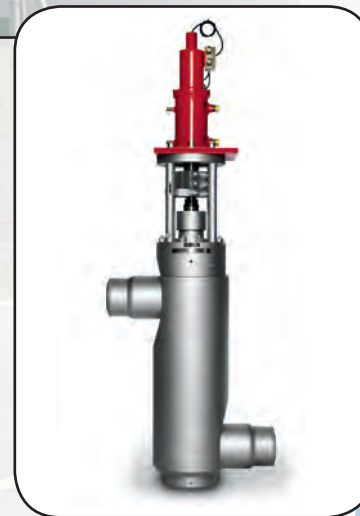


## Products and services

Overview



**WELLAND & TUXHORN AG**  
ARMATUREN- UND MASCHINENFABRIK



**WELLAND & TUXHORN AG**  
ARMATUREN- UND MASCHINENFABRIK



## **Made in Germany**

*You are getting a top-quality product from the German valve engineering industry*

### **History Siemens-SPPA-W&T in China**

In the beginning of the '90s Siemens Erlangen and Siemens Beijing were looking for further business opportunities on the Chinese market. As Siemens Erlangen and W&T had a long lasting relationship regarding control valves, desuperheater valves and bypass stations, it was decided that Siemens Beijing should also deal with these products for the Chinese market. In connection with Siemens DCS the market was convinced that the common solution of Siemens-W&T was a competitive offer for Chinese power stations.

In the following years the business of Siemens-DCS and W&T-TBS increased consequently under the common mentoring of company members from Erlangen, Beijing and Bielefeld. Middle of the 90's Siemens founded a joint Venture together with a Chinese I&C company located in Nanjing which later became the SPPA company. The DCS-TBS business was more and more shifted from Beijing to Nanjing and SPPA managed to increase and develop the acceptance of the products throughout the whole market. More and more Chinese power stations were equipped with TBS from SPPA-W&T.

Many successful references were built up which was very helpful for the rapidly increasing power station market from 2005 onwards. Dimensions, pressures and temperatures increased drastically during this period and TBS had to adopt to these requirements. Nowadays bypass systems are used up to huge 1000 MW coal fired power plants handling temperatures and pressures of 620°C and 350 bars. SPPA-W&T took a strong part of the market of thermal power stations and supplied more than ..... TBS to Chinese customers until today. All this experience and Know How is also integrated in the W&T control valve range to increase reliability and efficiency of the plant.

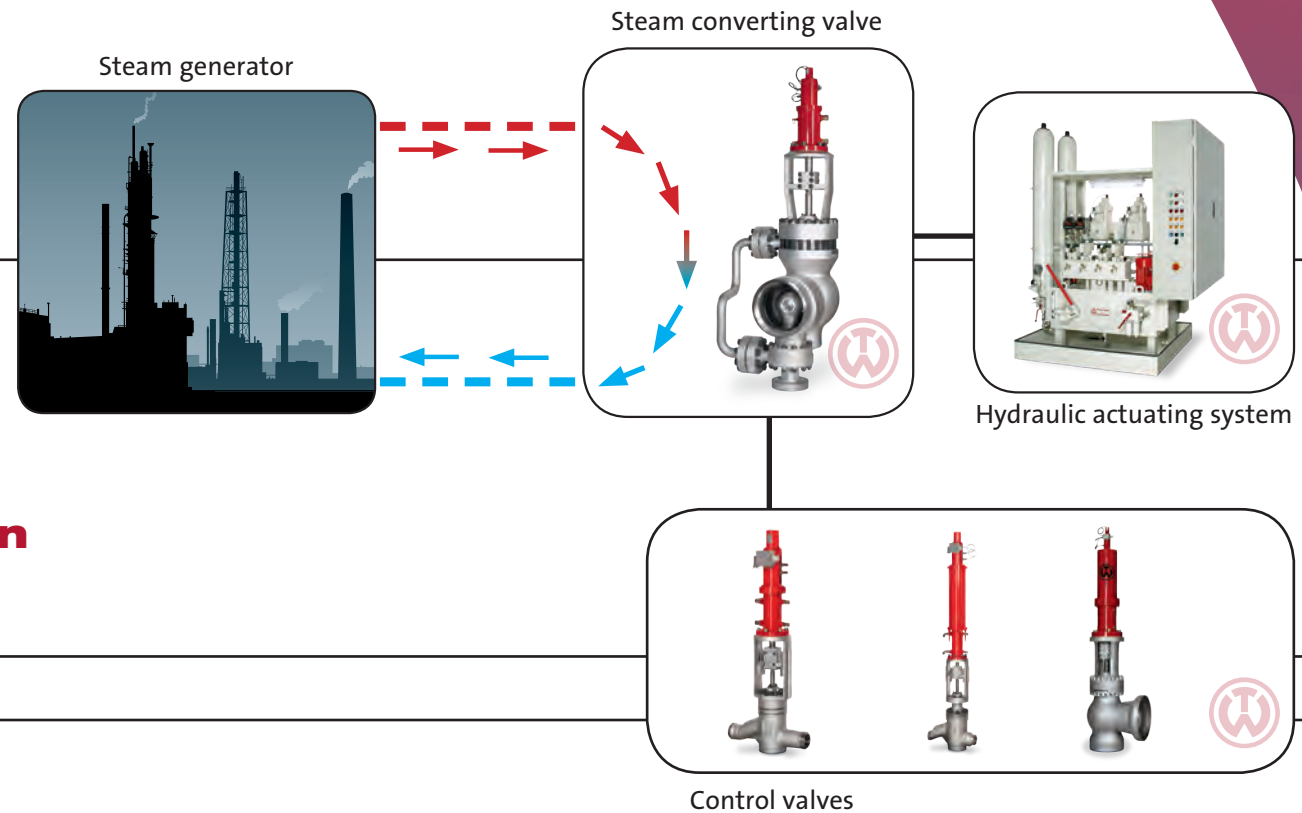


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### **Supply hub**

Valves are the connection points for the entire power plant network. They regulate the circuit and control the results. As a prerequisite for the highest possible degree of safety and seamless functioning of the system, they must be in perfect working order and therefore coordinated exactly.





## Seamless integration

*A one-stop shop*

### Precise planning

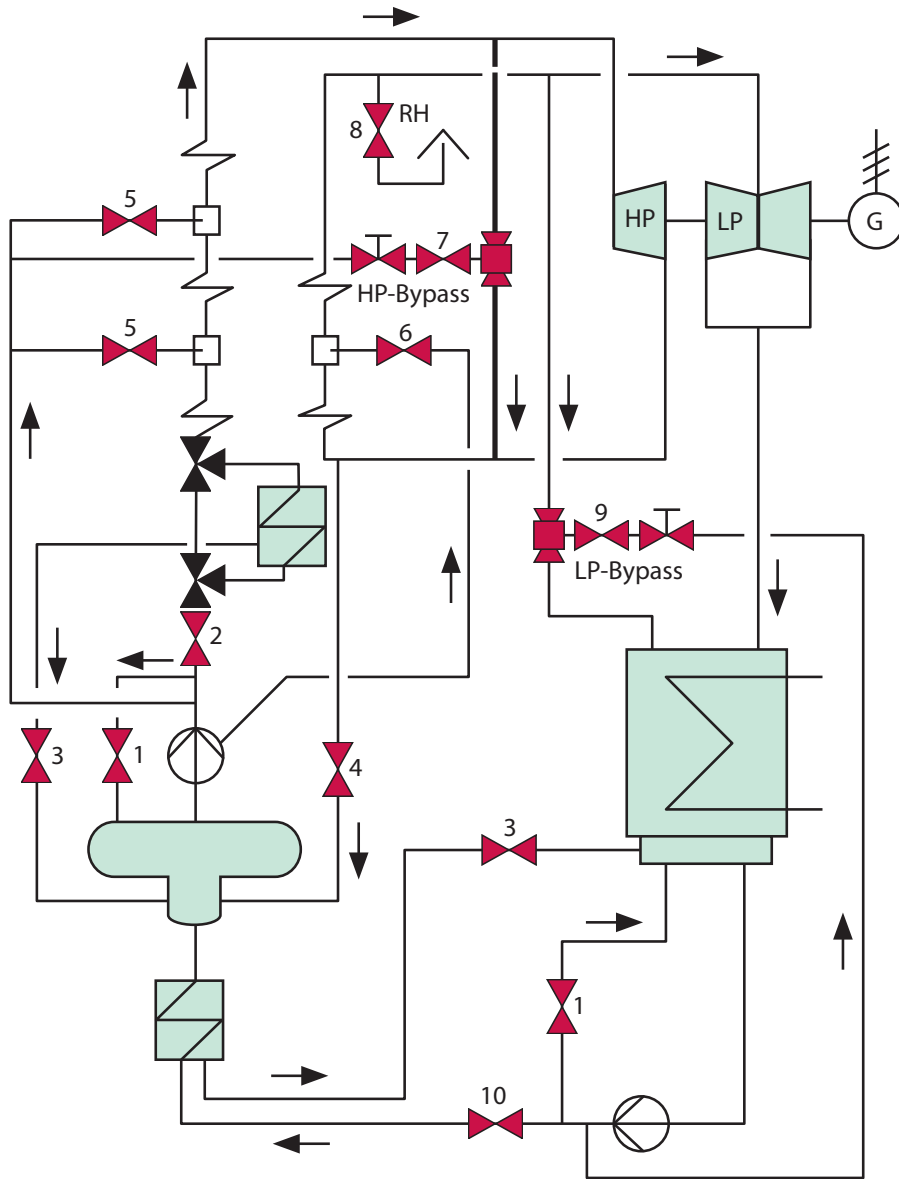
All of the diverse components have to be perfectly harmonised with each other to establish smooth integration into the production process. It is only then that the system can realise its optimum output potential. The basis for achieving this goal is precise planning.

