

Power Steam Valve Suppliers

Edited 3-22

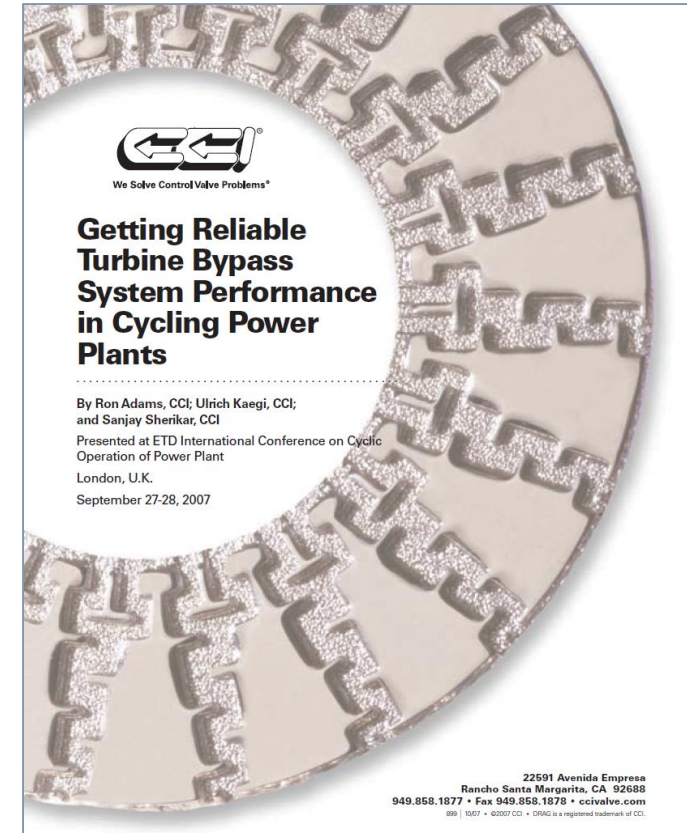
Bray metal seated ball valves

- 2 PIECE FLANGED FULL PORT
1/2" - 8" (15MM - 200MM)
- Flow-Tek, Inc. uni-directional, metal seated design as an additional option to our full port Flanged Series. This option increases the temperature rating to 750°F (399°C) and enhances wear resistance, while maintaining the proven safety and reliability of existing Flow-Tek valves. With our modular, interchangeable part system, the modification kit can be used in our ASME and DIN valves for sizes ranging from 1/2" - 8" (DN 15-200). A DIN version FD15/FD30 is also available

CCI link in Mcilvaine GTCC Decision Guide

(Click here for hyperlink to documents)

- **Resource Title:** CCI Getting Reliable Turbine Bypass Performance in Cycling Power Plants
- **Location:** GdPS for CCGT Valve Selection
- **Keyword:** Turbine-Bypass
- **Discussion:** Contributing factors to problems in turbine bypass systems were traced to faulty control algorithms, over-sized spray water valves, leaking spray water lines, thermal shock, and improper system layout.



CCI -Combined cycle severe service applications

Common Severe Service Applications – Combined Cycle Power Plants



- Main Boiler Feedpump Recirculation
- Start-up & Main Feedwater Regulation
- Turbine Bypass Systems
- Attemperation & Spraywater Control
- Auxiliary Steam
- Vent Valves
- Condensate Recirc valves



STRICTLY PRIVATE AND CONFIDENTIAL

Circor

- Trunnion Mounted ON-OFF ball valves Side entry-bolted body, top entry and fully welded are available with Metal or Soft seats. Specific designs have been developed for HIPPS, SIL3, Sub-sea, Cryogenic, High Temperature, Slurry / Erosive applications, in addition to the Three way ball valves and any “Custom” engineered ball valve.
- Trunnion Mounted CONTROL ball valves Specifically designed to handle very high flow rates or very high differential pressures our exclusive CAGEBALL™, patented HYPER CAGEBALL™ and HYPER SILENT™ concepts have been integrated with the basic features of our trunnion mounted On-Off ball valves.

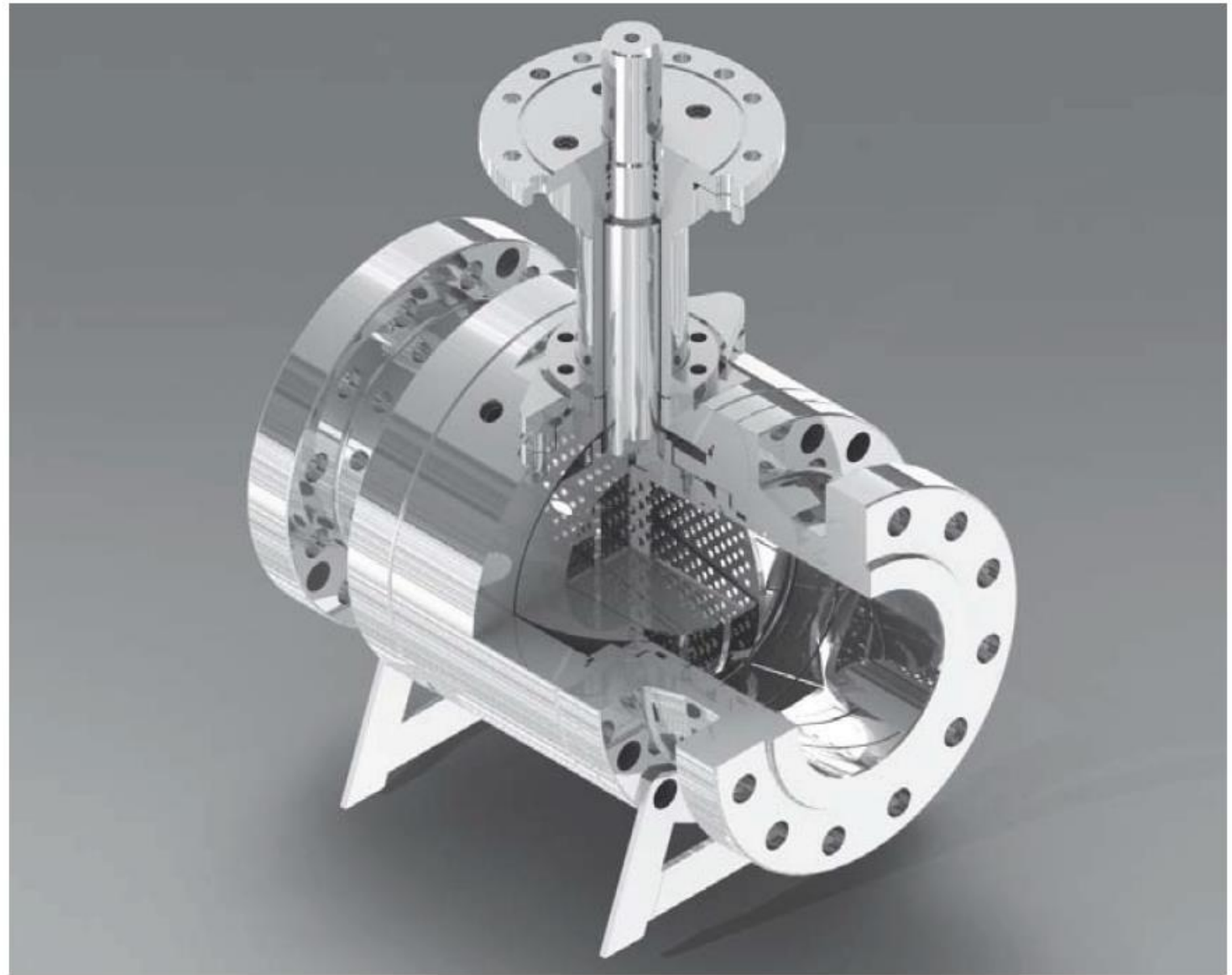
Circor-Pibiviesse side entry ball valves

- Pibiviesse side entry ball valves are manufactured in a wide range of diameters and pressure classes. Pibiviesse valves are specified for transmission pipelines, pumping, compression and re-injection units, offshore platforms, onshore terminals, pig traps, measuring stations and any critical applications such as subsea installations, cryogenic service in LNG plants, high temperature and abrasive services. The valves can be made in the various grades of carbon steel, stainless steel and high alloys thus complying with the most severe service conditions

Pibiviesse Axial Rotary control ball valves are developed with the proprietary CAGEBALL™ technology, in accordance to International Standard ISA S75, IEC 534.

The ball has an integrated patented Cage trim to eliminate or minimize the hydro or aerodynamic flow control disturbances. The Cage is designed to meet the Project requirements with a number of attenuating plates to divide the pressure drop in stages and reduce the noise generated by the pressure regulation.

The attenuating plates are an integral part of a replaceable cartridge and are specifically designed to obtain a number of significant control advantages, such as reduction of noise, high frequency vibrations and cavitation. This advanced trim allows a bidirectional control of the flow.



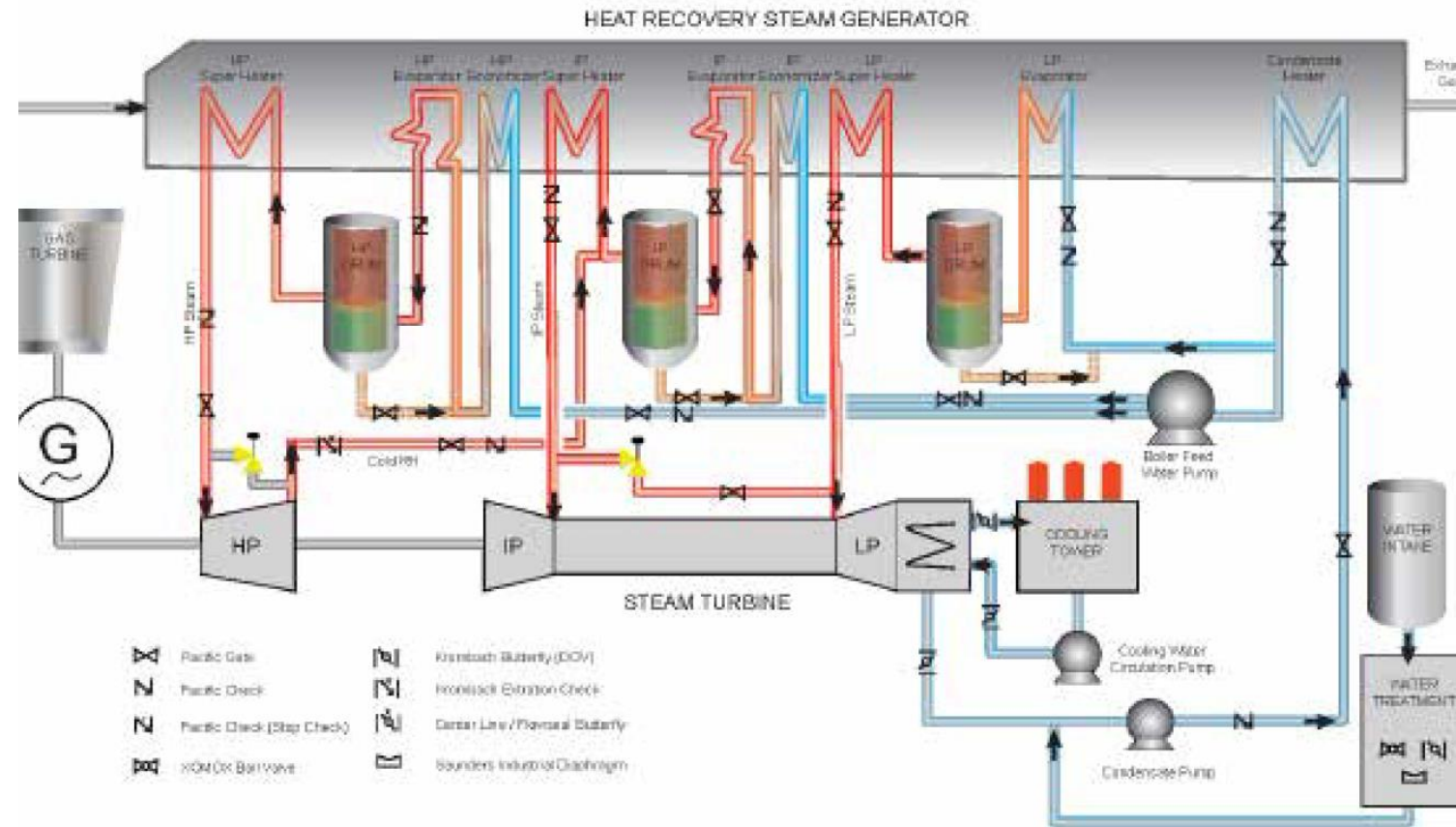
CAGEBALL™ control ball valves are particularly recommended any time that noise reduction, cavitation control, erosion, hydrate formation, plugging and clogging risk are present or handling of very large flow rates is a challenge for conventional valves.

