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A Division of NMW, Inc.

PROGUARD
FILTRATION SYSTEMS



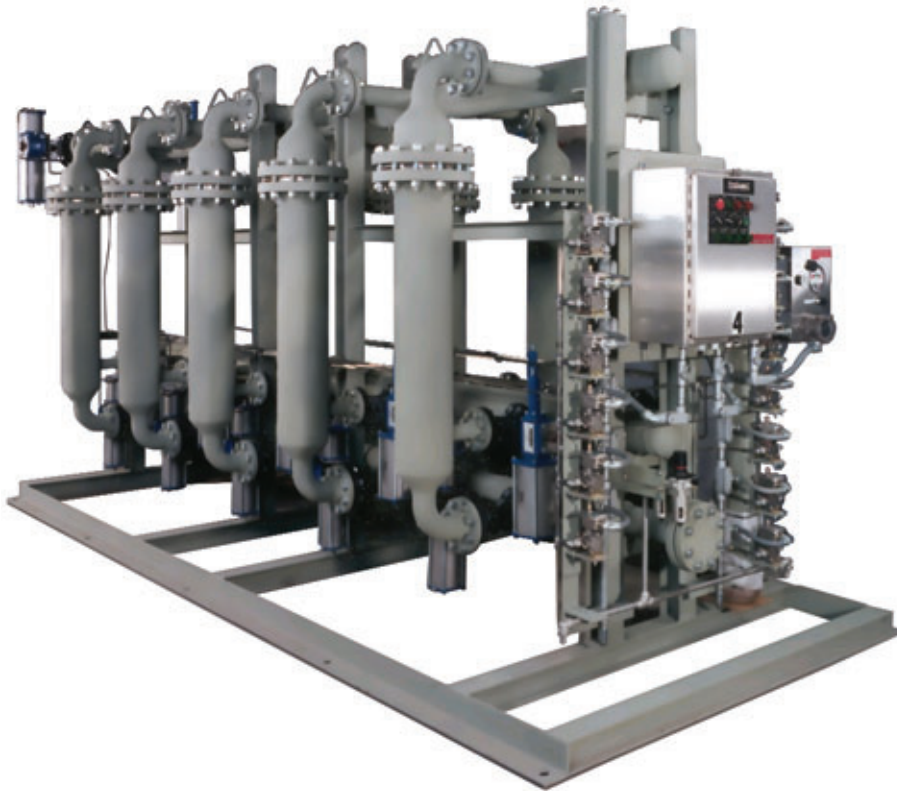
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4000 SERIES

Refinery Filters



4000 Series



Standard Features

- 4 to 20 filter tubes per bank
- Single sided or double sided arrangement
- Multiple banks for greater flow capacity
- ASME Code design and stamp
- Carbon steel, stainless steel or special alloy construction
- Operating pressure from 50 to 2200 PSI
- Automatic or Manual backwash
- Industry standard Programmable Logic Control Systems
- Permanent reusable filter media
- 1600 to 20 micron filtration
- Rugged, low maintenance design

General Information

The catalysts used in many of today's processes for hydrocracking, hydrodesulfurizing and hydrotreating are designed for longer service life, requiring more effective removal of solids from the feedstock to avoid premature and expensive replacements due to plugging. The cost of replacing a catalyst load is expensive, often as much as twenty to thirty times the price of an effective tubular filter system. 4000 Series tubular backwash filters, ASME Code designed and stamped, provide cost effective continuous protection for the life of catalytic reactors. The ProGuard Filtration System is designed for high temperature, high pressure critical refinery applications where low maintenance, continuous operations are a necessity.

Tubular backwashable filters are designed to remove solids from liquids by capturing the solids on a permanent reusable filter element. At a predetermined pressure differ-

ential, the system reverses flow through each filter element in the system, one element at a time, while the other elements continue filtering to provide continuous operation.

Tubular backwash systems are specified by process licensors for feed stocks such as gas oil, coker gas oil and heavy resids. Additional applications of the 4000 Series filters include clarification of a broad range of distillates, amine, glycol, synthetic heating oils and finished products.

