



ULTIPOR III FILTERS

High Performance
Filtration for
Hydraulic and
Lubricating Systems

Pall worldwide

Pall Corporation, founded by Dr. David B. Pall in 1946, is a global company with manufacturing facilities on three continents and subsidiaries throughout the world including locations in Austria, Brazil, Canada, France, Germany, Italy, Japan, Korea, Poland, Singapore, Spain, Switzerland, United Kingdom, and the United States, plus distributors in virtually every industrialized country.

Pall employs more than 6,500 people in the design, manufacture, sale and technical service of fluid clarification products for the aeropower, fluid processing, and health care markets. A focused scientific, R&D, and marketing organization identifies and develops specialized products to serve each market.

Since our first hydraulic filter application in the early 1950s,—dedication to our customers has enabled Pall to become the world's largest manufacturer of high performance filters for hydraulic, lubrication, and flushing applications.

Pall Corporation follows a simple but important credo call EESSES. Pall strives to do what eases the way for our customers by providing Ease of use, Economy of use, Safety, Efficacy, and Service.

Leadership in fluid clarification

Pall Corporation has nearly 50 years of pre-eminence in the field of fluid clarification with a worldwide reputation for excellence. For users of fluid powered and lubricated machinery, Pall Industrial Hydraulics has developed and promoted the concept of Total Cleanliness Control for reliable and economic system performance. Through its technical leadership, Pall has introduced a number of notable firsts in the last four decades.

1950-1960

- Dr. Pall introduced the concept of contamination control and filter media development for special applications in fluid power.

1960-1970

- Introduction of the "wear control" theory for fluid systems.
- Introduction of the original proprietary synthetic "Ultipor" filter medium with:
 - universal fluid compatibility
 - fixed pore construction in a disposable filter configuration.

1970-1980

- Introduction of Scientific and Laboratory Services and Technical Support Groups for on-site problem-solving expertise.
- Introduction of multi-pass performance ratings for filters.
- Introduction of Dirt-Fuse filter elements for use with non-bypass systems for ultimate component protection.
- Introduction of dynamic oil filterability testing.