### The complete scope

We would be happy to take charge of planning and deliver you all the types of valves that you need to operate your power plant. In addition to this you will receive the appropriate actuator from us. Our offer is rounded off with the commissioning of the system for operation as well as the possibility of hydraulic pipes and field cabling.

### Your benefits

A completely integrated system, planned and delivered by hand, means less effort for you, a higher degree of safety and reduced standby and maintenance times. Communication becomes quicker and easier because the system is designed for the highest level of integration during the planning stage.



### Control valves in the power plant circuit

1. Minimum flow control valves
2. Feed water control valves
3. Level control valves
4. Auxiliary steam control valves
5. High pressure injection cooler
6. Reheater injection cooler
7. High pressure bypass station
8. Reheater safety valve
9. Low pressure bypass station
10. Condensation control valve

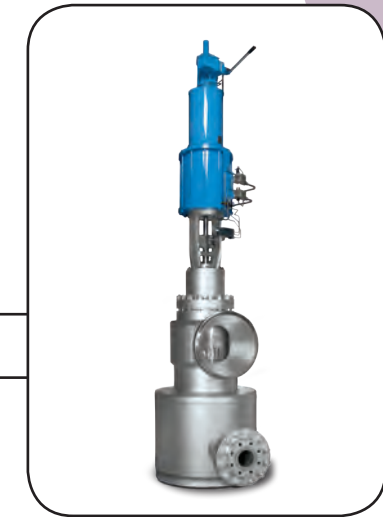
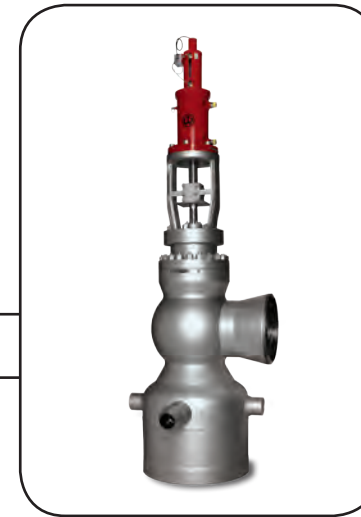
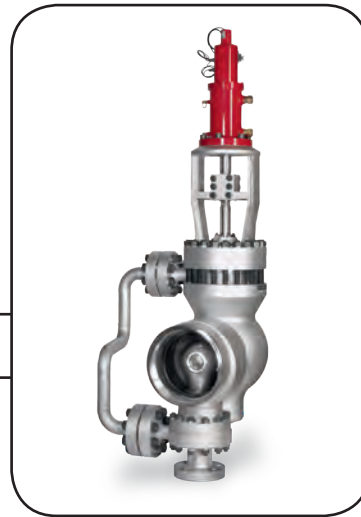
Process planning



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## Bypass stations

HP, IP/LP



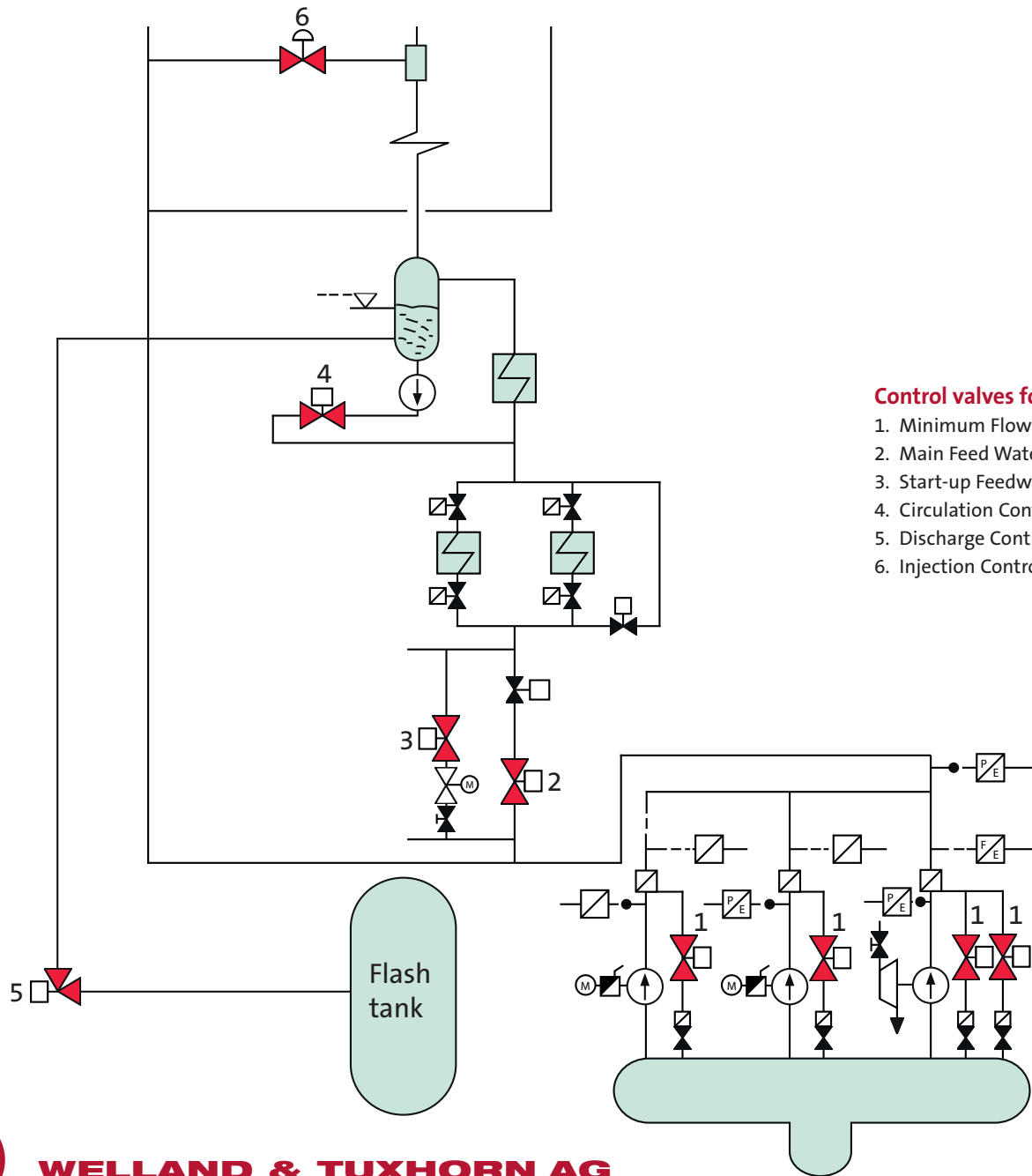
### Functional scope

Bypass stations ensure a safe current flow through the reheater and the independent operation of the steam generator, even when the turbine inlet is closed.

When operated with variable pressure the safety function is also maintained when the pressure quota for the chamber is exceeded. The valve also serves as a safety valve.

### Benefits

- For universal use
- Optimum steam conversion over the entire load range due to integrated motive steam nozzle (HP)
- Optimum cooling over the entire load range due to cooling water injection from nozzles at the outlet  
Optimised spray angle and minimised droplet size (MP/LP)
- Optimum water/steam mixing even just after the injection point
- Low-delay steam cooling, in particular in the event of partial loads
- Low-noise and low-vibration operation thanks to installed silencers
- All wear parts can be replaced on site
- All mounting parts can be replaced without mechanical processing



**Control valves for boiler / feedwater applications**

1. Minimum Flow Control Valve / Leak - off Valve
2. Main Feed Water Control Valve
3. Start-up Feedwater Control Valve
4. Circulation Control Valve
5. Discharge Control Valve
6. Injection Control Valves



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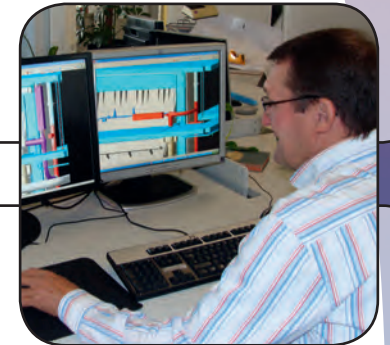