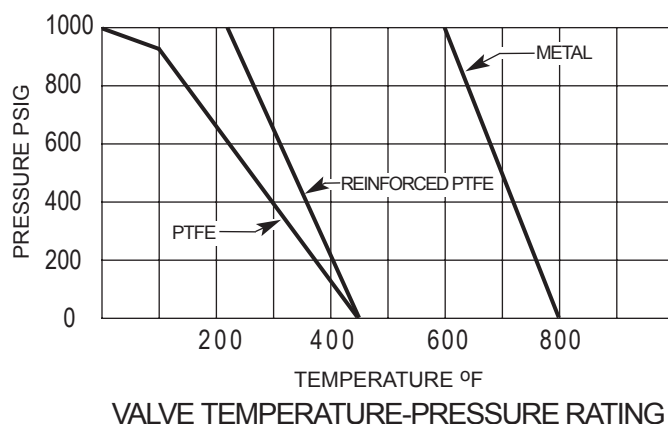
The 4000 Series filter is usually custom designed by engineering specifications. The filter can be readily modified to accommodate special components and accessories, to meet plant design standards or other customer requirements.

Standard Construction

The 4000 Series filtration system is a self-contained, fully-assembled filter consisting of individual filter tubes with elements manifolded in parallel to common inlet, outlet and drain headers for either internal or external backwash. Pressurized fluid, from the outlet header or introduced through a connected backwash supply header, flows in reverse through the individual filter elements, carrying the collected contaminants to the drain.

The 4000 Series filtration systems are designed for up to ANSI Class 900 pressures and temperatures and feature carbon steel construction as standard. Other materials, such as stainless steel or other special alloys, are available. The inlet and outlet headers come in 4, 6, 8 and 10 inch pipe sizes to handle specific flow rate requirements. The filter and backwash flow are controlled by flanged-end ball valves with seal materials designed to be compatible with the temperature requirements. (See Valve Temperature vs. Pressure Rating)

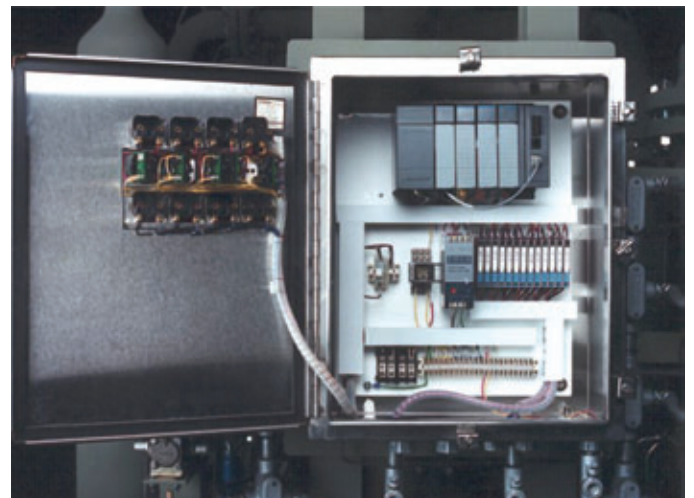
ProGuard's commercially available ball valves are flanged-end design and utilize gland type stem seals for ease of maintenance and leak prevention over the life of the valve. The valve brand may be recommended by ProGuard or specified by the customer to provide compatibility with the customer's existing spare parts inventory.



Automatic Backwash

The ProGuard 4000 Series Filtration System features a maintenance free, programmable logic controller (PLC). The PLC allows backwash at a predetermined time or differential pressure. The PLC can also be interfaced from one filter bank to the next in large filter systems so that only one start signal is required to clean the whole system. The flexibility of a PLC allows for additional process monitoring functions not available with conventional electrical or pneumatic control systems. The backwash cycle is always accomplished with the system on-line, allowing continuous operation during cleaning and maintenance. The controller also allows for manual override to facilitate troubleshooting or maintenance and it can be interfaced with the plant or process controller. The PLC can also be recommended by ProGuard or specified by the customer to help make program changes or upgrades less costly.