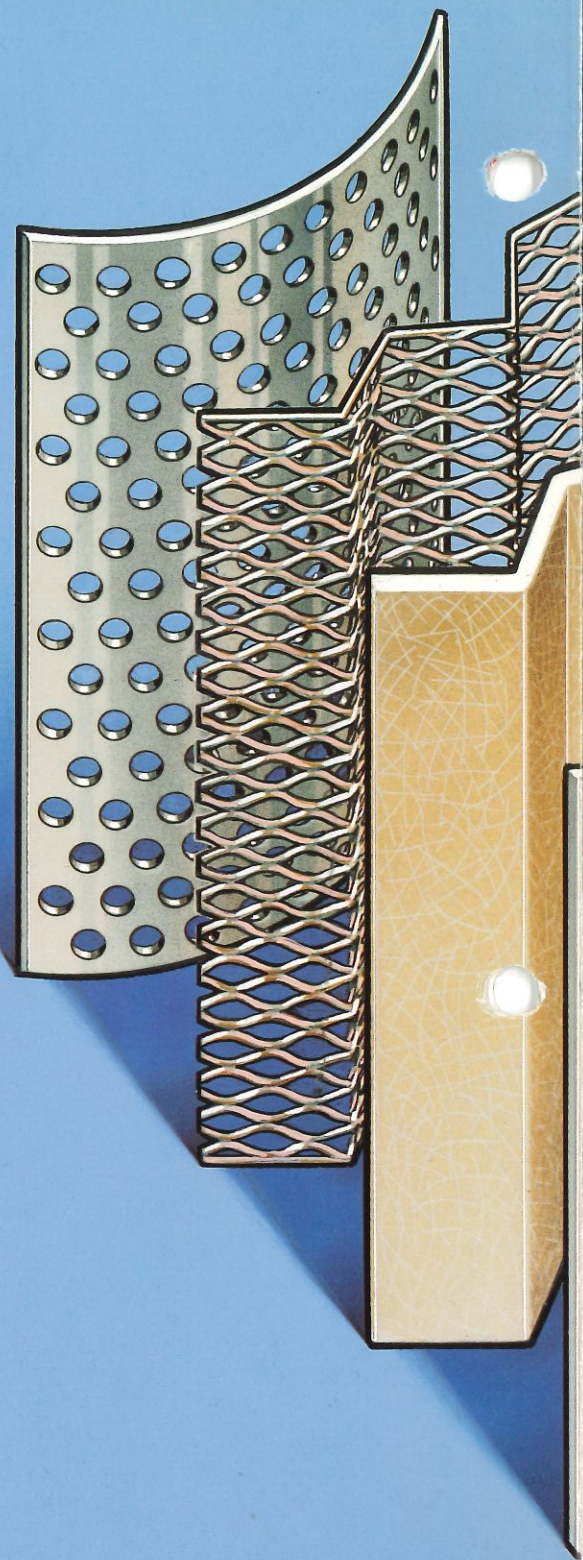
1980-1990

- Documentation of the benefits of filters with high Beta performance for bearing and lubrication system protection.
- Introduction of Ultipor II filter elements using a new filter support structure, stronger fiber bonding and graded pore media to achieve longer service life.
- Introduction of the Pall Cleanliness Code to evaluate cleanliness control of critical clearance-sized particles.

1992...

- Introduction of Ultipor III high performance filter elements with a unique "composite" construction for economically maintaining consistent fluid cleanliness.

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Ultipor III high performance filters — the new generation

Ultipor III filter elements are the third generation of Ultipor cleanliness control products. Pall continues to redefine the state-of-the-art in fluid clarification technology to advance the performance of hydraulic, lubrication and flushing systems. This enables industry in the '90s to adopt new component and system design advances with confidence.

Unique "composite" structure for unparalleled performance integrity.

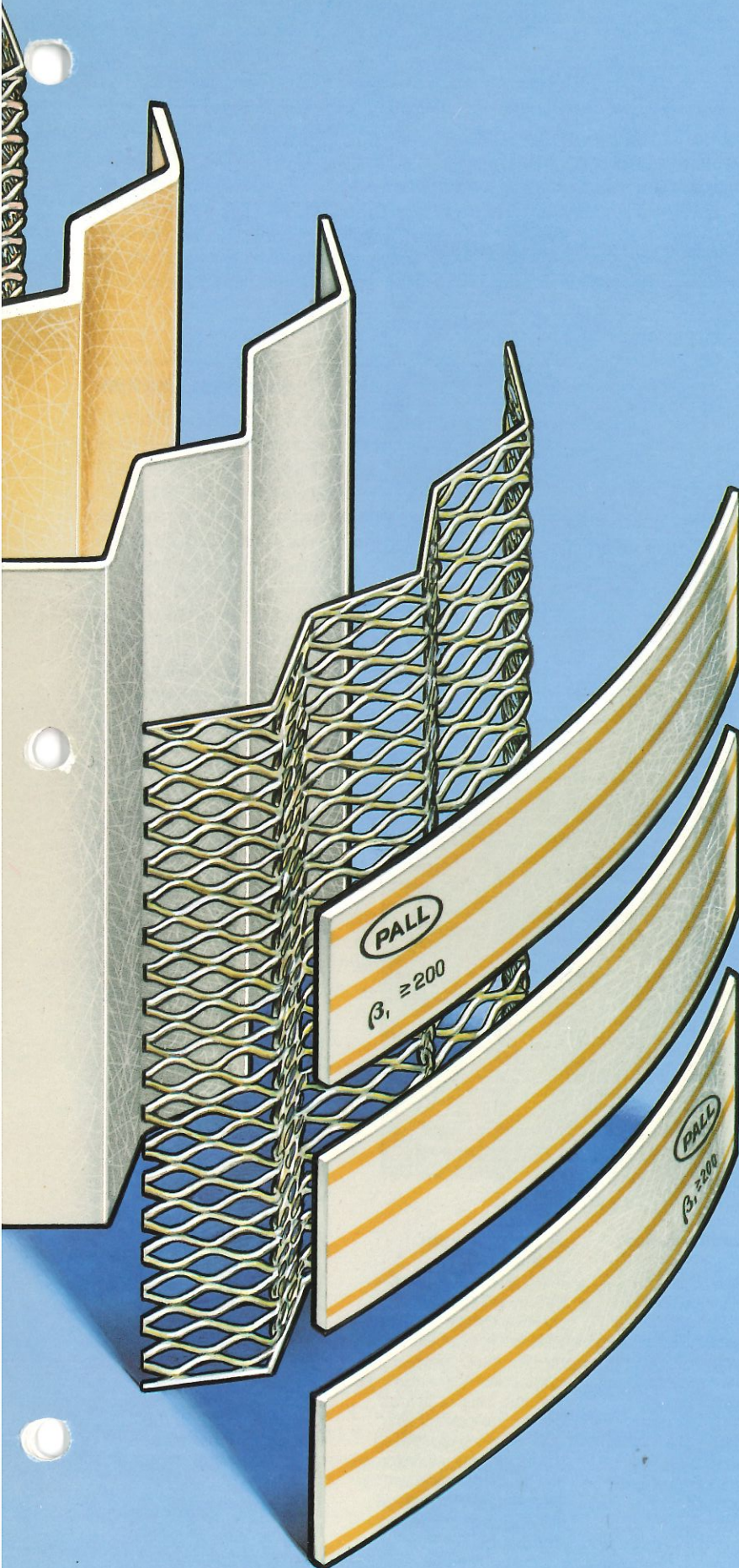
Optimized element design for longer service life and lower operating costs.

