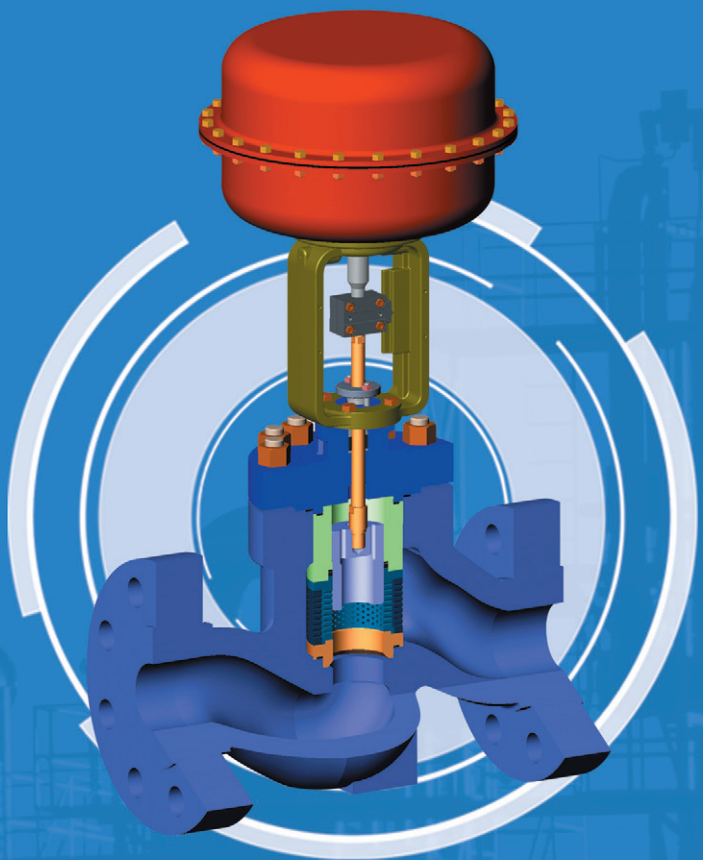
bFS

Control Valves for Power Plant Application Nuclear, Fossil

Oil Gas, Petrochemical



Introduction

Valve solutions and services for the energy industry. BFS incorporationis on new leader in design, manufacturing and support of valves, actuators for all energy industry.

1. BFS Inc. is one of new leading manufactures of valves for industrial applications. Wherever high pressure, extreme temperatures, critical media etc. Call for special safety requirement, BFS' s has solutions you know you can rely on. Our comprehensive range of standard products caters for most applications. But where necessary,we also provide engineered solutions, developed and manufactured to strict specifications.

   • BFS' s supplies valves for all kind of industrial plants, and especially for the power generation.

   • Valves supplied by BFS' s for both conventional and nuclear power plants are made to highest safety standards. Specifications are subject to ongoing review, incorporating technical advances as they occur.

   • BFS' s valves play on important part in all processing stages of the petrochemical industry from-on-and off shore choked valve through to refinery and other processing application. To on sure optimum cost-effectiveness, technical perfection and durability, we corporate closely with planners, plant manufactures, operators and investors.

Our aim is to be a good partner to our customers-that we achieve this can be seen from our many references.

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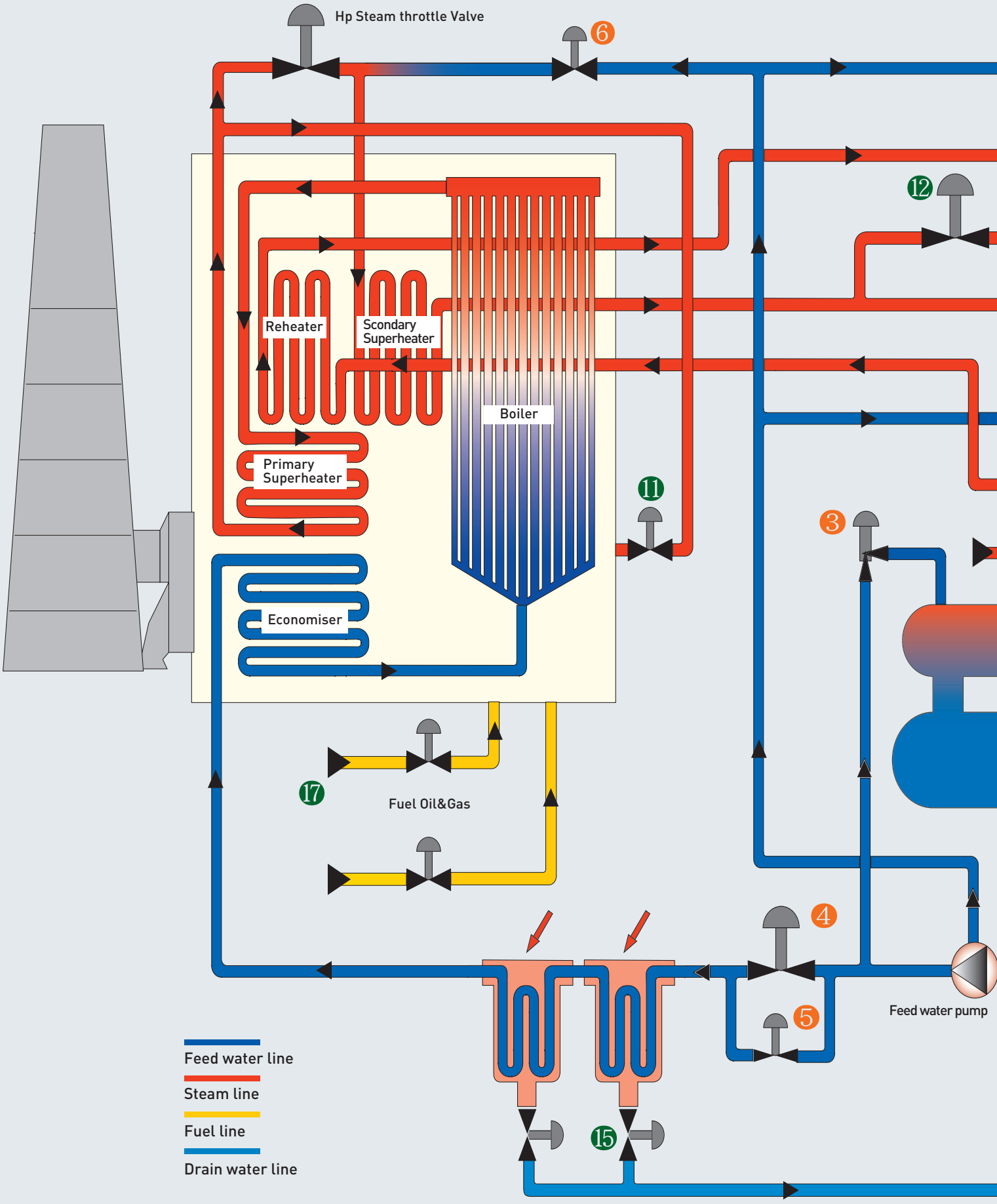
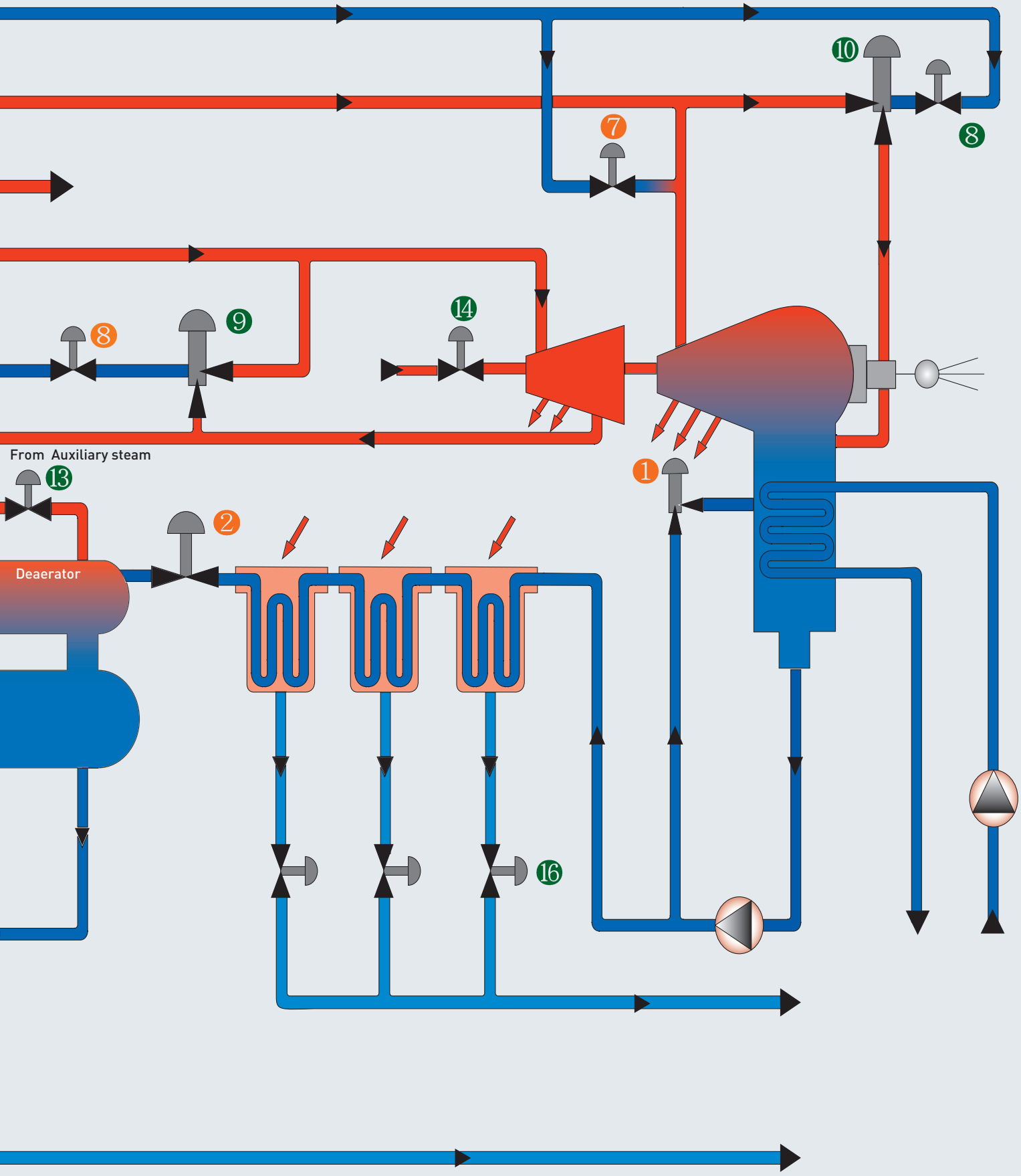

