

The Drive & Control Company

**Rexroth**  
Bosch Group

# Hydraulic fluids in mobile applications

User information



# Hydraulic fluids

Selection and maintenance of hydraulic fluids are decisive factors for the safe and economic operation of hydraulic systems. The requirements of the application as well as the environmental conditions at the site of operation determine the type of fluid to be used. The statutory regulations of the respective country also need to be complied with.

Bosch Rexroth works closely with machine manufacturers concerning the rating of hydraulic fluids.



Therefore, always use the hydraulic fluid that is recommended in the original service manual of the machine.

# Categories

- ▶ Hydraulic fluids based on mineral oils and related hydrocarbons  
e.g. HL, HLP, HVLP  
See Rexroth data sheet 90220
- ▶ Environmentally acceptable hydraulic fluids  
e.g. HETG, HEPG, HEES, HEPR  
See Rexroth data sheet 90221
- ▶ Fire-resistant hydraulic fluids – water-free  
e.g. HFDR, HFDU (ester, glycolbase)  
See Rexroth data sheet 90222
- ▶ Fire-resistant hydraulic fluids – water-containing  
e.g. HFAE, HFAS, HFB, HFC  
See Rexroth data sheet 90223

- ▶ Special hydraulic fluids
  - ▶ Single and multi-grade engine oils  
e.g. 10W, 10W–30
  - ▶ Multi purpose oils  
e.g. UTTO, STOU
  - ▶ and others  
See Rexroth data sheet 90220



You can find the data sheets in the Bosch Rexroth media directory

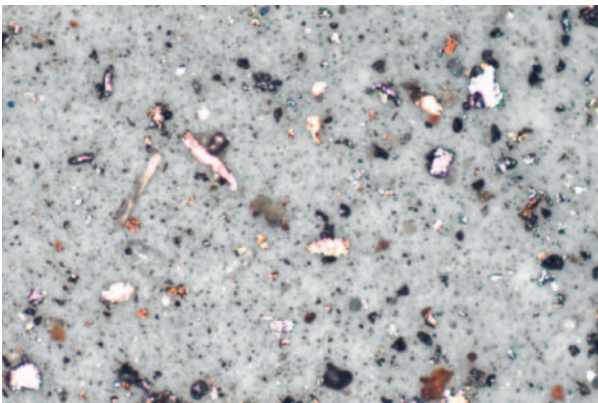
[www.boschrexroth.com/mediadirectory](http://www.boschrexroth.com/mediadirectory)

# Cleanliness levels

For hydraulic fluids, the cleanliness level is given as a three-digit numerical code in accordance with ISO 4406.

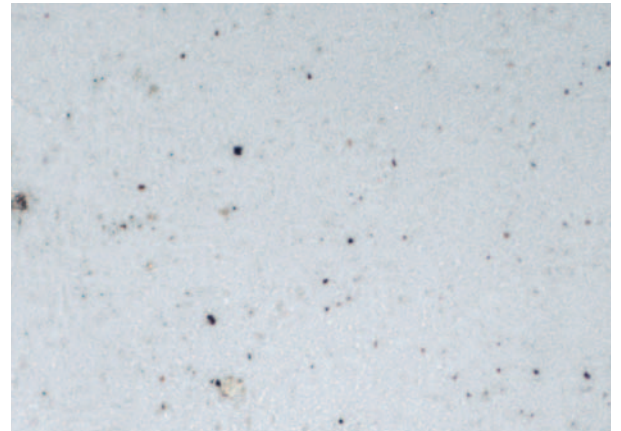
This numerical code denotes the number of particles present in a hydraulic fluid for a defined quantity.

Cleanliness level 22/19/17  
according to ISO 4406



200 µm

Cleanliness level 18/16/13  
according to ISO 4406



200 µm

In general, compliance with a minimum cleanliness level of 20/18/15 in accordance with ISO 4406 or better is to be maintained during operation. In particular servo valves require better cleanliness levels of at least 18/16/13. (see data sheet of the hydraulic component)

## Cleanliness levels

The component with the highest cleanliness requirements determines the required cleanliness of the overall system.



Further information can be found on the next pages as well as in the Bosch Rexroth oil cleanliness booklet (R999000239).

## Contamination

A high number of failures are due to contaminated hydraulic fluids.



Therefore, always pay particular attention to cleanliness when working on hydraulic systems.

Examples of different types of contamination and their possible causes

### Particles

- ▶ Hydraulic fluid is not properly filtered before filling
- ▶ Filling the tank in a dusty environment
- ▶ Ventilation and air bleed filters in the tank are damaged, contaminated, or not present

# Contamination

- ▶ Intrusion of dirt via the piston seal  
e.g. from hydraulic cylinders
- ▶ Wear particles are not properly filtered, e.g. due to using unsuitable filter elements
- ▶ Foreign particles are able to get into the system when opening a contaminated tank cover

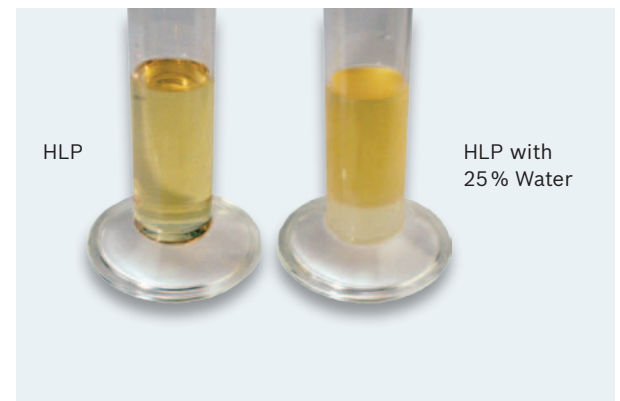
## Contamination (Particles)



