FM SAMUANG TURBINE BYPASS SYSTEM
Key Features

History

SAMYANG Comprehensive Valves Limited established in 1961 is a valve maker with its manufacturing facilities at Bucheon near Seoul, Republic of Korea. The company specializes in manufacturing various types of valves and Steam efficiency Equipments for Power plants.

In the year 1985 SAMYANG signed a Joint Venture agreement with M/s ARCA Regler of Germany for the manufacturing of Control Valves and PRDS Valves for the Korean Process and Power Sector.

With the market for Power showing signs of major recovery in Korea and all around the world, major Korean Power equipment manufacturers like DOOSAN, DAEWOO, HYUNDAI, etc. were winning more and more EPC Contracts.

This provided SAMYANG the opportunity to supply valves manufactured in Korea to the power and process industry in Korea and the rest of the world. SAMYANG was awarded contracts for supply of Turbine Bypass valves by several of the EPC Contractors mentioned above for jobs in Korea, Saudi Arabia, Iran, Thailand, etc.

The Turbine Bypass Systems of SAMYANG are based on the sophisticated steam atomizing technology as described in USA Patent 6,131,612.

All Turbine Bypass valves manufactured by SAMYANG Korea under the SAMYANG ARCA Brand name are engineered by GS Valve Engineering. As of today there are more than 50 references based on this patent design originally registered as a German Patent in 1994.

GS Valve Engineering GmbH, Oberhausen-Germany being an independent valve company, its main objective is to provide design and development support to SAMYANG Korea to cater to the increased demand for Turbine Bypass Valves and Systems along with Spray water control valves and systems.

The patent of the Turbine Bypass Valve continues to be with M/s GS Valve Engineering GmbH. GS Valve Engineering also provides for the spares and technical support for the valves supplied in the past.

In October 2010, Forbes Marshall Pvt Limited joined hands with M/s SAMYANG Comprehensive Valves Co. Limited and GS Valve Engineering GmbH for design, manufacture and supply of Turbine Bypass Systems, Safety Shut Off and Overflow valves, Spray Water Control Valves, under the FM – SAMYANG Brand name in India.
Key Features

TURBINE BYPASS SYSTEM

With the ever reducing reservoirs of Fossil Fuels, plants are increasingly demanding valves and Systems that provide them with flexibility of operation and steam at the desired Pressure and Temperature in one single unit.

The requirements of a modern bypass system include: Prevention of excessive boiler pressure fluctuations in the event of turbine trip or load rejection.

- Avoidance of use of Spring Loaded HP Safety Valves and the losses associated.
- With lifting of the Valve avoid losing valuable steam and boiler Quality medium in the event of turbine trip.
- Controlled pressure build-up during turbine start-up or following a turbine trip.
- Partial bypass to maintain steady upstream pressure when the turbine runs back to reduced load.
- Protection of the condenser against excessive pressure and temperature.

SAMYANG Korea has been manufacturing high pressure and high temperature Valves for over 15 years now based on the design under U.S. patent nr 6,131,612.

SAMYANG Turbine Bypass valves are custom designed and engineered to suit various turbine designs and operating parameters.

Actuation method is carefully selected to meet the different operating demands and failure modes. Actuation system selected is either Pneumatic or Hydraulic depending on the speed, accuracy and sealing force required to achieve a tight shut off in closed position and a quick and reliable operation when opening the valve. However, an electric actuator can also be applied.
Key Features

HP Bypass Valves (Series DSV)

HP Bypass valves are one of the most important and critical valves in a power plant. The valve is specifically designed to withstand the high pressure and temperature cycles to which it is subjected to. The valve is normally in closed position. However depending on the type of turbine and application the valve is required to open quickly, within 3-5 seconds, reduce the pressure and also bring down the temperature of the steam passing through its seat. All this is done inside the valve body itself.

As a result these valves have cage guided multistage trims to handle high pressure drops and thus control the outlet pressure.

Sometimes stack plates which provide a torturous passage for the steam, called as Labyrinth Trims are utilized by SAMYANG Valves for noise attenuation especially when pressure drops are very high.

Additional noise reduction plates may be used as an economical option to control the noise at valve outlet.

