A-T®

ARMATUREN-TECHNIK GMBH

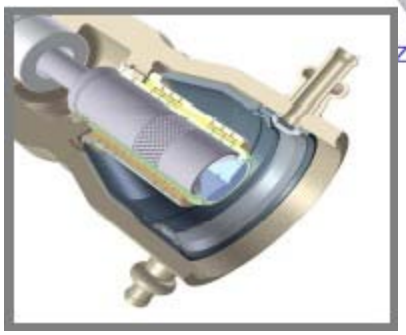
TURBINE BYPASS SYSTEM

㈜World Eng & T

WORLD ENGINEERING CORPORATION

서울시 강서구 화곡동 1114-32 2층
TEL 02-2694-4126 FAX 02-2695-4003
www.world-valves.co.kr

- Company name : A-T ARMATUREN-TECHNIK GMBH
- Date of establishment : 1995
- Business area : Valve manufacturer
  - Turbine Bypass System
- Website : http://www.at-armaturen.com
  sales@at-armaturen.com
- Main office : Duisburger Str. 375 46049 Oberhausen GERMANY
  TEL 49 208 833 1700
  FAX 49 208 833 1755



A-T ® A-T ARMATUREN-TECHNIK GMBH

Absperr-Armaturen, Regelventile, Turbinen-Umleitsysteme für Kraftwerkstechnik, Öl und Gas Pipelines
Isolating, control valves and turbine bypass systems for the electric power industry, oil and gas pipelines

A - T ARMATUREN - TECHNIK GMBH •
Duisburger Strasse 375 • 46049 Oberhausen

TO WHOM IT MAY CONCERN

Oberhausen, 24th February 2012

AUTHORISATION
(valid until cancelled)

Dear Sir or Madam,

We, A-T ARMATUREN-TECHNIK GMBH, are authorising WENGNT Co. Ltd. to act like our counterpart and agent for our products in Korea.

World Engineering is authorised therefore to present our offer on our behalf.

Yours faithfully,
A-T ARMATUREN-TECHNIK GMBH

M. Leufgen
(General Manager)

A-T ARMATUREN-TECHNIK GMBH
Duisburger Straße 375 Babcock T-Bldg.
46049 Oberhausen / Germany

Tel.: +49 208 833 1700
Fax: +49 208 833 1755

E-Mail: sales@at-armaturen.com
Web: www.at-armaturen.com

Geschäftsführung: Manfred Leufgen
Handelsregister Duisburg
8 HRB 12842

Ust.-ID Nr. DE 811 850 770

Finanzamt Oberhausen-Süd
Steuernummer : 124/5700/1400

Bankverbindungen:
Stadtsparkasse Oberhausen
Kto.-Nr.: 53208443 BLZ: 365 500 00
SWIFT Code: WELADED1OBH (O=letter) IBAN: DE16365500000053208443
Stadtsparkasse Düsseldorf
Kto.-Nr.: 1005949159 BLZ: 300 501 10
SWIFT Code: DUSSDEDDXXX IBAN: DE61300501101005949159
Commerzbank AG
Kto.-Nr.: 40 06 615 BLZ: 365 400 46
SWIFT Code: COBADEFF 365 IBAN: DE97365400460400661500 5
Hypo- und Vereinsbank AG
Kto.-Nr.: 363738877 BLZ: 360 201 86
SWIFT Code: HYVEDEMM360 IBAN: DE77360201860363738877
Deutsche Bank AG
Kto.-Nr.: 515160000 BLZ: 365 700 49
SWIFT Code: DEUTDEDE365 IBAN: DE3236570049 0515160000

A-T ARMATUREN-TECHNIK GMBH

Absperr-Armaturen, Regelventile, Turbinen-Umleitsysteme für Kraftwerkstechnik, Öl und Gas Pipelines
Isolating, control valves and turbine bypass systems for the electric power industry, oil and gas pipelines

A - T ARMATUREN - TECHNIK GMBH •
Duisburger Strasse 375 • 46049 Oberhausen

TO WHOM IT MAY CONCERN

Oberhausen, 22nd February 2012

Dear Sir or Madam,

We herewith confirm warranty period of 5 years after EXW delivery for valves manufactured by A-T ARMATUREN-TECHNIK GMBH.

Best regards,

A-T ARMATUREN-TECHNIK GMBH

A-T ARMATUREN-TECHNIK GMBH Duisburger Str. 375 46049 Oberhausen Tel.: +49 208/833-1700 · Fax +49 208/833-1755

Manfred Leufgen

A-T ARMATUREN-TECHNIK GMBH
Duisburger Straße 375 Babcock T-Bldg.
46049 Oberhausen / Germany

Tel.: +49 208 833 1700
Fax: +49 208 833 1755

E-Mail: sales@at-armaturen.com
Web: www.at-armaturen.com

Geschäftsführung: Manfred Leufgen
Handelsregister Duisburg
8 HRB 12842

Ust.-ID Nr. DE 811 850 770

Finanzamt Oberhausen-Süd
Steuernummer : 124/5700/1400

Bankverbindungen:
Stadtsparkasse Oberhausen
Kto.-Nr.: 53208443 BLZ: 365 500 00
SWIFT Code: WELADED1OBH IBAN: DE16365500000053208443
(O=letter)
Stadtsparkasse Düsseldorf
Kto.-Nr.: 1005949159 BLZ: 300 501 10
SWIFT Code: DUSSDEDDXXX IBAN: DE61300501101005949159
Commerzbank AG
Kto.-Nr.: 40 06 615 BLZ: 365 400 46
SWIFT Code: COBADEFF 365 IBAN: DE97365400460400661500 5
Hypo- und Vereinsbank AG
Kto.-Nr.: 363738877 BLZ: 360 201 86
SWIFT Code: HYVEDEMM360 IBAN: DE77360201860363738877
Deutsche Bank AG
Kto.-Nr.: 515160000 BLZ: 365 700 49
SWIFT Code: DEUTDEDE365 IBAN: DE3236570049 0515160000

A-T ARMATUREN-TECHNIK GMBH

Absperr-Armaturen, Regelventile, Turbinen-Umleitsysteme für Kraftwerkstechnik, Öl und Gas Pipelines
Isolating, control valves and turbine bypass systems for the electric power industry, oil and gas pipelines

A - T ARMATUREN - TECHNIK GMBH •
Duisburger Strasse 375 • 46049 Oberhausen

TO WHOM IT MAY CONCERN

Oberhausen, 22nd February 2011

Dear Sir or Madam,

The undersigned herewith certifies that an operation time of at least 25 years is possible with valves manufactured by A-T ARMATUREN-TECHNIK GMBH.

We also guarantee for after-sales services (which include maintenance and delivery of spare parts) for 25 years after date of contract.

For further information please do not hesitate to contact us.

Best regards,

A-T ARMATUREN-TECHNIK GMBH

Manfred Leufgen
General Manager

A-T ARMATUREN-TECHNIK GMBH
Duisburger Straße 375 Babcock T-Bldg.
46049 Oberhausen / Germany

Tel.: +49 208 833 1700
Fax: +49 208 833 1755

E-Mail: sales@at-armaturen.com
Web: www.at-armaturen.com

Geschäftsführung: Manfred Leufgen
Handelsregister Duisburg
8 HRB 12842

Ust.-ID Nr. DE 811 850 770

Finanzamt Oberhausen-Süd
Steuernummer : 124/5700/1400

Bankverbindungen:
Stadtsparkasse Oberhausen
Kto.-Nr.: 53208443 BLZ: 365 500 00
SWIFT Code: WELADED1OBH IBAN: DE16365500000053208443
(O=letter)
Stadtsparkasse Düsseldorf
Kto.-Nr.: 1005949159 BLZ: 300 501 10
SWIFT Code: DUSSDEDDXXX IBAN: DE61300501101005949159
Commerzbank AG
Kto.-Nr.: 40 06 615 BLZ: 365 400 46
SWIFT Code: COBADEFF 365 IBAN: DE97365400460400661500 5
Hypo- und Vereinsbank AG
Kto.-Nr.: 363738877 BLZ: 360 201 86
SWIFT Code: HYVEDEMM360 IBAN: DE77360201860363738877
Deutsche Bank AG
Kto.-Nr.: 515160000 BLZ: 365 700 49
SWIFT Code: DEUTDEDE365 IBAN: DE3236570049 0515160000

A-T ARMATUREN-TECHNIK GMBH

Absperr-Armaturen, Regelventile, Turbinen-Umleitsysteme für Kraftwerkstechnik, Öl und Gas Pipelines
Isolating, control valves and turbine bypass systems for the electric power industry, oil and gas pipelines

A - T ARMATUREN - TECHNIK GMBH •
Duisburger Strasse 375 • 46049 Oberhausen

TO WHOM IT MAY CONCERN

Oberhausen, 22nd February 2012

AUTHORISATION

(valid until cancelled)

Dear Sir or Madam,

We, A-T ARMATUREN-TECHNIK GMBH, are authorising World Engineering Corporation to act like our counterpart and agent for our products in Korea.

