

Oils for refrigerant R290 (propane)

Characterising the oils

Oil	Oil type	Applications	Designation on compressor
SHC226E	poly-alpha-olefin oil (PAO)	standard oil charge	"P" (e.g. 4VESP-10P)
BSG68K	polyalkylene glycol oil (PAG)	option for compact refrigerating circuits	"Z"

BITZER oils for R290

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

> DANGER

Risk of explosion and thus danger of death in the event of refrigerant outlet and in the presence of an ignition source!

Owing to the particularly high solubility of R290 in customary oils, BITZER compressors are charged with a special oil of a high viscosity index and particularly good tribological characteristics.

In view of the solubility, the design, operating mode and control of the compressor and the system are subject to particular requirements. Low or insufficient superheat in operation and insufficient heating of the oil sump during shut-off periods lead to a substantial reduction of the oil viscosity in the compressor. This results in reduced performance, heavy wear on drive gear parts, increased oil carry over and foaming. Secure compressor against "wet operation" and guarantee a sufficiently high suction gas temperature – for reciprocating compressors, suction gas superheat must be at least 20 K!

- Low oil temperatures and a high suction side standstill pressure must be avoided. An oil heater is absolutely required and an additional pump down system must be provided if necessary.
- Avoid quick changes in suction pressure – risk of border lubrication due to strong gas discharge of the refrigerant from the oil and unstable suction gas superheat.
- Avoid quick changes in condensing pressure – risk of strong foaming in the oil separator!

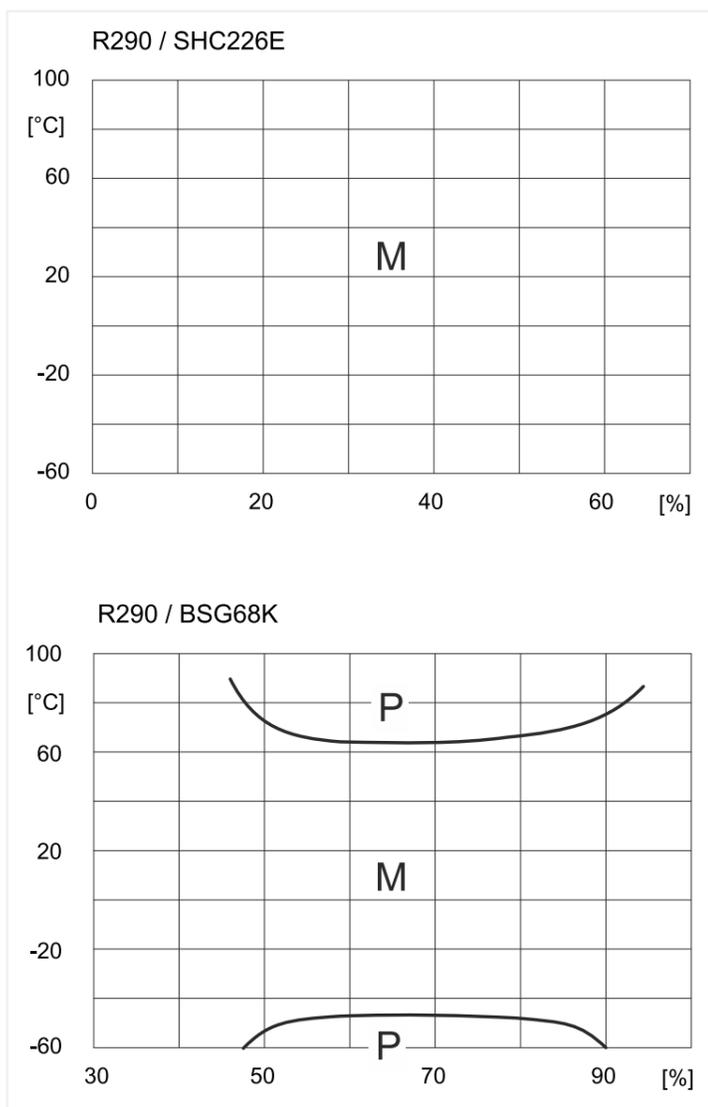
For further information on the use of R290 in semi-hermetic compressors: see Technical Information [AT-660](#)

Technical data

	BSG68K	SHC226E	Unit
Density at 15°C	1.003	0.830	g/ml
Flashpoint	> 200	250	°C
Pour point	-46	-45	°C
Kinematic viscosity			
at 40°C	68	67	cSt
at 100°C	16	10	cSt

