

Hydraulic components for industrial applications

Part 1: Hydraulic pumps and motors

Catalogue for the product range of hydraulic components by Bosch Rexroth, Hydraulics

Industrial applications	Part 1: Hydraulic pumps and motors	RE 00112-01
Industrial applications	Part 2: On/off valves Isolator, directional, pressure and flow valves	RE 00112-02
Industrial applications	Part 3: Proportional, high-response and servo-valves Directional, pressure and flow valves	RE 00112-03
Industrial applications	Part 4: Electronics and electro-hydraulic systems	RE 00112-04
Industrial applications	Part 5: Control plates, hydraulic power units and accessories	RE 00112-05
Industrial applications	Part 6: Hydraulic cylinders	RE 00112-06
Industrial applications	Part 7: ATEX units for potentially explosive atmospheres	RE 00112-07
Mobile applications	Part 1: Axial piston units, gearboxes, mobile electronics	RE 90005-01
Mobile applications	Part 2: External gear units, radial piston motors, mobile controls	RE 90005-02

Publisher Bosch Rexroth AG
Hydraulics
D-97813 Lohr a. Main
Zum Eisengießer 1 • D-97816 Lohr a. Main
Phone ++49 (0) 93 52/18-0
Fax ++49 (0) 93 52/18-23 58
Telex 6 89 418-0
eMail documentation@boschrexroth.de
Internet www.boschrexroth.de

Catalogue No. RE 00112-02/11 .05
Replaces: 04.03

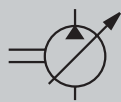
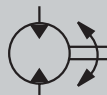
Printers Schleunungdruck GmbH
97828 Marktheidenfeld

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Subject to revision.

Should you have queries with regard to the products in this catalogue, please contact the Rexroth sales partner in your vicinity.

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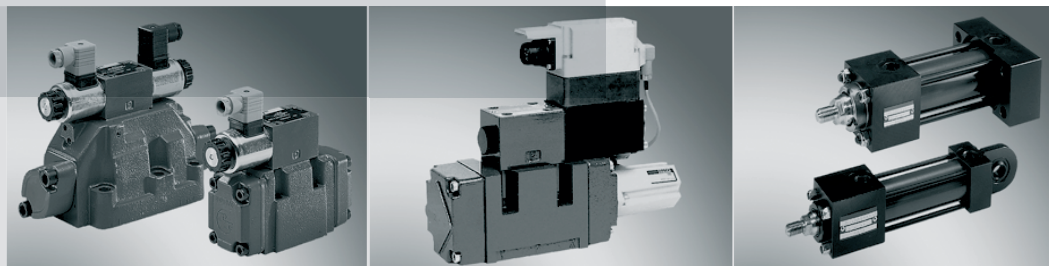
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General product information on hydraulic products

RE 07008/02.05

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DE	Ihre Sprache? – Siehe Rückseite!
EN	Your language? – See back page!
FR	Votre langue ? – Voir au dos !
IT	La vostra lingua? – Vedi retro!
FI	Kohdekielet? – Katso takankatta!
ES	¿Su idioma? – ¡Vea al dorso!
NL	Uw taal? – Zie achterzijde!
SV	Ditt språk? – Se omslagets baksida!
PT	O seu idioma? – Consulte a contracapa!
DA	Dit sprog? – Se bagside!
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1 Important basic information

1.1 Conventions used in this product information

Cross-references are printed in *italics*.



This symbol indicates a threat of danger which will result directly in death or very serious injury if not avoided.



This symbol indicates a threat of danger which may result in death or very serious injury if not avoided.



This symbol indicates possible danger which may lead to minor or serious injury and/or to material damage.

IMPORTANT

This symbol indicates additional information.

1.2 What you need to know about this product information

This product information applies to the following types of hydraulic products:

- Hydraulic components
- Hydraulic power units
- Hydraulic systems.

