

INTRODUCTION

Read this instructions carefully before installation. All operations must be carried out by qualified personnel following the instructions.

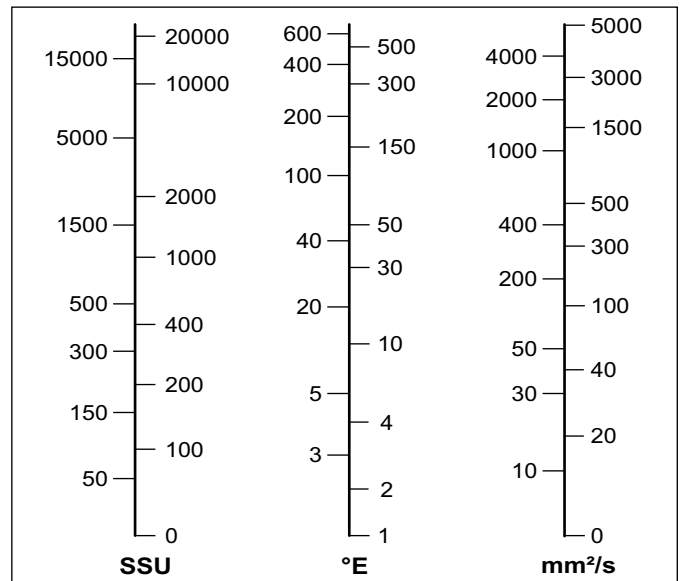
The user must periodically inspect, based on the conditions of use and the substances used, the presence of corrosion, dirt, the state of wear and correct function of the valves.

Always observe first the operating conditions given in datasheet of the valve.

HYDRAULIC FLUID

Observe the recommendations given in the data sheet of the valve. Use only mineral oil (HL, HLP) according to DIN 51524. Use of other different fluids may damage the good operation of the valve.

CONVERSION TABLE SSU / °E / mm²/s



VISCOSITY

Observe the recommendations given in the data sheet of the valve. The oil viscosity must be in the range of 10 mm²/s to 500 mm²/s.

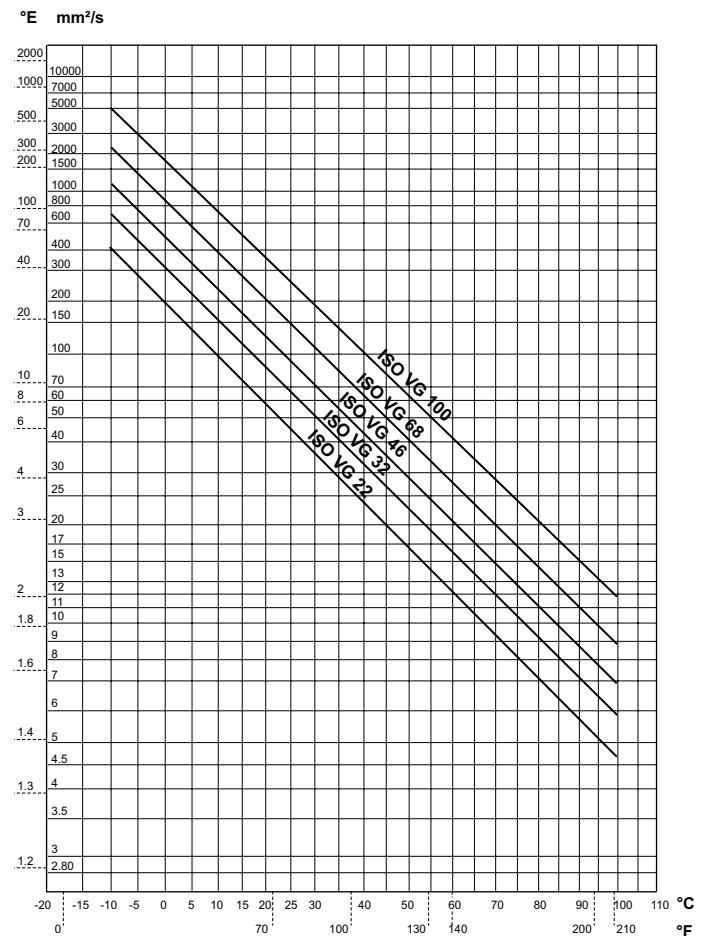
Recommended oil viscosity 46 mm²/s (32 mm²/s for Cartridge valves)

