



## ■ Factsheet

### Production of oil-free compressed air with activated carbon and refrigeration drying

For the production of compressed air of ISO 8573 quality class 1, most operators use activated-carbon adsorbers that remove oil molecules from the compressed air by means of adsorption.

As activated carbon also absorbs water vapour, it can be quickly spent, especially where the air contains quite a lot of water vapour. At this point, the activated-carbon adsorber is no longer able to take up oil molecules, so that the concentration in the downstream compressed air exceeds the limit for quality class 1 ( $> 0.01 \text{ mg/m}^3$ ). For reliable long-term treatment and consistent low residual oil contents, the compressed air must therefore be dried before it enters the activated carbon.

To produce quality class 1 compressed air ( $\leq 0.01 \text{ mg/m}^3$ ) using a refrigeration dryer and activated-carbon adsorber, the operating parameters (especially temperature and volume flow) should ideally be static. This cannot be achieved in industrial production environments where conditions change constantly. To obtain oil class quality class 1 compressed air, operators need to install an adsorption dryer upstream of the activated-carbon adsorber. In addition, they must take suitable measures to ensure that both treatment stages are operated within defined limits.

For compressed air of quality class 2 and lower ratings, combining a refrigeration dryer and activated-carbon adsorber might be sufficient, even for alternating loads, as long as the key parameters do not exceed certain limits.

residual oil content class	compressed air treatment with activated carbon adsorber plus		
	refrigerant air dryer		adsorption dryer
	stable, laboratory conditions	dynamic working conditions as usual in the industry	
1	possible within limited working conditions	permanently not possible	possible within limited working conditions
2		possible within limited working conditions	

Additional limit conditions for activated-carbon adsorbers:

- Volume flow rate over entire operating time between full load (100%) and partial load (50%) (including times of minimum consumption, i.e. during nights and weekends)
- Compressed air inlet temperature  $+2$  to  $+50^\circ\text{C}$  (note: the higher the temperature, the shorter the service life of the activated carbon)
- Operating pressure of minimum 4 bar, and not exceeding rated maximum operating pressure
- Total oil concentration in intake air  $\leq 0.1 \text{ mg/m}^3$
- Water content in intake air: no free water, relative humidity  $\leq 30\%$ , aerosol content  $\leq 0.01 \text{ mg/m}^3$
- Ambient temperature around activated carbon filter housing between  $+5$  and  $+50^\circ\text{C}$  at all times
- Replacement of activated carbon prior to saturation
- Also take into account other hydrocarbons in the intake air and observe the operating manual