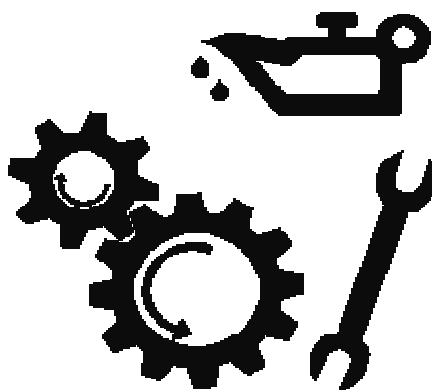


FOSSA-KINSSON



FOSSA-KINSSON Version 04



Use and Maintenance Manual



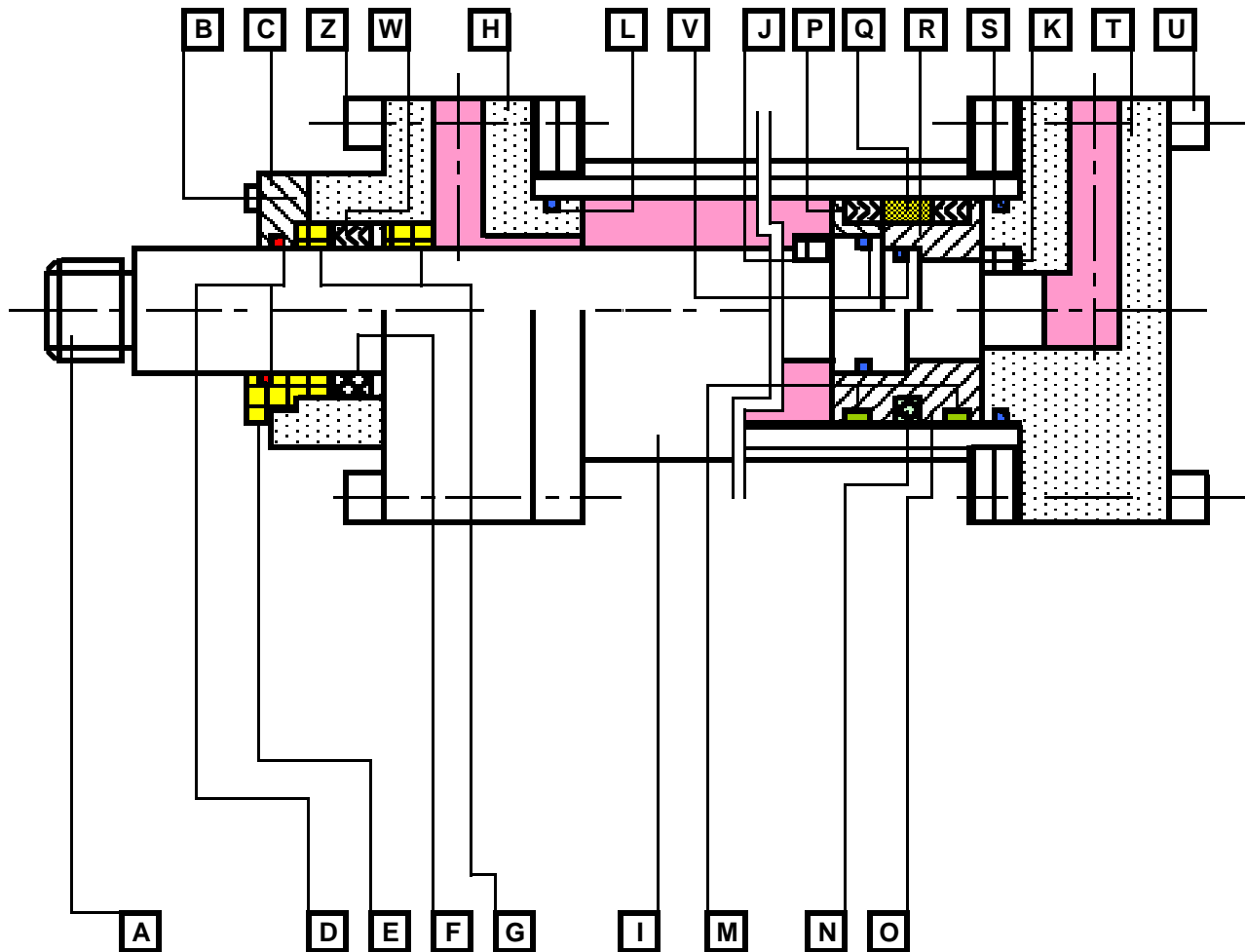
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CYLINDER FEATURES