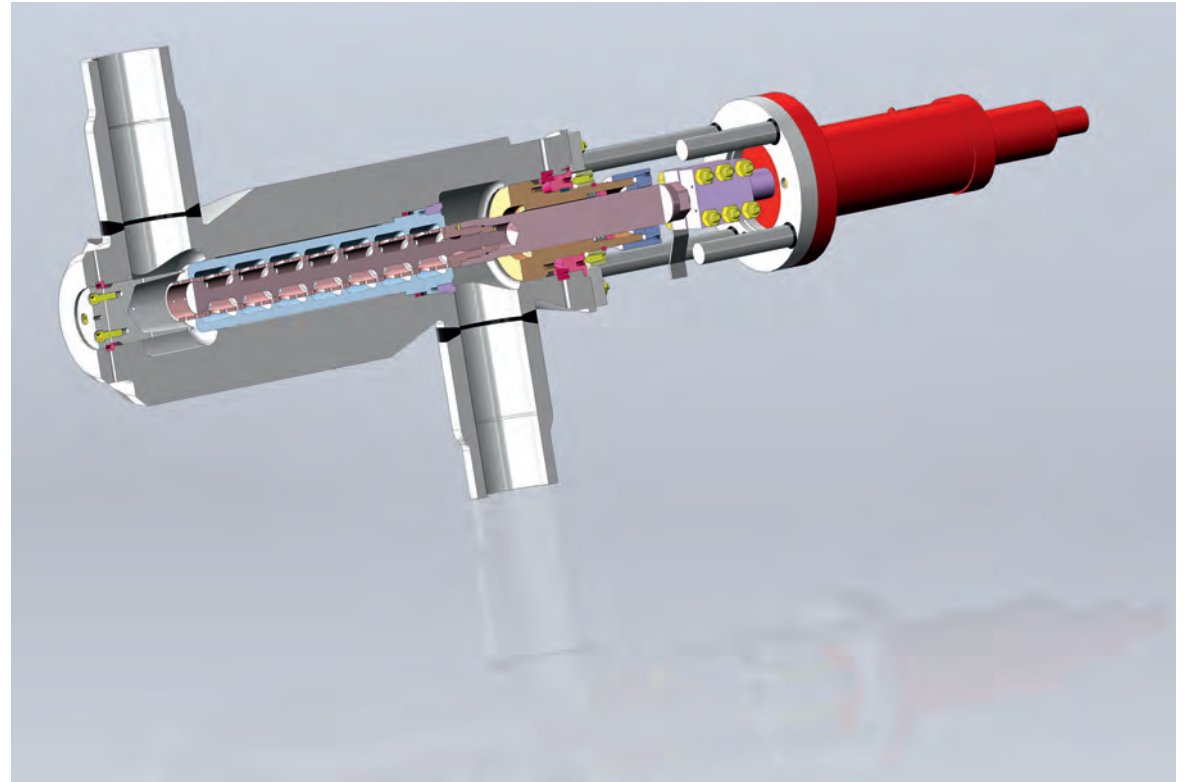
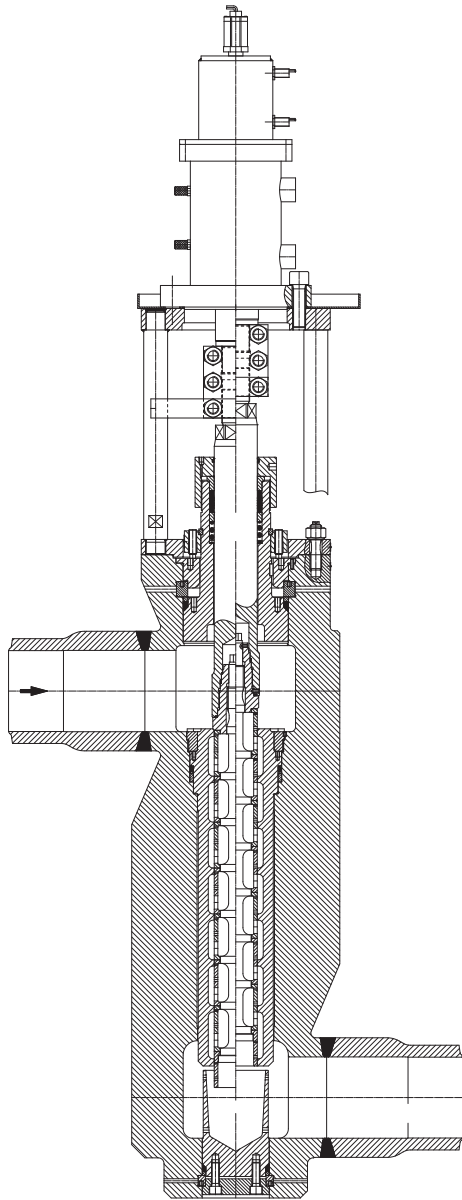
## Special Control Valves for Boiler applications

### Special Control Valves for Boiler applications

Next to steam conditioning there exists another wide field of applications with highest relevance to the most reliable and, even more important, the safest operation of your plant: Boiler applications.

The various types of boilers that are typically used in power stations as well as the various operating conditions that must be considered, demand perfectly engineered solutions. With the application of Special Control Valves by Welland & Tuxhorn you can participate in our know-how and long experience with these most pressing challenges.





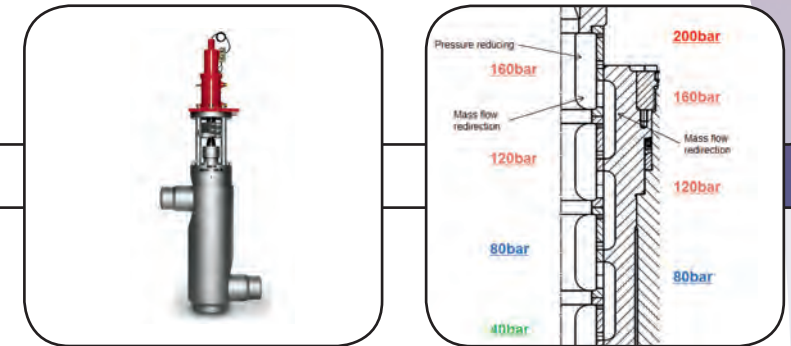
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### Application

The minimum flow generally means the lowest continuous flow the pumps are permitted to operate. A decrease of the feedwater flow to the boiler below the minimum flow of the pumps will result into cavitation and an unallowably high heating up of the feedwater pump. However, under certain operating conditions of the boiler (start-up, operation within a wide pressure range, low load operation) the feedwater flow required by the boiler would drop below the minimum flow of the pumps. This most critical operating condition would damage the pumps. With the application of a pump bypass system with a minimum flow - control valve as its key component, a discharge flow above the minimum flow of the pumps is verified at all times. Therefore the minimum flow - control valve can be considered a pump safety valve!

Seat $\varnothing$ mm			40-150
DN from-to	Inlet/Outlet	mm	50-300
		inch	2-12
PN up to	[bar]	630	
	[lbs]	4500	

## Minimum Flow - Control Valve / Leak Off Valve



### Design

Forged bodies: Angled or Z-shaped valves, for welding connections according to DIN, ANSI or other standards.

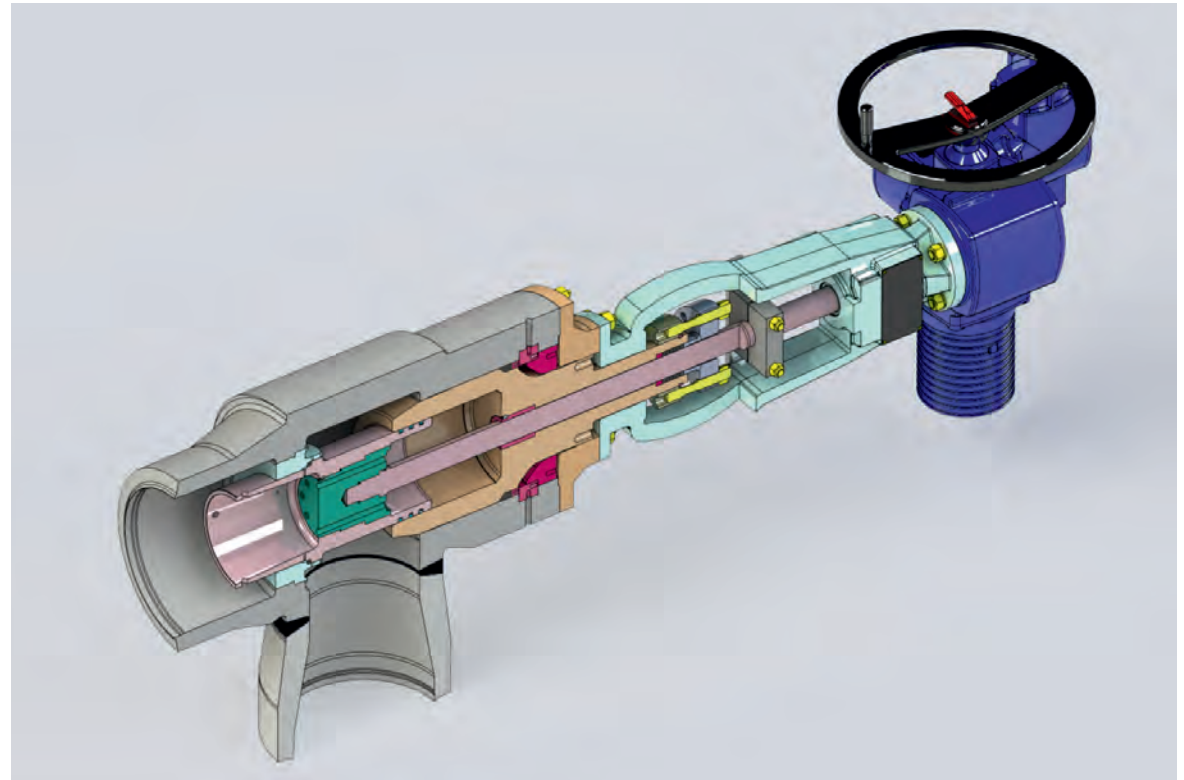
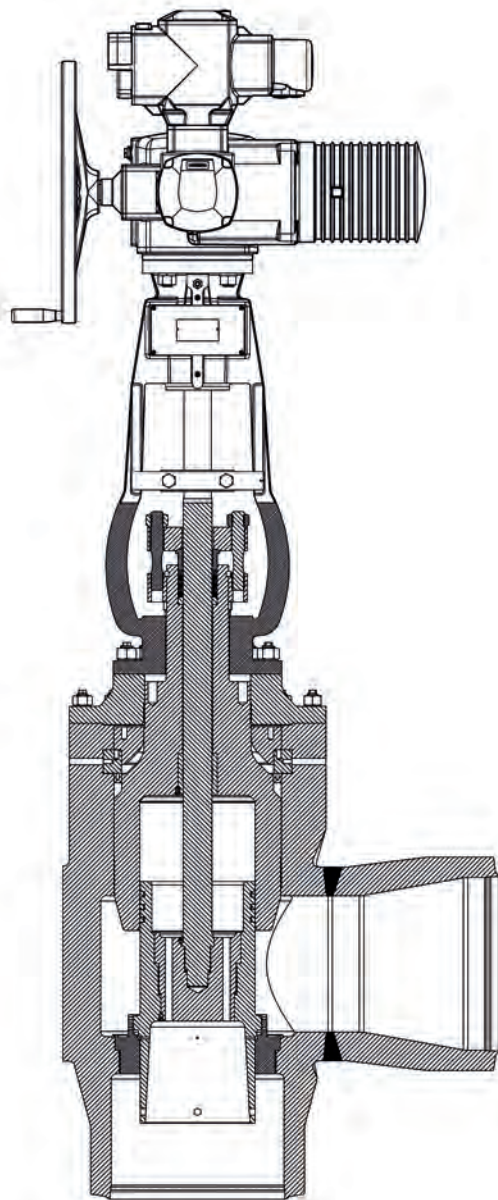
### Hydraulic Actuators

