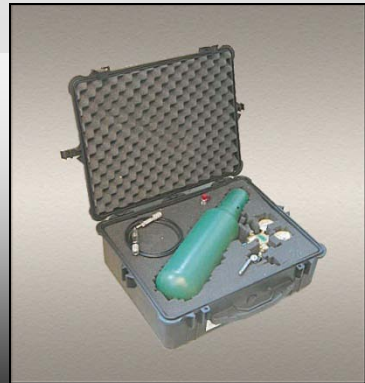


Installation, assembly and test procedure



KaMOS® Patented
Kammprofil Gasket

-the efficient solution for sealing and surveillance of flanged connections

Gasket Information

KaMOS® patented Kammprofil gaskets

A KaMOS® gasket will provide reliable seal when properly installed in the application for which it was designed. Please remember that the performance of a bolted joint is not solely dependent on the gasket itself, but on a combination of variables, many of which are outside the control of the gasket manufacturer. Experience has shown that leakage is not necessarily a sole indication of a faulty gasket, but is more likely to be the result of improper installation, assembly or bolting practices, damaged flanges, or a combination of the myriad of variables associated in a bolted gasketed assembly. When installing the gasket the following are to be considered:

Gasket Quality

Obviously gasket quality is important. Always deal with reputable suppliers and/ or manufacturers who are capable of high quality products and sound technical support.

Flange Surfaces

The condition of flange surfaces, as well as the proper flange material selection play an important part in achieving a leak- free joint assembly. Assure that flanges have the acceptable:

- Surface finish
- Flatness
- Parallelism
- Waviness
- Allowable imperfections

For optimum gasket performance KaMOS® recommends that the flange surface finishes specified for the respective gasket selected is to be used.

Fasteners

It is important that the proper stud/ bolts and nuts are selected to assure joint integrity. Improper selection of these may compromise the entire joint assembly. The following list is to be considered when selecting fasteners:

- Type
- Grade
- Class
- Proper material
- Appropriate coating or plating
- Correct stud/ bolt length

Assembly

In an effort to achieve a high degree of success in attaining a leak- free joint several steps are required. It is imperative that a regimented bolt up procedure is applied. As a minimum the following is offered:

- Install a new gasket on the gasket seating surface and bring the mating flange in contact with the gasket.
- Do not apply any compounds on the gasket or gasket seating surfaces
- Install all bolts, making sure that they are free of any foreign matter, and well lubricated. Lubricate nut bearing surfaces as well.
(Lubrication will not be required for PTFE coated fasteners)
- Run- up all nuts finger tight
- Develop the required bolt stress or torque incrementally in a minimum of four steps in a crisscross pattern. The initial pre- stress should be no more than 30% of the final required bolt stress. After following this sequence, a final tightening should be performed bolt to bolt to ensure that all bolts have been evenly stressed.

Note: The use of hardened washers will enhance the joint assembly.

Ensure use of skilled workmen and correct equipment. Final preload tools should be well maintained and should have accuracy within +/- 2% of the torque or tension to be applied.

For critical applications a more sophisticated method for bolt up may be considered such as heating rods, bolt tensioners, or ultrasonic extensometer.

Preparation

before installing KaMOS® patented Kammprofil gaskets

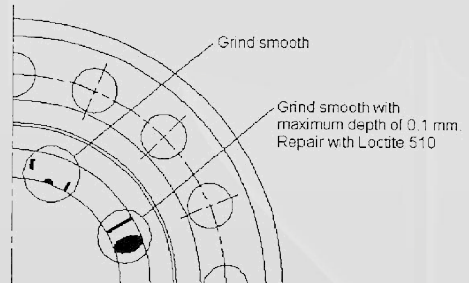
Clean and check

Use a nonabrasive soft cloth to clean all components with solvent to remove grease, preservation and dirt. Special care should be taken on sealing faces and contact areas. Check that all components are of correct material and size.