Hp Steam throttle Valve
6
12
Reheater
Scondary Superheater
Boiler
Primary Superheater
11
3
Economiser
17
Fuel Oil&Gas
4
5
Feed water pump
15
Feed water line
Steam line
Fuel line
Drain water line

MAIN CONTROL VALVES



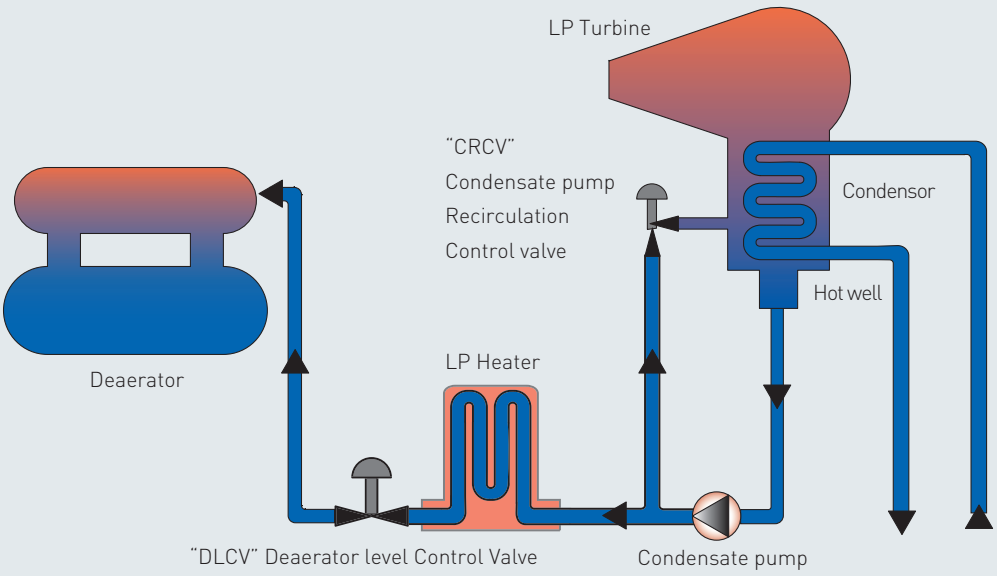
1 Condensate System

The condensate drain control valves serve to control the water level in the individual preheater stages. When the condensate pressure is reduced the volume is increased by evaporation of the water. As shown in Fig1. the straight through body is especially globe. Thus, also the pressure reduction of flashing condensate is reliably controlled, shown below is a schematic of a typical condensate system.

① Condensate Recirculation Control Valve (HG or HA)

As with most large centrifugal pumps, the condensate pump most have a minimum amount of flow through it at all times to prevent it from overheating and to protect it from cavitation. Therefore, are circulation line runs from the pump outlet back to the condenser, when recirculation Is necessary the 300psi to 600psi with fluid temperature from 38℃ to 66℃ condensate is dumped to the condenser. Which is very close to atmospheric pressure or at a vacuum. The condensate recirculation valve must absorb the entire pressure drop. At the high pressure drop experienced the condensate will be cavitating in a standard valve.

Application: X[iks]-trim H-series Valve or Multi-Hole-3stage C-series Valve



[Fig 1. Condensate system]

② Deaerator Level Control Valve (CG or HG)

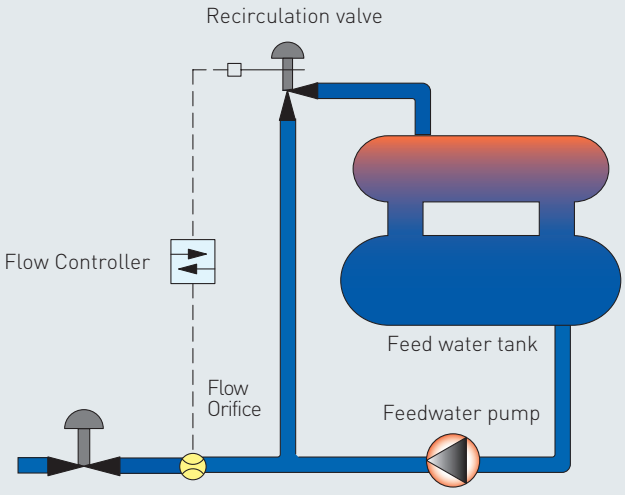
The purpose of this valve is to maintain a level in the deaerator, on open style of feedwater heater. It controls the amount of condensate flow into the deaerating vessel. The service conditions of this valve very directly with the plant load. During start-up the pumping load is small, the valve inlet pressure is high and the outlet pressure is low, because the deaerator pressure is not built-up yet.

In this case, there is a need for cavitation prevention and the flow capacity required is very low. As the plant load increases, the need for high flows and the condensate pump can not maintain the same pressure head at these higher flows. The result is a lower inlet pressure to the valves.
Concurrently, the line pressure to the deaerator is building, putting back pressure on the valve. These higher flows with lower pressure drop create a need for higher capacity of the valve but less resistance in the trim. Application: Standard X[iks]-trim H-series Valve.Multi-Hole cage trim c-series Valve

2 Boiler Feedwater System

❸ Boiler Feedwater pump Recirculation control valve (HG or HA)

Shows the functional diagram of the recirculation control, during start-up and shut-down with the feed pump in operation, the pump must be capable of handling a minimum flow for its own protection. If it is not yet possible for the boiler to accept this flow, it is returned directly to the feedwater tank through the open recirculation valve. The normally very high pressure difference between the pump discharge side and the feedwater tank is reduced in several stages by the minimum flow valve. Depending on the desired design these valve can operate in the on/off mode or be controlled continuously
The body is made of forged steel and available in angleor globe design. The valve closed by a pressure sealing bonnet. The pressure is reduced in a X[iks]-trim (Disk stack/labyrinth system) which is selected by balanced plug. The number of stages (turn) isadjusted to the differential pressure to be reduced. This allows optimization between costs and service life. It is taken for granted that the balanced plug, balance cylinder and X[iks]-trim are made of wear resistant materials