$\beta_x \geq 1000$ rating ensures critical particle control for rapid flushing and fluid clean-up.

Elements validated to the widest range of international performance standards.

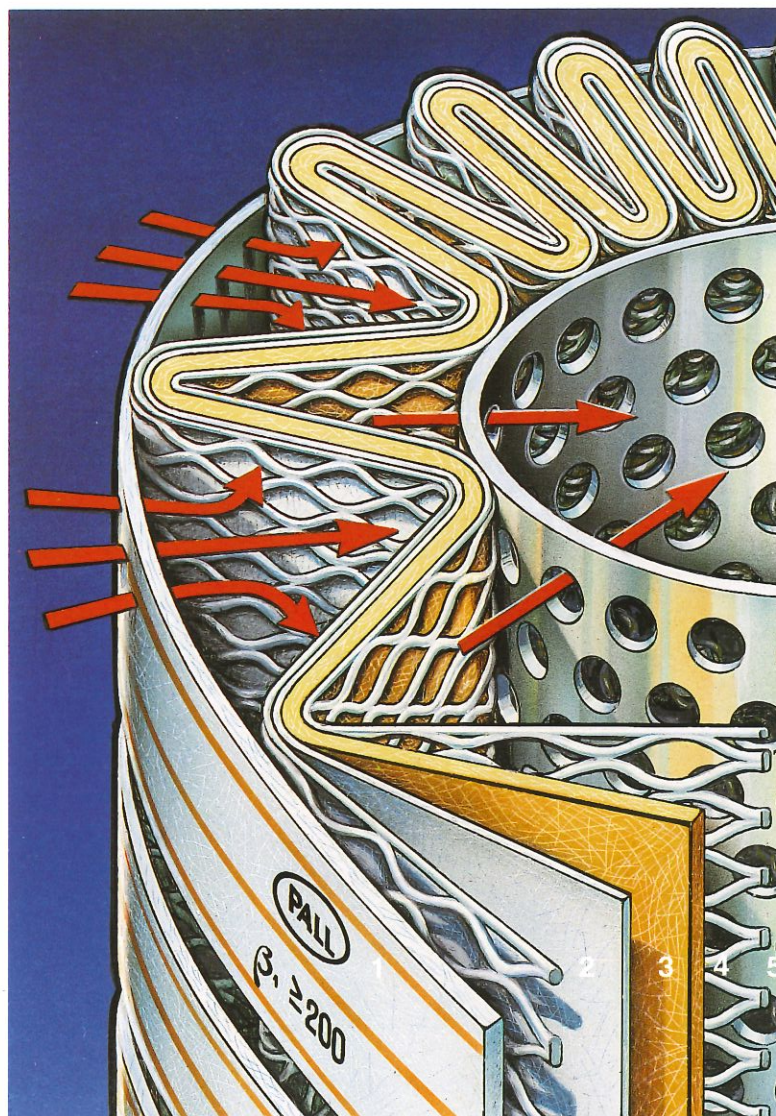
The technical excellence of Ultipor III filters is characterized by increased profitability through increased:

- Machine availability
- Fluid life
- Element service life
- Productivity
- Operating economy



Ultipor III composite filter structure

Industry today demands increased, more reliable equipment performance with "predictive maintenance" programs focusing on extending machine availability and productivity. Pall Industrial Hydraulics continues to respond to the needs of today's filter users with the introduction of Ultipor III filters.