Inspection and repair

Examine all sealing surfaces for mechanical damage and rust. The sealing faces relies on a good surface finish. These surfaces should therefore be free from leak path scratches, damage marks and other surface irregularities. Use a suitable light source and run the finger tip over seal surfaces to detect dents and gouges.

Polish off any small scratches on the heel, seal ring and seal ring seat with fine emery cloth in the circumferential direction only. Polish at least on third of the circumference to ensure a uniform blending of the re-work area. Lateral polishing is unacceptable. Larger flange damages may require flange face remachining. Consult Flange manufacturer for remachining advice.



Damage location	Remedy
Scratch or dent at the heel, covering less than $\frac{3}{4}$.	Grind with fine emery paper to the required depth. Finish with emery paper grade 240.
Scratch or dent at the heel, covering $\frac{3}{4}$ or more of the heel width.	Grind with fine emery paper to the required depth. Finish with emery paper grade 240. The depth after grinding should be maximum 0,1 mm. "Repair" with Loctite 510.
Small damage in seal ring seat location	Grind with fine emery paper. Finish with emery paper grade 240.
Outer wedge	Remove any burr standing proud of the surface by grinding/filing.
Seal ring sealing faces	Replace seal ring

Inspect bolt threads and nut bearing area to verify that there is no evidence of galling or other damage. The surface shall be completely intact. If any sign of damage discard and replace.

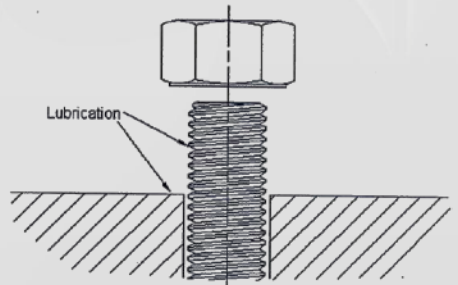


Check for stand-off

When seal ring is placed in the groove by hand, it should rock slightly in the groove, i.e. the ring should be unable to firmly contact the groove bottom. If this is not the case the seal will need replacing.

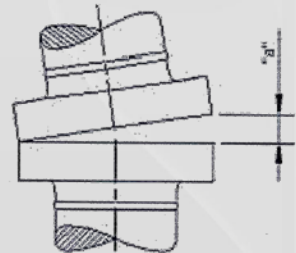
Lubricate

Prior to assembly, lubricate the flange heel and seating surfaces on the flange with recommended lubricator. Take care that no foreign matters (such as grit) is present in the lubricant. The nut thread and nut bearing surfaces on the flange should be lubricated in accordance to the qualified procedure when torque is used to achieve the final preload.



Alignment

With the seal ring in the groove of one of the flanges (parallel stand-off), bring the other flange into alignment, see figure. The bolt holes should be positioned so that the bolts can be moved easily.



Installation

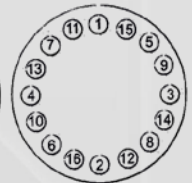
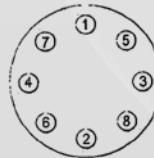
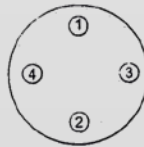
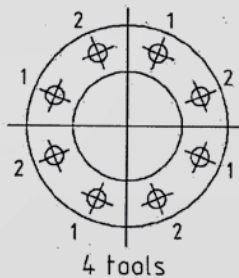
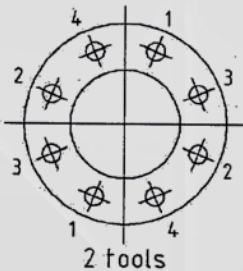
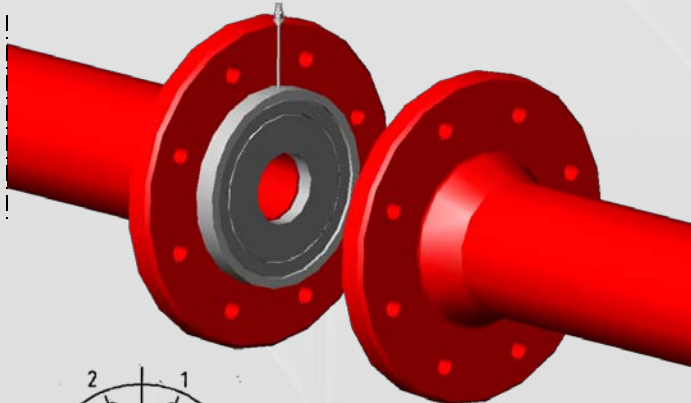
of KaMOS® patented Kammprofil gaskets

