Pall Corporation

Ultipleat® High Flow Technology

Keep your condensate clean and reduce power plant start-up

Filtration. Separation. Solution.SM

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Ultipleat High Flow Technology

Description

- Reduce chemistry holds by up to 50 %
- Help eliminate contamination-related boiler tube failures
- Superior flow characteristics for smaller footprint and lower capital costs
- Cost-effective solution to reduce start-up time and increase boiler reliability

Ultipleat High Flow technology controls metal and silica solid contamination in condensate water to reduce or eliminate boiler tube failures, and drastically shorten chemical holds during start-up.

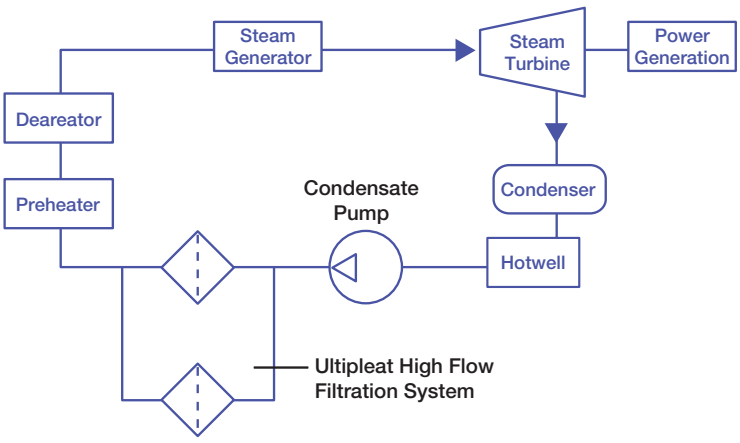
Metallics and silica present a tremendous challenge to water chemistry and integrity, especially during plant start-up. Ultipleat High Flow condensate filter systems are designed to rapidly deplete the system of its particulate iron and silica. By controlling iron and silica in their solid state at very high efficiency, Ultipleat High Flow condensate filters allow for rapid start-up without the risk of formation of soluble contaminants at higher temperatures. This can result in 50 % shorter chemical holds due to iron and silica. High efficiency filtration can serve as a perfect complement to chemical treatment by taking the brunt of the contaminant challenge. The result is more precise and efficient chemical treatment with reduced chemical costs.

The Ultipleat filter vessels are multi-element, code or non-code stamped, and can be applied to a wide range of flow rates, whether on start-up or in continuous mode. Their design makes the element easy to service, yet the element sealing mechanism allows replacement with maximum filtration integrity.

Ultipleat High Flow filters also protect boiler tubes during normal operation. Full flow filtration at high efficiency during continuous operation can significantly reduce instances of water wall boiler tube failures. The high capacity of the Ultipleat High Flow filter elements minimizes the size and cost of the filter installation.

Ultipleat High Flow filter elements allow superior flow characteristics through the filter medium, combining superior removal efficiency with a lower flow resistance and extended service life. The element's inside-out flow configuration enables easy replacement ensuring the contaminants remain inside the element. The filter elements can be compacted, incinerated or shredded for disposal, thanks to their metal-free construction.

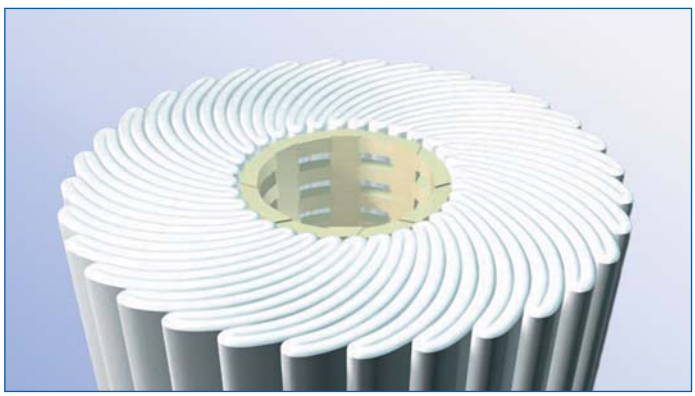
Typical Installation



Ultipleat housing designs and sealing mechanisms allow for easy element changeout.

