

Nuclear Product Lines

- Daume Control Valves
- EST HX Repair & Pressure Test Products
- Farris Engineering Pressure Relief Valves
- Phönix Gate, Globe, and Check Valves
- Solent & Pratt Butterfly Valves
- Strack Forged Valves
- Target Rock Solenoid and Safety/Relief Valves

At a Glance

Curtiss-Wright

Curtiss-Wright is a leader in designing and manufacturing highly engineered valves for a wide range of industries with an extensive installed base in nuclear power plants. We have a history of solving tough problems that begins with a passion for understanding customer needs. We add to that passion our unparalleled technical expertise, the highest standards of quality, and a long heritage of innovative thinking to provide the highest value to our customers.

FARRIS ENGINEERING

Farris has been at the forefront in design and manufacture of spring-loaded and pilot-operated pressure relief valves since the early 1940s. Farris has provided automatic and positive pressure protection against overpressure situations in thousands of industrial and power plants and facilities. Their reputation as "the First Line of Safety" is a result of Farris Innovations that have evolved into industry standard for pressure relief valve design.

SOLENT & PRATT

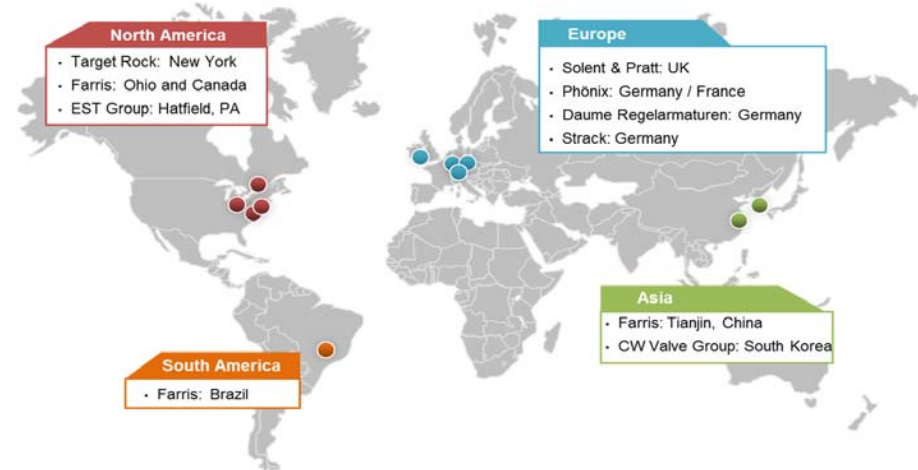
Solent and Pratt is a UK based company who has been supplying highly quality rotary valves since 1961. One of the first companies to develop the metal seated triple offset butterfly, S&P has been at the forefront of the design and development of products for high risk environments such as off-shore platforms, chemical petrochemical, and power industry. For ASME III applications these designs are sold as the Permaseat SP brand by Curtiss-Wright's Enertech division.

TARGET ROCK

Target Rock is 100% dedicated to the nuclear market where we have been an innovator of specialized valve technologies since the 1950s. Target Rock invented the first pilot-operated high pressure steam safety valve. Our solenoid operated globe valves are available in the most extensive size and pressure range worldwide and the modulating version of these valves provides a unique alternative to pneumatic control valves in critical post-accident applications.

EST GROUP

EST Group specializes in the development, manufacturing and marketing of highly engineered products and repair services for shell & tube heat exchangers, condensers, coolers and chillers. The best known product, the Pop-A-Plug®, is the industry's leading technology for sealing leaking heat exchanger tubes. EST Group also engineers and manufactures Pressure Testing and Isolation Plugs to greatly simplify and speed-up pressure testing and/or isolation of piping, tubing, valves, pressure vessels and a multitude of special applications



PHÖNIX GROUP

The Phönix Group includes three (3) distinct brands, each with their own technology and manufacturing center, supplemented by another separate shared manufacturing center. The nuclear certifications are held by the Phönix Armaturen-Werke facility in Volkmarshausen, Germany and *all three (3) product lines can be produced there and provided with the applicable nuclear certifications (ASME, RCC-M, etc.).*

PHÖNIX

Founded in 1910, Phönix Armaturen-Werke is today a leading manufacturer of high quality specialty valves for a wide range of industries. The extensive product range includes gate, globe, and check valves that range in sizes from small manual instrumentation valves to large actuated gate valves. Phönix has special expertise in bellows sealed globe valves

STRACK

Strack has been operating since 1922 and is a well known manufacturer specializing in the design and manufacture of forged high pressure gate and globe valves. The quality valves conform to a wide range of design standards.

DAUME REGELARMATUREN

Daume control valves have been designed, constructed, and manufactured since 1947. The products are highly engineered to each customer's requirements to ensure the highest quality and longevity in service.



Since the time of our work on the Nautilus and Shippingport, Curtiss-Wright has been a significant contributor to the success of nuclear power. As a corporation we are comfortable with the demands of the nuclear industry and are intimately familiar with Certification, Qualification, and Design Verification requirements worldwide.