This product information applies exclusively to hydraulic products that are operated with mineral-oil-based pressure fluids, if the *Operating Instructions* do not expressly permit the use of other pressure fluids.

IMPORTANT

As this product information for Rexroth hydraulic products applies in a general sense, some of the content may not necessarily apply to the hydraulic product you have purchased.

However, only by strictly observing this product information and the *Operating Instructions* can accidents be prevented and problem-free operation of your Rexroth hydraulic product be guaranteed.

Observing the product information and *Operating Instructions*

- reduces downtimes and maintenance costs
- increases the service life of your hydraulic products.

The *Operating Instructions* must be directly accessible to one of the personnel at the hydraulic product and kept readily available at all times in a place known to the personnel.

The *Operating Instructions* must be read and understood and all its provisions observed by those responsible and by the operative personnel. We recommend that a record is made in writing of the employees' familiarisation with all the relevant parts.

The cross-references to directives, standards and regulations contained in this product information refer to the versions current at the time of writing of this product information, which can be obtained from the title page of this product information.

1.3 The contents of this product information

In addition to this document, product information for Rexroth hydraulic products normally includes *Operating Instructions* consisting of three parts:

- **Part I**, the general *Operating Instructions* for the relevant class of products
- **Part II**, the *Technical Datasheet*
- **Part III**, the *Product- and Application-specific Operating Instructions*.

If you do not have all three parts, please request the missing part from Bosch Rexroth. Only if all the information contained in all parts of the three-part *Operating Instructions* is observed can safe operation of Rexroth hydraulic products be ensured.

Specific cross-references are used to draw your attention to information that you can find in the *Operating Instructions*.

The *Operating Instructions* contain detailed information about the product, including

- Information about the scope of delivery
- Safety instructions
- Technical data and operating limits
- Information about bringing into (first) use and maintenance
- Information about the mode of operation
- Layouts, drawings
- Parts lists if appropriate
- Information about replacement parts and accessories.

2 Scope of delivery and responsibilities

2.1 Scope of delivery and responsibilities of Bosch Rexroth

Rexroth hydraulic products fulfil all safety requirements applicable to fluid power systems and their components.

IMPORTANT

For the scope of delivery and the responsibilities of Bosch Rexroth with respect to the product, please refer to the *Product-specific Operating Instructions*.

2.2 Responsibilities of the plant operator



If Rexroth hydraulic products are positioned in the vicinity of sources of ignition or strong radiators of heat, protection must be put in place that would prevent any escaping pressure fluid from igniting and the hose lines from aging prematurely.

Mineral-oil-based pressure fluid is hazardous to water and flammable. It may only be used if the relevant safety data-sheet from the manufacturer is available and all the measures stipulated therein have been implemented.

If there is a risk of fluid leaking from the hydraulic product and contaminating water or the ground, the hydraulic product in question must be placed in a suitable collecting trough. In connection with this, the applicable statutory regulations must be observed.

You must also observe the EU directives for the use of work equipment (Directive 89/391/EC) and the associated individual directives, especially Directive 1999/92/EC for the protection from the danger arising from potentially explosive atmospheres and their implementations in national legislation. The legislation contains minimum requirements with respect to the making available by the employer of work equipment and for the use of work equipment by employees at work, including the regulations for operating equipment requiring supervision and the obligation to produce explosion protection documentation. This involves, for example, dividing areas endangered by potentially explosive atmospheres into zones and specifying suitable work equipment and procedures for these areas.

2.2.1 Noise protection

The A-weighted equivalent continuous sound power level of Rexroth hydraulic products can be obtained from the relevant *Operating Instructions*. If no values are documented then it can be taken that the value is less than 70 dB(A).

Installation of Rexroth hydraulic products in a machine or system may increase this value, and if so, the manufacturer of the machine/system must document this.

At or above 85 dB(A), the plant operator must make suitable hearing protection available to the personnel.

