NELES

Jamesbury™ Brand Ball Valves

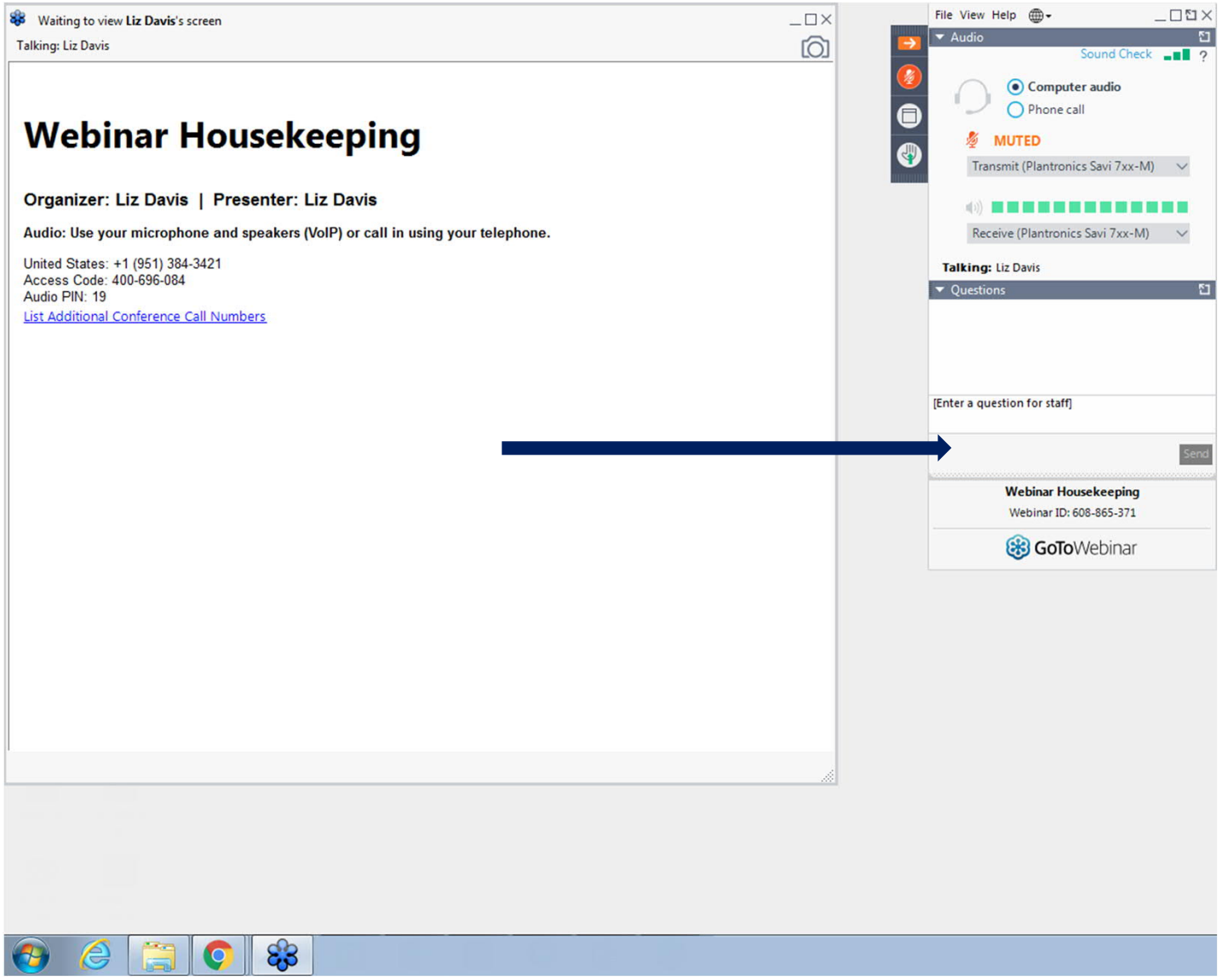
Webinar presentation, September 13, 2021
Welcome and thank you for participating

October 21, 2021

Presenter

- Steve Atherton
- Product Manager, 30+ years of experience in engineering, manufacturing and sales
- Will be presenting the Jamesbury™ Brand Ball Valve training today

In session question submittal

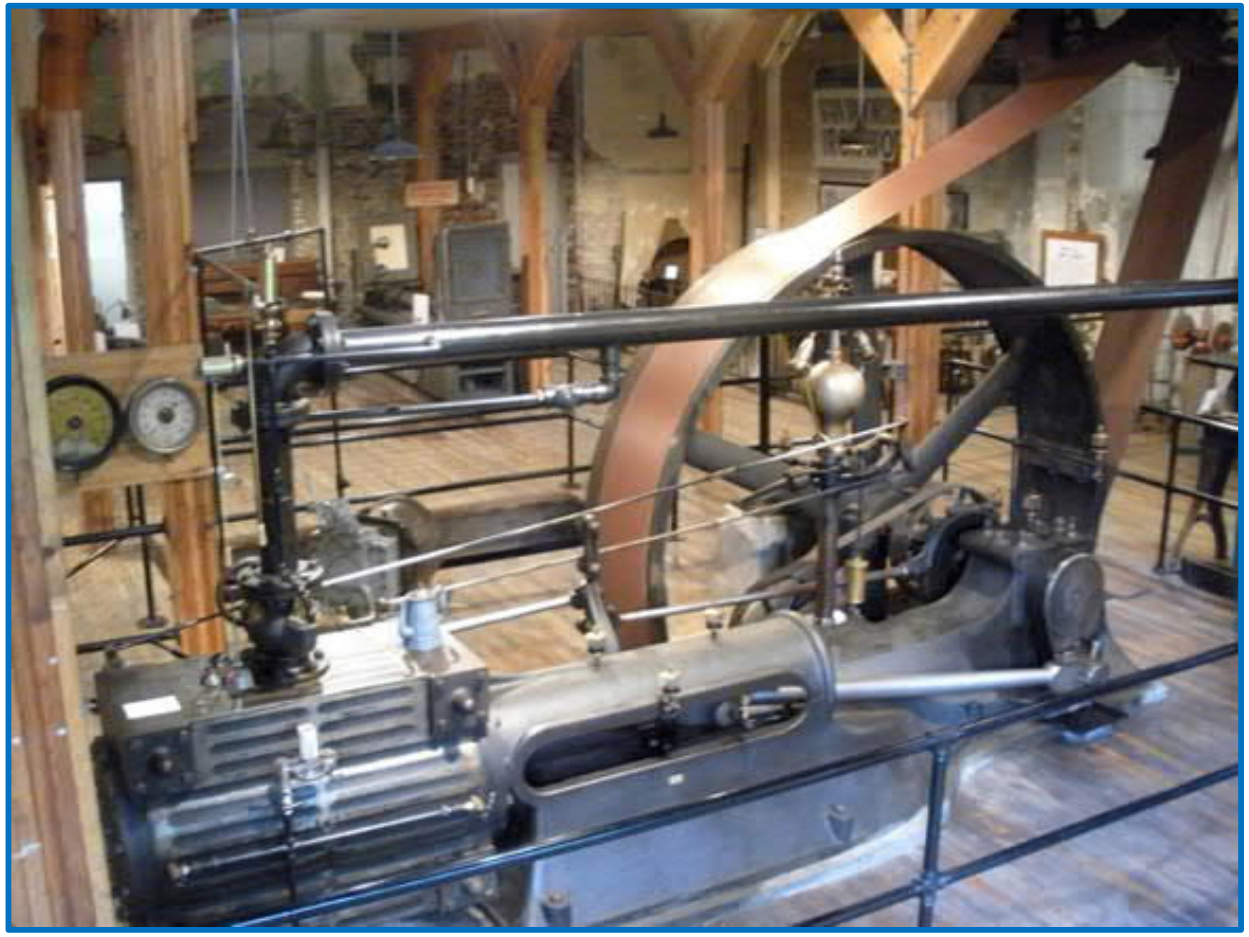


A short history of valves

Roman Plug Valves, Pompei, 100 AD

A short history of valves

Corliss steam engine, ca. 1850

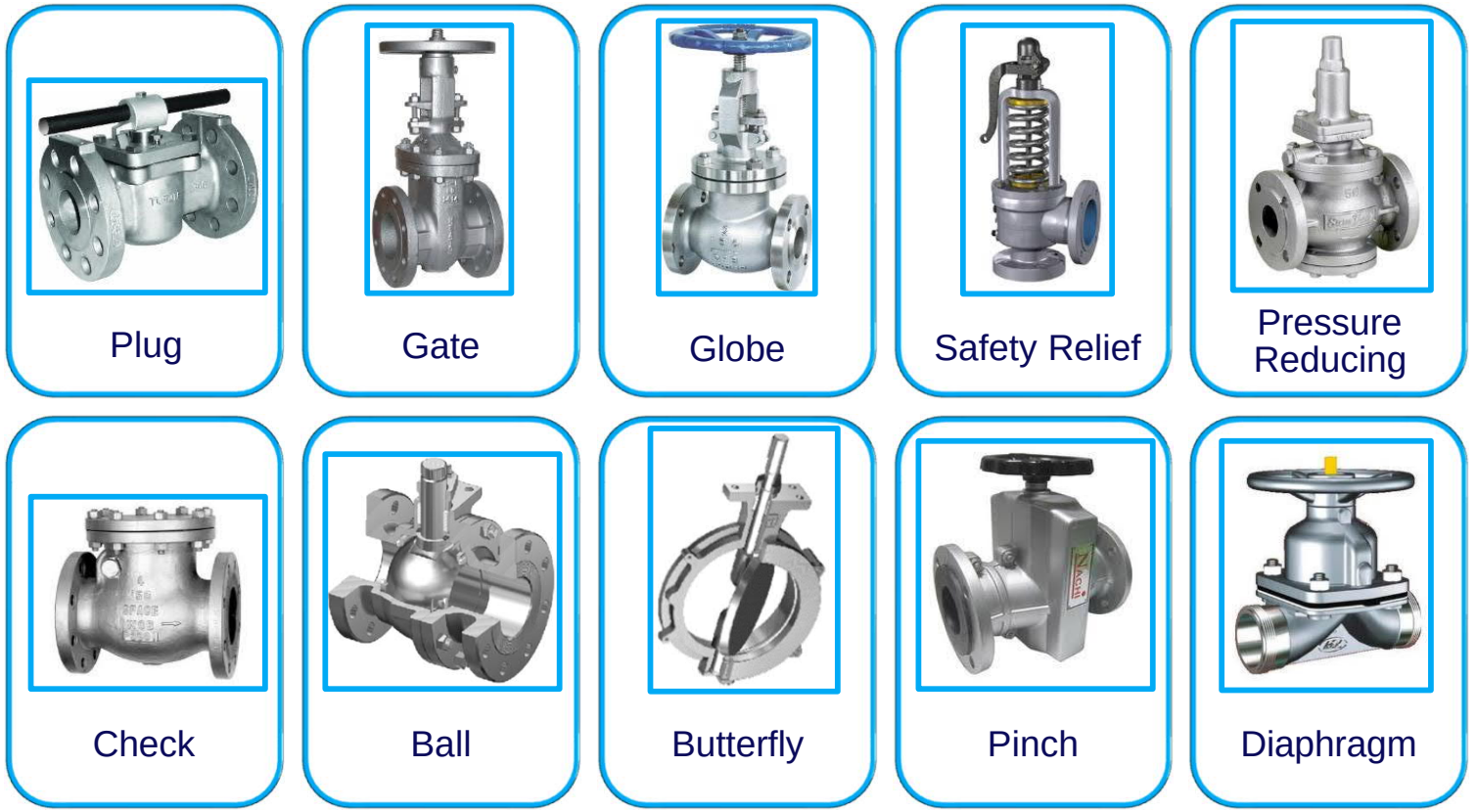


A short history of valves

Gate valves, ca. 1925

A short history of valves

Valve types, each having different characteristics



A short history of valves

Ball valve design and fabrication

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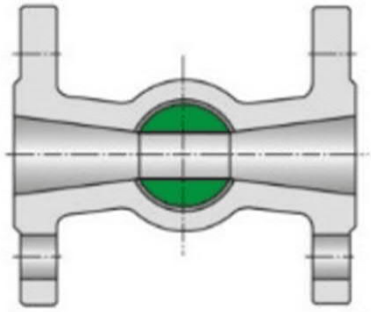
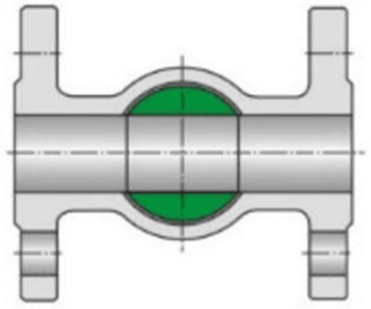
Bore size

