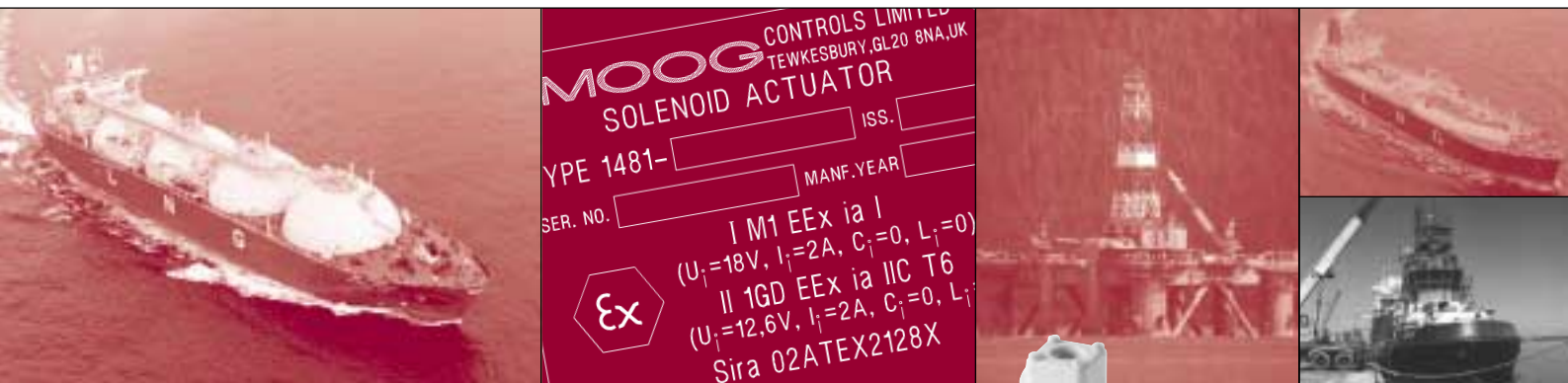


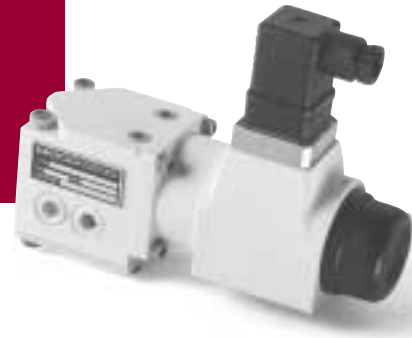
1410 Series & 4413 / 4423 Series Intrinsically Safe Solenoid Operated Directional Control Valves & Pilot Valves for Marine Applications



MOOG

Intrinsically safe solenoid
operated pilot valve

1410 Series



The 1410 series is a robust range of direct solenoid operated seated poppet or ball valves for use on applications where potentially flammable atmospheres necessitate the use of intrinsically safe products.

These valves may be used for direct control of equipment demanding low flows where zero leakage is necessary and for piloting larger flow control devices.

IMPORTANT : Intrinsic safety is the only type of protection permitted for use in hazardous areas designated Zone 0 (an area of continuous hazard).

Features :

- Approved intrinsically safe for use in all hazards defined in ATEX Directive 94/9/EC
- Direct solenoid actuation with manual operation facility
- Normally open or normally closed valve configuration
- Extremely low internal leakage in closed condition
- Suitable for use with a wide range of fluids
- Integral last chance filters
- Durable paint treatment affords additional protection

Technical Specification :

Supply Pressure :

Minimum recommended 3.5 bar
Maximum continuous 207 bar

Return Line Pressure :

Maximum permissible 138 bar

Proof Pressure :

At pressure port
150% max supply pressure

At return port

150% max return line pressure

Rated Flow : Refer to tables

External Leakage : Zero

Fluid : Industrial petroleum based hydraulic fluids, glycols and HWBFs
Also suitable for pneumatic applications

System Filtration : $\beta_{25} = 75$ or greater

Seal Material : High nitrile standard

Ambient Temperature Range :
-20°C to + 40°C (maximum surface temperature 85°C 'T6' classification)

Mass : 2.44kg

Max operating Temperature :
+70°C (continuous)

Pneumatic Data :

5 cu.ft/min @ 250 psi
(140 L/min @ 17.2 bar)

Electrical Characteristics

Type 1481 Solenoid Actuators are used on all standard 1410 pilot valves.