2.2.2 Special points concerning the installation of certain products

A Rexroth hydraulic product is intended above all for installation in machines, systems and power units as a part machine or a component for installation into another machine or system and is not a complete machine in the sense of the EU directive. In addition to the Machinery Directive, still further directives may apply, such as the Pressure Equipment Directive or the Explosion Protection Directive.

A wide range of dangers can arise from the combined actions of the hydraulic product and the machine or system in which the hydraulic product is installed. Therefore you must always make sure that the hydraulic product is also suitable without restriction for the proposed application at the installation location. The interfaces with the overall machine and the operating conditions are also of the greatest importance. We recommend that the results of the hazard analysis (risk assessment) of the overall machine are taken into account in the design of the hydraulic product.

The functioning of the hydraulic product is also influenced by the machine or system in which it is installed.

For this reason, you must also always observe the Operating Instructions of the overall system in which your hydraulic product is installed. It is most important for you to also consider the possible use of the hydraulic product in a potentially explosive atmosphere (see 94/9/EC).

IMPORTANT

Bosch Rexroth points out that, at the time of their first introduction on to the market, hydraulic products comply with the requirements of all relevant EU directives and/or their implementation into national legislation in Germany. If the scope of delivery is intended to be installed in a machine or system, then the Machinery Directive applies as appropriate – including the then currently applicable amendments – in that the scope of delivery does not necessarily comply with the requirements of the Machinery Directive because the scope of delivery is intended for installation in a machine or because the scope of delivery is intended for combination with other machines into a machine or a hydraulic system.

The bringing into use of the scope of delivery shall therefore not be permitted until the machine or system in which the scope of delivery is to be installed or of which it represents a component complies with the requirements of all relevant EU directives.

Details of further responsibilities can be found in *3 Important basic safety instructions* and in the *Operating Instructions*.

2.3 Liability, guarantee, warranty

Bosch Rexroth shall not be liable for damages that result from non-compliance with or disregard of these and other parts of the Operating Instructions.

Unauthorised tampering shall render the warranty null and void.

Bosch Rexroth shall only be liable if the scope of delivery was shown to be defective. Bosch Rexroth shall not be liable if a deficiency occurs that involves parts having been replaced by the customer with equivalent but not identical parts as specified by the manufacturer.

Please refer to our general terms of supply or your contract for details of the guarantee and manufacturer's warranty.

2.4 Copyright

This product information may only be reproduced – electronically or mechanically, in whole or in part – with the express written permission of Bosch Rexroth. It may likewise not be distributed, amended, transmitted, translated into another language or employed or copied for other purposes or by other parties without such consent.

3 Important basic safety instructions

3.1 What to do in an emergency

In the event of an emergency, fault or other abnormal occurrences:

1. Switch off the hydraulic system.
2. Secure the main switch against being unintentionally switched on again.
3. Secure the danger area so that no one can enter the danger area unknowingly or uncontrolled.
4. Notify the relevant specialist personnel immediately.
5. In the event of fire, observe the provisions of the safety datasheets issued by the manufacturer of the pressure fluid and the fire precautions specifically applicable to your place of work, which must be documented in the plant operator's operating manual.



Fighting fires with materials other than those permitted can lead to explosions and/or more rapid spread of the fire!

Danger to life from smoke inhalation!

3.2 Safety labelling on the hydraulic product

IMPORTANT

- The meanings of the safety labelling on the Rexroth product are explained in the *Operating Instructions*.
- For a diagram of the nameplate and an explanation of the information on it please refer to the *Operating Instructions*.

3.3 Proper use

Rexroth hydraulic products are designed and constructed for the provision, transmission, control or regulation of energy and signals using the flow of oil.

Unless otherwise agreed, the Rexroth hydraulic product satisfies at least safety category B in accordance with EN 954-1.

If the hazard analysis/risk assessment of the overall machine in which the Rexroth hydraulic product is to be installed indicates that a safety category higher than category B in accordance with EN 954-1 is required for the Rexroth hydraulic product, then a correspondingly higher rated hydraulic product can be supplied and installed only after special agreement with Bosch Rexroth.

