Power Generation

Pall Ultipleat® High Flow Technology

Reducing Power Plant Boiler Start-up Time

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

Description

Pall 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.

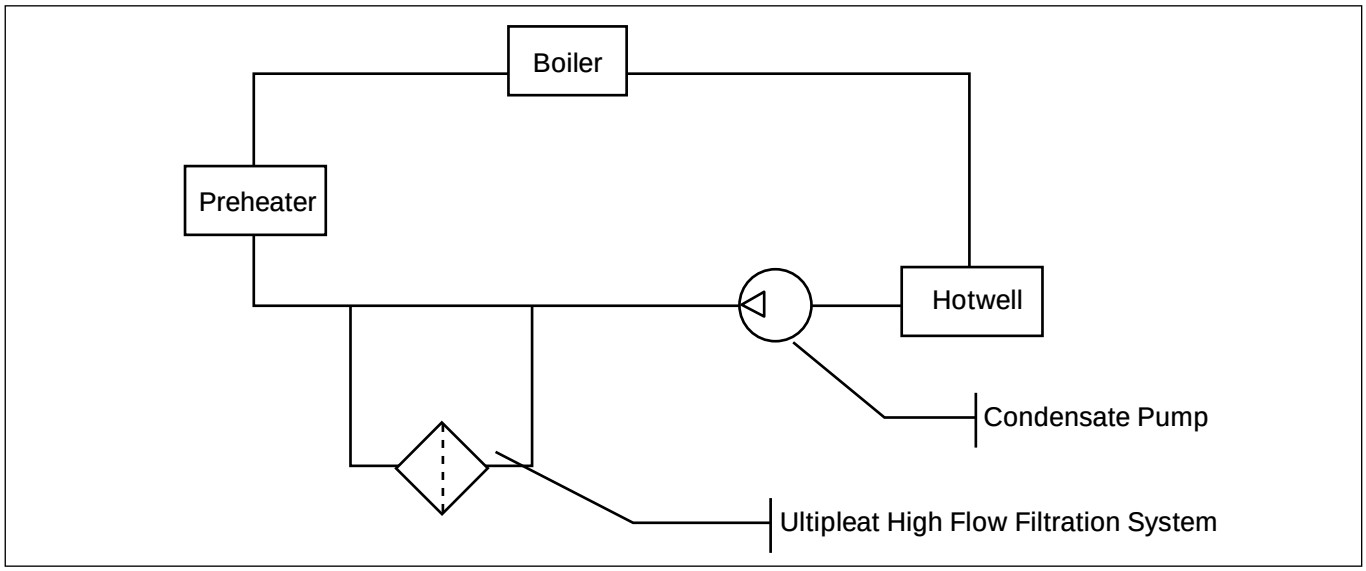
Metallics and silica present a tremendous challenge to water chemistry and integrity, especially during plant start-up. Pall Ultipleat High Flow condensate systems are designed to rapidly deplete the system of its particulate iron and silica. By controlling iron and silica in their solid state at very high efficiency, Pall Ultipleat High Flow condensate filters allow for rapid start-up without the risk of formation of soluble contaminants at higher temperatures. This rapid reduction in solid contamination level 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.

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

The Ultipleat 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 continuous mode. Their design makes the element easily serviceable, yet the element sealing allows replacement with maximum filtration integrity. Pall Ultipleat High Flow systems 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 elements minimizes the size and cost of the filter installation.

The Ultipleat High Flow elements are the latest in Pall's long history of filtration innovations and expertise. This breakthrough design allows superior flow characteristics through the filter medium, combining superior removal efficiency with a lower flow resistance and extended service life. The element inside-out flow configuration allows easy replacement while keeping the contaminants inside the element. The filtration integrity is maintained during maintenance procedures, and the elements can be compacted, incinerated or shredded easily, thanks to their metal-free construction.