Drum Boiler
P1 : 2800~3200 Psig
OP : 2700~3100 Psig
T : 149~204℃

Once-throngh Boiler
P1 : 3700~4500 Psig
OP : 3600~4400 Psig
T : 177~232℃

[Fig 2. Boiler Feedwater pump Recircalation System]

4 Main Feedwater Control Valve(CG or HG)

Feedwater control valves are used as control valve at 100% load if the feed pump is not providedwith a speed control. Feedwater control valves are used for start-up of the boiler load (with and without variable-speed pump)

- Stable control good follow-up performance.
- Rigorous and high-durability structure by cage and plug specially designed for feedwater valves.
- Cavitation and erosion in low opening controlled by standard X[iks]-trim or Multi-hole cage trim

a In this valve, two opposed functions are to be performed

- During full load operation, the minimum possible pressure drop with maximum mass-flow is expected since optimum efficiency can only be achieved in this way.
- During start-up of the boiler plant high differential pressure with low mass flow are to be reduced. The large control ratio resulting from requirements full-load & start-up in connection with the requirement for all sufficient service life leads in many cases to the use of two valves, The 30% start-up valve(bypass) normally of the X[iks]-trim (Disk-stack) type is combined with a Multi-Hole cage full load valve.

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b Many plants utilize a start-up valve and main valve for this service

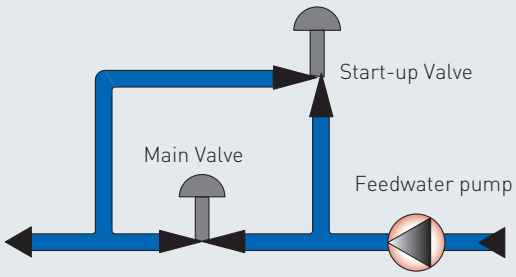
The start-up valve world have trim to cope with the low flow and cavitation condition and the main valve take over the flow increased and differential pressure decreased. The BFS's X[iks]-trim valve can be built with characterized trim to cover the full range of operation conditions in one valve.

Requirements of this valve

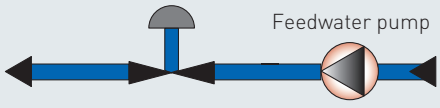
- High range ability & Cavitation protection at low flows
- Low resistance at maximum flow
- This valve should have at least class Ⅴ. Shut-off

5 Start-up Feedwater control valve (HA or HG)

The start-up valve will have much the same service conditions as the boiler feed pump recirculation valve. That is, high inlet pressure and full drop. This valve needs anti-cavitation trim and tight shut-off. Unlike the boiler feed pump recirculation valve, the feedwater start-up valve generally does not need the same amount of cavitation protection at all valve travels since pressure drop changes with travel. Therefore, a X[iks]-trim characterized cage may be used. The normal recommendation is a small HA design with X[iks]-trim (18 turns)



[Fig 3. Main Feedwater Valve with Stant-up Valve]



[Fig 3-1. Typical Feedwater System with X[iks]trim]

Start-up Process
P1 : 2800~3200 Psig
△P : 2700~3100 Psig
T : 149~204℃

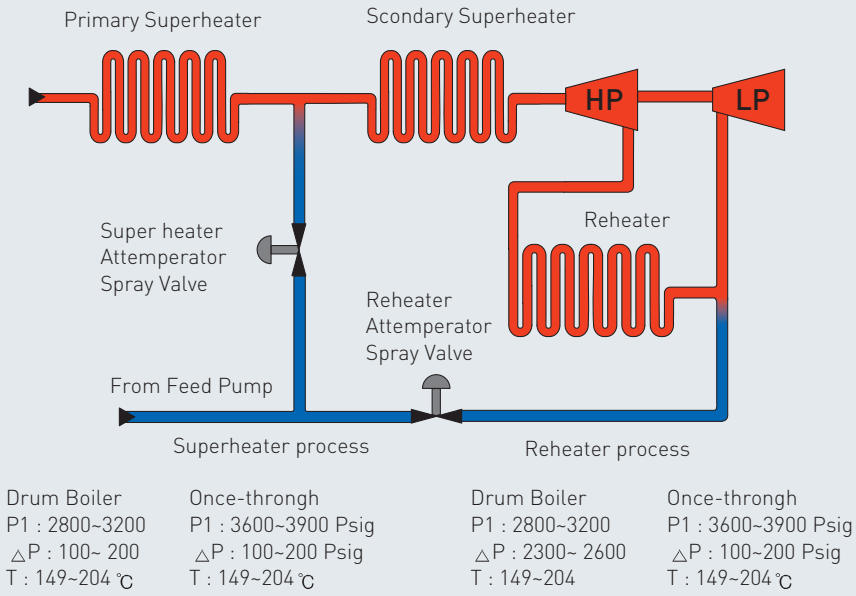
Main Valve
P1 : 2800~3200 Psig
△P : 100~600 Psig
T : 149~204℃

X[iks]trim Process
P1 : 2800~3200 Psig
△P : 100~600 Psig
T : 149~204℃

⑥⑦⑧ Attemperator Spray Control Valve (HA or HG)

Efficient spray valves are needed for temperature control in the final stages of the superheaters, but also in the steam conditioning valve still to be introduced for closing of the required cooling water. The high stressing due to the in part, large pressure drop to be handled is common to all these valves. Depending is pressure drop, various throttle plugs are used. Up to about 300psig, the Multi-hole, 1 stage trim application up to about 600psig, a Multi-stage 2 stage trim. The Multi-hole 3 stage trim or has its limit of application at about above 900psig. X[iks]-trim (Disk-stack). Beyond this valve, Multi-stage or X[iks]-trim are used.

The spray valve is provided with a quick change seat-ring. This ensures ease of maintenance required because of the high stressing. The valve is designed to allow replacement of the seat ring and plug within the shortest possible time. For this propose, the seat-ring is under the inserted. Sealing is provided by a spiral wound graphite gasket which is tightened along with the body seal of standard design via the bonnet flange up to 230 ℃ operating temperature PTFE packing material can be used above this temperature a pure graphite packing provided.



[Fig 4. Atthemperator Spray Control System]

3 Main Steam System

The main steam system covers the portion of the steam cycle from the boiler outlet to the condenser. It includes the path from the superheaters, in to the high pressure turbine, through the reheater, and in to the low pressure turbine. Finally, after all the potential is extracted from the steam, it is dumped in to the condenser the start the whole process over again.

Five important and challenging valve applications are contained in the main steam systems. Included are spray water control valve for both the superheater and reheater attemperators. Turbine bypass systems for both high and low pressure turbines will be discussed as well as steam pressure reduction and soot blower control valves.

All of these applications involve combinations of difficult service conditions. Covering high pressure, high temperature, cavitation and noise, the type of boiler, drum style or once-through has a major effect on the control valves in the main steam system.

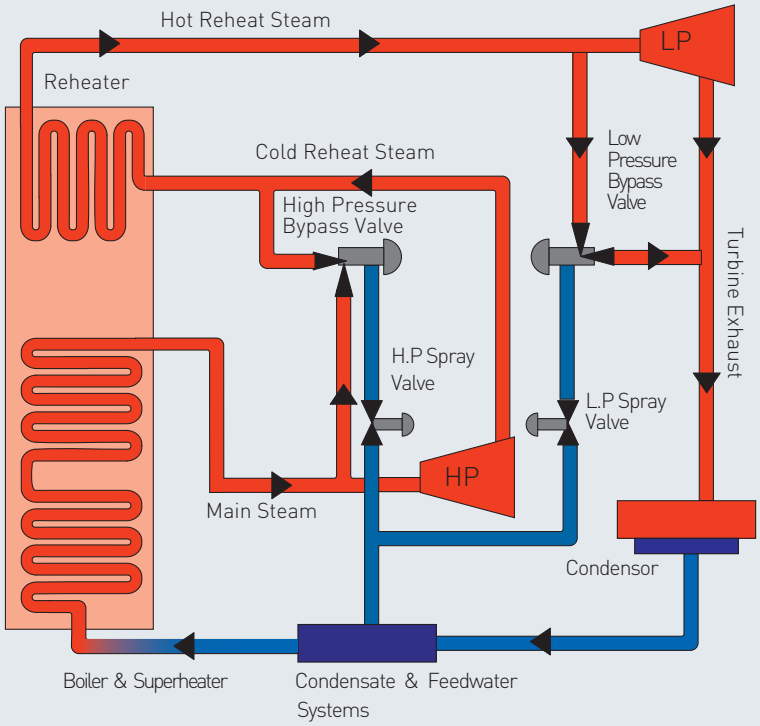
Once-through supercritical boiler is most often larger units which require larger valves. They also operate with higher main steam pressures. In addition to the valves mentioned there are several valves unique to a Once-through Boiler.