All our minimum flow - control valves can be equipped with a compact hydraulic actuator. Hydraulic actuators provide you with the following control types:

Quick open/close, Step to set-point, continuous control

### Distinctive features

- Highest possible level of cavitation prevention
- Highest possible level of erosion prevention
- State of the art design minimizing oscillations or vibrations
- Precise characteristic
- Noise levels <75 dB (A)
- Fail-safe technology: Valve opens in case of energy blackouts or malfunctions
- Quick maintenance and servicing due to easy-to-replace internal parts and components - replaceable without mechanical work Long service life



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### Application

Controlling, regulating and adjusting the flow of feedwater into the boiler. With feedwater control valves by Welland & Tuxhorn all requirements brought on by various boiler types and operating conditions are addressed:

Drum boilers require a feedwater level control and/or differential pressure control for variable speed drive turbo pumps.

Once-through boilers require additional means to reduce the amount of the feed water flow, especially when the outlet of the feedwater pumps cannot be throttled any further.

Full-load operation requires control valves that cause the smallest

Seat $\varnothing$ mm			150-600
DN from-to	Inlet/Outlet	mm	200-600
		inch	8-24
PN up to	[bar]		630
	[lbs]		4500

## Main Feedwater Control Valve

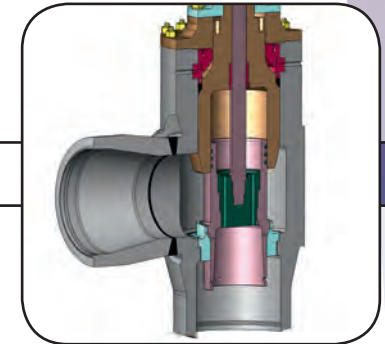
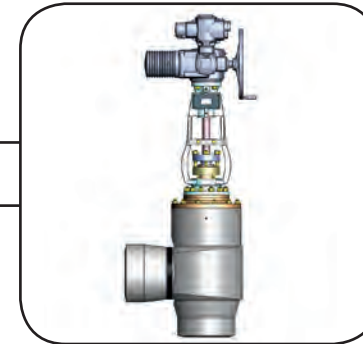
possible pressure drop. The control valves are set up to handle the entire amount of feedwater flow into the boiler. For this application the control valves are arrayed in the main feedwater line. Start-ups, shut-downs and low load operation require management of high pressure differences with a considerable low flow of feedwater.

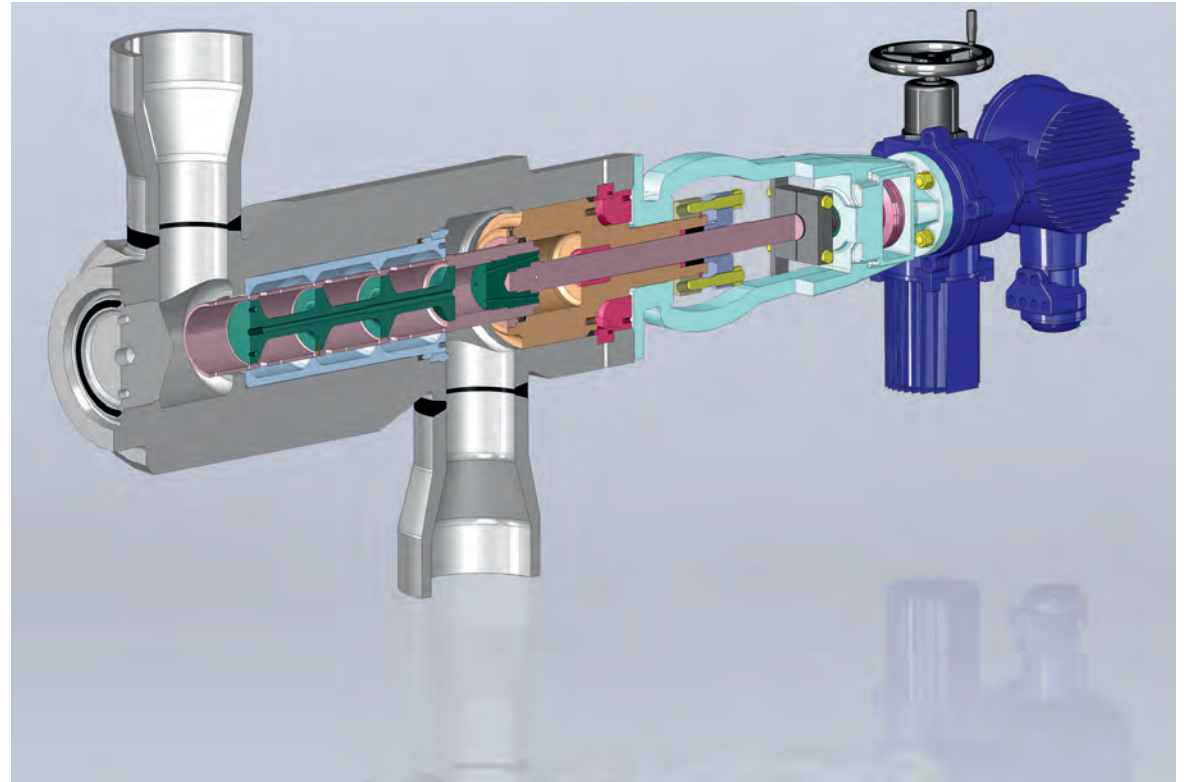
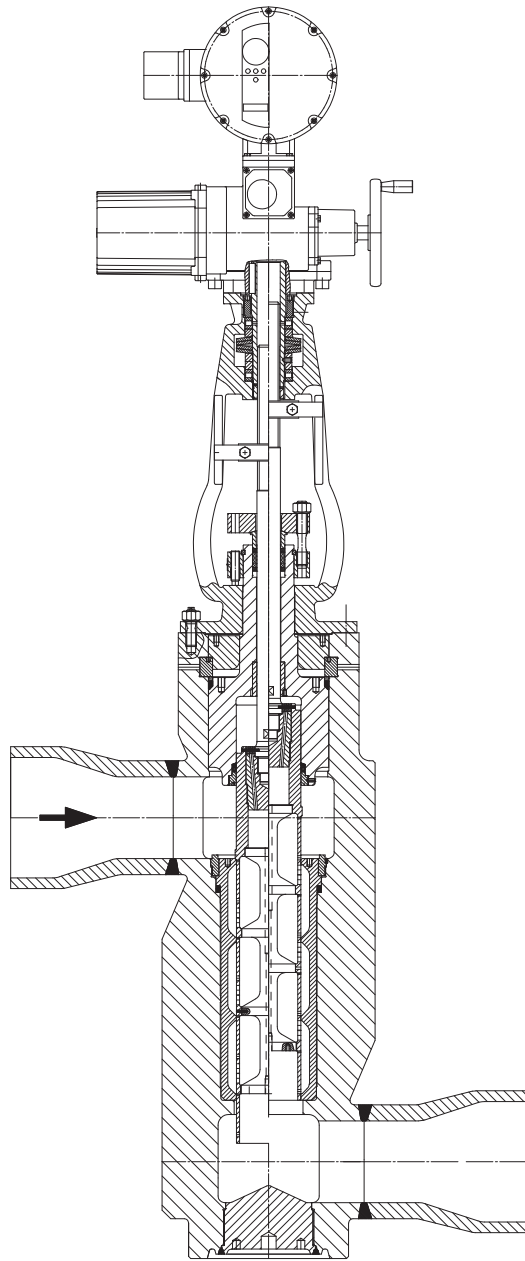
### Design

