Automatic Self-Cleaning & Fabricated Pipeline Strainers

Solving Your Need for More Reliable Process Systems with Smarter Technology
Eaton Manufacturing Capabilities
Specially trained workers using the latest equipment in a modern facility have the capability to fabricate just about any type of pipeline strainer...nothing is too big, too small or too special.

Introduction to Custom Fabricated Strainers

Model 90 Simplex Strainers
Simplex Strainers are installed into systems that can be shut down for basket cleaning or change-out. The Model 90 has a simple, cost effective design that can be customized to fit unique operating or dimensional requirements.

Model 900 & 950 Duplex Pipeline Strainer
Duplex Strainers never require the system to be shut down for basket cleaning: the system can run continuously. Two separate, independent straining chambers are connected with a piping/valve arrangement to permit the flow to be switched from one chamber to the other.

Model 91 Tee Strainers
Very compact, low-profile design strainers that work in either a vertical or horizontal installation. Available with two types of standard covers and can be adapted to almost any system. Recommended for pump protection.

Automatic Self-Cleaning Strainers Overview
Describes the design of these special strainers and the applications that they are used in.
Automatic Self-Cleaning Strainers Operation
How Eaton Automatic Self-Cleaning Strainers work.

Automatic Self-Cleaning Strainers Engineering Drawings

Strainer Screen Elements
Perhaps the most important part of the strainer...how to choose the right one.

Self-Cleaning Strainer Components

Application Considerations

Automatic Strainer Control Systems
Control panels that monitor and operate the strainer.

Technical Information
In September 2005 Eaton Corporation acquired the industrial filtration business of Hayward Industries, Inc. The Hayward filtration business has been integrated into Eaton’s Fluid Power Group as the Filtration Division.

Eaton’s Filtration Division is a global leader in products that include pipeline strainers, bag filtration systems, and gas/liquid separators for industrial and commercial customers worldwide. Primary markets include general industrial, petro-chemical, pharmaceutical, food and beverage, power utilities, marine, and water.

**PIPELINE STRainers**
Eaton’s Pipeline Strainers are used by industrial and commercial customers to protect their process piping equipment by removing debris from the liquid that flows through pipelines. Products include automatic self-cleaning strainers as well as manual, duplex, simplex, and Y strainers. Both cast and fabricated type strainers are made in standard configurations to meet the needs of most applications. For unique, complex, or specialized applications, a Pipeline Strainer can be designed and manufactured to meet the exact requirements of the application with no compromises. Eaton offers Pipeline Strainers in sizes from a tiny 1/4” up to a huge 48” pipeline size.

**BAG FILTRATION SYSTEMS**
Eaton’s Bag Filter Housings and Filter Bags are used by industries around the world and are manufactured worldwide to global standards. Customers can choose from a complete line of single and multi-bag filter housings designed to meet the needs of the most demanding applications. The choice of single bag filter housings range from those suitable for exacting absolute filtration applications to high quality housings designed especially for cost sensitive applications...and everything in between. Multi-bag housings that accommodate up to 36 individual filter bags for flow rates of up to 4500 gpm are available in a number of different designs. Eaton offers a full range of Filter Bags...more than 1500 choices in all. From economical sewn filter bags for standard applications to welded, multi-layered bags for demanding applications. Eaton is helping customers reduce process costs through its development of...
a unique range of proprietary filter bags and elements that offer a compelling, cost effective alternative to more expensive cartridge filter systems.

**GAS/LIQUID SEPARATORS**

Eaton’s Gas/Liquid Separators protect expensive system components, such as turbines, by removing potentially damaging moisture and particulate matter from air, gas, and steam lines. Dozens of different models, both cast and fabricated, are available to meet customers’ needs worldwide.

**COMMITMENT TO GLOBAL MARKETS**

Eaton’s Bag Filtration Systems, Pipeline Strainers, and Gas/Liquid Separators have each been developed into a global product line which is manufactured worldwide in multiple locations to a common design standard yet in compliance with local code requirements. This lets Eaton customers worldwide choose the pipeline strainer, bag filter, or gas/liquid separator that meets their exact requirements without compromise. Local sales and technical support specialists are always available to review the needs of an application with the customer and recommend specific solutions. This local support extends from initial purchase, to installation, through start-up and beyond.

**EATON CORPORATION**

Eaton is a diversified industrial manufacturer with 2009 sales of $11.9 billion. Eaton is a global leader in electrical systems and components for power quality, distribution, and control; fluid power systems and services for industrial, mobile, and aircraft equipment; intelligent truck drivetrain systems for safety and fuel economy; and automotive engine air management systems, powertrain solutions, and specialty controls for performance, fuel economy, and safety. Eaton has 70,000 employees and sells products to customers in more than 150 countries. For more information, visit www.eaton.com.
ASME Sec. IX certified welders insure the integrity of all Eaton fabricated strainers.

High-speed CNC machining equipment is used to insure conformance to specifications and to maintain the tight tolerances required by our customers.

A custom horizontal Model 90 Simplex Strainer ready for shipment to a customer. The strainer has a davit assembly to make cover removal for access to the strainer basket a one person operation.

Component parts are machined to tight tolerance with advanced machining equipment.
MANUFACTURING CAPABILITIES

A Model 90 Simplex Strainer during manufacture in our advanced welding shop.

Automatic Self-Cleaning Strainer during the initial assembly phase of construction. All strainers, no matter how large or complex, are tested three ways...for proper operation, conformance to all specifications, and then they undergo a complete pressure test.

Automatic Self-Cleaning Strainer during a final machining operation. We have the latest equipment so that fabrication operations can be done in house. This insures the integrity of the process, reduces the final cost, and improves lead times.

This large, advanced design plasma cutting machine is just one example of the investment that has been made in equipment needed to fabricate almost any type of strainer.

Skilled workers using the latest technology increase productivity to make Eaton fabricated strainers a cost effective choice.
Nothing Too Big, Too Small or Too Special

When unwanted solid material has to be removed from flowing fluids in order to protect equipment, an Eaton Strainer is the answer. Not only does the strainer protect equipment, it improves productivity by reducing maintenance and downtime.

While the Eaton Strainer Line is the world’s most complete line of cast strainers, sometimes, because of space limitations, the need for a special alloy, unique piping connection, cover opening system or size, a custom strainer is required. In these cases, a cast strainer will just not work because often it is not easy or possible to modify the cast metal unit. These application problems are solved by fabricating Eaton pipeline strainers to meet the requirements of any straining application.

Fabricated strainers, because they are manufactured one at a time, can be made to fit the exact requirements of the application. There are no trade-offs. You get the perfect strainer for your application...you never have to pay for more strainer than you need...or settle for a strainer that won’t quite do the job you want it to.

Often it is not necessary to go to the time and trouble to design a strainer from scratch. There are several Eaton simplex, duplex, and tee type designs of fabricated strainers. Very often one of these basic designs can be used “as is” or slightly modified with a different cover or piping connection to fit the application.

When an Eaton standard design fabricated strainer, even with modifications, will not meet the applications requirements, our Custom Fabricated Strainer Design Team will work with your engineers to create a unique Eaton strainer that will. We have over 75 years experience designing and building fabricated pipeline strainers. Your application might not be as unique as you think. Over the years we’ve seen thousands of different applications and can often offer a solution to your straining application problem right from our database of special strainer designs.

If you have already created the design parameters of the strainer you need, we can review the design and suggest changes to improve performance or reduce costs. Our large manufacturing facility with the most up to date equipment and skilled personnel allows us to deliver what others can only promise. With our manufacturing capabilities and investment in equipment, all but the most specialized fabrication work can be done in-house–reducing costs and expediting delivery of your finished strainer.

Getting involved with small shops or manufacturers that contract most of the work out to others will end up costing you time and money and even then the finished product may not be exactly to specification. What happens then? With an Eaton strainer made to ISO 9001:2000 Quality Assurance Certification you know that the finished product will be exactly as you designed it and that it will perform to specification.
The Eaton Model 90 Fabricated Simplex Strainer has been designed for manufacturing flexibility. It can be made for pipeline sizes from 1” to 48” in carbon steel or stainless steel although other materials can be specified. Three different ratings of flange connections are commonly available: ANSI Class 150, 300, and 600. Higher pressures are also available. The strainer features an in-line design that adapts to most applications.