Reduced bore

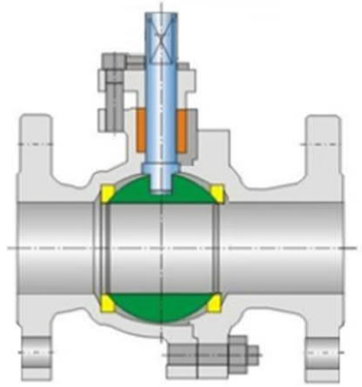


Full bore

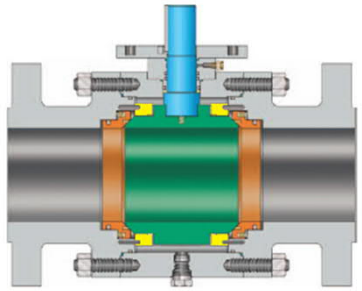


Ball support

Floating ball

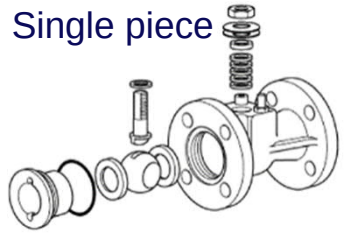


Trunnion ball



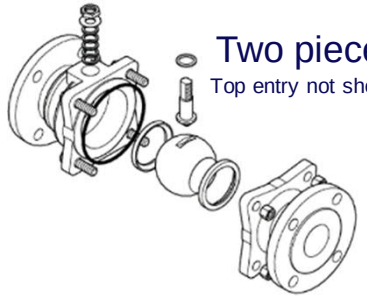
Body design

Single piece

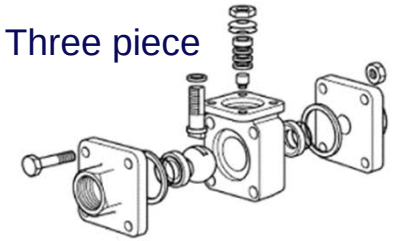


Two piece

Top entry not shown



Three piece



Body fabrication

Casting

Forging

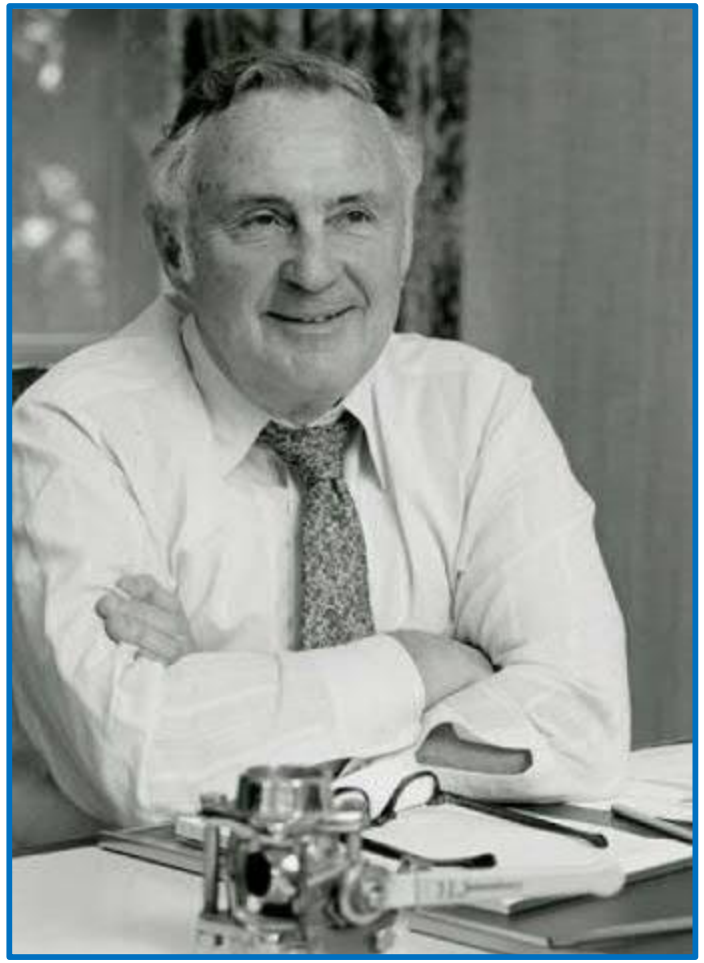
Seat material

Soft seated (polymer)

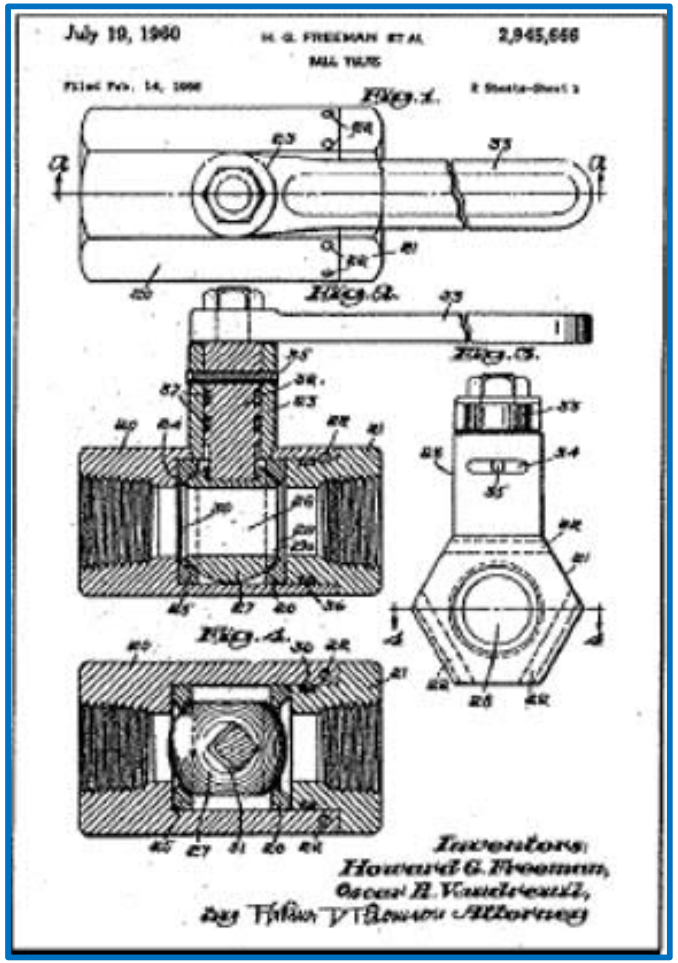
Metal seated

Jamesbury™ story

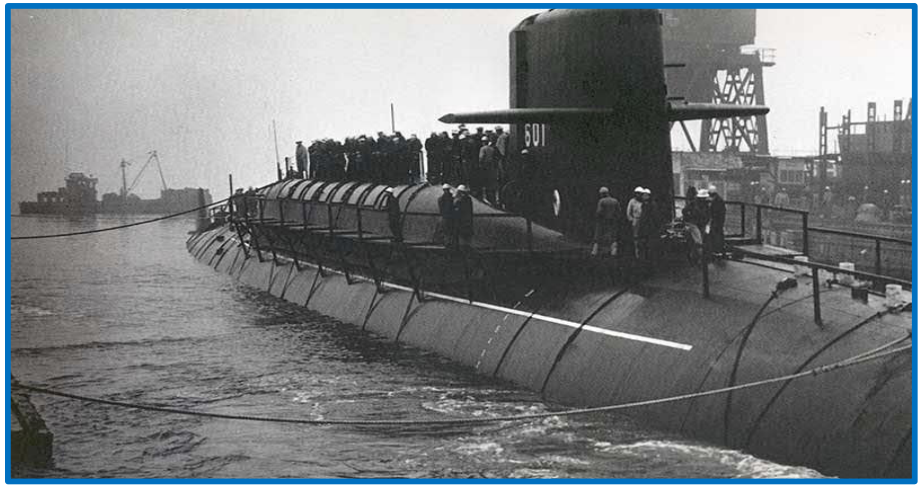
First Teflon® seated bi-directional ball valve, 1954



Howard Freeman



U.S. Patent 2,945,666



Jamesbury™ story

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Sequence of events

- Teflon discovered by Dupont Company, 1938
  - Unique material properties
- Howard Freeman graduates WPI, hired by Rockwood Sprinkler Company, 1940
- Howard Freeman develops spray mist hose nozzle for U.S. Navy, 1942
- Howard Freeman develops foam blanket additive for U.S. Navy, 1943
- U.S. Navy inspects captured German submarines, 1946
  - Use of ball valves to reduce space and weight discovered
- U.S. Navy begins designing & building nuclear submarines, 1951
  - Specifies ball valves to save space and weight
- U.S. Navy contacts Howard Freeman about ball valve problems, 1953
- Howard Freeman starts Jamesbury™ Ball Valve Company, 1954

Jamesbury™ Story

A culture of innovation & engineering excellence

- Flexible lip ball valve seat, 1954
- Valve pneumatic actuator, 1957
- Butterfly valve, 1968
- Self-relieving ball valve seat, 1982
- Firesafe butterfly valve seat, 1986
- Xtreme™ seat material, 2000
- RapidDraw 3D, 2012

Jamesbury™ story

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Takeaways

- Ball valves not widely utilized until late 1950s due to difficulty of manufacturing metal balls and seats, lack of ability to seal, galling, and lack of alternate seat materials, e.g. natural rubber
- Use of Teflon™ as a seat material provided good seal tightness, cycle life, chemical resistance, and reduced costs significantly
- Threaded end Teflon™ seated ball valves had significant cost advantages over plug and gate valves, as well as space and weight savings, and became industry standard products, flanged designs released later; many competitors entered the market
- The Jamesbury™ Company created the Teflon™ seated ball valve market, and continues to leverage our expertise to maximize customer value

Jamesbury™ Brand Ball Valves

Design features

Jamesbury™ Brand ball valves

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All valves are not equal!

Jamesbury™ Brand valves are engineered to provide superior performance

- Jamesbury™ is engineered sealing technology
  - ✓Seat design
  - ✓Stem sealing performance
  - ✓Stem packing adjustment
- Designed for automation
- Quality a priority
- Certified performance

Designed for seat sealing performance

Flexible lip seat technology

- Provides consistent seal by applying stored energy gained by compression and elastic torsion
- Provides bubble tight shut-off in either direction
- Maintains seal by adjusting as seat wears

