# Original parts – why they're worth every penny


**When talking about costs for compressed air, energy is by far the most important factor. If you look at the costs of a running compressor over its whole lifetime, energy costs make up around 75% of the overall total – and the larger the plant or the longer the operating hours, the higher this percentage. Costs for purchasing the device, maintenance and spare parts are minor in comparison.**

For a compressor to remain efficient (which helps keep energy consumption constant), all of its components need to be perfectly matched and changed regularly. Spare parts and consumables which do not fully meet the manufacturer's specifications can result in issues such as increased differential pressure which needs to be compensated by the compressor using more energy.

They can also have a negative influence on the life cycle, maintenance schedule and reliability of a compressor. Only original parts which have been tested and approved by the manufacturer will ensure optimum compressor efficiency over time.

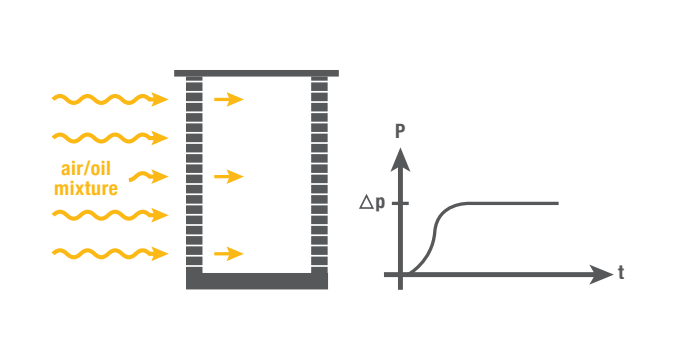
Original parts such as filters, separator cartridges or lubricants undergo numerous tests over several thousand continuous operating hours before being finally approved.

Non-approved parts may initially seem to represent a much more economical option – however, in the long term they can become much more problematic. In this white paper, we look at the most important spare parts and what needs to be taken into consideration when replacing components.

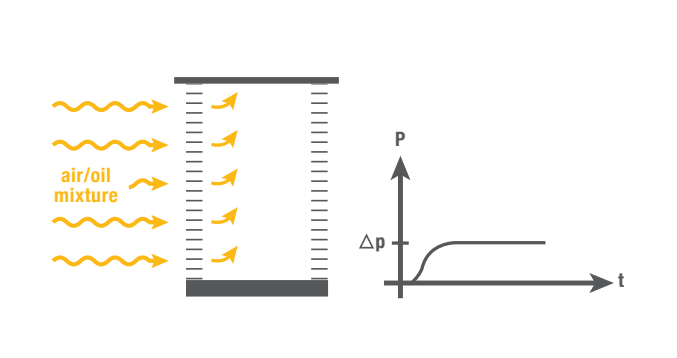
## OIL SEPARATOR

The operating principle of an oil separator is relatively simple: the oil/air mixture created during the compression process passes initially into a pressure tank for pre-separation. Any remaining oil droplets in the compressed air coalesce into larger drops in the oil separator elements (or spin-on separators) and are then collected and returned to the oil circuit. This keeps both the oil consumption by the compressor and oil ingress into the compressed air network to a minimum.

Too fine filter material in the oil separator will achieve high separation rates, but also high pressure losses. This results in huge energy wastage: an additional differential pressure of just 1 bar results in a 6% increase in energy




Filter material too fine: differential pressure too high




Filter material too thin: excessive oil leakage

costs. If, on the other hand, the filter material is of bad quality or too thin, there is insufficient separation and leakage of oil into the compressed air network is too high. As a result, more oil needs to be added and prematurely saturated treatment components such as activated charcoal or filters will need to be replaced (with the associated additional costs).
The situation for internal oil separators is even more complicated: proper

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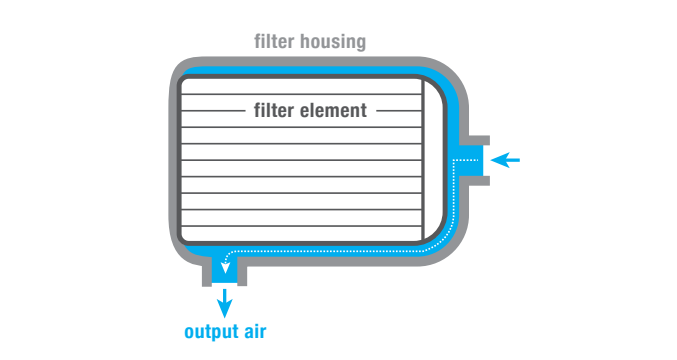
grounding of the element prevents the build-up of static and the risk of unwanted ignition.