DSV type valves have a unique methodology to desuperheat the steam. The technology is patented in the US and Germany and is developed after years of experience with different process parameters.

Water is sprayed into the steam passage where it is atomized into very fine water particles, almost like a mist.

The steam passing over the valve seat is routed through a parallel passage through the valve body. This atomizing steam mixes with the spray water at the chamber near the spray water stud and provides the motive force to the preheated spray water droplets to get atomized in the steam passage.

As a result of this 100% evaporation of spray water droplets is ensured and in a very short span of time and within a short travel from the spray water injection point.
Key Features

- Designs are tailor-made to suit customers’ pipe connection, orientation and pipe materials.

- Materials available for Inlet are A182 F11, F22 and F91.

- Forged body design up to #4500 with intermediate ratings available.

- Bolted or Pressure sealed bonnet construction.

- Installation with horizontal or vertical stem orientation.

- Leak Tightness to ANSI/FCI-70-2 Class VI.

- Turn Down of 1:100 depending on data.

- Low Pressure Difference between spray water and steam.

- Designed to prevent any thermal shock to valve body and internals when the valve opens quickly after remaining closed for a long time.

- Short mixing and evaporation length required downstream of the valve.

- Outlet Temperature Control near to saturation point.
**Key Features**

**IP/LP Bypass Valve**

IP/LP Bypass valve are utilized primarily to dump the turbine steam in case of trip to the condenser of the power plant.

The valve reduces pressure and temperature of IP/LP Stage steam from turbine to conditions suitable for proper operation of the condenser.

Because of the increased specific volume of the steam these valves are larger in size compared to HP Bypass valves. While the number of pressure reducing stages is less, the amount of injected water becomes much higher compared with HP Bypass.

**Key Features**

- Designs to suit customers pipe connection and orientation.
- Sizes available from 6” Inlet in A216 WCB, WC6 and WC9 Material or equivalent forged materials up to F91.
- Bolted bonnet construction for ease of maintenance. Pressure sealed bonnet construction on request.
- Installation in any orientation i.e. Horizontal or Vertical is possible.
- Leak Tightness to ANSI/FCI-70-2 Class VI.
- Turn Down of 1:100 depending on process data.
- Low Pressure Difference between spray water and steam.
- Spray water of temperature as low as 50 °C accepted.
- Designed to prevent any thermal shock to valve body and internals when the valve opens quickly after remaining closed for a long time.
- Short mixing and evaporation length required downstream of the valve.
- Combination of Stop and Bypass Valve can be offered on request.
- Outlet Temperature Control near to saturation point.

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GS valve ENGiNEERING GmbH

Forbes Marshall

Trusted Partners. Innovative Solutions.
Key Features

High Pressure Bypass System (acc to TRD 421) Type SOV

The High Pressure Safety Shut off Valve Type SOV is a valve which can be used as a combine HP Bypass Valve with integrated Safety function according to TRD 421 and DIN EN ISO 4126 Part 5.

With this solution the need for a separate Spring Loaded Safety Relief Valve on the main steam line can be avoided.

Located between the Superheater and HP line Reheater in a conventional thermal power plant, this valve can act as a startup vent valve for the boiler during Boiler startup and shutdown, as well as an HP Bypass Valve in the event of Turbine Trip.

- During start up (cold or hot start) of the turbine the amount and pressure of steam being transferred to the turbine is controlled by the valve. Once the turbine inlet control valve is fully open the OV Valve will fully close.

- During operation of the plant the SOV Valve carries out the important function of absorbing pressure peaks and discharging excess steam in the event of rapid drop in output.

- Also in the event of failure of any of the systems during normal operation of the power plant the SOV Valve has to perform the very important function of ensuring that the steam pressure the boiler never exceeds the permissible value.

The Flow to Open design valves has several controlled throttle stages, parabolic type shut off and control plug.

The valve design is complete with a Quick Operating Hydraulic System with Control Box mounted on the valve actuator or can be operated pneumatically. The adaption of an electric drive is also foreseen.
Key Features

Spray Water Control Valve (Series SPV)

The Operation of Turbine Bypass system greatly depends on the quick availability of spray water at the desired pressure.

