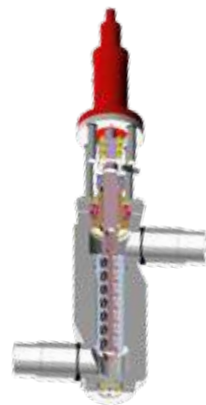


## HP Boiler Control Valves

*For Bypass Stations and Process Engineering Applications*



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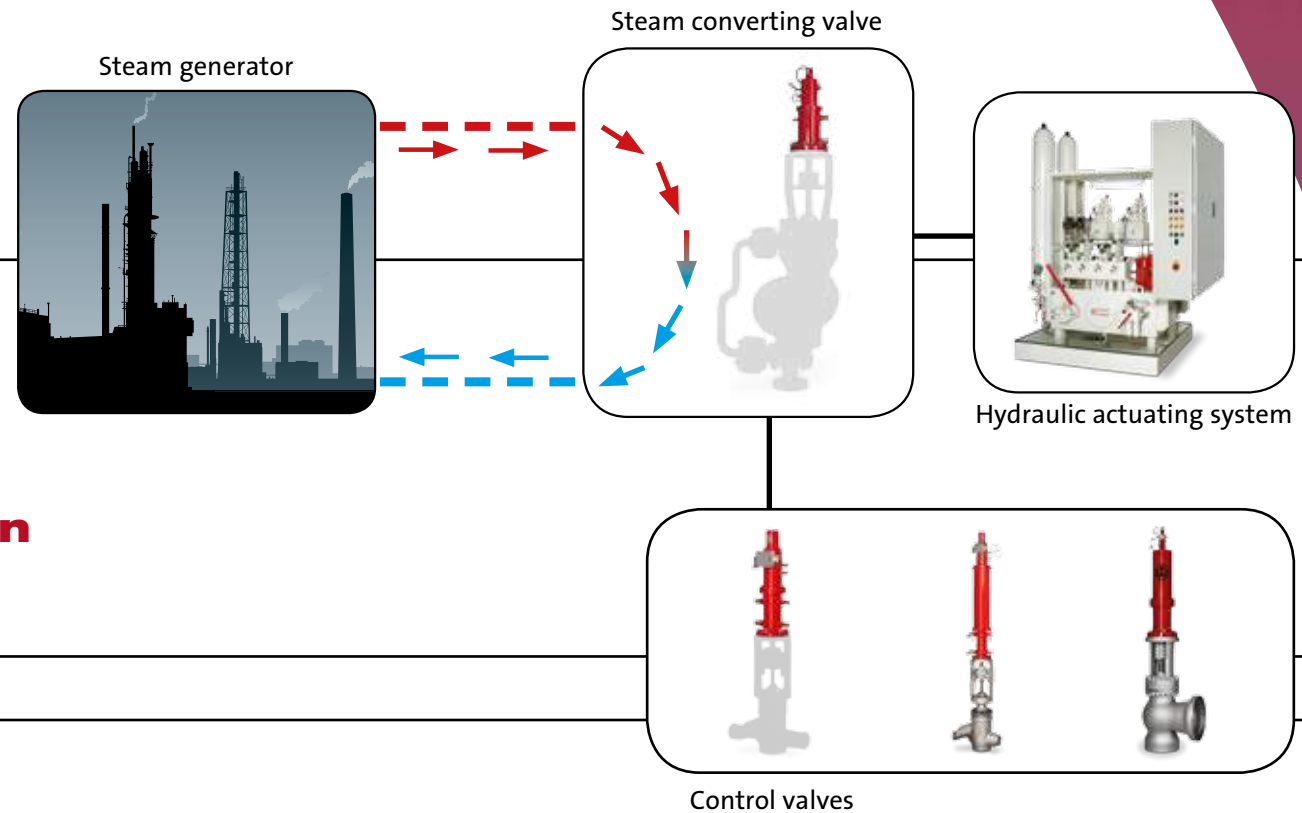
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### **Supply hub**