Two different types of covers are available. The simplest type is the bolted cover which is simple and cost effective and works well in applications where basket changing is infrequent. A davit assembly can also be specified for larger strainers with heavy covers. This makes it possible for a single person to remove the cover of the strainer.

If the strainer will be opened frequently for basket cleaning, a bolted cover can be less effective because of the time needed to remove and then tighten the bolts. For these applications, Eaton can design a special, hinged, quick opening cover that is secured by swing bolts. This type of quick opening cover can even be adapted for higher pressure applications. For medium size strainers, 8” to 16”, a bolted slide hinge cover is available. This permits a single operator to open the cover. Eaton strainers can also be designed and manufactured with special covers to meet any application requirements.

There is a special, unique Eaton strainer basket for the Model 90 Fabricated Strainer. The basket has a slant top design which improves the flow through the strainer and results in significantly lower pressure drops than would otherwise be the case. The slant top design results in a more compact basket which weighs less than an ordinary basket and makes it possible for a single person to remove it from the strainer housing. A real labor saving feature when it becomes time to clean or change out the basket. Strainer baskets for the Model 90 are made of stainless steel, although almost any type of material can be specified. Basket perforations from 1/32” up to 1” are available and mesh linings in sizes from 20 to 400 mesh for fine straining applications can be specified.

The Model 90 Fabricated Simplex Strainer will meet the requirements of most simplex strainer applications. It is also easy to customize the strainer to meet special application requirements.

### Basket & Screen Effective Area

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<tr>
<th>Strainer Model</th>
<th>Pipe Size in.</th>
<th>Perforation Size - in.</th>
<th>Nominal Area of Pipe (sq in)</th>
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*Contact Eaton for larger sizes. Dimensions are for reference only.*
Some common, easy-to-fabricate modifications are rotated nozzles, offset nozzles, and horizontal-vertical flow. Rotated inlet and outlet nozzles such as a right angle design can eliminate the requirement for an elbow in the downstream piping. Offset nozzles, lowering or raising either the inlet or outlet nozzle, can often eliminate serious alignment and support problems. The horizontal-vertical design with the flow exiting the strainer at a 90 degree angle can simplify the installation of a strainer in an already existing piping system.

Fabricated simplex strainers can also be designed with a backflush/backwash option. In these designs a piping connection with an on/off backflush valve is fabricated at the strainer bottom and has a connection to the bottom of the strainer basket. When solids accumulate in the bottom of the basket, the backflush valve is opened and the differential pressure between the operating pressure and the backflush system removes the solids without shutting the system down. Backflushing is often supplemented by a back washing operation.

Backwashing is done by having fluid flow, under pressure, in the reverse direction into an empty strainer. This flow reversal backwashes the basket and removes the residual dirt. Backwashing is often regarded as a second step, used to remove dirt not removed by backflushing.

Steamp jacketing is another option available for fabricated strainers. Steam jacketing is used to maintain critical fluid temperatures through the strainer. High temperatures are often required to process and transport highly viscous fluids. This modification is designed so that there is no impact on the function or normal maintenance of the strainer. Steam jacketing is available in carbon steel and type 316 stainless steel for service up to 450°F.

Eaton Model 90 strainers can be designed and fabricated to ASME section VIII and ANSI B31.1, .3, .4, .7, and .8 codes. Welders are qualified to ASME Sec. IX.

Contact us today to discuss your special fabricated simplex strainer requirements.
**Sizes from 4” to 24” - As Standard**  
*Available in Carbon Steel - Stainless Steel*  
*Flanged ANSI Class 150 and 300 - As Standard*  
*Flanged Class 600 and higher - Available on request*

*STTL strainers include carbon steel, external non-wetted fasteners as standard*

**Two cover types available:** quick opening hinged & bolted blind  
*Davit assembly optional*  
*Basket material: stainless steel, 1/32” to 1/2” perforation diameter. 20 to 400 mesh linings also available.*

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### Bolted Cover

![Bolted Cover Diagram](image)

### Quick-Opening Hinged Cover

![Quick-Opening Hinged Cover Diagram](image)

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Dimensions are in inches  
These dimensions are for reference only. For installation purposes, request certified drawings.

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</table>

Dimensions are in inches  
**** Force required to lift cover in lb.  
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Contact Eaton for larger sizes.
COVER OPENING OPTIONS:
Maintenance problems can result if proper consideration is not given to the process involved in removing and replacing strainer access covers. This is particularly true in sizes larger than 8” where the cover weight can easily exceed 150 pounds, in which case additional personnel and equipment may be required. The Eaton designs listed below were developed to eliminate the problems associated with this process.

Standard Hinged

The quick opening hinged cover is available on most fabricated strainers. It has the added advantage of swing bolts, and is particularly helpful if the access is on the vertical or bottom.

Integral Davit

The cover lift davit can reduce any cover lift process to a one man operation.

Bolted Slide Hinge

The slide hinge in medium size ranges (8”-16”) permits a single operator to engage the hinge and open the cover.

NOZZLE PLACEMENT OPTIONS:
Fabricated strainers are available with a multitude of nozzle design options to adapt them to existing or contemplated piping schemes.

Rotated Nozzles

Right angle design can eliminate the requirement for an elbow in the downstream piping.

Offset Nozzle

By lowering or raising either nozzle, serious alignment and support problems can be avoided.

Horizontal-Vertical

The above right angle design is especially appropriate for existing piping, and is typical of the many modifications that are possible.
BACKFLUSH/BACKWASH OPTION:
Custom fabricated simplex and duplex strainers are available with this important option.

In many systems, particularly where solids are heavy and well defined, dirt accumulates as shown above (A). When the backflush valve is open, (B), the differential pressure between the operating pressure and the backflush system removes the dirt, all without shutting the system down. This simple process is referred to as backflushing.

Backwashing occurs when backflushing is supplemented by fluid flowing, under pressure, in the reverse direction into an empty strainer. This flow reversal backwashes the element and removes the residual dirt. Backwashing is often regarded as a second step, used to remove dirt not removed by backflushing.

STEAM JACKET OPTION:
Custom fabricated simplex basket and tee strainers in all sizes are also available with this option. This modification is designed to have no impact on the function or normal maintenance.

Steam jacketing is available in carbon steel and 316SS for service up to 450°F. Steam jacketing is used to maintain critical fluid temperatures through the strainer. High temperatures are often required to process and transport high viscous fluids.
Eaton duplex strainers are used when the system flow cannot be shut down for basket cleaning or change out. A duplex type basket strainer can operate continuously and the pipeline never has to be shut down.

Both the Eaton Model 900 and 950 Fabricated Duplex Strainers feature two strainer basket housings with a valve flow diverter assembly connecting them. When the basket in one housing becomes full, flow is switched to the other using the butterfly valve assembly. The first basket is then removed, cleaned or replaced, and is ready for use again.

The Model 900 is available in carbon or stainless steel in sizes from 1” to 48” and comes with either 150# or 300# flanged connections. The inlet and outlet of the strainer are in the same plane.

The Model 950 is available in carbon or stainless steel in sizes from 1” to 48” with either 150# or 300# flanged connections. The Model 950 has an offset inlet and outlet, with the inlet located above the outlet.

Two different types of covers are available for both the Model 900 and 950. The simplest type is the bolted cover which is cost effective and works well in applications where basket changing is infrequent. A davit assembly can also be specified for larger strainers with heavy covers. This makes it possible for a single person to remove the cover of the strainer.

If the strainer will be opened frequently for basket cleaning, a bolted cover can be less effective because of the time needed to remove and then tighten the bolts. For these applications a special, hinged quick opening cover that is secured by swing bolts is available. This type of quick opening cover can even be adapted for higher pressure applications. For medium size strainers, 8” to 16”, a bolted slide hinge cover is available. This permits a single operator to engage the hinge and open the cover.

There is a special, unique Eaton strainer basket for the Model 900 Fabricated Strainer. The basket has a slant top design which improves the flow through the strainer and results in significantly lower pressure drops than would otherwise be the case. The slant top design results in a more compact basket which weighs less than an ordinary basket and makes it possible for a single person to remove it from the strainer housing. This is a real labor saving feature when it becomes time to clean or change out the basket. The basket for the Model 950 has a traditional, flat top design.