CERTIFICATIONS

ASME NQA-1
10CFR50 Appendix B
RCC-M
ISO 9001
CSA N285.0, N285.2
HAF 604
ASME National Board, NB
PED/CE/ATEX
CE
GOST-R and GGNT

QUALIFICATIONS

IEEE 323, 382
IEEE 344
ASME QME-1
IEC 610000-4-2
B51 CRN

DESIGN VERIFICATION FLOW TEST CAPABILITIES

High Pressure Steam Facility

- Two High Pressure Steam Boilers
 - Pressures to 2700 psi (18.6 MPa)
- Four High Pressure Accumulators
 - Total 85 cu ft (2.4 cu. m.)
- Steam Generating Capacity
 - 10,000 #/hr (4,535 kg/hr)

High Pressure Air Facility

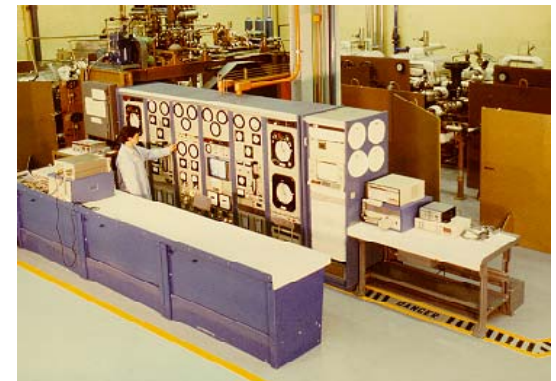
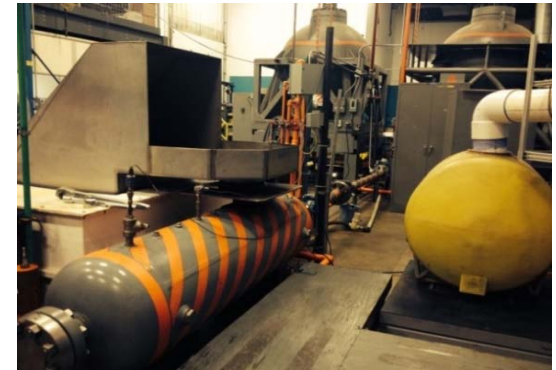
- Two Four Stage 5000 psi (34.4 MPa) compressors
- Storage Capacity: 72 cu ft. (2 cu. m.)
- Blowdown Cap: 137 cu ft. (3.9 cu. m.)







Pressurized Hot Water Loops

- Three (3) Test Loops
- Rated @ 3000 psig/670oF (20.6 MPa /355C)
- Flow Rates to 300 GPM (1135 lpm)

Flow Test Facilities


- High Pressure Loop
 - 3250 psid (22.4 MPa) @ 75 GPM (284 lpm)
- High Flow & Pressure Loop
 - 1000 psid (6.9 MPa) @ 250 GPM (946 lpm)
 - 500 psid (3.4 MPa) @ 1000 GPM (3875 lpm)
- High Flow/Low Press Loop
 - 1400 GPM @ 50 psid (5300 lpm @ 345 kPa)
- National Board Certified Test Loop









Type	189 + VKR	189 + 900	187-6	50-2A	50-2A	186-6
Design						
Description	Steam Conditioning Valve	Steam Conditioning Valve	Distribution and Mixing Three-Way Control Valve	Natural Gas Control Valve	Oxygen Control Valve	Control Valve
PN	10 - 500	10 - 500	10 - 500	10 - 160	10 - 160	10 - 160
DN	15 - 600	15 - 600	15 - 600	15 - 600	15 - 600	15 - 600
Class	150 to 2500	150 to 2500	150 to 2500	150 to 900	150 to 900	150 to 900
NPS	1/2" to 24"	1/2" to 24"	1/2" to 24"	1/2" to 24"	1/2" to 24"	1/2" to 24"
Temperature rating	-60°C up to +650°C	-60°C up to +650°C	-60°C up to +540°C	-10°C up to +200°C	-10°C up to +60°C	-60°C up to +450°C
Body forms	Straight pattern Angle pattern	Straight pattern Angle pattern	Three way	Straight pattern	Straight pattern	Straight pattern
Basic shell material	Carbon Steel Stainless Steel High Chromium SSt	Carbon Steel Stainless Steel High Chromium SSt	Carbon Steel Stainless Steel High Chromium SSt	Carbon Steel Stainless Steel High Chromium SSt	Carbon Steel Stainless Steel High Chromium SSt	Carbon Steel Stainless Steel High Chromium SSt
Connections	Flanged Butt Weld Other Requirements	Flanged Butt Weld Other Requirements	Flanged Butt Weld Other Requirements	Flanged Butt Weld Other Requirements	Flanged Other Requirements	Flanged Butt Weld Other Requirements
Operation	Hand wheel Lever Electric Hydraulic Pneumatic	Hand wheel Lever Electric Hydraulic Pneumatic	Hand wheel Lever Electric Hydraulic Pneumatic	Hand wheel Lever Electric Hydraulic Pneumatic	Pneumatic	Hand wheel Lever Electric Hydraulic Pneumatic
Application	High pressure and temperature service in power plants, petrochemical plants	High pressure and temperature service in power plants, petrochemical plants	High pressure and temperature service in power plants, petrochemical plants	Gas distribution stations, city supply, steam generator equipment, power plants, process steam for the industry	Steelworks and piping	Middle pressure and temperature service in power plants, petrochemical plants













