



Power Generation

Pall: A world of expertise to meet your condensate challenges

Reliability, efficiency, fuel consumption, power output...all the major critical performance indicators of steam power plants are affected by the quality of the boiler feedwater. From boiler tube corrosion to lower heat transfer and high blowdown rates, the consequences of poor condensate quality are widespread, costly, and sometimes irreversible.

When it comes to condensate polishing, Pall Power Generation functions with a set of principles that serve as the backbone of our entire organization, from fundamental R&D to our service organization.

Performance

The core of our filtration systems is our high-performance filter elements. Much more than one component of the system, Pall elements enable the performance and reliability our clients demand.

Productivity

A tremendous range of technology platforms and dedicated market expertise guarantees that the right product is chosen to meet your unique need. Our team leverages years of experience to ensure the highest level of productivity.

Partnership

As a partner committed to innovation and the science of filtration, Pall can solve even the toughest contamination challenges. We work with you to identify your needs, and develop the best possible solution to keep your business running smoothly.



Performance: Condensate polishing as a filter media science

The primary and overarching goal of optimum fluid cleanliness takes precedence over other considerations. In short, Pall filter systems are developed so that the filter elements can perform the role for which they were designed. In the filtration world, very few applications are as demanding as the protection of high pressure steam generators. Large water flow rates, stringent contamination and chemical specifications, and the requirement for quasi-continuous operation over a number of years all make this market quite challenging. Pall has extensive experience in this application, and has excelled in meeting customers' unique needs for years.

Pall Melt-Blown Elements: Blowing away the competition

Pall HGCoLD-R melt-blown elements are applied when pre-coat backwash operation and consistent element performance are required. These elements combine a modified pore structure with added structural strength to allow both efficient coating and efficient backwash. In that sense, all melt-blown elements are not created equal.

In its most basic form, a melt-blown element is difficult to backwash. However, Pall has designed a special pre-coatable element specifically for condensate polishing. This element, the Pall HGCoLD-R, leverages advanced depth structure and surface filtration capabilities.

The pore distribution was modified so that the element acts as a surface filter in which the pores on the upstream side (the outside layers) are the tightest. This enables no penetration inside the element. Instead, the deeper pore structure acts as a structural backing in operation, and as a flow channel during backwash. Pall's design allows the depth element to act as a surface filter, supported by a thick hydro-dynamically optimized support structure.

Maintaining a proper precoat layer on the element is key for filtration and demineralization efficiencies. The upstream layers of Pall's HGCoLD-R element stand apart. The added strength of co-located large fibers inside the element increase resistance to compression stresses, protecting the resin coat. The "roughness" of the element's surface also helps stabilize the resin coat onto the outer surface.

The Pall HGCoLD-R systems currently in operation around the world stand as proof that a melt-blown element can be much more than just a low-cost alternative.

Improving element performance doesn't mean sacrificing backwash operation

Much has been said of the influence of increasing filter surface area on the operation of the backwash cycle. The basic rule of thumb is that if you increase surface area, you reduce flux. In the case of reverse backwash flow, this flux reduction results in lower drag force on the particles and improper cleaning of the elements.

However, one of the biggest advantages of Pall HGPPB pleated elements is that they offer an increase in filtration surface area without sacrificing backwash ability. Not only has it proven to provide the highest removal efficiency without precoat, it consistently exhibits long runs and very long life, showing an excellent ability to be backwashed with minimal system flow upgrade.

Materials and media science means that even at lower fluxes, the element can be made to capture particles efficiently in the forward direction, while offering the least resistance in the backwash direction. For Pall, reducing the force needed to dislodge particles from the filter meant the following:

Optimizing filter media

The proper membrane structure must be "asymmetrical" regarding pressure drop. One way to accomplish this is to avoid fiber displacement in operation. If fibers are allowed to move, particles can "wedge themselves" into a pore, and drag forces will need to be higher to dislodge them. Pall filters are designed to minimize pore distortion, in order to minimize drag forces necessary for backwash.



Pall HGPPB elements combine excellent iron filtration capabilities with long life from advancements in its media and structure.

Expert flow dynamics

More than just structural strength and durability, the special support layer provides the HGPPB element its excellent flow dynamics as well. It is designed to “channel” the water at optimum velocity into the filter media layer, which is itself designed to offer low resistance to drag forces in the backwash direction.

Lower flux applies in the forward direction. Our experience across wide industries shows that lower fluxes prevent deep penetration of contamination and level off its distribution in the media. Forward forces embedding particles into the filter membrane are lower, contamination is more evenly distributed, and element pressure drop stays lower longer.