Uniform flow and improved pleat stability

The characteristic feature of the Ultipleat construction is that the fluid flow is uniform across the entire filter medium surface since the flow channel is the same width and length on both sides of the pleated filter medium. This uniform flow is maintained, even with high differential pressures across the element due to the filter's unique upstream support and downstream drainage layers. These layers, which sandwich the filter medium, hold these flow channels open. Lastly, the pleats are held in place and prevented from deforming by the patented external helical wrap that is bonded to each pleat tip along the outer diameter of the cartridge.



The unique pleat design extends element life while maintaining superior solid contamination removal efficiency.

The tapered pore filter medium combines excellent dirt capacity with low pressure drop. The absolute rating of the elements, and their integrity in challenging environments result in precise and consistent water quality.

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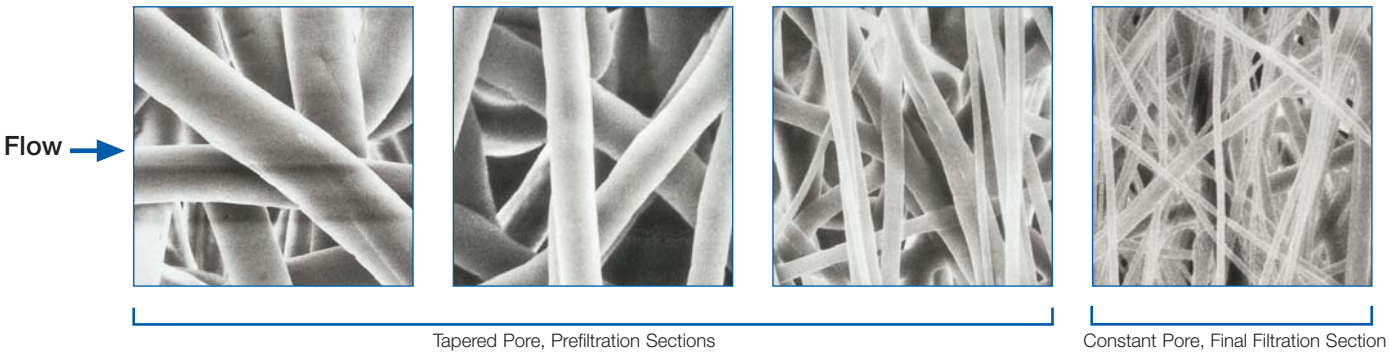


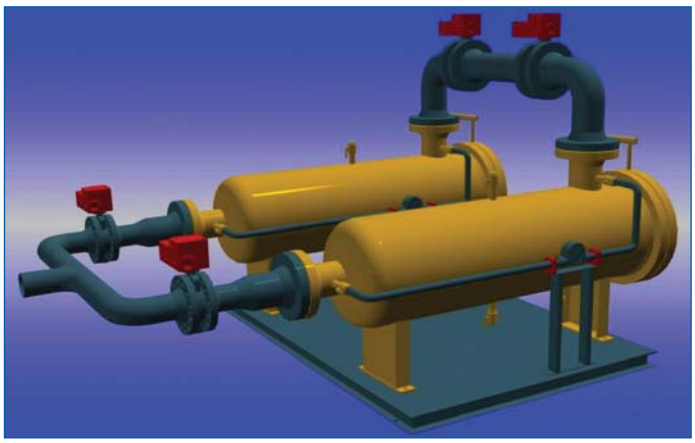
Sample sections of Ultipleat High Flow filter medium at 500X magnification

Compared to conventional elements with triangular shaped pleats, they have non-uniform flow through the filter medium (highest flow at the bottom of the triangular pleat).This irregularity in the flow can cause inconsistent particle removal.

Often, the drainage and support materials used in conventional pleated filters are thin and structurally weak. Consequently, pleats can be pushed together in groups resulting in low flow through these grouped regions and shortened filter element service life.

Result:
Uniform flow distribution yields

- Maximum filter life
- Reliable particle removal characteristics
- Low resistance to flow for longer periods of time



Typical duplex configuration for Condensate CRUD removal

Corrosion products in the condensate are primarily iron oxides, but also can include copper and nickel oxides which are mainly present in the form of suspended solids downstream the condensate pumps.