Strainer baskets for the Model 900 and 950 are made of stainless steel, although almost any type of material can be specified. Basket perforations from 1/32” up to 1/2” are available and mesh linings in sizes from 20 to 400 mesh for fine straining applications can be specified.
Eaton Model 900 and 950 fabricated Duplex Strainers will meet the requirements of most duplex strainer applications. It is also easy to customize the strainers to meet special application requirements. Often it is thought that a custom designed duplex strainer is required for an application. Then on examination of the Model 900 or 950 it is found that a few simple modifications of the basic design results in a strainer that fits the application perfectly and at significant cost savings over a custom design.

Fabricated duplex strainers can also be designed with a backflush/backwash option. In these designs a piping connection, with an on/off backflush valve is fabricated at the strainer bottom and has a connection to the bottom of the strainer basket. When solids accumulate in the bottom of the basket the backflush valve is opened and the differential pressure between the operating pressure and the backflush system removes the solids without shutting the system down. Backflushing is often supplemented by a backwashing operation.

Backwashing is done by having fluid flow, under pressure, in the reverse direction into an empty strainer. This flow reversal back washes the basket and removes the residual dirt. Backwashing is often regarded as a second step, used to remove dirt not removed by backflushing.

Steam jacketing is another option available for fabricated strainers. Steam jacketing is used to maintain critical fluid temperatures through the strainer. High temperatures are often required to process and transport highly viscous fluids. This modification is designed and effected without any impact on the function or normal maintenance of the strainer. Steam jacketing is available in carbon steel and type 316 stainless steel for service up to 450°F.

Eaton Model 900/950 strainers can be designed and fabricated to ASME section VIII and ANSI B31.1 codes.

### Typical Basket & Screen Effective Area

<table>
<thead>
<tr>
<th>Strainer Model</th>
<th>Pipe Size in.</th>
<th>Perforation Size - in.</th>
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*Contact Eaton for larger sizes*
### MODEL 950 150# with Bolted Cover

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### MODEL 950 150# with Quick Open Cover

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Consult Eaton for larger sizes. Dimensions are for reference only.
Model 900 with Bolted Cover

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Consult Eaton for larger sizes. Dimensions are for reference only.
The Model 91 Fabricated Tee Strainer is available in carbon steel or stainless steel with ANSI Class 150, 300, or 600 flanges or butt weld piping connections. Sizes are available for pipelines from 2” up to 48”. This type of tee strainer is typically used for pump protection or other low solids applications.

The Eaton Model 91 Tee Strainer offers several advantages over other strainer designs. The strainer is very compact, important in applications where space is restricted. Unlike most other strainers the Model 91 can be used in both vertical or horizontal installations. A real time saving feature of the Model 91 Tee Strainer is that the strainer screen can be cleaned without draining the strainer vessel.

In many applications the most important feature of the Model 91 is its very low pressure drop as compared to other types of strainers. The combination of a convoluted strainer screen and unrestricted flow path results in very low pressure losses. This low pressure drop makes it ideal for applications such as condensate and boiler feed pump suction where water quality is good and pressure drop is critical.

Two different types of covers are available for the Model 91. The simplest type is the bolted cover which is cost effective and works well in applications where basket changing is infrequent. A davit assembly can also be specified for larger strainers with heavy covers. This makes it possible for a single person to remove the cover of the strainer.

If the strainer will be opened frequently for basket cleaning, a bolted cover is less effective because of the time needed to remove and then tighten the bolts. For these applications, there is a special, hinged, quick-opening cover that is secured by swing bolts. This type of quick-opening cover can even be adapted for higher pressure applications.

### Basket & Screen Effective Area

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<tr>
<th>Strainer Model</th>
<th>Pipe Size in.</th>
<th>Perforation Size - in.</th>
<th>Nominal Area of Pipe (sq in)</th>
<th>Gross Screen Area (sq in)</th>
<th>Free Area (sq in)</th>
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*Contact Eaton for larger sizes*
Strainer screens for the Model 91 are made of stainless steel – although almost any type of material can be specified. Screen perforations from 1/16” up to 1/2” are available and mesh linings in sizes from 20 to 60 mesh for fine straining applications can be specified. The unique convoluted design of the strainer screen doubles the screen area and completely changes the dirt accumulation pattern on the screen. This makes more effective use of the screen’s straining area and increases the time between screen cleanings.

In larger sizes, because of greater screen area, the Model 91 can be an economical and functionally better choice than the traditional Y strainer.

The Eaton Model 91 Fabricated Tee Strainer will meet the requirements of most tee strainer applications. For those that it doesn’t, it is also easy to customize the strainer to meet special application requirements. The strainer can be designed to meet very tight dimensional restrictions. The Model 91 can also be adapted for straight through or right angle flow, making it ideal for retrofit situations in which strainers were initially omitted.

Steam jacketing is another option available for fabricated tee strainers. Steam jacketing is used to maintain critical fluid temperatures through the strainer. High temperatures are often required to process and transport highly viscous fluids. This modification is designed and effected without any impact on the function or normal maintenance of the strainer. Steam jacketing is available in either carbon steel or Type 316 stainless steel for services of up to 450°F.

The Eaton Model 91 Strainers can be designed and fabricated to ASME section VIII and ANSI B31.1 codes.
Tee-Type Strainers

- Sizes from 2” to 24” - As Standard
- Larger Sizes up to 48” - Available on request
- Available in Carbon Steel - Stainless Steel*
- Flanged ANSI Class 150 and 300 - As Standard
- Flanged Class 600 - Available on request

* SSTL strainers include carbon steel, external non-wetted fasteners as standard

Advantages include:
- Compact design
- Vertical or horizontal installation
- Basket can be cleaned without draining
- Convoluted element design doubles the screen area and completely changes dirt accumulation pattern.

Bolted Cover

Quick-Opening Hinged Cover

Contact Eaton for larger sizes
The Eaton automatic self-cleaning strainer is a motorized strainer designed for the continuous removal of entrained solids from liquids in pipeline systems. It has successfully performed in industrial, process, water, wastewater, power, paper and municipal applications for over 30 years.

With an automated control system monitoring the strainer operation, cleaning is accomplished by an integral backwash system. A small portion of the screen element is isolated and cleaned by reverse flow. The remaining screen area continues to strain – providing uninterrupted flow. With this efficient design, only a small amount of the liquid being strained is used to carry away the debris from the strainer.

All Eaton Automatic Self-Cleaning Strainers feature the idL™ shaft seal that positively prevents leakage from the backwash shaft at the top of the strainer. This unique quad seal replaces older, leak prone packing material. With the idL seal the exterior of the strainer stays dry and clean in service, there’s never any bothersome external leakage or weeping of the process media down the sides of the strainer.

A common problem in many smaller size automatic self-cleaning strainers (2” to 8”) is inefficient backwashing due to debris lodged in the strainer element. In these sizes, the Model 2596 Strainer features Eaton’s Cenpeller Technology which solves this problem. A unique vane plate is positioned at the inlet of the strainer element where it contacts the process media before it enters the element. The vane causes the incoming liquid to move in a circular motion, forcing the debris to lay up against the surface of the strainer element rather than impinging on the element and lodging in the element’s openings. Lodged debris in the strainer element can negatively impact the differential pressure across the strainer, resulting in a shut down of the strainer while the element is manually cleaned. Cenpeller Technology helps prevent this problem while making backwashing much easier and more efficient.
**AUTOMATIC SELF-CLEANING STRainers**

**operation**

The debris laden dirty fluid enters the strainer’s large bottom chamber where the line velocity is reduced. Flow continues upward, passing radially through the “sealed” screen element. Unwanted material is trapped on the inside of the screen. The flow is uninterrupted and the strained clean fluid continues its path into the correctly proportioned outer annulus of the strainer body and exits through the outlet nozzle.

Backwash cleaning is accomplished by utilizing the pressure differential between line pressure and atmosphere. A hollow, full flow backwash arm extending the full length of the screen element rotates slowly inside of the screen and is piped to atmosphere. The port shoe is in close proximity to the screen, and its opening is equivalent to the “debris collector” sections created by the convolutions and/or the vertical collector bars in the element. When cleaning is required the automatic backwash valve opens the system to atmosphere, causing a high velocity reverse flow across the isolated section of the screen. Dirt and debris are flushed from this segment of the screen into the backwash arm and out of the strainer via the backwash piping. During the backwashing cycle the main flow is uninterrupted and continues to be strained in the normal manner. A manual throttling valve is recommended after the control valve. Thus, backwash flow can be regulated and balanced for optimum performance and reduction of water loss.