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

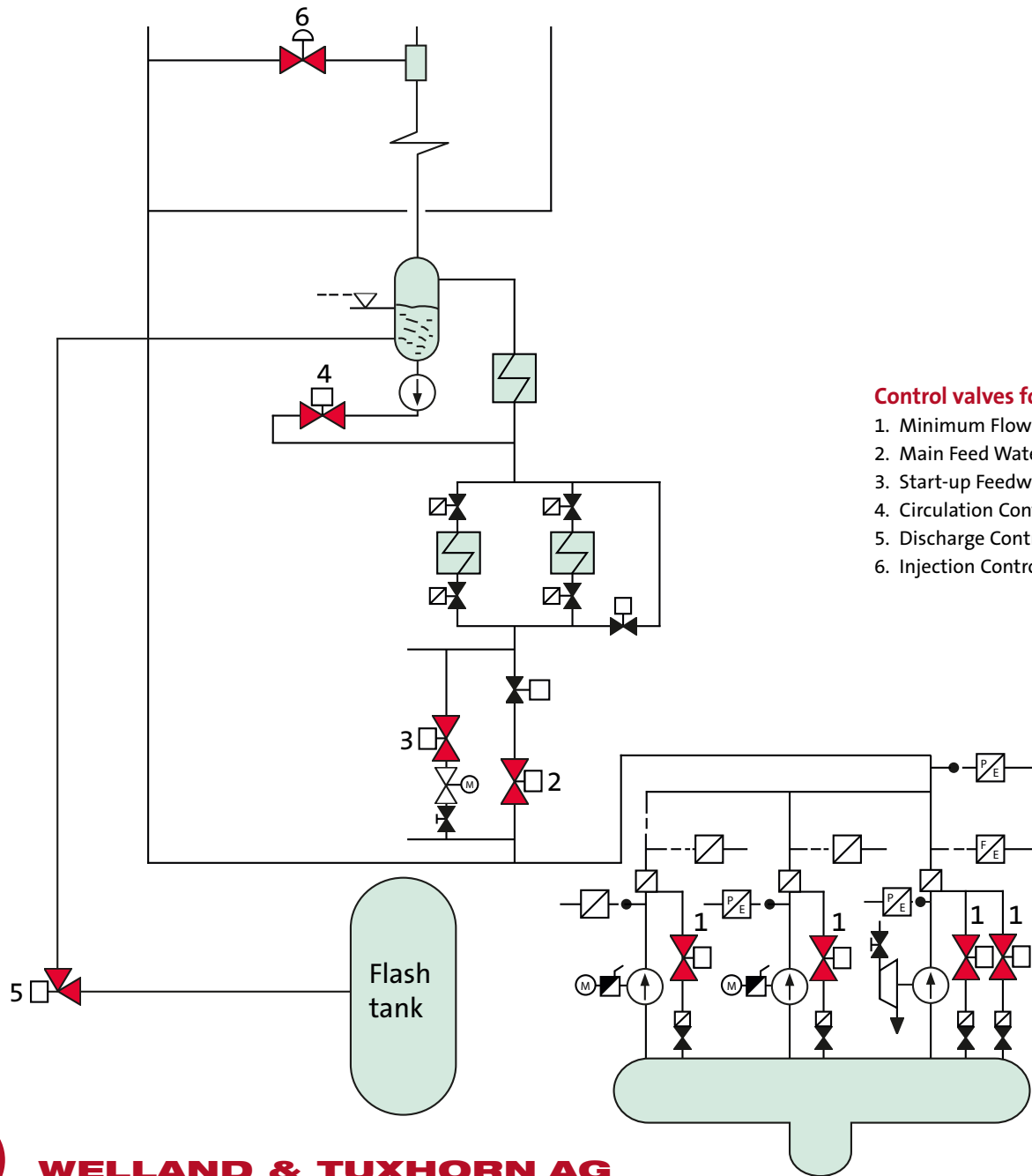
It is only when all of the diverse subcomponents have been perfectly harmonised with each other and integrated into the system that the system can realise its optimum output potential. The basis for this is precise planning.