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Challenge

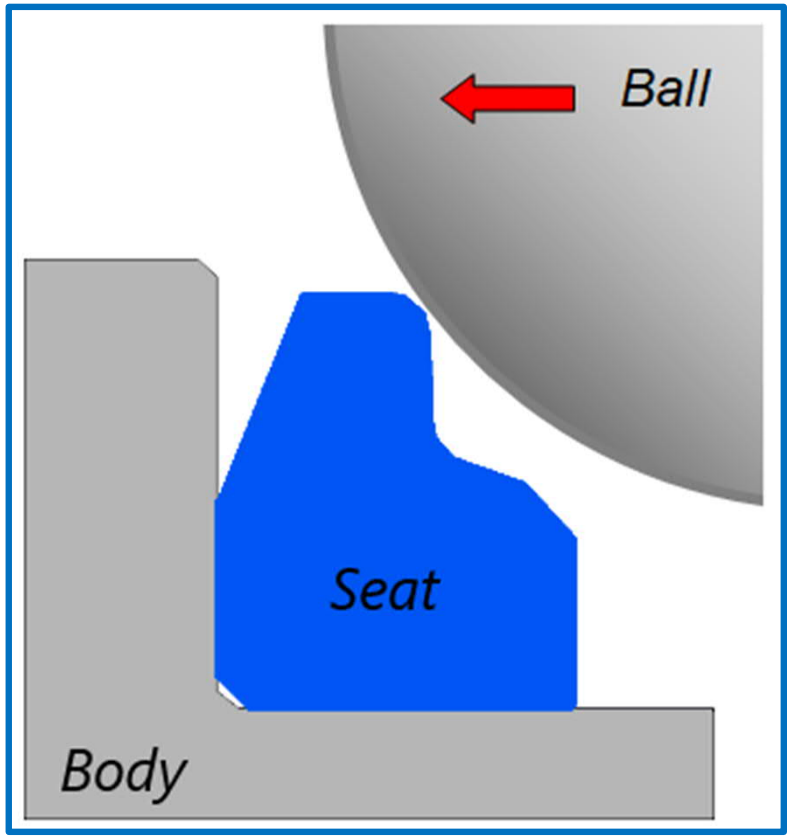
Repeatable & reliable sealing

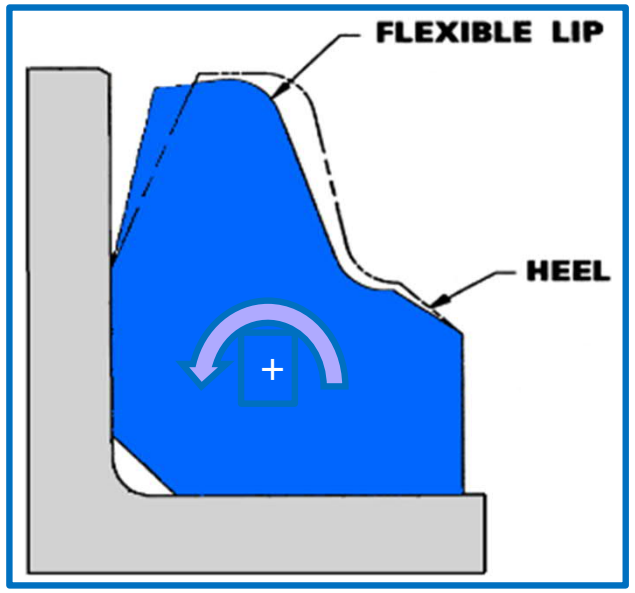
Solution

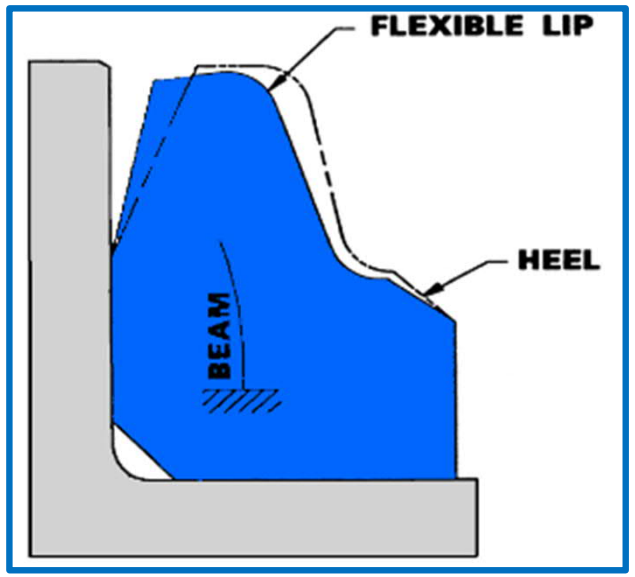
Flexible lip seat technology

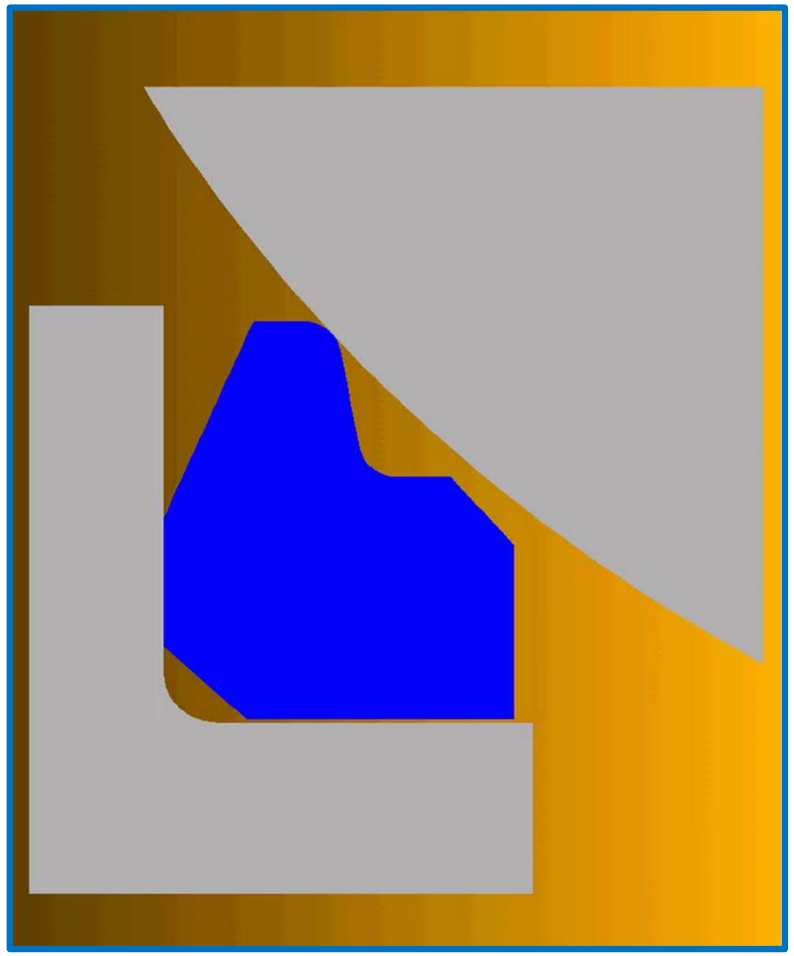
Designed for seat sealing performance

Flexible lip seat technology





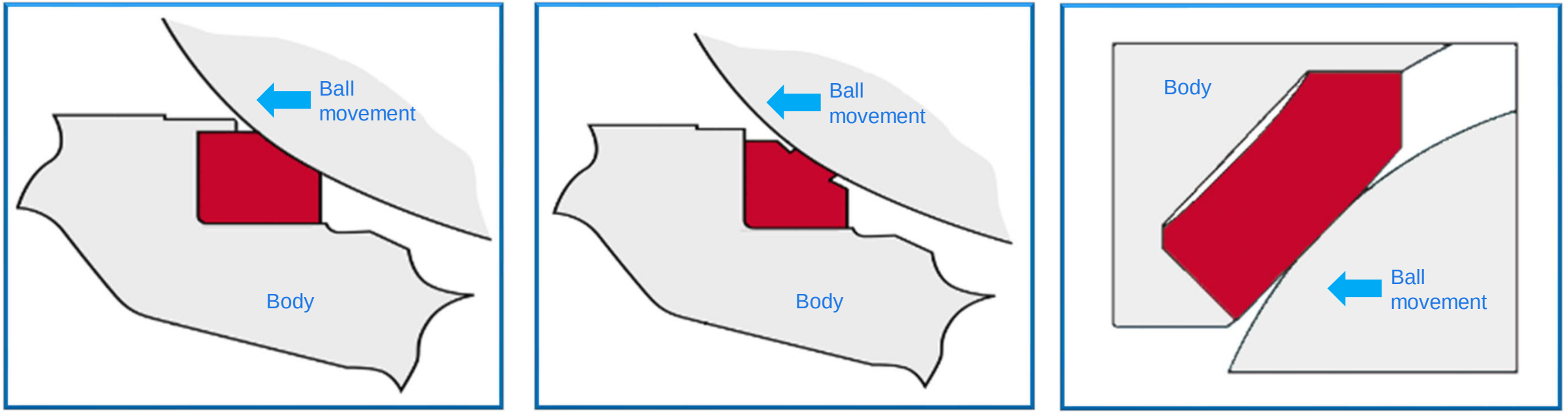




Designed for seat sealing performance

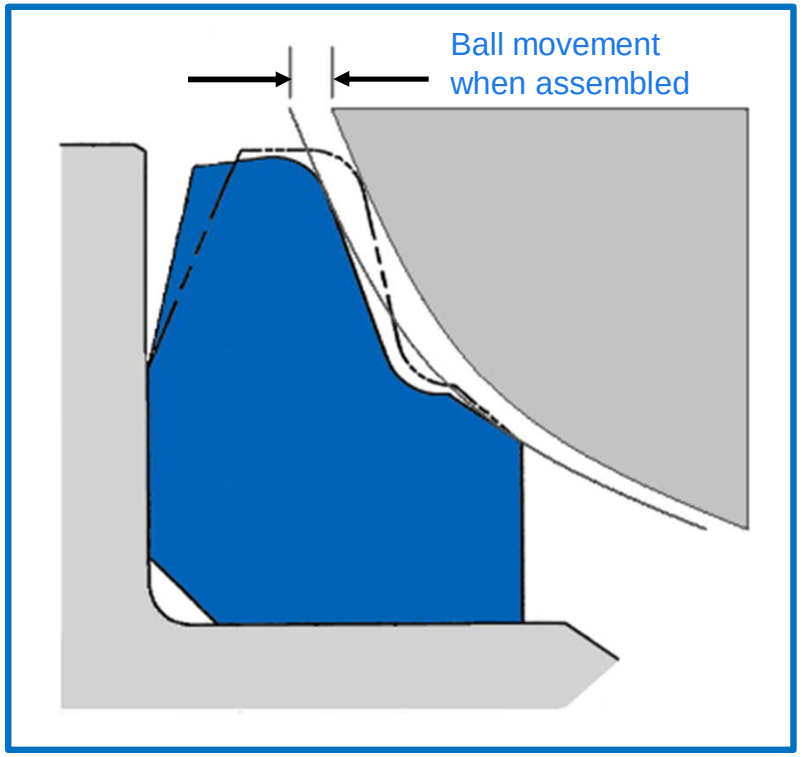
Typical competitor jam seat designs

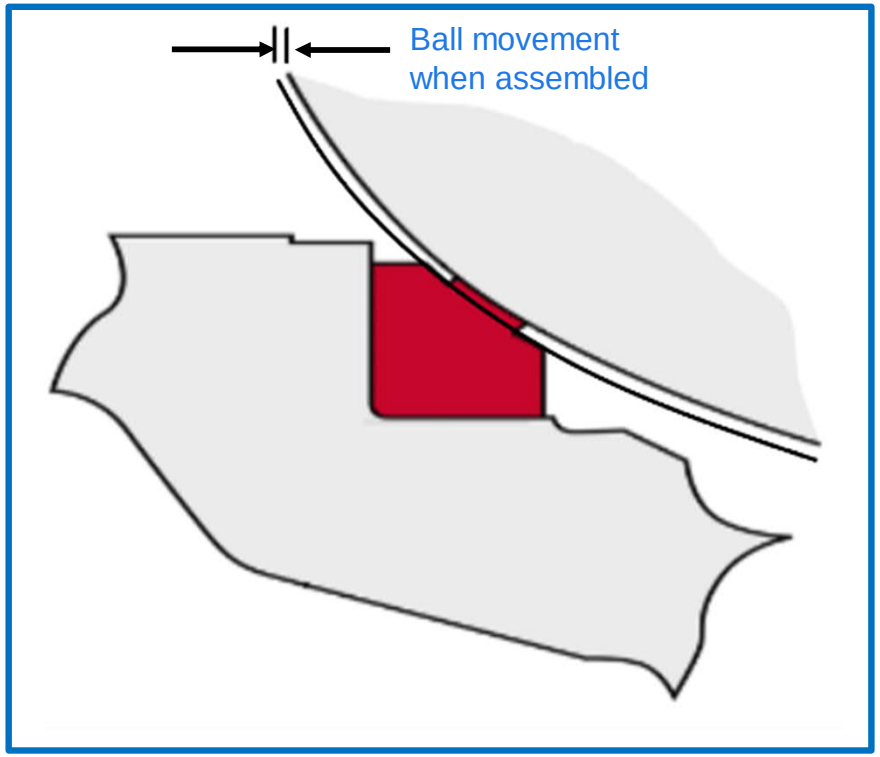
Primarily rely on polymer material alone for flexibility and recovery

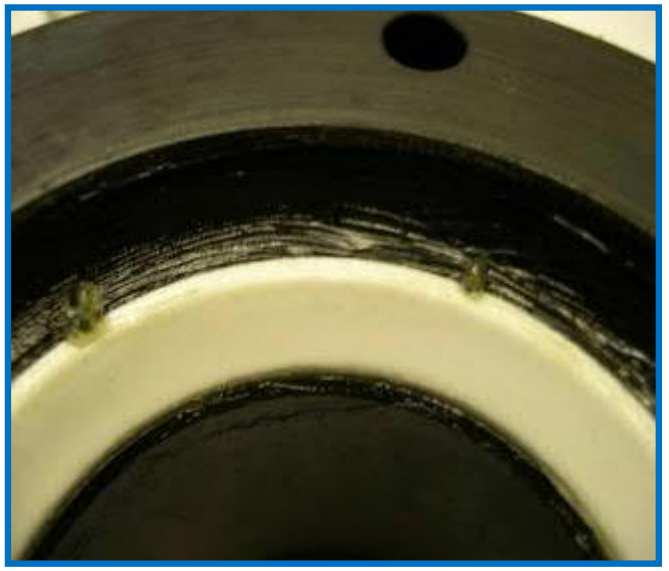


Designed for seat sealing performance

Jam seats have less compression & lower tolerance for wear







Jam seats often require grease lubrication to ensure relatively consistent torque