POS.	DESCRIPTION	FEATURES	TREATMENTS
A	Rod	High alloy steel/stainless steel	Hardening and tempering, normalization, high freq. hard., chromium plating, nitriding, others
B	Front flange bolt	Bolt steel cl. 8.8/12.9	Zinc plating
C	Bolted front flange	Carbon steel	Painting
D	Wiper ring	NBR/FKM(Viton)/Teflon/PU	
E	Screwed front flange	Bronze	
F	Rod low frict./compact gasket	NBR/FKM(Viton)/Teflon	
G	Rod bush	Bronze	
H	Front head	Carbon steel	Painting / Zinc plating
I	Jacket or body	Seamless steel tube/Carbon steel	Hardening and tempering, normalization, chromium plating, nitriding, others
J	Front cushioning bush	Bronze/Carbon steel	Chromium plating
K	Rear cushioning bush	Bronze/Carbon steel	Chromium plating
L	OR gasket	NBR/FKM(Viton)	
M	Slide guide	Synthetic resin/Teflon	
N	Piston low frict./compact gaske	NBR/FKM(Viton)/Teflon	
O	One piece piston	Alloy or carbon steel/Cast iron	Zinc plating
P	Piston chevron gasket	NBR/FKM(Viton)	
Q	Piston bush	Bronze/Cast iron	
R	Two pieces threaded piston	High alloy steel/Carbon steel	Zinc plating
S	OR gasket	NBR/FKM(Viton)	
T	Rear head	Carbon steel	Painting / Zinc plating
U	Rear head bolt	Bolt steel cl. 8.8/12.9	Zinc plating
V	OR gasket	NBR/FKM(Viton)	
W	Rod chevron gasket	NBR/FKM(Viton)	
Z	Front head bolt	Bolt steel cl. 8.8/12.9	Zinc plating

CYLINDER SKETCH



TOP HALF VIEW: version with chevron gasket and with cushioning both sides

BOTTOM HALF VIEW: version with low friction gasket and without cushioning

START UP

GENERAL NOTES

Before mounting on site the cylinder, please clean accurately the feeding pipes to remove any trace of rust or dirt. To execute this operation is preferable to use a chemical procedure and not sand blasting that could let residues dangerous for the gasket and for the internal parts honed or grinded.

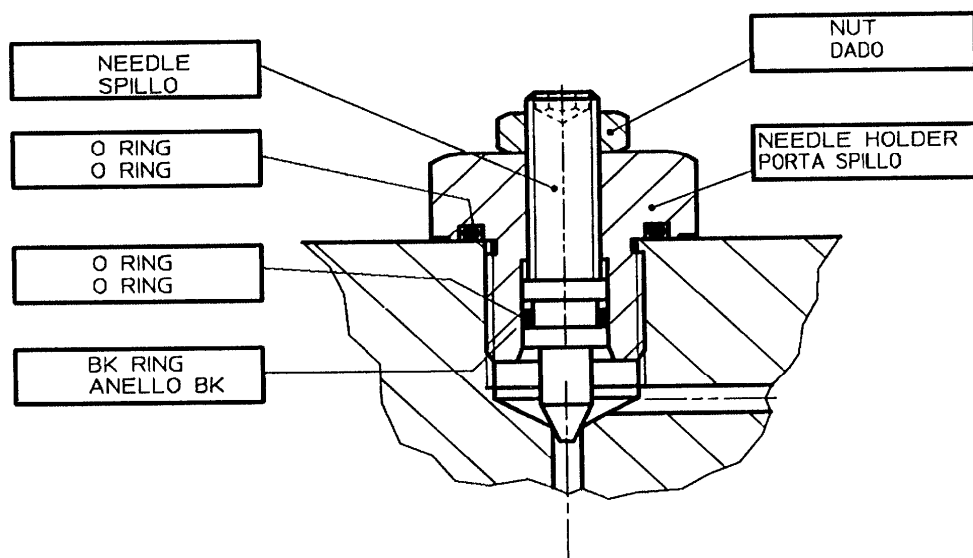
After mounting to obtain a proper working, to avoid abnormal wearing, it is necessary to verify the following points:

- check the alignment of rigid and mobile fastening of cylinder; alignment between rigid mounting device of cylinder and between rigid mounting device of cylinder and mobile part connected with piston rod
- use always good quality medium and check absolute absence of impurity. Usually it is acceptable a filtering of 10 microns if the cylinder mount lip or chevron gaskets. A filtering of 5 microns is necessary if the cylinder mount low friction gaskets and is driven by a servo-valve
- remove completely the residual air inside the cylinder (piston side and rod side), using the proper bleeder valves mounted on the heads or on the jacket. Unscrew half turn the needle; fill up slowly the chambers of the cylinder obtaining a slow sliding of the piston that permit the air draining. When only oil comes out, screw again the bleeder needle; see procedure on page 7
- check the cushioning (if any), in function of mass and speed wanted, because the cushioning valve are approximately regulated in our workshop, without knowing these parameter

WARNING

- If the cylinder is cushioned and in the hydraulic circuit is foreseen a hydraulic accumulator, verify that the flow rate not allow a speed exceeding 0.200 m/s.
To regulate the cushioning the piston rod speed have to be progressively increased and regulating gradually the breaking valve it is possible to set the proper damping value.
- If the cylinder is new and rod little leakage is present, do not substitute immediately the gasket.
Let run the cylinder same ours.
Sometimes a light running-in is necessary to soft and to fit the gasket in its groove.

BRAKING VALVE



CUSHIONING REGULATION

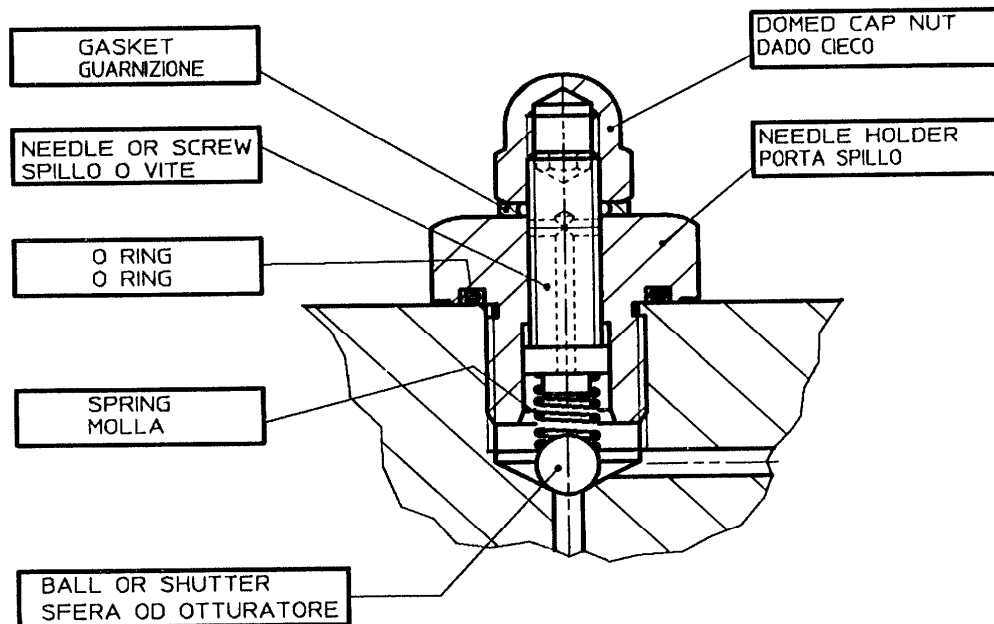
Please adopt the following procedure to regulate cushioning.