An automatic control system consisting of an electrical panel, actuated valves and a differential pressure switch operates the strainer. The cleaning cycle is set to activate on a timed cycle with a differential pressure override to protect against system upset conditions. The control system will automatically close the backwash valve after the screen element is properly cleaned. The unit can also be operated manually or in the continuous backwash mode. See modes of operation on page 28 for additional information.
AUTOMATIC SELF-CLEANING STRAINERS

**Straining Cycle**

- Rotating Full Flow Hollow Backwash Arm Piped To Atmosphere
- Debris-Laden Fluid Carried Away Through Backwash Piping
- DuraWedge® Screen Element
- Reinforcing Bands
- Collector Bars
- Lower Seal Ring
- Upper Seal Ring
- Clean Strained Fluid Outlet
- Clean Strained Continuous Flow

**Reverse Flow**

- Dirty Fluid From Inlet Nozzle
- Rotating Full Flow Hollow Backwash Arm
- Top View
- Strained Clean Continuous Flow

**Backwashing Cycle**

- Rotating Hollow Backwash Arm
- Debris-Laden Fluid Inlet
- Dirty Fluid Discharged Through Backwash Piping
- Backwash Outlet
- Backwash Outlet
- Debris-Laden Fluid Carried Away To Atmosphere
- Top View
- Strained Clean Continuous Flow
- Reverse Flow
- Dirty Fluid From Inlet Nozzle
AUTOMATIC STRAINERS

Model 2596 Cast Strainers

Sizes 2” Thru 8”

Cast construction Model 2596 Automatic Self-Cleaning Pipeline Strainers are available in 2”, 3”, 4”, 4”L, 6”, and 8” pipeline sizes. The 4”L size is designed for applications where the combination of flow rate and open area requirements may be too great for a standard 4” size.

Application Limits

Cast Iron Class 125 Flange (-20° to 150°F) 200 psi (2”- 8”)

Cast Stainless Steel Class 150 Flange (-20° to 100°F) 275 psi (2”- 4”)

Optional Features

Stainless steel, copper nickel, monel, aluminum bronze, and other materials of construction. ASME code stamp.

Pressure drop data indicates results to be expected with clean water, under normal flows, with standard straining media and in clean strainer.

Model 596 Cast Strainers

Sizes 10” Thru 20”

Application Limits

Ductile Iron Class 125 Flange (-20° to 150°F) 150 psi

Cast Steel Class 300 Flange (-20° to 150°F) 300 psi

Application Limit 20” Size

Ductile Iron Class 125 Flange (-20° to 150°F) 150 psi

Based on ratings of ANSI and ASME Section VIII, Div. 1.

Lower pressure ratings at higher temperatures

Optional Features

• Stainless steel, copper nickel, monel, aluminum bronze and other materials of construction.

• ASME Section VIII, Div. 1. code stamp available.

• Flanged, screwed or socket weld backwash connections (steel unit only).

Pressure drop data indicates results to be expected with clean water, under normal flows, with standard straining media and in clean strainer.

Specific descriptions and construction details illustrated may vary slightly from equipment furnished. We reserve the right to revise or discontinue equipment or design features without notice. We recommend that you review performance and application data with us prior to final design.
TECHNICAL INFORMATION

Model 2596 Fabricated Carbon Steel and Stainless Steel

Sizes 10” Thru 30”

APPLICATION LIMITS
Fabricated strainers are designed within the limits of the customer’s specifications and design criteria along with any applicable code requirement. i.e. ASME Section VII Div. 1.

OPTIMAL FEATURES
- Stainless steel, copper nickel, monel, aluminum bronze and other materials of construction.
- ASME Section VIII, Div. 1. code stamp available.
- Flanged, screwed or socket weld backwash connections (steel unit only).

Pressure drop data indicates results to be expected with clean water, under normal flows, with standard straining media and in clean strainer.

Approximate Dimensions (in) Approximate Weight (lb)

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<td>23</td>
<td>%</td>
<td>34.13</td>
<td>3,500</td>
<td>8,300</td>
<td>1,280</td>
</tr>
<tr>
<td>20”</td>
<td>54</td>
<td>37</td>
<td>120</td>
<td>123</td>
<td>50</td>
<td>3</td>
<td>25</td>
<td>%</td>
<td>38.13</td>
<td>3,700</td>
<td>10,000</td>
<td>1,480</td>
</tr>
<tr>
<td>24”</td>
<td>54</td>
<td>39</td>
<td>124</td>
<td>127</td>
<td>54</td>
<td>3</td>
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<td>%</td>
<td>38.13</td>
<td>3,830</td>
<td>10,160</td>
<td>1,480</td>
</tr>
<tr>
<td>30”</td>
<td>64</td>
<td>51</td>
<td>147</td>
<td>151</td>
<td>76</td>
<td>3</td>
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<td>%</td>
<td>48.13</td>
<td>5,000</td>
<td>13,400</td>
<td>2,000</td>
</tr>
</tbody>
</table>

Note: K= Diameter Bolt Hole (4) Required 90° Apart, L= Diameter Bolt Circle
Dimensions are for reference only. For installation purposes, request certified drawings.

Sizes 36” Thru 48”

APPLICATION LIMITS
Fabricated strainers are designed within the limits of the customer’s specifications and design criteria along with any applicable code requirement. i.e. ASME Section VII Div. 1.

OPTIMAL FEATURES
- Stainless steel, copper nickel, monel, aluminum bronze and other materials of construction.
- ASME Section VIII, Div. 1. code stamp available.
- Flanged, screwed or socket weld backwash connections (steel unit only).

Pressure drop data indicates results to be expected with clean water, under normal flows, with standard straining media and in clean strainer.

Approximate Dimensions (in) Approximate Weight (lb)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>P</th>
<th>Dry</th>
<th>Wet</th>
<th>Cover</th>
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</thead>
<tbody>
<tr>
<td>36”</td>
<td>90</td>
<td>60</td>
<td>103</td>
<td>148</td>
<td>182</td>
<td>72</td>
<td>6</td>
<td>1½</td>
<td>66</td>
<td>14</td>
<td>14,000</td>
<td>29,530</td>
<td>4,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>48”</td>
<td>109</td>
<td>62</td>
<td>122</td>
<td>177</td>
<td>227</td>
<td>80</td>
<td>48</td>
<td>8</td>
<td>1½</td>
<td>90</td>
<td>13</td>
<td>24,000</td>
<td>53,000</td>
<td>8,000</td>
<td></td>
</tr>
</tbody>
</table>

Note: J=Backwash Outlet Range Size, K= Diameter Bolt Hole (4) Required 90° Apart, L= Diameter Bolt Circle
Dimensions are for reference only. For installation purposes, request certified drawings.

Specific descriptions and construction details illustrated may vary slightly from equipment furnished. We reserve the right to revise or discontinue equipment or design features without notice. We recommend that you review performance and application data with us prior to final design.
Applications

Eaton Automatic Self-Cleaning Strainers are typically used in a wide variety of applications such as cooling water from ponds, lakes or rivers, cooling towers, plant service water, boiler feed water, secondary effluent, irrigation, and municipal water intake for equipment protection. Continuous flow is assured and protection is provided for nozzles, pumps, valves, heat exchangers and other process equipment.

These high quality strainers can also handle other liquids with water-like viscosities such as water based machine tool coolant successfully. The limiting factors are the level of solids content and the ability to handle the backwash discharge flow.

Eaton Automatic Self-Cleaning Strainers will significantly reduce maintenance costs, due to a design that reduces the number of internal parts to ensure the strainer is easy to access and maintain.

Eaton Automatic Self-Cleaning Strainers provide uninterrupted flow, a major consideration in plant operation. They are a worthwhile investment in applications where frequent cleaning of large size lines or installations in remote locations is encountered. These strainers also provide worry-free operation. Unexpected problems such as high system differential pressure due to a dirty strainer basket resulting in downtime or unscheduled maintenance will not occur.

Eaton Automatic Self-Cleaning Strainers are ideal as replacements for both simplex or duplex manual strainers because of their reliability and low maintenance requirements.

Typical Applications

Irrigation systems where low head is commonly encountered.