Side Entry Circor Valves

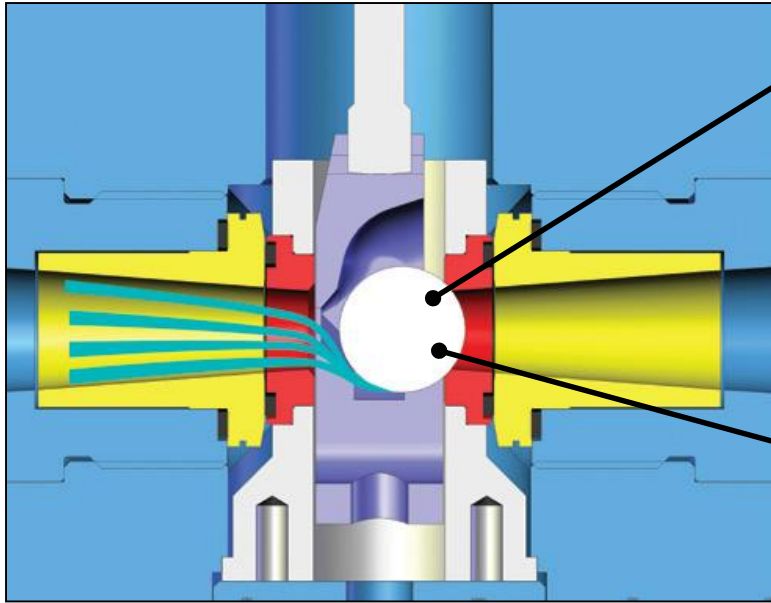
- Model > E Size > 1.5" trough 64"
- Classes > 150 trough 2500 and API 3000 to 15000
- Temperature > -193 °C to 400°C
- Design & Features >
 - Trunnion mounted ball >
 - Triple barrier stem seals
 - Anti-Blow Out stem design
 - Stem separated from the ball
 - Bearing blocks adsorbing the pressure load on the ball
 - Single or Double piston effect sealing barrier in both directions
 - Built in grease & sealant injection system for emergency stem and seat seal
 - Self lubricating PTFE sleeve bearings and thrust washer reducing torque and to extend service life
 - Body thickness in accordance with ASME B16.34
 - Bolting design to ASME VIII as standard. Different design available on request
 - Plastic polymer insert, O-Ring or Metal to metal seat sealing
 - Inconel 625 or 316 overlay on sealing areas or on all wetted areas when required
 - Integral stop in the adapter plate for a permanent reference of open and closed position
 - Antistatic device
 - Double Block and Bleed

Crane Forged Valves

Combined Cycle Power Plant



DFT Control Valve - Shut Off

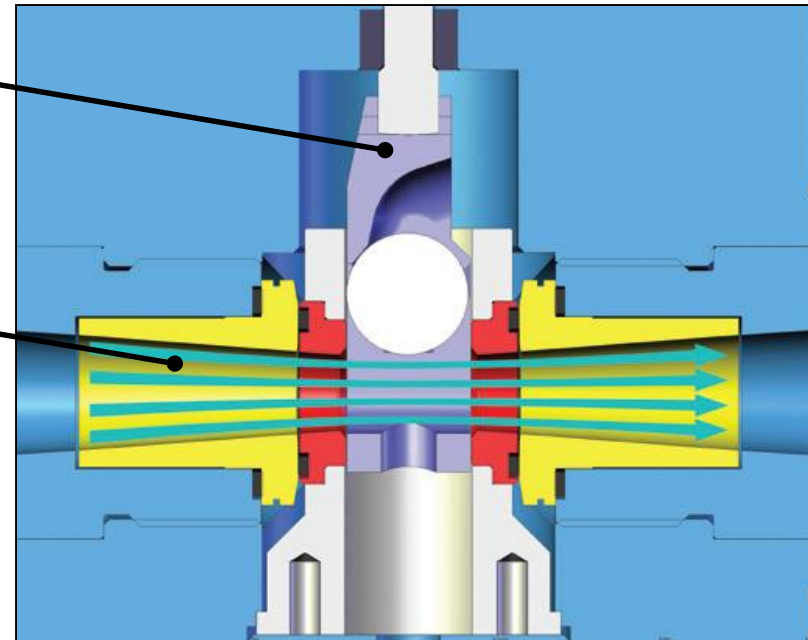


■ Upstream pressure pushes the Ball into a lapped downstream Seat face, which yields high unit loading for exceptionally tight closure.

■ The Ball changes positions each time the valve is cycled, which results in a new seating surface each time it closes.

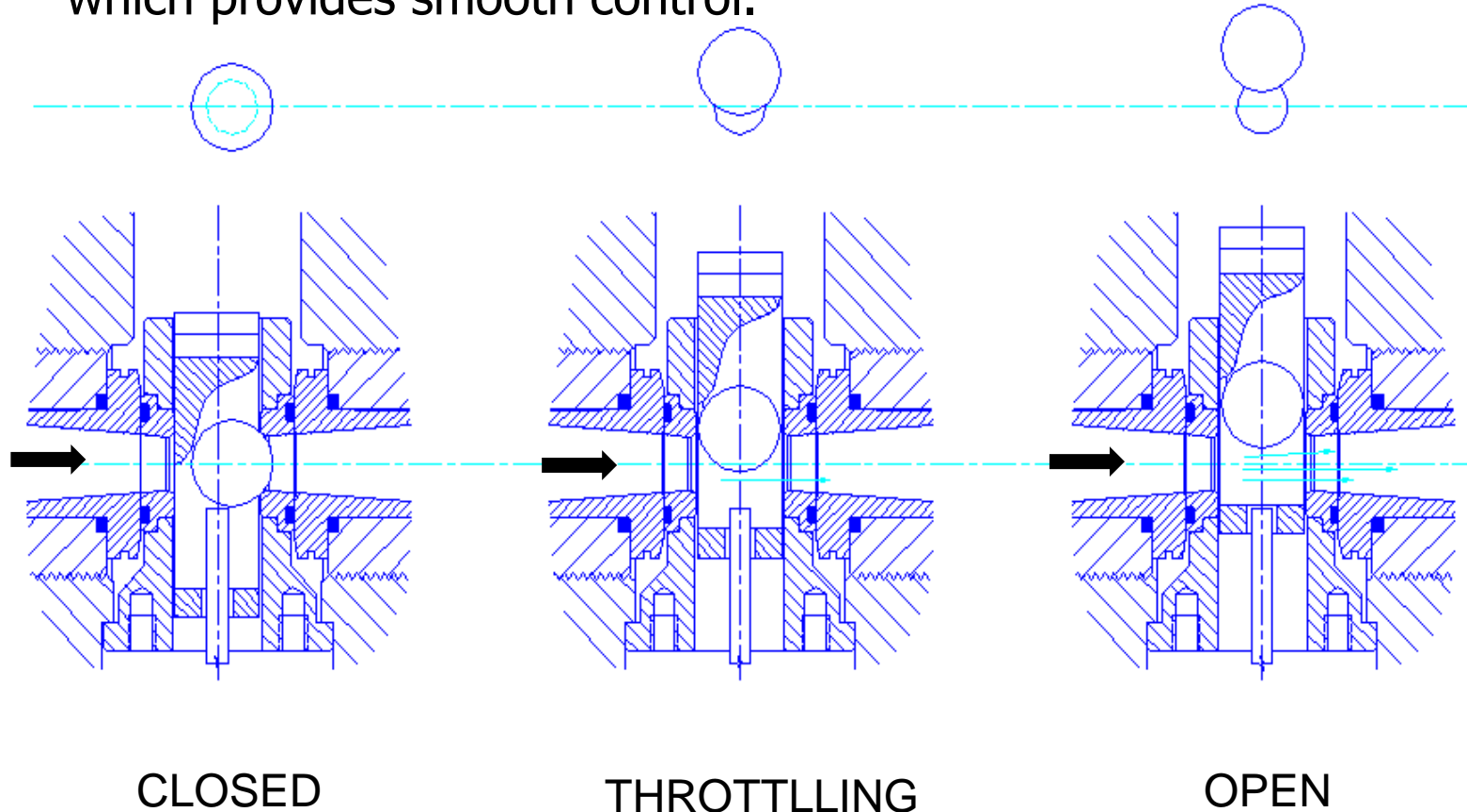
DFT Control Valve - Open Position

- ⦿ The Cage lifts the Ball completely out of flow for a full unobstructed opening.
- ⦿ Straight-thru flow path. No turns within valve body.
- ⦿ In this position, the Valve operates as a true venturi.



DFT Control Valves - Flow Characteristics

Fluid is controlled by moving the Ball in and out of the flow stream. The moving Ball creates a variable eclipsed orifice which provides smooth control.



DFT Severe Service Applications

- ◎ Feedwater Pump Recirculation
- ◎ Feedwater Control
- ◎ Drum Level Control
- ◎ DA Level Control
- ◎ Reheat Spray
- ◎ Superheat Spray
- ◎ Auxiliary Steam



Erreesse Trunnion Ball Valve Side Entry Split Body – High temperature

Metal seated with metal sealing and stem extension for steam service and high temperature applications. The special design is suitable for service from 250°C up to 700°C and over.

