

Packaging Option Requirements for R744 and R134a on the same vehicle

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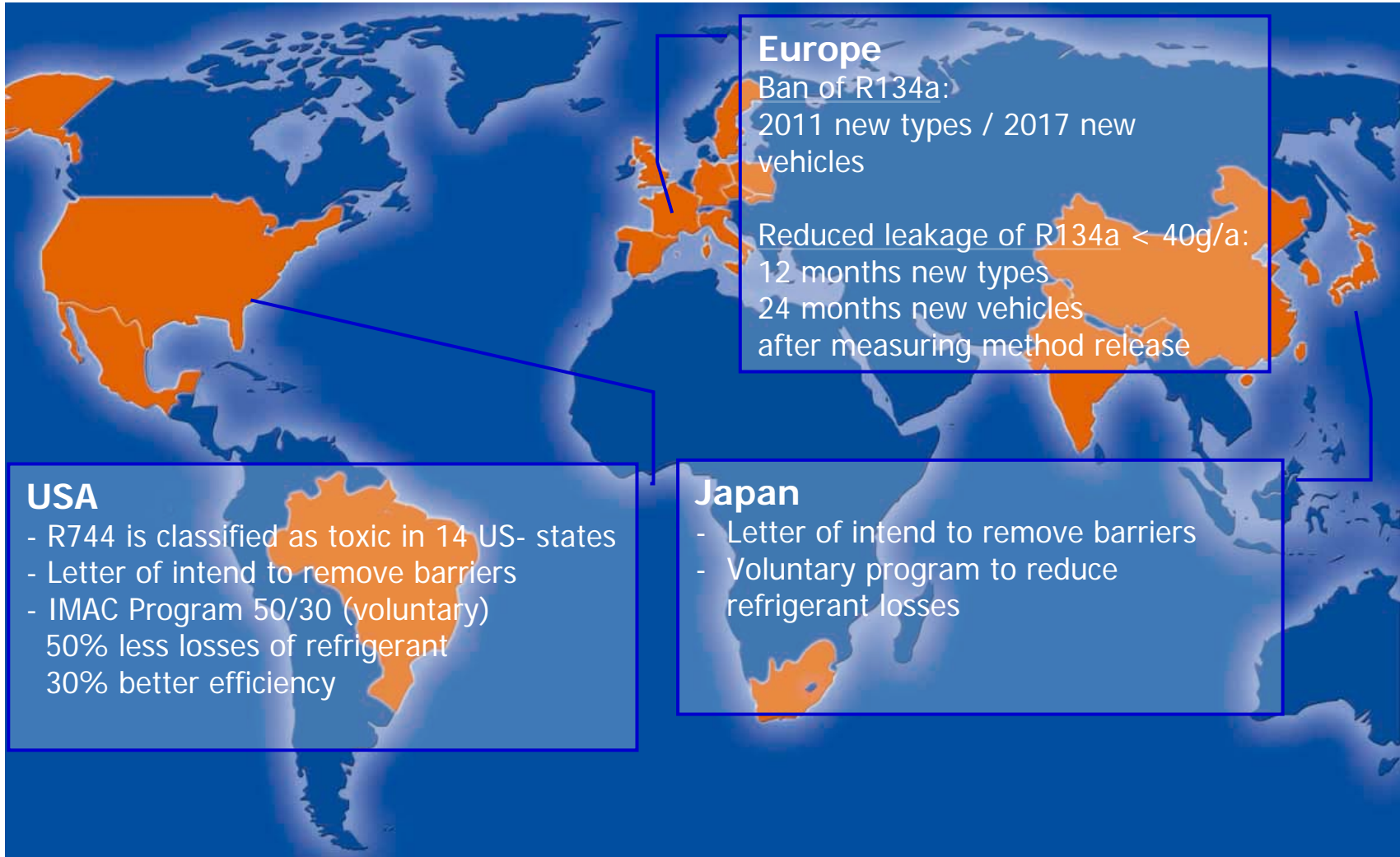
BEHR GmbH & Co. KG