The spray water control valve performs this important function of operating as soon as it receives the signal to open and allow passage for spray water towards the spray nozzles. The instrumentation installed on the valve control the supply of air to the actuator and therefore the position of the plug w.r.t the valve seat and therefore controlling the valve outlet pressure.

In the closed position, the spray water control valve has also to ensure that the tightness across the valve seat is good enough not to allow leakage of spray water past the valve seat.

SAMYANG can offer different trim options to achieve the desired reduction of pressure of spray water. Options can be single stage or multistage depending on the pressure drop to be handled across the valve seat.

Spray Control Valves are available in sizes from 15mm up to 125mm in K_v up to 72 in equal percentage, linear and On-Off Characteristic trims. Valves are offered in forged 182F1, F11, F22 material in Angle and Inline pattern.

For low pressure services, cast bodies in A216 WCB material can also be offered on request in all the above mentioned sizes.

The valves are available mounted with Diaphragm, Piston Type or Hydraulic actuators.
Key Features

Pneumatic Valve Actuators (PD Series)

Pneumatic Piston Actuators are commonly offered with Turbine Bypass Valves for operating the valves. SAMYANG Valves are designed with unbalanced trim to achieve tight shut off in closed position.

SAMYANG pneumatic actuators are offered in Single or Double acting type and the speed for opening or closing is increased by use of Quick Exhaust valves and/or Volume Boosters. An accumulator vessel can also be supplied by SAMYANG along with the actuators. These accumulators serve as reservoirs to enable the actuator perform a full operation stroke in the event of plant air failure in order to achieve the safe position. These actuators are available in sizes up to 800mm with Side or Top Mounted Handhweel arrangement with reduction Gear (with a hydraulic Hand Pump on request).

A single acting Piston Actuator of DN800 with 6 bar air pressure can generate thrust force as high as 250 kN.

SAMYANG also offers TANDEM Actuators (Two piston actuators one on top of the other) in cases where the actuation forces are high (DN 800 Tandem actuator using 6 bar air pressure can generate Thrust force as high as 450-500 kN). The quick action stroking time can be selected from 2-5 sec.

Hydraulic Actuators

Applications where dead time is not desirable, Hydraulic Actuators and actuation systems are preferred and can also be offered by SAMYANG.

Hydraulic System is normally used when:

- Actuation Forces are very high.
- High accuracy of Position Control.
- Short Stroke time.
- Direct mounted control block makes valve stroking independent of distance from hydraulic supply unit.
Key Features

Hydraulic Supply Unit (HPU)

Hydraulic Systems are skid mounted inbuilt with Pump (with 100% redundancy), filtration system, Accumulator, Emergency Hand Pump, Hydraulic Fluid Temperature Control System, Control Panel with PLC Instrumentation with DCS Interface and so on.
Key Features

Bypass Valve for Back Pressure Turbines

Back pressure turbines are very often employed on Combined Heat and Power (CHP) plants or Turbine driven machinery applications.

The Bypass valves are used to reduce the Steam pressure and temperature to match the steam conditions at the turbine exhaust.

These valves are also used during start up, in the event of turbine trip and therefore non availability of turbine steam.

Frequently, the bypass can be required to perform continuously at low load conditions providing IP or LP makeup steam to satisfy process plant requirements.

The turbine bypass application is highly critical and one of the most demanding.

Should the turbine be taken off load, the whole steam demand is handled by the bypass system.

To fully satisfy such applications, the bypass system must be extremely flexible within a wide ranging performance envelope. SAMYANG bypass valves have been successfully used on such applications.
**Key Features**

**Bypass Valve for Condensing Steam Turbine with Extraction**

Of the total energy output from a CHP Plant, a CHP Plant may desire to utilize a major proportion of its output steam for generation of Electricity. In such a situation the turbine will exhaust steam to the condenser and extract steam for process.

On some occasions the process may be stopped for a short period and excess steam can be dumped to the condenser to keep the system stable. When the system starts again the condenser Bypass valve will be closed and the steam will be directed to the Turbine.

In a Heat Recovery Steam Generating unit, only the Gas Turbine would be operating to generate electricity and the steam system stopped.

Thus the Bypass Valve to the condenser would have to handle a wide range of Pressure and temperature and load fluctuations.