The amount of daily backwash effluent is determined

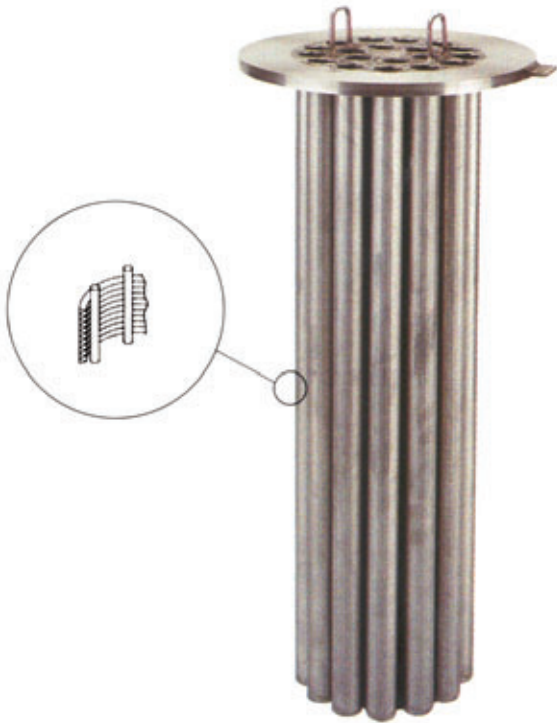


Control Panel

by the amount of solids removed from the feed stream, which determines the number of backwash cycles. During each backwash cycle, the amount of fluid passed to the drain is a function of the pressure drop in the backwash system piping. In an external backwash system, the pressure is typically controlled by a remotely installed differential pressure control valve. In an internal backwash system, the pressure drop is typically controlled by a manually operated flow control valve. During start-up the backwash flow rate should be adjusted by the ProGuard Technician to provide an optimum flow rate for efficient cleaning.

Filter Element

The 4000 Series filter element is a 316L Stainless Steel profile wire screen. The wire screen is suspended inside the filter body and is available in a variety of multi-cluster configurations, ranging from 3.5 ft² to 22 ft² of surface area per filter element. These multi-cluster configurations vary by the diameter of filter vessels as well as the diameter and length of the individual filter stalks that make up the multi-cluster element. Your ProGuard representative will help determine which element configuration is best for your application.

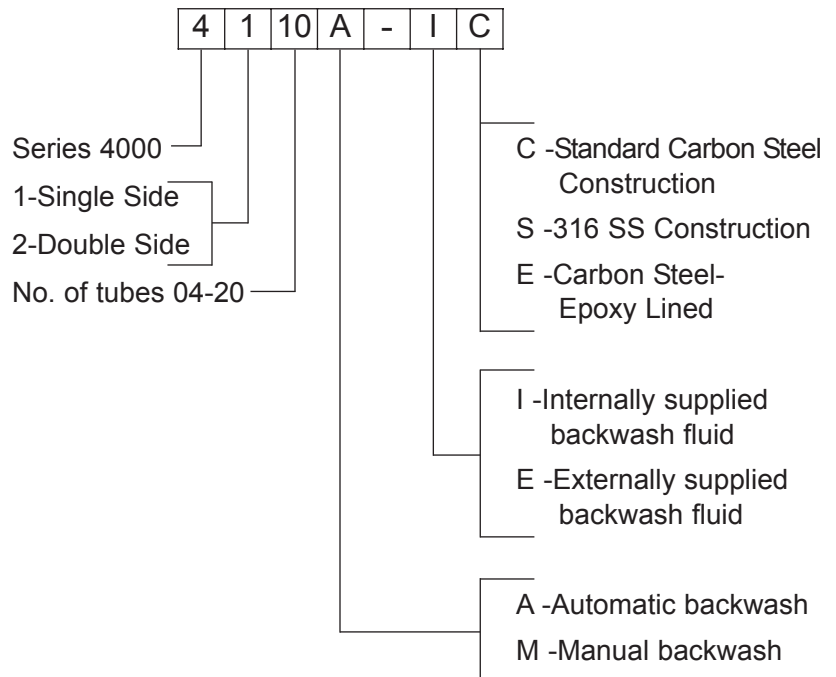


Sizing

Capacity planning of the filtration system is essential in critical refinery applications to avoid potential problems such as lost productivity or wasted catalyst. Contact your ProGuard representative early in the project planning stages to assist with the feed filter design. This will assure that there is sufficient filter capacity to handle upset conditions and to provide spare operating capacity for filter system maintenance.

Ordering Information

TYPICAL MODEL NUMBER



Each filter bank is specified by Model Number.
Filter systems are typically composed of multiple filter banks.



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