EST Heat Exchanger Repair and Pressure Test Products

Type	Pop-A-Plug® P2	Pop-A-Plug® CPI/Perma	G-150 Tube Test Gun	G-250 Vacuum Tube Test Gun	G-650 Vacuum Joint Test Gun	Pop-A-Plug® Tube Stabilizers	GripTight MAX™ High Pressure Test Plug
Design							
Description	High Pressure Heat Exchanger Tube Plugging System	Medium Pressure Heat Exchanger Tube Plugging System	Pneumatic Test System for Detecting Pinhole Leaks in Heat Exchanger Tubes	Vacuum Test System for Detecting Pinhole Leaks in Heat Exchanger Tubes	Vacuum Test System for Detecting Tube Joint Leaks in Heat Exchangers	Stabilizes Weakened or Fractured Heat Exchanger Tubes	Test Plug for Hardened Pipe, Non-Metallic Pipe, and Higher Test Pressures
Pressure Rating	7000 Psig (483 BarG)	1000 Psig (69 BarG)	125 Psig (8.62 BarG)	0.387 Psig (20 Mmhg)	0.387 Psig (20 Mmhg)	N/A	Up to 15000 Psig (1034 BarG)
Materials	Brass Carbon Steel 304/316 SS 4142 Alloy 70/30 CU/NI 90/10 CU/NI Monel Titanium Duplex 2205 Chromoly Grade 11 (F22) for Chromoly Grade 22	Brass Carbon Steel 304/316 SS 4142 Alloy 70/30 CU/NI 90/10 CU/NI Monel Titanium Duplex 2205 Chromoly Grade 11 (F22) for Chromoly Grade 22	Lightweight Aluminum Body Carbon Steel Hardware Neoprene Seals	Lightweight Aluminum Body Carbon Steel Hardware Neoprene Seals	Lightweight Aluminum Body Carbon Steel Hardware Neoprene Seals	316 Stainless Steel Anchor Carbon Steel Cable or Rod	Zinc Plated Carbon Steel Urethane Seal
Sizes Available	0.400" - 1.480" (10.19mm - 37.61mm)	0.471" - 1.944" (11.99mm - 52.50mm)	0.28" - 1.23" (7.1mm - 31.2mm)	0.28" - 2.5" (7.1mm - 63.5mm)	0.28" - 2.46" (7.1mm - 55.1mm)	0.501" - 0.960" (12.73mm - 24.38mm)	1" - 24" (DN25 - DN600)








Farris Engineering Pressure Relief Valves

Type	2600 Series Spring Loaded Pressure Relief Valve	2700 Series Spring Loaded Pressure Relief Valve	3800 Series Pilot Operated Pressure Relief Valve	4200 Series Spring Loaded Safety Valve	4700 Series Spring Loaded Pressure Relief Valve	iPRSM
Design						
Description	Spring loaded Pressure Relief Valve available in conventional and balanced designs.	Spring loaded Pressure Relief Valve available in conventional and balanced designs.	Snap-Acting and Modulating Pilot Operating Pressure Relief Valve.	Spring loaded Safety Valve.	Spring loaded Pressure Relief Valve available in conventional and balanced designs.	Patented, web-enabled software for intelligent Pressure Relief System Management and Design
PN DN	16 - 400 25 - 500 inlet sizes	16 - 400 15 - 40 inlet sizes	16 - 400 25 - 200 inlet sizes standard. (Larger available)	16 - 100 32 - 150 inlet sizes standard.	16 - 400 15 - 25 inlet sizes standard.	<p>iPRSM provides cost effective management of pressure relief system documentation and assures compliance with regulatory codes and standards over the facility's lifetime.</p> <ul style="list-style-type: none"> * Web Enabled * Data Import / Export * Document Repository <p>Comprehensive thermal hydraulic analysis of plants systems:</p> <ul style="list-style-type: none"> * Flash Calculation Engine * Thermophysical Properties * Change Management * Overpressure Analysis * Maintenance Database * Relief Load Calculations * Inlet/Outlet Pipe Calculations * Two-Phase Flow Calculations
Pressure Class NPS	150 to 2500 1" to 20" inlet sizes	150 to 2500 1/2" to 1- 1/2" inlet sizes	150 to 2500 1/2" to 8" inlet sizes standard (Larger available)	150 to 600 1-1/4" to 6" inlet sizes standard	150 to 2500 1/2" to 1" inlet sizes standard	
Temperature Rating	-268C (-450F) to 815C (1500F)	-268C (-450F) to 399C (750F)	-268C (-450F) to 232C (450F)	-28C (-20F) to 538C (1000F)	-268C (-450F) to 538C (1000F)	
Body Forms	Angle Pattern	Angle Pattern	Angle Pattern	Angle Pattern	Angle Pattern	
Basic Shell Material	SA-216 GR WCB CS Range of other material options available	SA-351 GR CF8M SS SA-479 Type 316 SS SA-216, Gr. WCB CS	SA-216 GR WCB CS Range of other material options available	SA-216 GR WCB CS	SA-216 GR WCB CS Range of other material options available	
Connections	RF, RTJ, Butt Weld	MNPT, FNPT, Flanged, Socket Weld, Sanitary, Welded Nipple, Special	RF, RTJ, Butt Weld, High Pressure Hub	RF, RTJ	RF, RTJ, Butt Weld, High Pressure Hub, Graylock, API	
Operation	Spring-Over-Disc	Spring-Over-Disc	Snap acting and modulating pilot	Spring-Over-Disc	Spring-Over-Disc	
Typical Applications	Gases, Liquids and Steam	Gases, Liquids and Steam	Gases, Liquids and Steam	Air and Steam	Gases, Liquids and Steam	