- Step 1 Untight the nut, without removing it completely.
- Step 2 Unscrew the needle.
For a proper regulation do not unscrew the needle more than a quarter of turn between a braking test and the following.
If necessary screw partially the needle, till the braking value wanted.
- Step 3 Lock the needle tightening the nut.



**Attention! DO NOT unscrew the needle holder having pressure inside the cylinder.
Dangerous!**

CHECK VALVE AND BLEEDER



BLEEDING PROCEDURE

Please adopt the following procedure to drain residual air, inside hydraulic cylinder.

Warning: before starting be sure to have removed all inside pressure.

- Step 1 Untight the nut and remove it completely.
- Step 2 Unscrew the needle half, one turn maximum.
Wait the complete drainage of air. Light sliding movements of the piston can make easier the air leakage.
When only oil leaks from the bleeding hole, screw the needle clockwise for the same number of turn anti-clockwise used to untight it.
- Step 3 Lock the needle tightening the nut.



**Attention! DO NOT unscrew the needle holder having pressure inside the cylinder.
Dangerous!**

GENERAL INSTRUCTIONS FOR ASSEMBLY USE AND MAINTENANCE

GENERAL NOTES

FOSSA-KINSSON cylinders are designed to allow easy and quick assembling and disassembling operations.

Before starting these operations, check with care the general layout drawing, in order to avoid useless operations and to mount again in a proper way all the components, without omitting any detail.

During maintenance operation, the cylinders should always be kept cleaned.

FREQUENCY OF INSPECTIONS AND MAINTENANCE OPERATIONS

Life of a cylinder is strictly dependant on working conditions, medium features and environment conditions.

Anyway it is a good rule to complete a visual inspection of the cylinder every six mounts, in order to check possible leakages or not proper running.

Life of gaskets, if the cylinder is properly mounted and is properly working, could be considered the following:

- chevron gaskets 300.000 cycles
- low friction gaskets 600.000 cycles

The employed fluid is a very important factor which determines the life of the cylinders.

Consequently the medium have to be cleaned and checked periodically with care. It has to be free of impurity, water mud, corrosive fluids, painting traces,...

The hydraulic circuit have to be equipped with proper cleaning filter.

Use always good quality medium and products.

PROCEDURE OF INSPECTION, DISASSEMBLY AND ASSEMBLY - STANDARD MAINTENANCE

Scope of this procedure is to establish the steps necessary to check a cylinder, to replace the gaskets, the guide rings and all other wearing parts.

Please refer to cylinder sketch, page 4, and adopt the following procedure.

- Step 1 Move the piston, end stroke rod side, by means of air supplied piston side.
- Step 2 Loose bolts ref. Z, following the criteria to unscrew the opposite bolt, in sequence.
- Step 3 Remove front head ref. H.
- Step 4 Extract rod ref. A, complete with piston, from the cylinder liner ref. I.
- Step 5 Loose bolts ref. U, following the criteria to unscrew the opposite bolt, in sequence.
- Step 6 Remove rear head ref. T.
- Step 7 Remove cylinder liner ref. I.
- Step 8 Loose bolts ref. B.
- Step 9 Remove front flange ref. C or ref. E; extract relative scraper ring ref. D.
- Step 10 Remove guide bushings ref. G and relative internal gasket ref. W or F.
- Step 11 Unscrew the piston ref. R or O from rod ref. A.