IMPORTANT

The hydraulic product shall be operated exclusively with pressure fluids complying with DIN 51524. Where other pressure fluids are permitted, for example brake fluids for brake valves, this is specially mentioned in the *Operating Instructions*.

For details on proper use see 4 *Technical data and ambient conditions*.

The following information can be found in the *Operating Instructions*:

- the proper use, specific to the hydraulic product
- where applicable, the safety category in accordance with EN 954-1
- non-permitted and improper use.

3.3.1 Proper use, requirements before operation

- Rexroth hydraulic products may only be operated if they are in perfect technical condition.
 - In the event of disturbances in the power supply and/or damage to the electrical equipment, switch off immediately and secure the main switch against being switched on again without authorisation.
 - Report and rectify all faults and damage indicated by the system or discovered by other means.
- The connections, operating conditions and performance data specified in the *Operating Instructions* must be observed and never changed.
- Rexroth hydraulic products shall not be converted or otherwise modified without prior consultation with Bosch Rexroth.
- The plant operator shall not modify the program code of programmable control systems.
- Dependencies and time factors shall not be modified without prior consultation.
- The safety devices fitted by Rexroth must be present, properly installed and in full working order – except when this is impractical during setting up or maintenance work. They shall not be relocated, bypassed or rendered ineffective.
- Safety components such as limit switches, valves and other control components shall not be rendered inoperative.
- Tamperproof lead seals installed by the manufacturer shall not be removed or damaged except when this is necessary in the course of maintenance tasks defined in the *Operating Instructions*.
- The specified maintenance tasks in the *Operating Instructions* shall be carried out at the intervals stated in the *Operating Instructions*.

- Uncontrolled access by persons unfamiliar with the system to the immediate operating zone of Rexroth hydraulic products is prohibited (even if the product in question has been shut down).
- Rexroth hydraulic products must never be assembled, operated or maintained by persons under the influence of alcohol, drugs or other medication which affect one's ability to react.

3.4 Requirements for personnel, duty of care

3.4.1 Qualifications of specialist personnel

A specialist person is someone who, using his specialist training, knowledge and experience as well as familiarity with the relevant conditions, can

- safely carry out the tasks allocated to him and correctly assess the scope and implications of his work
- recognise possible dangers
- undertake the necessary measures to eliminate possible accidents.

3.4.2 Requirements for hydraulics maintenance personnel

In accordance with DIN 31051, maintenance comprises the individual activities of **inspection**, **servicing** and **repair**. All personnel involved in maintenance shall be familiar with and observe all parts of the Operating Instructions and this product information.

Inspection personnel shall fulfil the following requirements:

- They have been instructed in the relevant activity.
- Specialist knowledge of hydraulics is not required for purely inspection activities but the personnel must be aware of the particular dangers associated with hydraulic products.

Servicing personnel (who carry out filter and oil changes, for example) shall fulfil the following requirements:

- They have been instructed in the relevant activity.
- Specialist knowledge of hydraulics is not required to carry out servicing work.

Repair personnel shall fulfil the following requirements:

- The personnel must be hydraulics experts, who have been instructed and meet the definition given above,
- Repair personnel must be familiar with the function of the hydraulic system as a whole, from subsystems to their interaction with the function of the entire machine.
- Repair personnel must be able to read hydraulic circuit diagrams, interpret individual functions from their symbols and understand function diagrams.
- Repair personnel must possess knowledge of the function and construction of hydraulic elements.

3.4.3 Requirements for electrical maintenance personnel

All work on electrical equipment shall only be carried out by an authorised, qualified electrician, or by instructed persons under the guidance and supervision of a qualified electrician, in accordance with the rules applicable to electrotechnical products.

3.4.4 Minimum age

Persons under the age of 18 who are currently receiving instruction or training or are working under supervision may not work on Rexroth hydraulic products.