Fire protection/general service water from ponds and lakes.

Installations on the suction side of service water pumps.

Intake water for plants from rivers, bays, etc. where head variations occur.

Secondary effluent in treatment plants for spray nozzles and service water applications.
DuraWedge® is a nonclogging, rugged stainless steel straining element constructed from vee-shaped profile wire. Available only from Eaton.

Features
• Two point contact straining from the “smooth” side prevents plugging or packing of debris and particles.
• Effective dislodging of dirt, debris and fibers from the element during backwash. This is accomplished by the increased velocity of the reverse flow (during backwash) from the “open side” of the vee.
• Fiber stapling is reduced because of smooth surfaces and the design contour of the profile wire.
• Vertical collector bars form spaces to accumulate debris and dirt, preventing snow plowing of materials by the rotating backwash arm and port shoe.
• No bypass. Elements are sealed.
• Longer service life. All-welded design with circumferential reinforcing bands provides structural integrity.

This is a sturdy, economical stainless steel element for general service use. It is ideal in applications where leaves, twigs and large amounts of miscellaneous debris are encountered. The generous spaces created by the convolutions provide an area for the debris to collect. “Packing” does not occur due to the gradual contoured shape of the convolutions. During backwashing the debris is easily dislodged and carried away through the backwash arm and out of the strainer.

Features
• Circumferential reinforcing bands for added resistance to pressure and flexing ensures long service life.
• Cartridge design for easy removal and cleaning.
• Convoluted sections are individually isolated by the port shoe during backwash for increased cleaning efficiency.
• No snow plowing. Convoluted profile provides collection spaces for debris.
• Extended area design offered only by Eaton.
• No bypass.
• Sinterbonded mesh available - An Eaton exclusive.

STANDARD OPENINGS

DuraWedge Element
Model 2596 - 2” to 8” - 1/16, 1/32, 0.015”
Model 2596 - 10” to 16” - 1/8”, 1/16”, 1/32”, 0.015”, 0.009”
Model 2596 - 18” to 24” - 3/16”, 1/8”, 1/16”, 1/32”, 0.015”, 0.009”

Convoluted Element
This is a sturdy, economical stainless steel element for general service use. It is ideal in applications where leaves, twigs and large amounts of miscellaneous debris are encountered. The generous spaces created by the convolutions provide an area for the debris to collect. “Packing” does not occur due to the gradual contoured shape of the convolutions. During backwashing the debris is easily dislodged and carried away through the backwash arm and out of the strainer.

Features
• Circumferential reinforcing bands for added resistance to pressure and flexing ensures long service life.
• Cartridge design for easy removal and cleaning.
• Convoluted sections are individually isolated by the port shoe during backwash for increased cleaning efficiency.
• No snow plowing. Convoluted profile provides collection spaces for debris.
• Extended area design offered only by Eaton.
• No bypass.
• Sinterbonded mesh available - An Eaton exclusive.

STANDARD OPENINGS

Convoluted Perf Element
Model 2596 - 2” to 8” - 1/8”, 1/16, 1/32
Model 2596 - 10” to 16” - 1/8”, 1/16, 1/32
Model 2596 - 18” to 24” - 5/32”, 1/8”, 1/16”

Convoluted Mesh Element
Model 2596 - All Sizes - 40 mesh (0.015”), 60 mesh (0.009”), 80 mesh (0.007”)

Note: Screen element selection is important. A smaller than required opening will reduce the efficiency of the system. Please contact Eaton for prompt expert assistance to ensure proper element/strainer selection.
**Features:**

**Quality Construction**
Eaton Automatic Self-Cleaning Strainers are designed and constructed in general accordance with ANSI and ASME Section VIII, Division 1. A Code Stamp is available. Seismic qualification is also available.

**idL™ Seal**
The unique Eaton idL Shaft Seal replaces older style packing and prevents troublesome leakage. This special quad seal means that the strainer always stays dry and clean in service with no process media leaking down the sides of the strainer.

**Ease of Maintenance**
Unitized modular assembly – the motor, gear reducer, cover and complete operating mechanism lift off as a unit, making all components easily accessible. This greatly simplifies maintenance and reduces costs.

**Low Backwash Fluid Requirements**
Due to the efficient hydraulic design of the backwash system.

**Material of Construction**
Cast 2” through 20” in iron, ductile iron, carbon and stainless steel, Ni-resist, aluminum bronze. Fabricated 6” through 60” in carbon steel, stainless steel, Monel, and copper nickel.

**Choice of Screen Elements**
To suit the particular service – DuraWedge, Perforated or Mesh elements.

**Minimal Power Consumption**
1/3 HP drive motor in 2” through 8” Model 596, 1/4 HP in 10” through 16” Model 2596. 1/3 HP in 18” through 24”, 1/2 HP in 30”, 1 HP in 36” to 42”, and 2 HP in 48” through 60”.

**No Dirty Fluid Bypass**
“Sealed End” cartridge screen element seat in close tolerance machined retained rings.

**Tight, Simple Cover Seat**
O-ring design permits resealing without time-consuming gasket replacements and adjustment.

**Manual Operation if Required**
Utilizing extended shaft.

---

**Typical Construction**

1. Extended Shaft for Manual Operation
2. Low H.P. Motor / Heavy Duty Gear Reducer
3. idL™ Shaft Seal
4. O-Ring Cover Seal
5. Full-Flow Backwash Arm with Adjustable Port Shoe
6. Upper Seal Retaining Ring
7. Sealed End Cap Ring
8. DuraWedge® Stainless Steel Element
9. Sealed End Cap Ring
10. Lower Seal Retaining Ring
11. Composite Bearing
12. Bearing Collar
13. Retaining Ring
14. Strain-O-Matic® Body, Designed and Constructed in Accordance with ANSI & ASME Sec. VIII
15. Backwash Outlet
16. Inlet with Large Bottom Chamber, Reduces Flow Velocity
17. Mounting Feet for Ease of Installation

**Entire Assembly Lifts Off as a Unit, for Ease of Maintenance and Inspection.**
Straining Elements

There are three kinds of Eaton straining elements: convoluted perforated plates, convoluted sinter-bonded mesh and DuraWedge®.

For coarse straining applications, such as raw water intakes from lakes, ponds and streams, the convoluted perforated elements will perform well and offer the most economical unit pricing.

On other applications, where pre-screening of the fluid has already been performed, but finer filtering of the fluids is desired, then the sinter-bonded mesh element may be selected.

On applications where fibrous materials will be encountered in the fluid being strained, then a DuraWedge element may help to minimize the impact of the fibers stapling to the screen.

Standard available opening sizes are shown on page 26. The rule of thumb in determining the opening size is to be 1/2 of whatever opening is being protected.

Debris

Cleaning of the straining element is accomplished by utilizing the pressure differential between line pressure and atmosphere. When the backwash valve is opened to atmosphere during the cleaning cycle, a portion of the strained fluid reverses flow back across the section of element being cleaned, lifts off the debris, and ejects the debris out of the strainer.

Sticky or greasy debris are more difficult to backwash and may require longer backwash cycle durations. Sand, dirt and pipe scale should backwash easily. The quantity of debris coming into the strainer can also be a problem. Insure that the volume of the suspended solids does not exceed 200 ppm or 0.02 percent. If the application requires heavier loading than this, consult Eaton.

Backwash Requirements

The quantity of fluid required to clean a straining element is dependent upon the type and quantity of debris. Under normal conditions, approximately 5 percent of the line flow will be used for cleaning of the straining element during the cleaning cycle. The loss of fluid through the backwash can be minimized by adding a manual throttling valve downstream of the automated valve.

Pressure and Temperature

- Cast Iron and Ductile Iron are rated at 150 psi @ 150°F.
- Fabricated Units are rated at 150 psi @ 150°F, however other ratings are available, consult Eaton.
- The minimum operating pressure is 20 PSIG.
Design and Operation
Eaton Automatic Control Systems (ACS) are specifically designed to monitor and operate the backwash cleaning system of Eaton Automatic Strainers. They are simple to operate, reliable and easily maintained. The design allows field adjustments to suit the demands of the service conditions, ensuring effective cleaning with a minimum use of backwash fluid.

Three basic systems, ACS-1, ACS-2 and ACS-3 are available.

Optional designs to meet specific requirements with special wiring arrangements, panel boxes (NEMA 7, 9), control valves, and air actuation among others, can be furnished.