Table 1: ISO viscosity grades

| Average kinematic viscosity mm ² /s @ 40°C | Viscosity grade | Kinematic-viscosity limits mm ² /s @ 40°C | |
|--|-----------------|---|------|
| | | min. | max. |
| ISO VG 10 | 10 | 9.00 | 11.0 |
| ISO VG 15 | 15 | 13.5 | 16.5 |
| ISO VG 22 | 22 | 19.8 | 24.2 |
| ISO VG 32 | 32 | 28.8 | 35.2 |
| ISO VG 46 | 46 | 41.4 | 50.6 |
| ISO VG 68 | 68 | 61.2 | 74.8 |
| ISO VG 100 | 100 | 90.0 | 110 |

= Values used in the chart "Oil viscosity according to temperature"

OIL VISCOSITY ACCORDING TO TEMPERATURE



CONTAMINATION

Oil contamination is the main cause of faults and malfunction in hydraulic systems. Abrasive particles in the fluid erode or block moving parts, leading to system malfunction.

The valves we are offering do not require filtering characteristics any higher than those needed for usual hydraulic components such as pumps, motors, etc.

However, accurate filtering does guarantee reliability and a long life to all the system's hydraulic parts. Reliable performance and long working life for all oil-pressure parts is assured by maintaining the level of fluid contamination within the limits specified in the data sheet of the valve.

Hydraulic fluid must also be cleaned properly before filling the hydraulic circuit, especially when commissioning a new system, as this is when the oil contamination generally peaks due to its flushing effect on the components, and the running-in of the pump.

Maximum contamination level is required on datasheet of the valve according to ISO 4406:1999.

In the following table there is the correspondence between ISO 4406:1999 and old standard NAS 1638 for information purpose:

The standard ISO 4406:1999 defines the contamination level with three numbers that relate with the number of particles of average dimension equal or greater than 4 µm, 6 µm e 14 µm, in 1 ml of fluid.

In following table there is a reference to recommended contamination level and correspondence with old NAS 1638 standard.

Table 2: Recommended contamination level.

| Type of system Type of valve | Oil filtration recommendations | | |
|--|--------------------------------|--------------|--|
| | Cleanliness class recommended | | Absolute filtration micron rating (**) |
| | ISO 4406 : 1999 | NAS 1638 (*) | |
| Systems or components operating at HIGH PRESSURE > 250 bar (3600 psi) HIGH DUTY CYCLE APPLICATIONS Systems or components with LOW dirt tolerance | 18 / 16 / 13 | 7 - 8 | 5 |
| Systems or components operating at MEDIUM / HIGH PRESSURE Systems and components with moderate dirt tolerance | 19 / 17 / 14 | 9 | 10 |
| Systems or components operating at LOW PRESSURE < 100 bar (1500 psi) LOW DUTY CYCLE APPLICATIONS Systems and components with GOOD dirt tolerance | 20 / 18 / 15 | 10 - 11 | 20 |

* Contamination class NAS 1638: it is determined by counting the total particles of different size ranges contained in 100 ml of fluid.

** Absolute filtration: it is a characteristic of each filter, it refers the size (in micron) of the largest spherical particle which may pass through the filter.

WORKING TEMPERATURES

Ambient temperature range: -25°C to +60°C

Fluid temperature range (NBR seals): -25°C to +75°C

Thermal shocks can affect the performance and the expected life of the product, hence it is necessary to protect the product from these conditions.