KaMOS® Gasket

Step 1 – Standard procedure for installation of gaskets is to be used.

Make sure that the injection tube for testing the gasket is placed between the bolt holes.

Step 2 – Bolt up.



Bolt up sequence

- Example for use of torque

Step 1 – Torque bolts up to approximately 30% of final torque value following the diametrically opposed sequence.

Step 2 – Repeat Stage 1, increasing the torque value to approximately 60% of the final torque value.

Step 3 – Repeat Stage 2, increasing the torque value to the final required torque value.

Step 4 – A final tightening should be performed following an adjacent bolt to bolt sequence to ensure that all bolt have been evenly stressed.

The gasket should **NOT** be fitted with the blind plug prior to installation of the gasket in the flange tightening of flange bolts. Blind plug should only be installed after gasket has been installed, hydrotight performed on the flange bolts and tested.

KaMOS® Test equipment

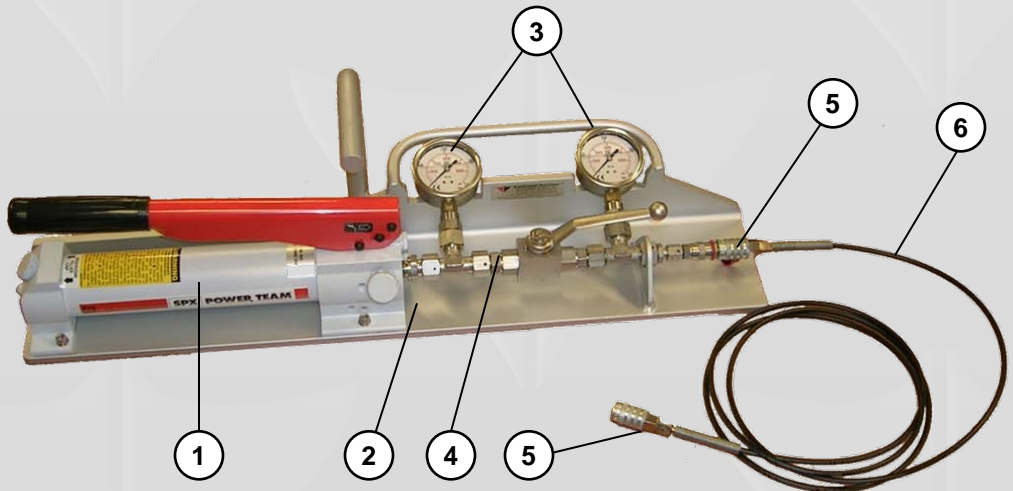
type 200800, for testing of KaMOS® patented gaskets by using KaMOS® hydraulic test equipment (testrange: 0 – 400 bar)

Step 1 - Connect the quick release coupling ⑤ to the pump and the testplug.