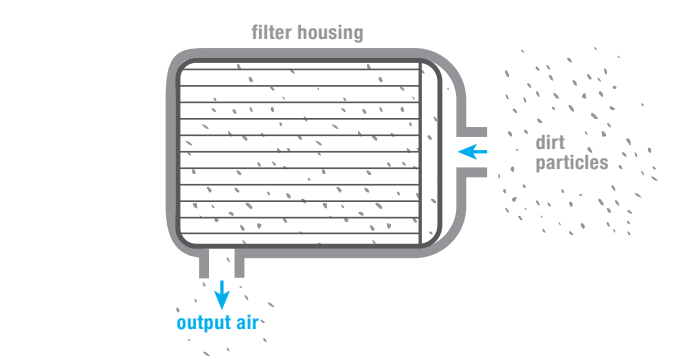
Only original oil separators ensure minimum oil leakage, constant separation rates and minimum loss of pressure over the device's lifetime.

## AIR FILTER

Ambient air contains millions of particles, dust particles and pollens which can have a negative effect on the performance of a compressed air system. If these microscopic particles are not removed properly by an air intake filter, they can cause damage to the rotors and bearings which shortens the operational lifetime of oil filters and oil separators downstream.




seal insufficient




low-quality filter material

Filter elements remove this type of contaminant and so need to be replaced regularly. In the case of the air intake filter, the material, size and differential pressure all play a decisive role in its efficiency. Only original parts have the necessary high-quality filter material and separation capacity to ensure a low differential pressure over time. They also provide an optimum seal between the filter housing and the element which prevents unwanted bypass – bypass is when unfiltered air is allowed to flow into the machine causing the aforementioned issues.

Sometimes companies will also attempt to clean air filters by blowing high pressure air back out through the filter. Doing this risks creating small holes in the filter material. When back in use, the airflow will attempt to take the path of least resistance which means some of the air will enter the system unfiltered and possibly cause some of the damage mentioned above.

When changing an old filter element, there may be some dirt, sand or pollen which has managed to build up in the filter housing. It is important that they are removed so that they cannot enter the air intake duct when fitting the new filter. Where possible, a vacuum cleaner should be used to clean around where a new filter element is to be installed.

Modern, powerful compressors require effective filters, and need to be checked regularly to ensure optimum system performance. Their enormous capacity for removing dirt ensures long, efficient compressor service lives – preventing unplanned outages, downtime and the resultant cost.

Energy info: a change in differential pressure of just 0.1 bar at the intake filter due to dirt can reduce the free air delivery of the compressor by up to 8%.

## OIL FILTER

In oil-lubricated compressors, the oil serves a range of different purposes: sealing, cooling, lubricating and transporting away dirt and impurities. The oil filter removes dirt and particles caused by wear from the oil and retains them in the filter material. It is subjected to constant fluctuations in pressure, vibration and high temperatures.

Poor filter material results in bad oil filtration which leads to contamination in the oil circuit and – in the worst case scenario – premature filter blockage. If the oil filter is not changed regularly, the filter material can become

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blocked. The built-in bypass valve on the original filter opens once the material can filter no more oil. By opening, it ensures the lubrication film is not broken and the airends continue to be supplied with oil. However, this does mean damaging particles enter the oil circuit unfiltered. This can result in costly damage to the compressor and other components, and possibly even breakdown of the machine. Regular changing of the filter is essential.

## COMPRESSOR OILS

As we have seen, oils used in a compressor have to face the toughest conditions – they need to both cool all of the components in a compressor and also protect the device against overheating. In addition, they need to form a seal between the rotors or pistons and the cylinder. Oils must be able to transport away deposits before they can affect the function of the compressor. And on top of that they need to lubricate all the parts in order to reduce wear and tear. To fulfil all of these functions, the oils are given additives to make sure they have exactly the right properties for use in the devices. The most important properties of additives in oils is that they must prevent foaming, ensure good water separation and display excellent viscosity and corrosion protection properties.