Recommended Operating Voltage :
12 V DC

Minimum Operating Voltage :
7.5 V DC

(under certain conditions of supply pressure and flow the minimum operating voltage will be 6 V DC).

Coil Resistance :

The solenoid coil winding resistance is 80 Ω nominal. However a diode bridge arrangement is used in the solenoid assembly to meet intrinsically safe certification requirements.

To assess coil current the following can be used:

$$\text{COIL CURRENT} = \frac{\text{OPERATING VOLTAGE} - 1.4}{80 \pm 6\%}$$

CURRENT IN AMPS
OPERATING VOLTAGE IN VOLTS

IMPORTANT : To comply with the requirements for intrinsic safety the solenoid must only be operated from an intrinsically safe approved power supply.

Any number of solenoids may be operated individually from an approved source but the numbers which may be operated simultaneously will be dependent upon the characteristics of the specific power source and cable resistance.

Ordering Code



1410 - 1 X X - 0 9 X

VALVE SERIES NO

1st Digit Configuration

SERIES

6th Digit Configuration

1	Normally Open	
2	Normally Closed	

7th Digit Maximum working pressure/flow

	Orifice Dia (mm)	Pressure (bar)	Flow (L/min)
2	1.3	207	5.45
3	3.2	35	5.90

8th & 9th Digit - Solenoid Type

	1410
09	1481 Solenoid Actuator ATEX Approved with LED

10th Digit Electrical Connector

5	Gland M20 x 1,5
6	Hirschmann type GDM 20 2 pole + earth

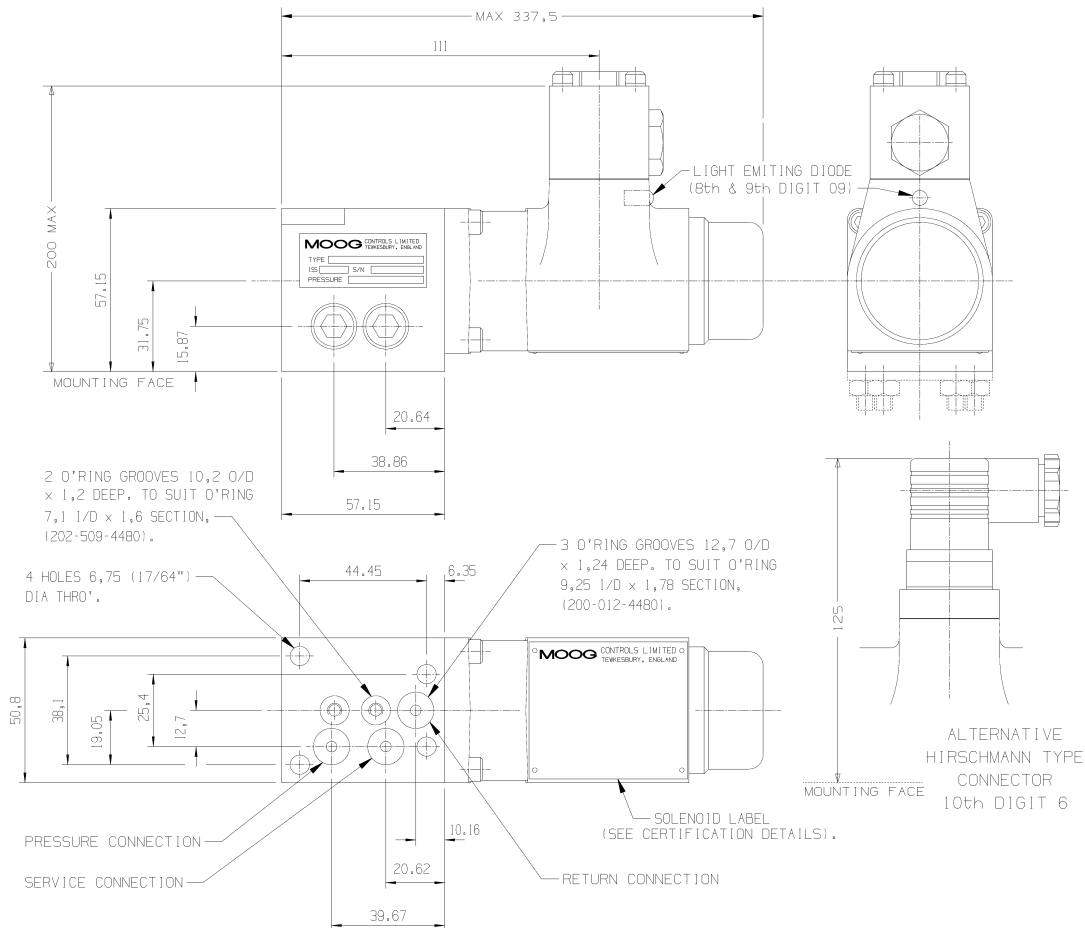
Installation Data

Suggested mounting screws M6 x 60 long high tensile socket head cap screws.