1. Helical wrap

Elements are tightly spiral wrapped, each pleat is bonded to the spiral wrap for stable pleat spacing. This allows complete medium utilization even under severe duty conditions such as high viscosity, cold starts and flow surges. It further ensures uniform diffused flow throughout the length of the filter, optimizing element pressure drop and service life.

2. Upstream support

A unique combination of rugged proprietary nylon mesh and open synthetic high strength support material optimizes flow distribution and strength.

3. Ultipor III medium

Composed of proprietary inert, inorganic fibers bonded with proprietary resin into a tapered pore structure, Ultipor III media are manufactured by Pall exclusively for use in Pall products. These media are manufactured to exacting procedures and strict quality control.

4. Downstream support

Integral medium substrate and rugged proprietary nylon mesh provide additional filter medium support during cold starts and extended service. Ultipor III filter performance remains consistent and reliable throughout its service life, and from element to element, regardless of variations in operating conditions.

5. Filter hardware

O-ring seal ensures positive sealing between the filter element and housing, preventing bypass flow and maintaining integrity of filter performance. Corrosion resistant endcaps and rugged metal inner core complete the element structure.

Performance integrity

Fluid power filtration applications differ in a variety of areas such as duty cycle and operating environment. However, all filter users require that their filtration systems provide consistent, high performance cleanliness control. Ultipor III

elements, with their unique composite construction, give users the confidence of superior performance in all applications including severe duty cold start and high pulse flow conditions. With

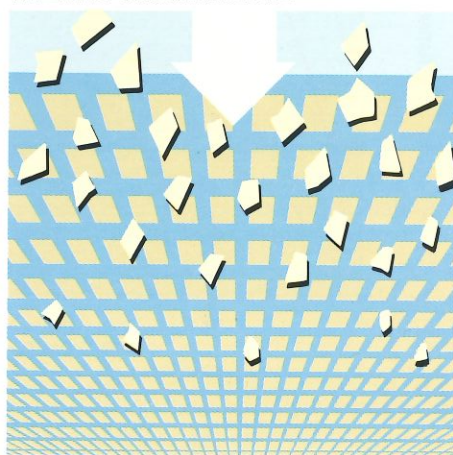
this design, element pleats are resistant to movement and/or collapse—occurrences which limit the available filter flow area during operation and which can lead to loss of filter integrity.

Tapered pore design

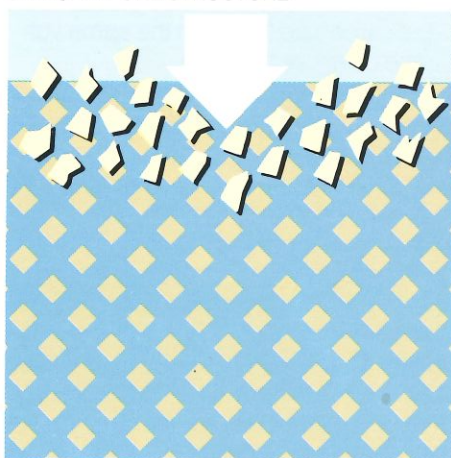
The unique tapered pore design of Ultipor III media allows users to reduce operating costs by combining maximum particle retention with extended service life. The effective protection of critical components, along with longer element service intervals, increases profitability of the operation through more reliable system performance and lower maintenance and disposal costs.

The tapered pore construction of the medium enables the coarser upstream surface to act as a prefilter, capturing larger particles and allowing finer downstream pores to capture critical clearance-sized particles. The use of small diameter fibers leaves more void volume to hold contaminant compared to conventional glass fiber media of similar pore size, but made with thicker fibers. With this design, Ultipor III elements give both longer service life and higher cleanliness control than other synthetic filter media available today.