Designed for seat sealing performance

Flexible lip seat technology

- Seats seal in both directions
- Double-seated valves can trap fluid in the center of the valve between the seats. When warmed, trapped fluid pressure can exceed valve rating
- Jamesbury™ Brand flexible-lip seat automatically relieves cavity pressure

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Challenge

Trapped fluid pressure

Solution

Flexible lip seat technology

Designed for seat sealing performance

Cavity pressure relief

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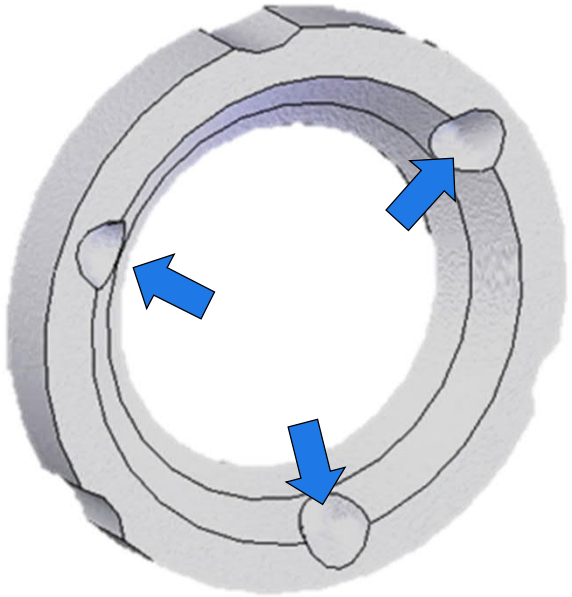
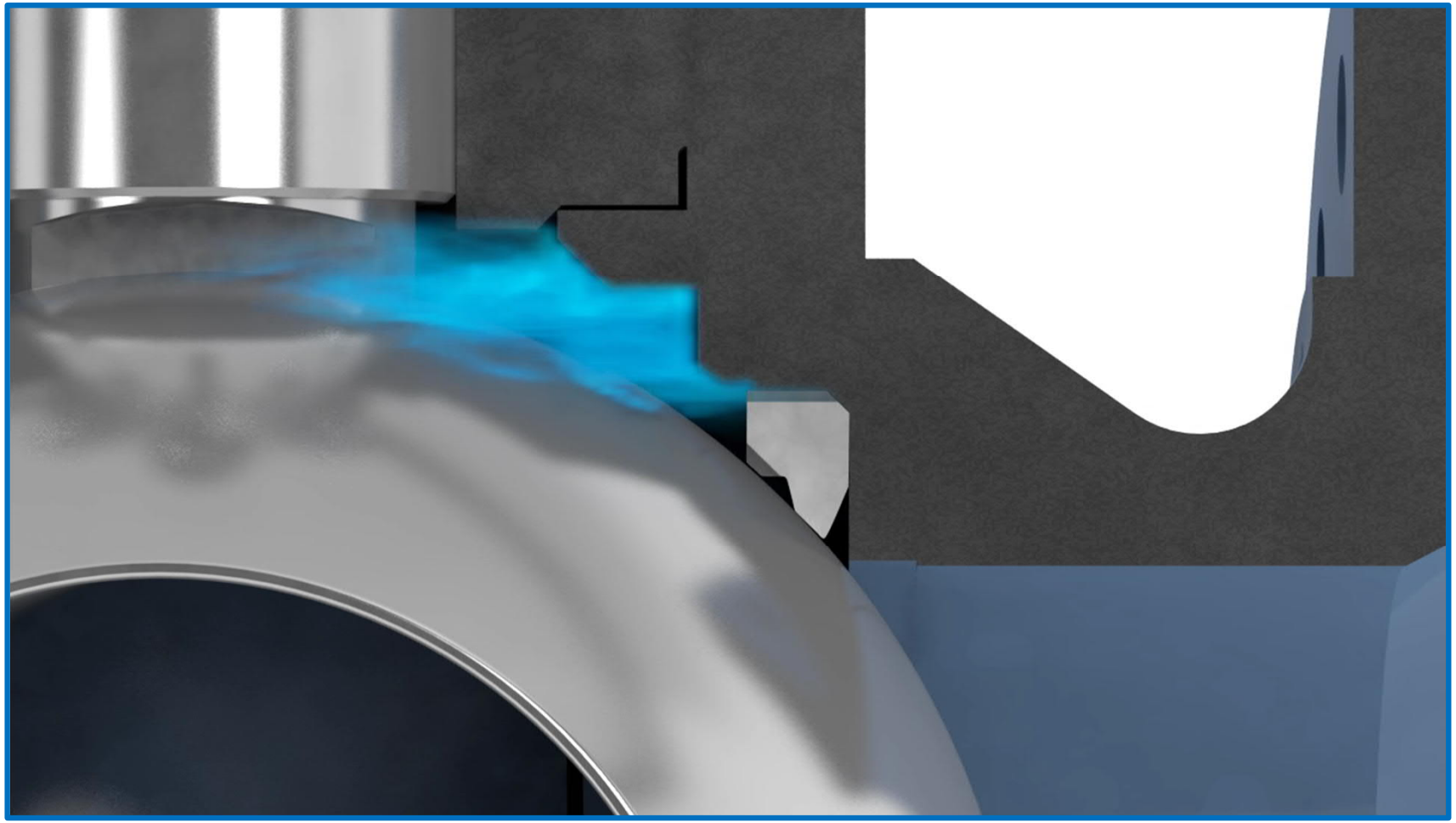
Heel grooves



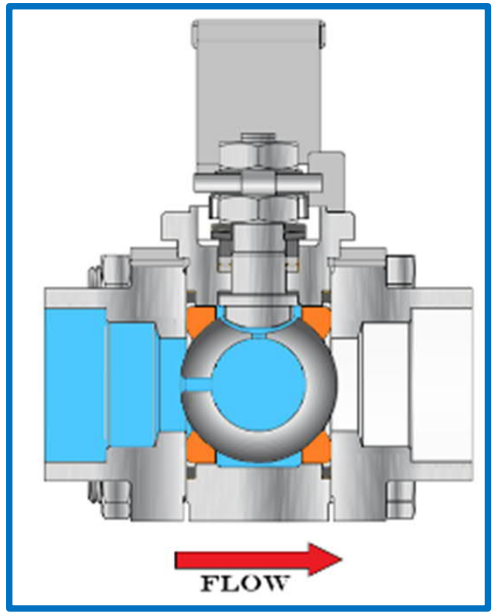
Heel grooves allow cavity pressure to pass through ball support and push against flexible lip – releasing the pressure



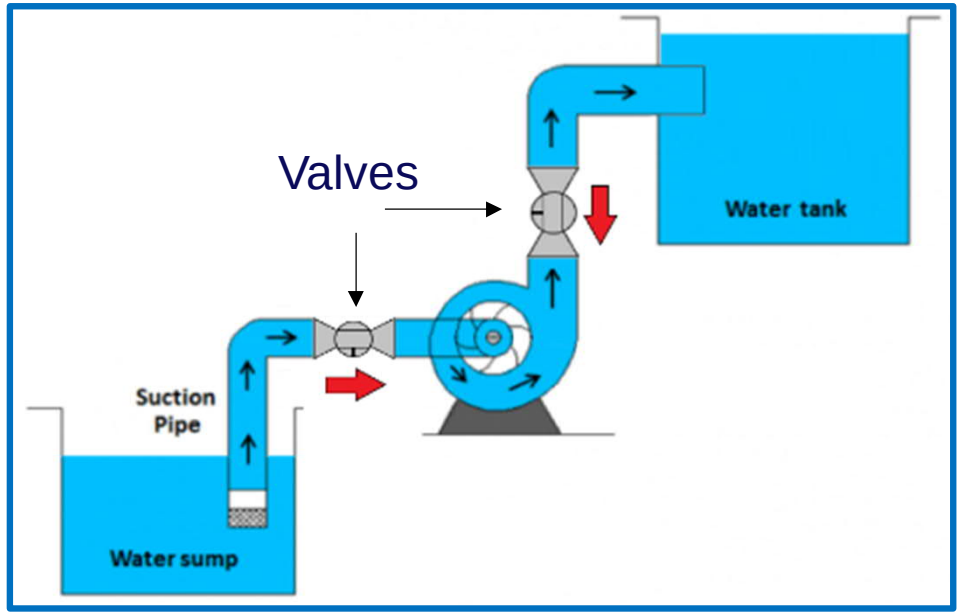
Designed for seat sealing performance

Valves without self-relieving seats require a vent hole in the ball

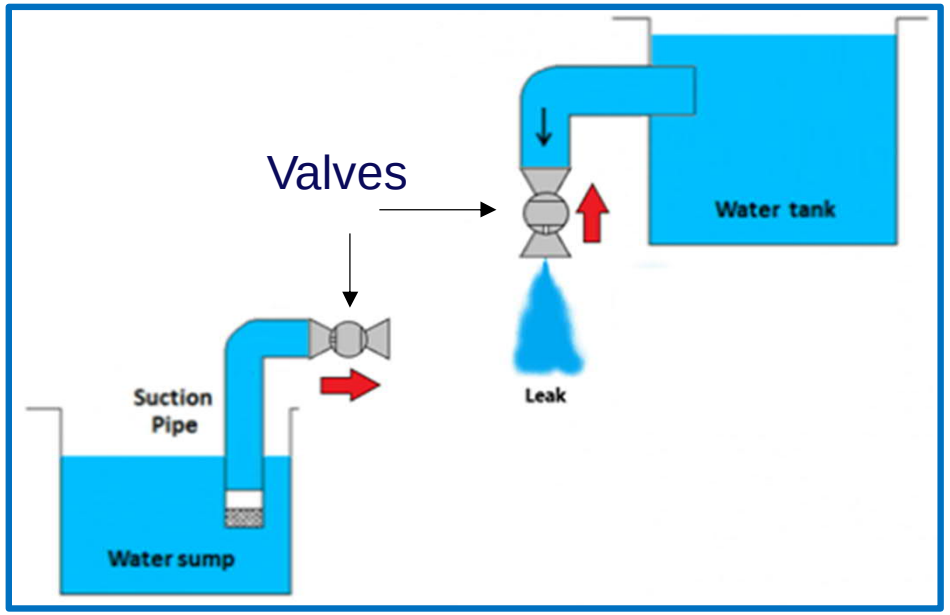
Vent hole causes serious safety problems when installed in wrong direction



Valve with vent hole has flow direction arrow to ensure correct installation direction



Correct installation of isolation valves around a pump will have the flow arrows towards the pump. Common mistake is that the downstream valve will be installed in the opposite direction, so flow arrow is the same as normal pump flow.



When valves are closed and pump is removed for maintenance, media in pipe can leak through vent hole to atmosphere.

Designed for seat sealing performance

Cavity pressure relief

- ASME B16.34 warns of cavity pressure in double seated valves
- API 608 requires ball valves to have a means of protection from excessive cavity pressure
- API 6D requires cavity pressure relief at less than 1.3x body rating
- Some customers mistakenly apply API 6D requirement to API 608 valves; seat designs are different
- Jamesbury™ Brand flexible lip seats comply with API 608, and relieve cavity pressure at less than body design capability
- Performance validated by testing

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Questions?