ACS-1 Standard Control System Components
This system features a NEMA 4 rated (water and dust tight) panel box complete with adjustable timer, differential pressure override, 10 amp control relay for backwash valve activation, display lights to indicate Power on – Backwash Valve Open – and High Differential Pressure. A selector switch is also included to manually control the backwash valve functions of Off or On-Auto. The panel also has contact terminals for a motor starter and an external alarm connection. The panel requires 110 VAC input and is CSA approved, UL approval is available as an option. The panel has a differential pressure switch and an electrically-actuated ball valve that controls the backwash function. With Model 596LPD for low pressure systems, an electrically-operated butterfly valve is included to control the external source of cleaning water.

ACS-2 Standard Control System Components
This system has all of the features of the ACS-1 and includes a motor starter in addition to the other standard equipment.

ACS-3 Standard Control System Components
This system has all of the features of the ASC-2 system and includes a 480V/120V dual voltage transformer.

Motors
An electric motor and gear box are furnished as part of the strainer. The standard TEFC motor is 120/220V, Single phase 60 Hz, or 230/460V Three Phase 60 Hz, at customer option. Other motors are available.

Modes of Operation
By operating the selector switch, the controls can be easily switched to either of two modes: automatic intermittent or continuous backwashing.

The automatic intermittent mode is adjustable by setting the timer in the panel that controls the frequency of backwashing and the “open” time of the backwash valve. The settings will depend on the individual installation. Predicting average times is difficult because conditions vary. Experience will dictate the optimal settings. Field adjustments should be made to suit the application.

The differential pressure switch must also be set. Two PSID above the clean reading is the setting recommended. This switch will compensate for sudden high loadings by overriding the time cycle and initiating backwash should the differential pressure rise above the programmed setting. A secondary delay timer will continue the cleaning for 60 seconds beyond that point. The time delay can be varied from 1 to 150 seconds.

The continuous backwashing mode is positive, efficient and practical where the backwashing fluid can be recycled to its source. It is also desirable, and sometimes necessary, to use this mode when very high solid loadings are encountered.

This mode is initiated by placing the backwash switch on the panel in the “on” position. Manual operation of the system can be controlled with this switch, opening or closing the backwash valve as desired. Returning it to “auto” will restore the intermittent cycling as set.

In both the automatic intermittent and continuous backwashing modes the backwash arm continuously rotates at a low 2-4 RPM.

Differential Pressure Switch
A diaphragm-type differential pressure switch is a standard component in all Control Systems. It provides protection for the strainer and element, initiating backwash should a high differential pressure occur between timed cleaning intervals.

Backwash Valve
Electrically actuated (115 VAC/60 Hz) ball valves are also standard in the Control Systems. Materials of construction are suitable for water service. Other materials, valve types and pneumatic actuation are optional.

Backwash Valve Sizes

<table>
<thead>
<tr>
<th>Strainer Size</th>
<th>2”, 3”, 4”</th>
<th>6”, 8”</th>
<th>10 thru 20”</th>
<th>24”, 30”</th>
<th>36”, 42”</th>
<th>48”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve Size</td>
<td>1”</td>
<td>1½”</td>
<td>3”</td>
<td>4”</td>
<td>6”</td>
<td>8”</td>
</tr>
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</table>
Basic Guidelines
1. Insure that the pipeline flow velocity falls within the standard design range of the strainer.
2. Select the correct screen and opening size, don’t make smaller than necessary.
3. The quantity, type and nature of debris to be removed are considered.
4. The strainer meets the design pressure and temperature requirements of the pipeline.
5. Backwash line should discharge to atmosphere in close proximity to the strainer.

Standard Design Parameters
1. Self-cleaning strainers have a design flow range where the unit will best perform its two main functions, straining and self-cleaning.
2. Inlet flow velocity to the strainer should be in the 6 to 10 feet per minute range. There may be applications where the operating flow will fall outside the normal design range. When this occurs, please contact Eaton for recommendations.
3. Minimum operating pressure is 20 PSI for standard units. Consult Eaton for equipment options when the system pressure is less than 20 PSI.
4. Suspended solids should not exceed 200 PPM or 0.02% of volume. For heavier loadings consult Eaton.

<table>
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<tr>
<th>PPM</th>
<th>%</th>
<th>LB / 1000 GAL</th>
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<tbody>
<tr>
<td>10000</td>
<td>1.0</td>
<td>80</td>
</tr>
<tr>
<td>8000</td>
<td>0.8</td>
<td>60</td>
</tr>
<tr>
<td>6000</td>
<td>0.6</td>
<td>40</td>
</tr>
<tr>
<td>4000</td>
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<td>4</td>
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<td>400</td>
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<table>
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<tr>
<th>PPM</th>
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<th>LB / 1000 GAL</th>
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</thead>
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<tr>
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<td>80</td>
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<td>60</td>
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</tr>
<tr>
<td>1.0</td>
<td>0.0001</td>
<td>0.01</td>
</tr>
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Design
1. The Automatic Self-Cleaning Strainer shall be a Eaton Strain-O-Matic® Model 596 or 2596.

2. Strainer Design Parameters:
   - Strainer Inlet Size ______ in.
   - Flow Rate___________ GPM
   - Working Pressure ________ PSI (Min. 20 PSI)
   - Design Pressure __________ PSI
   - Design Temperature _________°F
   - Max. Allowable Pressure Drop ______ PSID
   - Solids Loading ______ PPM
   - Design shall be in general accordance with ANSI and ASME Sec. VIII Division 1.

3. For ease of maintenance the strainer shall be designed so the entire operating assembly, motor, gear reducer, cover, backwash arm assembly, bearing housing and element lift from the strainer body as a complete unit.

4. For backwashing efficiency the entire open area of the backwash port opening shall be in close proximity to the full length of the screen section being backwashed. Additionally, the entire backwash arm shall have a full-flow opening throughout the entire passage to the backwash piping. The backwash arm shall not contact or scrape the screen at any point.

Screen Element
1. Media Design parameters (check one):
   - Type:
     - ___ DuraWedge media (vee-shaped profile wire)
     - ___ Convoluted
     - ___ Convoluted Sinterbonded

   Opening Size:
   - Inches ____ , Mesh Equivalent ____ , Microns ____

2. The element shall be a one-piece cartridge design for ease of removal and cleaning.

3. The element shall have stainless steel “cap rings” at both ends to prevent bypass of dirty fluid. Reinforcing circumferential bands shall also be provided for structural strength.

Materials of Construction
The strainer body shall be (iron, carbon steel, stainless steel, bronze) and shall be appropriate for the service conditions.

All components shall be of ASTM designed materials suitable for the service conditions and consistent with good engineering practice.

Control System
The system shall be capable of automatically controlling and monitoring the strainer’s operation.

The system shall have the following components.

The motor shall be a low HP TEFC single-phase 110/220V or three-phase 230/460V with a gear reducer to drive the backwash shaft.

A NEMA 4 control panel shall be furnished with three indicator lights (Power on, Backwash valve open and High differential Pressure); a 3-position selector switch (Off-On-Auto) to control the backwashing cycle; and contacts for external alarm. (Motor starter and/or transformer are optional as specified).

A diaphragm-type differential pressure switch is to be provided that shall be capable of initiating backwashing at a set differential pressure.

