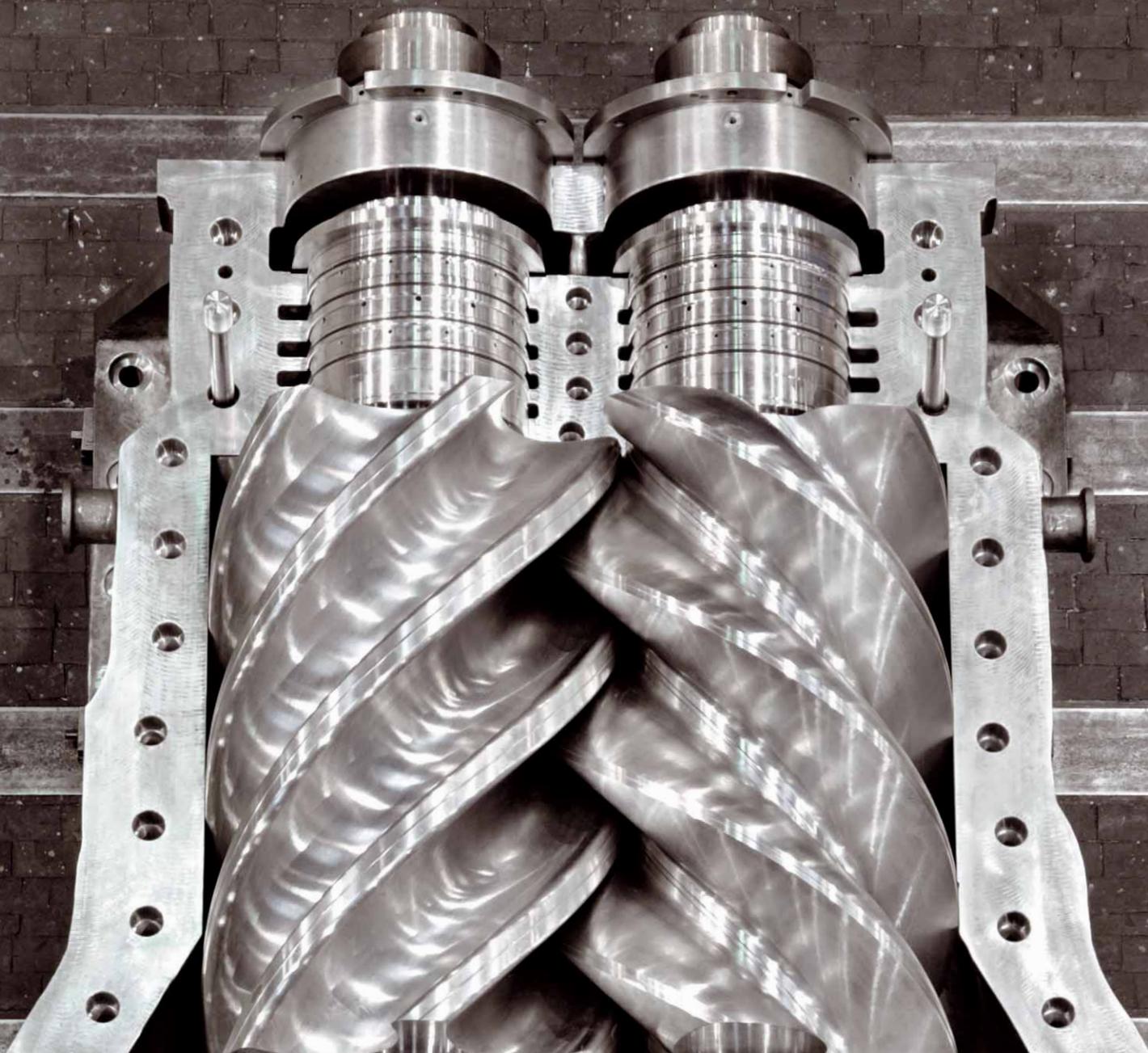


# Advantages of Oil-Free Screw Compressors



Engineering the Future – since 1758.

**MAN Diesel & Turbo**





### **Experience**

MAN Diesel & Turbo has about 60 years of experience in the design, manufacture and operation of screw compressor units. More than 3,000 machines have been installed in that time. Whether in regard to highest discharge pressure, largest volume flow or lowest suction temperature – MAN Diesel & Turbo is the leading manufacturer of oil-free process-gas screw compressors.