### The whole programme

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 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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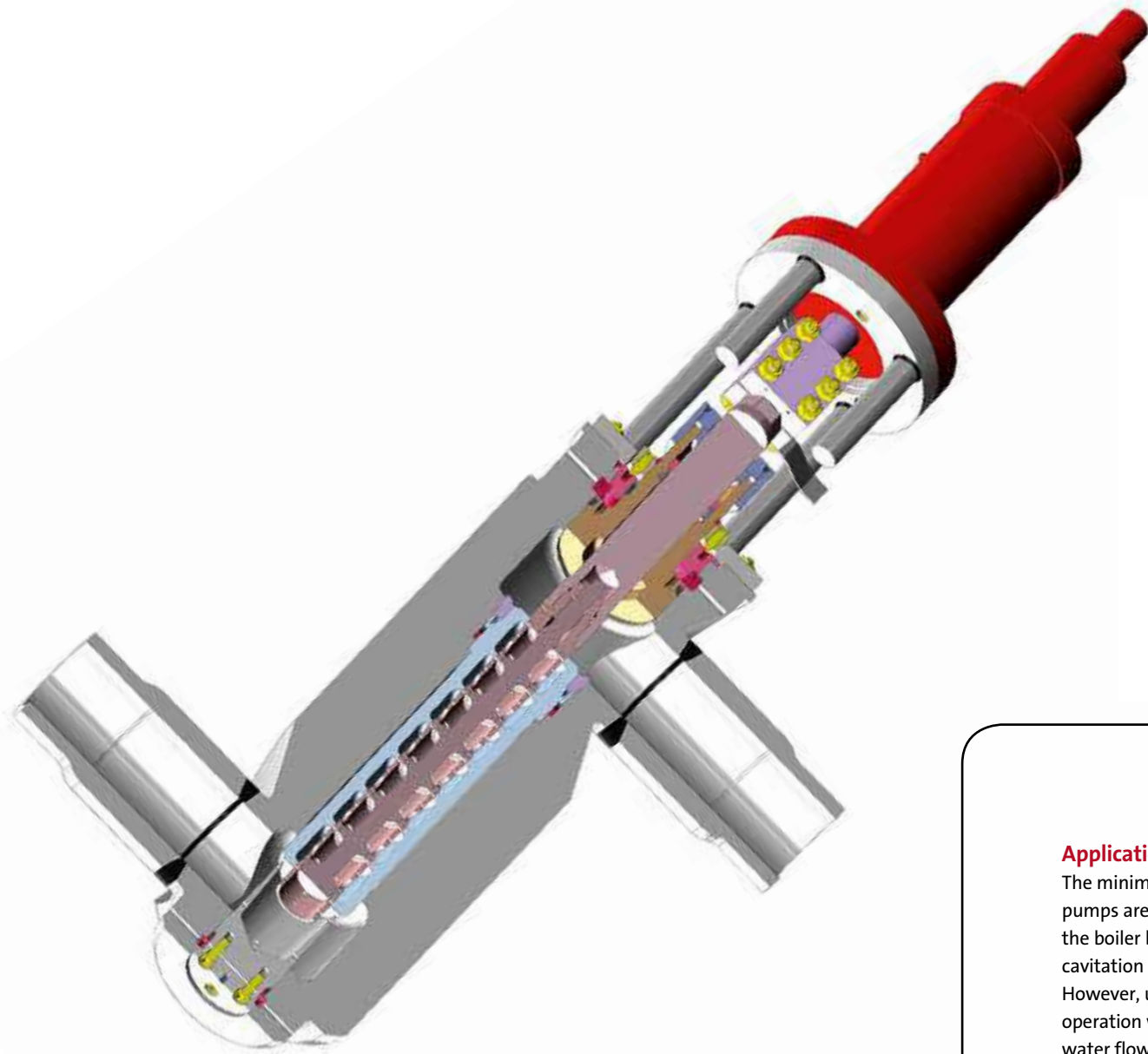
## Special Control Valves for Boiler applications



### 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.



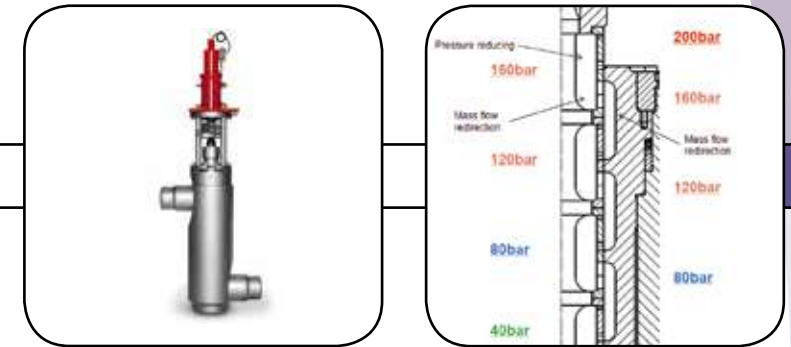
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### Application

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

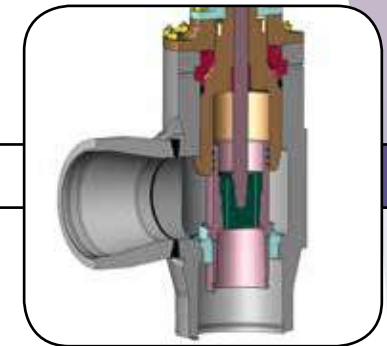
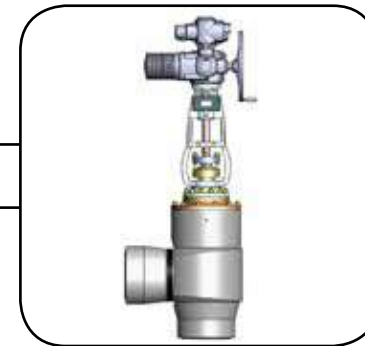
possible pressure drop. The control valves are set up to handle the entire amount of feedwater flow into the boiler. For this application the control valves are arrayed in the main feedwater line. Start-ups, shut-downs and low load operation require management of high pressure differences with a considerable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

