Oils for refrigerant R744 (CO_2)

Characterising the oils

Oil	Oil type	Applications	Designation on compressor
BSE60K	polyolester oil (POE)	standard oil charge for subcritical (e.g. cascade) applications	"K" (e.g. 4DSL-10K)
BSE85K	polyolester oil (POE)	standard oil charge for transcritical applications, alternative oil charge for subcritical (e.g. booster) applications	"K" (e.g. 4FTE-30K)
BSG68K	polyalkylene glycol oil (PAG)	standard oil charge and precondition fo applications with low pressure > 40 bar / high pressure > 120 bar, alternative oil charge for sub- and transcritical compressors in booster applications e.g. with ejectors	"Z" (e.g. 4MTEU-10LZ)

BITZER oils for R744

Material safety data sheets

Apart from this document, please observe the material safety data sheet (MSDS) for the respective oil. It contains information on toxicity, handling, personal protective equipment and disposal of the oil. Material safety data sheets for all BITZER oils are available on request.

Application range

Oil	Air conditioning	Medium temperature application	Low temperature application
BSE60K	– –	– –	✓
BSE85K	(✓)	✓	✓
BSG68K	✓*	✓	✓

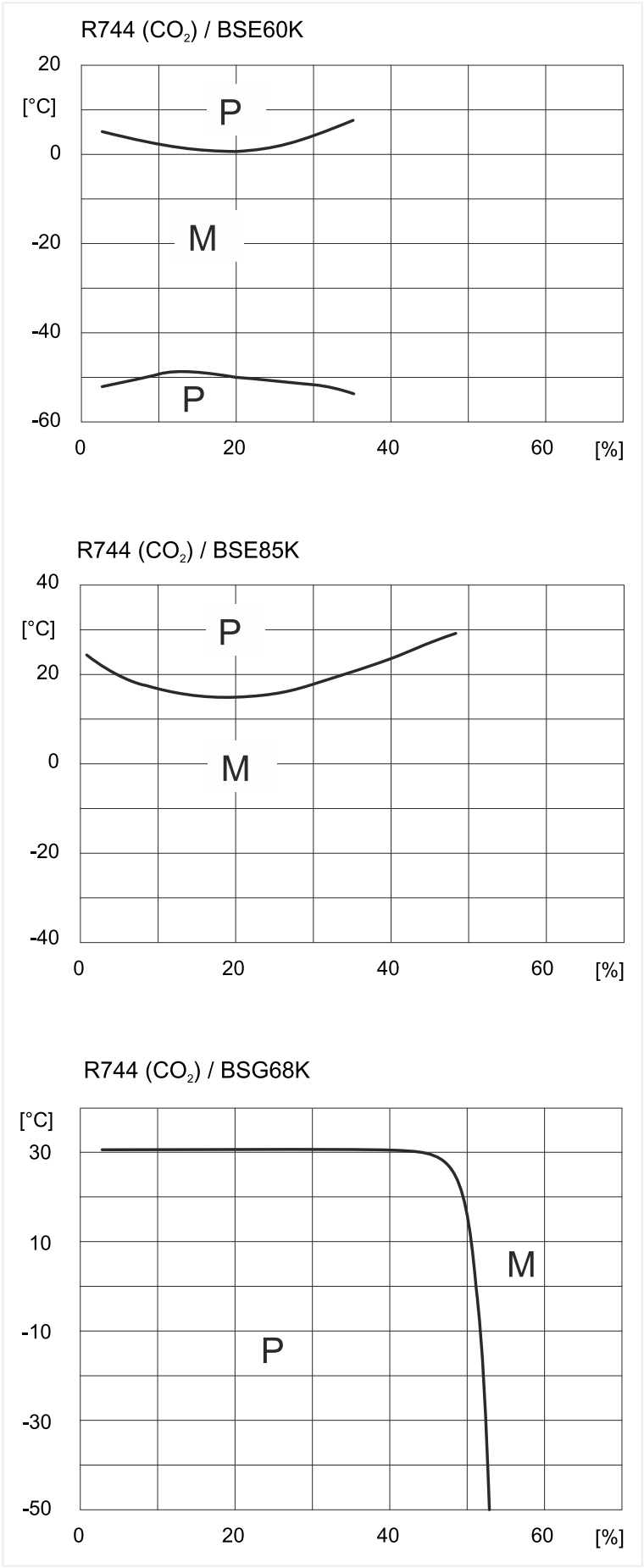
Application range of oils for R744 in BITZER reciprocating compressors. For application limits see also BITZER SOFTWARE.
(✓): after consultation with BITZER Application Engineering
✓: BSG68K is precondition for applications with low pressure > 40 bar / high pressure > 120 bar*