Temperature range	-29° to > 700°C (-20° to > 1292°F)
Pressures range	PN20 (ANSI 150) to PN420 (ANSI 2500)
Size range	DN15 (1/2") to DN1400 (56")



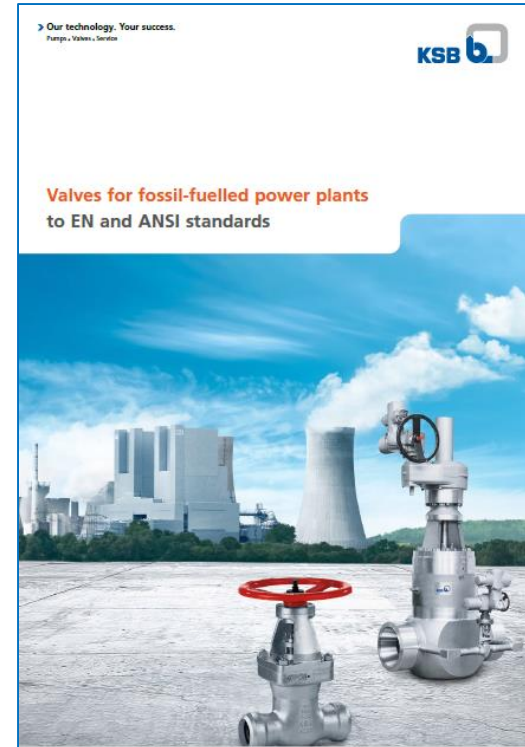
Flowserve

- Flowserve Corporation (NYSE: FLS), a leading provider of flow control products and services for the global infrastructure markets, today announced it booked, in the second quarter of 2009, a multi-million dollar order from Korea Hydro & Nuclear Power Co. Ltd (KHNP) **for main steam and main feedwater isolation valves.**
- The valves will be used at KHNP's Shin-Kori 3 and 4 nuclear plant's Pressurized Water Reactors (PWRs), which are currently under construction and scheduled for commercial operation in 2013 and 2014, respectively. Shin-Kori 3 and 4 represent the first two reactors built to KHNP's new APR-1400 reactor design.
- "This order is a direct result of Flowserve's 20-year relationship with KHNP, and our long history of providing solutions to the nuclear power industry," said Mark Blinn, Flowserve President and Chief Executive Officer. "We are proud to play such an important role in the production of clean, emissions-free energy in South Korea and around the world."
- "Flowserve's expertise and global presence allow us to meet our customers' needs in the critical nuclear power industry," said Tom Pajonas, President, Flowserve Flow Control Division. "Our dedication to the manufacture and long-term service of these valves are important aspects of our strategy."
- PWR nuclear power technology involves heating de-mineralized water in the reactor core. This hot, high pressure water is pumped through a steam generator to produce a continuous supply of steam for driving electricity generating turbines. The cooled demineralized water then returns to the reactor core in a continuous cycle. Flowserve main steam isolation valves (MSIVs) and feedwater isolation valves play an important role in emergency nuclear power plant shut downs by preventing the reactor from losing its protective cooling water.

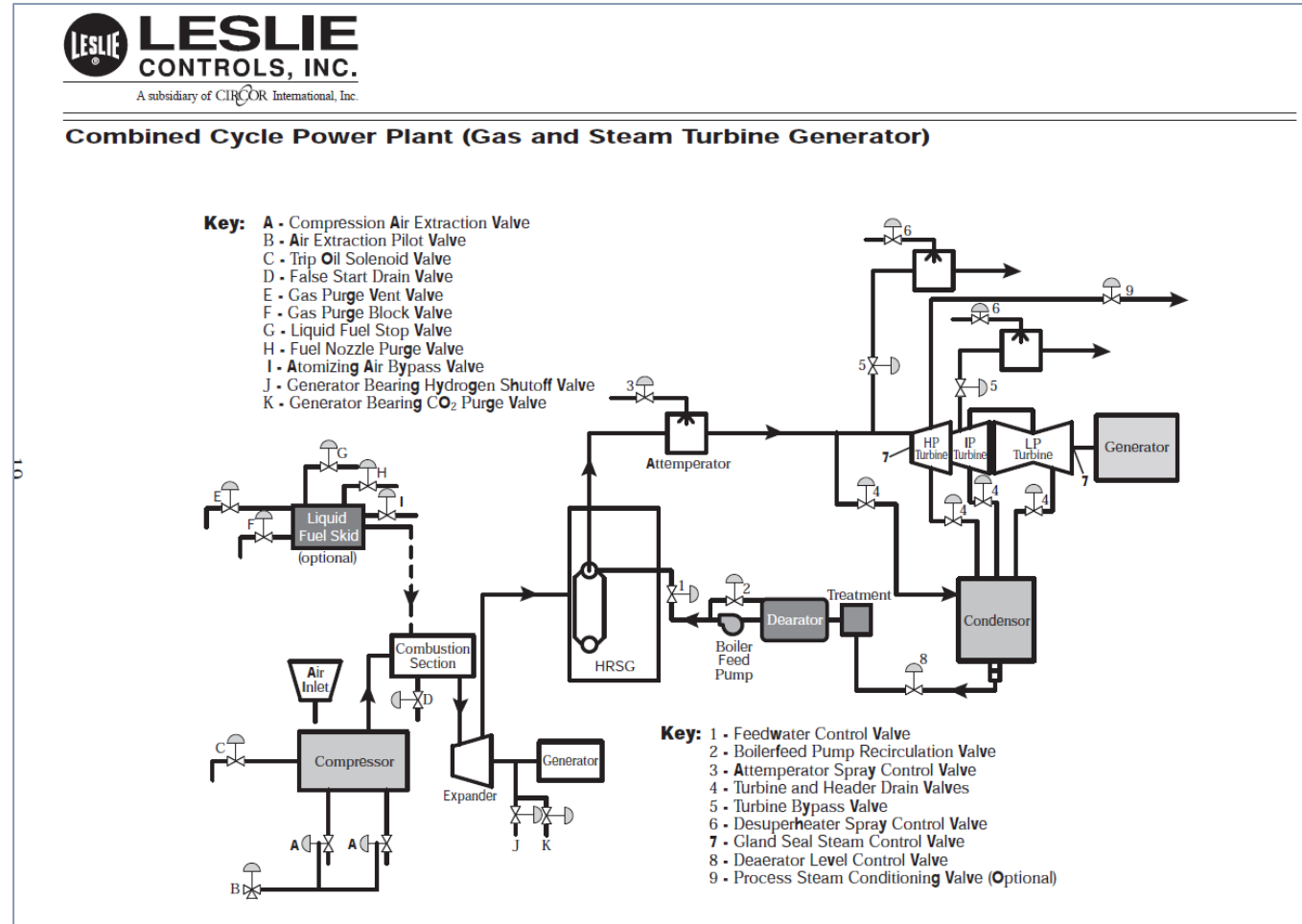
KSB link in Mclvaine GTCC Decision Guide

(Click here for hyperlink to documents)

- **Resource Title:** KSB Valves for Fossil Fueled Power Plants
- **Keyword:** Standards
- **Discussion:** The demands placed on components in power plant applications are immense. This is particularly the case for valves that are used to reliably shut off water and steam. These must withstand enormous heat and pressure and have to fulfill the exacting requirements of standards and codes such as DIN / EN, ASME / ANSI or IBR.



Leslie-Major Valves in CCGT Water & Steam Cycle



MEC coated valves advantages

- MEC which introduces a new surface coated ball and gate valves used in the petrochemical industry, with improved wear resistance and reliability.
- Surface engineering developed at MEC has produced a hardcoating solution of ball and gate valves for METAL TO METAL (MTM) seals, as typically used in the oil and petrochemical industries and for power generation and marine application. MTM valves have very clear advantages over soft seated valves.
- a) Ability to operate in a wide temperature range ;from cryogenic to very high temperatures.
- b) Excellent corrosion, wear and abrasive resistance.
- c) Firesafe&Extended(Service)LifeCycle.

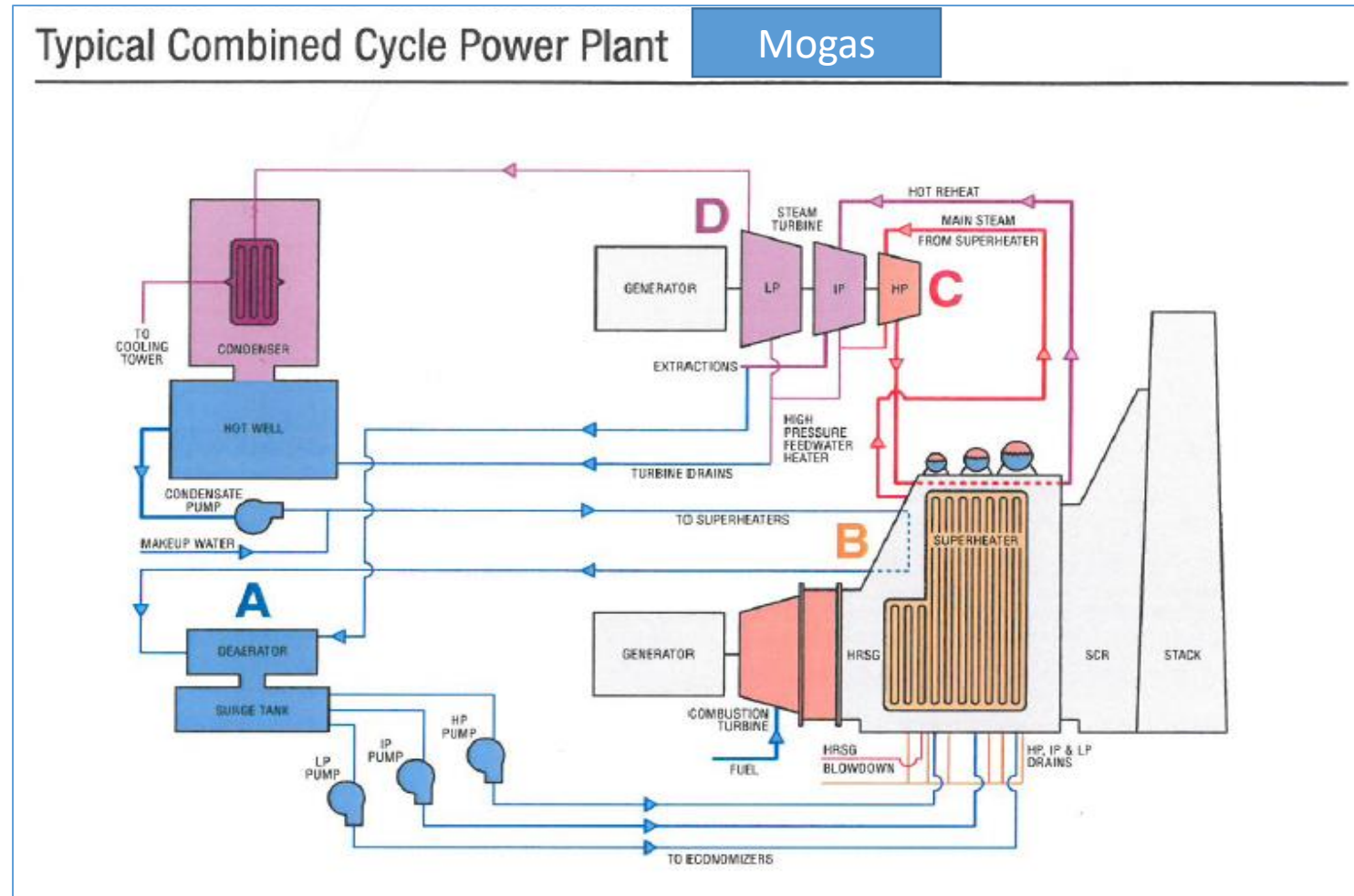
- Marshall Excelsior Co.
1506 George Brown Drive
Marshall, MI 49068