⑨ High Pressure Turbine Bypass Valve (TB-HP)

Fig 5. shows typical valve of the mentioned type in high pressure angle (TB-HP) design. The pressure is reduced in the X[iks]-trim (Disk stack). High pressure turbine bypass system provides an alternate flow path for high pressure & high temperature steam. Flow passes around the turbine and back to the reheat section.

This bypass system permits stable operation of the boiler when the turbine trips off line or during start-up operations steam flowing through the high pressure bypass valve TB-HP is cooled to a temperature slightly above the H/P/ turbine exhaust temperature by spraying feedwater in to the outlet of the bypass valve. This flow is tan combined with high pressure exhaust steam and passes through the reheater.

The control system must provide the logic to open the valve quickly and than modulate with feedback control to predetermined pressure & temperature set points. Opening speed of less than five seconds are typical. In operation the high pressure bypass provides the same expansion, pressure reduction and cooling which protects the reheat section of the boiler and quickly unloads the turbine without requiring boiler trip.



HP-TB

Drum Boilers
P1 : 2800Psig
△P : 2600~2800 Psig
T : 149~204 °F

Once Through Boilers
P1 : 4500Psig
△P : 3000~4500 Psig
T : 149~204 °F

LP-TB

Once Through Boilers
P1 : 500Psig
△P : 300Psig
T : 1000 °F

[Fig 5. Turbine bypass System]

⑩ Low Pressure Turbine Bypass Valve.(TB-LP)

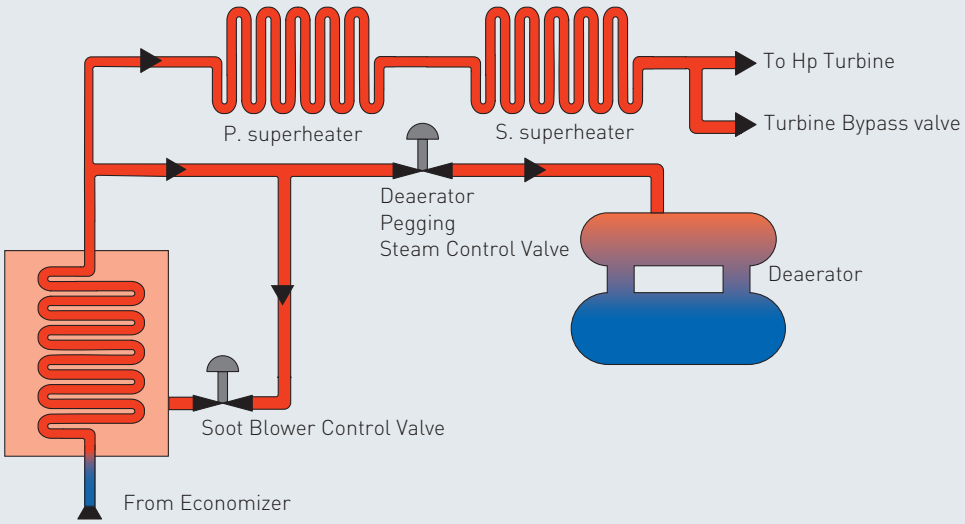
Fig 5. shows the L.P. variant of steam conditioning valves of the straight-through (Globe) type made of cast steel in this type (Option/Angle type). The low pressure bypass system provides a few pathsaround the low pressure turbine and controls pressure and temperature whenever the high pressure bypass system is operating. The low pressure bypass valve takes steam from the reheat

section of the boiler and condition the steam to be accepted in to the condenser. High pressure & High temperature drops a taken by valve throttling and by addition of large amount of desuperheating spray. Temperature control is not critical expect as to protect the condenser. This protection is accomplished by deliberate over spray and by quick closing capability. Low pressure bypass or condenser dump application are usually handled by the model TB-LPproduct requirement for both high and low pressure bypass valve include high pressure and temperature, noise attenuation, tight shut-off and desuperheating.

⑪ Soot Blower Control Valve (HG)

A good modulating valve is required to control the pressure in the soot blower. The valve must have good range ability because the flow varies considerably during the soot blower cycle. As the soot blowers open and close, the header control valve must respond quickly to avoid pressure surges which would pop the safeties on the line.

The application that are most difficult for control valves are the soot blowers that use steam. Product requirements include a high pressure class rating due to the pressure and temperatures and tight shut-off so the valves don't leak valuable steam. Soot blower valves are often operated numerous times during the day. This lead to temperature cycling of the valve, especially if a block valve isolates the soot blower vale from the steam line. In addition to temperature cycles, high pressure drops create high noise levels and can cause excessive wear and vibration to occur in the trim. Use of trim specially designed for this service will provide much improved performance. The combination of cycle conditions, high noise levels and frequent operation is likely to create problems otherwise. The disk stack is characterized with max 18 turn expanding disks for minimum fluid velocities and high range ability. The flow is over the plug to protect the seat from trash damage. The plug is unbalanced with high actuator load for good shut-off(shut-off class Ⅴ).



[Fig 6. Soot Blower and Deaerator Pegging Steam System]

⑫ Auxiliary steam control valve (CG or HG)

Auxiliary Stem to various equipment Supplied by reducing pressure of main steam
Reduces vibration and noise caused by a high differential pressure.
A wide control range to load fluctuations.
Structure and materials meeting high temperature and high pressure steam.

⓭ Deaerator Pegging Steam Control Valve (Drum Boiler,HG/HA.Once-through, CG/CA)

The deaerator is a contact heater (a heater where steam and Feedwater are mixed) that is especially designed to remove the non-condensable gases from the feedwater. These non condensable gases include oxygen and carbon dioxide which attack and corrode piping and boiler tubes. Generally hot steam is mixed with the feedwater entering the deaerator bringing it to saturation temperature, thus liberating any dissolved non condensable gases. For drum boilers, the steam that is supplied to the deaeratoris usually taken from an auxiliary line off the main steam line. For once-through boilers, steam that is taken from the flash tank or the final high pressure heater. Thus, it is at a lower pressure than a com parable drum style unit. The steam is usually at a high pressure than needed and. therefore, must be reduced. When steam is subject to a substantial pressure drop across a control valve, there are inevitably noise problems to consider. The deaerator pegging steam valve is considered a severe service valve because the noise levels will probably be of concern and some sort of noise abatement equipment should be specified.

⓮ Turbine seal pressure control valve (CG)

4. Heater Drain System

There are two sets of feedwater heater systems in a typical power plant. The low pressure heat the condensate coming from the condensate pump so that it is near saturation when it enters the deaerator. The other set, called high pressure heaters, heat the feedwater coming from the boiler feedwater pump so that it is near saturation at the higher pressure conditions when it enters the boiler. Both systems work in the same way with the exception of the heating media. In the low pressure heaters, exhaust steam from the low pressure turbine is used while the high pressure heaters use extraction steam from the reheat section.

Feedwater heater are shell and tube heat exchangers, steam is introduced, cooled and ultimately condensed back to liquid. In the process it passes it's heat to the feedwater.

The level of condensate in the heaters must be closely controlled for best system efficiency. So that drain system is fairly elaborate.

In both heater systems, the drains lead to the condenser which is at a vacuum. The problem is that the condensate is drained to the condenser it loses pressure and flashes.