Test Equipment includes:

1	200800-01	Max capacity pump: 10,000 PSI
2	200800-02	Protection frame: Aluminium, length 700mm
3	200800-03	Manometers: 400 bar
4	200800-04	Valve: 400 bar
5	200500-06*	Quick-release: Female coupling
6	200500-07*	Test hose: Hose 630 bar

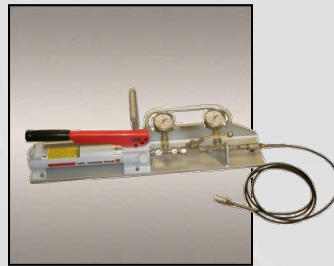
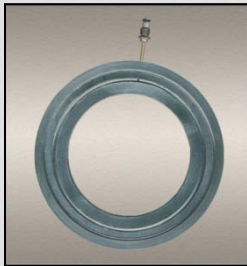
* Same as used with KaMOS® Test Equipment type 200500



Procedure

type 200800, for testing of KaMOS® patented gaskets by using KaMOS® hydraulic test equipment (testrange: 0 – 400 bar)

- Step 1** – Turn the valve handle pointing to the hose.
- Step 2** – Start pumping up the pressure.
- Step 3** – On the gauges, you will see the pressure you have pumped into the ring.
- Step 4** – Take the pressure up to approx 70% of final pressure for 3 min., and then up to the final test pressure.
- Step 5** – Close the valve by turning it 90 degrees from hose.
- Step 6** – Hold the pressure for approx 3-5 min.
- Step 7** – If any pressure drop on the **right** gauge there is a leakage and the installation of the ring need to be checked.
- Step 8** – If no pressure drop on the right gauge the gasket is correctly installed.
- Step 9** – Test certificate to be written.



Important – When using KaMOS® hydraulic test equipment and a long hose. It can take some time to stabilize the pressure, this is because of the viscosity and Compressibility. It can be necessary to bring the test pressure up to final test pressure several times until the pressure is stabilized.

Important – Under no circumstances should flange sealing surfaces be machined in a manner that tool marks would extend radially across the sealing surface. Such tool marks are practically impossible to seal regardless of type of gasket used.

The data contained in this document has been compiled from results of in- house and external testing and customers field reports. While every effort has been taken to ensure the integrity of this data, the company cannot take responsibility for misapplication. The properties of the application shown are typical, KaMOS® therefore recommends that the assistance of the Technical Department is sought when specifying products for new applications. Failure to select a suitable product could result in property damage and/ or serious personal injury. As the company's products are used for a multiplicity of purposes, and as KaMOS® has no control over the method of their application or use, KaMOS® excludes and disclaims all warranties, express or implies, as to their products and/ or their fitness for a particular purpose.

KaMOS[®] Test equipment

type 200500, for testing of KaMOS[®] patented gaskets by using KaMOS[®] pneumatic test equipment (testrange: 0 - 200 bar)

Step 1 - Install R21 Cylinder Pressure Regulator ② to the Pressure Bottle①

Step 2 - Connect the hose to the quick release male coupling at the valve.

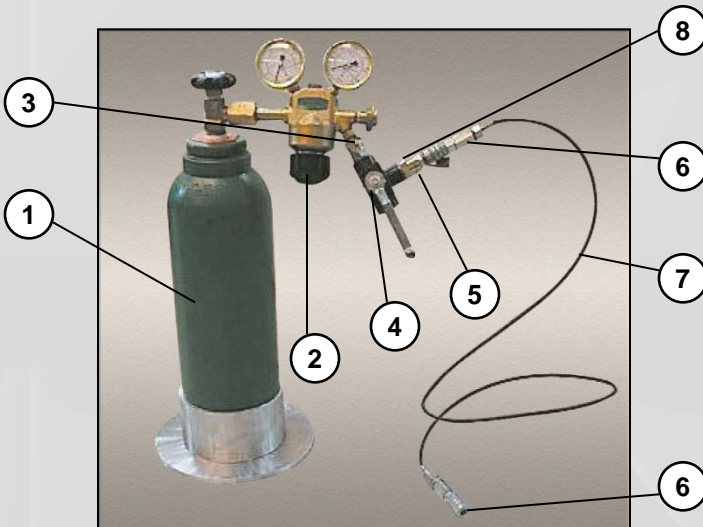
(Make sure that the handle on valve is pointing down, as picture)

Step 3 - Make sure that the pressure adjustment knob are in outstanding position.