Type	350	355 HS	359	365	390
Design					
Description	Globe valve with encapsulated super long bellows and emergency gland	Globe valve with encapsulated super long bellows and emergency gland	Control valve with encapsulated super long bellows and emergency gland	Globe valve with flushed bellows and emergency gland	Globe valve with long flushed bellows and emergency gland
PN DN	10 - 250 15 - 500	325 6 - 120	10 - 250 15 - 250	10 - 40 15 - 100	10 - 40 15 - 150
Pressure Class NPS	150 to 1500 1/2" to 20"	1500 1/4" to 5"	150 to 1500 1/2" to 10"	150 to 300 1/2" to 4"	150 to 300 1/2" to 6"
Temperature Rating	-196°C up to +800°C	-196°C up to +800°C	-196°C up to +650°C	-196°C up to +450°C	-196°C up to +450°C
Body Forms	Straight Pattern Y-Pattern Angle Pattern	Angle Pattern	Straight Pattern Angle Pattern	Straight Pattern	Straight Pattern Y-Pattern Angle Pattern
Basic Shell Material	Carbon Steel Stainless Steel High Chromium S.S. Hastelloy Inconel Pure nickel Titanium Other Special Alloys	Carbon Steel Stainless Steel High Chromium S.S. Hastelloy Inconel Pure nickel Titanium Other Special Alloys	Carbon Steel Stainless Steel High Chromium S.S. Hastelloy Inconel Pure nickel Titanium Other Special Alloys	Carbon Steel	Carbon Steel Stainless Steel High Chromium S.S. Hastelloy Inconel Pure nickel Titanium Other Special Alloys
Connections	Flanged Butt Weld Socket Weld Threaded Other Requirements	Threaded Other Requirements	Flanged Butt Weld Socket Weld Threaded Other Requirements	Flanged Butt Weld Socket Weld Threaded Other Requirements	Flanged Butt Weld Socket Weld Threaded Other Requirements
Operation	Hand Wheel Lever Chain Wheel Gear Operator Pneumatic Actuator Electric Actuator	Hand Wheel Lever Chain Wheel Gear Operator Pneumatic Actuator Electric Actuator	Hand Wheel Chain Wheel Gear Operator Pneumatic Actuator Electric Actuator	Hand Wheel Pneumatic Actuator Electric Actuator	Hand Wheel Chain Wheel Gear Operator Pneumatic Actuator Electric Actuator
Typical Applications	Nuclear island Primary and secondary circuit	High pressure valves for the high pressure synthesis in the chemical industry (e.g. in urea and ammonia plant, hydrocarbons et.) under consideration of the material resistance	For highly toxic, aggressive, inflammable, volatile and expensive media under consideration of the material resistance	acc. to TA-Luft (German "Clean Air Act"), especially for media which are dangerous for environment and ground water, for additional energy saving and reduction of service costs	For highly toxic, aggressive, inflammable, volatile, polymerizing and crystallizing media under consideration of the material resistance

Type	420	820	829	834	899 HS
Design					
Description	Check Valve	Strainer Basket type with extremely large filtering area and low pressure drop	Strainer	Gate Valve with encapsulated super long bellows and emergency gland	Excess Flow Valve (pipe break valve)
PN	10 - 160	10 - 40	10 - 40	10 - 160	325
DN	15 - 250	15 - 250	15 - 150	15 - 800	6 - 120
Pressure Class	150 to 900	150 to 300	150 to 300	150 to 900	2500
NPS	1/2" to 10"	1/2" to 10"	1/2" to 6"	1/2" to 30"	1/4" to 5"
Temperature Rating	-196°C up to +450°C	-196°C up to +450°C	-196°C up to +450°C	-196°C up to +800°C	-196°C up to +800°C
Body Forms	Straight Pattern Y-Pattern Angle Pattern	Straight Pattern	Y-Pattern	Straight Pattern	Straight Pattern
Basic Shell Material	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Titanium Other special alloys	Carbon steel Stainless steel High chromium stainless steel Hastelloy Other special alloys	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Titanium Other special alloys	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Titanium Other special alloys	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Titanium Other special alloys
Connections	Flanged Butt Weld Socket Weld Threaded Other requirements	Flanged Butt Weld Socket Weld Threaded Other requirements	Flanged Butt Weld Socket Weld Threaded Other requirements	Flanged Butt Weld Socket Weld Threaded Other requirements	Threaded Flanged Other Requirements
Operation	Spring Loaded	Passive	Passive	Hand wheel Chain wheel Gear operator Electric actuator	Passive
Typical Applications	For aggressive gases and liquids as far as these are not toxic, inflammable or detrimental to environment under consideration of the material resistance	In front of measuring equipment to protect sensitive valves, pumps, aggregates and similar plant components under consideration of the material resistance	In front of measuring equipment to protect sensitive valves, pumps, aggregates and similar plant components under consideration of the material resistance	For highly toxic, aggressive, inflammable, volatile and expensive media under consideration of the material resistance	High pressure valves for the high pressure synthesis in the chemical industry (e.g. in urea and ammonia plant, hydrocarbons et.) under consideration of the material resistance




