

Alfa Laval Hydraulic Control Oil filter

Automatic oil filtration for MAN E.S. ME-engines

Introduction

The two-stroke propulsion engine landscape has evolved in recent years to cope with ever-more stringent IMO emissions regulations and a general drive for increased energy efficiency.

Market leader MAN Energy Solutions in particular has rolled out their now-standard "ME" engine range, where high pressure hydraulic oil is used to actuate the fuel injection system. Highly sensitive to particle pollution, this system has created the need for a new generation of very fine automatic oil filter.

Alfa Laval has stepped up to the challenge and created their HCO filter range, fully validated by MAN E.S. and able to cover their full range of ME propulsion engines.

Application

The Alfa Laval filter range for Hydraulic Control Oil builds on the innovative Alfa Laval Atrium. This technology allows continuous backflushing with virtually no pressure drop and enables a large filtering area using less space than traditional automatic backflushing filters. Backflushing efficiency is also enhanced by the improved distribution system.

Benefits

Maximized engine uptime, maximized profit!

The Alfa Laval Hydraulic Control Oil filter range ensure your engine is running under the best possible conditions. The fuel injection valves are protected from early wear by genuine fine filtration and virtually no oil pressure drop. The engine availability is maximized.

Compact by design

Thanks to its innovative filtering element design and distribution system, the Alfa Laval Hydraulic Control Oil range offers the most compact solution on the market across the whole range, with footprints up to 120% smaller for the 46 mm bore size, and up to 110% smaller for the 60 mm bore size, compared to other products on the market. The filter is easy to integrate and install.



Easy to install and operate

No additional power, compressed air connection, pump or dedicated tank are required. The Alfa Laval Hydraulic Control Oil filter range is designed for quick and painless installation, for all the MAN E.S. ME engine range.

Predictable and simple maintenance routines

The large filtering area and continuous backflushing protect the filter mesh from early wear, thereby prolonging the maintenance intervals. Users can easily plan for routine oil polishing operations on the redundancy filter and preventive inspections at regular planned intervals with full peace of mind. With few parts to disassemble, maintenance is also quick and easy.

Design

All products of the Hydraulic Control Oil product range are engineered for the same objective: very fine particle filtration with virtually no pressure drop. The Atrium technology gives the best footprint-to-filtering surface ratio available on the market.

The filters are configured with a redundancy filter which can be easily put in operation during maintenance or for routine oil polishing operations by actuating the change-over valve.

Disc-shaped filter elements

The main components of the Alfa Laval HCO filter are disc-shaped Atrium filter elements (Figure 1) assembled into a disc stack. One filter element is comprised of two identical halves.

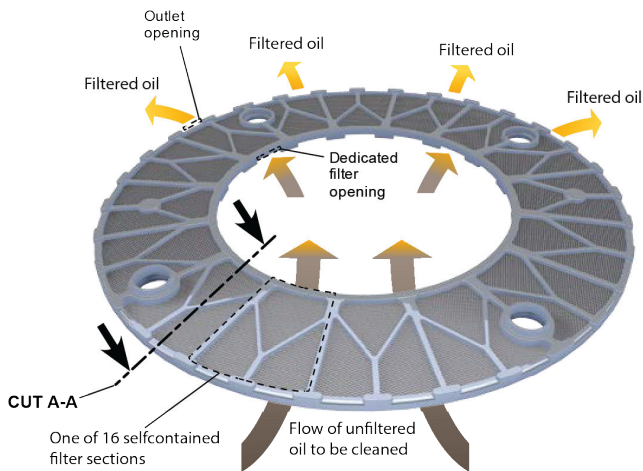


Figure 1. Alfa Laval Atrium filter element

Ribbed aluminum filter frame

Each half includes a stack of filter media housed in an aluminum frame with ribbed sections (Figure 2). The filter media has three layers: two outer layers to provide support and fatigue resistance and a fine filter layer in the middle.

Wide opening for oil inlet and outlet

The Alfa Laval Atrium technology also features a special arrangement of the filter mesh for wider openings at the inlet and outlet than conventional filters. These enlarged openings smooth the passage of oil through the filter (Figure 3).

