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	ß 6…10 $\geq$ 75

CONTAMINATION CLASSES

The contaminations classes indicate how many particles of a certain size are contained in 100 ml of hydraulc 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 (ß x) The ß x value is the ratio of all particles > x μm before the filter, to the particles > x μm after the filter.

Example: Filter element with retention rate ß 10 $\geq$ 75

Contamination level
before the filter

Filter with retention rate

Contamination level after
the filter
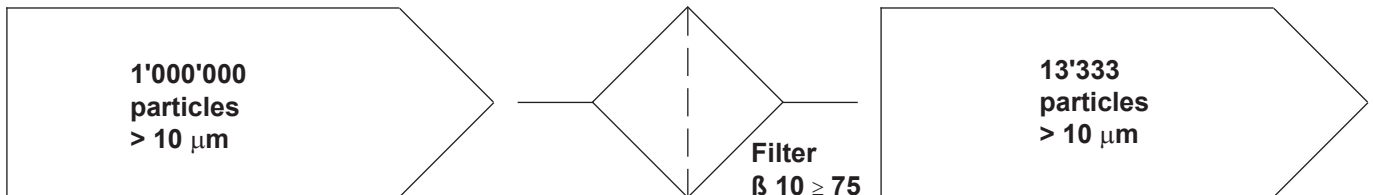
In the Wandfluh product documentation, the retention rate is indicated as ß x $\geq$ 75.
Further customary retention rates are: ß x $\geq$ 2, 20 und 200

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 — over 5 μm	over 15 μm	Recommended filter fineness ß x $\geq$ 75 (x = μm)	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
16/14/11	> 8000…16000	> 1000…2000	ß 3…6								
18/16/13	> 32000…64000	> 4000…8000	ß 6…10								
20/18/14	> 130000…250000	> 8000…16000	ß 10…16								
21/19/15	> 250000…500000	> 16000…32000	ß 16…25								

Pressure filter required	Pressure filter recomended	return line filter

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