MAXIMATOR®

Maximum Pressure.

High Pressure Technology • Testing Equipment
Hydraulics • Pneumatics

Spare parts & Maintenance Requirements & Application Materials

Operating information Cleaning

» Oxygen Compression
Product Identifyer-S und - O2

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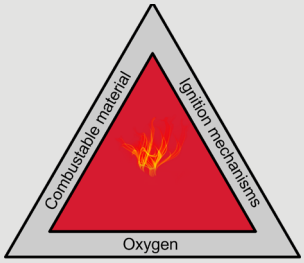
Oxygen Compression
Product identifyer-S und -02

Dangers of oxygen compression

For the compression of gases with an oxygen content >21%, **Maximator GmbH** has defined a purification process, technical adjustments to the products and special procedural instructions in order to make compression to a maximum of 350 bar safely for users.

Oxygen itself is not flammable but it accelerates the combustion reaction of other flammable substances significantly.
Flammable substances can ignite very quickly in pure oxygen environment, caused by different ignition mechanisms. During the increase of pressure inside a closed volume, the temperature raises significantly. Residues or particulates within a system with a low ignition temperature may ignite quickly and the constantly inflowing oxygen speeds up this oxidation reaction. In addition, this exothermic reaction enables circumstances where presumed non-flammable materials can ignite with combustion temperatures over 2000...3000 °C.



The risk factors for this reaction are residues or particulated in the system, so it is essential to reduce these risk factors to the smallest possible level. The cleaning process Maximator developed therefore, has this elimination in focus.

Oxygen purification requirements

Furthermore, all end users and commissioning engineers need to be aware of the risks caused by improper use or installation. They should be equipped with oxygen optimised components, operate in proper conditions and take comprehensive security precautions.

Typical applications for oxygen compression :

» Transferring oxygen from cylinder bundles to smaller cylinders

» Filling and emptying of oxygen cylinders

» Diving gas applications

Standards and regulations employed by Maximator GmbH:

» ASTM G88 (Standard Guide for Designing Systems for Oxygen Service)

» ASTM G93/G93M (Standard Guide for Cleanliness Levels and Cleaning Methods for Materials and Equipment Used in Oxygen-Enriched Environments)

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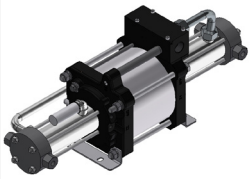
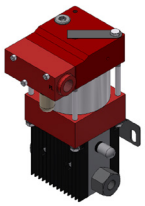
Maximator Overview - Materials

Implementation of measures: these data refer to boosters DLE (-S), ROB, needle valves, fittings and pressure switches (-O2)

Booster / ROB



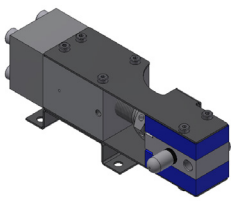


- Cleaned for oxygen applications
- O-Ring : special compound for oxygen applications
- Seals, Valve seats, valve ball, cooling, high-pressure section: specific defined materials for oxygen applications
- Lubricants: lubricants for oxygen application are tested with statutory requirements
- Leakage measurement with nitrogen (full inspection)

Valves and Fittings

- Cleaned for oxygen applications
- Seal packing: specific defined materials for oxygen applications
- lubricants for oxygen application are tested with statutory requirements
- Leakage measurement with nitrogen (on request)

Pressure switches



- Cleaned for oxygen applications
- Enclosure, o-ring, seals, piston: specific defined materials for oxygen applications
- lubricants for oxygen application are tested with statutory requirements
  Leakage measurement with nitrogen (full inspection)
- Leakage measurement with nitrogen (full inspection)

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Oxygen cleaning

All Maximator components for oxygen applications are cleaned in an ultrasonic bath or dishwasher. All cleaning steps as well as the assembly are executed in a clean assembly environment. After completing the cleaning, all parts are inspected visually and some are checked on a random basis with one of the following testing procedures:

» **White-Wipe Prüfung**

» **White-Light Prüfung**

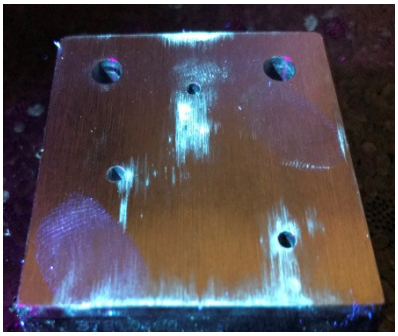
» **Black-Light Prüfung**

Only when all parts have passed the tests, will they be assembled and finally packed. Therefore, all components will be packed air-tight and dust-tight, if possible. Once all requirements have been met, the package is marked: **„cleaned for oxygen service“**

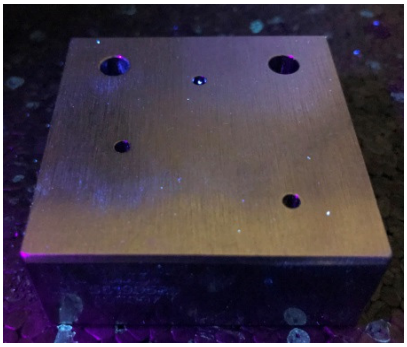
	Standard[1] for oxygen applications	Maximator GmbH (Test results)
Residual contamination	<22 Particles/m² between 500 µm and 1000 µm	2 Particles/m² > 300 µm

1(EIGA DOC 33/18, Cleaning of Equipment for Oxygen Service; ASTM G93/G93M-19:2019, Standard Guide for Cleanliness Levels and Cleaning Methods for Materials and Equipment Used in Oxygen-Enriched Environments).

Maximators special area for cleaning and assembly of components with high cleanliness requirements



Fluorescing particulate and hydrocarbon residues on a not yet cleaned part become visible under ultraviolet light.



A specially cleaned part for oxygen applications under ultraviolet light.

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Oxygen - Information COMPACT

Important operating information

- Maximum compression ratio: 1:4
- Maximum working pressure: 350 bar (5076 psi)
- Maximum flow velocity (flow rate): 8 m/s
- Maximum particle size: 10 µm
- Drive air has to be oil– and grease-free
- Only components that are specially cleaned for oxygen service should be used for oxygen applications
- Only lubricants recommended by Maximator GmbH should be used for oxygen applications
- All details about recommended lubricants can be found on the latest drawing of the component
- All connections to a cleaned component need to be completely oil- and grease-free or to be used with lubricants recommended by Maximator GmbH
- There might be some limitations in the use of two stage compressors due to the maximum compression ratio. Please contact your Maximator Sales Engineer or a Maximator partner for further assistance

Spare parts and Maintenace

- Only spare parts according to Maximator specifications are allowed. These spare parts are not cleaned for oxygen applications and need to be cleaned specially before usage. A list of available spare parts, spare part kits and reusables can be found at the latest drawing of the component, which is supplierd with the products.
- In case of spare part orders, a serial number/ revision of the system is required
- Attention should be paid to the maximum storage time for seals
- Inspection of all movable parts is necessary. In case of scratches or damages, these parts need to be replaced.
- A special cleaning of all parts is needed
- Personnel must be especially trained for the handling of high pressure oxygen components
- Maintenance intervals for preventive maintenance depend on the application and need to be defined by the user. Maximator GmbH recommends maintenance once a year as a minimum for components used in oxygen applications.

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We go the extra mile for your safety!

How do we create security for you?

» Regular internal tests and hydrocarbon residue analysis through independent laboratories (certificates available on request)

» Alignment with regulations from official councils and committees

» Competent advisors through the whole product lifecycle

» Maximization of appropriate materials (ignition/ combustion resistant or a low potential therefore)

» Minimization of ignition potential through control mechanisms which prevent ignition or dirt contamination of the system

Your benefit

Safety
Higher safety level for operators and commissioning experts; Prevention of accidents with personal injuries or material damage

Raise of availability
Reduction of loss of turnover caused by system downtime

Predictability
Long-term predictable maintenance expenses

Easy integration
Facilitation of risk assessment with regards to Maximator GmbH components

Service
Operating instructions for assembly, operation and maintenance released by competent and experienced advisors

Know-how
Experienced application specialists/ application expertise

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