Technical data

	BSE60K	BSE85K	BSG68K	Unit
Density at 15°C	1.009	0.993	1.003	g/ml
Flashpoint	286	246	> 200	°C
Pour point	-48	-42	-46	°C
Kinematic viscosity				
at 40°C	55	80	68	cSt
at 100°C	9	11	16	cSt

Technical data of oils for R744 in BITZER reciprocating compressors

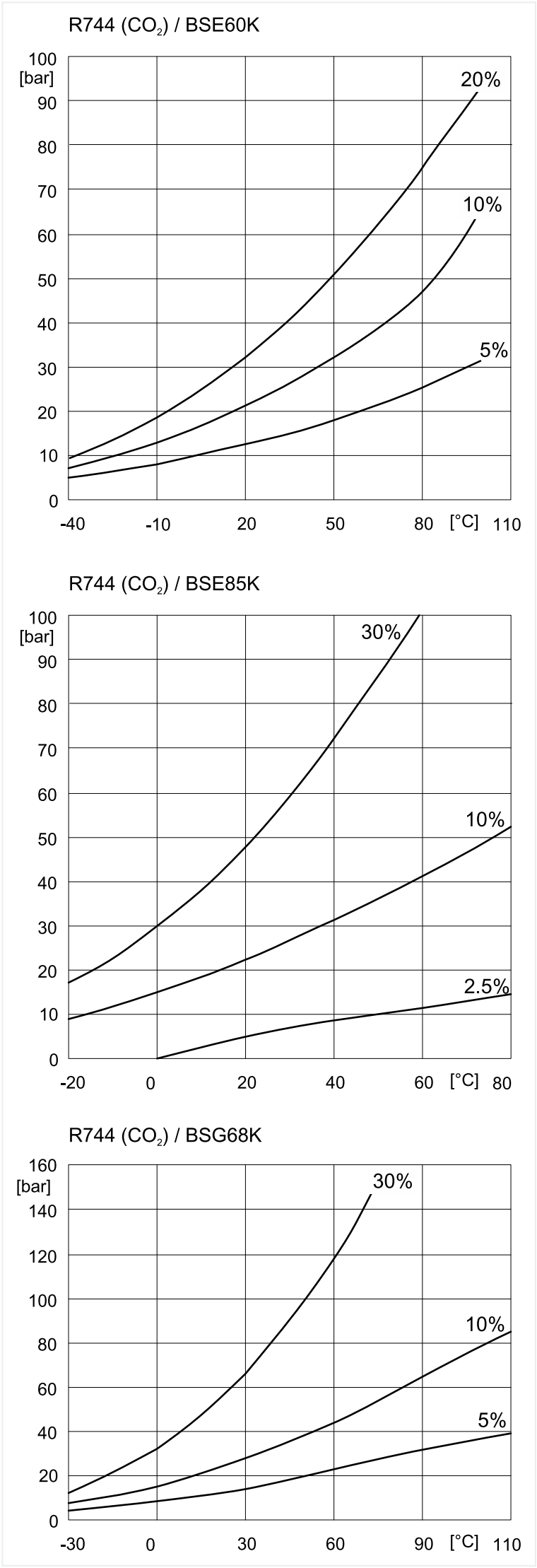
Miscibility gaps



Miscibility gaps for R744: Limit temperature depending on oil content (mass % of oil in oil refrigerant blend).
M: Range of complete miscibility.
P: Phase separation range (miscibility gap).

Refrigerant solubility in oil

The following diagrams can be used to read off the refrigerant content in the lubricant depending on refrigerant pressure and oil temperature.



Oils for R744: Refrigerant pressure depending on the oil temperature and the refrigerant content (mass % of refrigerant in oil-refrigerant blend).

Warning values for used oils

The listed polyolester oils and the polyalkylene glycol oil are categorized as group KB according to DIN51503, Part 1. To determine the used condition of the oil, e.g. with respect to water content or total acid number (TAN), the reference values of DIN 51503, Part 2, apply.

Oil	Kinematic viscosity at 40°C (DIN EN ISO3104)	Max. water content (DIN51777-2)	Total acid number (DIN51558-1)
BSE60K	outside of 47 .. 63 cSt (*)	150 mg H_2O/kg oil	0.2 mg KOH/g
BSE85K	outside of 68 .. 92 cSt (*)	150 mg H_2O/kg oil	0.2 mg KOH/g
BSG68K	outside of 58 .. 78 cSt (*)	800 mg H_2O/kg oil	0.2 mg KOH/g

Warning values for used BITZER oils for R744.
(*): that is ± 15% of the value for new oil

Elastomer compatibility

Relevant literature recommends the following seal materials for polyolester oils (POE) and polyalkylene glycol oils (PAG) with R744:

- hydrogenated acrylonitrile butadiene rubber, nitrile content >36%
- ethylene propylene diene rubber
- fluorinated rubber

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