Typical installation



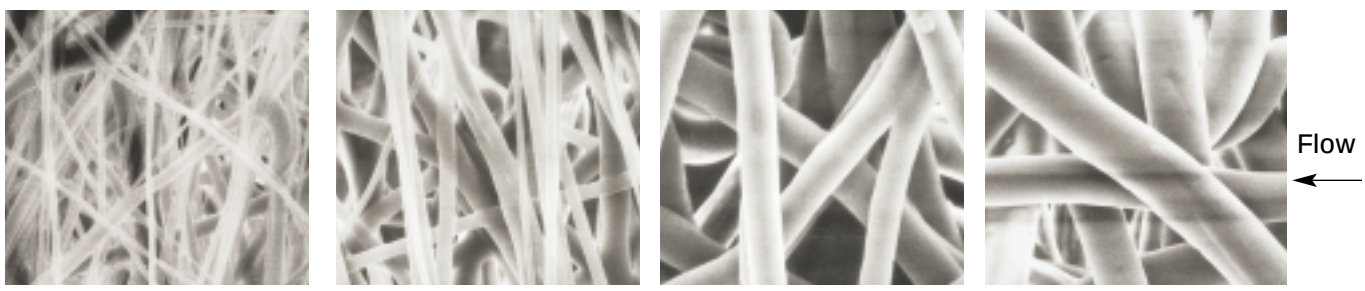
Pall Ultipleat High Flow technology helped reduce boiler tube failures from eight to ten a year down to zero

A coal fired two unit generating station had been experiencing a high rate of boiler tube failures on the second unit, peaking at 10 during 1996. The second unit is 260 megawatts equipped with a Westinghouse turbine/generator, 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. It was determined that the metals forming the deposits originated from the pre-boiler system. The transported metals were determined to be mostly in particulate form. 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. The reduction in metal transport has virtually eliminated the under deposit corrosion problems that the second unit was experiencing.

For the past 14 months, the second unit has not experienced one forced outage due to a water wall tube failure.

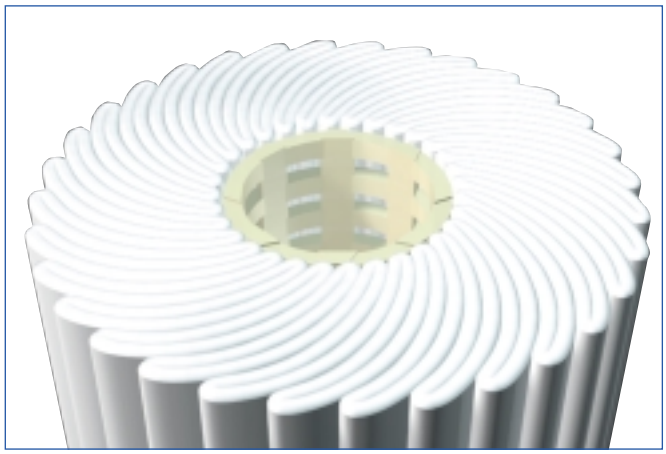
The Pall Ultipleat High Flow filter vessels are installed between the condensate pump and the first feed water heaters. The design and high flow capabilities of the elements have maintained the clean element pressure drop at 3 psid, with a terminal pressure drop of 40 psid. The vessels are used continuously to trap as much metal as possible. Metal transport at start-up can be 100 times 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 start-ups.

Ultipleat High Flow - Uniform flow distribution over the filter's entire surface area is the key



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

The patented 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.