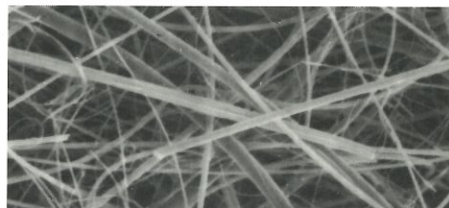
TAPERED PORE STRUCTURE



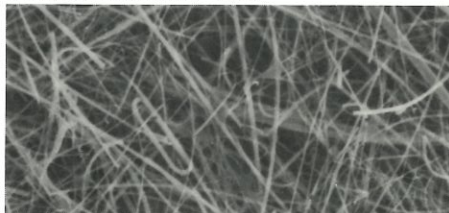
UNIFORM PORE STRUCTURE



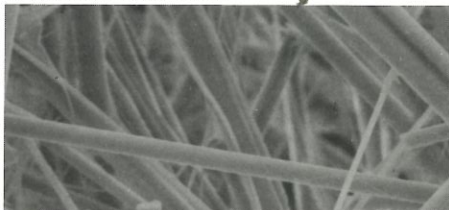
UPSTREAM PHOTO 500X



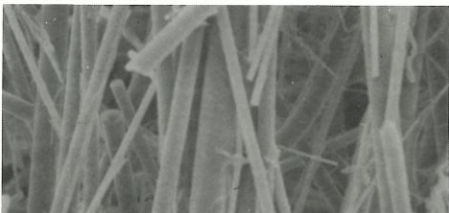
DOWNSTREAM PHOTO 500X



UPSTREAM PHOTO 500X



DOWNSTREAM PHOTO 500X



Bonding

To be effective, an element must not only collect dirt, but retain it under pressure and when subjected to flow surges and other stresses. Ultipor III medium maintains its fixed pore structure to ensure captured particles are retained. A

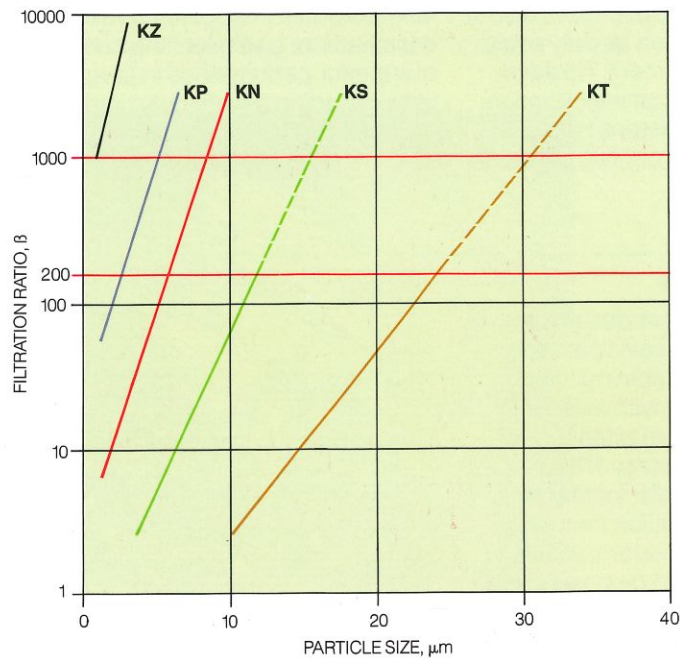
medium with poorly bonded fibers will deform and fatigue under pressure and flow fluctuations, resulting in unloading of contaminant, medium migration and ineffective particle control. The Ultipor

III medium fiber matrix is bonded with specially formulated Pall proprietary resins which resist deterioration from pressure and flow fluctuations, water contamination, or age.

Specific particle control

Pall designs and produces proprietary Ultipor III media to obtain specific particle control to protect critical clearances.

A steep Beta curve profile demonstrates a medium with consistent, stable pore structure and high Beta performance across the selected particle range. Flatter curves are indicative of media with inconsistent pore structure and lack of control over the particle range.



PALL

$\beta_1 \geq 200$

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$\beta_3 \geq 200$

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$\beta_6 \geq 200$

PALL

$\beta_{12} \geq 200$

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$\beta_{25} \geq 200$

Beta ratio

The separation capability of a filter is presented as a *filtration ratio* Beta sub x (β_x), defined as "the ratio of the number of particles greater than a given size

(x μm) in a given volume of influent fluid to the number of particles greater than the same size (x μm) in the same volume of effluent fluid."