Designed for consistent operating torque

Design & testing

- All seat designs are qualified by a rigorous test program
- Grooves on the seat OD are an original Jamesbury™ Brand innovation to minimize operating torque

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Challenge

Inconsistent operating torque

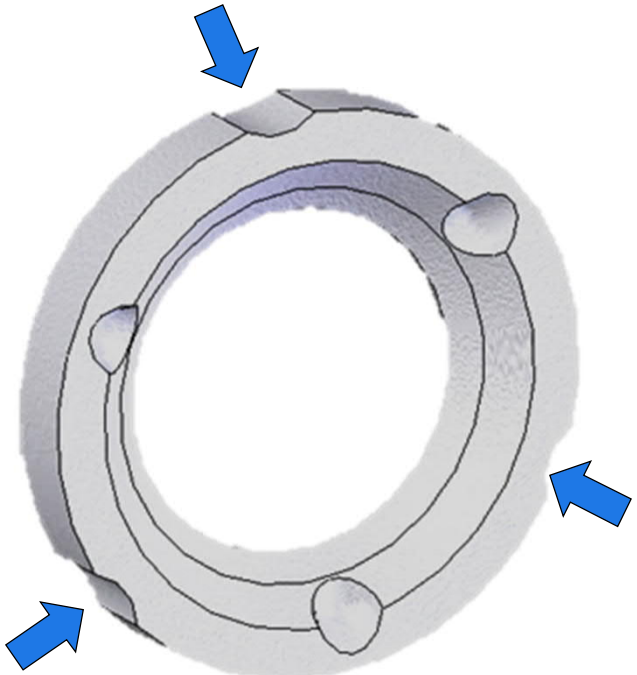
Solution

Design & testing

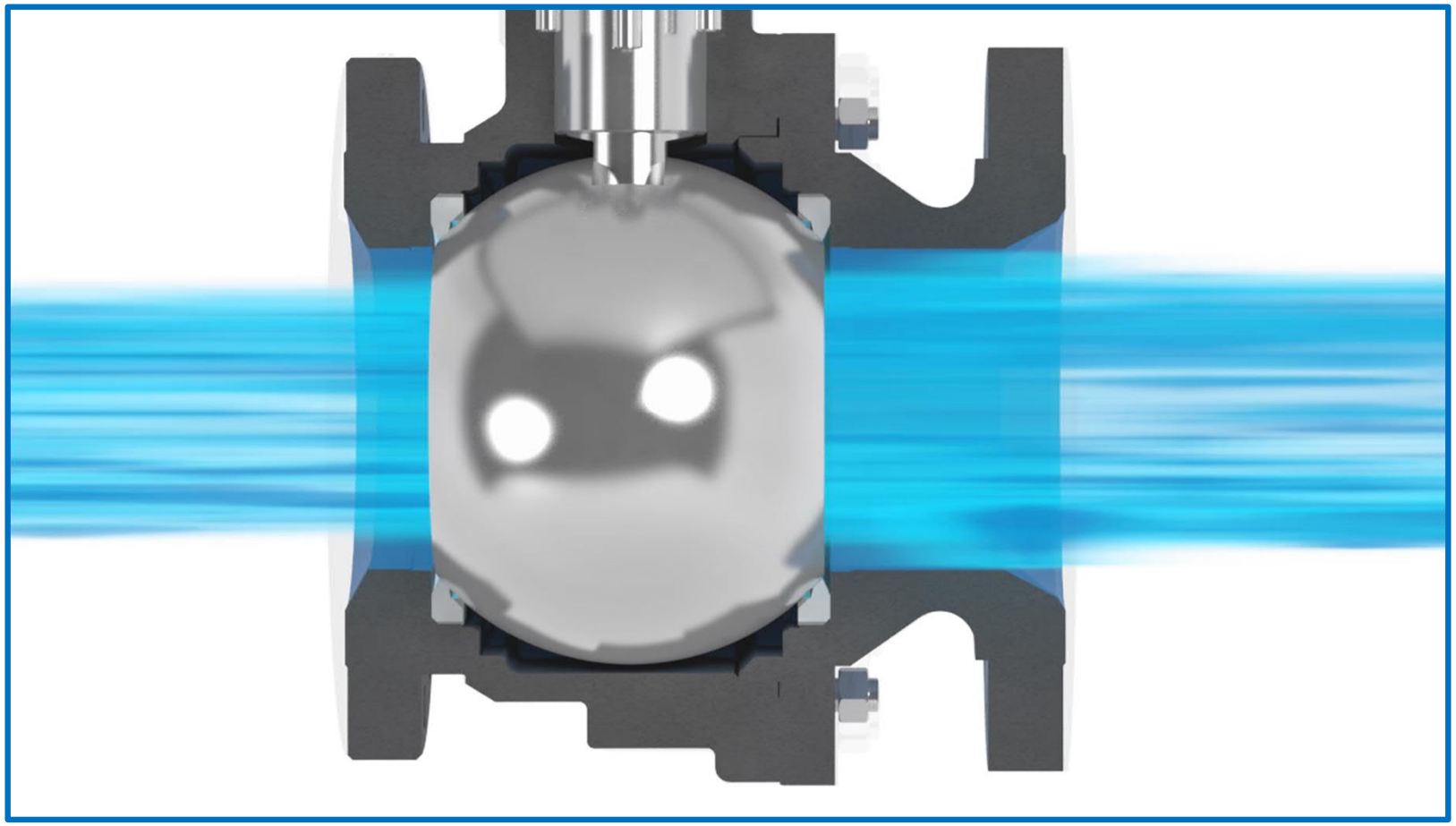
Designed for consistent operating torque

Design & testing

Grooves on OD



OD grooves allow pressure to pass around the upstream seat, so it does not add to the torque required to operate the valve



Designed for maximum material performance

Xtreme™ seat material

- Xtreme™ is a unique polymer developed by Jamesbury™ Brand material engineers
- Improved seat recovery leading to higher pressure-temperature ratings for increased production
- Excellent chemical compatibility
- Chemical Processing Vaaler Award winner (1999)

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Challenge

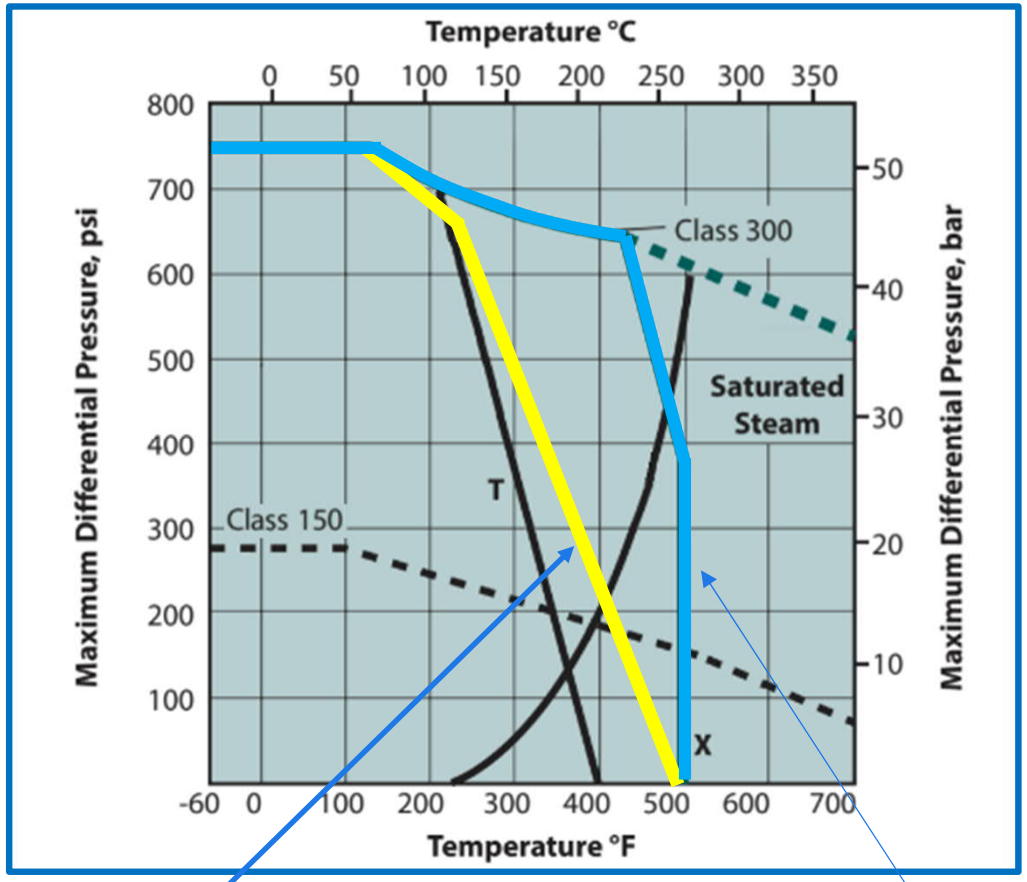
Higher operating temperatures and pressures

Solution

Xtreme™ seat material

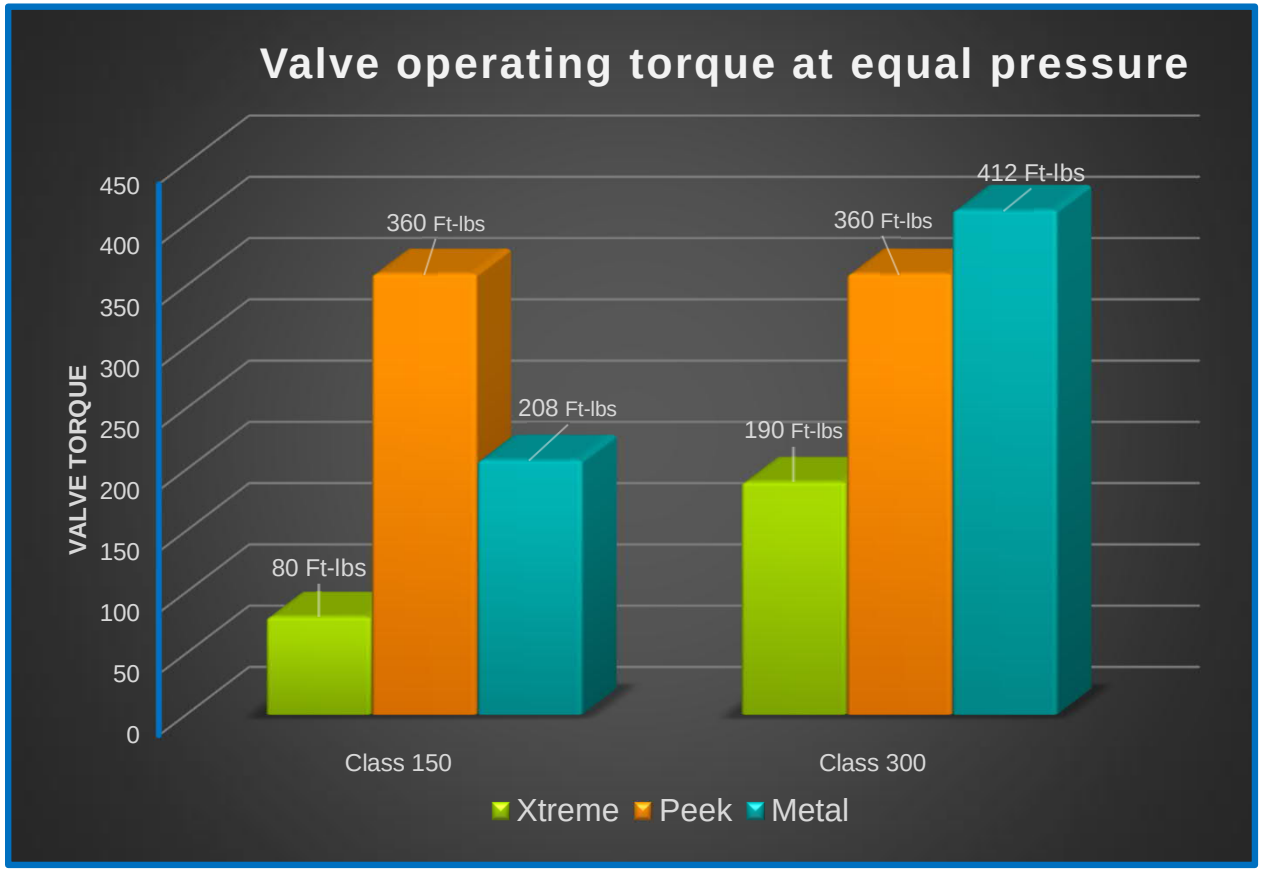
Designed for maximum material performance