An electrically actuated ball valve shall be provided to control the backwash flow.
# Automatic Strainer Application Worksheet

## Self-Cleaning Strainers

### General

**Service Application:**

**Market Code:** (Check one)
- [ ] Industrial
- [ ] Municipal
- [ ] Power
- [ ] Petroleum

**Liquid to be strained:**

- Specific Gravity __
- Viscosity (CPS/SSU) __
- Temp. (°F) __

### Flow Conditions

**Flow (GPM):** __

- Maximum __
- Minimum __
- Vel (FT/SEC) __

**Operating Pressure (PSI):**

- Normal __
- Design __
- Minimum __

**Operating Temperature (°F):**

- Normal __
- Design __
- Minimum __

**Max. Allowable Press. Drop (PSI) Clean __, Dirty __

### Contaminant

**Solids to be removed:**
- [ ] Hard
- [ ] Soft
- [ ] Sticky
- [ ] Fibrous

**Solids Concentration:**

- PPM __
- % WT __
- % Volume __

**Particle Size:**

- __ Microns or __ Inches

**Element:**
- [ ] Perforated
- [ ] Mesh
- [ ] DuraWedge® Element

### Strainer Construction

**Model 2596:**

- [ ] Cast Ductile
- [ ] FAB Steel
- [ ] FAB Stainless
- [ ] Cast Iron
- [ ] Cast Steel
- [ ] Cast Stainless
- [ ] Cast Bronze
- [ ] FAB Steel
- [ ] FAB Stainless

**Pipeline Size (Inches):**

**End Connections:**
- [ ] Flanged
- [ ] 125#
- [ ] 150#
- [ ] Other __________

### Motor

**Frame:**
- [ ] TEFC
- [ ] TENV
- [ ] Other __________

**Power Supply:**
- [ ] 120V, 1 PH, 60 Hz
- [ ] 230/460 V, 3 PH, 60 Hz
- [ ] Other __________

**Special Comments:**

______________________________

### Control Package

**Type:**
- [ ] ACS-1
- [ ] ACS-2
- [ ] ACS-3

**Special Requirements or Options:**

______________________________

### Submittals (Check if Required)

- [ ] Approval Prints
- [ ] Certified Prints
- [ ] Chemical/Physical Certifications
- [ ] Hydro Test Reports
- [ ] Other __________________

### Other Specifications/Requirements:

______________________________
Simplex, Duplex and Y Strainers

**LIQUID TO BE STRAINED**

SPECIFIC GRAVITY _____, VISCOSITY (CPS/SSU), _____ TEMP. (°F) __________

**FLOW CONDITIONS**

FLOW (GPM): ___, MAXIMUM ___, MINIMUM ___, VEL (FT./SEC) ___

STEAM OR GAS FLOW: ___, STD CU FT/MIN (SCFM) ___, OR LB/HR ___.

(GIVE MINIMUM WORKING PRESSURE FOR GAS APPLICATIONS)

OPERATING PRESSURE (PSI): ___, NORMAL ___, DESIGN ___, MINIMUM ___

OPERATING TEMPERATURE (°F): ___, NORMAL ___, DESIGN ___, MINIMUM ___

MAX. ALLOWABLE PRESSURE DROP: CLEAN ___ PSI, DIRTY ___ PSI

CAN FLOW BASKET BE INTERRUPTED TO CLEAN STRAINER BASKET?  ❑ YES  ❑ NO

**CONTAMINANT**

SOLIDS TO BE REMOVED: ___, ARE THEY?  ❑ HARD  ❑ SOFT  ❑ STICKY  ❑ FIBROUS

SOLIDS CONCENTRATION: ___,PPM, __%,WT, _____% VOLUME

PARTICLE SIZE: ___ MICRONS OR ___ INCHES

MESH OR PERFORATION ______________________________

**STRAINER CONSTRUCTION**

BODY COVER:  ❑ STAINLESS STEEL  ❑ CARBON STEEL  ❑ OTHER SPECIFY __________

PIPE SIZE (INCHES): ______________________________

END CONNECTIONS:  ❑ THREADED  ❑ SOCKET WELD  ❑ BUTT WELD  ❑ FLANGED

❑ ANSI  ❑ 150 LB  ❑ 300 LB  ❑ 600 LB  ❑ OTHER ______

O-RING MATERIAL:  ❑ VITON®  ❑ BUNA-N  ❑ OTHER __________________

**SPECIAL FEATURES REQUIRED**

❑ DIFFERENTIAL PRESSURE GAUGE  ❑ SWITCH  ❑ DRAIN VALVE  ❑ VENT VALVE

PAINTING_______________  COATING_______________

❑ BOLTED COVERS  ❑ QUICK OPENING

**SUBMITTALS (CHECK IF REQUIRED)**

❑ APPROVAL PRINTS  ❑ CERTIFIED PRINTS,  ❑ CHEMICAL/PHYSICAL CERTIFICATIONS

❑ HYDRO TEST REPORTS,  ❑ COMPLIANCE CERTIFICATIONS  ❑ SHOCK/VIBRATION TEST

**OTHER SPECIFICATIONS/REQUIREMENTS:** ____________________________

The data contained in this publication are correct to the best of our knowledge. However, we do not assume any liability for the accuracy or completeness of such data. The final determination of suitability of product information, use intended, manners of that is, or infringement of patents, is the responsibility of the user.
### TECHNICAL DATA

**Flow Conversion Factors**

- **M/hr** = 3.671 I.G.M.
- **I.G.P.M.** = 41.14 Barrels/Day
- **T.P.H.** = 3.74 I.G.M.
- **I.G.P.M.** = 1.2 U.S. G.P.M.
- **I.G.P.M.** = 4.54 Liters/Min
- **LITER/MIN** = 0.22 I.G.P.M.
- **U.S. G.P.M.** = 0.833 I.G.P.M.
- **Barrel** = 35 Imp. Gallons
- **Barrel** = 42 U.S. Gallons

**Flow Velocity Conversion Factors**

- **Velocity in Ft/Sec** = \( \text{GPM} \times 0.4085 \)  
  \( \text{ID}^2 \text{ in Inches} \)

### Volume Conversion Factors

<table>
<thead>
<tr>
<th>To Obtain: Multiply By:</th>
<th>U.S. Gallon</th>
<th>Imperial Gallon</th>
<th>U.S. Pint</th>
<th>U.S. Pound Water</th>
<th>U.S. Cubic Foot</th>
<th>U.S. Cubic Inch</th>
<th>Liter</th>
<th>Cubic Meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Gallon</td>
<td>1</td>
<td>0.833</td>
<td>8.0</td>
<td>8.337</td>
<td>0.13368</td>
<td>231.0</td>
<td>3.7853</td>
<td>0.003785</td>
</tr>
<tr>
<td>Imperial Gallon</td>
<td>1.2009</td>
<td>1</td>
<td>9.60752</td>
<td>10.0</td>
<td>0.16054</td>
<td>277.42</td>
<td>4.54596</td>
<td>0.004546</td>
</tr>
<tr>
<td>U.S. Pint</td>
<td>0.125</td>
<td>0.1041</td>
<td>1</td>
<td>1.042</td>
<td>0.01671</td>
<td>28.875</td>
<td>0.473168</td>
<td>0.000473</td>
</tr>
<tr>
<td>U.S. Pound Water</td>
<td>0.11995</td>
<td>0.1</td>
<td>0.9596</td>
<td>1</td>
<td>0.016035</td>
<td>27.708</td>
<td>0.45405</td>
<td>0.00454</td>
</tr>
<tr>
<td>U.S. Cubic Foot</td>
<td>7.48052</td>
<td>6.22888</td>
<td>59.8442</td>
<td>62.365</td>
<td>0.0005787</td>
<td>1728.0</td>
<td>28.31702</td>
<td>0.0028317</td>
</tr>
<tr>
<td>U.S. Cubic Inch</td>
<td>0.004329</td>
<td>0.00361</td>
<td>0.034632</td>
<td>0.03609</td>
<td>1</td>
<td>0.016387</td>
<td>0.0000164</td>
<td></td>
</tr>
<tr>
<td>Liter</td>
<td>0.2641779</td>
<td>0.2199756</td>
<td>2.113423</td>
<td>2.202</td>
<td>0.0353154</td>
<td>61.02509</td>
<td>999.972</td>
<td>0.001000</td>
</tr>
<tr>
<td>Cubic Meter</td>
<td>264.170</td>
<td>219.969</td>
<td>2113.34</td>
<td>2202</td>
<td>35.31446</td>
<td>61023.38</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

To convert from one unit to another, locate the starting unit in the left hand column. Multiply by the factor shown horizontally to the right under the desired unit.