Metso-Neles coating options

- **Hard Chromium (HCr)** Hard Chromium is the standard ball coating for most Neles ball valves and is suited to a wide range of applications in clean liquids and gases at moderate temperature and pressure. Its corrosion resistance is equivalent to stainless steel (AISI 316) with certain limitations. The pH of the media should not be less than 2. HCr has no resistance to hydrochloric acid (HCl), hydrofluoric acid (HF) or sulfuric acid (H₂SO₄), and it should not be used with seawater, wet chlorine or other media with high chloride content.
- **Nickel Boron (NiBo)** Nickel Boron performs very well in high temperature, high pressure applications with abrasive media and dry gases. It is resistant to damage from erosion, cavitation and thermal shocks and is ideal for steam service, catalyst handling and coal gasification. NiBo has limited corrosion resistance and is not recommended for use with acids and dry or wet chlorine. NiBo coating is available on CF8M (316 SS) balls up to 18" size.
- **Tungsten Carbide (WC-Co)** Tungsten Carbide is very resistant to wear from high cycle operations and erosion from abrasive catalysts, muds and slurries. It is ideal for cryogenic applications, oxygen service and non-lubricative dry services. WC-Co is not suitable for use in corrosive services and condensates such as water, but generally performs well in hydrocarbon gases and liquids.
- **Tungsten Chromium Carbide [(W/Cr)C]** Tungsten Chromium Carbide is the ideal choice for corrosive liquids at moderate temperature. It provides excellent resistance to wear and erosion in applications such as seawater, basics or organic acids, geothermal steam and water, media with high chlorides and sour wet hydrocarbons containing H₂S,

Overview of CCGT Major Systems

(Boiler Feed, HRSG, Turbine, Condenser, Flue gas, other systems)



Mogas Power Plant Valves



RSVP-UK

- ASME 600 / 900 / 1500 Limited Class
- 1/2 to 3/4 inch (15 to 20 DN)
- Uni-directional sealing
- Lightweight



PORV

- ASME 1500 / 2500 / 4500 Class
- 2-1/2 to 4 inch (65 to 100 DN)
- Power operated relief valve
- ASME "V" stamp available
- Wear-resistant proprietary coating
- Complete with automation package



iRSVP

- ASME 600-4500 Limited Class
- 3/4 to 2-1/2 inch (15 to 65 DN)
- Uni-directional sealing
- Forged uni-body design
- Mechanical precision stop
- Diffusion seat available



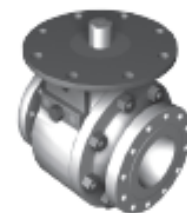
SC-3 Piece

- ASME 600 to 4500 Class
- 2 to 24 inch (50 to 600 DN)
- Critical isolation
- In-line repairable
- 3-piece forged body



Gen-X

- ASME 600 / 900 / 1500 Limited Class
- 2 to 3 inch (50 to 80 DN)
- 1.87 or 2.00 inch bore
- 2-piece body
- Designed to meet TDP-1 2013



C-Series

- ASME 150 – 4500 Class
- 1/2 to 42 inch (15 to 1050 DN)
- Valve engineered specifically for customer application
- 2-piece or 3-piece forged body
- Blowout proof stem

Mogas SC-3PC

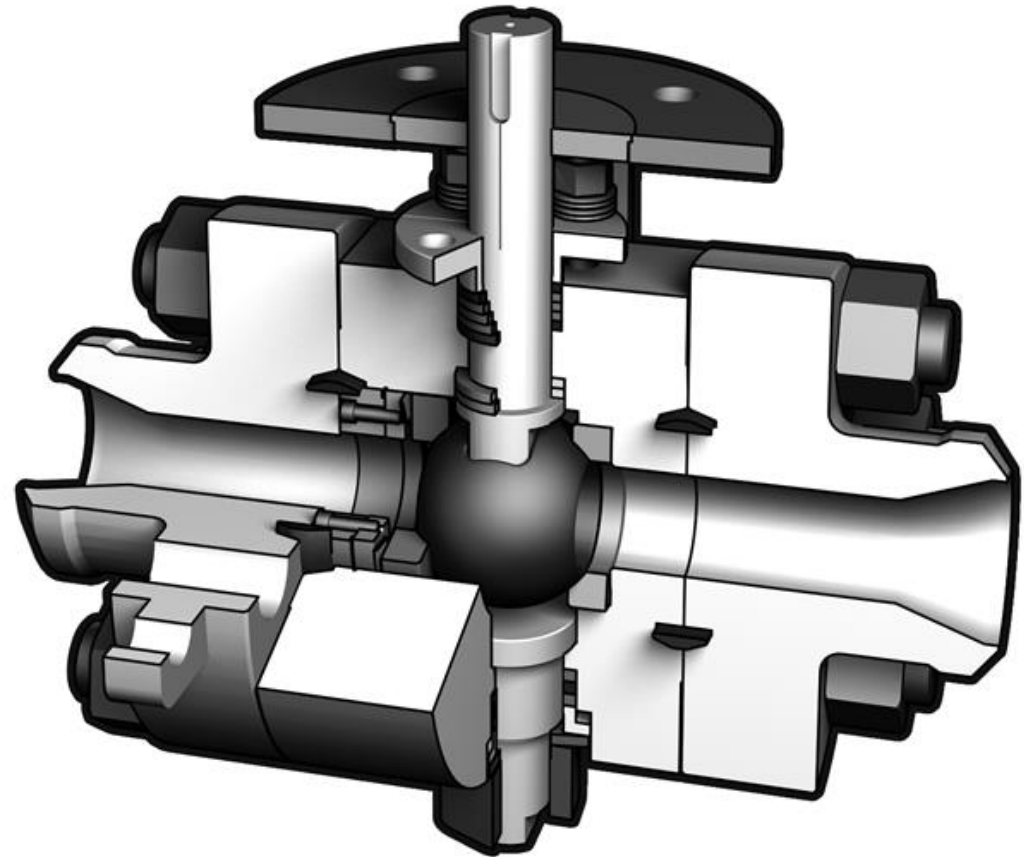
The SC-3PC has a three-piece body assembly with two proprietary body seals that allow the valve body to be easily removed while the end connections remain in line. The design also allows the valve body to be tested after repair, prior to insertion back in-line.

The SC-3PC is used in power plants for isolation of high pressure / high temperature

Ball & Seats

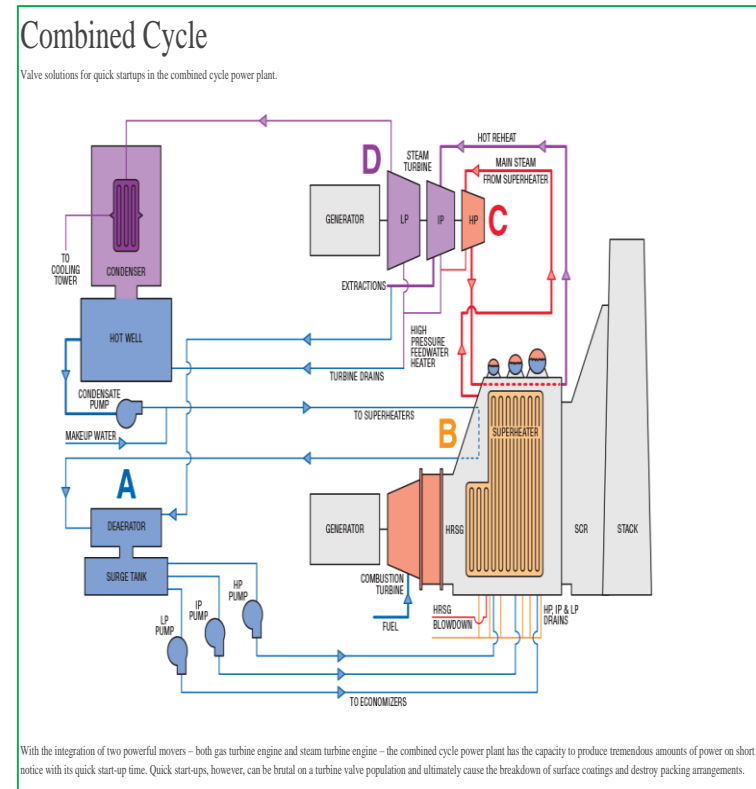
- Mate-lapped for 100% sealing contact
- Ensures absolute shutoff
- Corrosion resistant
- Seats are protected from flow in open / closed position
- Seats are field replaceable