High-efficiency redundancy filter

The redundancy insert is designed with a high retention capacity for very small particles, exceeding the specifications of MAN Energy Solutions while maintaining low pressure drop.

Operating principle

A fraction of the coarsely pre-filtered main lubrication oil flowrate is diverted to the hydraulic control oil system via the fine HCO filter, and then to the engines fuel injection valves (FIVA). The outlet oil is filtered to $6\mu\text{m}$ to protect the hydraulic control oil system, sensitive to fine particulate pollution and low pressure. The filter backflush flow is treated in the diversion chamber and directly re-circulated to the oil tank.

The high-efficiency redundancy filter can be periodically put in service to polish the oil quality and remove very fine pollutants that may have accumulated in the oil loop.

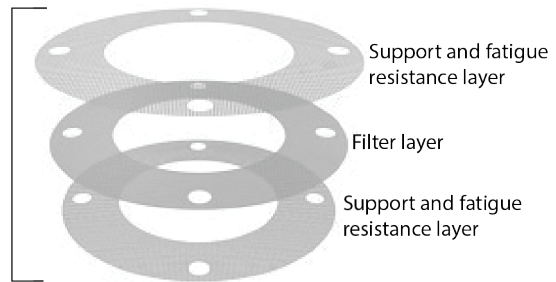


Figure 2. Alfa Laval Atrium technology is comprised of three layers housed in a filter frame.

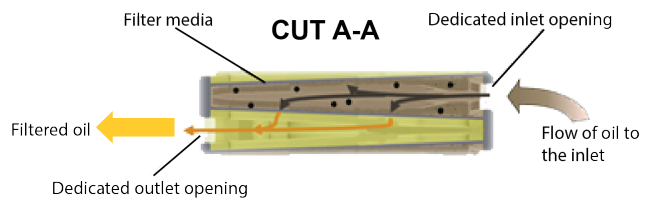


Figure 3. Cross-section of Alfa Laval Atrium filter element.

Optimized flow distribution system

Each filter element features a highly optimized flow distribution system (Figure 5). Ribs in the aluminum filter frame separate each element into several self-contained sections. The filter elements are tightly stacked together, creating filtration columns sized to meet the capacity requirements of the engine. A finned shaft is inserted into the element stack central channel. Each fin of the shaft perfectly aligns with the elements' axial ribs, thereby centering the vertical distribution channels with the inlet openings of each independent filtration column.

Self-powered hydraulic drive

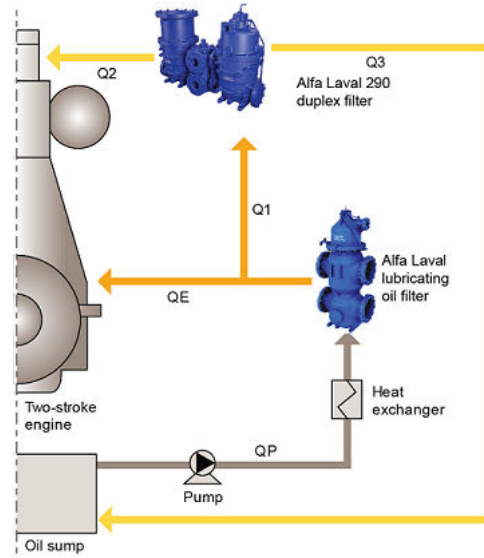
A hydraulic motor located on top of the filter housing and driven by the system pressure actuates a distributor. The distributor, in contact with the finned shaft, rotates continuously to feed oil to most of the columns and simultaneously collect backflushed oil from one of the columns. An indicator shows the rotation of the hydraulic motor and can also be actuated manually in case of emergency.

Continuous backflushing

Solids collect on the filter medium and the filtered oil flows to the engine FIVA. A small amount of the filtered oil, typically about 3%, is used to backflush one of the filtration columns and remove all the previously collected solids. The oil is taken through an internal passage in the distributor, which rotates at continuous intervals to backwash each filtration column. In this way, all the columns are backflushed once per full rotation of the distributor. Backflushed oil is then re-circulated back to the oil tank for cleaning.