SAMYANG DSV Series valves are developed over the years of experience to handle such applications with relative ease.
TYPE DSV

APPLICATION

HP Bypass

HP Bypass valve Type DSV is used as a Turbine Bypass in power plants on the main steam line between the Superheater and the High Pressure section of the Turbine. It acts as a Startup Vent valve during boiler startup operation and performs the important job of stabilizing the system pressure in the event of Turbine Trip. Very often the same valve, when sized for a sufficient capacity, also acts as a Safety Valve preventing the Main Steam Safety Valve from opening.

LP Bypass

LP Bypass Valves, compared to the HP Bypass Valves are relatively larger as they are required to handle steam with a larger specific volume.

LP Bypass Valves are located on the steam line between the reheater and the IP/LP section of the Turbine onwards to the condenser. The application of a Steam Stop valve to protect the condenser normally can be waived as our Bypass Valves have class VI tightness.
TYPE DSV

Unique spray water injection

The DSV Type Angle Pattern design Valve uses multiple stages to reduce pressure of inlet steam. Temperature control is achieved through a unique steam assisted spray water injection system in which the water is sprayed into the steam passage where it is steam atomized. As a result, complete mixing of steam and spray water is assured within a short distance from the spray water injection point.

For other process and utility applications, pressure and temperature reduction may be achieved by using an Inline Type Globe pattern valve body called ECOTEMP.

ECOTEMP design uses the same philosophy of using motive energy of steam to atomize the spray water entering the steam passage.

Water Injection through the stem by spraying water to control the steam temperature at the VENA CONTRACTA can also be offered on request.

<table>
<thead>
<tr>
<th>Part List For Valve</th>
<th>Composition</th>
<th>ASTM</th>
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<tr>
<td>1 Body</td>
<td>10CrMoVNB91</td>
<td>A182F91</td>
</tr>
<tr>
<td></td>
<td>10CrMo 910</td>
<td>A182F22</td>
</tr>
<tr>
<td></td>
<td>13CrMo45</td>
<td>A182F11</td>
</tr>
<tr>
<td>2 Seat</td>
<td>10CrMoVNB91+Stellite</td>
<td>A182F91+St</td>
</tr>
<tr>
<td></td>
<td>10CrMo 910+Stellite</td>
<td>A182F22+St</td>
</tr>
<tr>
<td></td>
<td>13CrMo45+Stellite</td>
<td>A182F11+St</td>
</tr>
<tr>
<td>3 Transition</td>
<td>10CrMo 910</td>
<td>A182F22</td>
</tr>
<tr>
<td>4 Piece</td>
<td>13CrMo45</td>
<td>A182F11</td>
</tr>
<tr>
<td></td>
<td>15Mo3</td>
<td>A182F1</td>
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<tr>
<td>5 Outlet Piece</td>
<td>-</td>
<td>A355P22</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>A355P11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A355P1</td>
</tr>
<tr>
<td>6 Spindle and Plug</td>
<td>X20CrMoV121</td>
<td>-</td>
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<tr>
<td>7 Bonnet</td>
<td>10CrMoVNB91</td>
<td>A182F91</td>
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<tr>
<td>8 Closure Piece</td>
<td>10CrMo 910</td>
<td>A182F22</td>
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<tr>
<td></td>
<td>13CrMo45</td>
<td>A182F11</td>
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<tr>
<td>9 Packing</td>
<td>Pure Graphite Rings</td>
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<tr>
<td>10 Gland Flange</td>
<td>C.22.8/10CrMo910</td>
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<td>11 Gasket</td>
<td>Graphite</td>
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<tr>
<td>12 Actuator</td>
<td>Hydraulic/Pneumatic</td>
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### HP / LP Bypass Valve

#### Type DSV

<table>
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<th>Valve Inlet</th>
<th>Valve Outlet</th>
<th>Valve Centre To Inlet (A)</th>
<th>Valve Centre To Outlet (B)</th>
<th>Valve Inlet Centre to Water Injection Stub(D)</th>
<th>Weight (Approx)</th>
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<td>650</td>
<td>400</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>18&quot;/20&quot;</td>
<td>40&quot;</td>
<td></td>
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</table>

*Subject to alteration without notice*
TYPE DSV

FEATURES & BENEFITS

Design

Globe, Angle (Flow to Close), Z Pattern: Valve design will be performed to suit customer pipe orientation and dimensions.