Surface to which the valve is mounted requires 0,8 microns finish flat within 0,025mm

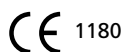
Replacement base mounting 'O' rings 200-012-4480 are 9,25mm I/D x 1,78mm section. 3 off
202-509-4480 7,1 I/D x 1,6 section 2 off

Installation sub plate 4401-020-000 is available with 1/4" BSP side entry pressure, service and return connections.



Certification

Group II Units with LED Indicator
ATEX Directive 94/9/EC



Code
II 1GD EEx ia IIC T6
(u.=12,6V, I_i=2A, C_i=0, I_i=0)
Sira 02ATEX2128X

MOOG CONTROLS LIMITED TEWKESBURY, GL20 8NA, UK	
SOLENOID ACTUATOR	
TYPE 1481-	ISS. <input type="text"/>
SER. NO. <input type="text"/>	MANF. YEAR <input type="text"/>
I M1 EEx ia I (U _i =18V, I _i =2A, C _i =0, L _i =0) II 1GD EEx ia IIC T6 (U _i =12,6V, I _i =2A, C _i =0, L _i =0) Sira 02ATEX2128X	
CE 1180	

MOOG

Intrinsically safe solenoid
operated directional control valve

4413/4423 Series



The 4413/4423 Series is a robust range of direct solenoid operated spool valves, suitable for use in harsh environmental conditions where potentially flammable atmospheres necessitate the use of intrinsically safe products.

The valves may be used either for direct control of equipment demanding small flows or for piloting larger valves to meet the demands of high flow control systems.

IMPORTANT : Intrinsic safety is the only type of protection permitted for use in hazardous areas designated Zone 0 (an area of continuous hazard)

Features :

- Approved intrinsically safe for use in all hazards defined in ATEX Directive 94/9/EC
- LED indicating solenoid energised
- Direct solenoid actuation with manual operation facility
- CETOP 3 mounting
- Choice of spool configurations
- Cast iron body with additional paint protection

Technical Specification :

Supply Pressure :

Minimum recommended 3.5 bar
Maximum continuous 210 bar

Return Line Pressure :

Maximum permissible 70 bar

Proof Pressure :

At pressure port
150% max supply pressure

At return port
150% max return line pressure

Rated Flow :

At 17,25 bar valve pressure drop
4413 7 L/min (nom)
4423 10,5 L/min (nom)

External Leakage : Zero

Fluid : Industrial petroleum based hydraulic fluids, glycols and HWBFs

System Filtration :

$\beta_{25} = 75$ or greater

Seal Material : High nitrile standard

Ambient Temperature Range :

-20°C to + 40°C (maximum surface temperature 85°C 'T6' classification)

Mass :

4413 2.3kg
4423 3.2kg

Electrical Characteristics

Type 1481 Solenoid Actuators are used on both valve series.

Recommended Operating Voltage :

12 V DC

Minimum Operating Voltage :

8.2 V DC

Coil Resistance :

The solenoid coil winding resistance is 80 Ω nominal. However a diode bridge arrangement is used in the solenoid assembly to meet intrinsically safe certification requirements.

To assess coil current the following can be used:

$$\text{COIL CURRENT} = \frac{\text{OPERATING VOLTAGE} - 1.4}{80 \pm 6\%}$$

CURRENT IN AMPS
OPERATING VOLTAGE IN VOLTS

IMPORTANT : To comply with the requirements for intrinsic safety the solenoid must only be operated from an intrinsically safe approved power supply.

Any number of solenoids may be operated individually from an approved source but the numbers which may be operated simultaneously will be dependent upon the characteristics of the specific power source and cable resistance.