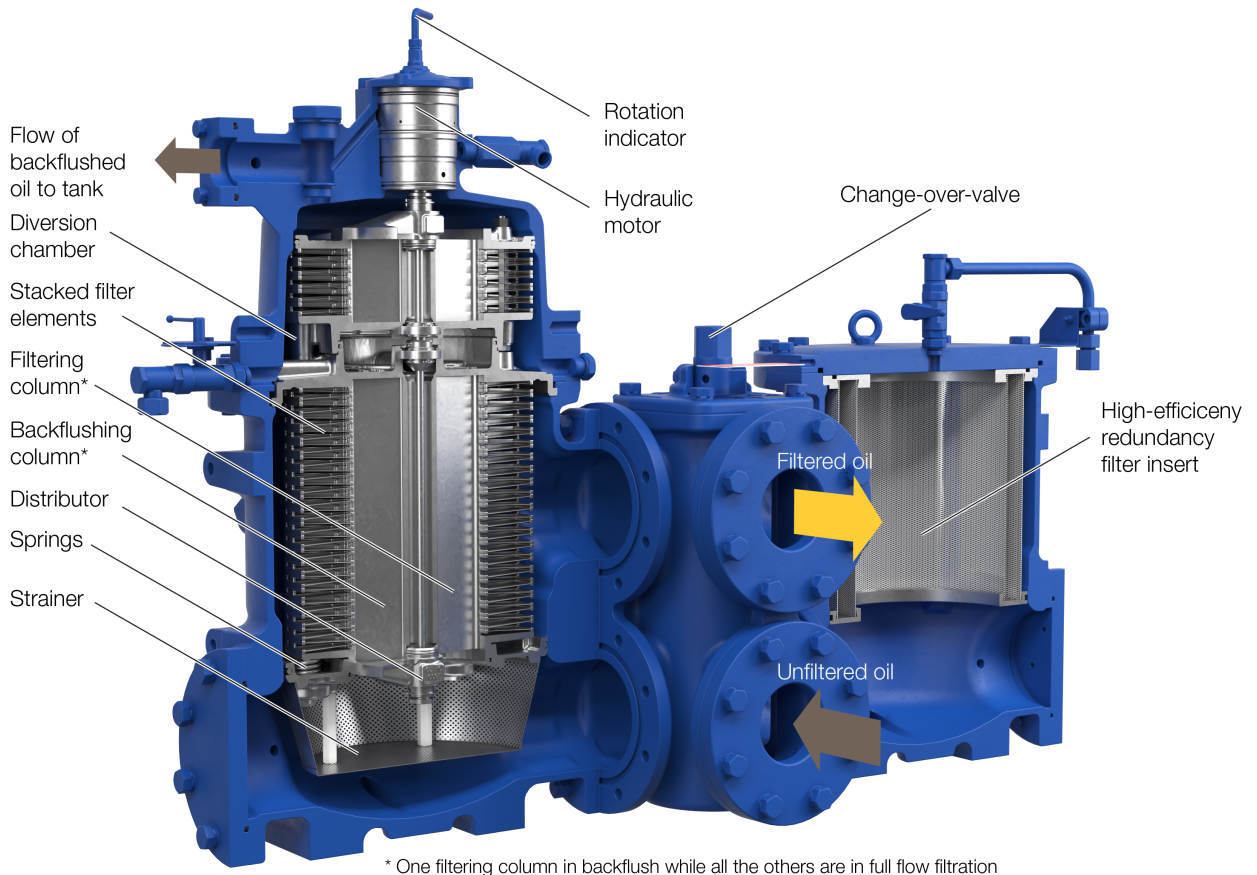
Highly efficient sludge removal

For highly efficient removal of solids in the backflushed oil, Alfa Laval Hydraulic Control Oil filters are fitted with an integrated diversion chamber, which is an automatic second stage filter. It ensures continuous solids removal from the system, even when the high-efficiency redundancy filter is not in operation. It is actuated by the same hydraulic motor as the primary filtration stage and requires no additional pump or separate tank.



QP = Lubricating oil pump capacity
 Q1 = Maximum capacity of the filter
 Q2 = Hydraulic control oil flow to the engine
 Q3 = Flow of backflushed cleaned oil
 QE = Lubricating oil flow to the engine

Figure 4. Schematic diagram of a two-stroke engine system using Hydraulic Control Oil.