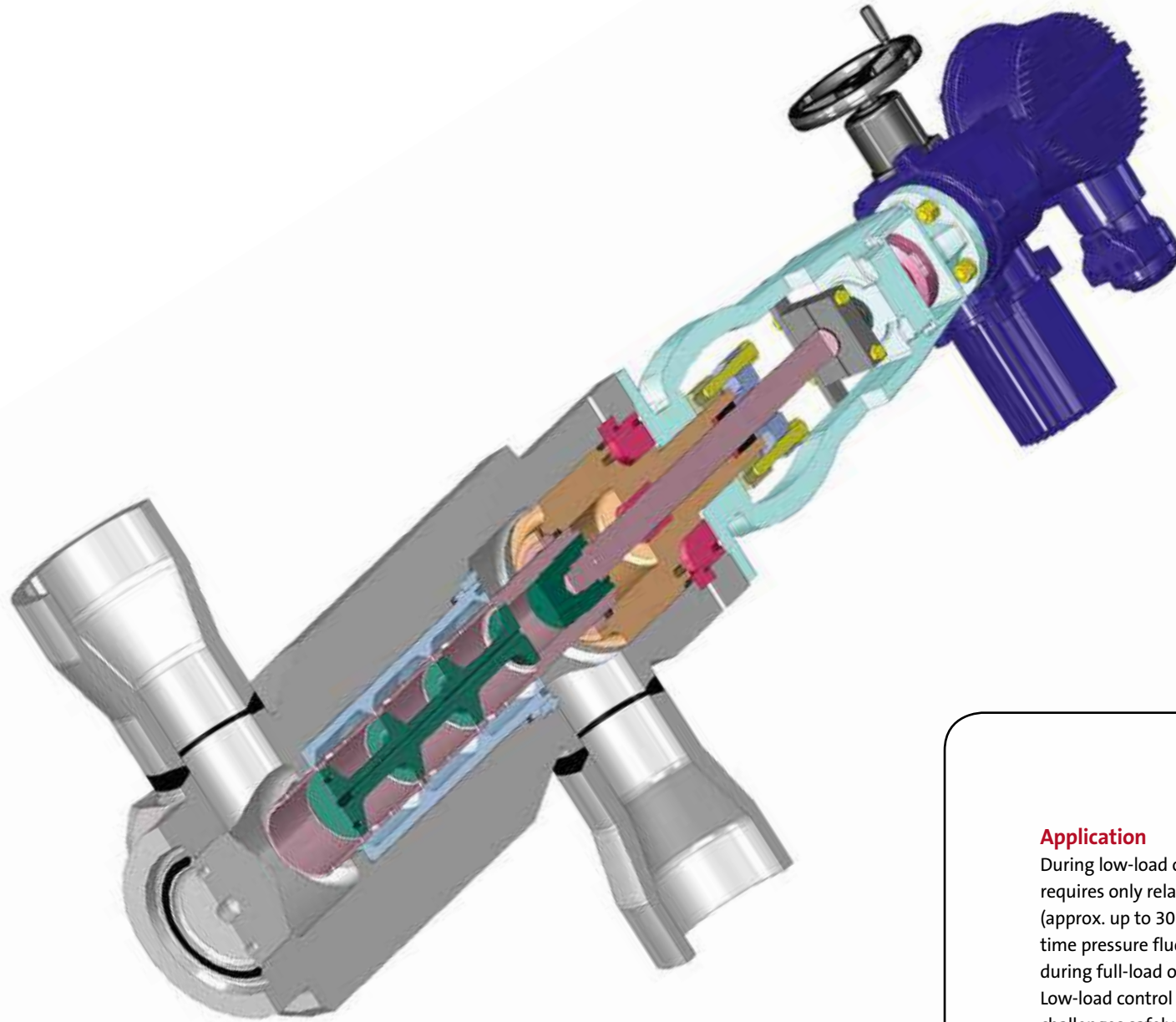
### Design

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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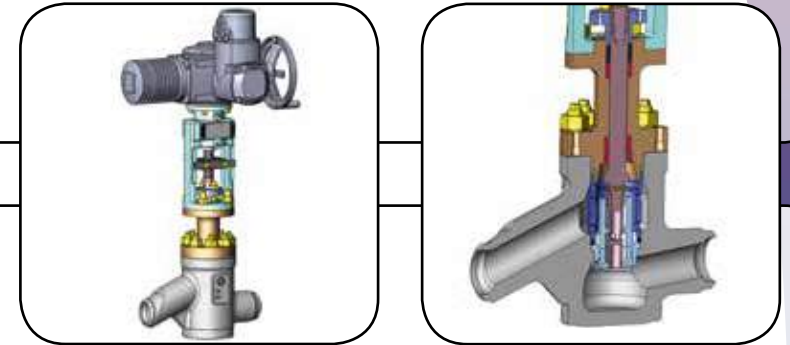
#### **Application**