Xtreme™ pressure-temperature ratings previously required PEEK or metal seats



Typical competitor seat

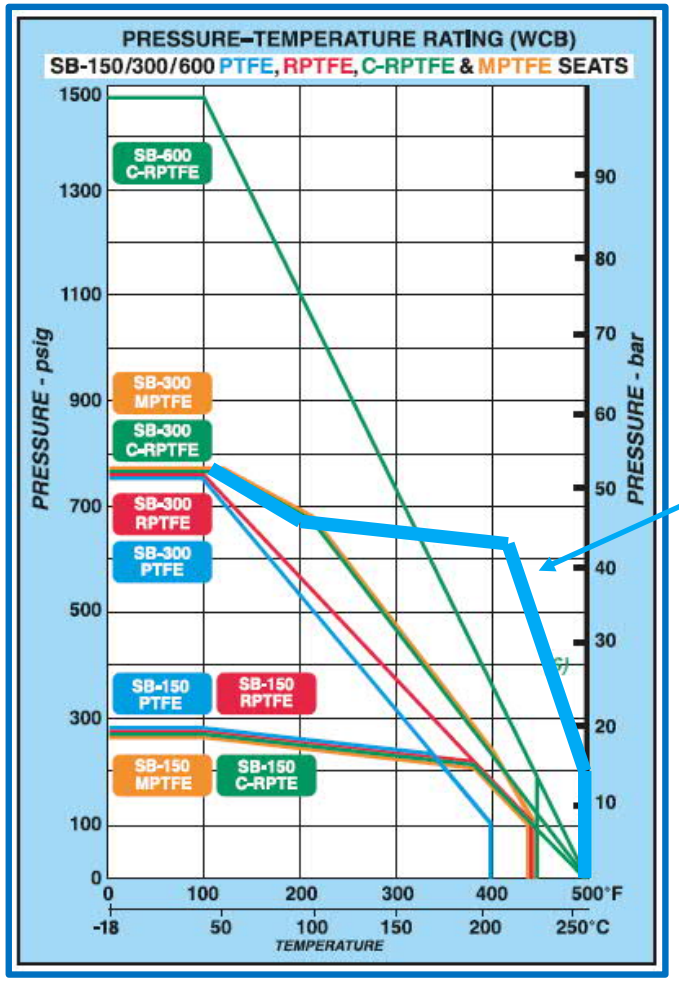
Xtreme™



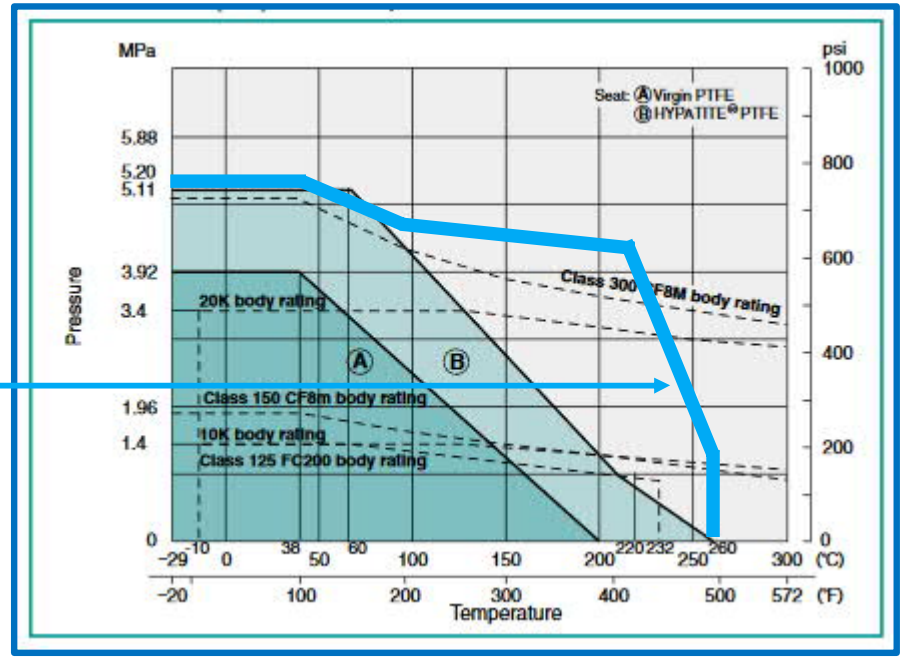
Operating torque and required actuator size is much lower than PEEK or metal seats

Designed for maximum material performance

Xtreme™ seat material pressure-temperature rating versus competition

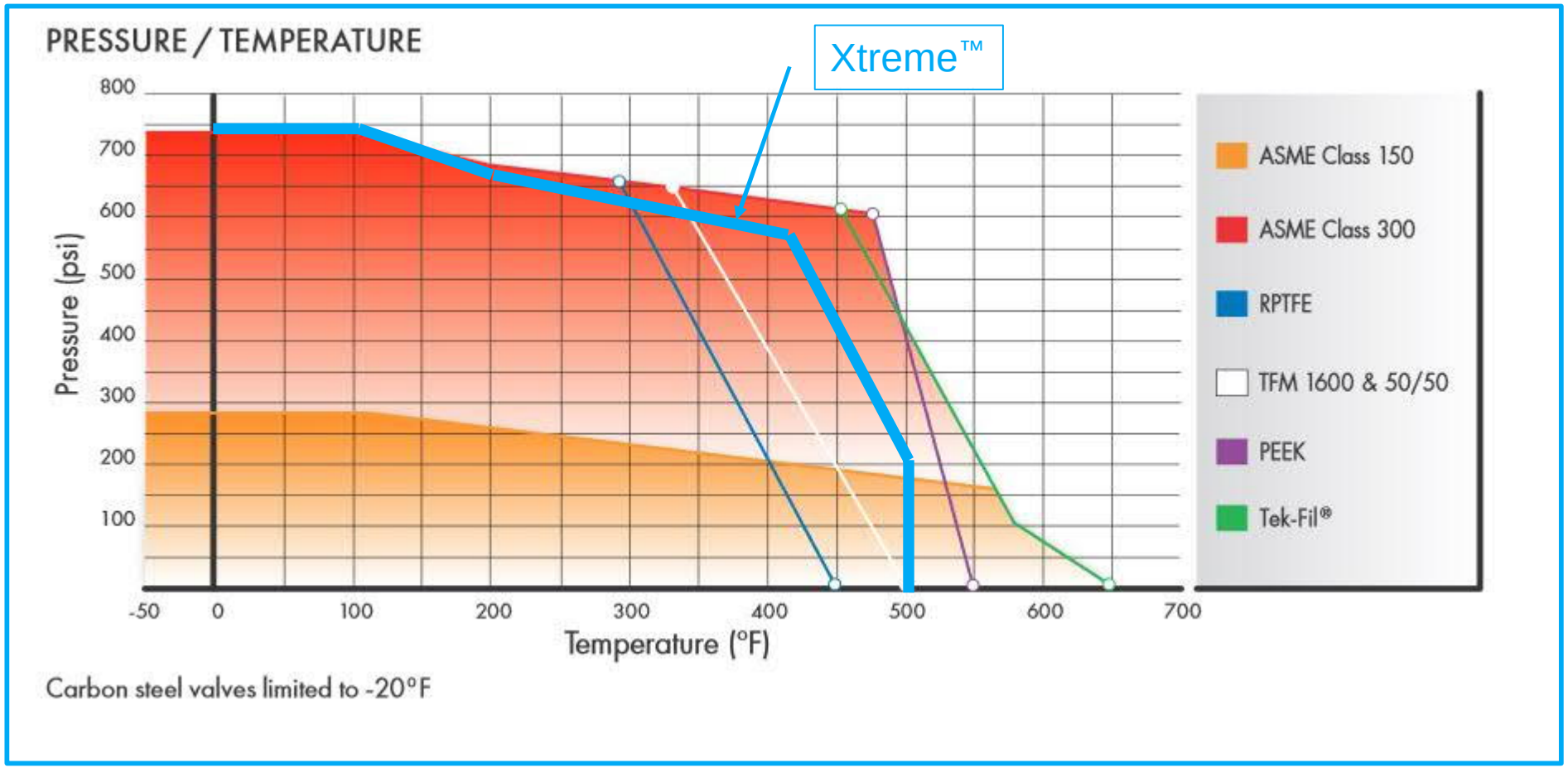


Xtreme™



Designed for maximum material performance

Xtreme™ seat material pressure-temperature rating versus competition



Designed for maximum cycle life

Xtreme™ seat material

- Xtreme™ is a unique polymer developed by Jamesbury™ Brand material engineers
- Excellent wear resistance for long life and reduced maintenance costs
- Low operating torque for cost-effective automated assemblies