* One filtering column in backflush while all the others are in full flow filtration

Figure 5. Cross-section of an Alfa Laval HCO filter.

Technical data

Filtration grade	6 µm abs
Normal filter outlet pressure	0.8-4 bar
Max. filter inlet pressure	7 bar
Min. filter outlet pressure	0.8 bar
Max. viscosity	112 cSt
Max. temperature	70°C
Alarm (pressure drop)	0.8 bar
Backflushing flow	3%
Test pressure	14 bar
Housing material	Cast iron
Filter medium material	Stainless steel

Class Certification

BV, LRS, CCS, ABS, DNV-GL

KR, NKK, RINA, MRS

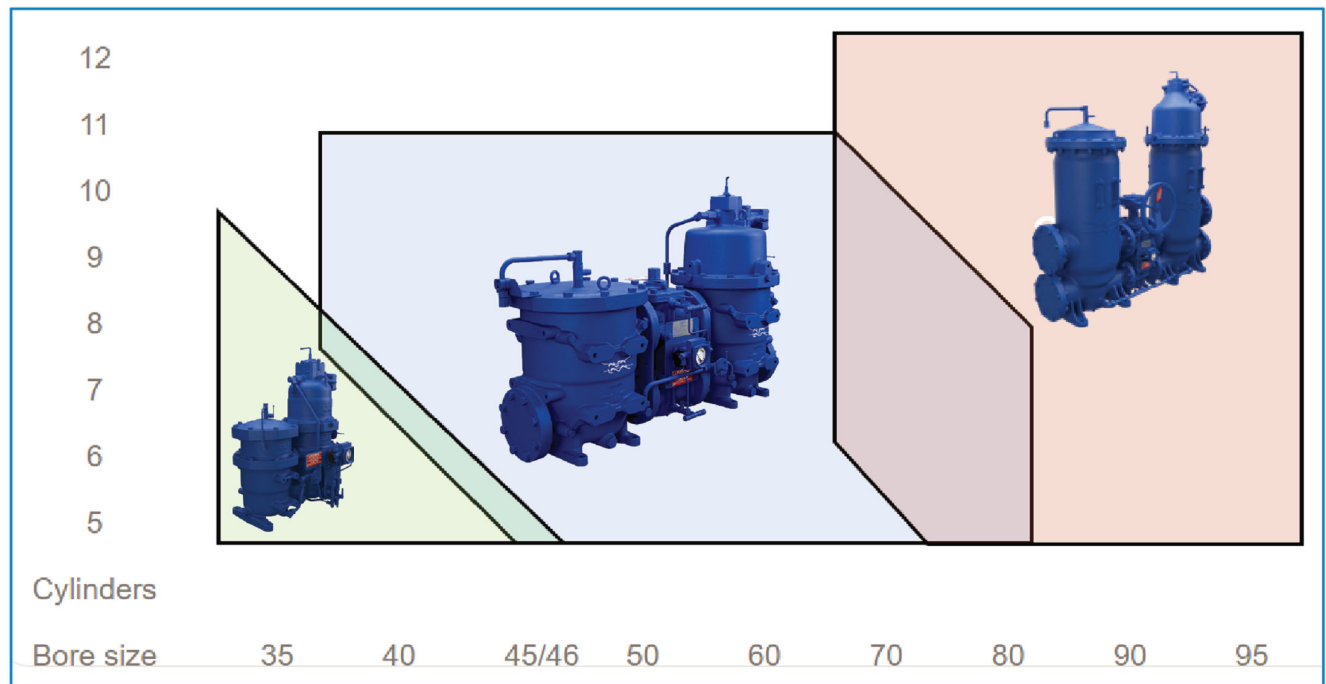
Dimensions

Dimensions			
	180DM range	290DM range	350DM range
Length (mm)	690	1367	1803 to 2387
Width (mm)	543	451	633 to 797
Height (mm)	816 to 992	905 to 1395	1861
Weight (kg) (in operation)	230 to 268	487 to 713	1382 to 2636



Product range

The Alfa Laval Hydraulic Control Oil filter range is available for all MAN Energy Solutions ME engines from 35 mm bore size to 95 mm bore size.



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