## THE MOST IMPORTANT PROPERTIES AND THEIR EFFECTS

**Low foaming**

- lower residual oil content
- foam does not reach oil separator element
- lubrication properties of oil remain intact

**Good water separation**

- prevent mixing of oil and condensate
- prevent corrosion
- lubrication properties of oil remain intact

**More constant viscosity**

- fewer temperature-dependent fluctuations
- no obstruction or inadequate lubrication at low temperatures
- no loss of oil film at high temperatures

**Less oxidation**

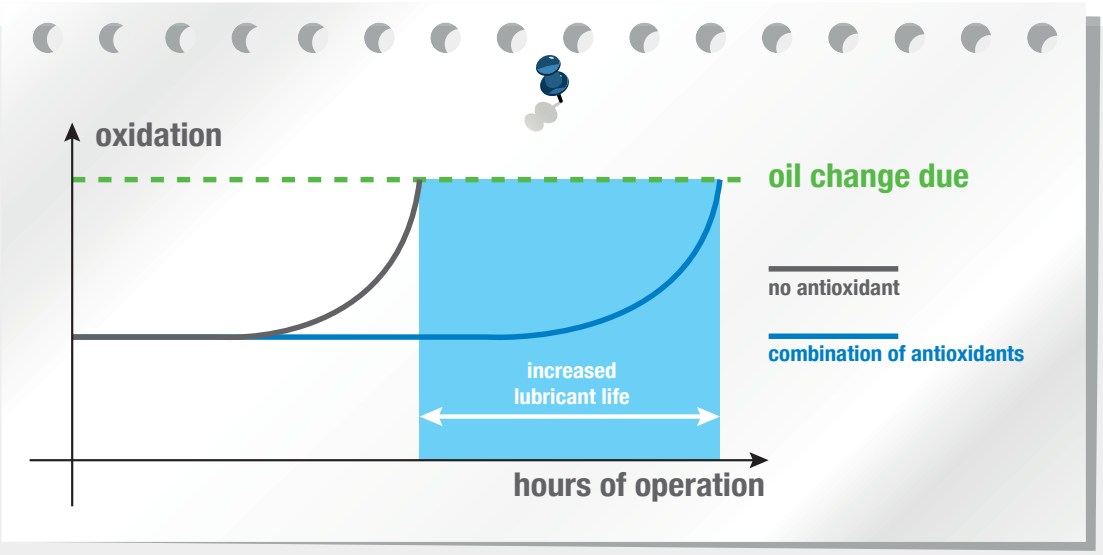
- prevention of acid build-up
- no corrosion on metallically bright parts
- prevention of creation of sludge

The correct oil to use depends on your requirements and the compressor type. Most standard oils are either mineral or synthetic oils. In the case of the food sector, there are some other types of oil which are authorised for this industry.

The period between oil filter changes can vary greatly depending on the oil type and environmental conditions. One indicator that oil may need to be changed is oxidation (a reaction with oxygen, water and dust). The current level of degradation can be checked in an oil oxidation test, however, the results are to be treated with caution: degradation can remain constant over long periods of time, but then rise exponentially all of a sudden. As a result, the maximum oil operation times as specified by the manufacturer must never be exceeded. Using the oil for too long can result in oil sludge deposits, acidification and corrosion, clogged filters and blocked valves. In particularly sensitive applications, the oil should also be checked regularly for degradation in a laboratory.

It might seem at first that similar oils are completely interchangeable, however, before a manufacturer will approve an oil for use in their machines, they will have carried out testing on many devices over several thousand operating hours and will have monitored the essential properties with the help of laboratory testing throughout the entire process. Only once all of these tests have been satisfactorily completed will the oil be approved for use.

**BOGE Compressed Air Systems GmbH & Co. KG**
Otto-Boge-Straße 1–7 · 33739 Bielefeld
Fon +49 5206 601-0 · Fax +49 5206 601-200
info@boge.com · **boge.com**




## CONCLUSION

1. Non-approved ('pirate') parts and lubricants only represent a much more economical option on the surface.

2. Only original parts comply fully with the manufacturer's specifications and ensure constantly high system efficiency.

3. The use of original parts reduces the risk of unplanned machine outages.

4. Oils contain specially selected additives and are tested over several thousand operating hours before finally being approved for use by the manufacturer.

5. Regular maintenance carried out by qualified professionals using original spare parts will protect your investment and result in lower overall costs (TCO) over the lifetime of the device.