### **Design**

MAN Diesel & Turbo process-gas screw compressors are of very robust design. A large number of machine units have been installed in refineries, offshore applications and for gas turbine feed; operating in critical processes requiring high reliability. They are mainly installed as unspared 1x100% units. According to API619, an uninterrupted service of three years is mandatory, but most customers have been operating MAN Diesel & Turbo screw compressors for over five years without interruption.

### **Reliability**

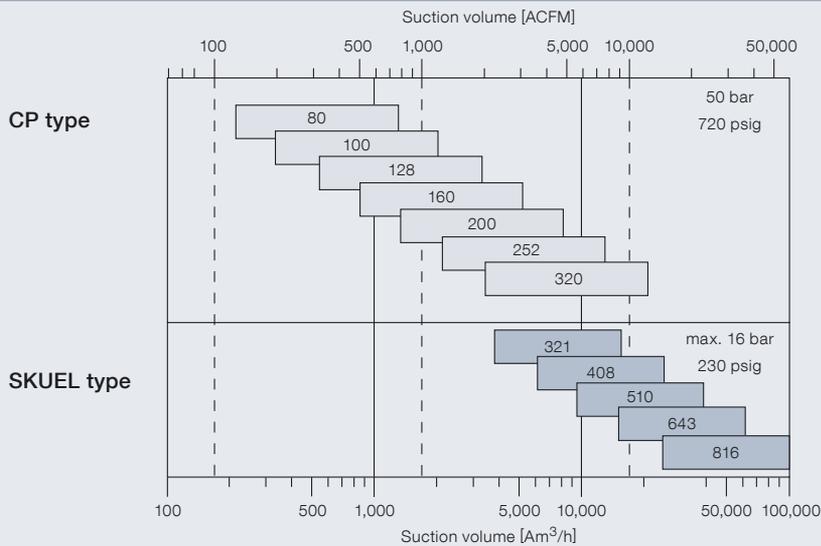
The table below shows the average values of availability, reliability etc. for different compressor types. The table is based upon statistics presented in the magazine "Hydrocarbon Processing" some years ago. It shows that centrifugal and oil-free screw compressors have the highest reliability compared to other compressor types. The availability of oil-injected screw compressors and of reciprocating compressors is much lower. This becomes obvious from the mean time between failure (MTBF). For the oil-free screw compressor, a failure is only expected every five years.

### **Advantages**

Due to their design, process-gas screw compressors have advantages when operating with the following gases:

#### **Gases with low molecular weight**

A screw compressor is a positive displacement compressor and, therefore, ideal for handling light hydrogen gases. The problem of an increasing number of stages required for low molecular weight – as is the case with centrifugal compressors – does not apply to screw compressors.



Screw compressor Type CP



Screw compressor Type SKUEL

### Gases with varying molecular weight

As molecular weight has only a small impact on the achievable pressure ratio – different to centrifugal compressors – the screw compressor is ideal for use in processes with fluctuating molecular weights. Such applications, for example, are flare gas compressors in refineries, recycle compressors in chemical plants etc.

### Dirty and polymerizing gases

Screw compressors have low rotor tip speeds and a very rigid rotor and casing design. They can even handle dirty and dusty gases.

MAN Diesel & Turbo has a lot of references for this service, for example for coke oven gas, soda ash, butadiene, styrene monomer etc. To reduce the discharge temperature, water may be injected in the screw compressor to prevent polymerization. Large amounts of water are injected, for example, in the compression of coke oven gas containing impurities such as tar and naphthalene, among others. The water forms a layer on the compressor surfaces and protects the compressor. Using this facility, reliable and long-term operation is achieved even with impure, dusty gases.

| Compressor type              | Availability % | Reliability % | IMR&O hr/year | Forced DT hr/year | MTBF year |
|------------------------------|----------------|---------------|---------------|-------------------|-----------|
| Recip., lubricated           | 97.3           | 97.8          | 237.2         | 189.2             | 0.5       |
| Recip., conv. non lube       | 91.3           | 92.3          | 766.1         | 670.1             | 0.3       |
| Recip., labyrinth piston     | 97.6           | 98.3          | 207.2         | 147.2             | 2.0       |
| Centrifugal, fouling service | 99.0           | 99.5          | 90.6          | 40.6              | 3.7       |
| Screw, oil flooded           | 97.7           | 98.8          | 199.9         | 99.9              | 1.5       |
| Screw, oil free              | 99.0           | 99.7          | 90.0          | 30.0              | 5.0       |

Note: IMR&O: Inspection, Maintenance, Repair&Overhaul; MTBF: Mean Time Between Failure, DT: Down Time

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