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

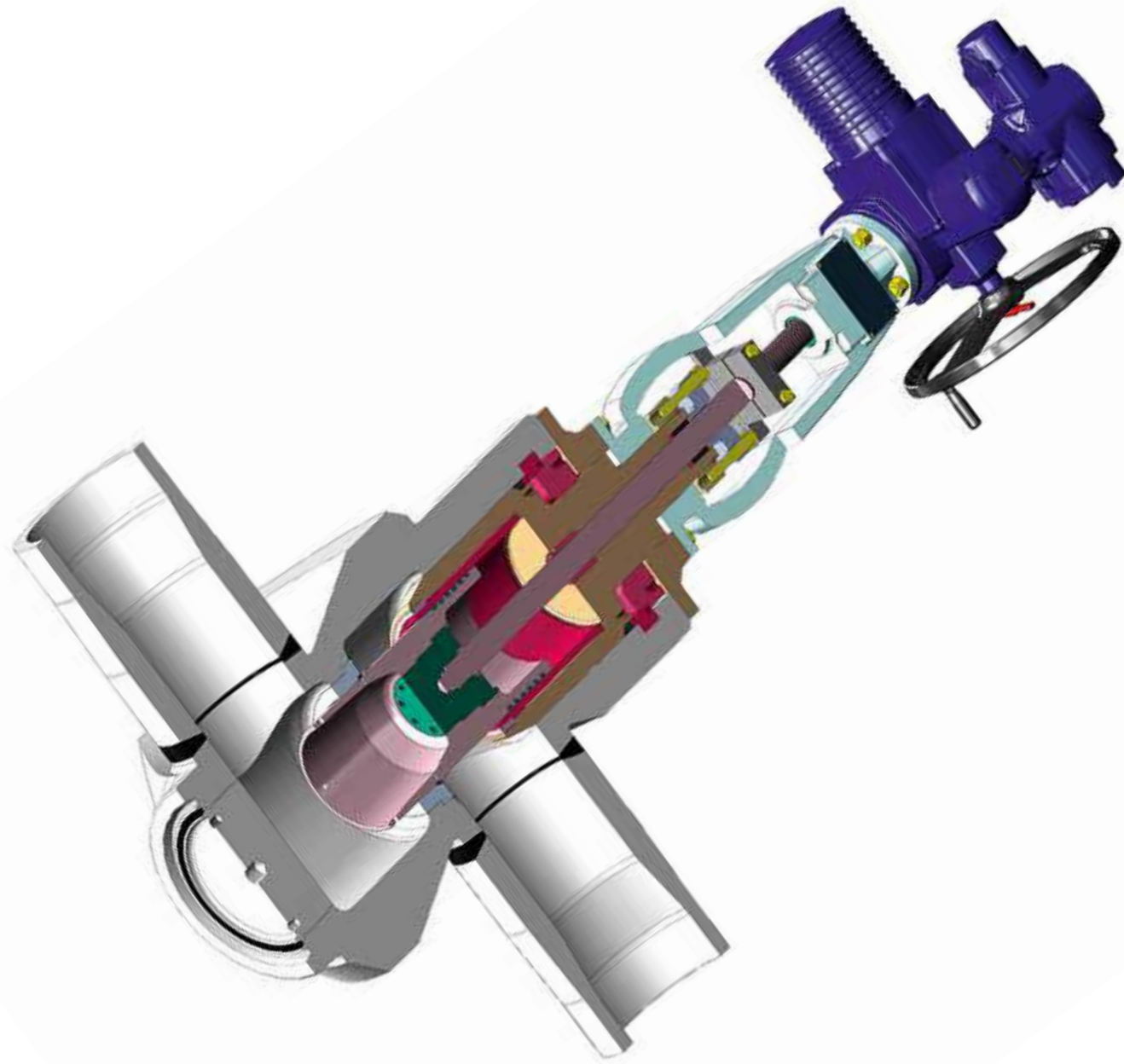


### Design

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



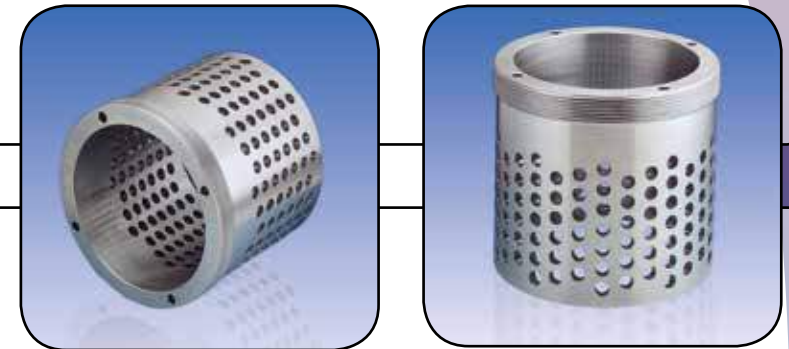
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Seat Ø mm			100-250
DN from-to	Inlet/Outlet	mm	100-400
		inch	4-16
PN up to	[bar]		630
	[lbs]		4500