Type	506 / 525	570 / 535	580 / 582 / 584	587	597	589	599
Design							
Description	Globe valve with stuffing box seal, coupled divided stem, renewable disc and seat	Globe valve with encapsulated bellows and emergency gland, coupled divided stem, renewable disc and seat	Pressure gauge valve with stuffing box seal, vent screw (DIN 16270), test connection (DIN 16271), blocking test connection (DIN 16272)	Pressure gauge valve with test connection, stuffing box seal, coupled divided stem, renewable disc and seat	Pressure gauge valve with test connection, bellows and emergency gland, coupled divided stem, renewable disc and seat	Pressure gauge valve with blocking test connection, stuffing box seal, coupled divided stem, renewable disc and seat	Pressure gauge valve with blocking test connection, bellows and emergency gland, coupled divided stem, renewable disc and seat
PN	400 / 630	250 / 400	400	400	250	400	250
DN	8	8	3,5	3,5	3,5	3,5	3,5
Class	2500	1500 / 2500	2500	2500	1500	2500	1500
NPS	1/4"	1/4"	1/8"	1/8"	1/8"	1/8"	1/8"
Temperature Rating	-196°C up to +650°C	-196°C up to +650°C	-40°C up to +120°C	-196°C up to +450°C	-196°C up to +450°C	-196°C up to +450°C	-196°C up to +450°C
Body Forms	Straight Pattern Angle Pattern	Straight Pattern Angle Pattern	Straight Pattern	Straight pattern body	Straight pattern body	Straight pattern body	Straight pattern body
Basic Shell Material	Carbon Steel Stainless Steel High Chromium SSt Hastelloy Inconel Pure Nickel Titanium Other special alloys	Carbon Steel Stainless Steel High Chromium SSt Hastelloy Inconel Pure Nickel Titanium Other special alloys	Carbon steel Stainless steel Brass Other special alloys	Carbon Steel Stainless Steel High Chromium SSt Hastelloy Inconel Pure Nickel Titanium Other special alloys	Carbon Steel Stainless Steel High Chromium SSt Hastelloy Inconel Pure Nickel Titanium Other special alloys	Carbon Steel Stainless Steel High Chromium SSt Hastelloy Inconel Pure Nickel Titanium Other special alloys	Carbon Steel Stainless Steel High Chromium SSt Hastelloy Inconel Pure Nickel Titanium Other special alloys
Connections	Butt Weld Socket Weld Threaded Flanged Other Requirements	Butt Weld Socket Weld Threaded Flanged Other Requirements	Inlet: Male plug G 1/2 acc. to DIN EN 837-1 Outlet: Male plug G 1/2-LH with adjusting nut G 1/2 (form A) or female G 1/2 (form B) Test: Male plug M 20x1,5	Inlet: Butt and socket welding ends, threaded ends Outlet: Male plug G 1/2-LH with adjusting nut G 1/2 acc. to DIN 16283 Test: Male plug M 20x1,5	Inlet: Butt and socket welding ends, threaded ends Outlet: Male plug G 1/2-LH with adjusting nut G 1/2 acc. to DIN 16283 Test: Male plug M 20x1,5	Inlet: Butt and socket welding ends, threaded ends Outlet: Male plug G 1/2-LH with adjusting nut G 1/2 acc. to DIN 16283 Test: Male plug M 20x1,5	Inlet: Butt and socket welding ends, threaded ends Outlet: Male plug G 1/2-LH with adjusting nut G 1/2 acc. to DIN 16283 Test: Male plug M 20x1,5
Operation	Hand wheel T-handle Pneumatic actuator Electric actuator	Hand wheel T-handle Pneumatic actuator Electric actuator	Hand wheel	Hand wheel T-handle	Hand wheel T-handle	Hand wheel T-handle	Hand wheel T-handle
Typical Applications	For liquids, gases and vapors under consideration of the material resistance, also be used as first interception valve	For highly toxic, aggressive, inflammable, volatile and expensive media under consideration of the material resistance, also be used as first interception valve	For liquids, gases and vapors under consideration of the material resistance	For liquids, gases and vapors under consideration of the material resistance	For highly toxic, aggressive, inflammable, volatile and expensive media under consideration of the material resistance	For liquids, gases and vapors under consideration of the material resistance	For highly toxic, aggressive, inflammable, volatile and expensive media under consideration of the material resistance






