge end temperature of R407F, which makes the use of classical suction-gas cooled semi-hermetic compressors in the field of deep freezing difficult and which requires normally the use of additional fans as well as a liquid injection. Additionally, experiments indicated a temperature glide of 4-6 K.

An easier, cheaper and more efficient solution is offered by air-cooled Bock HA-compressors. Due to their design with an integrated external air-cooling, these compressors can be operated without difficulty by R407F in the field of deep freezing. There are no further investments for additional fans or complex liquid injections necessary.

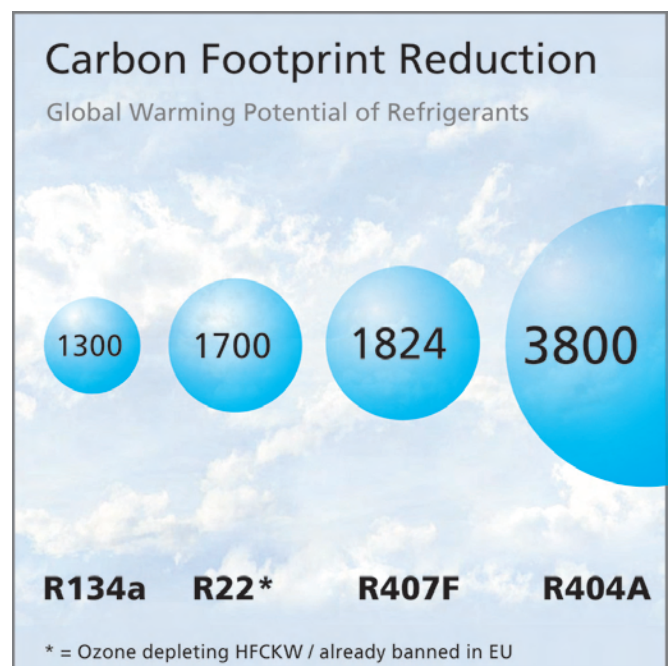
For more information about the design of the compressors with R407F, please contact the GEA Bock application engineering department directly (bock@gea.com, Tel: +49 70 22 94 54 0).

More detailed information about the retooling of existing R22 plants to R407F can be found in the documentation of the refrigerant manufacturer Honeywell.

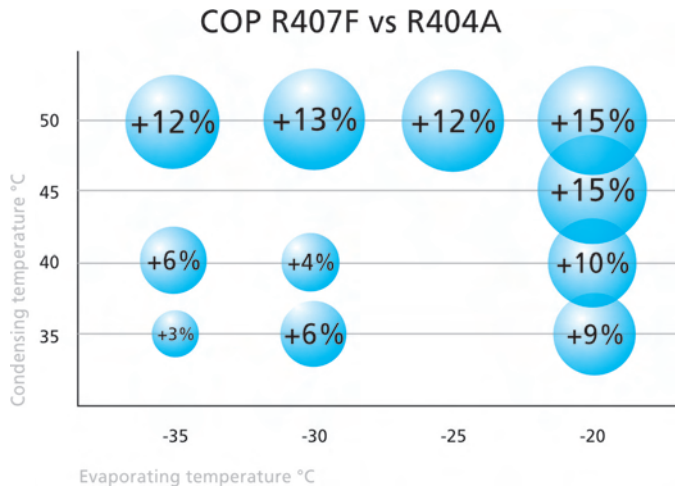


R407F - Selected Physical Data

Substitutes	R22, R404A
Molecular Weight	82,1
Boiling Point @ 1 Atm (°F)	-50,9
Freezing Point @ 1 Atm (°F)	-
Critical Temperature (°F)	180,8
Critical Pressure (psia)	689,6
Saturated Liquid Density @ 86°F (lb/ft ³)	68,3
Specific Heat of Liquid @ 86°F (Btu/lb °F)	0,39
Specific Heat of Vapor	0,2
Flammable range (Based on ASHRAE Standard 34)	None
ASHRAE Safety Group Classification	A1



Deep freezing



In low temperature applications R407F in combination with the air-cooled Bock HA series offers a energy saving potential of around 5 to 10% compared to R404A systems.

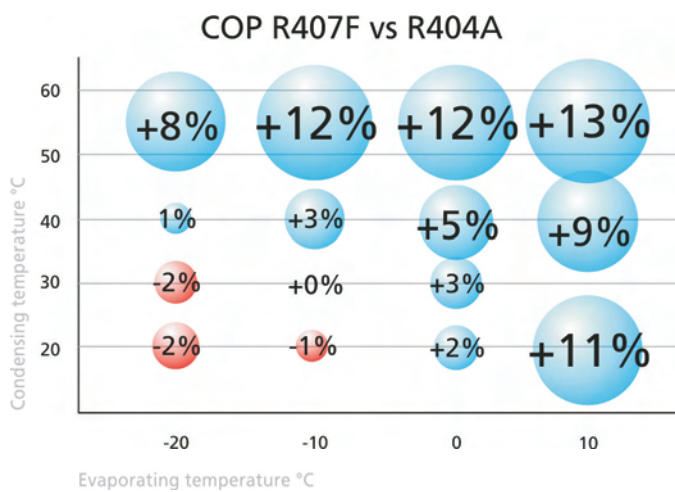
Bock HA Series



GEA Bock Semi-Hermetic Compressor Air-Cooled

Thanks to its integrated air-cooling system for the motor the Bock HA compressors are able to work in deep freezing applications with R407F without any liquid injection or additional head fans.

Normal cooling



In normal cooling applications R407F in combination with the suction gas-cooled Bock HG series offers a energy saving potential of around 7 to 12% compared to R404A systems.

Bock HG Series



GEA Bock Semi-Hermetic Compressor Gas-Cooled

Bock HG Compressors are classic semi-hermetic compressors with suction gas cooled motors - designed for maximum efficiency and long lifetimes.



Excellence

Passion

Integrity

Responsibility

GEA-versity

GEA Group is a global engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX Europe 600 Index.



GEA Refrigeration Technologies

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