World Engineering is authorised therefore to present our offer on our behalf.

Yours faithfully,

A-T ARMATUREN-TECHNIK GMBH

A-T ARMATUREN-TECHNIK GMBH
Duisburger Str. 375
46049 Oberhausen

M. Leufgen
(General Manager)

A-T ARMATUREN-TECHNIK GMBH
Duisburger Straße 375 Babcock T-Bldg.
46049 Oberhausen / Germany

Tel.: +49 208 833 1700
Fax: +49 208 833 1755

E-Mail: sales@at-armaturen.com
Web: www.at-armaturen.com

Geschäftsführung: Manfred Leufgen
Handelsregister Duisburg
8 HRB 12842

Ust.-ID Nr. DE 811 850 770

Finanzamt Oberhausen-Süd
Steuernummer : 124/5700/1400

Bankverbindungen:
Stadtsparkasse Oberhausen
Kto.-Nr.: 53208443 BLZ: 365 500 00
SWIFT Code: WELADED1OBH IBAN: DE16365500000053208443
(O=letter)
Stadtsparkasse Düsseldorf
Kto.-Nr.: 1005949159 BLZ: 300 501 10
SWIFT Code: DUSSDEDDXXX IBAN: DE61300501101005949159
Commerzbank AG
Kto.-Nr.: 40 06 615 BLZ: 365 400 46
SWIFT Code: COBADEFF 365 IBAN: DE97365400460400661500 5
Hypo- und Vereinsbank AG
Kto.-Nr.: 363738877 BLZ: 360 201 86
SWIFT Code: HYVEDEMM360 IBAN: DE77360201860363738877
Deutsche Bank AG
Kto.-Nr.: 515160000 BLZ: 365 700 49
SWIFT Code: DEUTDEDE365 IBAN: DE3236570049 0515160000

Content

1. Turbine Bypass Systems

A-T ARMATUREN-TECHNIKs typical Turbine Bypass system indudes the Turbine Bypass Valve (Steam Condftioning Valve) Type DZE as well as a Spraywater Control Valve Type ESV. Its main job comprises to route steam from the main steam line to the cold reheat line or from the hot reheat line to the condenser respectively in the following cases occurring:

a) During start up of Boiler (cold-, hot-, superheated start up):
The Steam Condilioning Valve keeps the permissible pressure and temperature aiteration velocity inside the boiler keeps up the steam pressure as well as reduces it to a minimum during a cold start up.

b) During start up of turbine:
The Steam Condilioning Valve regulates the steam transfer to the turbine. By opening of the Turbine Inlet Valves, the orifice cross section of the main valve will be closed.

c) During normal operation:
The Steam Conditioning Valve dissipates the excess steam in case of abrupt dedine in output and also absorbs pressure peaks.

d) During breakdown:
The Steam Condilioning Valve ensures that the steam pressure inside the boiler as well as inside the main steam line does not exceed the maximum permissible value. Therefore the valve is able to dissipate the complete amount of steam generated by the boiler to the reheat line or to the condenser respectively.

2. Scope of delivery for typical power plants

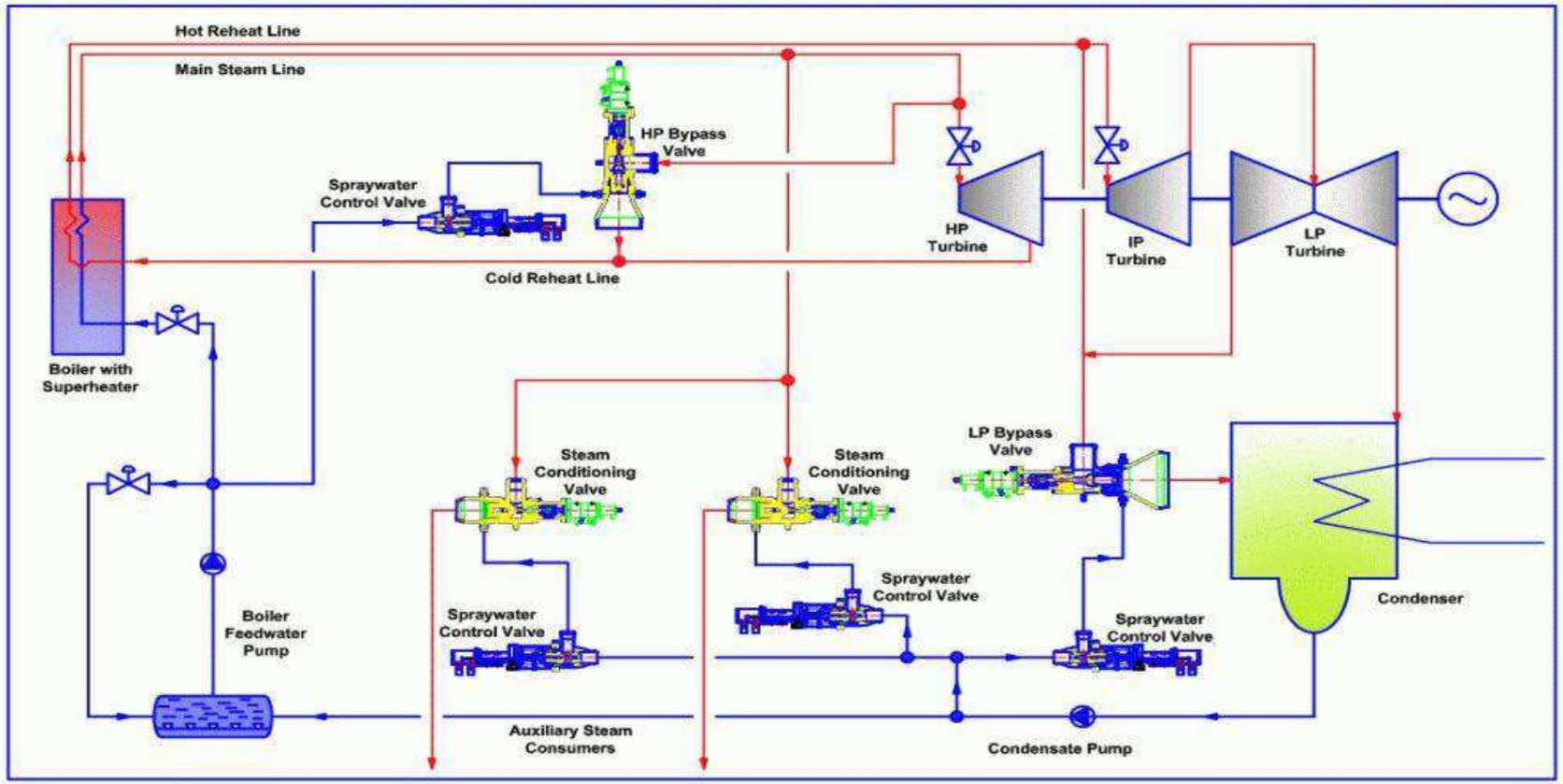


Figure 1: Illustration of bypass systems

3. Typical Shapes

Steam Conditioning Valves Type DZE

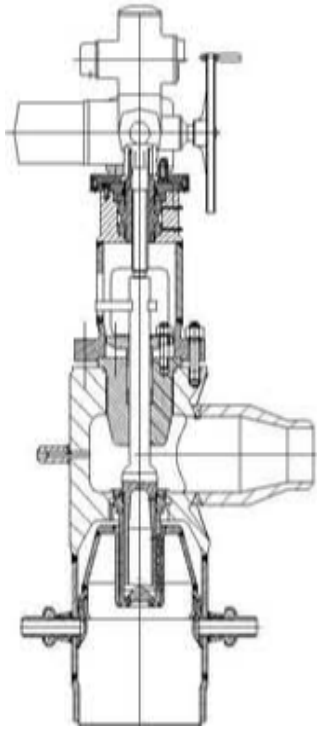


Figure 2: DZE with angle-type casing shape

Spray Water Control Valves Type ESV

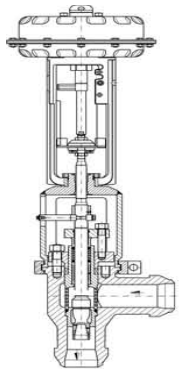


Figure 3: Spraywater valve with angle-type casing shape

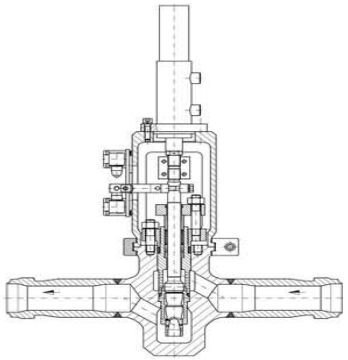


Figure 4: Spraywater valve with straight-type casing shape

4.1 Steam Conditioning Valve type DZE - Overview

- Are custom designed
- Require little space
- Reduce the initial cost
- Have a low noise level
- Are approved by important approval organizations:
  - European Community: CE-marking acc. to Pressure Equipment Directive (PED) 97/23/EC
  - Germany: TÜV approval acc. to PED, AD 2000-Merkblatt A2 and AD — Merkblatt HPO as well as TRD 201