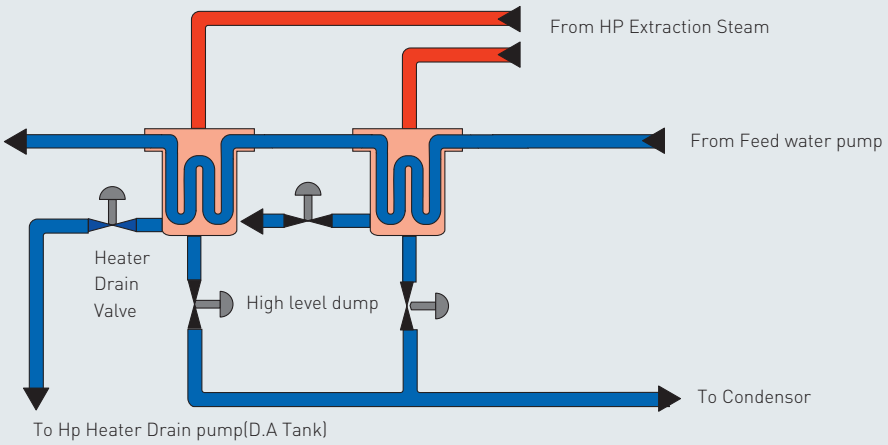
The flashing fluid causes erosion damage to the control valve and associated piping. The important thing in choosing control valves in this application is to use a low resistance valve to keep the velocities as low as possible keep flashing damage to a minimum. Material selection is also critical.

⓯ High pressure heater drain control valve (HG or HA)

For the pressure heater drain system, a globe valve is probably required to handle the static pressure involved. The primary recommendation is to use a A217-WC9(A182-F22) or A217-C5(A182-F5) alloy steel Model HG's with hardened trim. The materials resist erosive attacked oversized and connections slow fluid velocity in the body. When an ANSI class 1500# valve required, the recommendation is an HG's or HA's.

The HA's will eliminate body erosion concern due to the angle configuration.

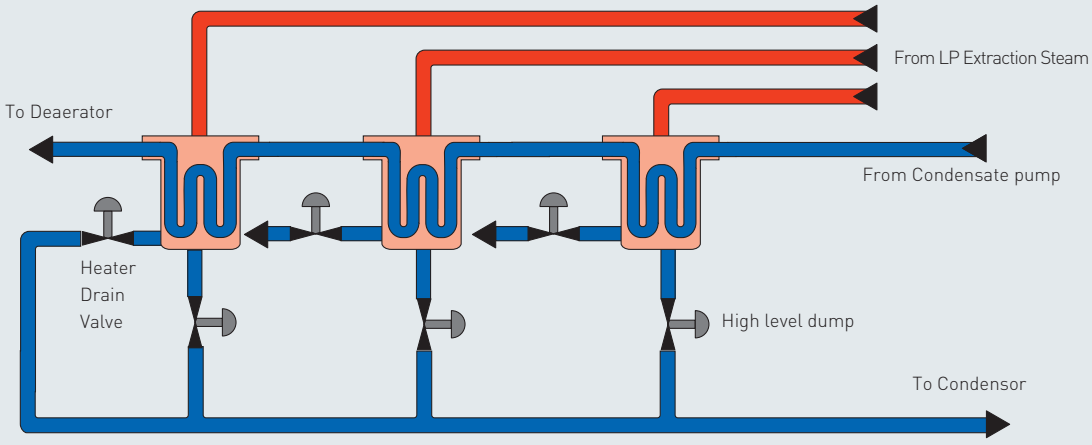
The important thing in choosing control valve in this application is to use a characterized disk stack to range low flow away from the seat with sufficient turns to keep velocity as low as possible.



[Fig 7. H.P Heater System]

⑯ Low Pressure Heater Drain Control Valve (CG or ER)

For the low pressure heater drain system. If globe valves are required, WC9 CG's with heat treatment trim are the answer low pressure CA's also eliminate any problems associated with body erosion due to their angle configuration. Because of the low resistance, high recovery characteristic of ER's and VR's it has been BFS's experience that the rotary line is an excellent choice for this service.



[Fig 8. L.P Heater System]

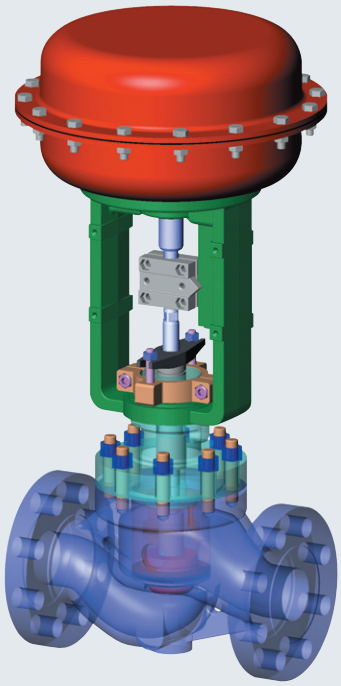
⑰ Fuel oil or gas control valve (SG or CG)

-Fuel oil: Seat leak not allowed and rapidly in an emergency. (SG Series)

SG & SA Series/Single Seat Globe & Angle (Unbalance)

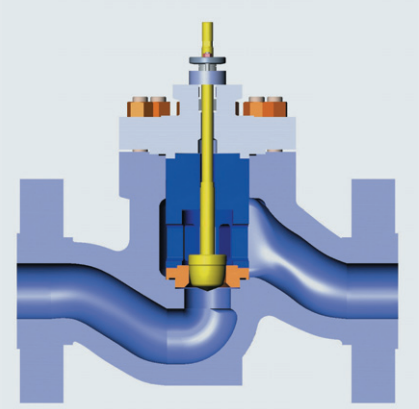
Constructions

- A single seated, heavy top & Retainer guided top valve designed to handle a wide variety of process control application.
- Pressure reduction trim of S-Series is noise attenuation and anti-cavitation trim options. It is well suited to handle a wide range process.
- Small size(1/4", 1/2", 3/4", 1") is compact globe & angle style valve designed specially for micro flow control.



Design Flexibility / Option

- Reduced port area & Micro flow control trim
- Various characteristic / EQ%. Linear. Modified%. Quick-change. Others.
- Various trim materials: Hardened trim. Stellite. Heat treatment. Others.
- Soft seat design / Class VI
- Low emission device / Live loading packing arrangement / Bellows seal bonnet
- Cryogenic service valve / Long extension welded Bonnet with cold box application
- Actuator / Spring Diaphragm. Double Cylinder. Single Cylinder.

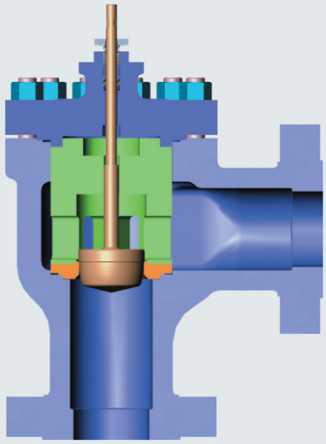


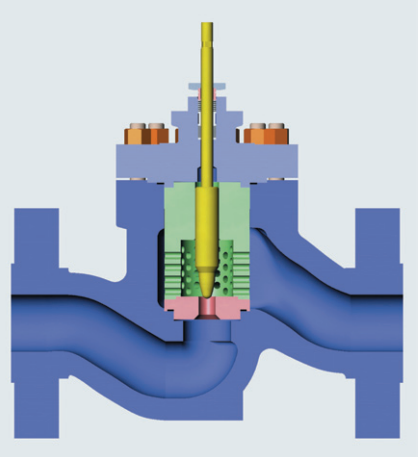
SG11 Series

• **Construction**	|	Single-Seated Globe Valve
• **Size**	|	3/4″ to 12″
• **Rating**	|	Class 150# to 2500#
• **Characteristic**	|	Linear, EQ %, Mod-%. Q-open
• **Seat Leakage**	|	FCI 70-2 Class IV. V. VI MSS-SP-61
• **Rangeability**	|	30:1 50:1 70:1 100:1

SA11 Series

• **Construction**	|	Single Seated Angle Valve
• **Size**	|	3/4 to 12″
• **Rating**	|	Class 150# to 2500#
• **Characteristic**	|	Linear, EQ%, Mod-%, Q-open
• **Seat Leakage**	|	FCI 70-2 Class IV. V. VI. MSS-SP-61
• **Rangeability**	|	30:1 50:1 70:1 100:1



