



Filter elements, two-stage for installation in wind turbines with filter housings

Type 65. filter elements



- ▶ Exchangeable with filter element 1300 R ... BN...HC/-B4-KE50
- ▶ Exchangeable with filter element 2600 R ... BN...HC/-B4-KE50
- ▶ Collapse pressure rating up to 15 bar [218 psi]
- ▶ Filter rating: 3 to 10 μm
- ▶ Operating temperature: $-10\text{ }^{\circ}\text{C}$ to $+100\text{ }^{\circ}\text{C}$ [$14\text{ }^{\circ}\text{F}$ to $212\text{ }^{\circ}\text{F}$]

Features

- ▶ Low initial pressure differential (ISO 3968)
- ▶ Special filter element design with two filtration stages for wind turbines
- ▶ With integrated bypass valve
- ▶ High dirt holding capacity and filtration performance due to multi-layer glass fiber technology and simultaneously a low initial pressure differential (ISO 3968)
- ▶ Highly efficient filter materials

Ordering code

of the type 65. filter element

01	02	03	04	05	06	07
65.			-	0	00	- B4 - M

Filter element

01	Design	65.
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Size

02	According to standard	1300
		2600

Filter rating in µm

03	Filter element	1st stage	= main filter, non-woven glass fiber media, absolute (ISO 16889), not cleanable	H3XL
				H6XL
				H10XL
		2nd stage	= protective filter, stainless steel wire mesh	G40

Pressure differential

04	Maximum admissible pressure differential of the filter element 15 bar [218 psi]	0
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Element design

05	Standard adhesive	0...
	Standard material	... 0

Bypass valve

06	4 bar [58 psi]	B4
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Seal

07	NBR seal	M
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Order example:

65.1300 H10XL/G40-000-B4-M

Preferred types

Filter elements

Type	Material no. filter element, filter rating in µm		
	H3XL	H6XL	H10XL
65.1300 H...XL/G40-000-B4-M			
65.2600 H...XL/G40-000-B4-M			

Function, section

The filter element is the central component of a filter assembly.

The actual filtration process takes part in the filter element. The main filter variables, such as size range of particle retention, dirt holding capacity and pressure loss are determined by the filter elements and the filter media used to construct them.

These filter elements are used to filter lubricants in wind turbines. The series 65. filter elements consist of two separate filter elements which are designed in series so fluid flows through one filter followed by the second filter and a bypass valve.

In order to achieve the cleanliness class, the outer filter element made of non-woven glass fiber media (1) serves as the main filter. The inner filter element (2) made of wire mesh serves as a protective filter in case of a cold start. The outer filter element (1) consists of a multi-layer combination of star pleated filter media which are laid around a perforated support tube. The bypass valve (3) is located in the cover of the filter element. The bypass valve has a cracking pressure of 4 bar [58 psi]. The inner filter element (2) has the same general design, except the filter material is different.

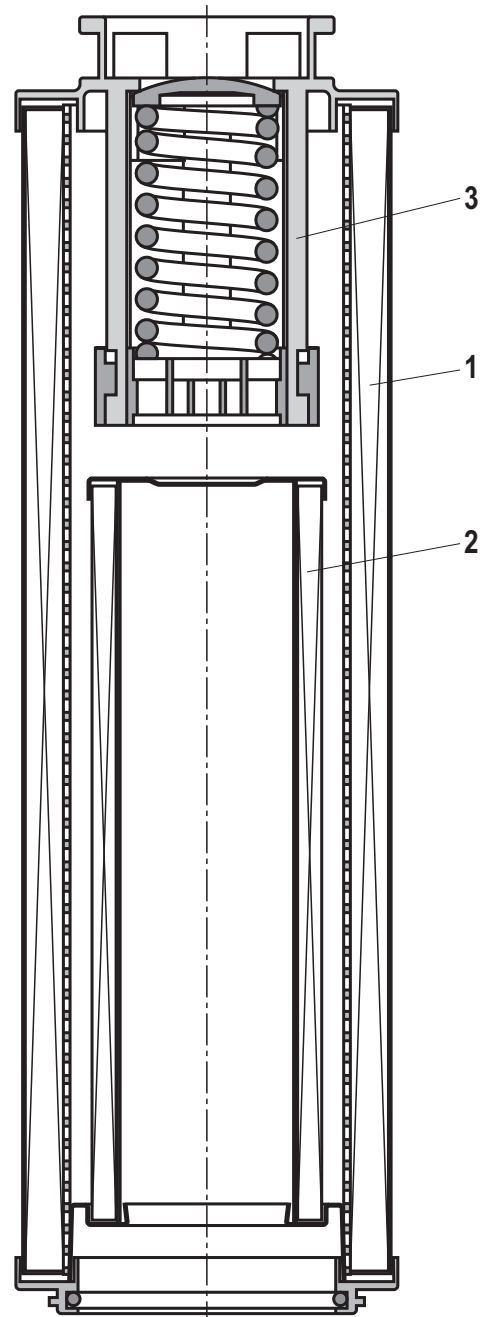
Possible operating conditions:

1. Normal operation with a clean filter element:

The fluid flows through the outer filter element (1). The bypass valve is closed. When the fluid flows to the filter outlet, it passes the inner filter element (2).

2. Cold start or highly contaminated outer filter element:

A very small portion of the fluid flows through the outer filter element (1). Nearly all of the fluid flow passes through the bypass valve, which is completely open. Through the open bypass valve, dirt particles get to the clean side of the outer filter element (1). But the inner filter element (2) still retains any coarse particles. Therefore, the downstream components are still protected, even under these bypass conditions.



Filter variables

Filter rating and attainable oil cleanliness

The main goal when using industrial filters is not only the direct protection of machine components but also to attain the target oil cleanliness.

Oil cleanliness is defined on the basis of oil cleanliness classes which classify how the amount of particles of the existing contamination is distributed in the operating liquid.

Filtration performance

Filtration ratio $\beta_{x(c)}$ (β value)

The retention capacity of hydraulic filters in a hydraulic system is characterized by the filtration ratio $\beta_{x(c)}$. This variable is the most important performance characteristic of a hydraulic filter. It is measured in the multipass test, and is the average value of the specified initial and final

pressure differential according to ISO 16889 using ISOMTD test dust.

The filtration ratio $\beta_{x(c)}$ is defined as the ratio of the particle count of the respective particle size on both sides of the filter.

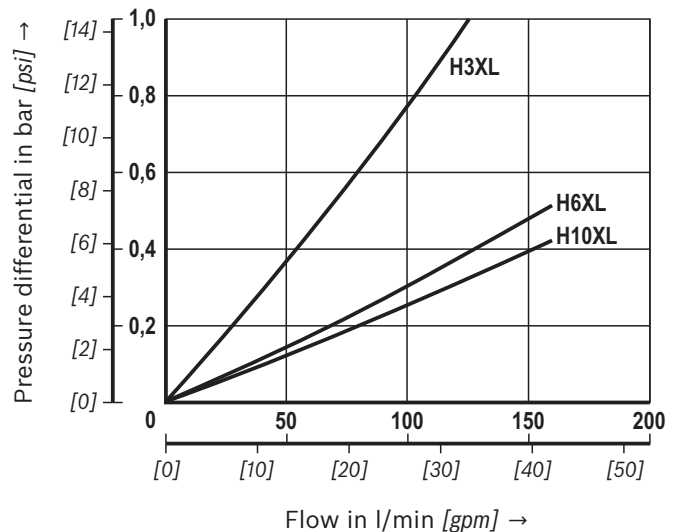
Dirt holding capacity

It is also measured using the multipass test and determines the amount of test dust ISOMTD which is fed to the filter medium until a specified pressure differential increase has been reached.

Pressure loss (also pressure differential or delta p)

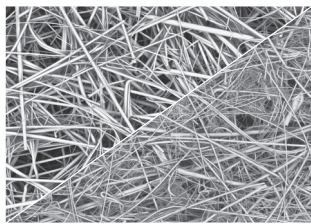
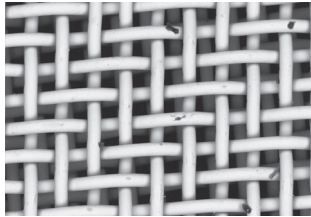
The pressure loss of the filter element is the relevant characteristic value for the determination of the filter size. The pressure loss with a clean filter element is recommended by the filter manufacturer or defined by the system manufacturer. This characteristic value depends on many factors, mainly: The rating of the filter media, its geometry and arrangement in the filter element, the filter area, the operating viscosity of the fluid and the flow. The term "delta p" is often also expressed with the symbol " Δp ".

When dimensioning the filter, an initial pressure loss is determined which must not be exceeded by the new filter element based on the aforementioned conditions. The following diagram shows the typical pressure loss behavior of filter elements with different filter media at different flows for a viscosity of 30 mm²/s [150 SUS].