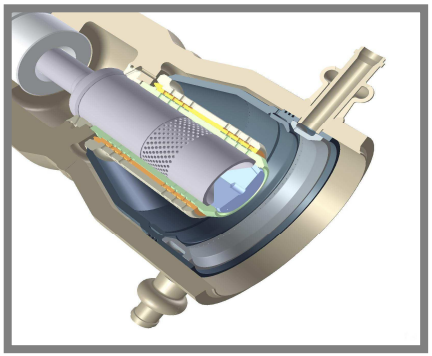


Figure 5: Isometric view of a steam conditioning valve

4.2 Steam Conditioning Valve type DZE

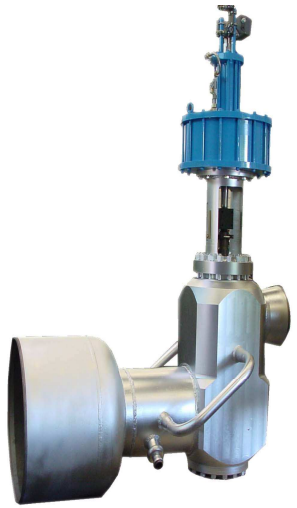
Application

The steam conditioning valve Type DZE represents the essential part of any turbine bypass system whose primary job is steam conditioning. Its design is suitable for any available steam condition at the highest operating values to the lowest initial ones. Therefore the steam conditioning valve is attractive for power stations, steam distribution mains in the chemical industry, paper mills and sugar factories etc. .

Design & Operation

The steam conditioning valve combines two functions in one: high-pressure throttling integrated with desuperheating.
Its design is based on a combination of high-speed water injection into a high-velocity steam flow. The injection occurs outside the body — the motive steam atomizes the spraywater immediately after the injection. The spray pattem is within the outlet to provide an even temperature distribution at all flow conditions.

The throttling is effected by a mutti-stage expansion which guarantees low sound emission and vibration.



Valve of angle type
pneumatic operated

4.3 Sound emission and reduction measures

During the pressure reduction in a valve, a pari: of the energy of the process medium is converted into sound energy and radiates both from the valve itself, but also primarily from the pipe system. Guidelines as well as health and safety at work legislation are pushing towards quiet valve solutions; sound level requirements of 70 to 75 dB(A) are not unusual.

The increasing demand for lower sound emissions from process plants often come up against not only economic boundaries but also technical limitations. Low-noise valves require not only more complex inner parts, but often also a longer body. This is refiected in significantly higher costs. Extreme levels of sound emission are always also an expression of mechanical stress. Whenever considering sound emission it must always be come in mind that the sound is in fact generated in the valve, the sound radiation actually emanates from the downstream pipe system.

With reference to sound generation, a differentiation must be made here between incompressible and compressible media.

For gases or vapours the main cause of sound emission is, for subcritical expansion, the partial conversion of energy into sound energy. Due to the significantiy higher flow velocities compared with liquids, the sound level increases sharply with rising pressure difference. Even for relatively small valves, it can already lie above permissible limits and cause impairments to health. If the pressure ratio across the control valve exceeds the XT value, shock waves are the main cause of sound emission in the expansion zone.

4.4 Primary Reduction Measures

In gaseous flows, a reduction of the level of sound generation is achieved by distributing the throttling area into many smaller individual flow passages (perforated cage). In this manner, the sound-generating source is divided into many individual sound sources. On account of the lower extent of the turbulent zone and the higher frequency range, these generate in total a lower noise level in the A-weighted sound spectrum relevant to human hearing.
The second effective measure is the distribution of the throttling process into a number of stages. In this manner, a lowering of the flow velocities, which are causally responsible for the sound generation, is achieved in the individual throttling stages.

The sum of the individual sound levels adds up to a significantly lower overall level in comparison with the single-stage throttling process. In particular, if cavitation and supertritical expansion are present, distribution of the throttling process is always to be considered as a primary measure. In spite of their "open" flow areas, perforated cages also have an encapsulating effect on the sound generated by the upstream stages and thus act furlher to reduce sound levels.

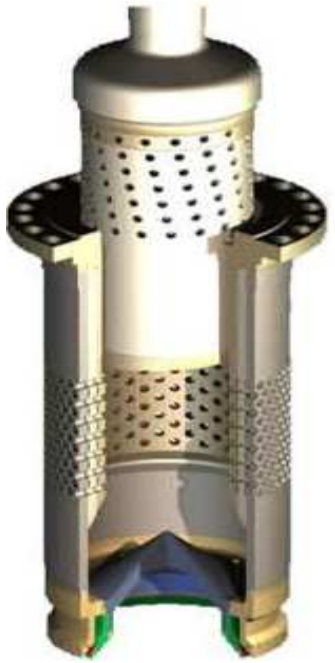


Figure 6: Perforated plug
with peforated cage

4.5 Secondary Sound Reduction

Secondary sound reduction measures are concemed not with sound gemeration but rather sound radiation. For this purpose are mainly downstream sound dampers used.

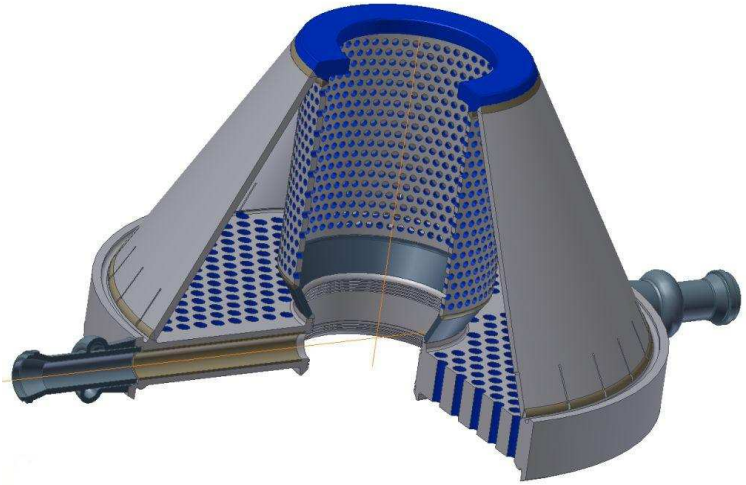
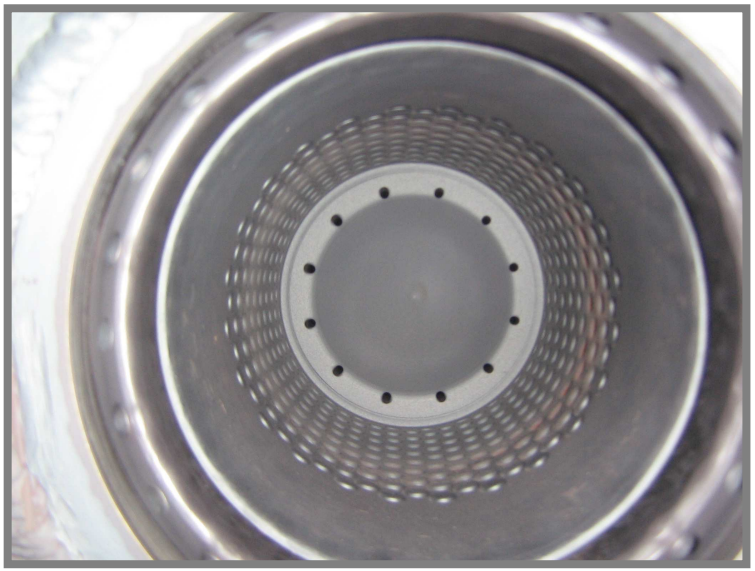


Figure 7: Isometric view of a silencer



Inspection of a A-T silencer after 18 years of operation

Since the sound radiation of the acoustic energy generated in a control valve occurs over a very long lenght of pipe, extending sometimes more than an hundred meters, the introduction of secondary sound reduction means is resource intensive and should therfore always be considered as an additional measure only.