System performance is key

At Pall, element science and separations performance is paramount. This requires that our system designs and upgrades allow the elements to perform consistently, as specified, with a long operational life.

This philosophy affects how we size the vessels, how we design and improve the backwash dynamics, how we design element change-out tools and procedures, and how we upgrade tube sheet designs for efficiency, reliability, and ease-of-use. To take full advantage of the possibilities regarding filter elements, each Pall system integrates features learned and adapted from some of the most challenging backwash applications in the industry -- from slurry oil to heavily contaminated coolant fluids.

An example of this is Pall's backwash design. Born out of the need to process and backwash viscous and contaminated fluids in the petrochemical industry, this vessel concept matches Pall condensate filter elements performance and makes for a durable, efficient, and cost-effective installation.

Another example is our top tube sheet design, which has been a Pall standard for years because it offers excellent backwash characteristics, provides easier evacuation of waste, and is easier to service.

Productivity: Leveraging an unmatched knowledge base

Nothing has a greater impact on the




Pall Ultipleat High Flow® filters are the newest generation of disposable filtration for small condensate treatment. The revolutionary pleat configuration makes it possible to filter full condensate flows with very few elements, without sacrificing element life or removal efficiency.

productivity of a power producing asset than the purity of the fluids running through it. This is the fundamental idea behind Pall's Total Fluid Management practices, and is certainly true for condensate polishing. Productivity is our goal – the productivity of assets, the productivity of people, and the productivity of Pall's own scientific and engineering force.

Learning, customer relationships, innovation, and evolution are the tools with which Pall maintains its productivity and leadership. Pall's ability to combine the dedicated, customer-centric knowledge of our SLS¹ structure with a remarkable filtration and separation technology portfolio ensures that only the best products are brought to market. Our customers choose our products because they are best adapted to the application. The result is a higher level of productivity, both for us and for our customers.

Pall's Ultipleat® High Flow filters for condensate filtration were developed from this rich cross-fertilization. Ultipleat High Flow filters offer a compact, cost-effective, and highly efficient solution to solid metal transport in smaller condensate systems. Its innovative pleat design was first introduced to solve some of the most challenging hydrocarbon contamination issues in the oil

¹ SLS : Scientific & Laboratory Services : Pall's unique structure of scientists and technicians around the world whose sole mission is to act at the customer level, with focused application and technology expertise, to provide consulting, analysis and process improvement services.



industry. The unique structure and flow path of the element makes for the perfect combination of high flux capability and high removal efficiency.

For condensate systems, it opens a new realm of possibility for utility and industrial steam generators looking for better boiler productivity without the large capital or running costs of backwash systems or traditional disposable filter systems, respectively.

Continuous Improvement

We continuously improve our technology through the challenges and hurdles we encounter, and with the partnerships we form with our customers. When Pall filters purify the primary coolant of nuclear reactors, we learn to capture particles so small they are almost not considered particles at all; when Pall filters are used on aircraft hydraulic systems, we learn to manufacture our products to the toughest quality standards; when Pall filters purify water to wash microelectronic wafers, we master the art of making very low-extractable filter elements; when Pall filters purify drinking water for entire cities, we ensure large flows with uncompromising reliability. All these examples and more increase our scope and expand the possibilities.

Our manufacturing facilities benefit from the same sharing of knowledge. While some have to find a way around calendaring machines for fear of hot spots, Pall manufacturing engineers, technicians and operators tackle the challenge, fine-tune the process, and use their years of experience across industries to prevent excessive heat transfer through the fiber layers.



Partnerships: Improving together

Innovation, separations science, media expertise, engineering and manufacturing adaptation all require in-depth knowledge and constant monitoring of the markets we serve. Being a technology leader means not only understanding any process and its current requirements, but to also ask what can be done better. This is the fundamental idea behind the partnerships Pall has with customers, large research institutions, Universities and private research centers. Pall's SLS group is continuously on the pulse of our customers' requirements and expectations so that we can deliver the best available separations technology for a given process.

Total Condensate Leader

Pall's condensate product evolution is always deeply rooted in the relationships we have with our customers. Pall Power Generation's leadership is rooted not only in our products, but also in our unwavering commitment to cleanliness through media science, the productivity gains we enable for the users of our products, and the partnerships we form with our customers to always move forward.



Pall Corporation

Power Generation

25 Harbor Park Drive
Port Washington, NY 11050
+1 516 484 3600 telephone
+1 800 360 7255 toll free US

Visit us on the Web at www.pall.com

Pall Corporation has offices and plants throughout the world. For Pall representatives in your area, please go to www.pall.com/contact

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