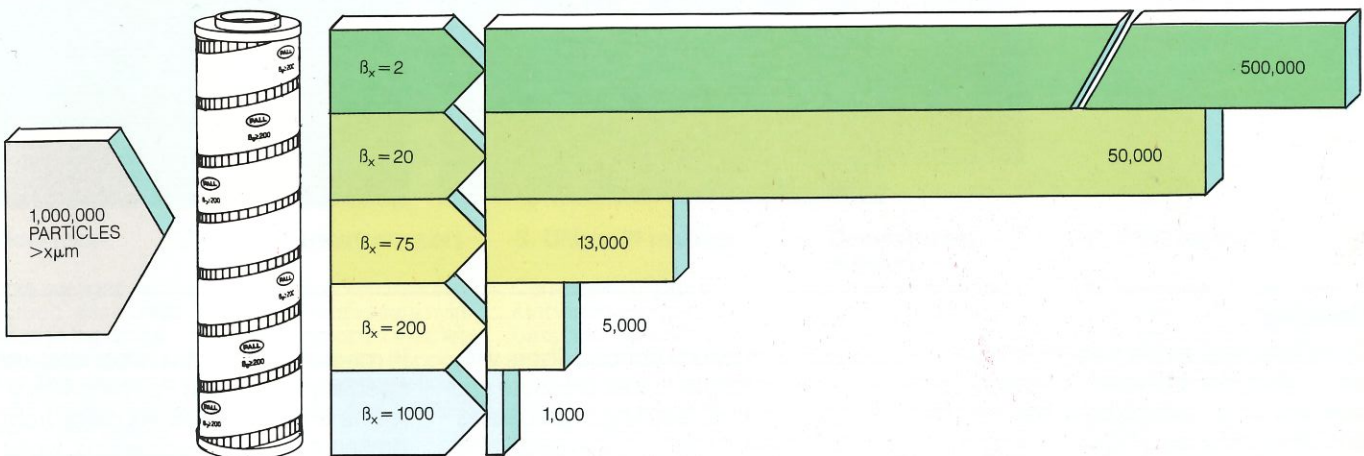
$$\text{Filtration Ratio } \beta_x = \frac{\text{Number of upstream particles larger than } x \mu\text{m}}{\text{Number of downstream particles larger than } x \mu\text{m}}$$

Higher beta values

CONTAMINANT CHALLENGE

FILTER RATIO

DOWNSTREAM FLUID QUALITY



If a filter is challenged with 1,000,000 particles of a size > x μm, its Beta value will determine how many particles pass downstream. Ultipor III filter elements with a filtration ratio of $\beta_x = 200$ ensure cleaner fluids for system reliability with lower filter operating costs.

Ultipor III filter specifications and performance

Multi-pass filter rating:

[ANSI(NFPA)T3.10.8.8R1 and ISO 4572 modified for silt control with in-line particle counting]

Operating Systems:

Time average Beta ratio ≥ 200 at 1, 3, 6, 12 or 25 micrometres.

Flushing:

Time average Beta ratio ≥ 1000 at 1, 5.3 or 8.3 micrometres.

Element collapse pressure ratings:

[ISO 2941]

Pressure Line Filters: 290 psid (20 bar)

Return Line Filters: 150 psid (10 bar)

8310 Series Filters: 100 psid (7 bar)

Fluid compatibility:

[ISO 2943]

Compatible with petroleum oils, water glycols, water-oil emulsions and high

water content fluids. Fluorocarbon seals are available for industrial phosphate esters, diesters and specified synthetics.

Flow fatigue:

[ISO 3724]

Contact factory; composite element structure incorporates upstream and downstream medium support to achieve maximum fatigue cycle life.

Fabrication integrity:

[ISO 2942]

Fabrication integrity is verified and assured during the manufacturing process by numerous evaluations and inspections including bubble point testing.

Flow/ ΔP :

[ISO 3968]

Consult specific product brochures by series.