5.1 Spraywater Control Valve type ESV - Overview

- Are custom designed
- Are low maintenance
- Have easy-to-service-seat / trim
- Have a short delivery period
- Are approved by important approval organizations:

  - European Community: CE-marking acc. to Pressure Equipment Directive (PED) 97/23/EC
  - Gerrnany: TÜV approval acc. to PED, AD 2000-Merkblatt A2 and AD — Merkblatt HPO as well as TRD 201, TRD 421

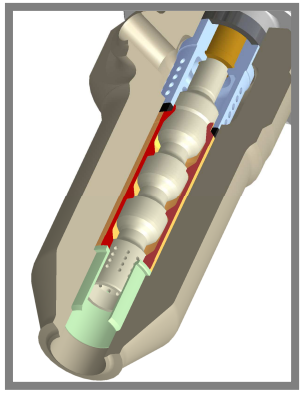


Figure 8: Isometric view of an angle-type spraywater control valve

5.2 Spraywater Control Valve type ESV

Application

Spraywater control valve Type ESV perceives itseif as final control element to provide service spraywater to the steam conditioning valve for steam temperature control. Its design is based on the operating values of the steam conditioning valve to ensure a consistent and reliable operation.

Design

Spraywater control valve Type ESV is designed for all severe service spraywater applications. Its basic design is characterized by:

- solid and die-forged body
- wear resistant seat and plug
- low-friction stem sealing
- static double sealing via seat and stern seal
- perforated cylinder

The design of the control elements can be single-stage as well as multi-stage, depending on the given operating values.

In case of impurities in the service spraywater, the inner trim will be protected against coarse particles by the perforated cylinder. If the medium also contains fine particles, we prefer to precede a strainer.

Valve of angle type pneumatic operated

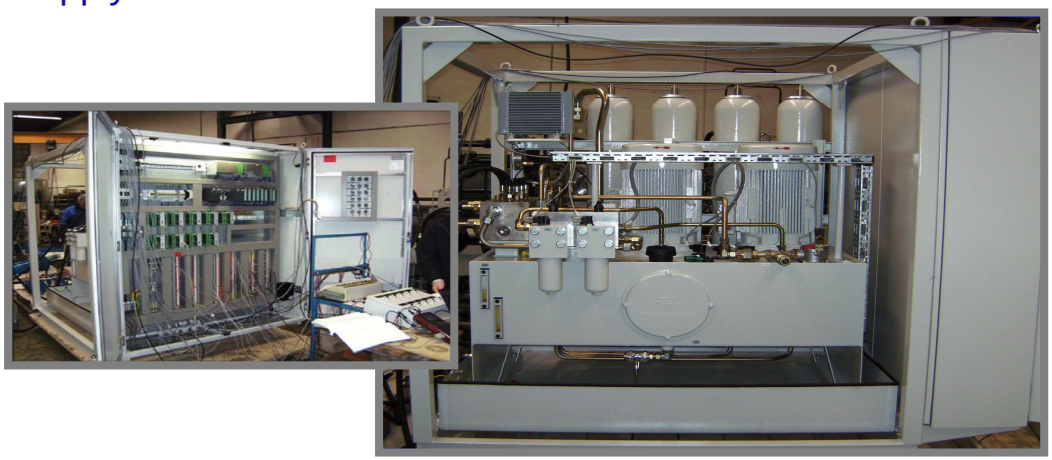
6. Hydraulic Power Unit HPU

Continuous modulating position control of Steam Conditioning Valves

Operating time approx. 20 seconds over the whole valve stroke during normal continuous modulating position control operation and 2 seconds over the whole valve stroke during quick operation. Fail open function within 2 seconds over the whole valve stroke in case of electric power supply failure, operated with 2 solenoid valves, with oil supply from the accumulators.

Continuous modulating temperature control of spray water control valves

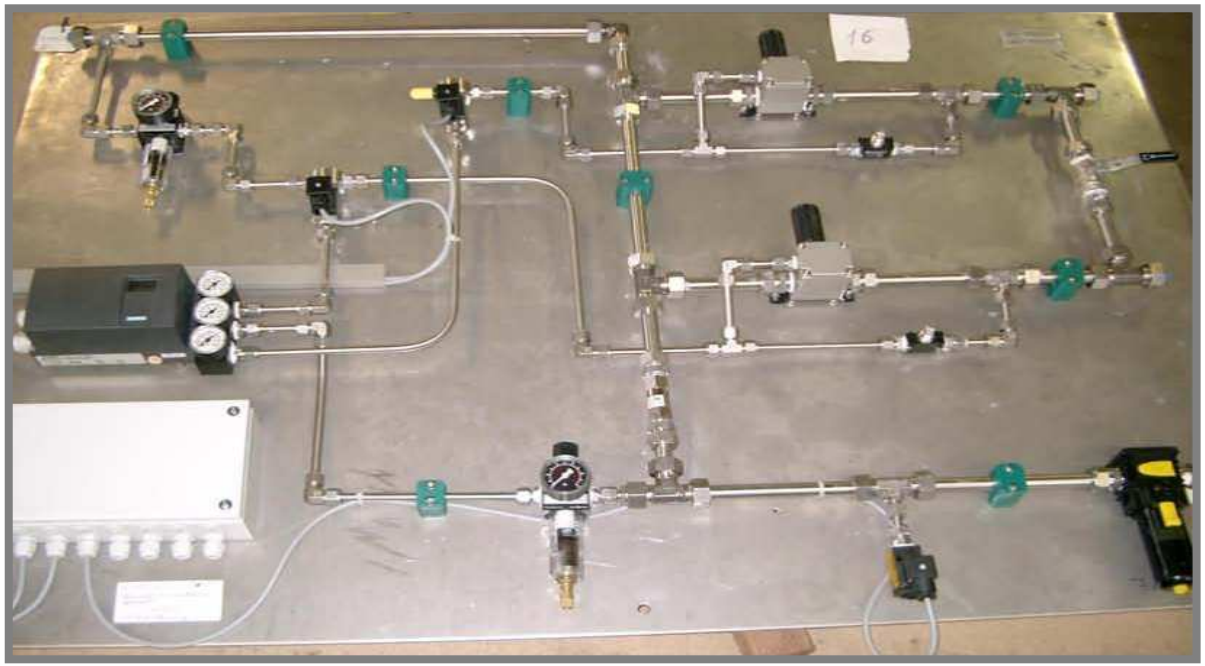
Operating time approx. 2 seconds over the whole valve strake during normal continuous modulating temperature control operation and
1 second over the whole valve stroke during quick operation. Fail open (or close) function within 1 second over the whole valve stroke in case of electric power supply failure, operated with 2 solenoid valves, with oil supply from the accumulators.



Front- and Side-view of a Hydraulic Power Unit

7. Pneumatics

Hydraulic actuators are known to have very good dynamics, stability, speed and high actuation forces. Their disadvantage is presumed by being expensive and resource-intensive to manufacture.



A-T pneumatic control panel

If certain circumstances require a cost-effective solution, pneumatic valve actuators can be used in potentially explosive areas without any problems. They have low actuating times, a constant sealing force, as well as safety positions that can easily be implemented.

8. Bringing into service

Installation

Steam Conditioning Valve	In general, the steam conditioning valve can be installed in any position. We recommend the installation with horizontal inlet and vertical outlet because no drainage points will be required. In case of any other installation position, drainage points will be required. All oil lines leading to the hydraulic cylinder must be laid free of tension and have to be equipped wilh air relief valves.
Spraywater Control Valve:	In general, the spraywater contol valve can be installed in any position. All oil lines leading to the hydraulic cylinder must be laid free of tension and have to be equiped wich air relief valves.
Electro-hydraulic System:	The hydraulic power unit has to run a performance test in the factory. The adjustment will be made within the entire system.

Adjustment

Steam Conditioning Valve:	The stroke is adjusted during assembly in the factory, but can also be readjusted at site.
Spraywater Control Valve:	The stroke is adjusted during assembly in the factory.
Electro-hydraulic System:	The hydraulic power unit has to run a performance test in the factory. The adjustment will be made within the entire system.