Filter media

Overview

Filter media/set-up	Electron microscope image
H...XL, non-woven glass fiber media Depth filter, combination of inorganic non-woven glass fiber media filter medium. High dirt holding capacity due to multi-layer construction.	
G..., Stainless steel wire mesh material 1.4401 or 1.4571 Surface filter made of stainless steel wire mesh with supporting mesh.	

Technical data

(For applications outside these parameters, please consult us!)

general				
Ambient temperature range		°C [°F]	–40 ... +50 [–40 ... +122]	
Weight		Size	1300	2600
		kg [lbs]	4.2 [9.2]	9.2 [20.2]
Material	– Cover	Polyamide / tin-coated steel		
	– Base	Polyamide / tin-coated steel		
	– Support tube	Tin-coated steel		
	– Filter material	Non-woven glass fiber media / stainless steel wire mesh		
	– Bypass valve	Polyamide / steel		
	– Seal	NBR		
hydraulic				
Fluid temperature range		°C [°F]	–10 ... +100 [+14 to +212] (for short periods down to –20 [–4])	
Minimum conductivity of the medium		pS/m	300	
Filtration direction		From the outside to the inside		

Filter media

Technical data

Non-woven glass fiber media, H...XL

If the H...XL filter media is properly sized and applied, it achieves a high degree of cleanliness for lubri-cants. Due to its designed retention capacity (ISO 16889), it offers highly effective protection for machine and system components which are sensitive to contamination.

- ▶ H...XL depth filter made of inorganic glass fiber material

- ▶ Absolute filtration/defined retention capacity according to ISO 16889
- ▶ High dirt holding capacity due to multi-layer set-up
- ▶ Non-reusable filter (not cleanable due to the depth filtration effect)
- ▶ Attainable oil cleanliness classes according to ISO 4406 up to ISO code 12/8/3 and better

Filter rating and attainable oil cleanliness

Recommended oil cleanliness according to ISO 4406 (SAE-AS 4059)	Recommended filter medium
$\leq 18/13/10$ (5)	H3XL
$\leq 19/14/11$ (6)	H6XL
$\leq 20/16/13$ (8)	H10XL

Filtration ratio $\beta_{x(c)}$ (β value)

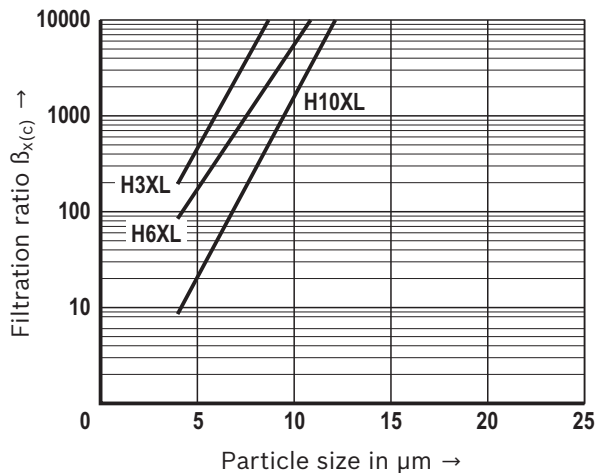
Typical β values of up to 2.2 bar [31.9 psi] Δp pressure increase at the filter element ¹⁾

Filter medium	Particle size "x" for different β values, measurement according to ISO 16889		
	$\beta_{x(c)} \geq 75$	$\beta_{x(c)} \geq 200$	$\beta_{x(c)} \geq 1000$
H3XL	4.0 $\mu\text{m}(c)$	< 4.5 $\mu\text{m}(c)$	5.0 $\mu\text{m}(c)$
H6XL	4.8 $\mu\text{m}(c)$	5.5 $\mu\text{m}(c)$	7.5 $\mu\text{m}(c)$
H10XL	6.5 $\mu\text{m}(c)$	7.5 $\mu\text{m}(c)$	9.5 $\mu\text{m}(c)$