Ordering Code

4413 - X X X - 0 8 X
4423

VALVE SERIES NO

1st to 4th Digits

SERIES

5th Digit

CONTROL

	4413	4423
1	Solenoid A Manual	Manual
2	Solenoid B Manual	Manual

6th & 7th Digit Spool Configuration
(Refer to standard Spool Configuration table over page other Spool Configuration available on request)

8th & 9th Digit - Solenoid Type

	4413 and 4423
08	1481 Solenoid Actuator ATEX Approved with LED

10th Digit Electrical Connection

	4413	4423
5	Gland M20 x 1.5	Gland M20 x 1.5
6	Hirschmann type GDM 20 2 pole + earth	Hirschmann type GDM 20 2 pole + earth

Installation Data

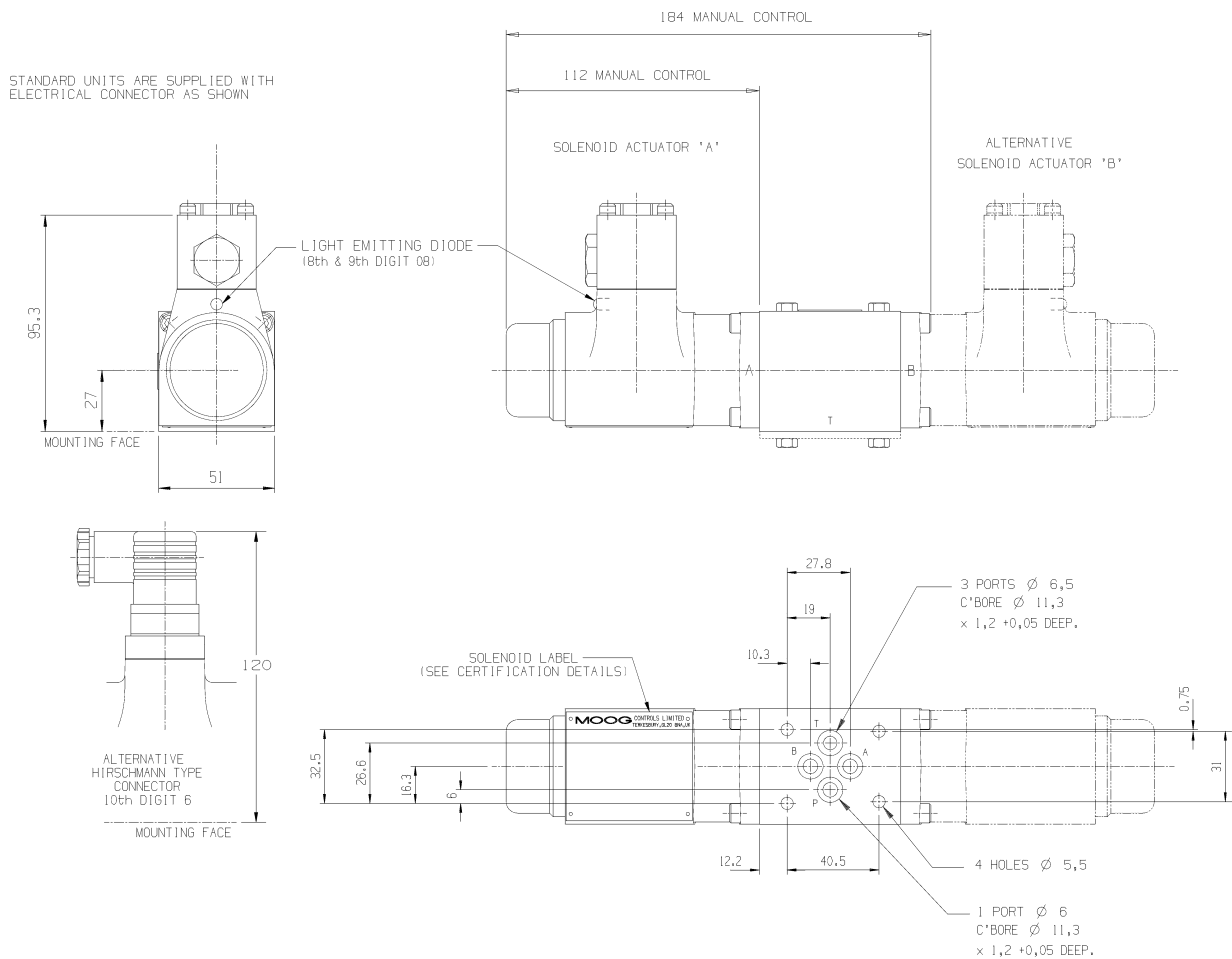
Suggested mounting screws M5 x 60 long high tensile steel screws.

Surface to which the valve is mounted requires 0,8 microns finish flat within 0,025.

Replacement base mounting 'O' rings 202-510-4480 are 8,1 I/D x 1,60 section, 4 off

Installation sub plate 4401-001-000 available with 1/4" BSP side entry pressure, service and return connections.