Contents

- Tool box of R744 components
- COP comparison of R134a, R744 and Fluid H

Legislation

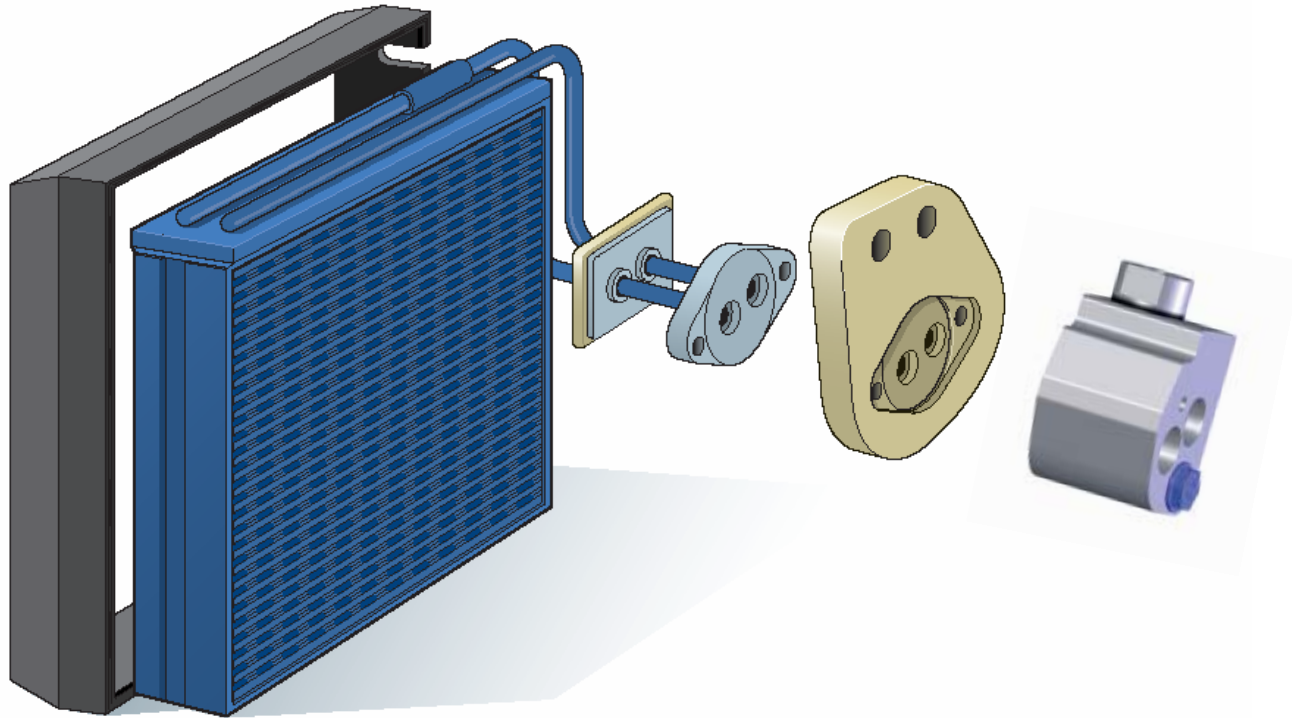
Refrigerants for Mobile Air Conditioning (MAC)



What is different?