## Circulation Control Valve



### Application

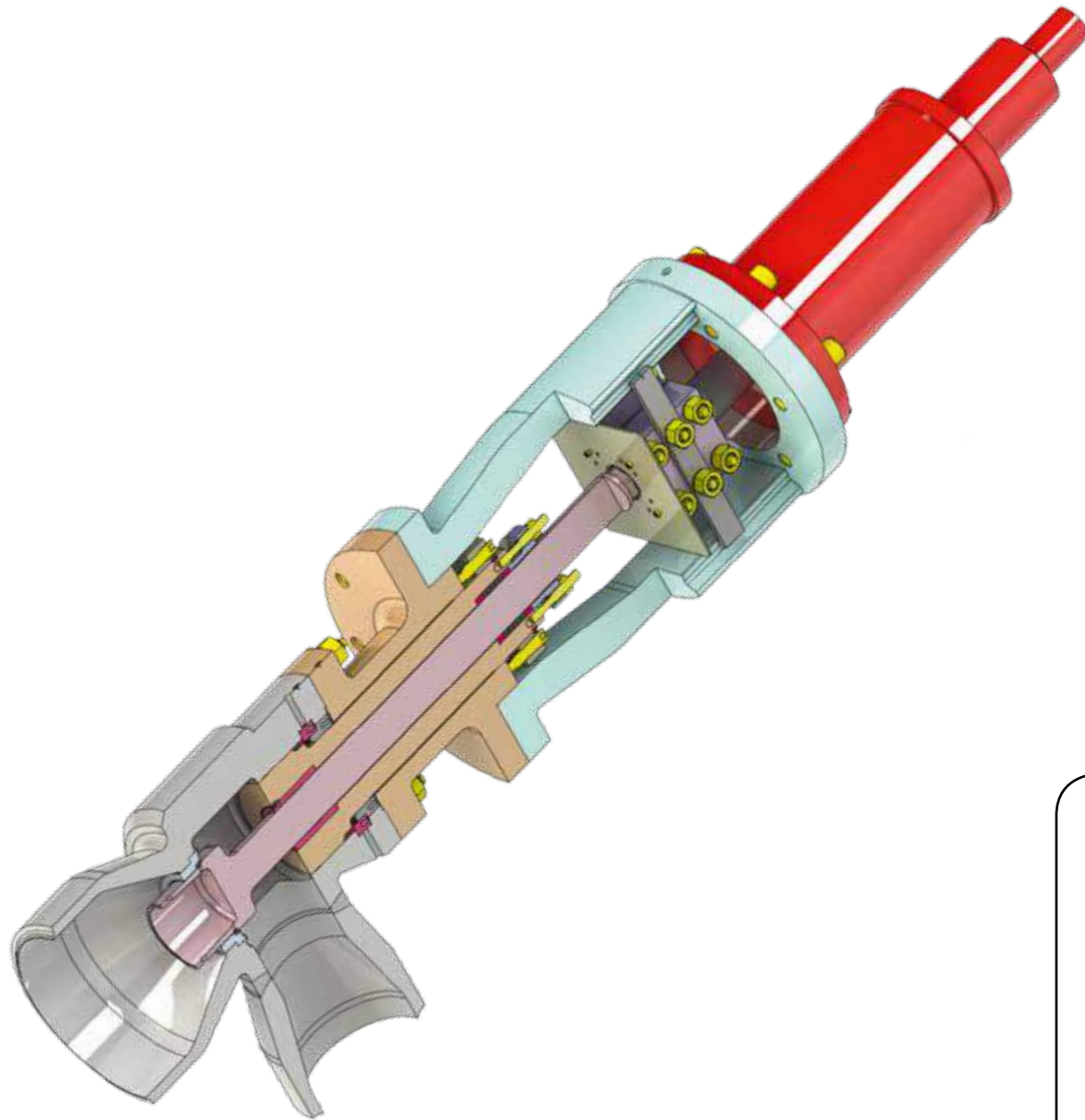
As soon as the feedwater is heated up, the level control within the separator is realized with a circulation control valve. By means of a pump in combination with a circulation control valve boiling water is reintroduced into the circuit in front of the evaporator.

### 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



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#### **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.