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Challenge

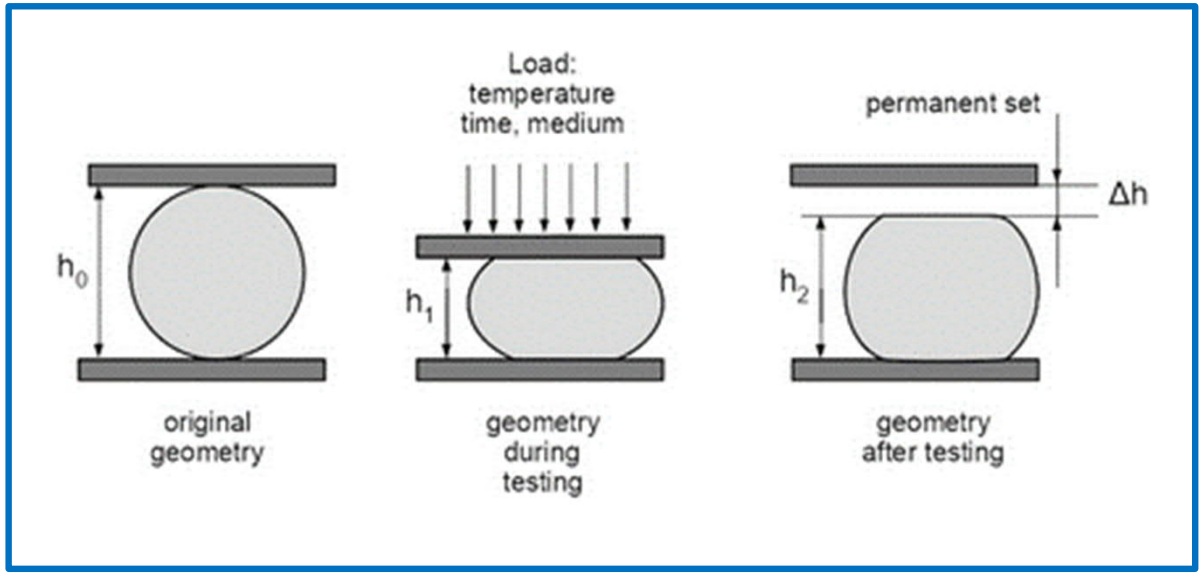
Poor cycle life

Solution

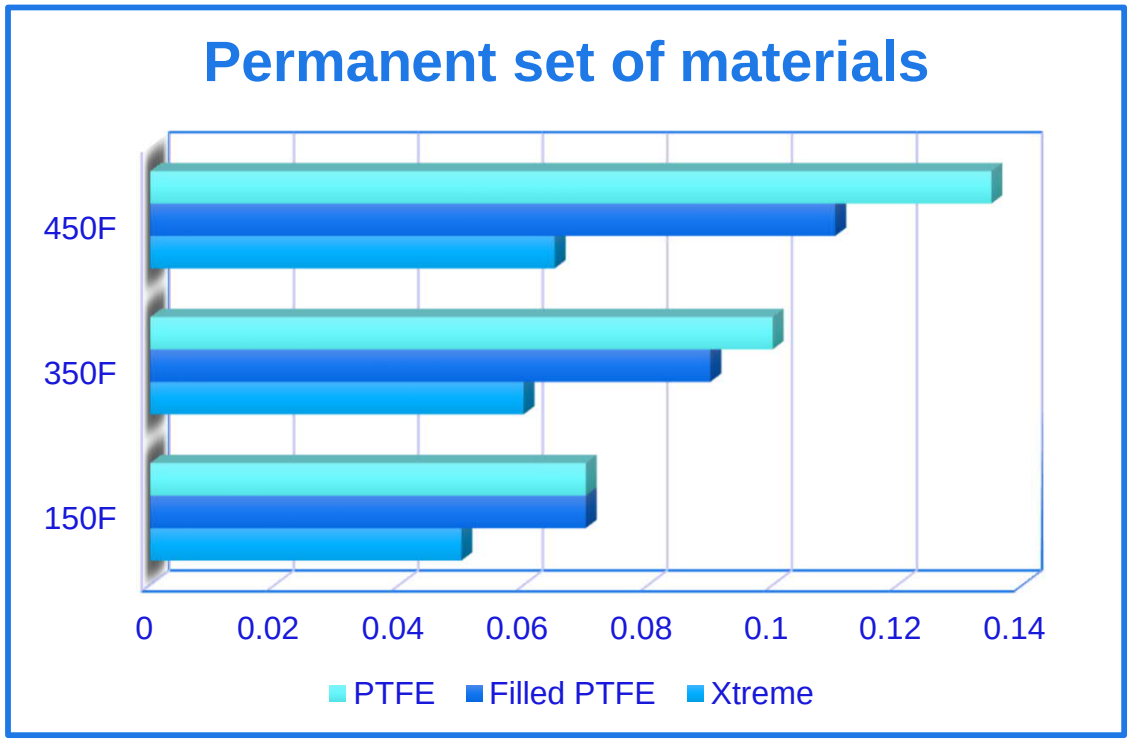
Xtreme™ seat material

Designed for maximum cycle life

Seat recovery is key to maximize pressure-temperature ratings and cycle life



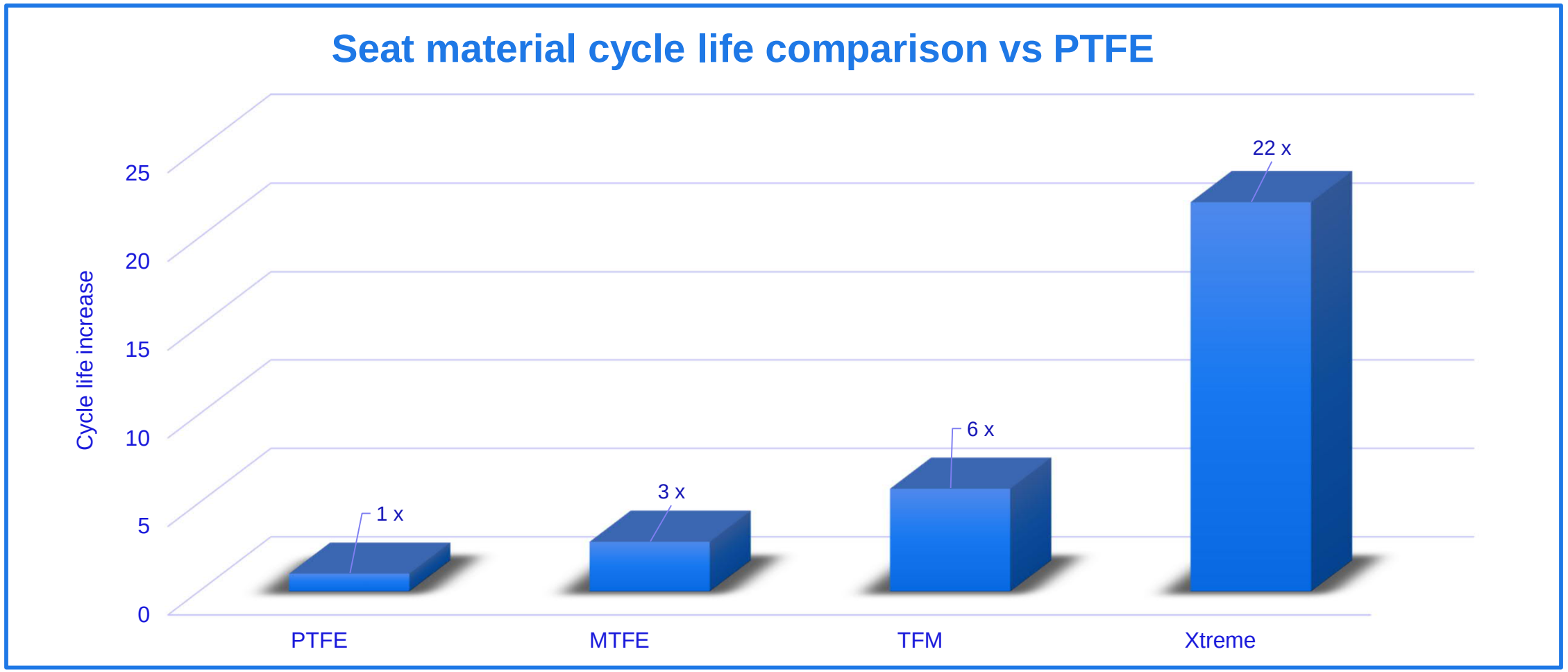
The greater the seat recovery to its original dimension after loading, especially at elevated temperature, leads to higher pressure-temperature rating and longer cycle life. More material can wear away and still provide an effective seal.



Permanent set of Xtreme is lower than PTFE and filled PTFE, especially at higher temperatures

Designed for maximum cycle life

Xtreme™ cycle life



Cycle life of Xtreme™ under the same conditions is 22 times times greater than virgin PTFE, and more than 3 times greater than virgin TFM

Designed for maximum cycle life

Customer success story

- Wacker Chemical Corp., Charleston, TN
- Produces ultra-pure polysilicon with a proprietary process
- Original valves were only lasting 5 batch cycles before leaking and forcing plant shut-down for maintenance
- Neles Series 9000 valves with Xtreme™ seats were tested and approved
- Cycle life has increased to over 25 batch cycles

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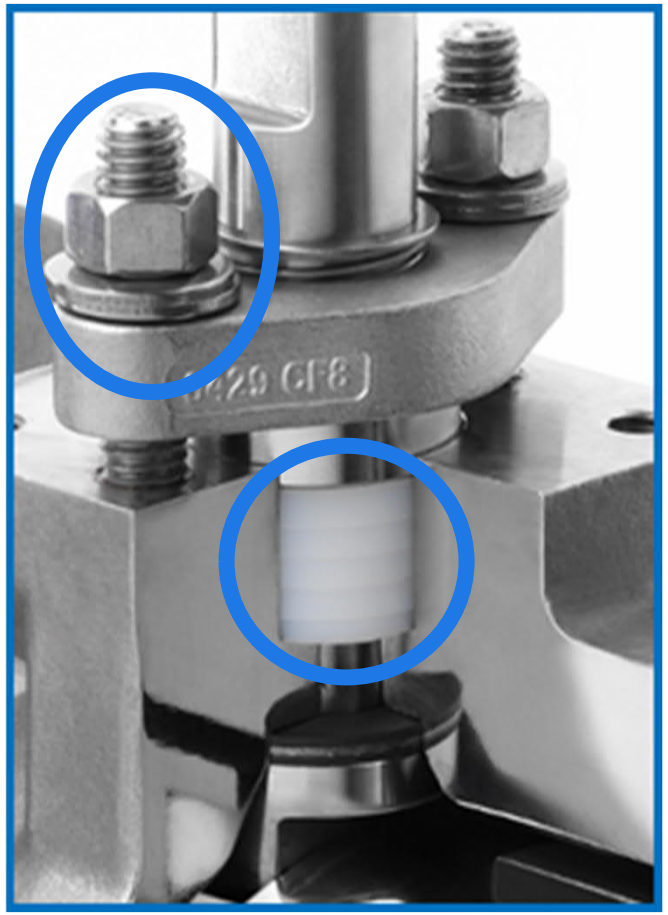
Questions?

Designed for stem sealing performance

Live loaded and robust stem seal design

- Spring loaded seal compensates for thermal expansion and contraction
- Extends cycle life by compensating for wear
- Live loading is a standard feature on most products
- V-ring packing & patented stem seals provide multiple sealing zones
- Enhanced PTFE material for tighter sealing performance



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Challenge

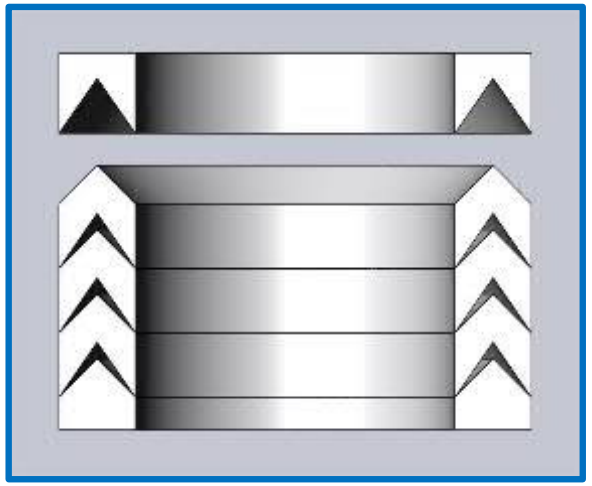
Stem seal leaks

Solution

Live loaded and robust stem seals

Designed for stem sealing performance

V-ring packing



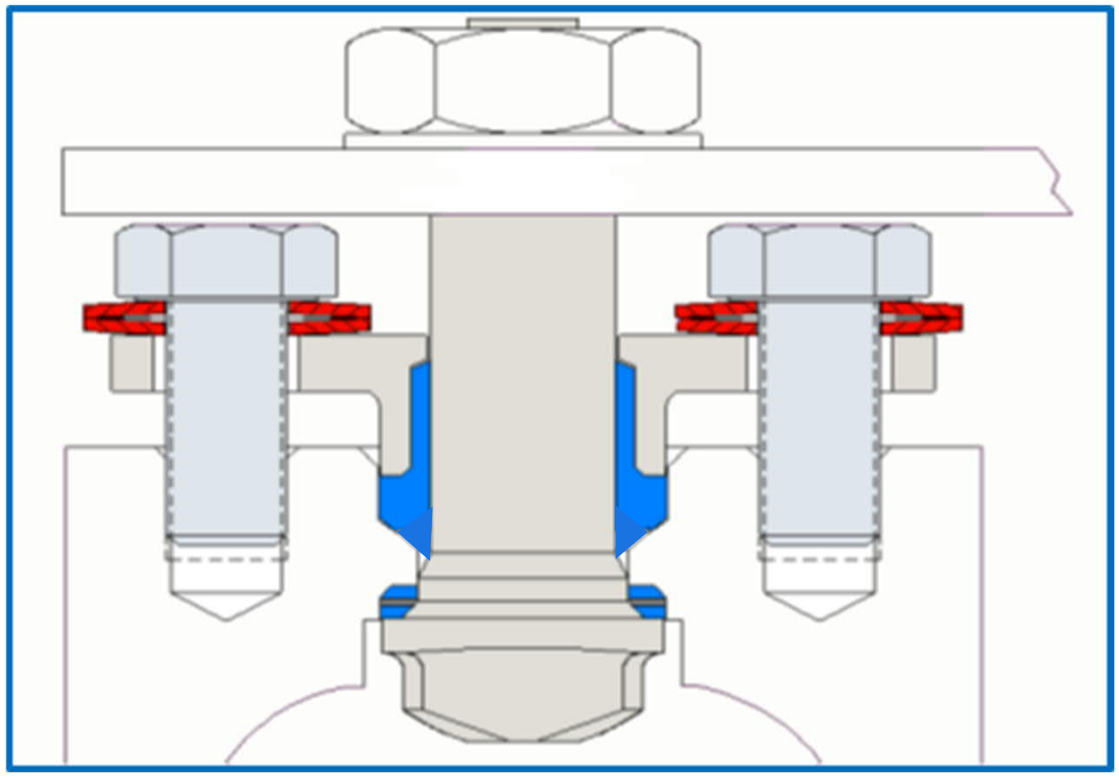
Wedging action of V-shape causes seal to expand when compressed, increasing sealing against packing bore and stem.

Multiple sealing points along potential leak paths

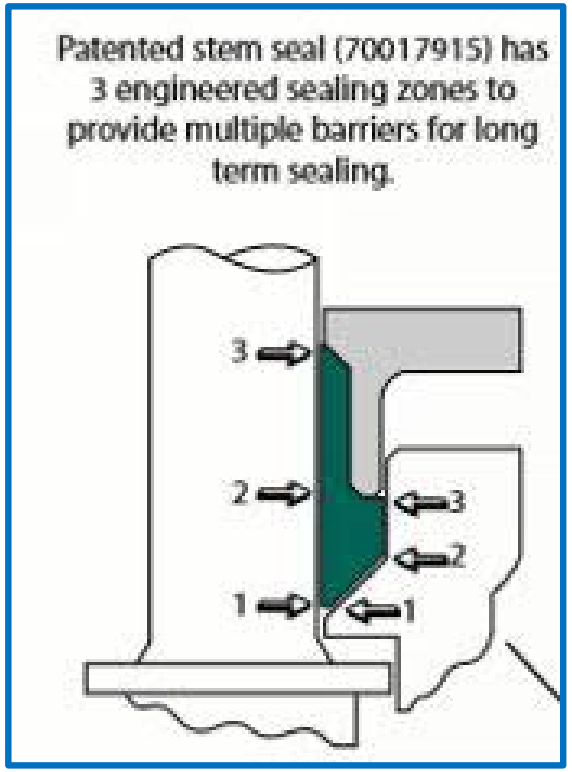
Challenge for small valves where there is not enough space to fit a tall stack of V-rings. How to get the benefit of multiple sealing points against the packing bore and stem?