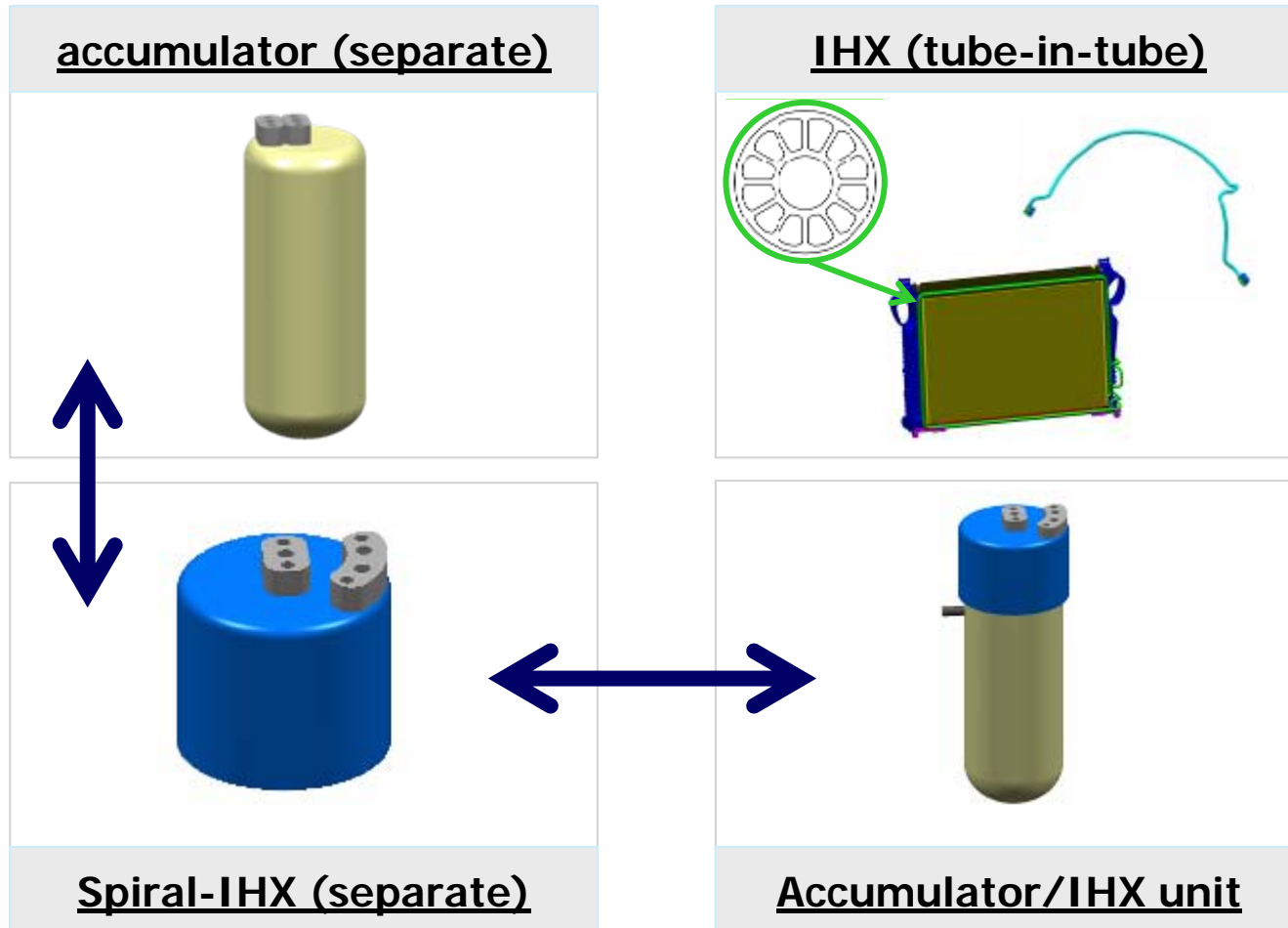
	R744	R134a
Evaporator	D=40mm	D=65mm
Condenser /Gascooler	D=16mm	D=16mm
Compressor	28ccm	170ccm
Refrigerant lines	Ø 7-10mm	Ø 12-18mm
Accumulator/ Receiver	460ccm inner volume	Integrated in condenser
Internal Heat exchanger	Coaxial, Spiral	-
Expansion device	Integrated at evaporator	TXV, integrated at evaporator