9.1 Calculation Steam Conditioning Valve

In accordance to TRD 421 the smallestflow cross-section of the steam conditioning valve can be calculated as follows:

$$A_0 = \frac{x \cdot qm}{\alpha_w \cdot p}$$

Where:

$A_0 \left[mm^2 \right]$ = Narrowst flow cross-section

$x \left[\frac{h \cdot mm^2 \cdot bar}{kg} \right]$ = Average pressure coefficient

The value can be derived from the regulations mentioned above. The cross section however can be calculated more exact via the following formula:

$$x = \frac{0.6211}{\psi} \cdot \sqrt{v \cdot p}$$

Where:

$v \left[\frac{m^3}{kg} \right]$ = Specific vapour pressure

$qm \left[\frac{kg}{h} \right]$ = Maximum quantity of vapour to be discharged

$p \ [bar]$ = Response pressure (absolute)

α_w = Outlet factor according to the component test

ψ = Outlet factor in accordance to TRD421 Section 9.4

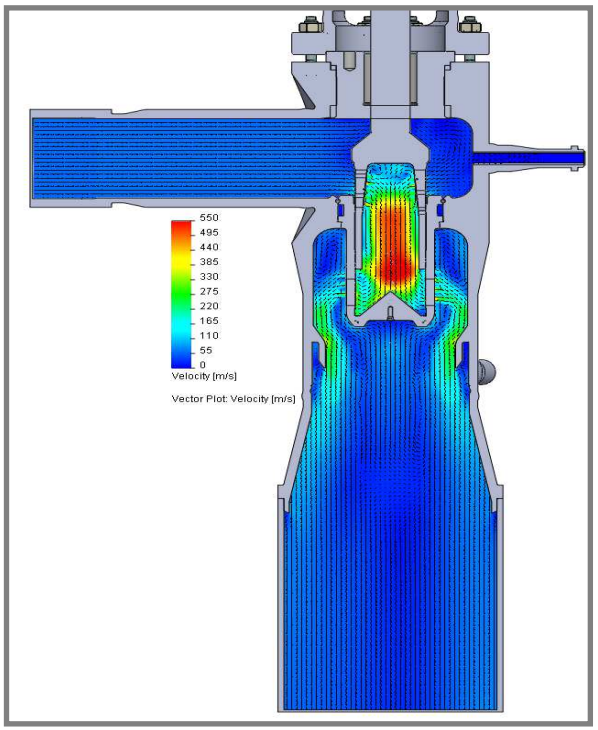


Figure 9: Distribution of fluid velocity inside a steam conditioning valve

9.2 Calculation Spraywater Control Valve

The necessary amount of spraywater which is needed to cool down the discharged steam flow of the steam conditioning valve can be calculated as follows:

$$Q_W = Q_{FD} \frac{h_1 - h_2}{h_2 - h_w}$$

Where:

$Q_w\left[\frac{t}{h}\right]$ = amount of spraywater

$Q_{FD}\left[\frac{t}{h}\right]$ = amount of live steam to be cooled

h_1 = specific heat content of live steam

h_2 = specific heat content of cooled steam

h_W = specific heat content of spraywater

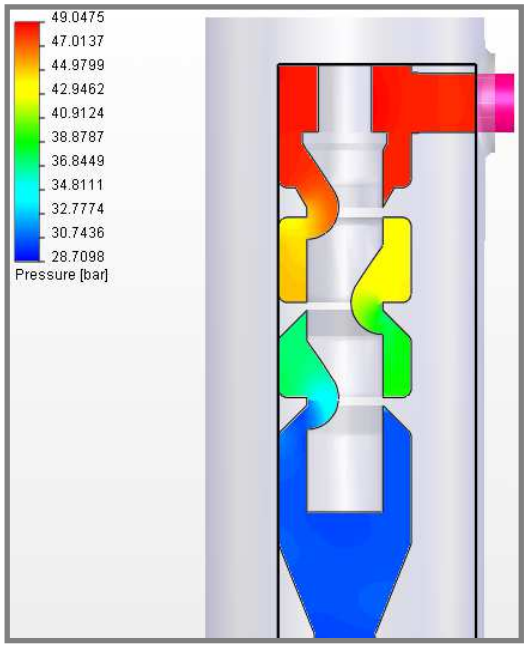


Figure 10: Distribution of fluid pressure inside a spraywater control valve

The detailed calculation of all components is carried out in accordance with valid technical regulations

10. Technical Data

	Steam Conditioning Valve	Spraywater Control Valve/Stop Valve
Nominal pressure	According to all pressure/temperature graduations occuring in modern powerstation constructions	According to all pressure/temperature graduations occuring in modern powerstation constructions
Nominal diarneter	According to the operating conditions occuring in modern power station constructions	According to the operating conditions at the steam conditioning valve
Connections	Welded ends	Welded ends
Materials	According to the prevalent operating conditions	Body: 1.5415/16Mo3, Inlet/Outlet acc. to the operating conditions occuring
Spraywater Connection	Flange	-
Trim	Noncorrosive steel, seat stellited	Noncorrosive steel, seat stellited
Stroke	Depending on size of seat	Depending on size of seat.
Characteristics	Modified linear	Equal percentage
Actuator	Unilaterally operating hydraulic cylinder with integral spring plate, air failure: spring open Control via electric actuator is possible	Hydraulic cylinder with integral spring plate, air failure: spring to open
Signal device:	Position feedback transmitter 0/4...20 mA with limit switches	Position feedback transmitter 0/4...20 mA with limit switches.

Extract of References

HP/LP Turbine Bypass System

A-T ARMATUREN-TECHNIK GMBH
Duisburger Straße 375 Babcock T-Bldg.
46049 Oberhausen / Germany

Tel.: +49 208 833 1700
Fax: +49 208 833 1755

E-Mail: sales@at-armaturen.com
Web: www.at-armaturen.com

Geschäftsführung: Manfred Leufgen
Handelsregister Duisburg
8 HRB 12842

Ust.-ID Nr. DE 811 850 770

Finanzamt Oberhausen-Süd
Steuernummer : 124/5700/1400

Bankverbindungen:
Stadtsparkasse Oberhausen
Kto.-Nr.: 53208443 BLZ: 365 500 00
SWIFT Code: WELADED10BH IBAN: DE16365500000053208443
Stadtsparkasse Düsseldorf
Kto.-Nr.: 1005949159 BLZ: 300 501 10
SWIFT Code: DUSSDEDD IBAN: DE61300501101005949159
Commerzbank AG
Kto.-Nr.: 40 06 615 BLZ: 365 400 46
SWIFT Code: COBADEFF 365 IBAN: DE97365400460400661500
Hypo- und Vereinsbank AG
Kto.-Nr.: 363738877 BLZ: 360 201 86
SWIFT Code: HYVEDEMM360 IBAN: DE77360201860363738877
Deutsche Bank AG
Kto.-Nr.: 515160000 BLZ: 365 700 49
SWIFT Code: DEUTDEDE365 IBAN: DE3236570049 0515160000

1. Major Experience (OVERSEAS)

Project Title	Name of tenderer	Country	Client name	Date	Design (bar/℃)
Jiangsu PP 1100MW	Stein Industry	China	Siangsu PP	1991	168 / 539
Ligang PP 4×600MW	Ansaldo Italy	China	Ansaldo Italy	1992	175 / 537
Novosibirsk PP 2×600MW	ThyssenKrupp Berlin/Germany	Russia	Novosibirsk PP	1999	184 / 540
Nishni-Nowgorod PP 1×600MW	ThyssenKrupp Berlin/Germany	Russia	Nishini-Nowgorod	2000	179 / 543
St. Petersburg PP 1-600MW	ThyssenKrupp Berlin/Germany	Russia	St.Petersburg PP	2001	188 / 544
Wladivostok PP 2×600MW	ThyssenKrupp Berlin/Germany	Russia	Wladivostok PP	2001	169 / 550
Ningbo PP 5×600MW	Arca Germany	China	Ningbo PP	2001	65 / 535
Hartha 800MW	Seika	Iraq	Hartha	2002	136 / 541
Az Zour 1000MW	Novamat	Kuwait	Az Zour	2003	155 / 545
Maritza 700MW	DSD	Bulgaria	Maritza	2004	180 / 550
Bokaro 500MW	Forbes Marshall	India	Bokaro	2006	106 / 545
Az Zour 1000MW	Al Arfaj	Kuwait	Az Zour	2007	174 / 543
Novosibirsk PP 2×600MW	ThyssenKrupp Berlin/Germany	Russia	Novosibirsk PP	2009	186 / 545
Yingkou 2×600MW	Kenda	China	China Company	2009	167 / 545
Awar-Awar 1200MW	Kenda	Indonesia	Indonesia Company	2010	175 / 546

* Detail experience refer to list

2. Major Experience (KOREA)

Project Title	Name of tenderer	Client name	Product	Date	Remarks
Ulchin 945MW	Samyang	Ulchin	HP/LP Turbine Bypass	2002	
Banwhol	Samyang	Banwhol	HP/LP Turbine Bypass	2003	
Hwaseong	Daewoo	Dwel	HP/LP Turbine Bypass	2006	
Nonhyun	Samyang	Nonhyun	HP/LP Turbine Bypass	2007	
KEPCO ULSAN	KEPCO	KEPCO	Parallel-slide-valve	2008	
KEPCO ULSAN	KEPCO	KEPCO	Check valve	2008	
KEPCO ULSAN	KEPCO	KEPCO	Minimum flow valve	2008	
Samyang Korea	Samyang	Ulchin	Steam desuperheating	2009	
Banwhol PP	Samyang	Banwhol	Dampfumformstation	2009	