Cast or forged bodies, straight, angled or Z-shaped, for welding connections or with flanges, according to DIN, ANSI or other standards

### Distinctive features

- Highest possible level of cavitation prevention
- Highest possible level of erosion prevention
- State of the art design minimizing oscillations or vibrations
- Precise characteristic
- Noise levels < 80 dB (A)
- Quick maintenance and servicing due to easy-to-replace internal parts and components - replaceable without mechanical work





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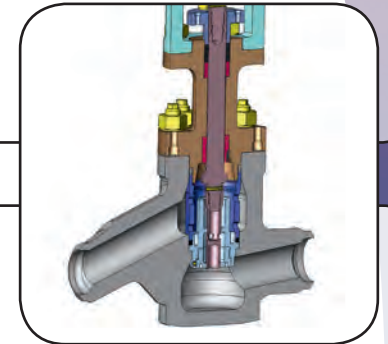
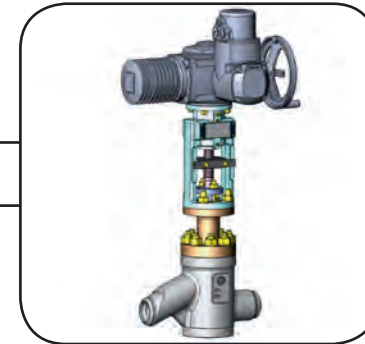
### Application

During low-load operation as well as during start-ups, the boiler requires only relatively small amounts of feedwater (approx. up to 30 % in compare to Full-Load operation). At the same time pressure fluctuations are substantially greater than they are during full-load operation.

Low-load control valves by Welland & Tuxhorn not only master these challenges safely and reliably, but as well they provide you with an outstandingly high rangeability.

Seat $\varnothing$ mm			50-200
DN from-to	Inlet/Outlet	mm	100-300
		inch	4-12
PN up to	[bar]		630
	[lbs]		4500

## Start Up Feedwater Control Valves

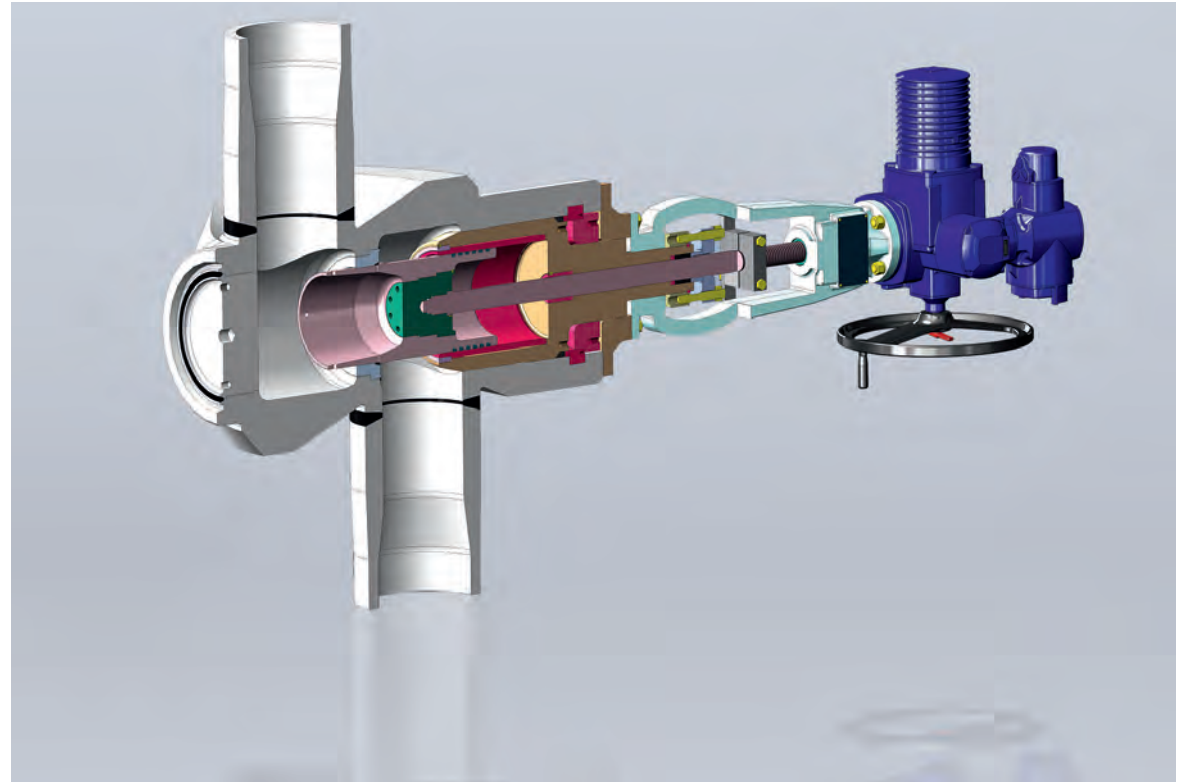
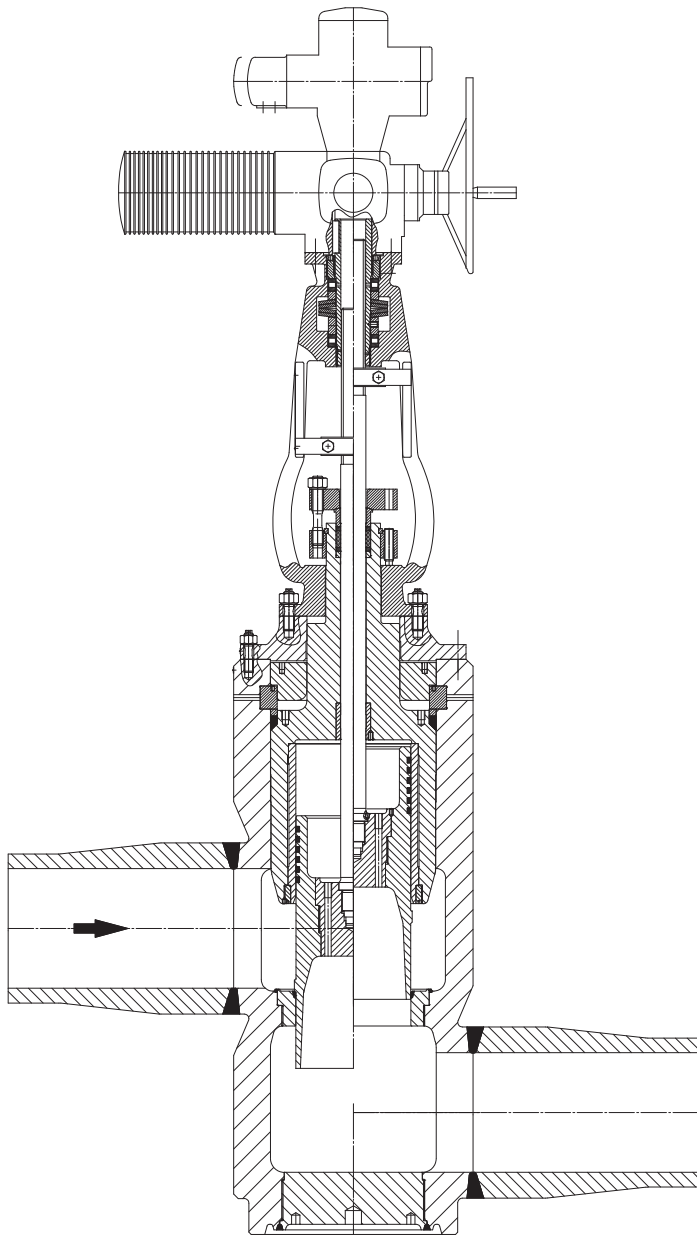


### Design

Forged bodies: Straight, angle or Z-shaped valves, for welding connection, manufactured according to DIN, ANSI, or other standards.

### Distinctive features

- Highest possible level of cavitation prevention
- Highest possible level of erosion prevention
- State of the art design minimizing oscillations or vibrations
- Precise characteristic
- Noise levels <75 dB (A)
- Quick maintenance and servicing due to easy-to-replace internal parts and components - replaceable without mechanical work



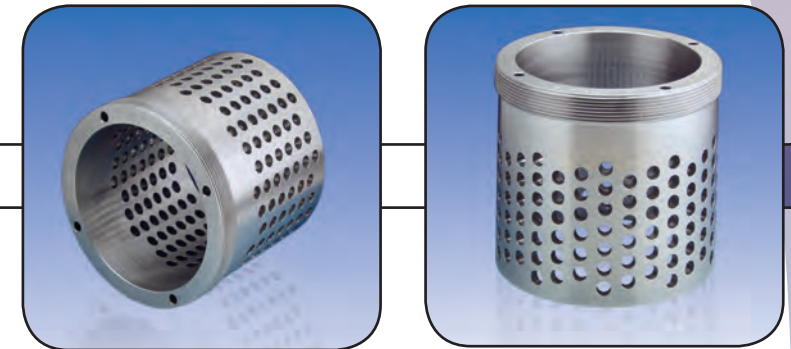
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Seat Ø mm			100-250
DN from-to	Inlet/Outlet	mm	100-400
		inch	4-16
PN up to	[bar]		630
	[lbs]		4500

