

■ Factsheet

Oil content in compressed air downstream of compressor

Lubricated piston compressors and oil injection-cooled screw and vane compressors require oil for cooling, lubrication, compression and corrosion protection, and even for controlling. To remove the oil from the compressed air, separator elements are installed downstream of the compressor. These elements consist of coalescing filters that eliminate the liquid oil from the compressed air. Oil vapours however simply pass through the oil separators. This can lead to problems, especially at high temperatures where the oil vapour concentration tends to increase disproportionately. As a result, the compressed air system becomes permanently contaminated, causing problems in many applications.

Oil-free compressors are no guarantee for compressed air free of hydrocarbons, as such substances are often already contained in the intake air. These substances originate from various sources. One such source is often the oil-free compressor itself, as its gear box housing ventilation is open to the ambient air, so that lubricating oil vapours might be sucked into the compressor.

For all modern compressors, there are a wide range of treatment systems available, enabling operators to achieve compressed air that meets even the most stringent quality standards.

Oil in compressed air occurs in various forms:

- liquid oil in the form of films on walls (due to condensation on the inside of pipelines or devices); oil droplets or oil aerosol
- oil vapour

The compressed oil contents published in marketing material of compressors refer to standardised operating conditions (air temperature 20°C, air pressure 1 bar (a) and 0% relative humidity; operation at full load, no switching or flow regulation). While such theoretical ratings might be useful in certain contexts, the conditions they refer to can hardly ever be reproduced in an industrial environment. There are a number of factors that greatly affect the oil contamination of compressed air systems: age and state of repair, design, control equipment, operating temperature, oil grade, viscosity and wear, location of installation, cooling method, etc.

Compressor Design	Residual oil at compressor outlet	Oil-carryover to pipe system at volume flow 1000 m ³ /h
piston compressor, lubricated	10 - 180 mg/m ³	240 - 4320 g/day
vane compressor, lubricated	1 - 180 mg/m ³	24 - 4320 g/day
screw compressor, lubricated	1 - 20 mg/m ³	24 - 480 g/day
compressor, oilfree	detection limit - 3 mg/m ³	detection limit - 72 g/day
ambient condition 20°C, 1 bar(a), 24h-full-load		

Fig. Typical oil content of compressed air by compressor design

(Source VDMA 15390-1: 2014-12)