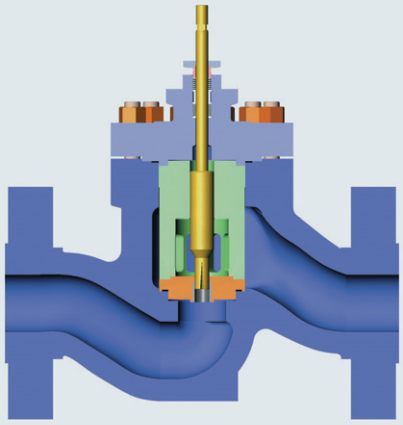


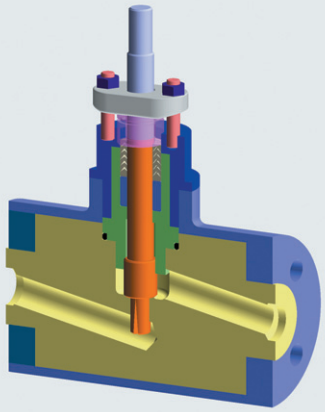
SG71 Series

• Construction	|	Single Seated Multi-Hole Valve
• Size	|	3/4″ to 12″
• Rating	|	Class 150# to 4500#
• Characteristic	|	Linear, EQ%, Mod-%, Q-open
• Seat Leakage	|	FCI 70-2 Class IV, V, VI MSS-SP-61
• Rangeability	|	30:1 50:1 70:1 100:1

SG81 Series

• Construction	|	Micro Flow Control Valve
• Size	|	1/4″, 1/2″, 3/4″, 1″.
• Rating	|	Class 150# to 4500#
• Characteristic	|	Linear, EQ%, Mod-%,
• Seat Leakage	|	FCI 70-2 Class V. VI. MSS-SP-61
• Rangeability	|	30:1 50:1



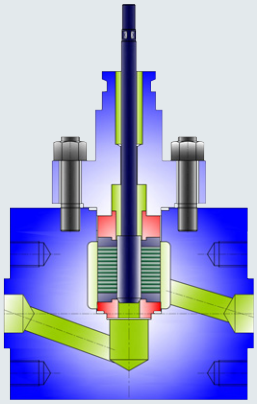


SF11 Series

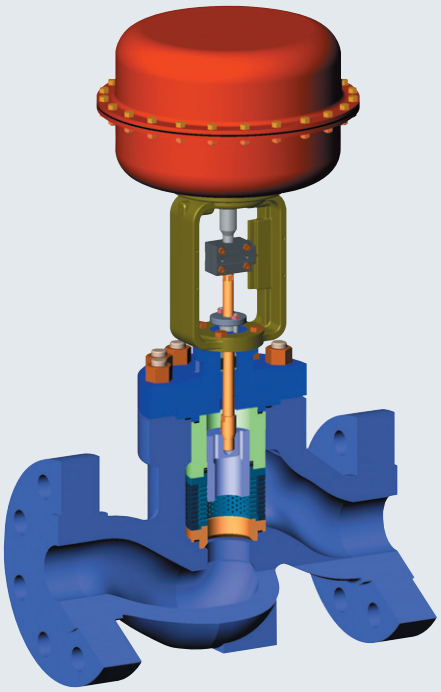
• Construction	|	Teflon Body Valve
• Size	|	1/4″, 1/2″, 3/4″, 1″ to 4″
• Rating	|	Class150# to 300#
• Characteristic	|	Linear, EQ%, Mod-%, Q-open.
• Seat Leakage	|	FCI 70-2 Class Ⅵ
• Temperature Range	|	Max. 270deg C

SG61 Series

• Construction	|	Single Seated X[iks]-trim Valve
• Size	|	1/4″, 1/2″, 3/4″, 1″, to 4″
• Rating	|	Class 150# to 4500#
• Characteristic	|	Linear, Mod-%, Q-open.
• Seat Leakage	|	FCI 70-2 Class V. VI. MSS-SP-61
• Rangeability	|	30:1 50:1 100:1



CG & CA Series / Balanced Cage Globe & Angle



Construction

C-Series is a heavy-duty globe valve design with balanced trim configurations. It offers cage guiding for added stability and the versatility to provide effective noise attenuation and anti-cavitation solutions.

CG42 Series Multi-Hole 2-Stage Cage Globe

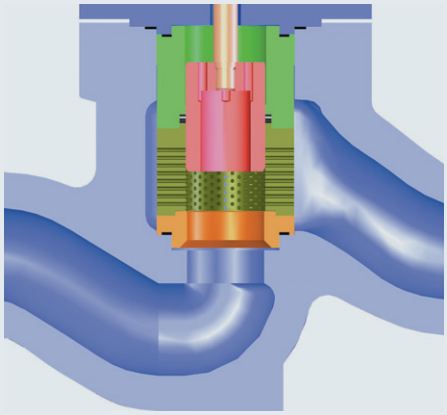
Designed for noise control on gas or steam at high pressure drop ratios. Also available for anti cavitation on high pressure liquid applications.
(Allowable differential Pressure : 60kg/cm2)

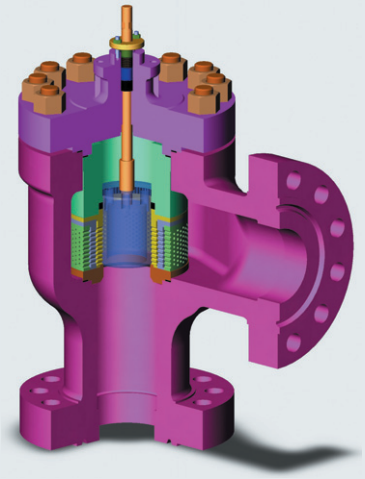
• Size	1″ to 26″
• Rating	Class 150# to
• Characteristic	Linear, EQ%, Mod%, Q-open.
• Seat Leakage	FCI 70-2 Class IV, V, VI MSS-SP-61

CG32 Series Multi-Hole 1-Stage Cage Globe

Provide excellent noise attenuation on gas or steam Service and cavitation protection on liquid services.
(Allowable differential pressure : 30kg/cm^2)

• Size	1″ to 26″
• Rating	Class 150# to 4500#
• Characteristic	Linear, EQ%. Mod%. Q-open.
• Seat Leakage	FCI 70-2 Class IV, V, VI. MSS-SP-61





CA51 Series Multi-Hole 3-Stage Cage Angle

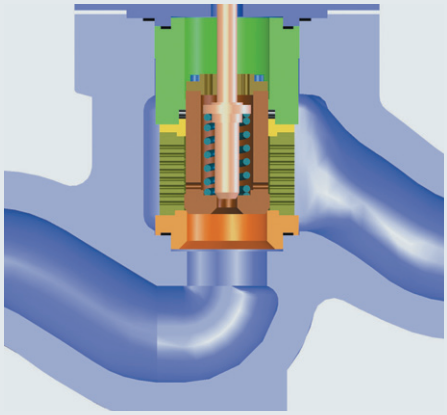
Designed to handle high pressure drops in severe service applications for incompressible fluids. Complete cavitation protection available for pressure drops up to 90kg/cm2

• Size	2″to 26″
• Rating	Class 150# to 4500#
• Characteristic	Linear, EQ%, Mod%, Q-open
• Seat Leakage	FCI 70-2 Class IV, V, VI. MSS-SP-61

CG33 Series | Auxiliary Pilot Trim Valve

Tighter shut-off capability high operating temperature is achievable using a spring-loaded internal auxiliary plug construction. An optional downstream diffuser is also available for additional noise reduction.

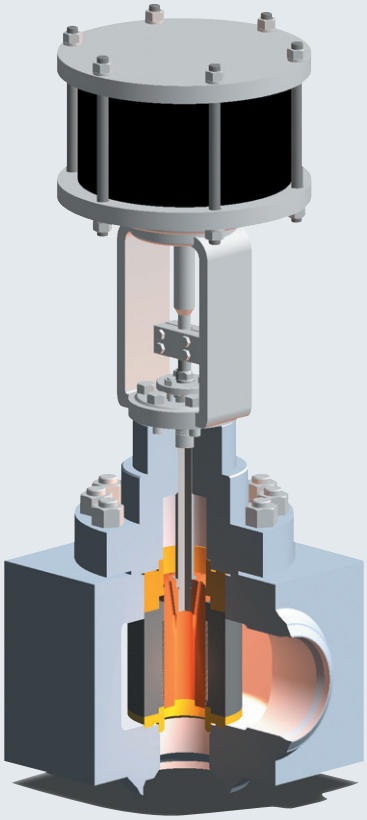
• **Size**	2″ to 26″
• **Rating**	Class 150# to 4500
• **Characteristic**	Linear, EQ%, Mod%, Q-open
• **Seat Leakage**	FCI 70-2, Class V. VI. MSS-SP-61
• **Rangeability**	50:1. 100:1 200:1. 800:1