Seat Spring



Mogas has switched from HFOF coatings to fusing their own coatings

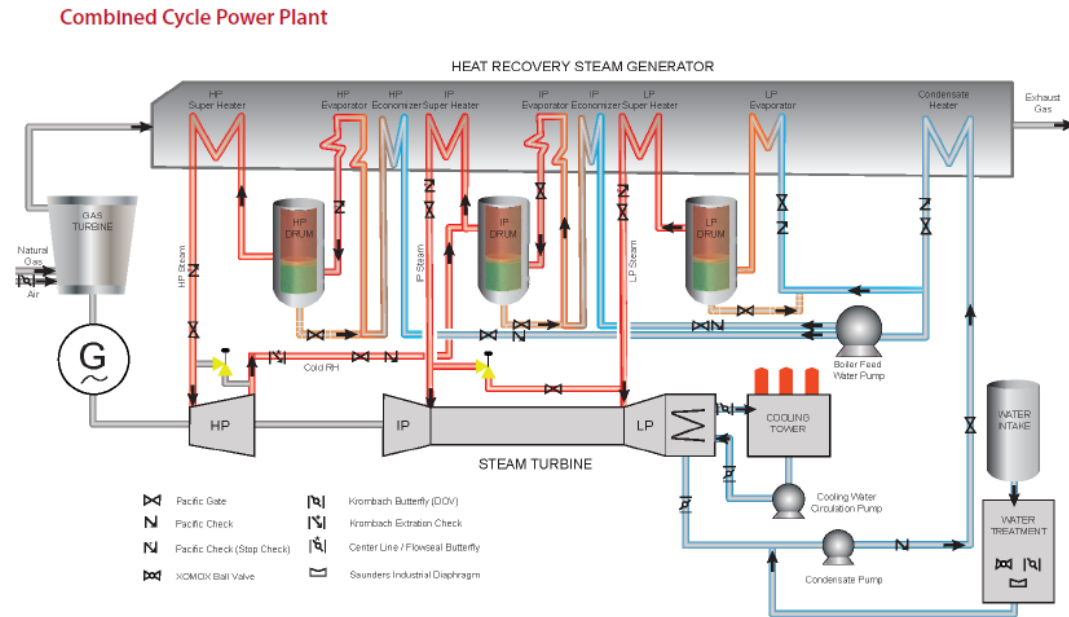
- **Resource Title:** Mogas Ball Valves for Power Generation Severe Service Applications
- **Location:** GdPS for CCGT Valve Selection
- **Keyword:** Delamination
- **Discussion:** With the integration of two powerful movers – both gas turbine engine and steam turbine engine – the combined cycle power plant has the capacity to produce tremendous amounts of power on short notice. Quick start-ups, however, can be brutal on a turbine valve population and ultimately cause the breakdown of surface coatings. MOGAS understands the unique challenges of the combined cycle plant and has done extensive research to better understand how the thermal power cycle affects turbine valve components. It was realized that the mechanically bonded coatings, such as HVOF applied Chrome Carbide, had a tendency to crack and flake off causing leak-by and possibly lock-up. Innovations were then made to fuse our coating to the base material creating a metallurgical bonded coating. Since this, we have enjoyed flawless performance and extended longevity.



Pacific Valve-Gas Power Applications

Combined Cycle Power Plant

- Market conditions demand faster online times, increasing the severity of gas turbine starts.
 - This in turn increases the thermal transients, with higher gas turbine acceleration and higher gas flows, at increased temperatures feeding the HRSG.
 - Every time the plant is cycled, the CT, HRSG, ST, steam lines and auxiliary components undergo drastic thermal and pressure stresses.
 - This can quickly damage the equipment, and dramatically accelerate the wear and tear on valves.
-
- Increasing cyclic conditions (on/off and load following) in today's combined cycle power plants are quickly increasing the demand, and the stress, being placed upon the equipment – particularly high pressure valves.
 - Key High Pressure Applications:
 - Drums
 - Superheater
 - Reheater
 - Steam Turbine
 - Feed Water Distribution
 - Economizers



Pacific Valves are designed specifically to last in the worst cyclic conditions of today's, and tomorrow's, thermal power applications.

Pacific Pressure Seal-HARD FACING Y-Globe Stop-Check Valve

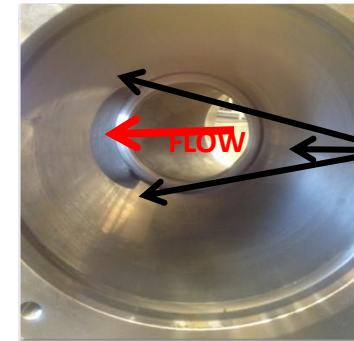
Cracking of Guide Ribs is a Widespread Concern

- An issue which is becoming more prevalent in **combined cycle power plant applications** is cracking of the body guide ribs in Y-Globes due to the **number of thermal cycles** and **thermal transient conditions**
- Pacific's guide rib design is such that the **guides are located at 4, 8, 12 o'clock**, outside of the flow path, providing a unique solution for combined cycle power plant applications

Features:

- Full-port, full flow body design enables **best-in-class flow (C_v)** and the **lowest pressure drop** in the industry
- **Integral, hard-faced body guides** provide consistent and accurate movement across the entire valve stroke

Pacific®



Body
Guide
Rib

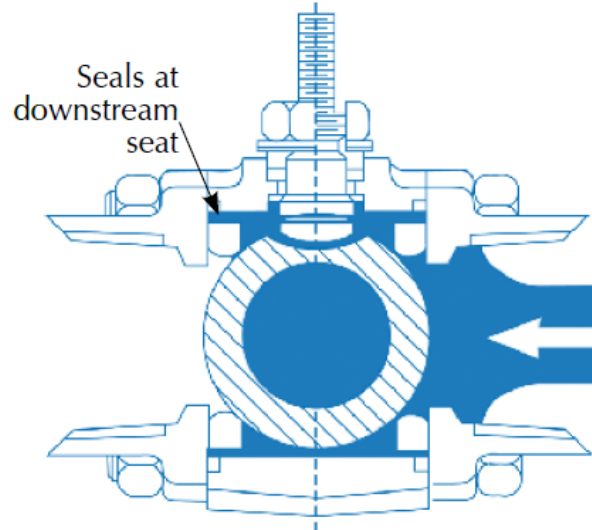


PBM metal seated valves for up to 1000F

- Design Features: • 1/2" through 10", 150# through 1500# class available • Design capabilities to provide custom valve configurations to address severe service applications including thermal expansion • Quick ship 1/2" through 4" split body ANSI Class 150/300 and 3-piece design 2-Way and 3-Way Diverter Valves
- • Temps up to 1000°F/538°C
 - Class V shut-off, Class VI available as an option with limited cycle life • Live-loaded packing assures long maintenance-free operation • PBM's metal seated valves are fundamentally firesafe • Valves with weld end fittings can be welded without disassembly • Optional patented locking lever handle or gear operator and complete line of automation and controls • Complete repair services available - fast turn around on valve repair • SIL-3 capable per IEC 61508 • Extended handles and automation brackets available for higher temperature services • Optional API622 packing design available to address Low-E requirements up to 800°F • Stem design, sizing torque, and pinned rigid actuator linkage per application eliminate stem twist and ensure alignment in high torque applications

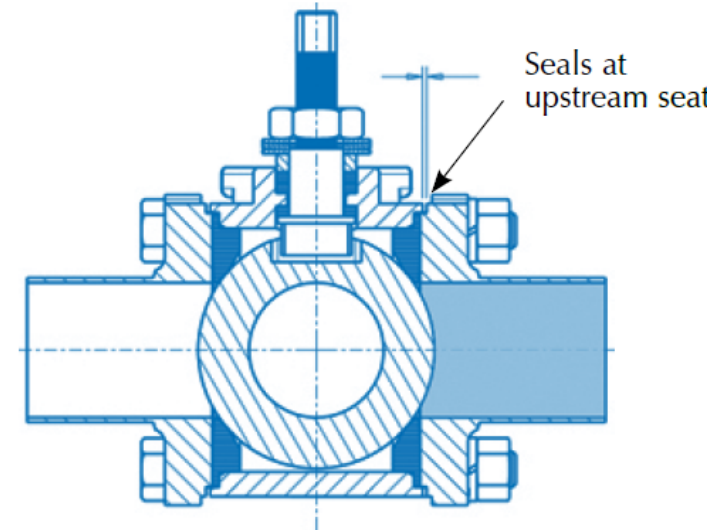
PBM vs Competitors

Competitor's Design



Line pressure pushes ball downstream in the ball-closed position, providing sealing at the downstream seat. There is no adjustment to compensate for seat wear.

PBM's Design



Valve body bolts compress valve seats against the ball, providing bidirectional sealing at the upstream seat. To compensate for seat wear, body bolts can be slightly tightened to recompress seats against ball.

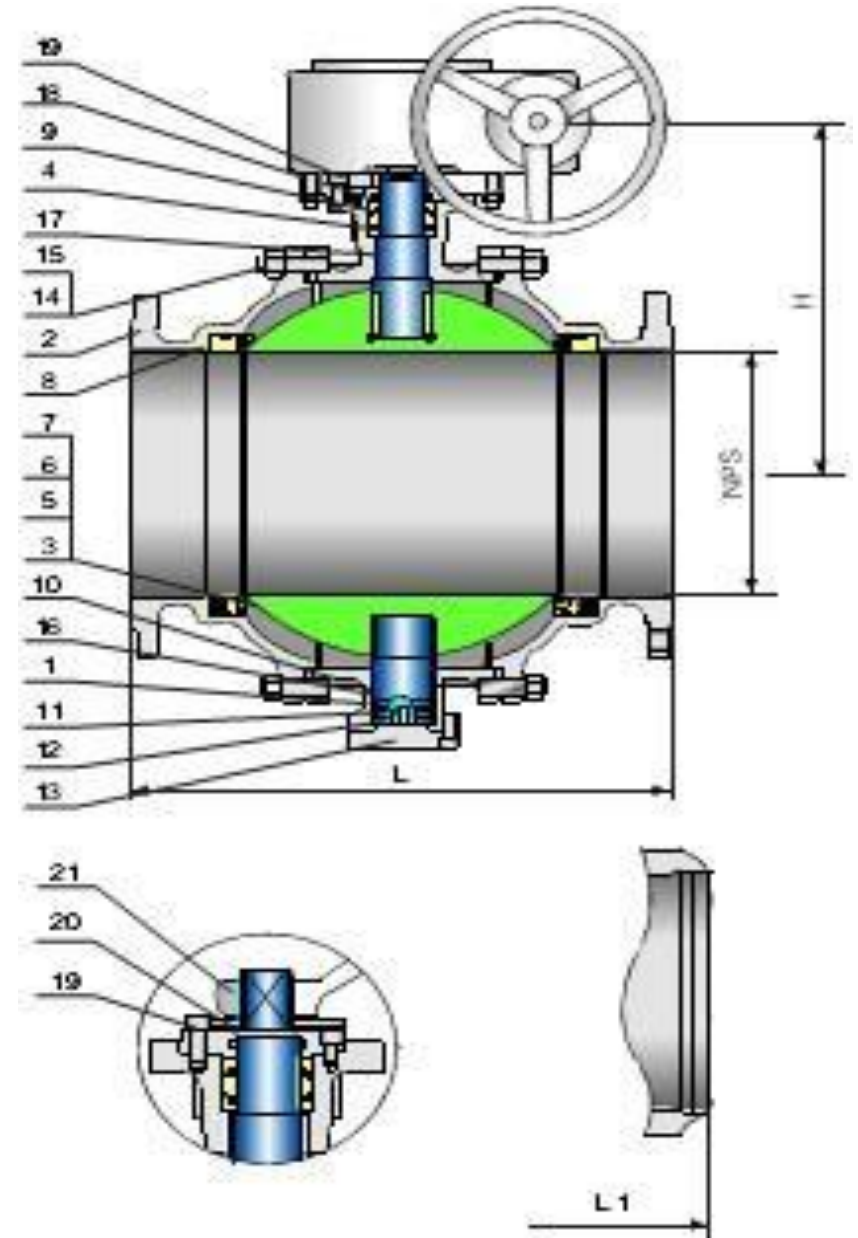
PBM Options

Options

- Trunnion
- Manual Spring Return Handles
- LOX (Cleaned for Oxygen Service)
- Body Cavity Fillers
- Steam Seats (Encapsulated)
- Purge Ports (SIP/CIP)
- Fire Rated, API 607
- Dribble Control Units
- High Alloys
- Fabflex[®] Manifolds
- Self Cleaning Flushable Ball
- USCG Category A
- ABS Type Approval
- Mechanical & Electro-Polishing
- Direct Mount Actuation
- Positioners
- Fieldbus, AS-i, DeviceNet
- Ball Flats or Purge Holes
- Locking & Ext. Locking Handles
- Internal & External Grounding
- Cylindrical Radius Weld Pads
- V-Balls for Flow Control