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

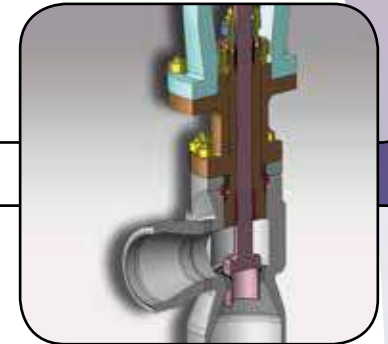
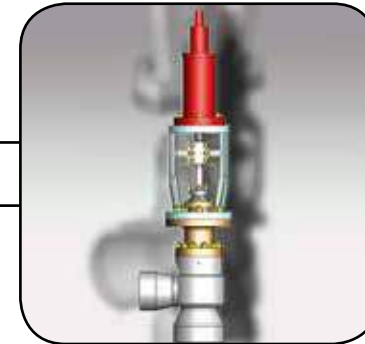
Forged bodies in angled shape with welded connections fulfilling DIN, ANSI or other standards.

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.

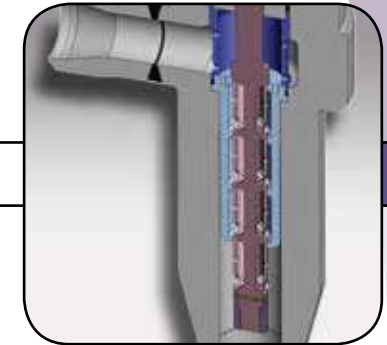
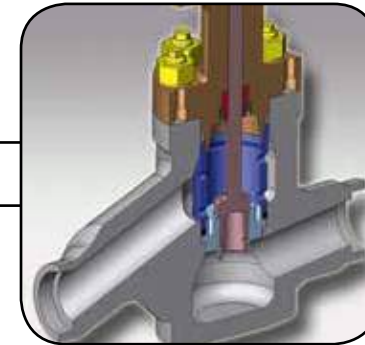
When used in boiler applications, the injection control valves are in constant operation.



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.





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### **Our service**

We accentuate service, because commissioning the system for operation and regular servicing are matters for the experts. The technicians at Welland & Tuxhorn are constantly on call for service assignments and they travel the world in the process. They take care of any maintenance tasks required in close cooperation with the machine operators, reliably and within the agreed time.

Maintenance on Welland & Tuxhorn hydraulic systems must be performed by experts to ensure the valves and control system continue to function and work in sync.





## **Our Service for You**

*Installation, maintenance and repair by the manufacturer*

### **On-site maintenance – a job for the professionals**

The company's own service organisation, with its trained and highly specialised staff, makes inspections and maintenance possible worldwide and thereby guarantees optimum support for the customer:

- We commission the system for operation
- We take care of the maintenance on your system
- We plan enhancements for your system in accordance with the newest technological innovations
- We react quickly and reliably when spare parts are required
- We carry out annual re-checks

### **Maintenance at the plant**

Our maintenance department is incorporated into the production plant. We test all parts for suitability for further use, and repair them expertly.





## Cooperating to Achieve Our Goals

*Fine-tuning in all areas*

Single-unit and limited-lot production requires up-to-date technology and highly-qualified personnel. Our customer-friendly service, consistent with theory and practice, is based on working closely together with planners and operators, and research projects at renowned technical colleges and institutes, and is the result of decades of experience worldwide. Innovative solutions are developed by our experienced employees, and in cooperation with universities and scientific institutions. Thus

the high technological standard at Welland & Tuxhorn is continually improved. Welland & Tuxhorn guarantees the best possible consultancy, expert knowledge and ideas, system-specific solutions, first-class raw materials, know-how, expertise and commitment from a highly-motivated team. An experienced team of trained and highly-specialised service personnel is continually at work all over the world, cooperating closely with the operating companies, in carrying out commissioning tasks, required inspections



and maintenance work. This ensures the best possible customer support. Our maintenance department inspects the parts and fittings to check whether they are still fit for use and maintains them expertly, thereby gathering new information that is integrated into the design and material technology areas.

Individual situations require expertly tailored solutions. We provide you with expert support for complex tasks. Talk to our engineers and technicians and find the solution that is best for you!