## Circulation Control Valve



### Application

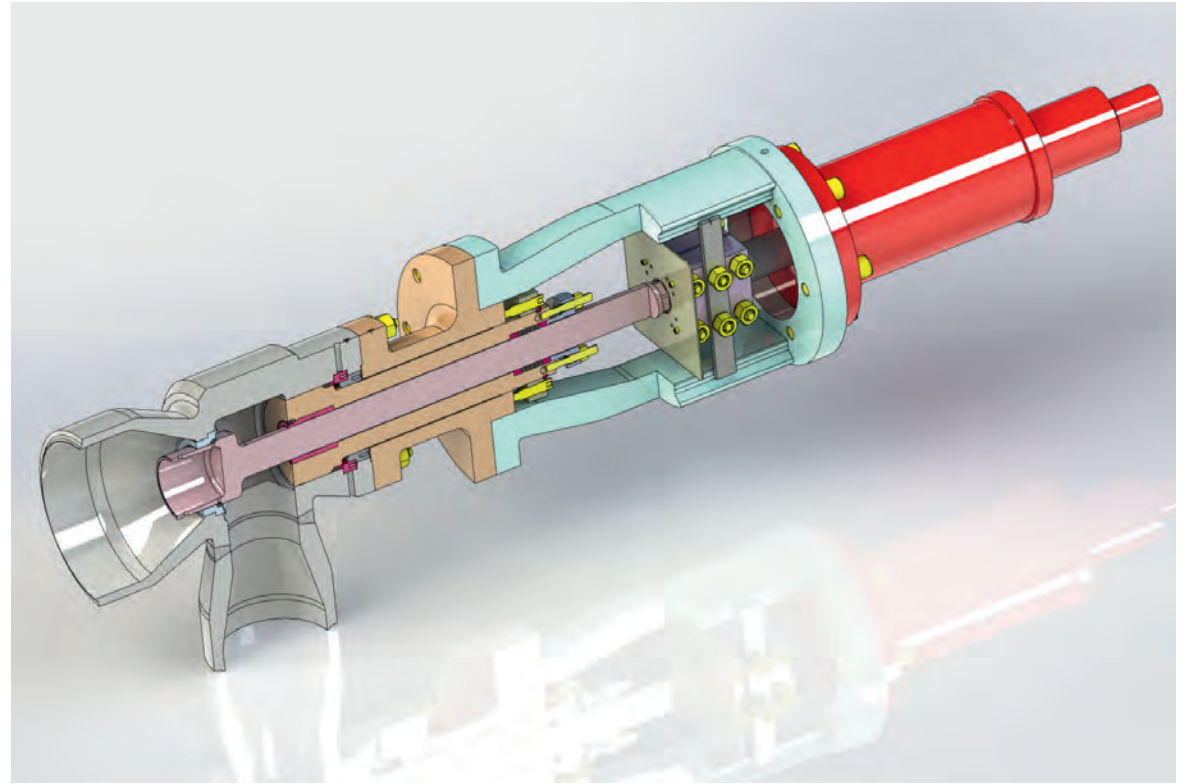
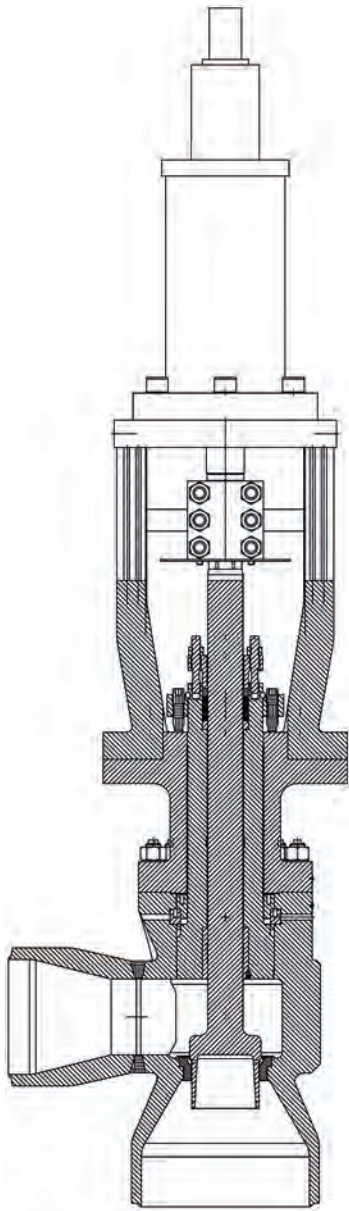
As soon as the feedwater is heated up, the level control within the separator is realized with a circulation control valve. By means of a pump in combination with a circulation control valve boiling water is reintroduced into the circuit in front of the evaporator.

### Design

Forged bodies, angled and Z-shaped valves for welding connections, manufactured according to DIN, ANSI, or other standards.

### Distinctive features

- Highest possible level of cavitation prevention
- Highest possible level of erosion prevention
- State of the art design minimizing oscillations or vibrations
- Precise characteristic
- Noise levels <85 dB (A)
- Quick maintenance and servicing due to easy-to-replace internal - replaceable without mechanical work



### Application

During start-up as well as during low-load operation the level of water inside of the separator needs to be controlled.

With the use of a discharge control valve water or boiling water can be discharged and reintroduced into the circuit by applying one of following methods:

Using a flash tank at atmospheric pressure

Using the feed water tank.



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Seat Ø mm			50-200
DN from-to	Inlet	mm	80-300
		inch	3-12
	Outlet	mm	2-3 times larger than DN of inlet
		inch	
PN up to	[bar]		630
	[lbs]		4500

## Discharge Control Valve / Blow Down Valve

### Design

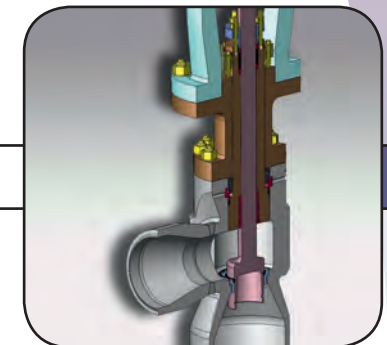
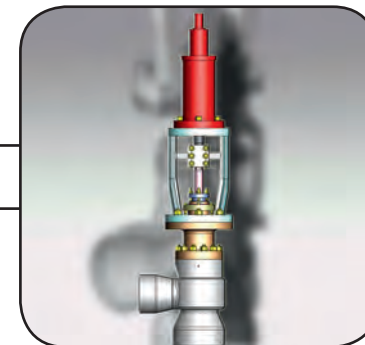
Forged bodies in angled shape with welded connections fulfilling DIN, ANSI or other standards.

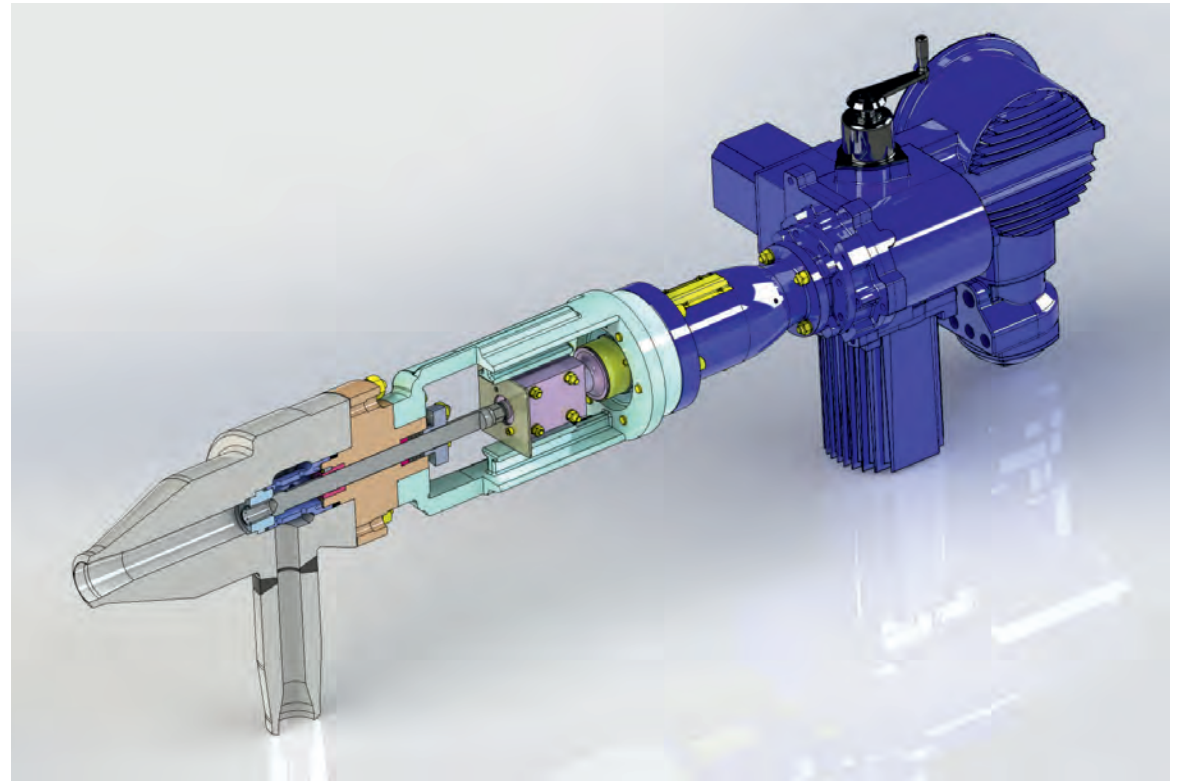
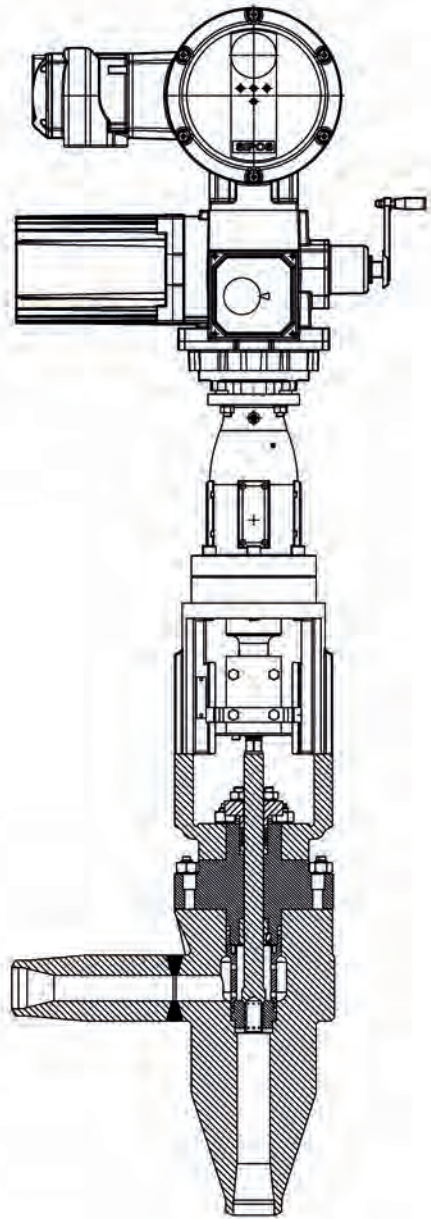
Outlet size 2-3 nominal diameter levels greater than the inlet size due to evaporation.