Trunnion Mounted Cast Steel Ball valves 150lb-2500 lb sizes 1.5 to 36 inches

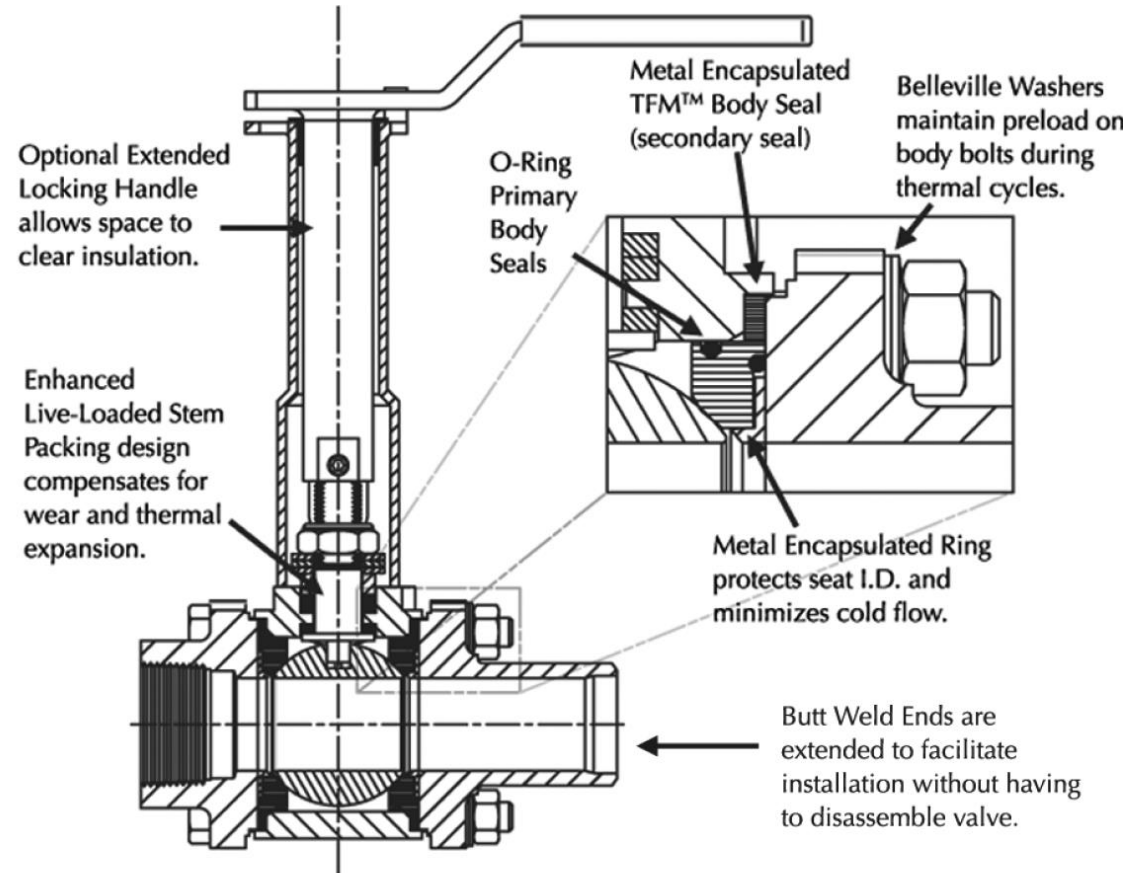
no	part name	carbon steel	stainless steel	low temperature carbon steel
1	body	216-wcb	a315-cf8m	a352-lcb
2	bonnet	a216-wcb	a315-cf8m	a352-lcb
3	ball	a182-f304	a182-f316	a182-f304
4	stem	a276-304	a276-316	a276-304
5	seat	a105+enp	a182-f316	a350-lf2+enp
6	seat Insert	glass filled ptfe		
7	seat spring	a313-304	Inconelx750	a313-304
8	seat o-ring	nbr	viton	viton
9	stem o-ring	nbr	viton	viton
10	bonnet gasket	graphite+304	graphite+316	graphite+304
11	bonnet o-ring	nbr	viton	viton
12	antistatic spring	a313-304	a313-316	a313-304
13	lower cover	a216-wcb	a182-f316	a182-f304
14	bonnet stud	a193-b7	a193-b8	a320-l7



PBM Valves

- PBM's manufacturing plant is located on 9 acres near Irwin, PA just 25 miles from Pittsburgh, PA. Within this facility valves are designed, machined, fabricated, assembled, tested, inspected, and packaged for shipment throughout the world. PBM inventories millions of dollars of raw material and finished components to support customer delivery requirements

PBM Ball valve features



Coating Options:

Chrome Carbide, 20% Nickel/Chrome

A hard coating that does not oxidize at high temperatures. Provides good abrasion, particle erosion cavitation and fretting resistance in high temperature environments. Good corrosion resistance and sliding properties.

Tungsten Carbide, 10% Nickel

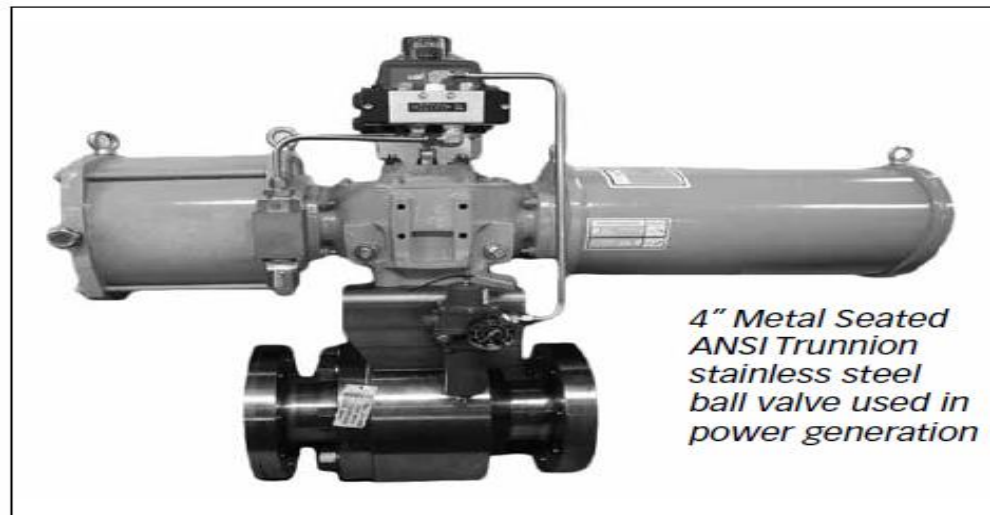
A hard, dense coating to resist high abrasive conditions, as well as particle erosion and fretting while providing the corrosion resistance of nickel with minimal loss of heat resistance.

CHROME CARBIDE	
TYPICAL COMPOSITION, WT%	
Nickel Chrome	20%
Chrome Carbide	Balance
COATING CHARACTERISTICS	
Bond Strength, PSI	>10,000/ 690 bar
Hardness	67
Porosity	2%
Max. Service Temperature	1000°F/538°C

TUNGSTEN CARBIDE	
TYPICAL COMPOSITION, WT%	
Carbon	3.7%
Iron	0.5%
Nickel	10.0%
Tungsten Carbide	Balance
COATING CHARACTERISTICS	
Bond Strength, PSI	>10,000/ 690 bar
Hardness	65-58 RC
Porosity	<1%
Max. Service Temperature	800°F/427°C

Coating Testing:

- Bond Strength Tensile Test
- Shear Strength Tensile Test
- Macro Hardness Rockwell Test
- Porosity Determination
- Bond Line Contamination
- Abrasion Wear Testing



Pentair KTM

- KTM markets a complete line of ball valves for the most demanding application requirements of the oil and gas, power, chemical, petrochemical, and other process industries. Types include floating and trunnion, 3-way, diverting and control along with premier specialty products with unique features. They feature several proprietary seat designs, and offer a wide range of performance; the E-seat, PTFE/PFE copolymer, Gratite® high temperature seat with tight shut-off and Metaltite metal seat. KTM has developed a reputation for high quality, dependable valves backed by excellent service. Each valve is precision manufactured from foundry casting to final assembly. Special options are available, including stem extensions, body coating and double block and bleed. Testing is also available for chlorine service, oxygen service, vacuum service, liquid penetrant, magnetic particle, ultra-sonic and x-ray
- Floating/Trunnion
- Size Range: 1/2" to 30"
- ASME Class: 150 and 2500
- Temperature Rating: -328°F to 932°F

Stranahan

High-performance, trunnion-mounted, metal-seated ball valves are now available from Strahman that have been specifically designed for severe service applications such as those found in oil and gas, petrochemical, refining, polymer, **steam**, catalyst, DCU (delayed coking unit) and coal gasification industries. Ranging from PN 10 to PN 630-4500 lb., the special coatings (hardened trim) on the ball and metal seats make them ideal for use in high temperature, high pressure, and abrasive environments.

The valves come in one-piece and two-piece designs for ease of use and maintenance. The one-piece design includes bottom entry for simplifying maintenance. This is done by dropping the valve internals without having to first remove the valve from the line.

Other features, besides trunnion mounting, of the metal seated ball valve include:

- Chromium carbide coated metal seating designed to minimize peak effect on edges and increase the lifetime of the ball and seat surfaces.
- Floating seats that allow expansion in temperature and the purge of the body inner seat cavity. Independent seats provide bi-directional lightness in the valve.
- Anti-blow out feature, with the valve stem securely mounted in the valve, whereby, even in case of a packing failure, the integral shoulder in the valve body and the shoulder machined on the stem prevents blow-out of the stem.
- Bidirectional upstream sealing, with two independent, spring-loaded seats that prevents line pressure from by-passing the ball. In low pressure situations, the springs maintain seating thrust. As pressure increases, it pushes the up-stream seat against the ball, increasing sealing force. The bottom vent connection allows purging of the inner seat cavity, making the design double block and bleed.
- Anti-static design prevents any accumulation of electric charges on the ball, therefore preventing unexpected electric discharge.
- Separate ball and stem assures proper centering of the ball between the two seats, preventing any bending or flexing of the stem which prolongs the life of the packing.
- Forged body and trim.

The valves come with numerous options, ranging from bore size, to body and trim materials, and welded jackets around the body and flanges, as well as others. For more information visit www.strahmanvalves.com.