Step 4 - Connect the quick release coupling ⑤ to the testplug.

Test Equipment includes:

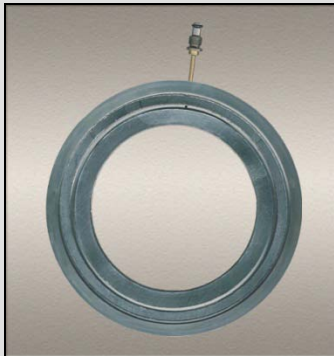
1	200500-01	Pressure Bottle, 5l Nitrogen
2	200500-02	Pressure regulator
3	200500-03	Transistion
4	200500-04	T-coupling
5	200500-05	Quick release Male
6	200500-06	Quick release Female
7	200500-07	Test Hose
8	200500-09	Messing reducer



Procedure

type 200500, for testing of KaMOS® patented gaskets by using KaMOS® pneumatic test equipment (testrange: 0 - 200 bar)

- Step 1** – Turn the valve handle pointing to the house.
- Step 2** – Open pressure bottle.
- Step 3** – On the left gauge, you will see the pressure you have on the bottle.
- Step 4** – Set the testing pressure (shows at the right gauge) by turning the pressure adjustment knob.
- Step 5** – Take the pressure up to approx 70% of final pressure for 3 min., and then up to the final test pressure.
- Step 6** – Close the pressure bottle.
- Step 7** – Hold the pressure for apporox 3-5 min.
- Step 8** – If any pressure drop there is a leakage and the installation of the ring need to be checked.
- Step 9** – If no pressure drop the gasket is correctly installed.
- Step 10** – Test certificate to be written.



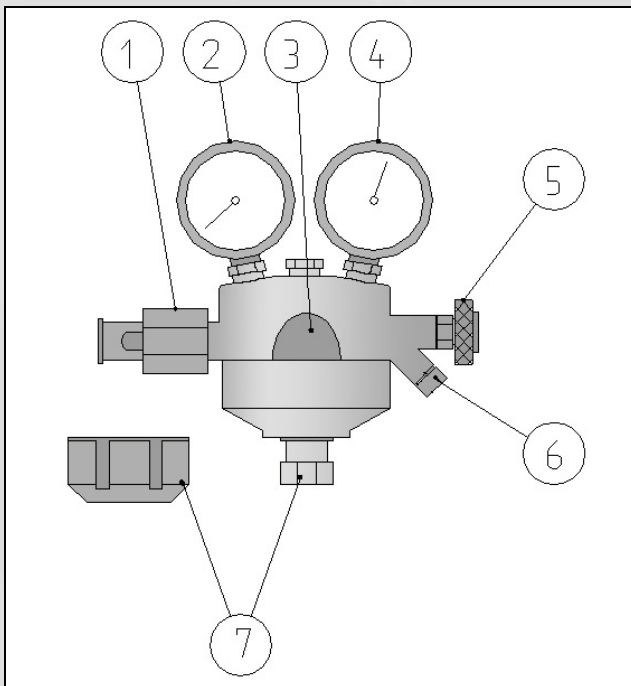
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Details

about R21 Cylinder Pressure Regulator

1. Inlet Nut
2. Content's Gauge
3. Label/Gas name
4. Outlet Gauge
5. Outlet -/Downstream valve
6. Outlet Connection
7. Pressure Adjustment Knob / screw



Instructions

for R21 Cylinder Pressure Regulator

THESE INSTRUCTIONS MUST BE KEPT PERMANENTLY AT HAND IN THE WORKSHOP



= *For safety instructions, also see paragraph 2. If in any doubt please consult the manufacturer.*