40″ Filter Cartridge

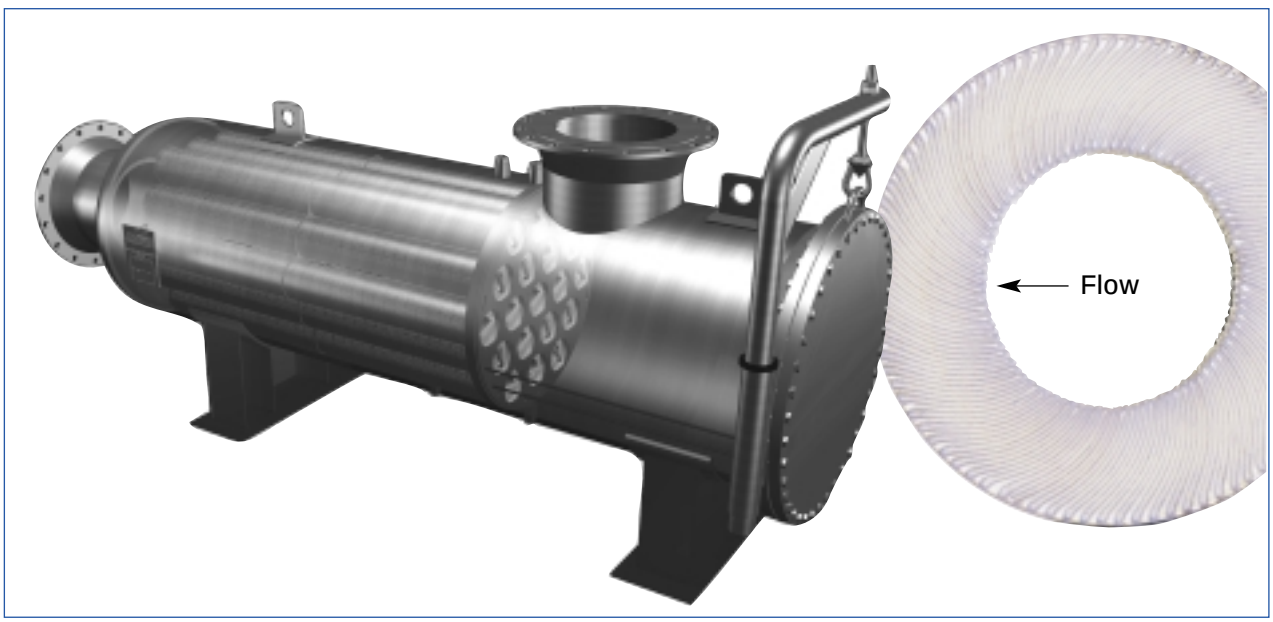
60″ Filter Cartridge

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.

In comparison, the flow channel upstream of the medium in a conventional triangular shaped pleat structure is much more open than the downstream side. Consequently, the flow is highest at the bottom of the pleat. This nonuniform flow through conventional filter medium 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



Cutaway illustration of horizontal housing. Note the filter element support cages are not shown to allow for a clear view of the internal configuration. The porous guide plate, which holds the perforated cages in position, is illustrated.

Ordering Information

Vessel Part Number	Number of Filters	Aqueous Rated Flow Per Housing	Nominal Housing OD	Inlet/Outlet Flange Diameter	Housing Overall Length	Horizontal Housing Height	Housing Weight Empty	Housing Weight Full of Water
		gpm/lpm	in/mm	in/mm	in/mm	in/mm	lbs/kg	lbs/kg
12HFH603016F1C285	12	3000/11355	30/762	16/406.4	121/3073	58/1480	4670/2118	7306/3314
19HFH603620F1C285	19	4750/17979	36/914	20/508	129/3264	68/1718	7060/3202	11121/5045

Vessels are carbon steel with 304 stainless steel tubesheet. Vessels are horizontal design.
For other material, size or orientation options, please contact your Pall representative.

Element Part Number	Micron Rating (at 99.98% Removal)[1]	Materials[3]	Element Aqueous Pressure Drop[2] (psid/gpm)	Maximum Allowable Pressure Drop at Temperature	
HFU660CAS010H13	1.0	Pleated polypropylene/ polyethersulfone membrane	0.049	50 psid	150°F
HFU660UY020H13	3.2	Polypropylene medium, Buna-N seals	0.003	50 psid	150°F
HFU660UY100H13	10	Polypropylene medium, Buna-N seals	0.0011	50 psid	150°F
HFU660UY200H13	20	Polypropylene medium, Buna-N seals	0.0008	50 psid	150°F

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 GPM 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 bar) 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. Refer to the housing ordering information table to select a housing that can hold the number of filters you calculated.

3 The Ultipleat High Flow filters constructed of polypropylene medium are constructed of FDA listed materials.

PALL Power Generation

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