### Pressure Conversion Factors

<table>
<thead>
<tr>
<th>To Obtain: Multiply By:</th>
<th>Pound Sq. In.</th>
<th>Pound Sq. Ft.</th>
<th>Atmosphere</th>
<th>Kilogram Sq. Cm.</th>
<th>Inch Water</th>
<th>Foot Water</th>
<th>Inch Mercury</th>
<th>mm Mercury</th>
<th>Bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pounds/Sq. In</td>
<td>1</td>
<td>144.0</td>
<td>0.068046</td>
<td>0.070307</td>
<td>27.7276</td>
<td>2.3106</td>
<td>2.0360</td>
<td>51.7150</td>
<td>0.06895</td>
</tr>
<tr>
<td>Pounds/Sq. Ft.</td>
<td>0.0069545</td>
<td>14.696</td>
<td>0.000473</td>
<td>0.000488</td>
<td>33.9570</td>
<td>0.01615</td>
<td>0.014139</td>
<td>0.35913</td>
<td>1.01325</td>
</tr>
<tr>
<td>Atmosphere</td>
<td>14.2233</td>
<td>2048.16</td>
<td>0.96784</td>
<td>1</td>
<td>394.27</td>
<td>32.864</td>
<td>28.959</td>
<td>735.558</td>
<td>0.9807</td>
</tr>
<tr>
<td>Kilogram/Sq. Cm.</td>
<td>0.03607</td>
<td>5.194</td>
<td>0.002454</td>
<td>0.00254</td>
<td>1</td>
<td>1.08333</td>
<td>0.0734</td>
<td>1.865</td>
<td>0.00249</td>
</tr>
<tr>
<td>Inch Water</td>
<td>0.43278</td>
<td>62.3205</td>
<td>0.029449</td>
<td>0.03043</td>
<td>12.0</td>
<td>1</td>
<td>0.8811</td>
<td>22.381</td>
<td>0.02984</td>
</tr>
<tr>
<td>Foot Water</td>
<td>14.5038</td>
<td>2088.55</td>
<td>0.98692</td>
<td>1.0197</td>
<td>33.51</td>
<td>402.1</td>
<td>29.53</td>
<td>750.0</td>
<td>1</td>
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<tr>
<td>Inch Mercury</td>
<td>0.49115</td>
<td>70.726</td>
<td>0.033421</td>
<td>0.03453</td>
<td>13.617</td>
<td>1.1349</td>
<td>1</td>
<td>25.40</td>
<td>0.03386</td>
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<tr>
<td>mm Mercury</td>
<td>0.019337</td>
<td>2.7845</td>
<td>0.0013158</td>
<td>0.001359</td>
<td>0.5361</td>
<td>0.04468</td>
<td>0.03937</td>
<td>1</td>
<td>0.001333</td>
</tr>
<tr>
<td>Bar</td>
<td>14.5038</td>
<td>2088.55</td>
<td>0.98692</td>
<td>1.0197</td>
<td>33.51</td>
<td>402.1</td>
<td>29.53</td>
<td>750.0</td>
<td>1</td>
</tr>
</tbody>
</table>

To convert from one unit to another, locate the starting unit in the left hand column. Multiply by the factor shown horizontally to the right under the desired unit.
### Technical Data

#### Viscosity Equivalents

<table>
<thead>
<tr>
<th>SSU (Saybolt seconds Universal)</th>
<th>Centipoise</th>
<th>Engler Degrees 20°C</th>
<th>Redwood Standard</th>
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<tbody>
<tr>
<td>30</td>
<td>1</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>50</td>
<td>5</td>
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<td>44</td>
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<tr>
<td>100</td>
<td>20</td>
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<td>88</td>
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<td>200</td>
<td>40</td>
<td>16</td>
<td>175</td>
</tr>
<tr>
<td>300</td>
<td>65</td>
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<td>72</td>
<td>525</td>
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<td>700</td>
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<td>90</td>
<td>615</td>
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<td>800</td>
<td>175</td>
<td>115</td>
<td>700</td>
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<td>195</td>
<td>132</td>
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<tr>
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<td>210</td>
<td>150</td>
<td>880</td>
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<td>2000</td>
<td>425</td>
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<td>625</td>
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<td>6150</td>
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<tr>
<td>8000</td>
<td>1700</td>
<td>1510</td>
<td>7300</td>
</tr>
<tr>
<td>9000</td>
<td>1920</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>10000</td>
<td>2150</td>
<td>–</td>
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</tbody>
</table>

#### Strainer Basket Opening Equivalents

<table>
<thead>
<tr>
<th>Mesh</th>
<th>Inches</th>
<th>Millimeters</th>
<th>Microns</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>0.0015</td>
<td>0.0381</td>
<td>38</td>
</tr>
<tr>
<td>300</td>
<td>0.0018</td>
<td>0.0457</td>
<td>45</td>
</tr>
<tr>
<td>250</td>
<td>0.0024</td>
<td>0.0609</td>
<td>60</td>
</tr>
<tr>
<td>200</td>
<td>0.0027</td>
<td>0.0686</td>
<td>68</td>
</tr>
<tr>
<td>150</td>
<td>0.0041</td>
<td>0.1041</td>
<td>104</td>
</tr>
<tr>
<td>100</td>
<td>0.0065</td>
<td>0.1651</td>
<td>165</td>
</tr>
<tr>
<td>80</td>
<td>0.007</td>
<td>0.1778</td>
<td>177</td>
</tr>
<tr>
<td>60</td>
<td>0.009</td>
<td>0.2286</td>
<td>228</td>
</tr>
<tr>
<td>40</td>
<td>0.015</td>
<td>0.8636</td>
<td>380</td>
</tr>
<tr>
<td>20</td>
<td>0.034</td>
<td>0.8636</td>
<td>862</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Perf</th>
<th>Inches</th>
<th>Millimeters</th>
<th>Microns</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/32</td>
<td>0.033</td>
<td>0.838</td>
<td>838</td>
</tr>
<tr>
<td>3/64</td>
<td>0.045</td>
<td>1.143</td>
<td>1143</td>
</tr>
<tr>
<td>1/16</td>
<td>0.070</td>
<td>1.778</td>
<td>1776</td>
</tr>
<tr>
<td>3/32</td>
<td>0.094</td>
<td>2.387</td>
<td>2387</td>
</tr>
<tr>
<td>1/8</td>
<td>0.125</td>
<td>3.175</td>
<td>3175</td>
</tr>
<tr>
<td>5/32</td>
<td>0.150</td>
<td>3.810</td>
<td>3810</td>
</tr>
<tr>
<td>3/16</td>
<td>0.1875</td>
<td>4.762</td>
<td>4762</td>
</tr>
<tr>
<td>1/4</td>
<td>0.250</td>
<td>6.350</td>
<td>6350</td>
</tr>
<tr>
<td>3/8</td>
<td>0.375</td>
<td>9.525</td>
<td>9525</td>
</tr>
<tr>
<td>1/2</td>
<td>0.500</td>
<td>12.700</td>
<td>12700</td>
</tr>
</tbody>
</table>
Pipeline Strainers
Eaton provides the most complete range of standard cast pipeline strainers for coarse filtration available from any manufacturer. These include Simplex, Duplex and Y Type Strainers in Iron, Bronze, Carbon Steel and Stainless Steel. For ultra-pure or highly corrosive applications, strainers of all plastic construction are available. Pipeline strainers range in sizes from 1/2” to 36”.

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There is an Eaton strainer perfect for any straining applications. When there is damage causing dirt or debris in liquid pipelines, there is an Eaton pipeline strainer to remove it.

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Eaton brand Gas/Liquid Separators have been the “Industry Standard” for over 100 years. Nobody knows more about gas/liquid separation. Eaton Gas/Liquid Separators are used to remove 99% of damage causing moisture and particulate matter from air, gas and steam pipelines. They protect valuable system components like air compressors and turbines.

There are hundreds of different Eaton Gas/Liquid Separators. When a standard model isn’t right for an application, we can work with customers to create a custom fabricated model that fits the applications requirements exactly.

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Select the right strainer for your application with just a few mouse clicks. See how different strainer basket perforation and mesh sizes affect pressure drop.

**AutoCAD and Engineering Drawings**
If you have AutoCAD software you can download AutoCAD files for most of our pipeline strainers. For those without AutoCAD, engineering drawings are available in Acrobat Reader format.

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There's lots of good information about how to use pipeline strainers and what to look out for in various applications in the Library section of our web site.

To get there, click “Metal Pipeline Strainers” from the home page menu. Next, click on “Pipeline Strainers”, then click on the strainer model you are interested in and scroll down to and click “Design Aids-Pressure Loss Calculator” button.

To access these files, just click on “Metal Pipeline Strainers” from the home page menu, then click on the strainer model you are interested in. Next, click the blue “Dimensional Drawings” button on the left, under the strainer photo.

To access helpful application in the Library, click on “Metal Pipeline Strainers” from the home page and then click on “Library.”