1. Operation

- 1.1 Cylinder pressure regulator use in accordance with current regulations. Cylinder pressure regulators are designed to reduce the respective cylinder pressure and to ensure a constant outlet working pressure. They are used with compressed gasses, pressurized dissolved gases in cylinder and liquid gases having a filling pressure of up to a maximum of 200 bar.
- 1.2 Cylinder pressure regulator use contrary to current regulations. Cylinder pressure regulators must not be used for gases in a liquid state. Cylinder pressure regulators must not be operated under temperatures of -30°C or above $+60^{\circ}\text{C}$.
Cylinder pressure regulators must not be used for corrosive gases such as ethylamine, dimethylamine, ammonia etc.

2. Safety instructions



All indications showing this exclamation mark are important safety instructions.

- 2.1 Cylinder pressure regulators comply with all current relevant technical regulations and meet all existing standards.



- 2.2 Under no circumstances must the cylinder pressure regulator be modified or tampered without the written consent of the manufacturer.



- 2.3 Intermediary connections between the cylinder valve and the cylinder pressure regulator are strictly prohibited.

- 2.4 Incorrect use may endanger the operator and the personnel. Damage to the cylinder pressure regulator and installation may also result.

3. Operating Instructions



3.1 Keep hands and tools clean. Oil and grease can cause an explosion on contact with oxygen.

3.2 The operator should be fully familiar with these operating instructions prior to use of his equipment. All instructions should be adhered to when in use.

3.3 Check that the cylinder pressure regulator is suitable for the gas to be used (see label 3).



3.4 Check that the cylinder valve connection is clean and undamaged: if not, you must not connect the cylinder pressure regulator.

3.5 Before connecting the cylinder pressure regulator, the cylinder valve should be swiftly opened and closed to dislodge water or foreign matter from the valve.

Do not stand in front of the cylinder valve.

Do not hold your hand before the cylinder valve.

3.6 Connect the cylinder pressure regulator to the valve by means of the inlet nut ① on the inlet stem.

3.7 Connect the hose to the cylinder pressure regulator outlet ⑥.



3.8 Operating the cylinder pressure regulator. Setting the pressure.

Prior to releasing gas into the system, check the following:

1. Correct cylinder pressure regulator.
2. All gauge pointers at zero.
3. Pressure adjusting knob/screw ⑦ fully screwed out (anti-clockwise).
4. Downstream valves ⑤ are closed.

Slowly open the cylinder valve. Ensure that the cylinder pressure is showing on the contents gauge ②, open the downstream valve ⑤ and with the pressure adjusting knob ⑦ rotate clockwise to set the required working pressure using the outlet gauge ④.

4. Closing down the cylinder pressure regulator

4.1 Prolonged interruption

Close the cylinder valve, unwind (anti-clockwise) the pressure adjusting knob ⑦, vent the pressure in the system. Once the system has been purged, close the downstream valves.

5. Operating and maintenance instructions

5.1 Protect the cylinder pressure regulator from damage. Check visually for any signs of damage regularly



5.2 The preset adjustments of safety must not be changed.

5.3 Ensure that all gaskets, O-rings and mating surfaces are in a satisfactory condition.



5.4 If it is suspected that the cylinder pressure regulator is not functioning correctly, or is found to have any form of a leak, close the cylinder valve and remove from service immediately.



Do not under any circumstances undertake, or allow any repairs by unauthorized personnel.

6. Repairs



6.1 Repairs of cylinder pressure regulator shall be carried out by competent personnel at an authorized service or repair workshop. Only genuine spares may be used.

6.2 Repairs or modifications carried out by the third user or a non-authorized third party will entail loss of liability.

7. Cylinder pressure regulators with flowmeter

7.1 Paragraphs 1 to 4 of these operating instructions apply also to cylinder pressure regulators with flowmeter.

The flow set by the outlet valve may be read at the flowmeter scale.



References

KaMOS® patented Kammprofil gaskets





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