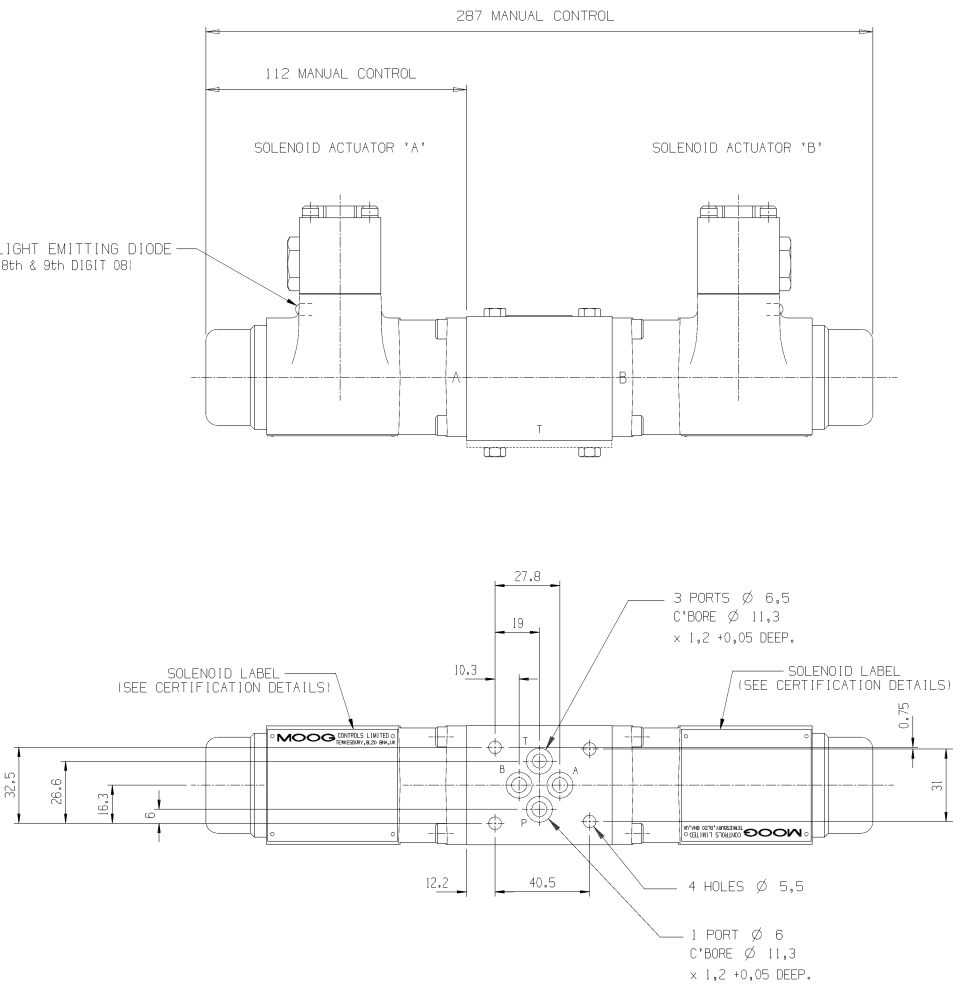
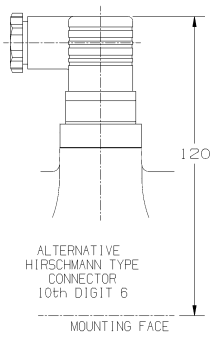
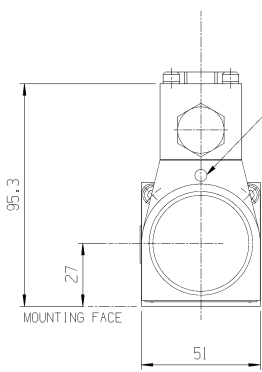
4413 Series



SPOOL CONFIGURATION		
6th & 7th DIGITS	HYDRAULIC SYMBOL	
	SOL. ACTUATOR A	SOL. ACTUATOR B
01		
02		

4423 Series

STANDARD UNITS ARE SUPPLIED WITH ELECTRICAL CONNECTOR AS SHOWN



SPOOL CONFIGURATION	
6th & 7th DIGITS	HYDRAULIC SYMBOL
01	

This information is applicable to all catalogue listed Moog Intrinsicly Safe Valves.

ELECTRICAL SUPPLY

The intrinsically safe solenoid actuators used on the range of valves are approved to international standards governing safe usage in potentially hazardous environments.