HG & HA Series / Heavy-duty Globe & Angle

◈ Construction

- Quick Change Trim
- Heavy-duty Balance Cylinder Guided X[iks]-trim (labyrinth disk stack)
- Quick disassembling 1 piece Trim (Seat-Ring. Cage. Balance cylinder.Plug.Gasket) for horizontal installation with easy maintenance.(option)

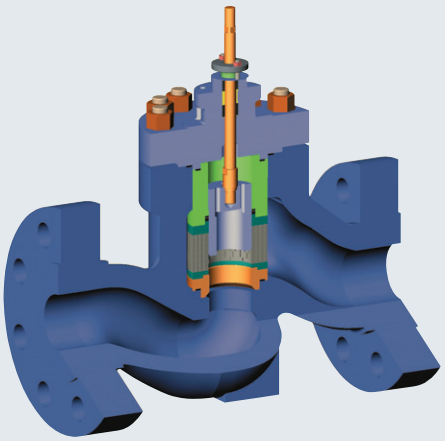


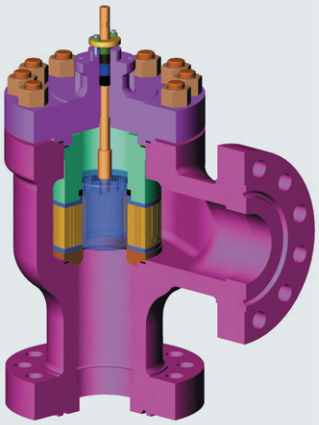
◈ X[iks]-trim Application

- Well-suited incompressible fluids, such as feed pump recirculation, injection valve bypass, and boiler feedwater. Engineered to provide anti-cavitation for applications with pressure drops of up to 6000PSI.
- Labyrinth disk stack control valve is designed primarily for high pressure compressible fluid applications. It effectively controls erosion, vibrations and high noise conditions (turbine bypass. Blow down vent. Etc)
- Fabricated angle valve is designed for precise capacity control, while deficiently minimizing noise and outlet velocities using X[iks]-trim. (compressor anti-surge. Flare to atmosphere)

HG62 Series Casting Globe Body

• Construction	X[iks]-trim Globe Valve
• Size	2″ to 36″
• Rating	Class 150# to 4500#
• Characteristic	Linear, EQ%, Mod%, Q-open.
• Seat Leakage	FCI 70-2 Class IV, V, VI MSS-SP-61
• Rangeability	50:1 100:1 200:1 800:1 Custom Engineered



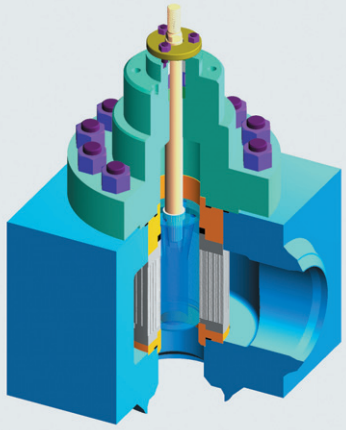


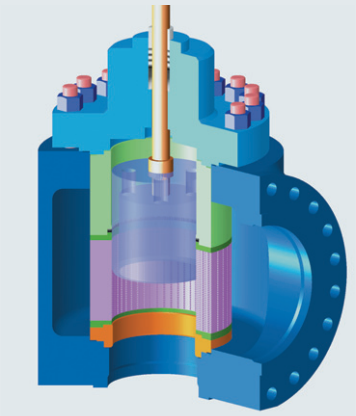
HA62 Series Casting Angle Body

• Construction	X[iks]-trim Angle Valve
• Size	2″ to 36″
• Rating	Class 150# to 4500#
• Characteristic	Linear, EQ%, Mod%, Q-open.
• Seat Leakage	FCI 70-2 Class IV, V, VI MSS-SP-61
• Rangeability	50:1 100:1 200:1 800:1 Custom Engineered

HA62 Series Forged steel Body

• Construction	X[iks]-trim Angle Valve
• Size	1″ to 36″
• Rating	Class 150# to 4500#
• Characteristic	Linear, EQ%, Mod%, Q-open.
• Seat Leakage	FCI 70-2 Class IV, V, VI MSS-SP-61
• Rangeability	50:1 100:1 200:1 800:1 Custom Engineered

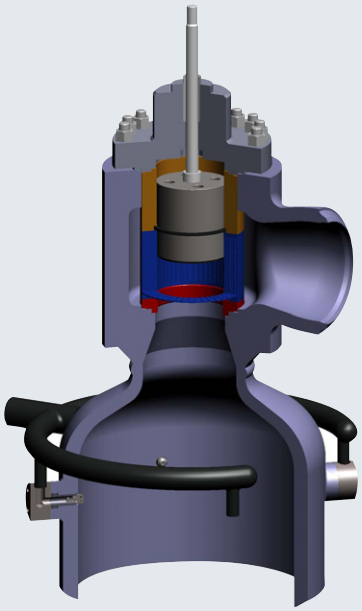




Anti-Surge Valve Globe & Angle

• Construction	X[iks]-trim or Multi-Hole trim
• Size(in / out)	4"~24" / 6"~42"
• Rating	Class 150# to 2500#
• Characteristic	Linear, EQ%, Mod%.
• Seat Leakage	FCI 70-2 Class IV, V, VI
• Rangeability	30:1 50:1 100:1
• Stroking time	1sec, 2sec,/Custom Engineered.

Turbine Bypass Valve / Steam Conditioning Valve



TB-HP Series — X[iks]-trim Application Angle Design

• Construction	Steam Conditioning Valve
• Size (in/out)	3″ to 12″ / 8″ to 42″
• Rating	Class 1500# to 4500#
• Seat Leakage	FCI 70-2 Class V, MSS-SP-61
• Tempe. Range	500deg C to 620deg C
• Press. Range	160 to 300kg/cm^2
• Body Materials	A217-WC6/F11, A217-WC9/F22 F91. Others
• Actuator	Pneumatic Cylinder, Motor, Electro-Hydraulic-Servo.
• Application	HP turbine bypass system Auxiliary steam conditioning.

TB-LP Series — Multi-hole trim Application (Angle & Globe Design)

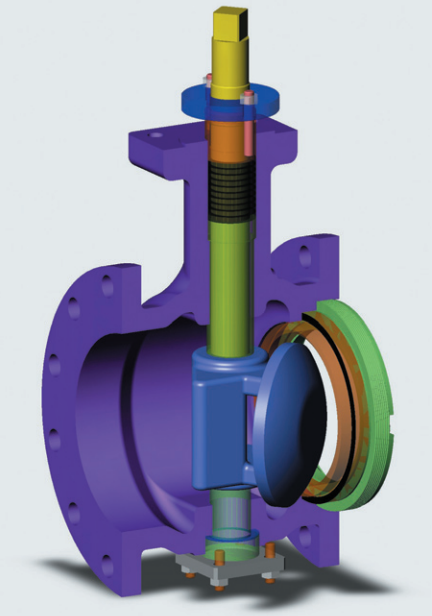
• Construction	Steam Conditioning Valve
• Size (in/out)	8″ to 24″ / 8″ to 30″
• Rating	Class 150# to 1500#
• Seat Leakage	FCI 70-2 Class V, MSS-SP-61
• Tempe. Range	565deg C
• Pressure Range	92kg/cm^2
• Body Materials	A216-WCB/A105. A217-WC6/F11 A217-WC9/F22
• Actuator	Pneumatic Cylinder Spring diaphragm Motor Electro-Hydraulic-Servo
• Application	Low pressure turbine bypass Intermediate pressure turbine bypass

ER Series Eccentric Rotary Plug Valves

◈ Construction

The ER series on eccentric plug valve is specially designed for severe rotary actuation valves. It features tight shut-off with globe valve style seating and excellent resistance to abrasive wear and flashing reduced erosion.

Size generally range through 16" in pressure rating to ANSI 600# (option/1500#). Both flanged and flangeless. Body styles can be had in a variety of materials.



• **Construction**	|	Eccentric Rotary Plug
• **Size**	|	1″ to 16″
• **Rating**	|	Class 150# to 1500#
• **Characteristic**	|	Linear, EQ%.
• **Seat Leakage**	|	FCI 70-2 Class IV, V, VI MSS-SP-61
• **Rangeability**	|	30:1 50:1 100:1
• **Actuator**	|	Pneumatic cylinder Spring Diaphragm
• **Application**	|	General Service, Heater drain, Low pressure steam, Flash tank.