Ref)	**Project title**	Jiangsu PP 1100 MW – coal fired (via Stein Industry / France)					
Name of tenderer	**Country**		**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
Stein Industry	China		100%	Siangsu PP	…	1991	
Flow	247 t/h	Design pressure	168 bar	Design temperature	539 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Erection-works (local Partners)		

Ref .	**Project title**	Ligang PP 4 x 600 MW – coal fired (via Ansaldo / Italy)					
Name of tenderer	**Country**		**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
Ansaldo Italy	China		100%	Ansaldo Italy	…	1992	-
Flow	258 t/h	Design pressure	175 bar	Design temperature	537 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Erection-works (local Partners)		

Ref .	**Project title**	Novosibirsk PP 2 x 600 MW – coal fired					
<Name of tenderer>	**Country**	**Overall project value (EUR)**	**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
ThyssenKrupp Berlin/Germany	Russia	approx. 1,5 Mio. EUR	100%	Novosibirsk PP	…	1999	-
Flow	273 t/h	Design pressure	184 bar	Design temperature	540 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Bendings-works Prefabrication-works Erection-works (local Partners)		

Ref .	**Project title**	Nishni-Nowgorod PP 1 x 600 MW - nuclear					
<Name of tenderer>	**Country**	**Overall project value (EUR)**	**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
ThyssenKrupp Berlin/Germany	Russia	approx. 0,75 Mio. EUR	100%	Nishni-Nowgorod PP	…	2000	-
Flow	229 t/h	Design pressure	179 bar	Design temperature	543 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Bendings-works Prefabrication-works Erection-works (local Partners)		

Ref)	**Project title**	St. Petersburg PP 1x 600 MW – coal fired					
<Name of tenderer>	**Country**	**Overall project value (EUR)**	**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
ThyssenKrupp Berlin/Germany	Russia	approx. 0,75 Mio. EUR	100%	St. Petersburg PP	…	2001	
Flow	218,4 t/h	Design pressure	188 bar	Design temperature	544 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Bendings-works Prefabrication-works Erection-works (local Partners)		

Ref	**Project title**	Wladivostok PP 2 x 600 MW – coal fired					
<Name of tenderer>	**Country**	**Overall project value (EUR)**	**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
ThyssenKrupp Berlin/Germany	Russia	approx. 1,5 Mio. EUR	100%	Wladivostok PP	…	2001	
Flow	216 t/h	Design pressure	169 bar	Design temperature	550 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Bendings-works Prefabrication-works Erection-works (local Partners)		

Ref	**Project title**	Ningbo PP 5 x 600 MW – coal fired					
Name of tenderer	**Country**		**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
Arca Germany	China		100%	Ningbo PP	…	2001	
Flow	212 t/h	Design pressure	65 bar	Design temperature	535 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System electrical operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Erection-works (local Partners)		

Ref	**Project title**	Ulchin 945 MW - nuclear					
<Name of tenderer>	**Country**	**Overall project value (EUR)**	**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
Sam Yang	Korea		100%	Ulchin	…	2002	
Flow	220 t/h	Design pressure	101 bar	Design temperature	530 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Erection-works (local Partners)		

Ref	**Project title**	Hartha 800 MW – oil and gas fired					
<Name of tenderer>	**Country**	**Overall project value (EUR)**	**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
Seika	Iraq		100%	Hartha	…	2002	
Flow	200 t/h	Design pressure	136 bar	Design temperature	541 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Erection-works (local Partners)		

Ref	**Project title**	Az Zour 1000 MW – gas fired					
<Name of tenderer>	**Country**	**Overall project value (EUR)**	**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
Novamat	Kuwait		100%	Az Zour	…	2003	
Flow	200 t/h	Design pressure	155 bar	Design temperature	545 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Erection-works (local Partners)		

Ref	**Project title**	Maritza 700 MW – coal fired					
<Name of tenderer>	**Country**	**Overall project value (EUR)**	**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
DSD	Bulgaria		100%	Maritza	…	2004	
Flow	212,76 t/h	Design pressure	180 bar	Design temperature	550 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Erection-works (local Partners)		

Ref	**Project title**	Bokaro 500 MW – coal fired					
<Name of tenderer>	**Country**	**Overall project value (EUR)**	**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
Forbes Marshall	India		100%	Bokaro	…	2006	
Flow	235,6 t/h	Design pressure	106 bar	Design temperature	545 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Erection-works (local Partners)		

Ref	**Project title**	Az Zour 1000 MW - gas fired					
<Name of tenderer>	**Country**	**Overall project value (EUR)**	**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
Al Arfaj	Kuwait		100%	Az Zour	…	2007	
Flow	289 t/h	Design pressure	174 bar	Design temperature	543 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Erection-works (local Partners)		

Ref .	**Project title**	Novosibirsk PP 2 x 600 MW – coal fired					
<Name of tenderer>	**Country**	**Overall project value (EUR)**	**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
ThyssenKrupp Berlin/Germany	Russia	approx. 1,5 Mio. EUR	100%	Novosibirsk PP	…	2009	-
Flow	278 t/h	Design pressure	186 bar	Design temperature	545 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Bendings-works Prefabrication-works Erection-works (local Partners)		

Ref	**Project title**	Yingkou 2 x 600 MW – coal fired					
<Name of tenderer>	**Country**	**Overall project value (EUR)**	**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
Kenda	China		100%		…	2009	
Flow	330 t/h	Design pressure	167 bar	Design temperature	545 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Erection-works (local Partners)		

Ref	**Project title**	Awar-Awar 1200 MW – coal fired					
<Name of tenderer>	**Country**	**Overall project value (EUR)**	**Proportion carried out by tenderer (%)**	**Client name**	**Source of funding**	**Date**	**Partners, if any**
Kenda	Indonesia		100%		…	2010	
Flow	352,5 t/h	Design pressure	175 bar	Design temperature	546 °C		
Project description					**Type of supplies provided, including training (where applicable)**		
Delivery of HP / LP Turbine Bypass System hydraulic operated incl. Erection. All related Supports have been engineered, delivered and erected by us.					Erection-works (local Partners)		

Ref)	Project title	Dahlian PP				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Mitsubishi Japan	China	100%	Dalian PP		1990	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Fuzhou PP				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Mitsubishi Japan	China	100%	Fuzhou PP		1992	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Jiangsu PP (via Stein Industry / France)				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Stein Industry	China	100%	Siangsu PP		1991	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Peterborough PP				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
GEC / Alstom	Great Britain	100%	Peterborough Power Ltd.		1991	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Corby PP				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
GEC / Alstom	Great Britain	100%	Corby Power Ltd.		1991	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Ligang PP (via Ansaldo / Italy)				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Ansaldo Italy	China	100%	Ansaldo Italy		1992	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	**Project title**	**Kemira**				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Prometal	Belgium	100%	Kemira		2000	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	**Project title**	**Ningbo PP**				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Arca Germany	China	100%	Ningbo PP		2001	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	**Project title**	**Nanshan PP**				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
K Wah Internation. Hong Kong	China	100%	Nanshan PP		2001	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Shenzen Nanshan				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Shenzen Nanshan	China	100%	Shenzen Nanshan		2001	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Babcock				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Babcock	Syria	100%	Homs		2001	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Daura				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Babcock	Iraq	100%	Daura		2001	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Ulchin				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Samyang	Korea	100%	Ulchin		2002	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Hartha				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Seika	Iraq	100%	Hartha		2002	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Edison				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Edison Temoelectrics	Italia	100%	Edison		2002	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Bayer Uerdingen L57				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
	Germany	100%	Bayer AG		2003	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Bayer				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Bayer Uerding	Germany	100%	Bayer		2003	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Solvay Rheinberg				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Solvay Soda Deutschland	Germany	100%	Solvay Soda Deutschland GmbH		2003	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Solvay				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Solvay	Germany	100%	Solvay		2003	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Banwhol				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Samyang	Korea	100%	Banwhol		2003	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Az Zour				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Novamat	Kuwait	100%	Az Zour		2003	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Solvay				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Solvay	Germany	100%	Solvay		2004	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Maritza				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
DSD	Bulgaria	100%	Maritza		2004	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Sapele				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
BBS	Nigeria	100%	Sapele		2004	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Trbovlje				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Novamat	Slovenia	100%	Trbovlje		2005	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Siemens				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Siekmann	Germany	100%	Siemens		2005	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Bokaro				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Forbes Marshall	India	100%	Bokaro		2006	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Medina Yanbu				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
SWCC	Saudi Arabia	100%	Medina Yanbu		2006	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Teluk Salut				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Tristate	Malaysia	100%	Teluk Salut		2006	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	HWASEONG				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Daewoo	Korea	100%	Dwel		2006	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Medina Yanbu				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
SWCC	Saudi Arabia	100%	Medina Yanbu		2007	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Nonhyun				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Samyang	Korea	100%	Nonhyun		2007	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Az Zour				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Al Arfaj	Kuwait	100%	Az Zour		2007	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Yingkou				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Kenda	China	100%			2009	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