SOURCE: Strahman Valves, Inc

Triad

- Triad Series [9150, 9300](#), and [66](#) valves are available with engineered metal seats for today's demanding process conditions. These [metal seated valves](#) are suitable for applications with elevated temperatures or highly abrasive conditions. The valves are typically provided with a hard chrome plated 316SS or electro-less nickel plated ball and hard faced Stellite or Alloy 6 seats. These high temperature valves are manufactured to Class V shut off. Each high temperature valve is designed for each specific application and has a quick delivery time

ValvTechnologies Turbine bypass

- Now keep gas turbine and heat recovery system generator (HRSG) online in the event of a steam turbine trip with the ValvTechnologies Turbine By-Pass System (TBS). Purposefully designed for the new generation of combined-cycle power plants, our TBS combines the proven XACTROL[®] severe service control valve design with a state-of-the-art de-superheating control system. At the same time, the TBS facilitates fast HRSG and CT start-ups in peaking power plants. and helps these plants operate at turndown conditions far below the levels that can be achieved with standard governor systems.

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Velan condensate high temperature floating ball valves with HVOF for U.S. power plants

- Valves are being used on **drain and vent lines to extract large quantity of condensate** during power station start-up to get dry superheated steam rapidly. During normal operation, drain and vent valves must remain steam-tight to prevent energy loss and maximize plant efficiency. Over the last decade, metal-seated ball valves (MSBVs) have been the industry standard for this application, providing maintenance-free, tight, reliable shut-off. MSBVs considered in this study are of a **floating ball design with a fixed seat**. Ball and seat are manufactured from forged Inconel 718 PH and coated with a HVOF 80/20 Cr₃C₂NiCr coating. The primary function of the HVOF coating is to increase the load carrying capacity of the Inconel 718 surface*. Indeed, it has been demonstrated that the deposition of such thick coating will not only reduce the wear rate but also distribute the peak stresses generated by localized loading from the surface to the base material and increase the galling threshold resistance (resistance to adhesive wear and material transfer) (Ref 1, 2). 80/20 Cr₃C₂-NiCr coating composition is also specially adapted to offer resistance to the high-temperature, oxidizing conditions experienced by the valve

Velan Trunnion Ball valves- Side Entry

PRODUCT RANGE	API 6D				API 6A				
	SIZE (in/mm) – PRESSURE RANGE				SIZE (in/mm) – PRESSURE RANGE ⁽¹⁾				
	ASME 150–600	ASME 900	ASME 1500	ASME 2500	API 2000	API 3000	API 5000	API 10000	API 15000
Service									

SIDE-ENTRY									
Standard	1–64 25–1600	1–56 25–1400	1–40 25–1000	1–32 25–800	1–18 25–450	1–18 25–450	1–18 25–450	1–18 25–450	1–12 25–300
Low Temperature -46°C / -50°F	1–64 25–1600	1–56 25–1400	1–40 25–1000	1–32 25–800	1–18 25–450	1–18 25–450	1–18 25–450	1–18 25–450	1–12 25–300
Cryogenic -47°C to -196°C / -52°F to -320°F	1–36 25–900	1–36 25–900	1–24 25–600	1–12 25–400	N/A	N/A	N/A	N/A	N/A
Sub Sea	1–64 25–1600	1–56 25–1400	1–40 25–1000	1–32 25–800	1–18 25–450	1–18 25–450	1–18 25–450	1–18 25–450	1–12 25–300
Underground	1–64 25–1600	1–56 25–1400	1–40 25–1000	1–32 25–800	1–18 25–450	1–18 25–450	1–18 25–450	1–18 25–450	1–12 25–300
High Temperature 280°C to 450°C / 536°F to 842°F	1–36 25–900	1–36 25–900	1–24 25–600	1–12 25–400	1–18 25–450	1–18 25–450	1–18 25–450	1–18 25–450	1–12 25–300
Underground - Low Temperature -46°C / -50°F	1–64 25–1600	1–56 25–1400	1–40 25–1000	1–32 25–800	1–18 25–450	1–18 25–450	1–18 25–450	1–18 25–450	1–12 25–300

Velan Trunnion Valves- Top Entry

TOP-ENTRY									
Standard	2-56 50-1400	2-48 50-1200	2-30 50-750	2-16 50-400	1-8 25-200	1-8 25-200	1-8 25-200	1-8 25-200	N/A
Low Temperature -46°C / -50°F	2-56 50-1400	2-48 50-1200	2-30 50-750	2-16 50-400	1-8 25-200	1-8 25-200	1-8 25-200	1-8 25-200	N/A
Cryogenic -47°C to -196°C / -52 to -320°F	2-36 50-900	2-36 50-900	2-24 50-600	2-12 50-300	N/A	N/A	N/A	N/A	N/A
Sub Sea	2-56 50-1400	2-48 50-1200	2-30 50-750	2-16 50-400	1-8 25-200	1-8 25-200	1-8 25-200	1-8 25-200	N/A
Underground	2-56 50-1400	2-48 50-1200	2-30 50-750	2-16 50-400	1-8 25-200	1-8 25-200	1-8 25-200	1-8 25-200	N/A
High Temperature 280°C to 450°C / 536°F to 842°F	2-36 50-900	2-36 50-900	2-24 50-600	2-12 50-300	1-18 25-450	1-18 25-450	1-18 25-450	1-18 25-450	N/A
Underground - Low Temperature -46°C / -50°F	2-56 50-1400	2-48 50-1200	2-30 50-750	2-16 50-400	1-8 25-200	1-8 25-200	1-8 25-200	1-8 25-200	N/A

(1) The API designation is the actual working pressure in psi.

Velan Trunnion Mounted Ball Valve Design

TRUNNION-MOUNTED BALL

The ball is fixed and the seat rings are floating, free to move along the valve axis.

Side load generated by the pressure acting on the ball is absorbed by bearings.

At low pressure the seat sealing action is achieved by the thrust of the springs acting on the seat rings.

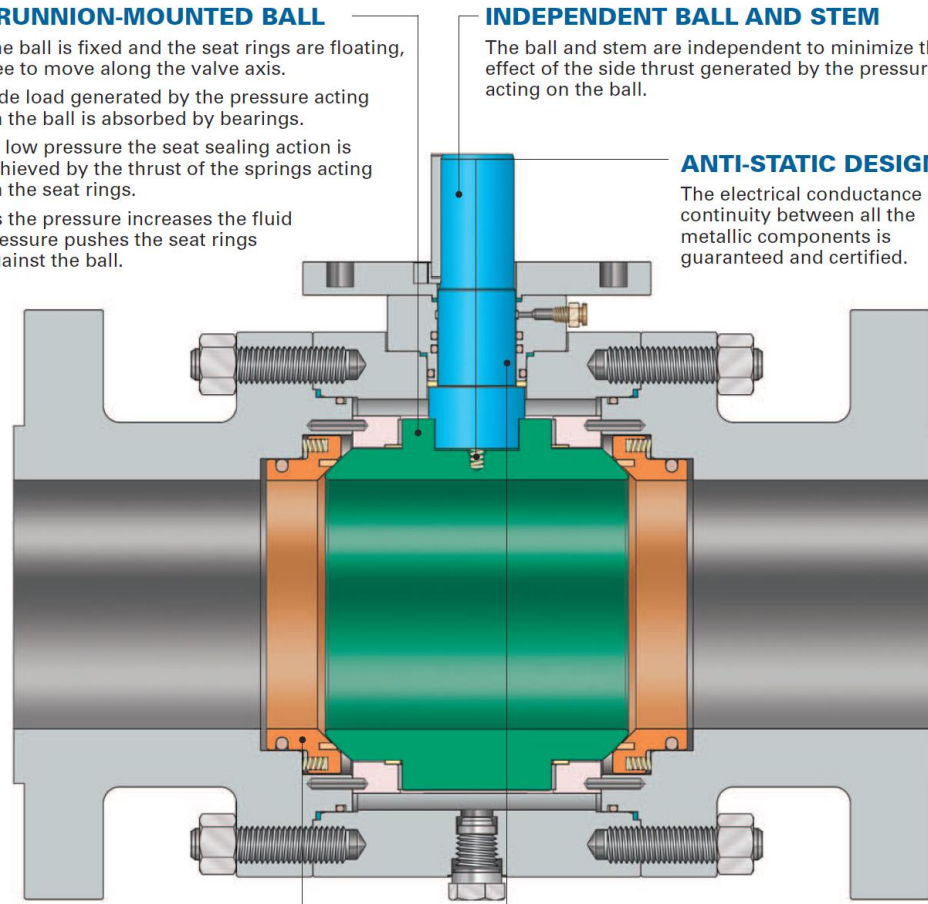
As the pressure increases the fluid pressure pushes the seat rings against the ball.

INDEPENDENT BALL AND STEM

The ball and stem are independent to minimize the effect of the side thrust generated by the pressure acting on the ball.

ANTI-STATIC DESIGN

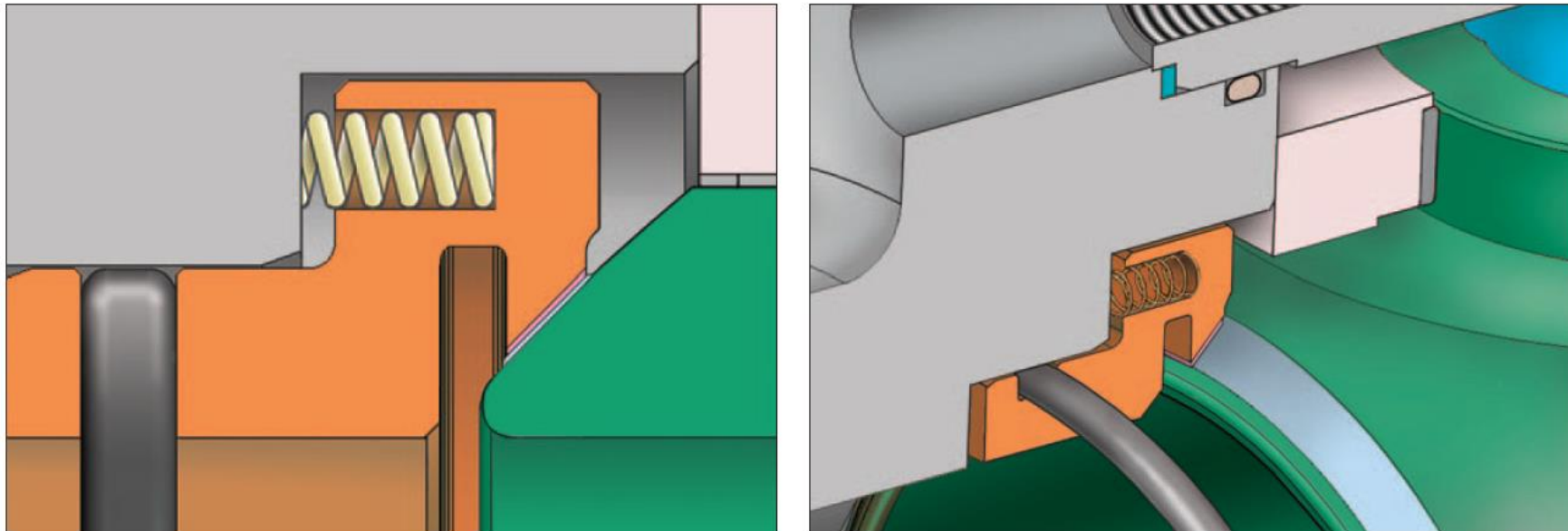
The electrical conductance continuity between all the metallic components is guaranteed and certified.