TR & DR Series High Performance Butterfly Valves

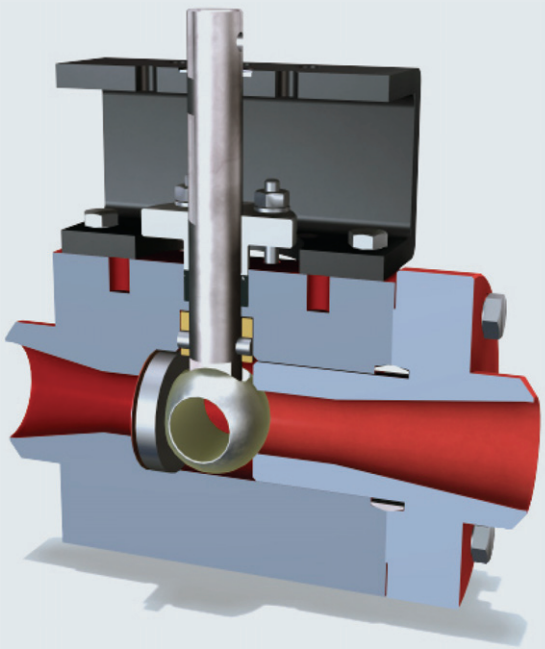
◈ Triple Offset & Double Offset

Triple offset Geometry : Provides non-rubbing motion throughout full 90 degree rotation elimination unnecessary. Wear & Prolongs life of seat and seal.
Bi-directional bubble tight-shut-off
Inherently seat is mounted in the body.
Laminated seat is mounted in the body removing
It from the erosive effects of the flowing media.

• **Construction**	|	Triple-off-set Butterfly
• **Size**	|	3″ to 24″ Above option.
• **Rating**	|	Class 150# to 1500#
• **Seat Leakage**	|	Triple : Zero Leakage Double : FCI 70-2 Class IV, V, VI
• **Rangeability**	|	15:1 30:1
• **Actuator**	|	Pneumatic Cylinder Spring Diaphragm, Motor.

Severe Service Ball Valves

This valve contains most of the same internal components and design principles still used today. The coatings are a little better and now there is a 4year, Zero Leakage limited warrantee but Copeland stood behind its products then and we still do now.



Power Valves

Reduced bore ball valves for high pressure steam applications. Features carbide sealing areas, live loaded graphite packing and a forged body. Available in ANSI Class 900, 1500, 3000, 3200 and 4500 rating size range from 1/2" to 4"(option through 24")

Applications

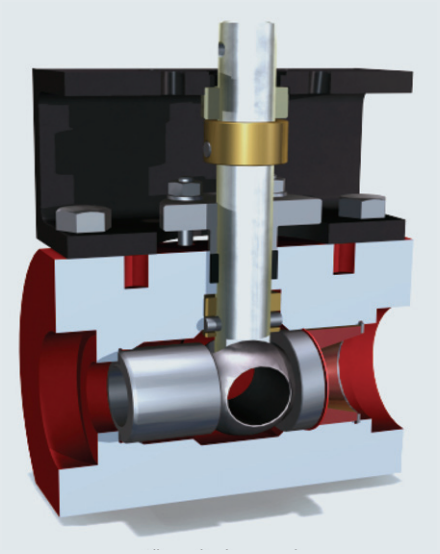
BFS-Copeland valves are not typical off-the-self products. Custom designs enables Copeland engineers to provide a wide versatility of metallurgical choices and design features. They are typically chosen to provide reliable operation and tight shut- off when one or more of the following service conditions are present;

- Abrasive Solids Heavy Solids build-up Temperature from 500deg F to 1600deg F.
- Corrosives & High Cycle Rates.
- High Pressure to ANSI 4500#

Typical Applications

Applications for severe service ball valves in power plants typically involve high pressure steam, ash slurries or corrosive liquids. Key areas where these are most often used include the following.

- Turbine System
- Economizer System
- Super-heater System
- Steam Drum and Boiler
- Mud Drum Drains
- Condensate Drain Valves Above and below Turbine Throttle Valves.
- Attemperator
- Feed-water Heater Isolation
- Steam Sampling
- Boiler feed Pump and Heater Systems



RETROFIT

Retrofit of Other Manufacturer's Valves

In the past, when faced with valve performance problems, plants have had little recourse but to disrupt production by tearing down the line and replacing the outdated valves. A major stumbling block to such on approach was the heavy capital expense associated with on entire valve replacement and the related piping changes. Now, BFS can retrofit existing valve bodies with X[iks]-trim through a fast and economical maintenance procedure. New trim can be installed at your site, without taking your valves out of line. Retrofits for virtually any make of linear motion control valve are accomplished quickly so you can soon be enjoying new performance advantages and equally impressive savings.

On Site Service

BFS can meet your field service needs with highly trained technicians knowledgeable in the power plant station. Our expert field engineers prevent problems by systematically evaluating your plant's control valve needs. Then, we follow-up with custom-designed solutions that will work for your plant and for your budget.

Retrofit for Performance / Easy and Fast

The retrofit installation is a simple maintenance procedure. Your other manufacturers valve body remains in the line while the valve's original trim is removed and replaced with the X[iks]-trim No welding? No machining! The time normally needed for the retrofit procedure is shorter than a valve replacement.
You will experience valve performance improvement immediately, without the expense associated with new valve installation and related piping charges. Isn't time to give your trouble valve a new life?

Severe Service Ball Valve Retrofits

BFS-Copeland stands alone in its ability to repair, modify and replace severe service valves. For many years, a majority of the original equipment manufacturers who manufacture similar products have sought Copeland's assistance in solving some of their most difficult valve design issues.
Copeland's carbide, ceramic, Hastelloy, and Inconel coatings are useful in preventing wear and erosion. Copeland specializes in repairing modifying or re engineering all types of valves so that they may operate longer and more reliably in the presence of particulates, corrosives or high pressure steam.
Brand Names of Valves Modified or Repaired by Copeland.
Repairs may include modification to metal seats, coating of internal components, or simply repair services.

- Mogas Industries., Inc
- Flowserve
- Fisher
- Keystone
- Crane Valves
- Nordstrom Valves, Inc
- DeZurrick
- Velan
- Valve technologies
- McCanna, Inc
- Edwards
- Dresser
- Others

Application of End Connection

MODEL	SCRD	FF	RF	WAFER	RTJ	SW	BW
SG, SA	◈	◈	◈	◈	◈	◈	◈
SF		◈	◈	◈			
CG, CA			◈		◈	◈	◈
HG, HA			◈		◈	◈	◈
TB			◈		◈		◈
ER, VR			◈	◈	◈		
TR, DR			◈	◈	◈		◈
FA			◈		◈		

Body Materials Application / Temperature Range

ASTM	Name	Temperature Range	Application
A48 Class 35	Cast Iron	0 deg C through 220 deg C	Low Pressure
B584-C 836	Brass	-196 deg C through 230 deg C	Low-press, Corrosive
A216-WCB	Carbon Steel	-5 deg C through 423 deg C	General Service
A217-WC6	Cr. Mo. Steel	-5 deg C through 550 deg C	Hi-press. Hi-tempe.
A217-WC9	Cr. Mo. Steel	-5 deg C through 600 deg C	Hi-press. Hi-tempe.
F-91	Cr.Mo Alloy	Above 600 deg C /SH-Steam	Super critical press.class
A351-CF8	St. Steel	-196 deg C through 680 deg C	Hi-Press. & Hi-Tempe.
A351-CF8M	St. Steel	-196 deg C through 700 deg C	Cryogenic. Corrosive.

Note : A351-CN3, A351-CN3M, 310SS, Hastelloy, Monel, Duplex, Inconel, Titanium, Tantalnium, Zirconium Brass, Aluminium, Other Alloys (Consult us for Materials)

Velocity Limited of Flow

- Liquid : 6m/sec
- Gas : 150 to 200m/sec (Below 0.3MACA)
- St. Steam : 50 to 80m/sec
- SH. Steam : 80 to 120m/sec

Your nearest bFS sales representative and the bFS technical staff can offer expert help with your specific problem application. Contact us today at our modern and efficient manufacturing facility in Incheon, Korea, and let us go to work for you.

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