Material

Carbon Steel, Alloy Steel (Low Alloy & High Alloy) to suit the process parameter and application the valve is to be used for.

Rating

For ECOTEMP, cast design is used for ratings up to ANSI #2500. Intermediate ratings are also possible on request. For DSV, forgings are used in accordance to the design data based on EN/DIN standards.

Leak Tightness at Valve Seat

Our valves are designed to achieve leak class III for balanced trim design. For class V the balanced trim needs to be equipped with a pilot valve. The standard non balanced trim has class VI tightness.

Rangeability

Rangeability for Type DSV is as high as 1:100. For ECOTEMP this is 1:50.

Pressure difference between Outlet Steam and Spray Water injection CV inlet

10 Bar Minimum.

Actuators

- Pneumatic (Diaphragm / Piston Cylinder)
- Hydraulic or
- Electric

Certification and Directive

Forged design Type DSV is based on EN/DIN standards while ECOTEMP body is available up to class #2500. The IBC Format III-C is optional.
TYPE DSV

ECOTEMP

Desuperheater

Features

- In line mounting
- Up to class #2500
- Multistage trim
- Control range 1:50
- Balanced trim
- Pilot valve option
- Flanged and Butt-welded ends

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>3”</th>
<th>4”</th>
<th>5”</th>
<th>6”</th>
<th>8”</th>
<th>10”</th>
<th>12”</th>
<th>14”</th>
<th>16”</th>
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<tbody>
<tr>
<td>Lift</td>
<td>30</td>
<td>30</td>
<td>45</td>
<td>45</td>
<td>60</td>
<td>60</td>
<td>75</td>
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<tr>
<td>Seat Size</td>
<td>55</td>
<td>70</td>
<td>70</td>
<td>90</td>
<td>90</td>
<td>110</td>
<td>130</td>
<td>130</td>
<td>155</td>
</tr>
<tr>
<td>Valve Approximate Kv m³/Hr</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1 Stage</td>
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<td>240</td>
<td>240</td>
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<td>2 Stage</td>
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<td>88</td>
<td>160</td>
<td>151</td>
<td>220</td>
<td>230</td>
<td>335</td>
<td>505</td>
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<tr>
<td>3 Stage</td>
<td>56</td>
<td>81</td>
<td>86</td>
<td>150,5</td>
<td>151</td>
<td>210</td>
<td>220</td>
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<td>4 Stage</td>
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<td>80</td>
<td>140</td>
<td>135</td>
<td>186</td>
<td>200</td>
<td>285,5</td>
<td>310</td>
</tr>
</tbody>
</table>

(Subject to alteration without notice)
TYPE DSV

SPRAY WATER INJECTION VALVE

Advantages

• Quick change trim
• Low actuating forces
• Forged body of F1 to F91
• Class VI tightness
• Drain trim option
• Actuated by any common drive

Application Range

The main function of injection valves in this series is to control the flow of injection water to the connected fittings and / or coolers. The injection water serves as a hot-steam temperature control. The injection valves are available with single- or multistage trims to ensure optimal performance for each case. This type of valve can also be used for other media and functions, e.g. as control-, stop or drain valve.

Design and Function

The stable and forged design of the valve body, the wear resistant construction of seat and plug as well as the low-friction pure graphite stem sealing are features to be underlined. Body and seat seal form a static double sealing by force-fitting. Valve plug and seat are ground to be tight-closing. During operation, these parts are protected against coarse foreign particles by a perforated cylinder which is installed in the body cover. However, we recommend installing a particle separator upstream to protect the unit against fine particles.
# TYPE DSV

**Technical Data**

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Body</td>
<td>Angle, Z or Globe type</td>
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<tr>
<td>Pressure rating</td>
<td>Up to PN 640</td>
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<tr>
<td>Nominal diameter</td>
<td>15 – 150</td>
</tr>
<tr>
<td>Working pressure</td>
<td>All commonly used pressure differences, high pressure differences with multistage valve type</td>
</tr>
<tr>
<td>Gland packings</td>
<td>Re-adjustable pure graphite stem sealing</td>
</tr>
<tr>
<td>Body sealing</td>
<td>Pure graphite</td>
</tr>
<tr>
<td>Connections</td>
<td>Butt-weld</td>
</tr>
<tr>
<td></td>
<td>Flange</td>
</tr>
<tr>
<td></td>
<td>Socket weld</td>
</tr>
<tr>
<td>Materials</td>
<td>All forged</td>
</tr>
<tr>
<td>Actuator</td>
<td>Pneumatic, hydraulic, electric, hand wheel</td>
</tr>
</tbody>
</table>

In addition to the fitting types described above, the valves can be used for other media, different application and made of other materials.