Quality control:

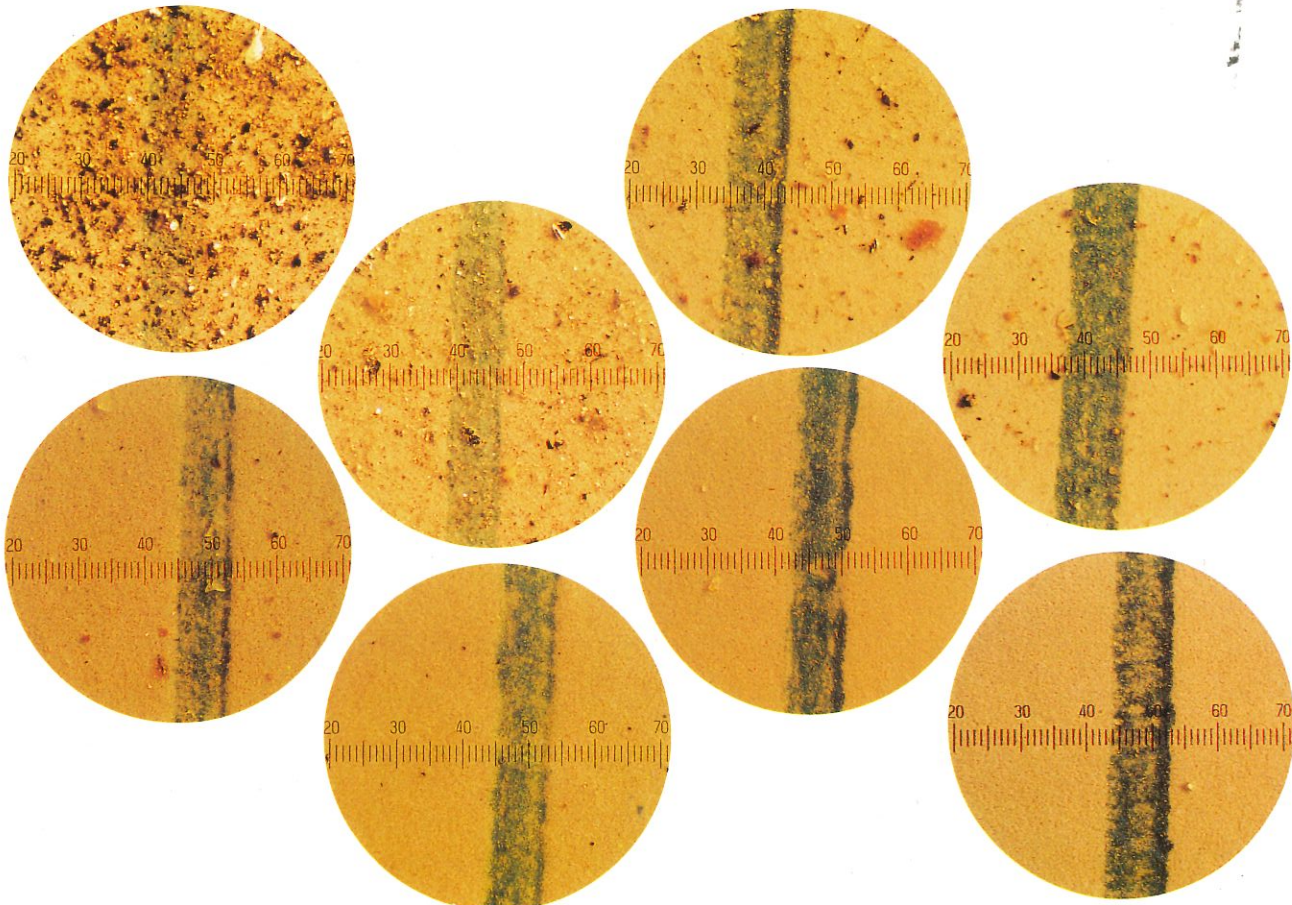
Ultipor III media are manufactured by Pall to exacting procedures and strict quality controls. Ultipor III elements are checked against rigorous, ongoing validation test protocols within Pall.

Filter element hardware:

Corrosion-protected carbon steel end caps and core.

Temperature range:

Nitrile Seals: -40°F (-40°C) to $+250^{\circ}\text{F}$ ($+120^{\circ}\text{C}$)





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Distributed by:



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