Ref)	Project title	Awar Awar				
Name of tenderer	**Country**	**Proportion Carried out by Tenderer(%)**	**Client name**	**Source of funding**	**Date**	**Partners, If any**
Kenda	Malaysia	100%			2010	
Project description				**Type of supplies provided, Including training (where applicable)**		
Delivery of HP/LP Turbine Bypass System pneumatical operated incl. Erection. All related Supports have been engineered, delivered and Erected by us.				Erection-works (local partners)		

List of References

(Extract only)

A-T ARMATUREN-TECHNIK GMBH

Absperr-Armaturen, Regelventile, Turbinen-Umleitsysteme für Kraftwerkstechnik, Öl und Gas Pipelines
Isolating, control valves and turbine bypass systems for the electric power industry, oil and gas pipelines

REFERENCE LIST HP-special valves

Customer	Product	Material	Size (DN)	Design Data (bar/ ℃)	
KWU Ibbenburen	Check valve	13 CrMo 44	800	42,5	311
VKR	Preheater-Bypass	15 NiCuMoNb 5	200	370	300
VKR	Gate valve	X 20 CrMo V 121	200	281	540
VKR	Control valve	10 CrMo 910	80	281	540
VKR	Gate valve	10 CrMo 910	80	281	540
VKR	Gate valve	10 CrMo 910	80	281	540
VKR FWK Buer	Gate valve	10 CrMo 910	80	61	540
VKR FWK Buer	Gate valve	15 Mo 3	80	61	400
VKR FWK Buer	Check valve	15 NiCuMoNb 5	200	370	290
VKR FWK Buer	Gate valve	15 NiCuMoNb 5	200	370	290
VKR	Gate valve	15 Mo 3	150	370	290
VKR FWK Buer	Gate valve	15 NiCuMoNb 5	150	460	260
VKR FWK Buer	Gate valve	15 NiCuMoNb 5	150	25	260
BTS Gardener	Control valve	13 CrMo 44		320	200
Ansaldo ENEL	Check valve	13 CrMo 44		52	
DELAVAL PZEM Borsele	Check valve	15 NiCuMoNb 5	350	400	180
VKR FWK Buer	3-way mixing valve	H Ⅱ	300/300/250	10	50
VKR FWK Buer	3-way mixing valve	H Ⅱ	500/500/500	25	150
DELAVAL PZEM Borsele	Check valve	15 NiCuMoNb 5	250	250	180
ELSONT	Check valve	13 CrMo 44	400	358	180
IPP-Oslo	Control valve	C 22.8	100	100	20
GKW Franken Ⅱ	Gate valve	15 Mo 3	65	240	200
GKW Franken Ⅱ	Gate valve	14 Mo V 63	350/300	35	545
GKW Franken Ⅱ	Gate valve	14 Mo V 63	450	35	545
AEG Kanis	Check valve	13 CrMo 44	200	PN 160	
STEAG	Gate valve	C 22.8	100	PN 160	
Stadtwerke	Gate valve	15 Mo 3	80	PN 160	

A-T ARMATUREN-TECHNIK GMBH

Absperr-Armaturen, Regelventile, Turbinen-Umleitsysteme für Kraftwerkstechnik, Öl und Gas Pipelines
Isolating, control valves and turbine bypass systems for the electric power industry, oil and gas pipelines

REFERENCE LIST HP-special valves

Customer	Product	Material	Size (DN)	Design Data (bar/ ℃)	
Stadtwerke	Gate valve	10 CrMo 910	150	115	530
VAG	Gate valve	C 22.8	80	290	160
VAG	Gate valve	C 22.8	50	290	160
STEINMULLER	Check valve	C 22.8	125	123	327
STEINMULLER	Gate valve	C 22.8	125	123	327
STEINMULLER	Gate valve	10 CrMo 910	200	100	535
STEINMULLER	Control valve	10 CrMo 910	100	100	535
STEINMULLER	Gate valve	10 CrMo 910	100	100	535
VAG	Gate valve	13 CrMo 44	250/200	103	525
VAG / Alfelder	Gate valve	10 CrMo 910	175	89	535
STEINMULLER	Gate valve	15 NiCuMoNb 5	250	344	380
STEINMULLER	Check valve	15 NiCuMoNb 5	250	344	380
STEINMULLER	Gate valve	15 NiCuMoNb 5	125	344	380
STEINMULLER	Check valve	15 NiCuMoNb 5	125	344	380
STEINMULLER	Pressure seal cover	15 NiCuMoNb 5	ϕ 340 mm	316	380
VAG	3-way mixing valve	H Ⅱ	300/300/250	10	50
VAG	Gate valve	13 CrMo 44	125	125	500
VALVO	Gate valve	14 MoV 63	200	164	545
VAG	Control valve	C 22.8 / St 35.8	100	13	250
VAG	3-way mixing valve	H Ⅱ	300/300/300	26	150
IPU	Steam conditioning cv	10 CrMo 910	250/400	140	520
IPU	Spraywater cv	15 Mo 3	50	250	520
ELSONT AG	Steam control valve	13 CrMo 44	65/250	115	505
STEINMULLER	Pressure seal cover	15 NiCuMoNb 5	ϕ 180 mm	245	410
Berliner	Air control valve	St 35.8 / H Ⅱ	600/700	PN 10	
IMPEXMETAL	Gate valve	13 CrMo 44	100	124	520
IMPEXMETAL	Gate valve	13 CrMo 44	200	124	520

REFERENCE LIST HP-special valves

Customer	Product	Material	Size (DN)	Design Data (bar/ ℃)	
BABCOCK	3-way mixing valve	H Ⅱ	250/150/250	22	210
BABCOCK	3-way mixing valve	H Ⅱ	300/300/300	PN 25	
UHDE	Gate valve	X 20 CrMo V 121	4 "	170	545
UHDE	Gate valve	X 20 CrMo V 121	10 "	170	545
BABCOCK	Feed water control valve	GS-17CrMo55 / 15Mo 3	200	150	343
BABCOCK	Feed water control valve	GS-17CrMo55 / 15Mo 3	100	150	343
BABCOCK	Start up control valve	15 Mo 3	150/250	87	301
STANDARDKESSEL	Start up control valve	13 CrMo 44		69	505
ELSONT AG	Pressure red. Element	C 22.8	40	138	105
Thyssen Berlin	Steam control valve	10 CrMo 910	80	52	555
Thyssen Berlin	Steam control valve	15 Mo 3	80	52	365
KEPCO ULSAN	Parallel slide valve	15 Mo 3	100/80	PN 400	
KEPCO ULSAN	Check valve	15 Mo 3	100/80	PN 400	
TISZAI	Gate valve	10 CrMo 910	125	172	550
TISZAI	Steam control valve	10 CrMo 910	125	172	550
PROMETAL	Atomising steam nozzel	13 CrMo 44			
CEPSA SANTA CRUZ	Gate valve	C 22.8	125/100	90	200
KEPCO ULSAN	Minimum flow valve	15 Mo 3	65/65	250	155
PROMETAL	Pressure red. Element	X 10 CrNiNb 189	50	138	105
ATS	Gate valve	10 CrMo 910	100/80	110	535
VOEST-ALPINE	3-way mixing valve	H Ⅱ	450/450/450	55	258
BABCOCK	Pressure seal cover	X 20 CrMo V 121	ϕ 275	136	540
STEINMULLER	Gate valve	10 CrMo 910	125/100	80	525
ENEL	Gate valve	10 CrMo 910	80/80	165	540
PROMETAL	Minimum flow valve	15 Mo 3	65/65	250	147
HOLTZMANN & CIE. AG	Steam conditioning cv	10 CrMo 910	100/500	93/3,5	535/180
HOLTZMANN & CIE. AG	Spraywater cv	15 Mo 3	40	130/60	130

A-T ARMATUREN-TECHNIK GMBH

Absperr-Armaturen, Regelventile, Turbinen-Umleitsysteme für Kraftwerkstechnik, Öl und Gas Pipelines
Isolating, control valves and turbine bypass systems for the electric power industry, oil and gas pipelines