- Step 12 Remove cushioning bushes ref. J and K, if any.
- Step 13 Remove spacer ref. Q from piston.
- Step 14 Remove gasket ref. V, P or N and M from piston.
- Step 15 Check the new set of gasket; (number and type of seal, guide ring and bushes).
- Step 16 Coat of grease the annular OR seat, rear head, and mount relative OR ref. S.
- Step 17 Coat of grease the annular OR seat, front head, and mount relative OR ref. L.
- Step 18 Coat of grease the annular rod gasket and bush seat, front head. Mount new gasket ref. W or F and bushes ref. G or E.
REMARK: Respect the correct direction of the lips for gasket type W, (see cylinder sketch).
- Step 19 Mount wiper ring ref. D in the relative groove on the flange ref. C or E.
- Step 20 Mount front flange ref. C or E.
- Step 21 Coat of grease the annular gasket and guide bush seats of piston, and mount relative gasket ref. Q or N and guide ref. Q or M.
REMARK: Respect the correct direction of the lips for gasket type W, (see cylinder sketch).
- Step 22 Coat of grease the groove and mount internal OR between piston and rod, ref V.
- Step 23 Mount cushioning bushes ref. J and K, if any.
- Step 24 Coat of grease the thread piston-rod and tight the piston ref. R or O on rod ref. A.
- Step 25 Insert the piston-rod group in the front head ref. H.
REMARK: During this operation pay attention to center the bushes, the guide rings, the rod gasket and the wiper ring, previously lubricated, without damage any on these wearing parts.
- Step 26 Mount the front flange ref. C tightening the bolts ref. B, following the criteria to screw the opposite bolt, in sequence, or screw the bush ref. E.
- Step 27 Insert the piston-rod group inside the jacket ref. I.
REMARK: In this phase the cylinder has always to be kept cleaned. Pay great attention to center the piston, using the proper jacket chamfer to guide the operation, avoiding damages of packing or surfaces.
- Step 28 Mount the front head ref. H on cylinder liner ref. I, with extreme care to avoid damages of packing or surfaces.
- Step 29 Mount the rear head ref. T on cylinder liner ref. I, with extreme care to avoid damages of packing or surfaces.
- Step 30 Tight the bolts ref. U and Z following the criteria to screw the opposite bolt, in sequence.
- Step 31 Feed air at pressure 2-5 bar, both sides, to verify the piston sliding in the cylinder liner. The run has to be continuous, without vibrations or shocks.

SPECIAL MAINTENANCE

To revamp and recondition completely a cylinder, we suggest contacting FOSSA-KINSSON workshop or specialized operators.

CYLINDER STORING

GENERAL NOTES

The cylinders must be kept in a dry room, protected from temperature sudden changes and far from heat sources.

The cylinder has always to be kept cleaned.

In case of storing for more than three months, the following treatment shall be carried out every three months, to avoid wearing or seizing-up:

- Complete some strokes at the working pressure, using high protection mineral oil for hydraulic cylinders, (like IP IDEXOIL SAE 30 or equivalent), and using plentiful lubricated air without moisture for pneumatic cylinders. This operation has the aim to prevent permanent deformation or sticking of gaskets and to lubricate all internal parts.
Lay down the cylinder in horizontal position and every month rotate it 90° along its longitudinal axis, to obtain a proper lubrication.
- Check and protect the cylinder ports and not painted surfaces, as follows:
 - The threaded holes have to be spread with Molycote or Neverseeze paste and sealed with steel or plastic plug.
 - SAE or other flange interface surfaces have to be coated of grease and/or protective oil (like Tectyl), and sealed by mean of blind flange or by a plate.
 - All not painted surfaces have to be coated of grease and/or protective oil (like Tectyl).
 - All these surfaces (ports, flange spot faces, not painted parts) have to be opportunely inspected every three months; in saline or acid environment check every month. If necessary remove the residual grease/oil by means of thinner and spread again the protective layer. That operation have to be peremptory done every six months.

In case of foreseen storing for nearly one year or more, hydraulic cylinders have to be duly and immediately filled with high protection mineral oil, (like IP IDEXOIL SAE 30 or equivalent), have to be runned some strokes and rotated the cylinders 90°, as above explained. About pneumatic cylinders above showed maintenance procedures have to be done every two months.

GASKETS, SEALS, RUBBER AND PLASTIC ITEM STORING

GENERAL NOTES

Most rubber and plastic change in physical properties during storage and ultimately become unserviceable, due for example, to excessive hardening, softening, cracking, crazing or other surface degradation.

This change may be the result of one particular factor or a combination of factors, such as the action of oxygen, ozone, light, heat humidity or oils and solvents.

The deleterious effects of these factors may, however, be minimised by careful choice of storage conditions (B. S. 3574).

The standard packing with polyethylene envelopes and cardboard boxes together with the following recommendations will provide the most suitable conditions for the storage and long life of the components.