Separated seat and control area.

### Distinctive features

- Highest possible level of cavitation prevention
- Highest possible level of erosion prevention
- State of the art design minimizing oscillations or vibrations
- Precise characteristic
- Quick maintenance and servicing due to easy-to-replace internal - replaceable without mechanical work
- Long service life





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### Application

In the first place the amount of cooling water as required by the consumer must be controlled and adjusted precisely.

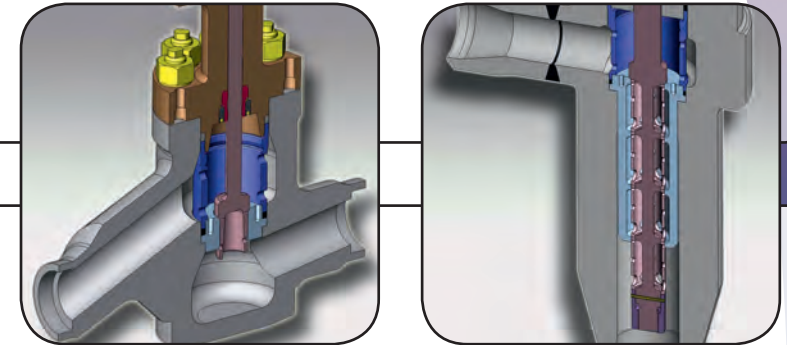
This task is compromised by great pressure fluctuations at the point of consumption, when the pressure on the inlet side of the valve however keeps steady. To achieve satisfying operating results Injection Control Valves far mostly follow an equal percentage opening characteristic. To a great extent, this ensures a linear flow characteristic.

When used in boiler applications, the injection control valves are in constant operation.

Seat $\varnothing$ mm			25-100
DN from-to	Inlet/Outlet	mm	50-150
		inch	2-6
PN up to	[bar]		630
	[lbs]		4500

## Injection Control Valves

*Single-stage for superheater / multi-stage for reheater*



### Typical design (single-stage)

Forged bodies: Straight, angled or Z-shaped valves, for welding connections, according to DIN, ANSI or other standards.

### Typical design (multi-stage)

Forged bodies: Straight, angled or Z-shaped valves, for welding connections, according to DIN, ANSI or other standards.

### Distinctive features

- Adaptable to prevalent operational conditions
- Pressure decrease stepwise (with multi stage design)
- Highest possible level of cavitation prevention
- State of the art design minimizing oscillations or vibrations
- Noise level < 80 dB (A)
- Precise characteristic
- Quick maintenance and servicing due to easy-to-replace internal parts - replaceable without mechanical work
- Long service life



Hydraulic



Hydraulic



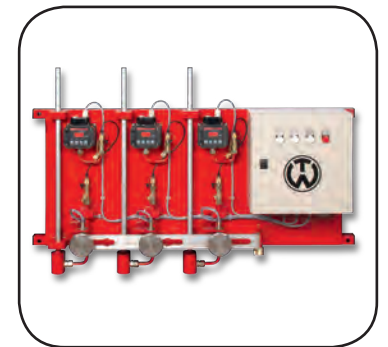
Pneumatic



Electric

### **A variety of applications**

As well as steam conditioning and control valves we also provide you with the appropriate actuator components. Hydraulic actuating systems are particularly suitable for plants with high operating pressures and high requirements in terms of accuracy and precision of regulation.



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## Actuator

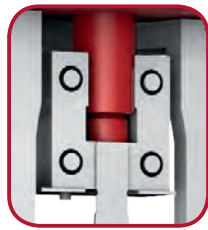
*Hydraulic, pneumatic, electric*

We also offer electric or pneumatic actuator. Each type is harmonised exactly with our valves and integrated perfectly. This reduces your costs, increases the safety of your plant and ensures seamless, trouble-free operation.

### Developed by us

Based on our years of project experience, over time we have designed and developed our own hydraulic actuating system. Accordingly the adaption of the appropriate hydraulic drive can be perfectly matched to the requirements of the valve. Your very benefit is the significant increase of the reliability and safety of plants operated by you.





Actuator coupling



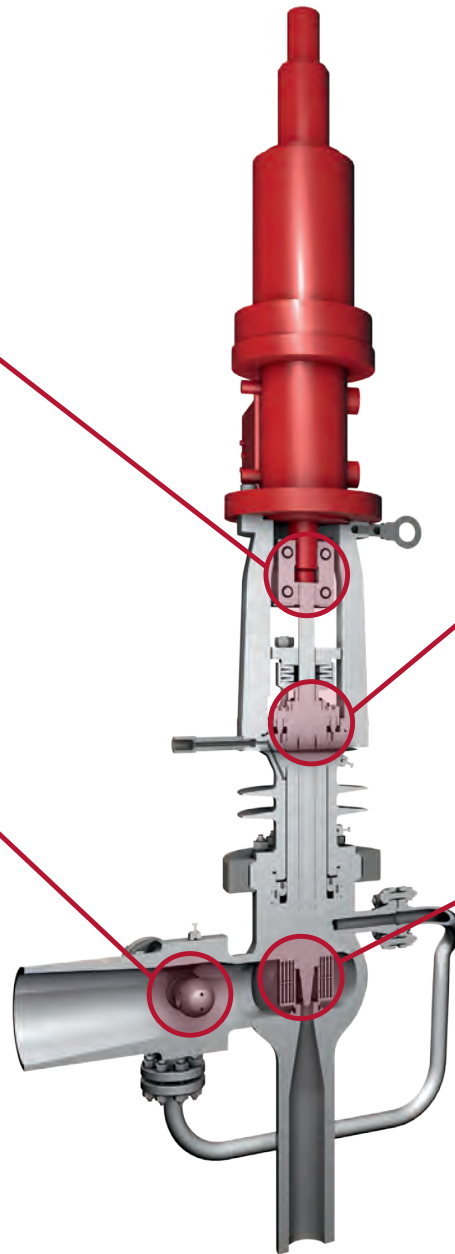
Cooling spacer with stuffing box



Integrated cooling water injection /  
motive steam assistance



Valve stem and 5-stages control/throttle element



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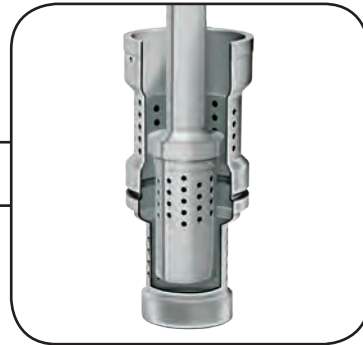


## Designing the future

Research project 725 °C

### Improved CO2 balance

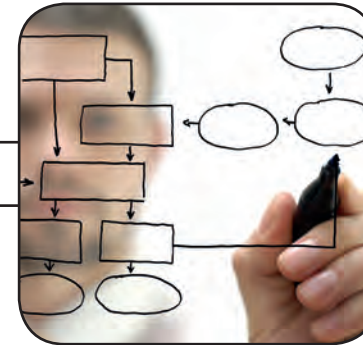
Since 2008 we have been running a research project together with other manufacturers, with the aim of increasing power plant efficiency. CO2 emissions can be decreased, making an important contribution towards protecting the environment.



### Increasing efficiency

Long term testing of materials and components with high strength at high temperatures helps to increase the steam temperature and therefore increase the efficiency of the power plant by around 20%.