Type	664	661	662	626	630	631	659
Design							
Description	Pressure gauge valve with encapsulated bellows and emergency gland, vent screw, coupled divided stem, integral seat	Globe valve with stuffing box seal, coupled divided stem, integral seat	Globe valve with encapsulated bellows and emergency gland, coupled divided stem, integral seat	Manifold with 3 valves and test connection, stuffing box seal, coupled divided stem, renewable disc and seat	Manifold with 5 valves and test connection, stuffing box seal, coupled divided stem, renewable disc and seat	Manifold with 5 valves and test connection, bellows and emergency gland, coupled divided stem, renewable disc and seat	Manifold with 3 valves and test connection, bellows and emergency gland, coupled divided stem, renewable disc and seat
PN	100	160	100	400	400	250	250
DN	3,5	8	8	8	8	8	8
Class	600	900	600	2500	2500	1500	1500
NPS	1/8"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"
Temperature Rating	-196°C up to +450°C	-196°C up to +450°C	-196°C up to +450°C	-196°C up to +650°C	-196°C up to +650°C	-196°C up to +650°C	-196°C up to +650°C
Body Forms	Straight Pattern Angle Pattern	Straight Pattern Angle Pattern	Straight Pattern Angle Pattern	Straight Pattern	Straight Pattern	Straight Pattern	Straight Pattern
Basic Shell Material	Carbon Steel Stainless Steel Other special alloys	Carbon Steel Stainless Steel Other special alloys	Carbon Steel Stainless Steel Other special alloys	Carbon Steel Stainless Steel High Chromium SSt Hastelloy Inconel Pure Nickel Titanium Other special alloys	Carbon Steel Stainless Steel High Chromium SSt Hastelloy Inconel Pure Nickel Titanium Other special alloys	Carbon Steel Stainless Steel High Chromium SSt Hastelloy Inconel Pure Nickel Titanium Other special alloys	Carbon Steel Stainless Steel High Chromium SSt Hastelloy Inconel Pure Nickel Titanium Other special alloys
Connections	Inlet: Butt and socket welding ends, threaded ends Outlet: Male plug G 1/2-LH with adjusting nut G 1/2 acc. to DIN 16283 Test: Male plug M 20x1,5	Butt Weld Socket Weld Threaded Flanged Other Requirements	Butt Weld Socket Weld Threaded Flanged Other Requirements	Inlet: Butt and socket welding ends, threaded ends Outlet: Directly flanged to transducer (acc. to DIN 19213) Test: Male plug M 20x1,5	Inlet: Butt and socket welding ends, threaded ends Outlet: Directly flanged to transducer (acc. to DIN 19213) Test: Male plug M 20x1,5 Drain valve: Male plug G 1/2	Inlet: Butt and socket welding ends, threaded ends Outlet: Directly flanged to transducer (acc. to DIN 19213) Test: Male plug M 20x1,5 Drain valve: Male plug G 1/2	Inlet: Butt and socket welding ends, threaded ends Outlet: Directly flanged to transducer (acc. to DIN 19213) Test: Male plug M 20x1,5
Operation	Hand wheel T-handle	Hand wheel T-handle Pneumatic actuator Electric actuator	Hand wheel T-handle Pneumatic actuator Electric actuator	T-handle	T-handle	T-handle	T-handle
Typical Applications	For highly toxic, aggressive, inflammable, volatile and expensive media under consideration of the material resistance	For liquids, gases and vapors under consideration of the material resistance, also be used as first interception valve	For highly toxic, aggressive, inflammable, volatile and expensive media under consideration of the material resistance, also be used as first interception valve	For liquids, gases and vapors under consideration of the material resistance	For liquids, gases and vapors under consideration of the material resistance	For highly toxic, aggressive, inflammable, volatile and expensive media under consideration of the material resistance	For highly toxic, aggressive, inflammable, volatile and expensive media under consideration of the material resistance

Type	TOSV Butterfly valve	TOSV Double Block & Bleed Butterfly valve	T-Series Butterfly valve	R-Series Butterfly valve	E-Series Butterfly valve	Control Butterfly valve
Design						
Description	Triple Offset Metal Seated Butterfly Valves	Triple Offset Metal Seated Twin Disk Double Isolation (DB&B) Butterfly Valve	Double Offset PTFE Seated Butterfly valves	Double Offset Rubber Seated Butterfly valves	Double Offset Rubber Seated or Ebonite Lined Butterfly valves	Double or Triple Offset Butterfly Valves
PN DN	16 - 250 50 - 2100	16 - 250 50 - 1200	16 - 40 80 - 1200	16 - 40 50 - 3500	16 50 - 2100	As TOSV, T, R & E Series
Pressure Class NPS	150 - 1500 2" to 84"	150 - 1500 2" to 48"	150 - 300 3" to 48"	150 - 300 2" to 138"	150 - 300 2" to 84"	As TOSV, T, R & E Series
Temperature Rating	Up to 1292°F (700°C)	Up to 800°F (425°C)	Up to 400°F (204°C)	Up to 400°F (204°C)	Up to 200°F (90°C)	As TOSV, T, R & E Series
Body Forms	Butterfly	Butterfly	Butterfly	Butterfly	Butterfly	Butterfly
Basic Shell Material	Carbon Steel Stainless Steel Duplex Stainless Steels 6 Mo Stainless Steel Bronze Monel Incoloy Hastelloy B and C Titanium	Carbon Steel Stainless Steel Duplex Stainless Steels 6 Mo Stainless Steel Bronze Monel Incoloy Hastelloy B and C Titanium	Carbon Steel Stainless Steel Duplex Stainless Steels 6 Mo Stainless Steel Bronze Monel Incoloy Hastelloy B and C Titanium	Carbon Steel Stainless Steel Duplex Stainless Steels 6 Mo Stainless Steel Bronze Monel Incoloy Hastelloy B and C Titanium	Carbon Steel Stainless Steel Duplex Stainless Steels 6 Mo Stainless Steel Bronze Monel Incoloy Hastelloy B and C Titanium	Carbon Steel Stainless Steel Duplex Stainless Steels 6 Mo Stainless Steel Bronze Monel Incoloy Hastelloy B and C Titanium
Connections	Wafer, Lugged, Double Flanged & B16.10 face to face	Double Flanged B16.10 face to face	Wafer, Lugged, Double Flanged	Wafer, Lugged, Double Flanged	Wafer, Lugged, Double Flanged	As TOSV, T, R & E Series
Operation	Manual Gearbox Pneumatic Hydraulic Electro-Hydraulic Electric	Manual Gearbox Pneumatic Hydraulic Electro-Hydraulic Electric	Manual Gearbox Pneumatic Hydraulic Electro-Hydraulic Electric	Manual Gearbox Pneumatic Hydraulic Electro-Hydraulic Electric	Manual Gearbox Pneumatic Hydraulic Electro-Hydraulic Electric	Manual Gearbox Pneumatic Hydraulic Electro-Hydraulic Electric
Typical Applications	High Temperature Isolation Hardened Vent	Hydrocarbon Gas and Liquid Lines Flare gas Water Filtration Metering Fire Systems Steam Isolation All metal construction ensures inherently fire safe design	Hydrocarbon Gas and Liquid lines Chemical Offshore in fire mains and produced water Can be fitted with fire safe seat - Inconel 625 secondary seal	Seawater Cooling water Service Water	Seawater	As TOSV, T, R & E Series