<table>
<thead>
<tr>
<th>Size</th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pressure Rating</td>
<td>PN 640</td>
<td>PN 640</td>
</tr>
<tr>
<td></td>
<td>Nominal Diameter</td>
<td>DN 15-50</td>
<td>DN 25-80</td>
</tr>
<tr>
<td></td>
<td>Kvs</td>
<td>Max. 11</td>
<td>Max. 25</td>
</tr>
<tr>
<td></td>
<td>Characteristics</td>
<td>Equal percent, linear or on/off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seat diameter</td>
<td>Max. 18</td>
<td>Max. 30</td>
</tr>
<tr>
<td></td>
<td>Stem diameter</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Stroke</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>
Installation Recommendations

- Our valves can be installed in any orientation. However it is preferred that the valve should be installed with stem in vertical position. In the event that the valve is required to be installed in horizontal position, the manufacturer should be consulted for confirmation of actuator thrust forces.

- Upstream piping should have a minimum unobstructed straight length of 3-4 mts. Most valve manufacturers, based on their experience recommend an upstream straight length of a minimum of 5xDN inlet pipe.

- Downstream straight length should have a minimum unobstructed straight length of 5-7 mts. It is however recommended that the downstream straight length of 10xDN Outlet Pipe.

- Good engineering practices recommend that the inlet and outlet pipes to and from the PRDS/Bypass valve should have a slope of 1% for every meter with a drain tapping at the lowest point. Drain tapping should be sized to handle a minimum of 7-8% of the max spray water that would be injected in the system.

- Spray water line from water control valve to water injection stub should always be charged with spray water. To ensure this the water control valve should be located at a level lower than the spray water injection stub. Avoid multiple bends in the water line as far as possible and locate the water valve as close to the injection point.

- Locate the Temperature Sensors a minimum of 5-7 mts. from the valve outlet. It is recommended as a thumb rule that sensors should be located at 10xDN at the downstream side of the valve. However very often shorter distances can be considered depending on the degree of superheat in the steam at the spray injection point. Higher degree of superheat ensures quicker evaporation of spray water and in such cases placing a temperature sensor as close as 5 mts. from the valve outlet can be considered.

- For the removal of rust, weldments and other foreign particles from the system at the time of system commissioning, Acid Cleaning and Steam Blowout is recommended using the Blowout kit provided by the valve manufacturer to protect critical parts like valve seat, spray nozzles etc.
<table>
<thead>
<tr>
<th>CUSTOMER</th>
<th>PROJECT NAME</th>
<th>VALVE MODEL</th>
<th>VALVE SIZE</th>
<th>VALVE PRESSURE RATING</th>
<th>PRESSURE</th>
<th>PERFORMANCE YEAR</th>
<th>REMARK</th>
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<tr>
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<td>And others</td>
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<td>And others</td>
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<td>300A / 450A</td>
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<td>And others</td>
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<td>KOSPO / DOOSAN</td>
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<td>P1=90.8K / T=550</td>
<td>2005 / DAEWOO &amp; C</td>
<td>And others</td>
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</table>

- Current projects are listed as follows
1) DAEWOO E & C / KHC : PAJU CHIP (DZEK TYPE BYPASS : 13 SETs) : ACTUATOR TYPE : HYDRAULIC
2) DAEWOO E & C / LIBYA : MISURATA & BENGAZI CCPP (BYPASS SYSTEM TTL : 28 SETs) : ACTUATOR TYPE : HYDRAULIC & PNEUMATIC
## Short list of customers - worldwide