Legislation covering the rules of intrinsic safety is strict and rigorously applied.

The solenoid actuators are only approved intrinsically safe when used in the prescribed manner in association with approved power supplies. Any attempt to operate from non approved sources will render the IS approval invalid.

FLUIDS

Moog Intrinsicly Safe Valves can be used on a wide variety of petroleum base hydraulic fluids and with appropriate sealing, various phosphate ester based fire resistant fluids (HFD fluids).

The spool valves can also be used with glycols (HFC) and water in oil emulsions (HFB) sometimes referred to as invert emulsions and comprising typically 40% water suspended in 60% oil.

The poppet or seated ball valves can be used with any of the above and are ideally suited for use on 5/95 emulsions (HFA fluids).

HYDRAULIC POWER SUPPLY

Any hydraulic pump capable of sustaining the required system pressure and flow may be used but careful attention should be given to the following:

RESERVOIR

- To have sufficient free volume to cater for level changes due to variations in system demand
- To have sufficient free surface area for heat dissipation where no other heat exchanger is used
- Provide suitable conditions for air separation
- Employ good quality air breathing and filtration $\beta_{10} = 2$ recommended
- Provide separation of pump suction and system return
- Provide a contamination settlement trap

Construction should be robust with sealed covers. Rustless material is preferable but where this cannot be used, bright cold rolled steel sheet is a good alternative. Hot

rolled plate is not recommended. Welded seams should be kept to a minimum and always be external. Non stainless steel constructions should be pickled and washed after welding followed by internal phosphating.

PIPE WORK

Cold drawn seamless tube in carbon steel, stainless steel or copper based materials are all acceptable. Tube wall thickness must be sufficient to withstand the highest pressure peaks plus a substantial safety margin. Tube suppliers' catalogue must be consulted. Where flexible hoses are used the material must be compatible with the system fluid and suppliers pressure ratings must be observed. Avoid using materials likely to cause particle shedding and select only hose with permanently swaged end fittings.

Tubes should be firmly supported at frequent intervals and mechanical stresses due to fitting avoided.

Bore sizes should be in accordance with the usual accepted practice of a fluid flow velocity less than 3 m/s for supply lines and 1.5 m/s for return lines. In the case of flexible hose, care should be taken to check suppliers catalogue for minimum bore size compared to the nominal hose size. Precise sizing will depend on hydraulic fluid, length of runs and complexity of routing.

Thoroughly deburr and clean all tubes before assembling. Pickling may be required where welding and other scale producing operations have been applied.

Seal off tube ends after cleaning until installed. Never wipe mounting faces, tubes or fittings with rag waste but use lint free tissues.

FITTINGS

The system fittings should be chosen:

- To give minimum practicable restriction. Use a slow bend in preference to a right angle fitting.
- To impose minimal mechanical stress on the tube, sealing by a toroidal seal and clamping by split collar may be preferable to the use of compression ring fittings.
- Wherever possible use fittings that are free from scale and coatings capable of flaking.

IMPORTANT: Consideration must be given to limitations on use of certain materials in specific areas of hazardous environments e.g. underground coal mining.

CONTAMINATION CONTROL

Effects of contamination in a hydraulic system.

- **Erosive Wear:** This has the effect of wearing away metering and sealing edges degrading performance and increasing internal leakage
- **Abrasive Wear:** Surface finish is damaged and edges worn with similar consequences to the above.
- **Silting:** This build up of fine particles between sliding surfaces has a jamming effect which can prevent movement and render valves inoperative.

PREVENTION OF CONTAMINATION

Install $\beta_{25} = 75$ or better filter in the pressure line to the valves. Oversize this filter by as much as 3x nominal flow rating to maximise life.

Wherever possible use filters with clogging indication.

Avoid use of filters with pressure relief by-pass. It is generally preferable to use high pressure differential filters capable of sustaining total contamination without collapse. The consequence is to block the filter and stop the system which, unless more serious damage can result, is better than damaging system components with contaminant.

It is good to practice to clean a hydraulic system as comprehensively as possible, before fitting expensive and dirt sensitive components. Cleaning is best effected by conducting a flushing operation using low cost disposable filter elements and fitting flushing plates to link pressure and return lines in place of the units to be protected.

It is important to remember that whenever a hydraulic system is broken there is an inherent risk of contamination and the same precaution should be taken as for initial commissioning of a new system.

New fluid is not necessarily clean fluid.



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Sweden

United Kingdom

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