¹⁾ Filtration ratio $\beta_{x(c)}$ for other filter media upon request

Filtration ratio $\beta_{x(c)}$

as a function of the particle size $\mu\text{m}(c)$



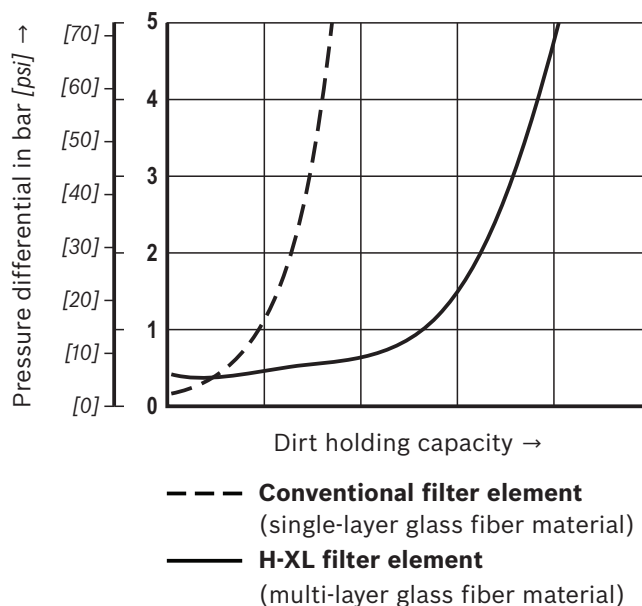
Filter media

For further information regarding filter elements as well as to contamination and oil cleanliness control, see our publications or specific brochures.

Dirt holding capacity

Compared to conventional filter media with single layer construction, the H...XL non-woven glass fiber media features a high dirt holding capacity because it is made of two separate filter layers connected in series.

Superior dirt holding capacity of H...XL filter elements



Stainless steel wire mesh, G...

Wire mesh G40

As surface filters, these materials are generally cleanable. Due to their fine mesh, however, cleaning is more difficult than with coarser filter mesh.

Filter medium	Design	Mesh size	Attainable oil cleanliness ¹⁾
G40	Woven mesh	40 µm nom.	No specification possible

¹⁾ According to ISO 4406 for particles $\geq 4 \mu\text{m}(c)$, $\geq 6 \mu\text{m}(c)$ and $\geq 14 \mu\text{m}(c)$

Compatibility with hydraulic fluids

Hydraulic fluid	Classification	Suitable sealing materials	Standards
Mineral oil	HLP	NBR	DIN 51524
Bio-degradable – insoluble in water	HETG	NBR	VDMA 24568
Flame-resistant – containing water	HFAS, HFAE	NBR	DIN 24320
	HFC	NBR	VDMA 24317



Important information on hydraulic fluids!

- For more information and data on the use of other hydraulic fluids, please refer to data sheet or contact us.
- **Flame-resistant - containing water:** Due to possible chemical reactions with materials or surface coatings of machine or system components, the service life with these hydraulic fluids may be less than expected. Filter materials made of filter paper P... (cellulose) may not be used, filter elements with filter materials

made of glass fiber (HydroClean H...XL or wire mesh G...) have to be used instead.

- **Bio-degradable:** If filter materials made of filter paper P... are used instead of HydroClean H...XL, the filter life may be shorter than expected due to material incompatibility and swelling.

Installation, commissioning and maintenance

When must the filter element be exchanged?

As soon as the dynamic pressure or the pressure differential set at the maintenance indicator is reached, the red push button of the optical-mechanical maintenance indicator pops out. If there is an electronic switching element, an electric signal output is also provided. In this case, the filter element has to be replaced.

Filter elements should be replaced after 6 months at minimum.

Notice!

Depending on the design of the filter size, the maintenance indicator may reach the set dynamic pressure or pressure differential during start-up of the hydraulic system. The electrical signal will go out after the operating temperature has been reached.

If the maintenance indicator signal is ignored, the increasing pressure differential may damage the filter element causing it to collapse.

Filter element exchange

- Switch off the system and discharge the filter on the pressure side.

Also refer to the relevant system maintenance instructions.

Warning:

Filters are containers under pressure. Before opening the filter housing, check whether the system pressure in the filter has been decreased to ambient pressure. Only then may the filter housing be opened for maintenance. Detailed instructions with regard to the filter element exchange can be found on the relevant data sheet of the filter series manufacturer.

Directives and standardization

filter elements are tested and quality-monitored according to different ISO test standards:

Filtration performance test (multipass test)	ISO 16889:2008-06
Δp (pressure loss) characteristic curves	ISO 3968:2001-12
Compatibility with hydraulic fluid	ISO 2943:1998-11
Collapse pressure test	ISO 2941:2009-04

The development, manufacture and assembly of industrial filters and filter elements is carried out within the framework of a certified quality management system in accordance with ISO 9001:2000.