## Water/air

- ▶ Incorrect storage of the fresh hydraulic fluid
- ▶ Changing climatic conditions such as ambient temperature and air humidity
- ▶ (Damaged) seals

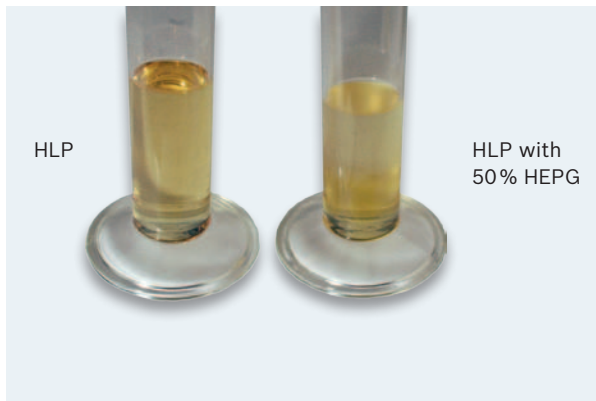
## Contamination (Water)



# Mixing

Mixing hydraulic fluids can change the original characteristics of the hydraulic fluid. It can, for example, lead to filter blocking due to deposits.

Mixing  
(Different hydraulic fluids)



If individual lubricant manufacturers advertise miscibility and/or compatibility, this is entirely the responsibility of the lubricant manufacturer.

Miscibility is by no means to be equated with compatibility!



Any mixing with other hydraulic fluids and the subsequent addition of additives is generally not permitted.

Unintended mixing may occur, for example,

- ▶ when replenishing (replacing the leakage amount) between the planned maintenance intervals
- ▶ due to damaged seals e.g. defect shaft sealing ring between the pump and splitter gearbox

## Mixing

- ▶ when replacing the hydraulic fluid as part of the maintenance. Often the amount remaining in the components outside of the tank such as in the lines, hydraulic cylinders, hydraulic pumps, etc., is not taken into consideration.
- ▶ when rinsing the system after repair work
- ▶ when using changeable accessory equipment



The residual amount remaining in the system may only amount to 2 % maximum of the total volume (VDMA 24569).

## Oil change

The term “oil change” means completely replacing the hydraulic fluid with another hydraulic fluid. For example

- ▶ Change within a category (mineral oil HLP “A” should be replaced with another mineral oil HLP “B”) or
- ▶ Change to a different hydraulic fluid category (mineral oil HLP “A” should be replaced with an environmentally acceptable hydraulic fluid)

A change may become necessary, for example, if the field of application of a machine changes.

Example:

An excavator, whose hydraulic system was originally operated with mineral oil, now needs to work in a water reserve.





Image: Kaiser

In environmentally sensitive areas and depending on the national legal provisions of the country, some very stringent requirements apply that require the use of special hydraulic fluids.



If the change is not carried out properly and completely, damages to the hydraulic system could arise due to the mixing of incompatible fluids.

The consequence is high repair costs!

Further information is available from the lubricant or machine manufacturer and from your Bosch Rexroth service partner.

## Maintenance and service

Unplanned standstill times and the probability of damage occurring to the hydraulic components can be reduced through professional and timely maintenance.

Bosch Rexroth assists you with individual service products and services.



## Maintenance and service

The condition of the hydraulic fluid should always be monitored during operation. It is advisable to regularly take samples and analyze the fluid. In the laboratory, for example, the neutralization number, water content and quantity of particles caused by the deposition of dirt or wear is determined. Comparison with a reference sample identifies trends. This enables you to react more quickly and avoid high repair costs.



## Documentation

Careful documentation of the maintenance measures that have been carried out is of great advantage and can provide valuable information when troubleshooting.

### **The following information should always be recorded**

- ▶ Manufacturer code and the production date (production batch) of the hydraulic fluid
- ▶ Conversions, e.g. to environmentally acceptable fluids (clear marking on the machine), time of the conversion and maintenance interval

## Storage of hydraulic fluids

- ▶ Do not exceed the maximum storage period according to the specifications of the manufacturer
- ▶ The temperature and humidity of the environment can strongly affect the storage life
- ▶ Required protective measures for people and the environment are based on the potential danger
- ▶ Only store in the closed original packing container

## Environmental protection

All hydraulic fluids (also environmentally acceptable) are subject to a special duty of disposal. The respective lubricant manufacturers provide specifications on environmentally friendly handling and storage. Please ensure that spilled or splashed fluids are absorbed with appropriate absorbents or by a technique that prevents them contaminating bodies of water, the ground or sewage systems.

National legal provisions must be observed when disposing hydraulic fluids.



Comply with the local safety data sheet of the lubricant manufacturer for the country concerned.

# Training

## Hydraulic fluids training (HT-FLUIDE)

- ▶ Hydraulic fluids as structural design elements
- ▶ Tasks of hydraulic fluids
- ▶ Base oils
- ▶ Additives and their effect
- ▶ Oil properties
- ▶ Standardization
- ▶ Mineral oils and related hydrocarbons
- ▶ Environmentally acceptable hydraulic fluids
- ▶ Fire-resistant hydraulic fluids
- ▶ Notes on commissioning and operation respectively maintenance and service



[www.boschrexroth.com/training](http://www.boschrexroth.com/training)

# Service benefits

## Services

- ▶ Replacement units
- ▶ Repairs, complete overhauls
- ▶ Commissioning
- ▶ Fluid service
- ▶ Technical consulting

## Contact

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General

During operation

Maintenance and service

Environment

Service benefits

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Subject to change.