This does not apply to young persons of 16 or over if

- working on Rexroth hydraulic products is necessary in order for them to accomplish a training objective
- their protection is guaranteed by the supervision of an experienced, competent person
- they are allowed to use only tools, work implements and protective gear that preclude the risk of injury.

3.4.5 Training

The plant operator using Bosch Rexroth hydraulic products shall train his personnel regularly in the following subjects:

- Observation and use of the Operating Instructions and legal requirements
- Proper operation of the Rexroth hydraulic product
- Observation of the instructions of safety officers and the plant operator's operating manual
- What to do in an emergency.

IMPORTANT

Bosch Rexroth can provide you with training support in specialist areas.

An overview of the training can be found on the Internet at <http://www.boschrexroth.de/didactic>.

3.5 General ancillary dangers and protective measures when operating hydraulic products



In the interests of your safety, all safety instructions shall be carefully observed, especially those in the Operating Instructions.

In spite of the high intrinsic safety of Rexroth hydraulic products, the risk of personal injury or damage to the environment cannot be excluded, even when the equipment is properly used.

New, additional dangers may arise if the hydraulic product is installed in another machine or installed with other machines in a system. This shall apply in particular to mechanical movements generated by the hydraulic product.

Information on these additional dangers can be found in the overall operating manual of the supplier of the overall system in which the hydraulic product is installed.

3.5.1 Dangers from pressure fluid



Handling pressure fluid without protection is **hazardous to health**.

Please observe the manufacturer's safety instructions and the safety datasheets for the pressure fluid that you are using.



Serious damage to health or death may result if pressure fluid enters the blood stream or is swallowed. If this occurs, contact a doctor immediately!

3.5.2 Malfunctions due to contamination of pressure fluid

Contamination of the pressure fluid can be caused by:

- Wear during operation of the machine/system (metallic and non-metallic abrasion)
- Leaks of the hydraulic product
- Contaminants introduced during servicing/repair
- The use of dirty (unfiltered) pressure fluid when the pressure fluid is changed.

Contaminants lead to malfunctions, increased wear and shorter service life of the hydraulic product. This can have negative effects on the safety and reliability of the hydraulic product.

Therefore the maintenance tasks specified in the *Operating Instructions* shall be carried out at regular intervals and the utmost cleanliness is required during work on the hydraulic product.



When changing the pressure fluid, always use factory-fresh pressure fluid and filter it before filling to remove any contaminants in the pressure fluid that it often contains from the packaging container (drum). Flush out lines and hoses before installation.

The cleanliness class of a pressure fluid is specified in accordance with ISO 4406. Detailed information can be obtained from the relevant datasheet or the *Operating Instructions*.

In older datasheets, the cleanliness class is sometimes specified in accordance with NAS 1638. The following table can be used to convert this to an equivalent ISO 4406 cleanliness class:

Comparison table for cleanliness classes

Earlier class to NAS 1638	Current class to ISO 4406 (c)
Class 7	Class 18/16/13
Class 9	Class 20/18/15

3.5.3 Electrical dangers

When working on electrical systems:

- De-energise the hydraulic system before beginning any maintenance work.
- Cordon off the working area with red-white safety chain and warning signs.
- Lock the main switch, remove the key and keep it in a safe place until the work is completed.
- Attach a warning sign to the main switch.
- Check that there is no voltage using a **two-pole** voltage detector.
- Earth and short-circuit the point where you are working.
- Cover neighbouring live parts.
- Clear your workplace to prevent contact with live parts as a result of tripping or slipping. Wear safety footwear.
- Always use electrically insulated tools.
- Disconnect plugs at sensors and valves – even those with low voltages – after the system has been de-energised.



Even after disconnection of the electrical supply (main switch OFF) the following supply systems/danger areas can still give rise to life-threatening voltages:

- Electrics, electronics, hydraulics (e.g. accumulators, rechargeable batteries)
- Main switch
- Power supply cables
- Points identified with an electric shock warning sign.