Application Success

Pall Ultipleat High Flow technology helps reduce boiler tube failures

Problem

A coal fired, two unit generating station had been experiencing a high rate of boiler tube failures, peaking at 10 failures. The 260 megawatts unit equipped with a Westinghouse turbine/generator, was driven by 2.5 million pounds of steam/hour at full load, with a CE tangentially fired drum boiler. The root cause of the failures was determined to be under deposit corrosion and hydrogen damage and that the metals forming the deposits originated from the pre-boiler system.

Metal transport at start-up can be 100 times that of the on-line metal transport. At the station sited above, for metal transport, three days of start-up is equal to one year of on-line operation. The element service life is typically eight to ten months with on-line operation, or two cold start-ups. The transported metals were mostly in particulate form.

Solution

To reduce metal transport, the decision was made to install equipment to control the particulate contaminants on both units, as well as make some chemistry changes.

Results

The Ultipleat High Flow filter vessels were installed between the condensate pump and the first feed water heaters. The design and high flow capabilities of the elements maintained the clean element pressure drop at 3 psid, with a terminal pressure drop of 40 psid. The vessels were used continuously to trap as much metal as possible.

The reduction in metal transport has virtually eliminated the under deposit corrosion problems that the second unit was experiencing. For 14 months, the second unit did not experience one forced outage due to a water wall tube failure.

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Ordering Information

Part Numbers **HFU** ☐ ☐ ☐

Table 1 Table 2 Table 3

Table 1

Code	Filter Dimensions (in/mm)
640	6/152.4 x 40/1016
660	6/152.4 x 60/1524
680	6/152.4 x 80/2032

Table 2: Medium: Profile® UP Pleated Depth Polypropylene

Code	Liquid Removal Rating (µm) at ß 5000 (99.98%)[1]	Maximum Allowable Pressure Drop at Temperature		Typical Element Aqueous Pressure Drop[2] 40" Length		60" Length		80" Length	
		(psid/bard)	Temp.(ºF/ºC)	(psid/100 USgpm)	(mbard/m³hr)	(psid/100 USgpm)	(mbard/m³hr)	(psid/100 USgpm)	(mbard/m³hr)
UY020[3]	2[3]	50/3.4	180/82	0.540	1.64	0.362	1.10	0.270	0.82
UY045	4.5	50/3.4	180/82	0.242	0.73	0.162	0.49	0.121	0.37
UY060	6	50/3.4	180/82	0.196	0.59	0.131	0.40	0.098	0.30
UY100	10	50/3.4	180/82	0.170	0.52	0.114	0.35	0.085	0.26
UY200	20	50/3.4	180/82	0.120	0.36	0.080	0.24	0.060	0.18
UY400	40[4]	50/3.4	180/82	0.090	0.27	0.060	0.18	0.045	0.14
UY700	70[4]	50/3.4	180/82	0.020	0.06	0.013	0.04	0.010	0.03
UY1000	90[4]	50/3.4	180/82	0.013	0.04	0.009	0.03	0.007	0.02

[1] The test procedure used is an adaption of ISO 4572, modified to determine the micron size above which particles are quantitatively removed.

[2] Pressure drop in psig per USgpm for the cartridge length shown. Multiply this value by the total system flow to determine the aqueous pressure drop. Next for fluids other than water, multiply this value by the fluid viscosity (in centipoise) at the operating temperature. Divide this calculated pressure by 3. This will determine the number of filters required to have a 3 psig/(0.2 barg) pressure drop across the filter elements at start-up. This value is the pressure drop across the Ultipleat High Flow filter(s) only-it must be added to the pressure drop due to the Ultipleat High Flow housing to determine the total system pressure drop.

[3] 99% efficiency.

[4] Filters rated by Maximum Spherical Particle Passed test.

Table 3

Code	O-ring Materials
H13 (Standard for glass fiber filters)	Buna N
J (Standard for polypropylene filters)	Ethylene Propylene
H	Fluorocarbon Elastomer
H13U	Buna N U-Cup Seal
JU	Ethylene Propylene U-Cup Seal

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PGUHFTEN Produced in the UK January 2011