REFERENCE LIST HP-special valves

Customer	Product	Material	Size (DN)	Design Data (bar/ ℃)	
VW Kraftwerk	Gate valve	13 CrMo 44	125	125	500
CAFFARO HIMICHE	Gate valve	C 22.8	175/175	250	215
BABCOCK	Pressure seal cover	10 CrMo 910	ϕ 140	210	540
BABCOCK	Pressure seal cover	10 CrMo 910	ϕ 160	55	540
MEG	Gate valve	15 Mo 3	65/65	250	180
PROMETAL	Gate valve	10 CrMo 910	20"/400	40	500
PROMETAL	Gate valve	10 CrMo 910	14"/400	40	500
ZIKESCH	Gate valve	15 NiCuMoNb 5	200/200	235	425
ZIKESCH	Gate valve	C 22.8	175/150	180	250
PROMETAL	Gate valve	15 Mo 3	12"/260	127	450
PROMETAL	Gate valve	15 Mo 3	16"/325	127	450
HP-VALVES	Gate valve	X 10 CrMoVNb 91	12"/240	151	571
HP-VALVES	Globe valve	X 10 CrMoVNb 91	4"/85	151	571
PROMETAL	Gate valve	15 Mo 3	350	250	250
BAYER	Check valve	15 Mo 3	125	56	450
BAYER	Check valve	15 Mo 3	200	56	450
BAYER	Gate valve	15 Mo 3	80/80	140	350
ELENAC	Discharge control valve	15 Mo 3	80/80	140	350
PROMETAL	Steam control valve	13 CrMo 44	200/200	70	480
BAOTEX	3-way mixing valve	H Ⅱ	450/450/450	55	258
BABCOCK	Pressure seal cover	X 10 CrMoVNb 91	ϕ 540	51	550
Thyssen Berlin	LP bypass isolation valve	10 CrMo 910	350/350	47	535
Cepsa Tenerife	Gate valve	15 Mo 3	125/125	75	450
WM	Gate valve	C 22.8	65/65	190	300
Siemens Enstedtvaeket	Gate valve	13 CrMo 44	350/350	60	500
Bariven Tablazo	Steam control valve	13 CrMo 44	8"/10"	78	500
Novamat Osijek	Spraywater cv	15 Mo 3	40/40	144	160

A-T ARMATUREN-TECHNIK GMBH

Absperr-Armaturen, Regelventile, Turbinen-Umleitsysteme für Kraftwerkstechnik, Öl und Gas Pipelines
Isolating, control valves and turbine bypass systems for the electric power industry, oil and gas pipelines

REFERENCE LIST HP-special valves

Customer	Product	Material	Size (DN)	Design Data (bar/ ℃)	
Novamat Osijek	Spraywater cv	15 Mo 3	50/50	144	160
BABCOCK	Pressure seal cover	10 CrMo 910	460	51	540
HP valves	Gate valve	13 CrMo	150/150	94	530
HP valves	Gate valve	10 CrMo 910	300/300	94	530
WM	Gate valve	13 CrMo 44	150/150	63	350
WM	Gate valve	x 20	100/100	187	545
BABCOCK	Spraywater cv	15 Mo 3	40/40	170	180
BABCOCK	Feed water cv	15 Mo 3	225/225	265	355
BABCOCK	Spraywater cv	15 Mo 3	65/65	180	450
BABCOCK	Spraywater cv	10 CrMo 910	50/50	175	520
PROMETAL	Steam control valve	10 CrMo 910	125/125	129	540
BABCOCK	Parallel slide valve	x 20	350/350	211	547
Novamat Sostanji	Spraywater cv	15 Mo 3	50/50	150	200
Novamat Sostanji	Spraywater cv	15 Mo 3	50/80	65	235
Novamat	Steam control valve	10 CrMo 910	125/125	132	540
Novamat	Steam control valve	15 Mo 3	65/65	165	230
Novamat Trbovlje	Spraywater cv	15 Mo 3	25/25	170	250
Novamat Trbovlje	Spraywater cv	15 Mo 3	32/32	170	250
PROMETAL	Steam control valve	GS 17 CrMo 55	200/200	45	525
BABCOCK	Control valve	15 Mo 3	100/100	160	250
BABCOCK	Spraywater cv	15 Mo 3	150/150	160	250
BABCOCK	Spraywater cv	15 Mo 3	25/25	110	500
ELENAC	Discharge control valve	15 Mo 3	80/80	140	350
BABCOCK	Parallel slide valve	C 22.8	200/200	160	210
BABCOCK	Control valve	GSC 25	4"	150	160
BABCOCK	Control valve	GSC 25	8"	150	160
BABCOCK	Spraywater cv	15 Mo 3	50/50	160	210

A-T ARMATUREN-TECHNIK GMBH

Absperr-Armaturen, Regelventile, Turbinen-Umleitsysteme für Kraftwerkstechnik, Öl und Gas Pipelines
Isolating, control valves and turbine bypass systems for the electric power industry, oil and gas pipelines

REFERENCE LIST HP-special valves

Customer	Product	Material	Size (DN)	Design Data (bar/ ℃)	
PROMETAL	Steam control valve	10 CrMo 910	125/250	126	540
PROMETAL	Spraywater valve	15 Mo 3	40/40	180	200
HP Valves	Parallel slide valve	X 10 CrMo	8"/8"	142	582
HP Valves	Parallel slide valve	X 10 CrMo	12"/12"	142	582
Solvay	Spraywater valve	15 Mo 3	25/25	250	250
Samyang	Steam conditioning valve	15 Mo 3	20"/40"	65	535
Shenzen	Steam conditioning valve	10 CrMo 910	300/800	65	535
Shenzen	Steam control valve	WBC	300/350	11	270
BABCOCK	Parallel slide valve	X 20	250/250	154	545
Thyssen Berlin	Check valve	H Ⅱ	500	16	120
Thyssen Berlin	Check valve	H Ⅱ	800	16	120
Thyssen Berlin	Gate valve	10 CrMo 910	300/275	74	535
PROMETAL	Gate valve	10 CrMo 910	20"	40	530
PROMETAL	Gate valve	10 CrMo 910	14"	40	530
Novamat Trbovlje	Feed water control v	15 Mo 3	200/200	222	230
BABCOCK	Steam Control valve	15 Mo 3	25/80	140	395
BABCOCK	Spraywater valve	15 Mo 3	25/25	PN 250	
Novamat	Spraywater valve	15 Mo 3	80/80	250	250
BABCOCK	Gate valve	15 Mo 3	65/65	250	180
Solvay	Feed water control v	15 Mo 3	200/200	200	185
Thyssen Berlin	Steam Control valve	10 CrMo 910	80/100	175	546
Thyssen Berlin	Spraywater valve	15 Mo 3	2"/72"	301	350 K
BABCOCK	Spraywater valve	15 Mo 3	65/65	226	200
BABCOCK	Spraywater valve	15 Mo 3	25/25	101	200
BABCOCK	Control valve	15 Mo 3	150/400	51/11	400/350
BABCOCK	Spraywater valve	15 Mo 3	40/40	170	180
BABCOCK	Spraywater valve	10 CrMo 910	50/50	175	520

A-T ARMATUREN-TECHNIK GMBH

Absperr-Armaturen, Regelventile, Turbinen-Umleitsysteme für Kraftwerkstechnik, Öl und Gas Pipelines
Isolating, control valves and turbine bypass systems for the electric power industry, oil and gas pipelines

REFERENCE LIST HP-special valves

Customer	Product	Material	Size (DN)	Design Data (bar/ ℃)	
BABCOCK	Gate valve	C 22.8	150/400	51/11	400/350
BABCOCK	Spraywater valve	15 Mo 3	40/40	170	180
BABCOCK	Spraywater valve	10 CrMo 910	50/50	175	520
BABCOCK	Gate valve	C 22.8	80/80	200	200
BABCOCK	Spraywater valve	15 Mo 3	80/80	250	250
Samyang Banwhol PP	Steam desuperheating cv	A182F12	250/500	112/10	530/250
Deambrosis	Minimum flow valve				
BABCOCK	Change over valve		350/350/300		
Thyssen Berlin	Change over valve		300/300		
Thyssen Berlin	Quick closing valve		300/300		
Siekmann	Minimum flow valve		4"/150		
Samyang Ulchin	Control valve		250/250	10,35	93,3
Novamat	Spraywater valve	15 Mo 3	50/50	160	350
Novamat	Spraywater valve	15 Mo 3	50/50	170	235
BABCOCK	Gate valve	13 CrMo 44	150/125	285	255