Actuator coupling



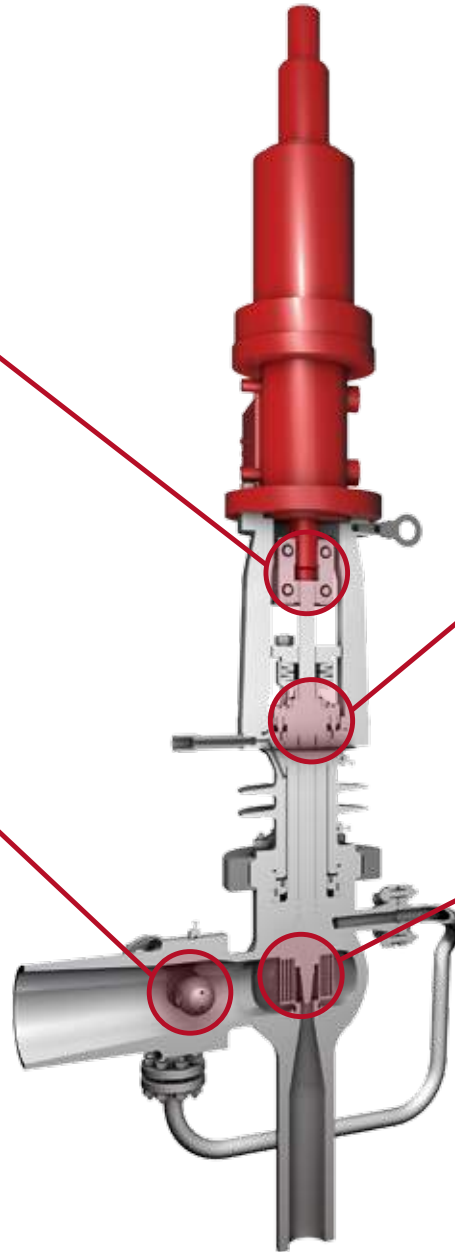
Cooling spacer with stuffing box



Integrated cooling water injection / motive steam assistance



Valve stem and 5-stages control/throttle element



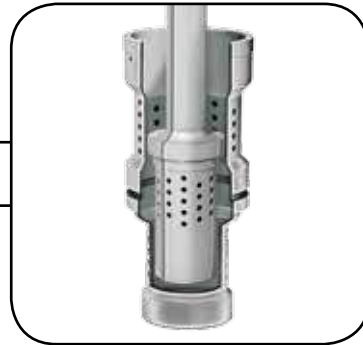
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## Designing the future

Research project 725 °C

### Improved CO<sub>2</sub> balance

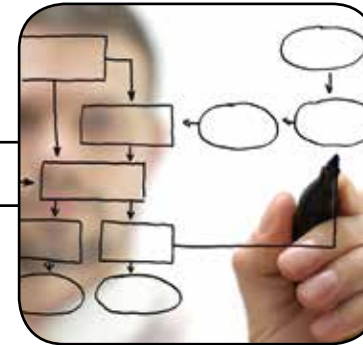
Since 2008 we have been running a research project together with other manufacturers, with the aim of increasing power plant efficiency. CO<sub>2</sub> emissions can be decreased, making an important contribution towards protecting the environment.



### 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





Ivanpah - Plant of the year 2014

## Our Contribution to Climate Protection

*Environmentally-conscious products for the future*

### Our contribution

Using resources sparingly is our sustainable contribution to climate and environmental protection.

Our high development and quality standards also apply to protecting nature and society. Already in the design phase of our operating processes we ensure that energy and fresh water consumption is kept as low as possible. Precise planning, forward-thinking organisation and detailed fine-tuning ensure that all processes from the development to the actual product are checked and opti-

mised with regard to ecological saving potential. From products which boost efficiency for high-efficiency power plants to solar thermal systems, we are assuming responsibility for the climate. And we are investing in high-temperature research and CO<sub>2</sub> minimisation for the benefit of the coming generation. And with our products we make a contribution to meeting the increasing worldwide energy requirement in an efficient, ecological and socially acceptable way.

**Since time immemorial:** Less consumption means more for everyone.



Certificate Water Resources Law





WELLAND & TUXHORN AG



## Made In Germany

*You will get a top product made by German valve engineering industry*

### Our philosophy

A high level of precision, processing quality and durability have distinguished the development and production processes at Welland & Tuxhorn for over 100 years. Continuously working together with renowned power station planners and operators and with technical and scientific institutes, we have gathered theoretical and practical experience and applied this to consistently optimise our products. The proof is in our success - special regulating valves from Welland & Tuxhorn are operating all over the world!

### 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, (DIN EN ISO 6126 Part 1), ASME, ANSI, IBR and RTN as well as PED. Our quality assurance system is approved by the following regulations: DIN EN ISO 9001:2000, Directive 97/23 EG (PED), KTA 1401 and ASME. We have our products inspected and evaluated by recognised authorities.

### Our service

After a product is delivered, an experienced team of service technicians is available for consultation during the start-up phase, or to carry out routine inspection work. Maintenance is integrated into our production process. Inspections as to continued usability and expert maintenance in the light of the latest expertise in material technology and design, are carried out by our highly qualified personnel.

**Contact us – our engineers and technicians will provide you with individual and expert advice.**







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





## **And Finally**

*We look forward to working with you*



### **Contact us**

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