

## Recommended hydraulic fluids



BRAND (alphabetical)	Hydraulic-mineral oil HLP to DIN 51524, part 2	
	ISO-VG32 (32 mm <sup>2</sup> /s at 40° C)	ISO-VG46 (46 mm <sup>2</sup> /s at 40° C)
	TEMPERATURE RANGE	
	+10 to +60° C	+20 to +70° C
AGIP	AGIP OSO 32	AGIP OSO 46
ARAL	ARAL VITAM GF 32	ARAL VITAM GF 46
ASEOL	ASEOL PLUS 16-110	ASEOL PLUS 16-115
BP	BP BARTRAN HV 32	BP BARTRAN HV 46
CASTROL	CASTROL HYSPIN AWS 32	CASTROL HYSPIN AWS 46
ESSO	ESSO NUTO H 32	ESSO NUTO H 46
FUCHS	RENOLIN MR 10	RENOLIN MR 15
GULF	GULF HARMONY 32 AW	GULF HARMONY 46 AW
MOBIL	MOBIL D.T.E. 24	MOBIL D.T.E. 25
PANOLIN	PANOLIN HLP 32	PANOLIN HLP 46
SHELL	SHELL TELLUS OIL 32	SHELL TELLUS OIL 46
TEXACO	RANDO OIL HD A-32	RANDO OIL HD B-46

- Hydraulic oil products of other manufacturers can also be used, provided their properties are equivalent to the above mentioned products.

- Please contact Wandfluh before using biodegradable or fire resistant hydraulic fluids.

**CONTAMINATION IN HYDRAULIC UNITS**

One differentiates between the following kinds of contamination:

**Initial contamination:**

This contamination takes place during the erection and commissioning of the hydraulic units.  
 (Dust, swarf, rust, hammer scale, packaging residues, etc.)

**Contamination by new oil:**

The oil supplied by the oil supplier is often contaminated, therefore the oil definitely must be filtered before filling it into the unit.

**Contamination during operation:**

Entry of dirt into the hydraulic tank due to insufficient ventilation, piston rod seals, etc.

**FILTER / DEGREE OF CONTAMINATION**

In the Wandfluh product documentation, degrees of contamination and recommended filters are indicated as follows:

Example:

Maximum admissible degree of contamination      ISO 4406:1999, class 18/16/13  
 Recommended filter with retention rate             $\beta_{6...10} \geq 75$

**CONTAMINATION CLASSES**

The contaminations classes indicate how many particles of a certain size are contained in 100 ml of hydraulic fluid. Usually control- and proportional valves are the components most sensitive to contamination in the hydraulic unit. Therefore they determine the overall degree of contamination of the hydraulic oil. At the moment, 5 classification systems are available (ISO 4406:1999, resp. NAS 1638, SAE, Mil. std. 1246A). In the Wandfluh product documentation the maximum admissible degrees of contamination are indicated in classes in accordance with ISO 4406:1999.

**RETENTION RATE / BETA - VALUE**

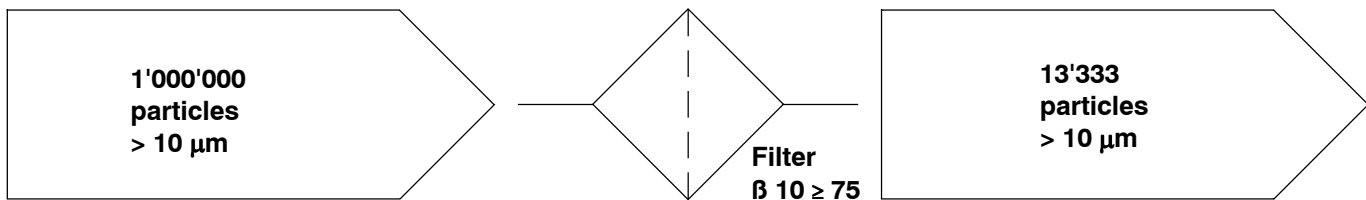
The retention rate of a filter element is the measure for the separation capacity of the filter for defined particle sizes. It is defined by the beta-value ( $\beta_x$ ) The  $\beta_x$  value is the ratio of all particles  $> x \mu\text{m}$  before the filter, to the particles  $> x \mu\text{m}$  after the filter.

**Example:** Filter element with retention rate  $\beta_{10} \geq 75$

Contamination level  
before the filter

Filter with retention rate

Contamination level after  
the filter



In the Wandfluh product documentation, the retention rate is indicated as  $\beta_x \geq 75$ .  
 Further customary retention rates are:  $\beta_x \geq 2, 20$  und  $200$

**SELECTION OF FILTER/RECOMMENDATION**

In the following table, the degrees of contamination (extract) in accordance with ISO 4406:1999 with number of particles/100 ml, as well as hydraulic valve groups with the filter fineness recommended for them are indicated.

Contamination classes	Number of particles per 100 ml		Recommended filter fineness $\beta_x \geq 75$ ( $x = \mu\text{m}$ )	Control valves	Prop. valves in control systems	Prop. valves in general	Valves with control plunger	Soft shift valves	Poppet valves	Valves in general > 160 bar	Valves in general < 160 bar
	over 5 $\mu\text{m}$	over 15 $\mu\text{m}$									
16/14/11	> 8000...16000	> 1000...2000	$\beta_{3...6}$								
18/16/13	> 32000...64000	> 4000...8000	$\beta_{6...10}$								
20/18/14	> 130000...250000	> 8000...16000	$\beta_{10...16}$								
21/19/15	> 250000...500000	> 16000...32000	$\beta_{16...25}$								
				Pressure filter required			Pressure filter recommended		return line filter		