Type	S 20 / S 24	S 04 / S 03	S 21	S 02	S 17
Design					
Description	Globe valve with stuffing seal and rotating or non rotating, rising stem	Gate valve with stuffing seal and non rotating , rising stem	Globe valve with integrated stuffing seal in the body, non rotating and rising stem	Gate valve API 600	Gate valve with stuffing box seal
PN DN	10 - 160 15 - 300	10 - 160 50 - 600	630 10 - 50	10 - 160 50 - 1200	16 - 400 15 - 50
Class NPS	150 to 2500 1/2" to 18"	150 - 2500 2" to 40"	4500 1/2" to 2-1/2"	150 - 2500 2" to 48"	150 - 2500 1/2" to 2"
Temperature Rating	-196°C up to +650°C	-196°C up to +800°C	-196°C up to +650°C	-196°C up to +650°C	-196°C up to +650°C
Body Forms	Straight pattern body Y-pattern body Angle pattern body	Circular and flat types Straight pattern body	Straight pattern body	Straight pattern body	Straight pattern body
Basic Shell Material	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Other special alloys	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Other special alloys	Carbon steel Stainless steel Other special alloys	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Other special alloys	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Other special alloys
Connections	Flanged ends Butt welding ends Socket welding ends Threaded ends Other requirements	Flanged ends Butt welding ends Socket welding ends Threaded ends Other requirements	Flanged ends Butt welding ends Socket welding ends Threaded ends Other requirements	Flanged ends Butt welding ends	Flanged ends Butt welding ends Socket welding ends Other requirements
Operation	Hand wheel Lever Chain wheel Gear operator Pneumatic actuator Electric actuator	Hand wheel Lever Chain wheel Gear operator Pneumatic actuator Electric actuator	Hand wheel Chain wheel Pneumatic actuator Electric actuator	Hand wheel Lever Chain wheel Gear operator Pneumatic actuator Electric actuator	Hand wheel Electric actuator
Typical Applications	For gases and liquids as well as boiler and cooling water, saturated steam and similar under consideration of the materials resistance	For gases and liquids as well as boiler and cooling water, saturated steam and similar under consideration of the materials resistance	Nuclear island Primary and secondary circuit	For gases and liquids as well as boiler and cooling water, saturated steam and similar under consideration of the materials resistance refining and chemical processes	Chemical- and petrochemical plants

Strack Forged Valves

Type	S 15	S 16	S 22	S601 & S603	S 70 / S 25
Design					
Description	Forged - high pressure Gate valve with stuffing box seal and pressure seal bonnet	Forged - high pressure Gate valve with stuffing box seal and bolted bonnet	Forged - high pressure Globe valve with stuffing box seal and pressure seal bonnet	Forged - high pressure Preheater valve with pressure sealed bonnet	Check valve
PN DN	160 - 630 50 - 600	160 - 400 50 - 600	160 - 630 50 - 250	160 - 400 150 - 600	16 - 100 50 - 500
Class NPS	900 - 4500 2" to 24"	900 - 4500 2" to 24"	900 - 4500 2" to 12"	900 - 2500 2" to 24"	150 - 2500 2" to 40"
Temperature Rating	-196°C up to +650°C	-196°C up to +650°C	-196°C up to +650°C	up to +550°C	-196°C up to +650°C
Body Forms	Straight pattern body	Straight pattern body	Straight pattern body Y-pattern body Angle pattern body	Quick Closing 3-way valve and T- or Angel Quick Closing Check valve	Swing and Piston check types
Basic Shell Material	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Other special alloys	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Other special alloys	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Other special alloys	Carbon steel	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Other special alloys
Connections	Flanged ends Butt welding ends Socket welding ends Threaded ends Other requirements	Flanged ends Butt welding ends Socket welding ends Threaded ends Other requirements	Flanged ends Butt welding ends Socket welding ends Threaded ends Other requirements	Butt welding ends	Flanged ends Butt welding ends Socket welding ends Other requirements
Operation	Hand wheel Lever Chain wheel Gear operator Electric actuator	Hand wheel Lever Chain wheel Gear operator Electric actuator	Hand wheel Lever Chain wheel Gear operator Pneumatic actuator Electric actuator		
Typical Applications	Chemical plants, petrochemical plants and offshore power plants, including the new generation of power plants with temperatures up to 650°C	Chemical plants, petrochemical plants and offshore	Chemical plants, petrochemical plants and offshore power plants, including the new generation of power plants with temperatures up to 650°C	Power Plants	High demanding valves for special and dangerous services

