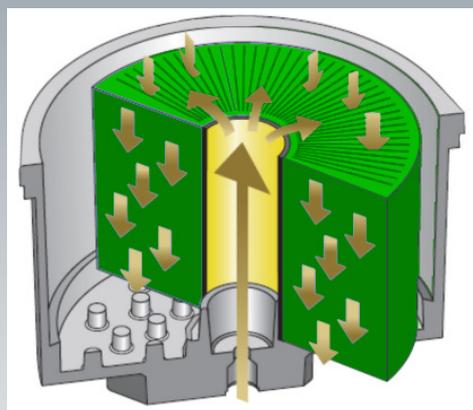


KLEENOIL filter cartridges SDFC, HDFC-N and LDFC

Cut model of the SDU Filter incl. SDFC filter cartridge



Functional schematic KLEENOIL Filter



The **KLEENOIL filter elements are depth filters**. The filter medium is made of long fibre cellulose, polypropylene and polyester. Especially the high quality cellulose filter medium and the specially aligned construction of the filter housing ensure a high particle retention capability and very effective filtration of water. Even **solid particles < 1µm are filtered out and water is bound within the cartridge**. The eliminated water frequently (and especially with big quantities) is visible as a whitish "sludge". The actual water quantity can be determined by analyzing the fluid which has been pressed out of the cartridge. Although it has to be taken into account that the water is bound in the cellulose fibres and will only leak out of the cartridge if it is completely pressed out. The retention capacity (solid particles and water) is exceptionally high. The filtration is carried out at low pressure between min. 1 and 4 resp. max. 6 bar to protect the oil. **The additives are not affected by the filtration**. By eliminating the abrasive and catalytic contamination, wear is minimized and the oxidative catalytic reactions in the oil prevented.

Various standards for the determination of the filter fineness

It is necessary to observe, that when determining the filter fineness and performance of a filter according to ISO 16889 compared to ISO 4572 interpretation differences may arise. The reason for this is the use of different test particles (artificial contamination) which are inserted into the fluid for the test. For lack of ACFTD (old) test dust synthetically produced contamination (ISO MTD) - new) is used.

Overview old and new method

OLD AC Fine Test Dust ACFTD µm	NEW ISO Medium Test Dust ISO MTD µm (c)
1	4.2
3	4.6
5	6.4
10	9.8
20	17.5
30	24.9

Retention ratio beta (β) value

The term Beta value (β-value) indicates the filter efficiency. This value qualifies the measuring unit for indication of the filtration capability of a filter element. The beta value is important because it expresses the filter efficiency in percent, e.g. 2 (50%) until 1.000 (99.9%) and is valid for all particle sizes (x) or determined particle sizes (e.g.: β₁₀ = particles ≥ 10 micron).

The calculation formula for the beta value is:

$$\beta_x = \frac{n \text{ before the filter } \geq x \mu\text{m}}{n \text{ after the filter } \geq x \mu\text{m}}$$

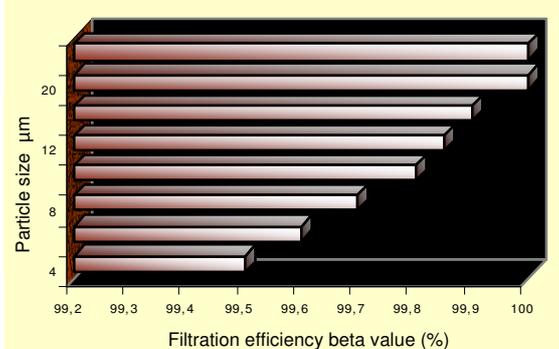
n = number of particles
x = particle size in µm

**Beta value and filter fineness of the KLEENOIL filter elements:
β₄ (ISO MTD) ≥ 200, corresponds β₁ (ACFTD) ≥ 200, filter fineness: 1(4) µm absolute!**