Expansion device

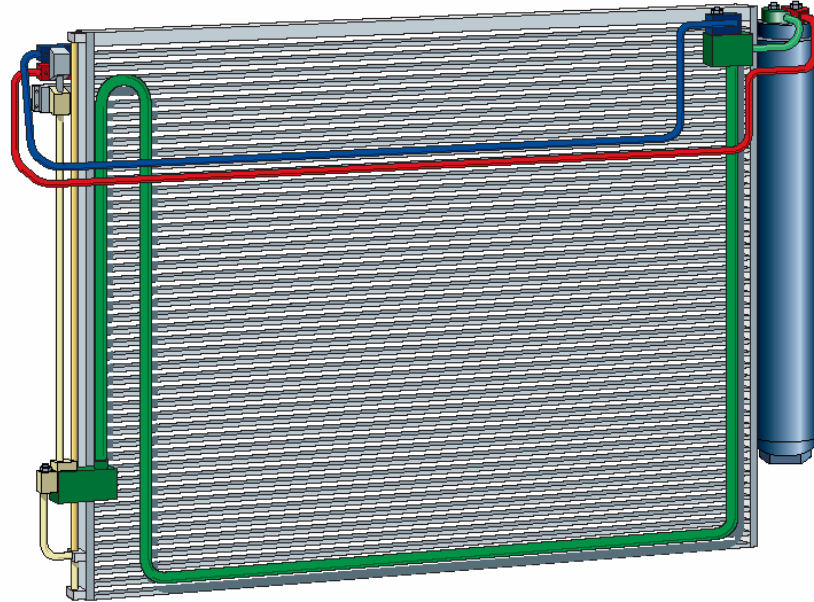


- Low pressure burst disc integrated
- Same assembling of HVAC than R134a

Internal Heat exchanger / Accumulator

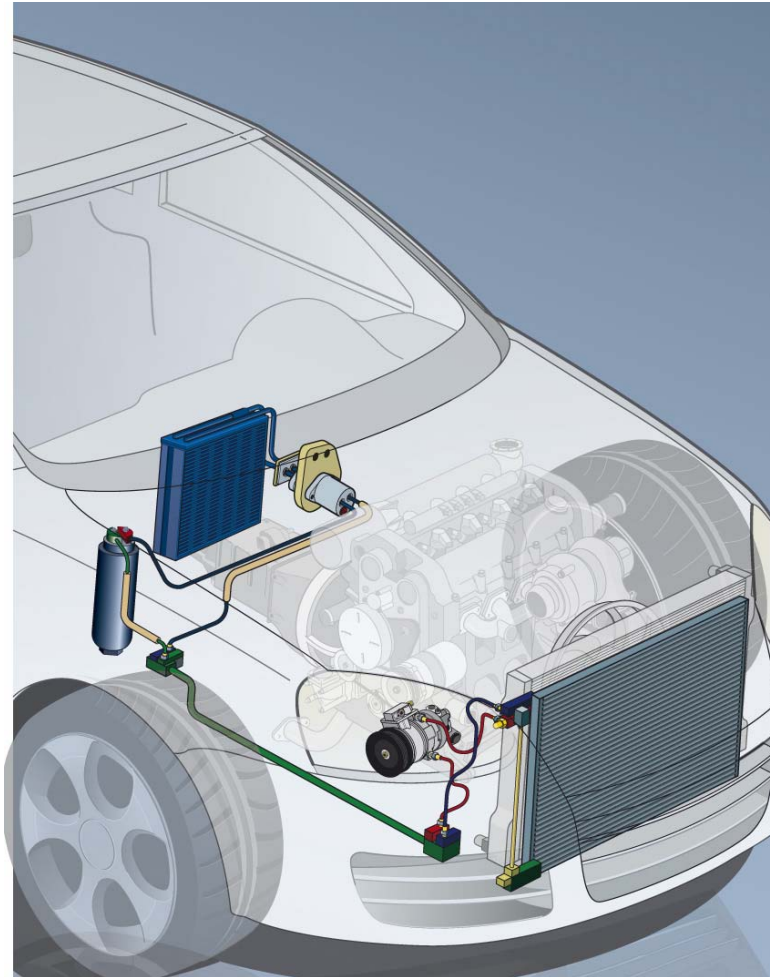


Gascooler Module

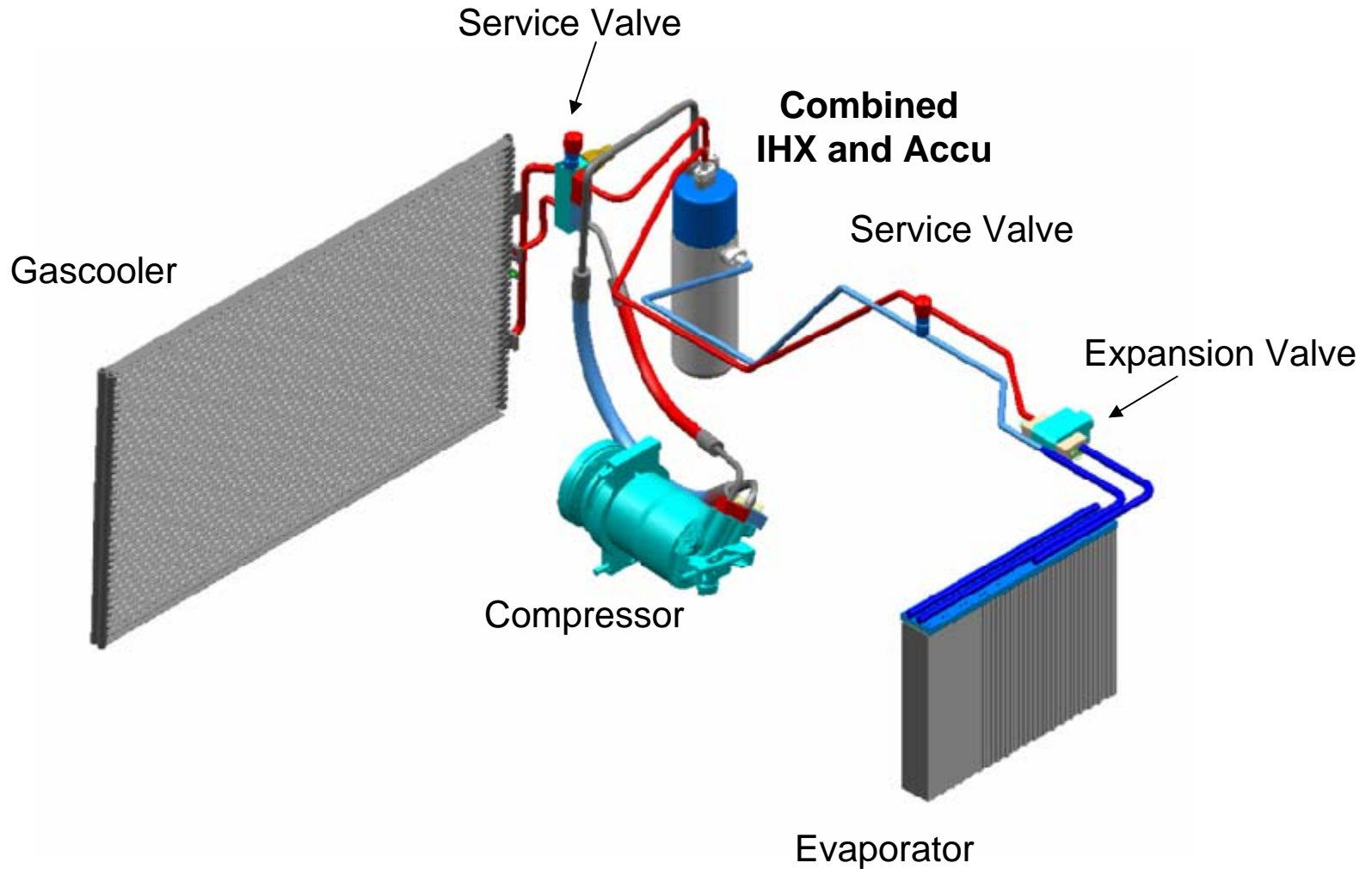


- Accumulator and Internal heat exchanger integrated in the gascooler module
- Easy integration in the cooling module
- Only one refrigerant line set for all engine variations
- Reduction of variants

R744 circuit in the car



Example of an R744 circuit



Comparison R134a / Fluid H / R744



List of Components

Compressor:

R134a/ Fluid H
R744

Denso 7SEU17
Hyvatec 31ccm

variable displacement, externally controlled
variable displacement, externally controlled

Condenser:

BMW 5-series Diesel

W x H x D = 383 x 610 x 16 mm³
micro channel, subcooled condenser, with integrated R/D

R744

W x H x D = 380 x 610 x 16 mm³;
micro channel

Evaporator:

BMW 5-series

W x H x D = 307 x 200 x 65 mm³;
micro channel

R744

W x H x D = 305 x 190 x 40 mm³;
micro channel

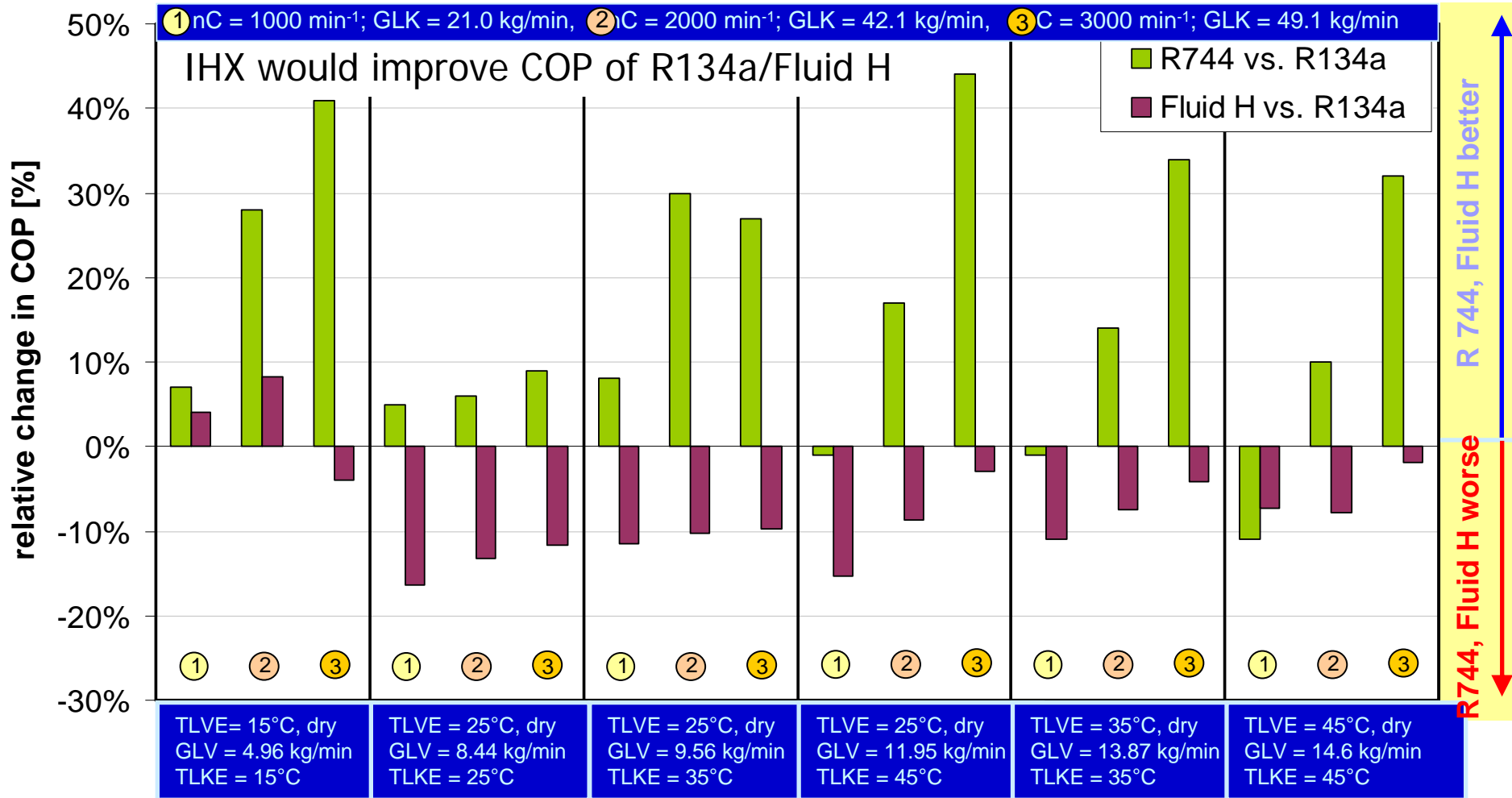
Expansion device

Egelhof
R744

2 Tons, cross charge (C1)
TXV, 2,3 bar (R134a) / 2,6 bar (Fluid H) at 0°C
Orifice with Bypass

Fluid H and R744 vs. R134a: COP at same performance

Fluid H as drop in, with adapted TXV spring setting



Conclusion

- Size of R744 components \leq R134a
 - New R744 components (Accumulator/IHX) have various package options
 - Modules with R744 components possible
 - Gascooler Module simplifies package (R134a/R744)
- R134a, Fluid H and R744 fit in the same package