Type	S 27	S 29	S 50	S 51	S 72
Design					
Description	Piston Check valve spring loaded option	Strainer	Lift plug valve, non-lubricated	Three way lift plug valve special design, non lubricated	Forged - high pressure Swing check valve with pressure sealed bonnet
PN DN	630 10 - 65	630 10 - 250	10 - 160 15 - 500	10 - 100 25 - 300	160 - 400 50 - 600
Class NPS	4500 1/2" to 2-1/2"	4500 1/2" to 10"	300 to 1500 1/2" to 20"	300 1" - 12"	900 - 4500 2" to 24"
Temperature Rating	-196°C up to +650°C	-196°C up to +650°C	-196°C up to +800°C	-196°C up to +650°C	-196°C up to +650°C
Body Forms	Straight pattern body	Straight pattern body Y-pattern body	Straight pattern body	Three way and four way design	Straight pattern body
Basic Shell Material	Carbon steel Stainless steel High temperature stainless steel Other special alloys	Carbon steel Stainless steel Other special alloys	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Titanium Monel 6Mo Other special alloys	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Titanium Other special alloys	Carbon steel Stainless steel High chromium stainless steel Hastelloy Inconel Pure nickel Other special alloys
Connections	Flanged ends Butt welding ends Socket welding ends Threaded ends Other requirements	Flanged ends Butt welding ends Socket welding ends Threaded ends Other requirements	Flanged ends Butt welding ends Socket welding ends Other requirements	Flanged ends Butt welding ends Other requirements	Flanged ends Butt welding ends Socket welding ends Threaded ends Other requirements
Operation			Hand wheel and lever Pneumatic actuator Electric actuators	Hand wheel and lever Pneumatic actuator Electric actuators	
Typical Applications	High pressure and temperature service in power plants for non aggressive liquids, gases and vapors	In front of measuring equipment to protect sensitive valves, pumps, aggregates and similar plant components under consideration of the material resistance	Valves for special services, abrasive, synthetic media and Off-Shore	High demanding valves for special services abrasive, synthetic media	Chemical plants, petrochemical plants and offshore power plants, including the new generation of power plants with temperatures up to 650°C

Target Rock Solenoid and Safety/Relief Valves

Type	Solenoid Operated Isolation Valves	Solenoid Operated Control Valves	Pilot Operated Safety Valves	Direct Acting Safety Valves	Safety/Relief Valves	Pressure Regulators	Vacuum Relief Valves	Severe Service MOVs
Design								
Description	Solenoid Operated Isolation Valves	Modulating Solenoid Operated Control Valves	Safety and Relief Valves	Safety and Relief Valves	Safety and Relief Valves	Pressure regulators for Water and Gas	Vacuum Relief	Gate and Globe Valves for High Pressure and Severe Service Applications
PN DN	400 15 - 200	400 25 - 200	400 150 x 250	250 200 x 250	400 15 - 75 (inlet)	400 15 - 25	25 to 100	400 50 - 150
Pressure Class NPS	2500 1/2" to 8"	2500 1" to 8"	2500 6" x 10"	1500 8" x 10"	2500 1/2 - 3 (inlet)	2500 1/2" to 1"	1" to 4"	2500 2" to 6"
Temperature Rating	700F	700F	700F	680F	680F	400F	Ambient	680F
Body Forms	Y-Pattern T-Pattern Angle Pattern	Y-Pattern	Angle Pattern	Angle Pattern	Angle Pattern	Y-Pattern	Straight Pattern Y-Pattern	Y-Pattern T-Pattern
Basic Shell Material	ASME SA-182 316/316L ASME SA-105	ASME SA-182 316/316L ASME SA-105	ASME SA-182 316/316L ASME SA-105	ASME SA-105	ASME SA-182 316/316L ASME SA-105	ASME SA-182 316/316L ASME SA-105	ASME SA-182 316/316L ASME SA-105	ASME SA-182 316/316L ASME SA-105
Connections	Flanged Butt Weld Socket Weld Threaded Other requirements	Flanged Butt Weld Socket Weld	Flanged Butt Weld	Flanged	Flanged Butt Weld Socket Weld Threaded Other requirements	Flanged Butt Weld Socket Weld Threaded Other requirements	Flanged Butt Weld Socket Weld Threaded Other requirements	Flanged Butt Weld Socket Weld
Operation	Integral solenoid operator	Modulates by integral solenoid operator controlled by separate electronic controller based on 4 - 20 mA demand signal	Pilot operator based on Target Rock proprietary machined metal bellows used as a pressure sensor with Optional pneumatic override.	Spring over disc Bellville springs Optional pneumatic override	Spring over disc Lifting lever Test gag	Metal Bellows Rubber Diaphragm	Spring over Disc	Motor Operator
Typical Applications	Reactor Head Vent Sampling Isolation PORV Containment Isolation	Emergency Feedwater Control Pressurizer Spray Emergency Core Cooling	Main Steam Safety Valve Main Steam Safety Relief Valve Pressurizer Safety Valve	Main Steam Safety Valve Main Steam Safety Relief Valve	Over-Pressure Protection of Safety System Piping and Vessels	Safety-Related Nitrogen Accumulators Component Cooling Control Room Habitability	Safety Related Storage Tanks with Nitrogen Blankets	RCS Emergency Depressurization Systems Emergency Core Cooling Systems

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