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<tr>
<th>Sl. No</th>
<th>Customer</th>
<th>Valve Size</th>
<th>Valve Rating</th>
<th>Operating Condition</th>
<th>Year of Delivery</th>
<th>PP rating</th>
<th>Remarks</th>
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<td>1</td>
<td>STX</td>
<td>250X300</td>
<td>#2500</td>
<td>220 T/H (P1=113bar/P2=9bar) (T1=560/T2=330)</td>
<td>2001</td>
<td>1 unit 500 MW</td>
<td>continuous operation</td>
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<td>2</td>
<td>KEPCO (YONGNAM THERMAL)</td>
<td>150X300</td>
<td>#2500</td>
<td>350 TPH (P1=206bar/P2=30bar) (T1=563/T2=315)</td>
<td>1996</td>
<td>1 unit 225 MW</td>
<td>intermittent operation</td>
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<td>3</td>
<td>DEB Donfang Boiler Corp. Chengdu China - ANSHUN Power Station</td>
<td>125x125</td>
<td>#2500</td>
<td>287TPH (P1=264 bar/P2=50 bar) (T1=280)</td>
<td>1997</td>
<td>1 unit</td>
<td>intermittent operation</td>
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<td>4</td>
<td>HWASEONG CCPP</td>
<td>250X400</td>
<td>#2500</td>
<td>217 T/H (P1=132 bar/P2=40 bar) (T1=557/T2=340)</td>
<td>May-07</td>
<td>2 units 800 MW</td>
<td>525MW for Gas Turbine and Heat Recovery Units Daily start-up*</td>
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<tr>
<td>5</td>
<td>HWASEONG CCPP</td>
<td>600X900</td>
<td>#2500</td>
<td>285 T/H (P1=29/P2=9) (T1=557/T2=180)</td>
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<td>2 units 800 MW</td>
<td>525MW for Steam Turbine Daily start-up*</td>
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<td>#1500</td>
<td>80 T/H (P1=115/P2=34 bar) (T1=545/T2=320)</td>
<td>Aug-07</td>
<td>2 units 500 MW</td>
<td>Mitsubishi Heavy Industries</td>
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<tr>
<td>7</td>
<td>GUNJANG CCPP</td>
<td>400X850</td>
<td>#1500</td>
<td>370 T/H (P1=92/9 bar) (T1=540/T2=205)</td>
<td>Oct-07</td>
<td>2 units 500 MW</td>
<td>Project intermittent operation*</td>
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<td>8</td>
<td>Glow CFB - Phase 1 (Thailand)</td>
<td>450</td>
<td>#4500</td>
<td>148 T/H (P1=134/P2=5.6 bar) (T1=566/T2=205)</td>
<td>Oct-08</td>
<td>1 unit 660 MW</td>
<td>Contract From Doosan for various</td>
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<tr>
<td>9</td>
<td>Glow CFB - Phase 1 (Thailand)</td>
<td>150X200</td>
<td>#4500</td>
<td>164 T/H (P1=172/5,6 bar) (T1=568/T2=196)</td>
<td>Nov-08</td>
<td>1 unit 660 MW</td>
<td>projects continuous operation</td>
</tr>
</tbody>
</table>
Certificate


Certificate No: 01 100 090985

TÜV Rheinland Cert GmbH certifies:

GS VALVE ENGINEERING GmbH
Duisburger Straße 375
D-46049 Oberhausen

Scope:
Development, manufacturing and sales of Turbine Bypass Systems, Control and Isolating Valves for the Electric Power and Process Industry

An audit was performed, Report No. 090985. Proof has been furnished that the requirements according to ISO 9001:2008 are fulfilled.
The due date for all future audits is 19-01 (dd.mm).

Validity:
The certificate is valid from 2010-01-25 until 2013-01-24.

Cologne, 2010-01-26

TUV Rheinland Cert. GmbH
Am Golden Stein · 51105 Köln

TGA-ZM-58-05-00

www.tuv.com

Member of

TÜVRheinland®
Precisely Right.
Quality-Assurance certificate

Certificate

Quality-Assurance System acc. to Directive 97/23/EC

Certificate no.: 01 202 310/Q-10 090965

Name and address of the manufacturer:
GS valve ENGINEERING GmbH
Duisburger Straße 375
D-46049 Oberhausen

Hereewith we certify that the above-mentioned manufacturer operates a quality system according to the European Directive 97/23/EC. The manufacturer has the permission to affix the following CE marking to pressure equipment described and manufactured in accordance to the scope covered by this Quality-Assurance System.