Technical data of oils for R290 in BITZER reciprocating compressors

Miscibility gaps



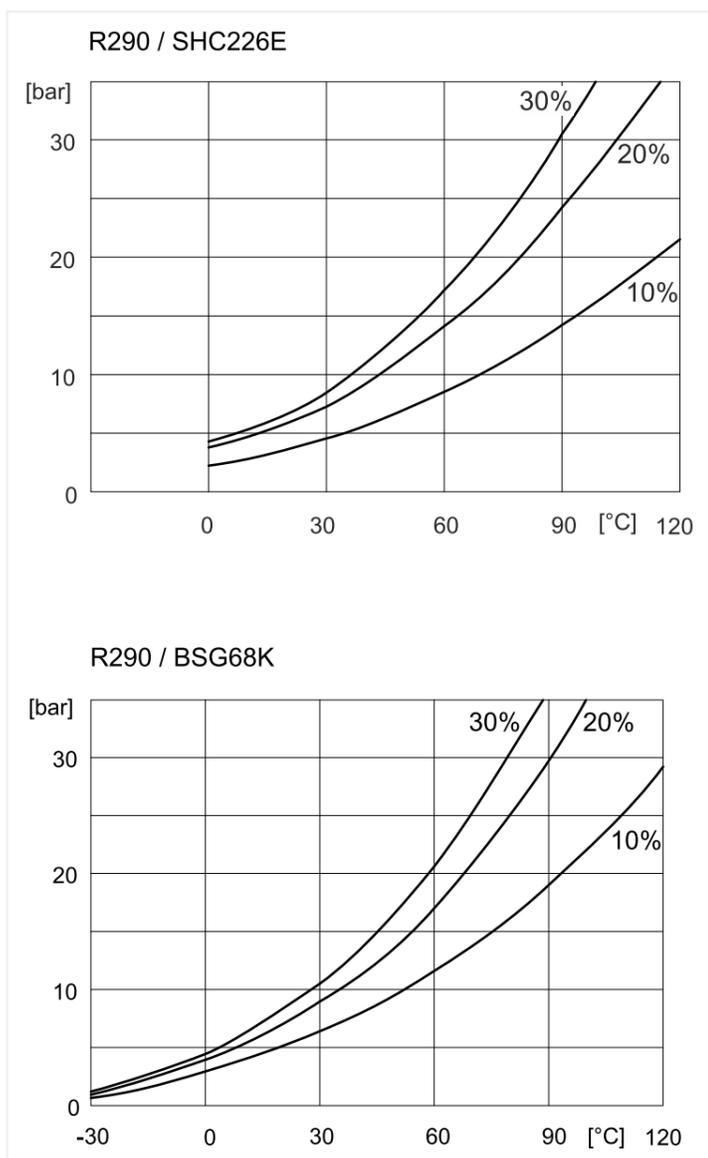
Miscibility gaps for R290: Limit temperature depending on oil content (mass % of oil in oil refrigerant blend).

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 R290: 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 oils **SHC226E** (PAO) and **BSG68K** (PAG) are categorized as group KE 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)
SHC226E	outside of 57 .. 76 cSt (*)	80 mg H ₂ O/kg oil	0.1 mg KOH/g
BSG68K	outside of 58 .. 78 cSt (*)	800 mg H ₂ O/kg oil	0.2 mg KOH/g

Warning values for used BITZER oils for R290.

(): that is ± 15% of the value for new oil*

In case of maintenance, be sure to observe the following:

> NOTICE

Danger of spark formation due to unintended switching operations or overheating of the oil heater during oil change.

> NOTICE

Danger of spark formation, when discharging electrostatic charges!

> NOTICE

Fire hazard!

R290 or R1270 dissolve very well in refrigeration compressor oil. Used oil from such systems may still contain relatively high percentages of dissolved R290 or R1270 even at atmospheric pressure. These components gas out. Observe during storage and transport:

- > Fill used oil into pressure resistant containers.
- > Fill containers with nitrogen as a protective gas and close them.
- > Mark them, e. g. with the warning sign "flammable substance" W022 from ISO7010.

Elastomer compatibility

Relevant literature recommends the following seal materials for polyalkylene glycol oils (PAG) and poly-alpha-olefin oils (PAO) with R290:

- chlorobutadiene rubber, e.g. neoprenes
- acrylonitrile butadiene rubber, nitrile content >36%
- hydrogenated acrylonitrile butadiene rubber, nitrile content >36%
- fluorinated rubber