3.5.4 Product-specific ancillary dangers

All product-specific ancillary dangers and precautions can be found in the relevant *Operating Instructions*.

3.5.5 Disposal

- Take metal, cable and plastic ducts to a recycling materials collection centre.
- Dispose of electronic components as electronic waste.
- Dispose of back-up batteries as special waste.
- Cleaning agents, operating fluids and other materials:



Please observe the disposal regulations specified in the appropriate *Safety Datasheets*.

4 Technical data and ambient conditions

IMPORTANT

The product-specific technical data, operating limits and ambient conditions for the operation of your Rexroth hydraulic product can be found in the *Operating Instructions*.

This includes the following information:

- Minimum flow rate for adequate cooling
- Permissible maximum temperature of the coolant
- Performance data
- Type of control and regulation functions
- Permissible pressures, flow rates
- Connections.

4.1 Information about pressure fluids

Unless otherwise indicated in the *Operating Instructions*, the following specification applies to the pressure fluid to be used:

- Mineral-oil-based pressure fluid complying with the requirements of DIN 51524.
- Operating temperature range 0°C...+80°C (in tank < 72°C).

Any deviations from this can be found in the *Operating Instructions*.

IMPORTANT

Bosch Rexroth recommends a maximum operating temperature of 55°C, because the rate of ageing of the pressure fluid increases and the service life of the seals and hoses is reduced at higher temperatures.

- Viscosity ranges:
see RE 07075 and RE 90220
- Max. permissible contamination class of the pressure fluid in accordance with ISO 4406: see 3.5.2 *Malfunctions due to contamination of pressure fluid*.

The maximum permissible cleanliness class can be found in the *Operating Instructions*. The following types of pressure fluids shall be used.

IMPORTANT

Rexroth hydraulic components are tested with test oil MZ45 manufactured by ESSO (class ISO VG 46 at 40°C), (Viscosity η = approx. 46 mm²/s).

4.2 Ambient conditions

4.2.1 Use in potentially explosive atmospheres



Rexroth hydraulic products shall be used in potentially explosive atmospheres only if they are designed for this purpose and this is expressly stated in the *Operating Instructions*.

IMPORTANT

Directive 1999/92/EC of the European Parliament and Council dated 16 December 1999 concerning the minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres governs protection from danger from potentially explosive atmospheres. Observe the requirements contained in the regulations for operating equipment requiring supervision and the obligation to produce explosion protection documentation.

This involves, for example, dividing areas endangered by potentially explosive atmospheres into zones and specifying suitable work equipment and procedures for these areas.

Observe the requirements of *Directive 94/9/EC of the European Parliament and Council dated 23 March 1994 on the approximation of laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres (ATEX Product Directive)* and/or the corresponding national legislation by means of which the Directive was implemented in law in the EU member states. The directive contains requirements for the use of equipment and protective systems in potentially explosive atmospheres.

4.2.2 Climatic operating conditions

Unless otherwise indicated in the Operating Instructions, the permissible ambient temperature

- for control units: 0 °C...+50 °C
- for drive units with electric motors without heat exchangers, surface-cooled by free air circulation: 0 °C...+30 °C
- for drive units with heat exchangers: <+40 °C.

Unless otherwise specified, Rexroth hydraulic products are designed for use in temperate climate zones and in covered areas (not in the open air) at relative air humidities of <70 % and at room temperatures of 22 °C.

IMPORTANT

For systems with oil-air heat exchangers:
Observe the information given in the circuit diagram in the *Operating Instructions*.

In relation to the electronic equipment, the permissible ambient conditions apply to installed and protected electrical connections of class IP 55.

- Ambient temperature +5 °C...+40 °C
assuming that the average air temperature over a 24 hour period does not exceed +35 °C.
- Relative air humidity: 23...95 %, non-condensing.
- Altitude: up to 1000 m above national datum.