SEALS

O-rings made in Acrylonitrile Butadiene (NBR) are normally fitted on the valves. The backup rings that protect the O-rings are also made in NBR, or sometimes PTFE. Both the O-rings and the backup rings are suitable for the working temperatures mentioned above.

In the case of fluid temperatures > 75°C, FKM seals must be used (identified with "V1" variant).

ELECTRICAL POWER SUPPLY

Solenoid valves coils are designed to operate safely in the voltage range of ±10% of nominal voltage at max. 60°C ambient temperature. The combination of permanent overvoltage and very hot temperatures can stress the solenoid. Therefore always a good heat dissipation and voltage level has to be assured. Faulty coils may only be replaced by new, interchangeable, tested components in original-equipment quality.

Before removing a coil, voltage must be disconnected.

When replacing the coil, be aware to insert O-Rings in order to avoid the entrance of water.

INSTALLATION

The mounting surface must feature surface quality specified in data sheet of the valve: for example for Cetop valves generally is required Ra ≤ 1.6µm and flatness ≤ 0.03 mm over 100 mm length. Normally in cartridge valve for sealing diameters of the cavities, is required roughness Ra ≤ 1.6µm. The surfaces and openings in the assembly plate must be free from impurity or dirt.

Make sure the O-Rings fit correctly in their seats.

Fixing screws must comply with the dimensions and the strength class specified in the data sheet and must be tightened at the specified tightening torque.

Complete the electrical wiring. For circuit examples and pin assignments, see the relevant datasheet.

USE AND MAINTENANCE

Observe the functional limits indicated in the technical catalogue

On a periodic basis and based on the conditions of use, check for cleanliness, state of wear or fractures and correct performance of the valve.

If the O-rings are damaged, replace them with those supplied by the manufacturer.

To assure the best working conditions at all time, check the oil and replace it periodically (after the first 100 working hours and then after every 2000 working hours or at least once every year).

Attention: all installation and maintenance intervention must be performed by qualified staff.

TRANSPORT AND STORAGE

The valve must be handled with care to avoid damage caused by impact, which could compromise its efficiency.

In the case of storage, keep the valves in a dry place and protect against dust and corrosive substances.

When storing for periods of more than 6 months, fill the valve with preserving oils and seal it.

CONVERSION CHART

| Type | SI units | | Alternative units | | Conversion factor |
|--------------------|-----------------|-----------------------------|----------------------------|-----------------------------|-------------------------------------|
| Force | Newton | (N) [kgm/s ²] | Kilogram force | (kgf) | 1 kgf = 9.807 N |
| | | | pound force | (lbf) [lbf/s ²] | 1 lbf = 4.448 N |
| Length | millimeter | (mm) [10 m] | inch | (in) | 1 in = 25.4 mm |
| | meter | (m) [1000 m] | yard | (yd) [3ft] | 1 m = 1.0936 yd |
| | kilometer | (km) [1000 m] | mile | (mile) [1760 yd] | 1 mile = 1.609 km |
| Torque | Newton meter | (Nm) | pound force.feet | (lbf.ft) | 1 lbf.ft = 1.356 Nm |
| Power | kiloWatt (kW) | [1000 Nm/s] | horsepower | (hp) | 1 kW = 1.341 hp |
| | | | metric horsepower | (CV) | 1 kW = 1.36 CV |
| Pressure | MegaPascal | (MPa) [N/mm ²] | bar | | 1 MPa = 10 bar |
| | | | psi (lbf/In ²) | | 1 MPa = 145 psi |
| | | | ton/f/In ² | | 1 ton/f/In ² = 15.45 MPa |
| Flow rate | liter/min | (l/min) | UK gal/min | | 1 UK gal/min = 4.546 l/min |
| | | | US gal/min | | 1 US gal/min = 3.785 l/min |
| Temperature | Degrees Celsius | (°C) | Fahrenheit | (°F) | 1°F = 1.8 °C+32 |