TEMPERATURE

The storage temperature should preferably be between 5 °C and 25 °C because at higher temperatures deterioration occurs more readily.

Sources of heat in storage rooms should be so arranged that the temperature of stored articles never exceeds 25°C. The effect of low temperature are not permanently deleterious to rubber articles, but they may become stiffer if stored at low temperatures. In this case it is necessary to manage it with care to avoid permanent deformation. When articles are taken from low temperature storage for immediate use their temperature should be raised to approximately 30°C, before using.

HUMIDITY

The relative humidity in the store room should be below 75% .

Very moist or very dry conditions should be avoided.

Where ventilation is necessary it should be kept to a minimum.

Condensation should not occur.

LIGHT

Rubber should be protected from light, in particular rather strong sunlight and strong artificial light with a high ultra-violet content.

Unless the articles are packed in opaque containers it is advisable to cover any windows of storage rooms with a red or orange coating or screen.

OXYGEN AND OZONE

Where possible rubber should be protected against circulation of air, by means of polyethylene envelop or other sealed containers. This particularly applies to articles with large surface area to volume ratios, e.g. proofed fabric, cellular rubber.

As ozone is particularly deleterious, storage rooms should not contain any equipment that is capable of generating ozone, such as mercury vapour lamps, high voltage electrical equipment, electric motors or other equipment which may give rise to electric sparks or silent electrical discharges .

DEFORMATIONS

Rubbers should, wherever possible, be stored in a relaxed condition free from tension, compression or other deformation.

Large " O " rings and seals must not be suspended on pegs as this will lead to severe deterioration.

If it is impossible to avoid deformation it should be kept to a minimum since deformation can lead to cracking and permanent change of shape.

Where articles are packed in a strain-free condition they should be stored in their original packaging.

CONTACT WITH LIQUID AND SEMI-SOLID MATERIALS

Rubbers should not be allowed to come into contact with solvents, oils, greases or any other semi-solid materials at any time during storage, unless so packed by the manufacturer.
In certain cases rubber components may require to be stored coated with the fluid in which they are to be used.

CONTACT WITH METAL

Direct contact with certain metals, e.g. manganese, iron and particularly copper and its alloys, e.g. brass and compounds of these materials, e.g. naphthenate are known to have deleterious effects on some rubbers.

Rubber should not be stored in contact with their metals, or materials impregnated with their compounds, but should be protected by wrapping or separation with a layer suitable material, e.g. paper, polythene.

CONTACT WITH NON-METALS

Because of possible transfer or plasticizers or other ingredients, rubbers must not be stored in contact with P.V.C.

Different rubbers should preferably be separated from each other. Contact with creosote impregnated timber or fabrics should be avoided, also compounds containing copper naphthenate and sulphur.

CLEANING

Where necessary, cleaning should be carried out with the aid of soap and water or methylated spirits. Water should not, however, be permitted to come into contact with fabric reinforced components or polyurethane rubbers. Disinfectants or other organic solvents must not be used. After cleaning, the article should be dried at room temperature and not placed near a source of heat.

LIP SEALS

Lip type seals should always be stored in such a way as to prevent the sealing edges being damaged. Identification labels have not to be tied to the gaskets.

SHELF LIFE

If the items are carefully stored as recommended their shelf life is generally very long.

Where there is any reason to think that storage conditions are less satisfactory than those recommended, representative samples from each batch should be inspected and tested in accordance with expire of the periods listed below:

Initial period 2 years.

Next check periodically every year.

In any case every detail should be checked immediately before assembly the component.

METHODS OF INSPECTION AND TEST

The rubber and unassembled rubber details have to be carefully checked for permanent distortion, mechanical damage, flattening, increasing of thickness, notable surface softening or hardening, other defects.

NOTE

During storage, degradation by oxidation may occur. These first appears as a surface defect and may have serious consequences. The usefulness of a rubber component will be related to the ratio of total thickness of the degraded layer.

Surface degradation may therefore be far more serious on a thin rubber section than on a thick rubber section.

The appearance of a "bloom" is unimportant and is not evidence of degradation.

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