Rexroth hydraulic products shall not be used in aeronautical equipment, except where they have been specially approved and appropriately labelled to this effect.

5 What you need to know about pressure fluids

5.1 How to handle pressure fluids safely



Mineral-oil-based pressure fluid is hazardous to water and flammable.

It may only be used if the relevant safety datasheet from the manufacturer is present and all the measures stipulated therein have been implemented.

5.2 Functions and effectiveness

Due to the many tasks of pressure fluid, its selection, inspection and maintenance are of vital importance for:

- proper functioning
- operating safety
- service life
- and the cost effectiveness of the hydraulic product.

The tasks of pressure fluid:

- to transmit hydraulic energy from the pump to the hydraulic cylinder/motor
- to lubricate parts moving against one another
- corrosion protection
- to remove contaminants
- to remove locally accumulated heat.

5.2.1 Reduced function due to ageing

The effectiveness of pressure fluid diminishes as it ages (undergoes chemical changes). Acids and resinous residues form, which may cause valve spools to stick.

The following factors accelerate the ageing process:

- high temperatures
- oxygen in the pressure fluid
- air humidity
- water
- metallic catalysers
- operating pressure
- contaminants.

IMPORTANT

Observe the following rules of thumb:

At pressure fluid temperatures $>70^{\circ}\text{C}$, the rate of ageing doubles for each 10°C .

5.3 Viscosity

5.3.1 Viscosity grades

The most important characteristic of a pressure fluid is its viscosity, i.e. stickiness. Viscosity range always plays a priority role in the selection of a pressure fluid.

Viscosity is measured in the SI unit $[\text{mm}^2/\text{s}]$. Many manufacturers still provide their information in centiStoke $[\text{cSt}]$, the equivalent of $[\text{mm}^2/\text{s}]$.

The viscosity grades (VG = viscosity grade) in accordance with ISO 3448 relate to the viscosity at 40°C . The viscosity grade is appended to the type designation or the commercial name of the pressure fluid.

Example: A pressure fluid with a viscosity grade of ISO VG 46 has a viscosity of $46 \text{ mm}^2/\text{s}$ at 40°C .

The relationship between medium temperature and viscosity for hydraulic oil (example)

Medium temperature	Viscosity
3°C	$800 \text{ mm}^2/\text{s}$
8°C	$500 \text{ mm}^2/\text{s}$
25°C	$100 \text{ mm}^2/\text{s}$
60°C	$20 \text{ mm}^2/\text{s}$
77°C	$12 \text{ mm}^2/\text{s}$

Too high a viscosity leads to the formation of air and vapour bubbles as a result of low pressure (cavitation). Too low a viscosity leads to increased leakage losses. Increased leakage losses cause the pressure fluid to heat up more, leading in turn to a further reduction in viscosity. The pressure fluid then loses its ability to lubricate.

Valves, pumps and hydraulic motors, in particular, require exact compliance with the defined viscosity ranges.

For certain ambient and operating temperatures, not all the requirements can always be covered with the available ranges of the viscosity grades.

In order to comply with all the requirements, high viscosity pressure fluids with viscosity index improvers or a pressure fluid cooler/heater may be used.

5.4 Leakage fluid

Clearances and play mean that some leakage fluid escapes from all hydraulic products. Leakage fluid can be lead away internally or externally, depending on the component. It can be fed back into the tank or must be disposed of.



Make sure that the leakage fluid is fed back into the tank in a proper manner.

Dispose of leakage fluid that is not fed back into the tank properly, in compliance with the applicable environmental protection regulations.

5.5 Topping up/refilling



When topping up/refilling your hydraulic system, make sure that you use pressure fluid of the same sort and type and from the same manufacturer.

If the fluid is heavily contaminated or prematurely aged, then the system, including the tank must be cleaned and flushed before refilling. New pressure fluid must always be filtered in accordance with the required cleanliness class, as it does not normally meet the required cleanliness class in the as-supplied state.