Velan Metal Seated Valves

METAL-SEATED VALVES

Valves designed for abrasive service or for operation in temperatures that prohibit the use of a resilient material have seating action provided by the metal to metal contact between the ball and the seat rings. Seating faces are hardfaced.



Velan awarded nuclear valve contracts by CNEIC, CHINERGY and HUANENG

- **Velan Awarded Major Nuclear Valve Contracts in China Worth US\$34 Million (EUR30 Million)**
- MONTREAL, QUEBEC--(Marketwired - May 19, 2015) - (TSX:VLN) - Velan S.A.S., Velan Inc.'s wholly-owned subsidiary located in Lyon, France, has been awarded important contracts for the supply of nuclear class valves to China Nuclear Power Engineering Corporation ("CNPEC"), China Nuclear Power Engineering Co. Ltd. ("CNPE"), China Nuclear Energy Industry Corporation ("CNEIC"), CHINERGY and HUANENG. These nuclear valve orders represent a sales value of about US\$34 million (EUR30 million) of which US\$15.6 million was recorded in backlog prior to our 2015 fiscal year-end. The valves are scheduled for delivery from 2016 until 2018.
- For CNPEC, the orders are for valves for the two new ACPR1000 design nuclear plants of HongYangHe Units 5 and 6. The scope of supply consists of nuclear classified forged valves, electric operated gate valves, globe valves with pneumatic actuators and swing check valves.
- For CNPE and CNEIC, who are both part of the China National Nuclear Corporation ("CNNC"), Velan S.A.S. received orders for the supply of nuclear classified gate and globe valves for the two new nuclear pilot project power plants based on the new Hualong One (ACP 1000) technology to be built at FuQing Units 5 and 6. **The scope of supply is mainly high-pressure forged valves** complete with electric or pneumatic actuators for service inside nuclear containment.
- Velan S.A.S. also signed contracts with CHINERGY and HUANENG for the supply of nuclear classified bellows seal globe valves for the new High Temperature Reactor ("C-HTR") built in Shidaowan, China.
- Michel Monier, Director of Nuclear-China at Velan, stated: "Chinese authorities have just announced plans to resume the construction of new nuclear power plants, which had been suspended following the Fukushima accident. Velan is honored to contribute to these new projects, which have all been designed by Chinese nuclear institutes. With these new orders, Velan valves have now been selected for 49 Chinese nuclear power plants."

Velan floating ball valve with Stellite at U.S power plant

- Recently, a major US-based power company experienced new challenges with the supercritical steam drain and vent lines in one of its plants. Kennametal Stellite together with Velan (Montreal, QC, Canada), a world leader in valve design and engineering for a broad range of industrial applications, were engaged to resolve the issue. MSBVs (metal-seated ball valves) were being used on drain and vent lines to extract a large quantity of condensate during plant startup in order to get dry, superheated steam rapidly. MSBVs must remain steam-tight to prevent energy loss and maximize plant efficiency. This particular fossil-fuel power station runs continuously from May to October due to high power demand to run air-conditioning systems. For the balance of the year, the plant only runs when the demand calls for more power during peak usage times.
- This presented a unique situation. As the plant operation changed from base load to peaking, every time the plant shuts down or starts up, MSBVs are operated and exposed to supercritical steam operating conditions. The MSBVs in question were of a floating ball design with a fixed seat, manufactured from forged Inconel 718 PH and coated with a HVOF 80% Cr₃C₂ + 20% NiCr coating. On balls exposed to supercritical steam, valve coatings were failing after a year and less than 500 mechanical cycles in service, with deterioration extending to regions where there is no contact between ball and seats. Visual examination of damaged components revealed minor frictional wear and a typical stress/fatigue pattern.

Velan coating improvements

- Testing revealed the dominant failure mechanism to be coating embrittlement due to chrome carbide precipitation in service across the coating binder. Brand-new samples were produced with three new Kennametal Stellite coatings. A battery of tests was performed to assess their behavior for this specific application.

Once the cause was known, further tests revealed a spray-and-fuse NiWCrBSi coating more suitable to support high bearing loads when facing thermal shock. This coating is less sensitive to aging at high temperatures and therefore more durable under these very specific conditions.

An enhanced HVOF coating, produced from mixed (W,Cr)C and WC carbides in a nickel matrix, also emerged successful from the tests. While it showed similar ductility compared with the original HVOF Cr₃C₂-NiCr coating, it consistently provided longer in-service life under 540°C.

Armed with these new coating technologies, new valves were installed in the plant. They have worked flawlessly for the past year. As a result, Velan's MSBV line for the power industry now features two coatings: one designed for regular service—HVOF (W,Cr)C-Ni—and one specially designed for applications involving severe thermal shocks—S&F NiWCrBSi—all in keeping with Velan's motto: "Quality That Lasts."

-

Velan Secureseal Valves employ hard coatings

- Hard coatings can address, galling, abrasion, erosion, spallation/debonding and fatigue
- Key properties are hardness, high temperature hardness, bond, porosity, toughness
- Applications are electroplating, PTA, HVOF, APS, and S&F, diffusion, CVD
- New coatings from Velan are an HVOF carbide coating that maintains hardness at 1000F which is suited for high cycle applications, a K-type nickel based coating and V-type coating of tungsten carbide

Power plant valves fail and Velan develops new coating

- A major Texas, U.S.-based power company ran a boiler made by one of the largest global companies in this sector. However, it was experiencing problems with the supercritical steam drain and vent lines in one of its power stations. To resolve the issue, Kennametal Stellite was engaged by Quebec-based [Velan](#), a world leader in valve design and engineering and a specialist in valves designed to work in 'severe service' – i.e., with extreme temperatures, high pressures, abrasive, corrosive and acidic environments.
- **Currently in the power station, metal-seated ball valves (MSBVs) are being used on the drain and vent lines to extract large quantities of condensate during plant start-up, in order to rapidly obtain dry superheated steam. MSBVs must remain steam-tight to prevent energy loss and maximize plant efficiency.**
- There was an issue with this particular fossil-fuel power station, because it runs continuously from May to October, when there is typically a higher power demand to run air-conditioning systems during the hottest part of the year. However, during November to April, the plant only runs when the demand calls for more power during peak usage times. So, every time the plant shuts down or starts up, MSBVs are operated and exposed to supercritical steam operating conditions, causing additional corrosion problems. There is a considerable risk of thermal shock, as the valves are opened quickly and heat up rapidly. Temperatures can approach 1400°F, but are usually around 1200°F for this application.
- The MSBVs in use entailed a floating ball design with a fixed seat, manufactured from forged Inconel 718 PH and coated with a HVOF 80% Cr₃C₂ + 20% NiCr coating. This coating failed after one year and after less than 500 mechanical cycles in service on balls exposed to supercritical steam, with deterioration extending to regions where there is no contact between ball and seats. A visual examination of damaged components revealed minor frictional wear and typical stress/fatigue pattern.
- Testing revealed that the dominant failure mechanism was coating embrittlement due to chrome carbide precipitation in-service across coating binder. As a result, some brand new samples were produced with three new Kennametal Stellite coatings, and a range of tests was performed to assess their behaviour for this specific application.

Velan -Severe thermal shock coating resistant valve replaces original

- Further tests suggested that a spray and-fuse NiWCrBSi coating would be more suitable to support high bearing load when facing thermal shock. This coating is less sensitive to ageing at high temperatures and therefore more durable under these very specific conditions.
The spray and fuse method is similar to hardfacing, whereby an oxyacetylene flame is used to heat and deposit a nickel-based alloy onto a substrate. The flame is then used to melt or fuse the material onto the surface. It is similar to welding, except that spray and fuse acts more like a braze than a weld and does not dilute with the base metal, thus avoiding cracking. Spray and fuse is often used general machine component repair.
Kennametal Stellite also produced an improved high velocity oxygen fuel (HVOF) coating, produced from a mixed (W,Cr)C and WC carbides in a nickel matrix. The material costs are significantly lower for S/F coating versus the HVOF 80Cr3C2/20NiCr coating that failed.
- HVOF thermal spray coatings are produced by first mixing a fuel gas and oxygen within a chamber. The resulting mixture exits the chamber through the nozzle and ignites. The powder feedstock is then fed via carrier gas, axially, into the ignited gases and is propelled uniformly to the workpiece. The HVOF process can create extremely dense coatings with bond strengths in excess of 10,000 PSI. It can also produce very low surface roughness. This frequently results in easier and faster finishing.

While it showed similar ductility compared to the original HVOF Cr3C2-NiCr coating, the new coating consistently provided longer in-service life in service under 540°C (1,000°F).

Incorporating these new custom-made coating technologies, new valves were installed in the plant, and have worked flawlessly for the past year. Now the coatings should last many years and thousands of cycles. As a result, Velan's MSBV line for the power industry now features two coatings: one designed for regular service – HVOF (W,Cr)C-Ni — and another specially designed for applications involving severe thermal shocks – S&F NiWCrBSi.

Velan power plant steam drain and vent lines

- A major US-based power company had new challenges with their supercritical steam drain and vent lines in one of their plants. This particular fossil-fuel power station runs continuously from May to October because of high power demand to run air-conditioning systems. For the balance of the year, the plant only runs when the demand called for more power during peak usage times. Consequently, the operation of the plant changed from base-load to peaking. **Every time the plant shuts down or start-up, MSBVs are frequently operated and exposed to supercritical steam, going up to 15 MPa (2200 psi) and 675 C (1250F) (Ref 5).** HVOF 80/20 Cr₃C₂-NiCr coating has failed after 1 year and less than 500 mechanical cycles in service on balls exposed to supercritical steam, with deterioration extending to regions where there is no contact between ball and seats. Coating was applied with a Diamond Jet HVOF system using propylene as fuel. Visual examination of damaged components revealed minor frictional wear and typical stress/fatigue pattern (Fig. 1).

Velan order from NTPC Barh

- Velan Germany signed a contract for a Russian based client Technopromexport for 3 x 660 MW units of the Barh super critical coal fired plant

It included high-pressure gate, globe, and check valves as well as steam traps and other equipment totaling to approximately 4,700 items, plus spares. Six of the 20" forged high pressure gate valves are motor-operated, and they're in special F91 material for 2900 class service. The plant will also be installing the Velan patented Ultraflex™ wedge valves, an enhanced gate valve with a flexible wedge that is particularly suitable for high-temperature, high-pressure, and severe temperature-pressure cyclic service conditions