KLEENOIL filter cartridges SDFC, HDFC-N and LDFC

Retention capacity (filtration efficiency) KLEENOIL SDFC filter cartridges



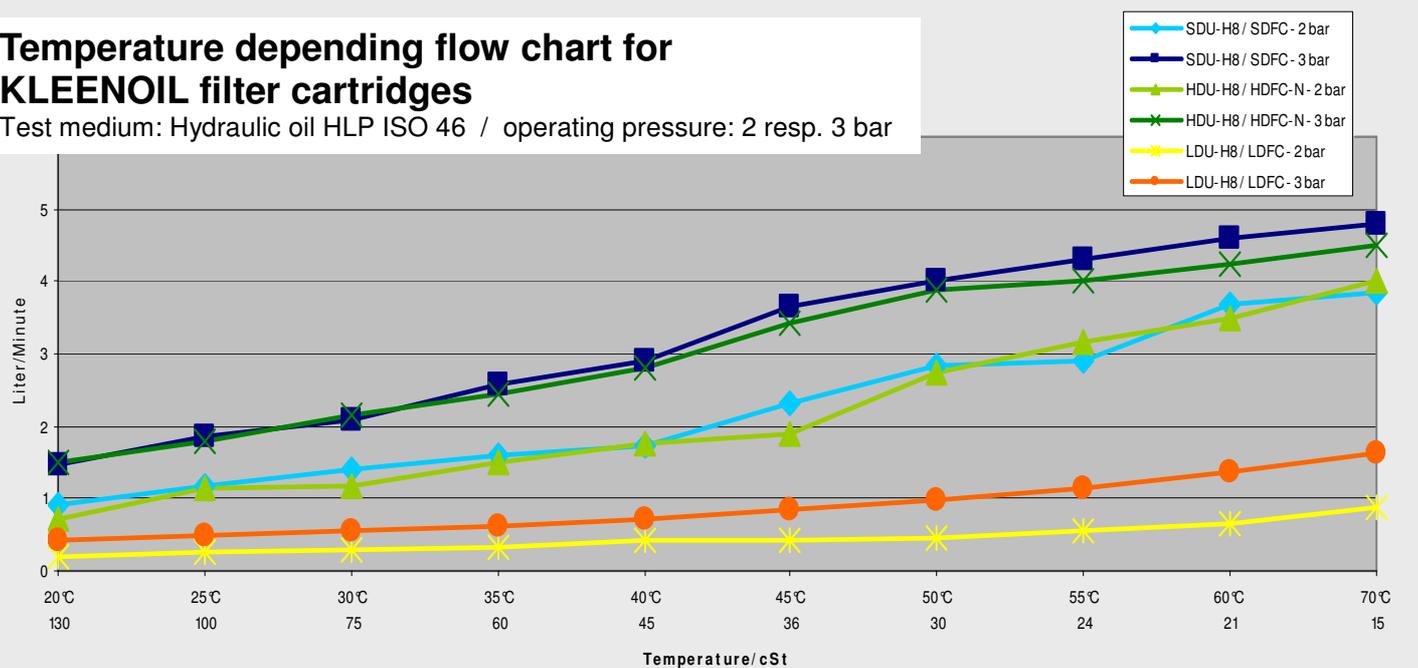
The test results confirm that the KLEENOIL filter cartridges can achieve a retention capacity for particles < 4 µm in the absolute range ($\beta_4 \geq 200$). The results are based on the use of ISO MTD test particles. Accordingly it results **a filter fineness of 1µm absolute according to ISO 4572 (ACFTD)**.

Due to the excellent retention capacities of the KLEENOIL filter cartridges the employment is only suitable for by-pass filters or in the specially designed filter rigs. Employment in the main line and/or under high pressure conditions is not possible. The KLEENOIL filter cartridges are built to eliminate solid particles and water from the oil in a combined function.

ATTENTION: Due to the specified medium compatibility the KLEENOIL filter cartridges SDFC, HDFC-N and LDFC are suitable for filtration of all non water soluble, fully or partially synthetic or mineral oil based oils and fuels. For filtration of several water mixable lubricating fluids as well as filtration of fluids not being compatible with paper (cellulose) filter elements, adequate cartridges of the same construction, made of polypropylene (code letter "P") available.

Temperature depending flow chart for KLEENOIL filter cartridges

Test medium: Hydraulic oil HLP ISO 46 / operating pressure: 2 resp. 3 bar



Summary performance data and dimensions

* Average values directly at the filter outlet with normal inlet contamination.

TYPE	APPLICATION	RETENTION LEVEL		Max. Temperature °C	Height mm	Ø mm	Weight g	PACKING UNIT	Filter medium	Cleanliness-class* ISO 4406 = 15/13/10 NAS-class = 4	Filter fineness (ACTFD)
		Particles in gr.	Water in ml								
SDFC	All KLEENOIL filter rigs & by-pass filters SDU-H 350 / (H/M)8	up to 2500	780	95	112	195	1000 ± 5%	box of 6	Paper + Polyester	19/17/11 NAS 8	1 µm
HDFC-N	By-pass filter HDU-300 / (H/M)8	up to 1000	370				500 ± 5%				
LDFC	By-pass filter LDU-(H/M)8	up to 600	230				225 ± 5%				
SDFC-P	All KLEENOIL filter rigs for filtration of water mixable lubricants	up to 2500	-	90		195	1000 ± 10%	box of 6	Polypropylene		< 10 µm