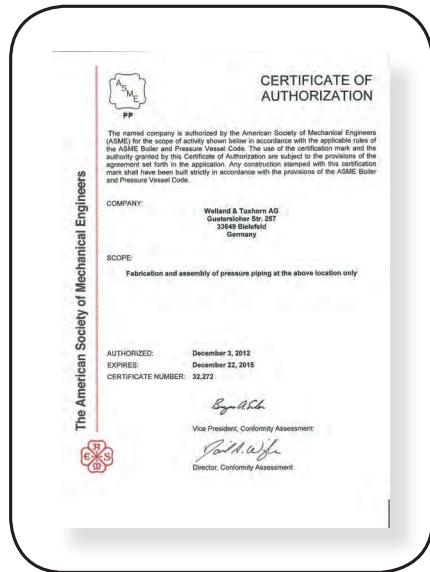
Our valve has been installed in the 725 °C high temperature material test facility (HWT II) at the large-scale coal power plant in Mannheim.



### At a glance

Description: valve with integrated steam header  
Operation: with hydraulic drive  
Live steam: design: 725 °C / 205 bar  
Nominal width: DN 80/150  
Total weight: 420 kg  
Stroke: 50 mm  
Valve housing material: alloy 617mod





ASME PP Certificate



DIN EN ISO 9001 2008 Certificate



Gost Certificate



KTA-Certificate



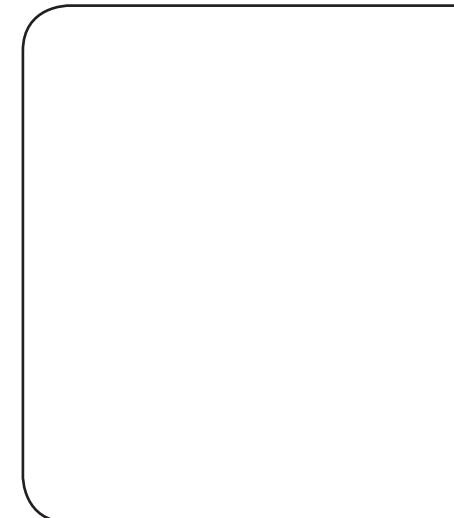
PED Certificate



SIL3 Certificate Hydraulic



SIL3 Certificate Pneumatic



## Our Quality

### Our quality

Our consistently high product quality is the result of a well-thought-out concept: we implement a range of quality assurance measures and comply with all the requirements of DIN EN, VdTÜV, AD-2000, TRD, as well as ASME, ANSI, IBR and RTN. Our quality assurance system is approved by the following regulations: DIN EN ISO 9001:2000, Directive 97/23 EG (DGRL), KTA 1401 and ASME. We have our products inspected and evaluated by recognised authorities.



## Reference projects

<b>EUROPE</b>	<b>Denmark</b> Asnaesvaerket	Endsorf Hamm-Uentrup Herdecke Knapsack Köln-Niehl Lünen GKM 9 Moorburg Neurath Niederaußem	<b>Hungary</b> Gönyü Tisza	Moerdijk Rijnmond Rozenburg Swentibold	<b>Slovakia</b> Bratislava Malzenice	<b>Turkey</b> Adana Canakkale Denizli Iskenderun Kangal Mersin	<b>AMERICA</b>	<b>Chile</b> Nehuenco	Prairie State St. Francis West-Phoenix	Kusile Lethabo Majuba Matimba Matla Medupi Tutuka	Shenhua Shenton Taishan II Xingyi Xinhai Yanshanhu	<b>Indonesia</b> Belawan 1 / 2 Paiton	<b>S. Korea</b> Bugok Incheon Poryong	Sanandaj Shirvan	<b>U.A.E.</b> Al Taweelah Shuweihat
<b>Austria</b> Hallein Korneuburg Simmering Timelkam Voestalpine Linz Wien	<b>Estonia</b> Tallinn	<b>Finland</b> Haapavesi Kymn Voima Oy Kymmene Metsä Botnia OLkiluoto	<b>Italy</b> Livorno Ferrais Moncalieri Termoli	<b>Norway</b> Karstoe Sarpsborg	<b>Slovenia</b> Sostanj	<b>United Kingdom</b> Baglan Bay Bridgeport- Harbour Cottam Killingholme King's Lynn Rye House Seabank	<b>Argentina</b> Atucha Genelba Manuel Belgrano Salta	<b>Mexico</b> Naco Nogales Pemex Valladolid	<b>AFRICA</b>	<b>Algeria</b> Mers el Bejaia Mers el Hadjadj Skikda	<b>India</b> Anpara Bellary Bina Chhabra Derang Durgapur Faridabad Koderma Kothagudem Rihand Satpura Ukai Vindhyachal Vallur	<b>Japan</b> Ohi	<b>Thailand</b> Amata Bang Pakong	<b>Aserbaidshan</b> Sumgait	<b>Saudi Arabia</b> Al Khobar Shuaibah
<b>Belgium</b> Gent T-Power	<b>France</b> Chateauroux Dunkerque Richemont	<b>Greece</b> Aghios Dimitrios Atherinolakkos Kardia	<b>Ireland</b> Huntstown Poolbeg	<b>Poland</b> Belchatow Dolna Odra Patnow Pomorzany	<b>Spain</b> Arrubal Gibraltar Palos Puertollano Trillo	<b>USA</b> Allegheny Athens City of Austin Elm Road Harquahala Hines Ivanpah Solar Project Oklahoma Orion Kelson R.	<b>Brazil</b> Angra Cuiaba Norte Flumin- ense	<b>Venezuela</b> Tamara Termostulia	<b>Egypt</b> Ayon Moussa Sidi Krir	<b>Malaysia</b> Paka Pasir Guadang	<b>Pakistan</b> Guddu Kot Addu Rousch	<b>Taiwan</b> Hsinta 1 – 5 Kuo Kuang Nan Pu	<b>Israel</b> Gezer Hagit Haifa	<b>Qatar</b> Ras Laffan	
<b>Bosnia Herze- govina</b> Tuzla	<b>Germany</b> Altbach Boxberg Datteln Emsland	<b>Macedonia</b> Bitola	<b>Latvia</b> Riga TE 2 Riga	<b>Portugal</b> Pego Ribatejo Tapada	<b>Sweden</b> Halmstad Stockholm Värtan	<b>Canada</b> Bear Creek	<b>Marocco</b> Tahaddart	<b>Sudan</b> El Gaili Phase II	<b>Zimbabwe</b> Hwange	<b>ASIA</b>	<b>Philippines</b> Santa Rita	<b>Vietnam</b> Ca Mau Phu My	<b>Jordan</b> Rehab	<b>AUSTRALIA</b>	<b>Australia</b> Broadwater Condong Goro Nickel Loy Yang Perlis
<b>Bulgaria</b> Kozloduy		<b>Netherlands</b> Eemshaven Enecogen	<b>Romania</b> Braila	<b>Switzerland</b> Bern Gösgen Zürich	<b>Ukraine</b> Smijew	<b>Uzbekistan</b> Syrdarinskaja	<b>South Africa</b> Duvha Kendal Kriel	<b>China</b> Gujiao Lingang Luneng Baoqing Luneng Hequ Ninghai	<b>Singapore</b> Pulau Seraya	<b>Iran</b> Damavand Jahrom Kerman Neka	<b>Russia</b> Norijsk UFAORGSINTEZ Lukoil Chemical Novokuznet Sibirian Steel	<b>New Zealand</b> Otauhu			



Medupi 1-6 ZA



Kusile 1-6 ZA



Koziernen PL



Wilhelmshaven DE



Moorburg DE



Eemshaven DE



Westfalen DE



Rotterdam/Maasvlakte NL



Neurath Blöcke F/G DE



Lünen DE



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## Reference list

Supercritical Power Plant	MW	Country	Customer	Year	Kind of Valves	Qty
Medupi 1-6	6 x 800	RSA	Hitachi Power Europe	2008-2014	HP Bypass Stations, Reheater Safety Stations, Boiler Control Valves	436
Kusile 1-6	6 x 800	RSA	Hitachi Power Europe	2008-2014	HP Bypass Stations, Reheater Safety Stations, Boiler Control Valves	436
Kozienice	1075	PL	Hitachi Power Europe / Hitachi Japan	2013-2014	HP Bypass Stations, Reheater Safety Stations, LP Bypass Stations, Boiler Control Valves	47
Wilhelmshaven	800	DE	Hitachi Power Europe	2009-2010	Boiler Control Valves	77
Moorburg	2 x 865	DE	Hitachi Power Europe	2008-2013	Boiler Control Valves	105
Eemshaven	2 x 800	DE	Alstom / Siemens	2009-2013	LP Bypass Stations, Boiler Control Valves	104
Rotterdam/Maasvlakte	1100	NL	Hitachi Power Europe	2009-2014	Boiler Control Valves	83
Datteln	1100	DE	Hitachi Power Europe / Alstom / e-on	2008-2009	Boiler Control Valves	32
Neurath Blöcke F/G	2 x 1000	DE	Hitachi Power Europe / Alstom	2007-2012	Boiler Control Valves	48
Lünen	800	DE	IHI Japan / Siemens	2009-2010	HP Bypass Station, LP Bypass Station, Boiler Control Valves	49
Westfalen	2 x 800	DE	Alstom / Siemens	2009-2010	LP Bypass Stations, Boiler Control Valves	90



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