 Tested acc. to Directive 97/23/EC: GS-System (Modul H1)
(The GS-Modules E1, E, E1, D and H are performed by Module H1)

Audit report no.: 310/Q-10 090965
Area of validity: Turbine Bypass Valves, Control and Isolating Valves, see annex to certificate

Manufacturing plant: GS valve ENGINEERING GmbH
Duisburger Straße 375
D-46049 Oberhausen

Valid until: January 31, 2013

Cologne, February 01, 2010
Dr.-Ing. W. Wichert

TÜV Rheinland: Certification Body for Pressure Equipment
TÜV Rheinland Industrie Service GmbH
Notified Body, ID-No. 0055
Am Grauen Bacht, D-51109 Köln

www.tuv.com

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United States Patent
Beurskens

[54] VALVE FOR A SUPERHEATED-STEAM CONVERSION PLANT
[76] Inventor: Theo Beurskens, Hoogezandsestraat 56, NL-5942AN Lemmer, Netherlands
[6] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(c), and is subject to the twenty year patent term provision of 35 U.S.C. 154(a)(2).
[21] Appl. No.: 08/81,522
[22] Filed: Mar 6, 1996
Related U.S. Application Data
[65] Continuation of application No. 06/342,682, Nov. 18, 1994, abandoned.

[51] Int. Cl. 1 E 14K 84
[52] U.S. Cl. 137/825-39; 137/829

[56] Field of Search 137/829, 625-37, 137/823-38, 625-39, 625-48, 861, 862

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494,100 6/1991 Germany :
48,18,066 U1 9/1994 Germany :
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390,955 4/1963 Switzerland :

Patent Number: 6,131,612
Date of Patent: Oct 17, 2000

OTHER PUBLICATIONS
Drawing dated Sep. 18, 1992 and captioned “Anlage 5” [Attachment 5] and “Dampfumformventil Typ BN72 Mercedes Benz” [alteration of steam conversion valve type BN72].
Drawing captioned “Anlage 1” [Attachment 1], Bopp & Reuther # 3-38-18759.1 and “Dampfumformventil Typ BN72 mit E-Antrieb” [steam conversion valve type BN72 with E-drive].
Drawing captioned “Anlage 6” [Attachment 6], Bopp & Reuther # 3-38-18759.1 and “Dampfumformventil Typ BN72 mit E-Antrieb” [steam conversion valve type BN72 with E-drive].

Primary Examiner—John Fox
Attorney, Agent, or Firm—Million Oliver, Wars, Florida,
Van Der Steyn & Addiploch LLP

ABSTRACT
The invention relates to a valve, more particularly for a superheated steam conversion station, having an inlet and an outlet which can be closed by a closure member extending into the inlet or outlet, and a draw-off via which a component flow of the steam can be drawn off in the form of booster steam from the valve chamber (2) of the valve casing in dependence on the position of the closure member; the inlet or outlet is constructed with at least one chamber connected to a booster steam draw-off hose with which a fixed wall of the chamber is formed; and when the valve is closed the chamber, which is sealed off from the pressure side of the valve by sealing faces of the closure member, is connected to said pressure side of the valve with the first lifting of the closure member, while the inlet or outlet is not yet opened or not yet completely opened.

11 Claims, 9 Drawing Sheets
Some Typical Installations

Hwaseong 800 MW Unit

Phase 2

Hwaseong 800 MW Unit IP Bypass with Stop Valve

H. P. Bypass Yeongwol
Manufacturer: **SAMYANG COMPREHENSIVE VALVES COMPANY LTD**
48-14, Samjeong-dong, Ojeong-gu, Bucheon-si, Gyeonggi-do, 421-308 Korea

Engineered by: **GS Valve Engineering GmbH**
Duisberger Strasse 375, 46049 Oberhausen, Germany

Marketing and Technical Support by: **FORBES MARSHALL PVT LTD**
A34/35, MIDC Industrial Estate, H-Block, Pimpri, Pune 18