Designed for stem sealing performance

Patented stem seal – another Jamesbury™ Brand engineering innovation



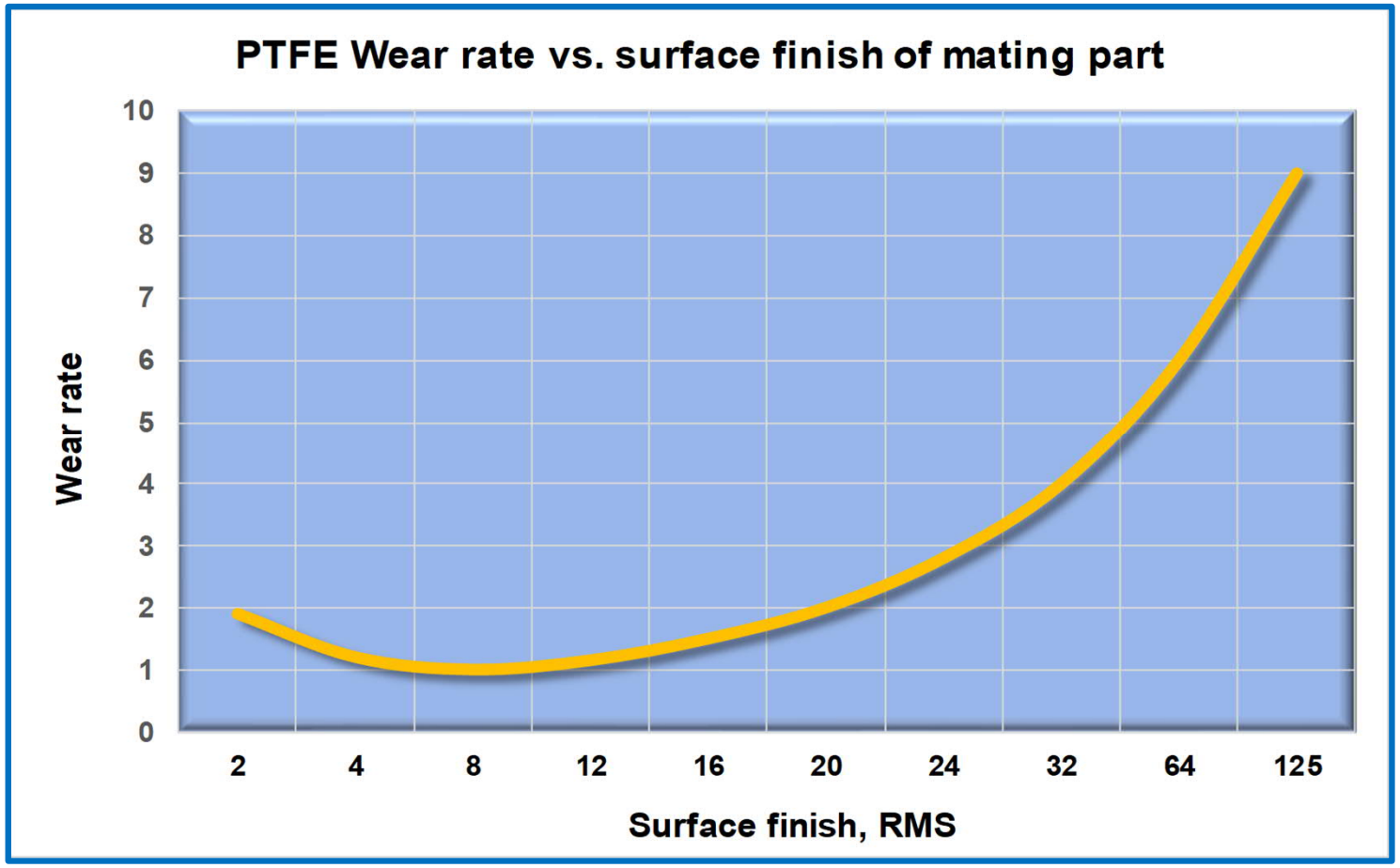
Angled contact surfaces create multiple sealing points at the OD and ID



Compact design easily fits into small valves and provides the sealing performance of V-ring type packing

Designed for stem sealing performance

Surface finish



Our laboratory studies have revealed the optimum surface finish for longest cycle life. When polished below 8 RMS, the wear rate of PTFE materials actually begins to increase.

Jamesbury balls & stems manufactured with an 8 RMS finish

Designed for stem sealing performance

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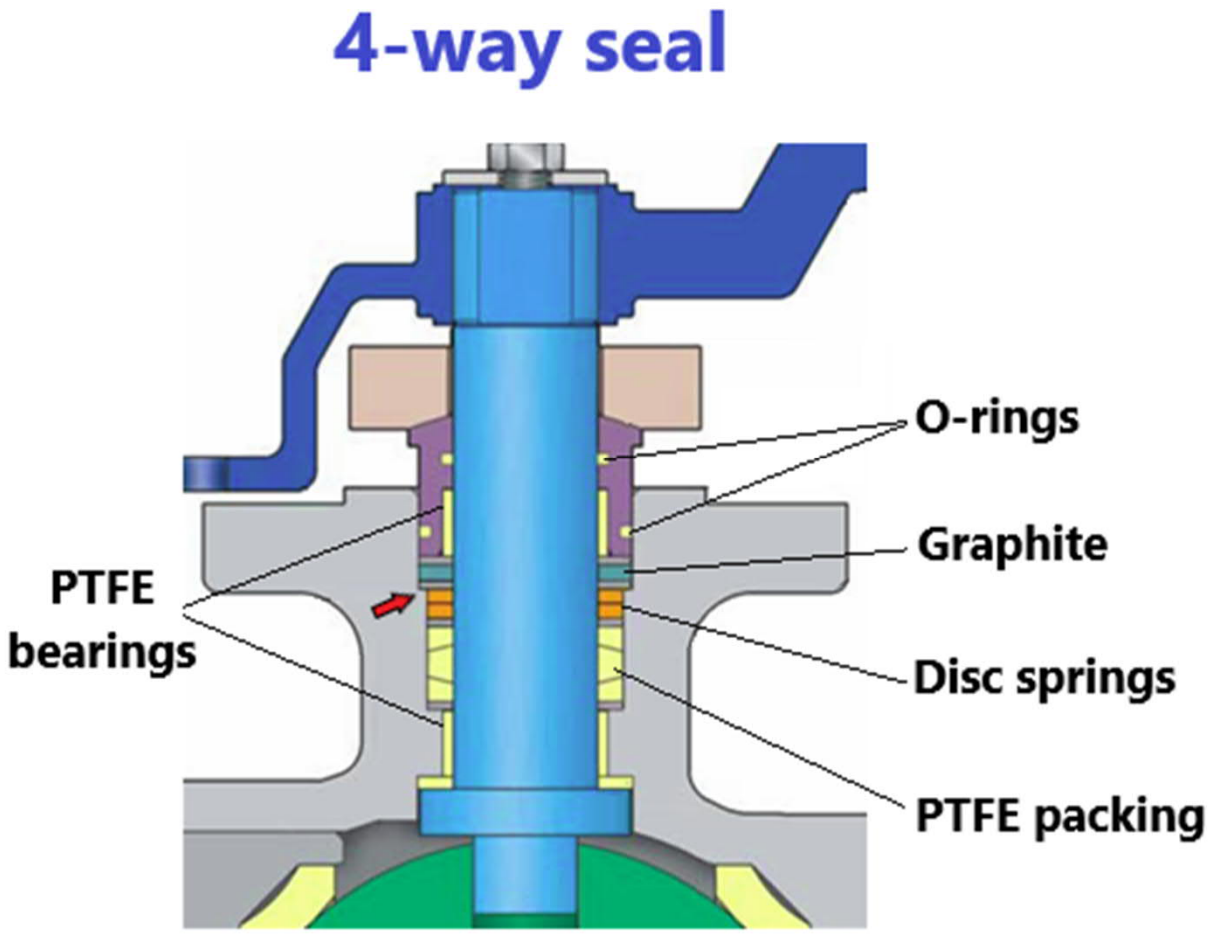
Our design features along with Xtreme™ provides longest cycle life available

	Typical stem seal cycle life	Frequency of adjustment	Seat leakage
Competitor A	2,000 - 6,000	Continuous	None
Competitor B	20,000 - 35,000	Several	None
Competitor C	3,000 - 3,500	Several	2,000 cycles
Competitor D	40,000 - 70,000	Infrequent	None
Competitor E	500 - 5,000	Continuous	Stem Broke
Competitor F	1,500	Infrequent	None
Neles Valves	**400,000 - 700,000**	**Infrequent**	**None**

Cycle life performance of ball valves opening and closing against 10 bar air at ambient temperature
Monitored stem seal and seat leakage, as well as number of times stem seal required adjustment

Designed for stem sealing performance

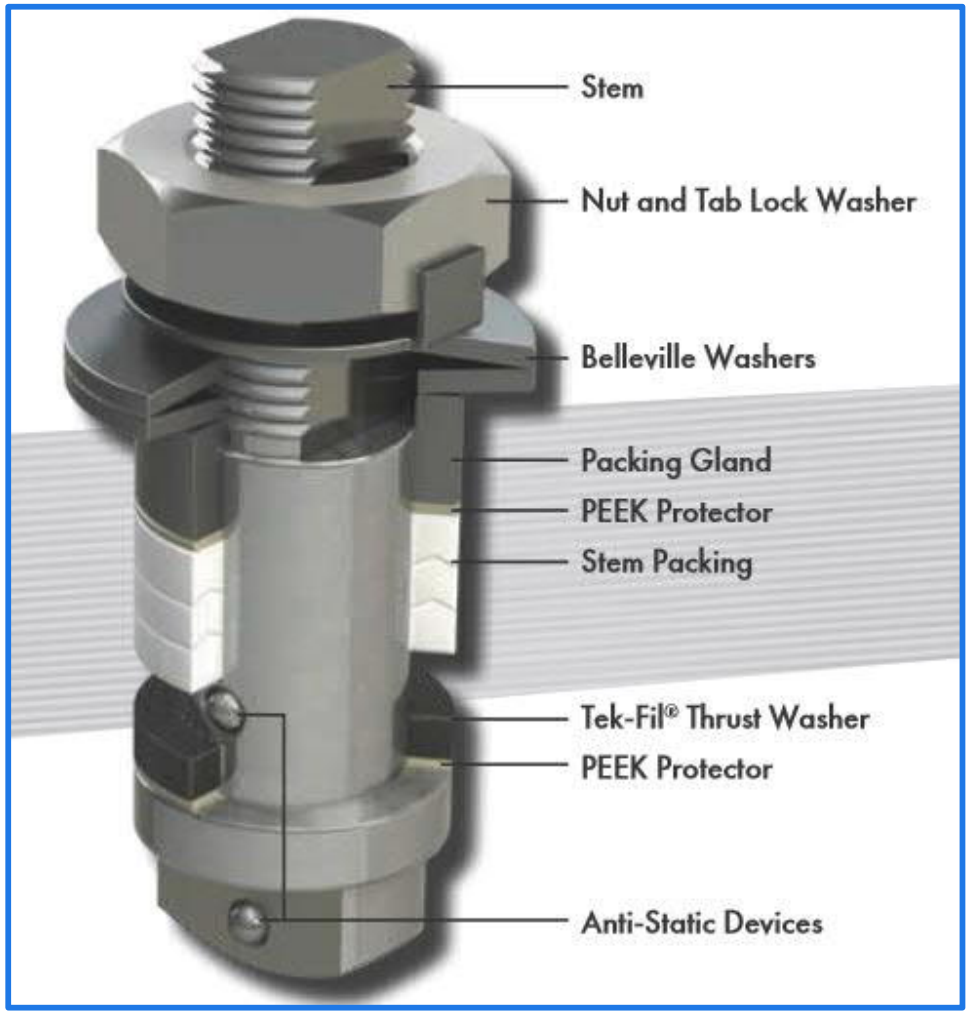
Competitor design evaluation



- Complex design with many parts that are advertised as features
- Step in packing bore below graphite seal prevents additional compression of PTFE packing when packing nuts are tightened
- No additional adjustment possible once primary PTFE seal wears
- Clearly a problem since additional O-rings added at OD and ID
- O-rings limit temperature rating and have limited media compatibility
- Additional PTFE bearings added to increase tolerance to side loading during manual operation or by misaligned actuator

Designed for stem sealing performance

Competitor design evaluation



- Belleville washers buried inside valve body
- Locking tab prevents incremental adjustment
- Access to locking tab likely nearly impossible
- Better, simpler design than previous example
- Spring loaded ball static grounding fails in our experience during cycle testing

Designed for stem sealing performance

Certified performance

- ISO 15848 Rate AH & BH
- API 641 to 10” NPS
- EPA Method 21 to < 100ppm
- Certified Low Leak Technology

NELES

Challenge

Fugitive emissions

Solution

Certified performance

Designed for stem sealing performance

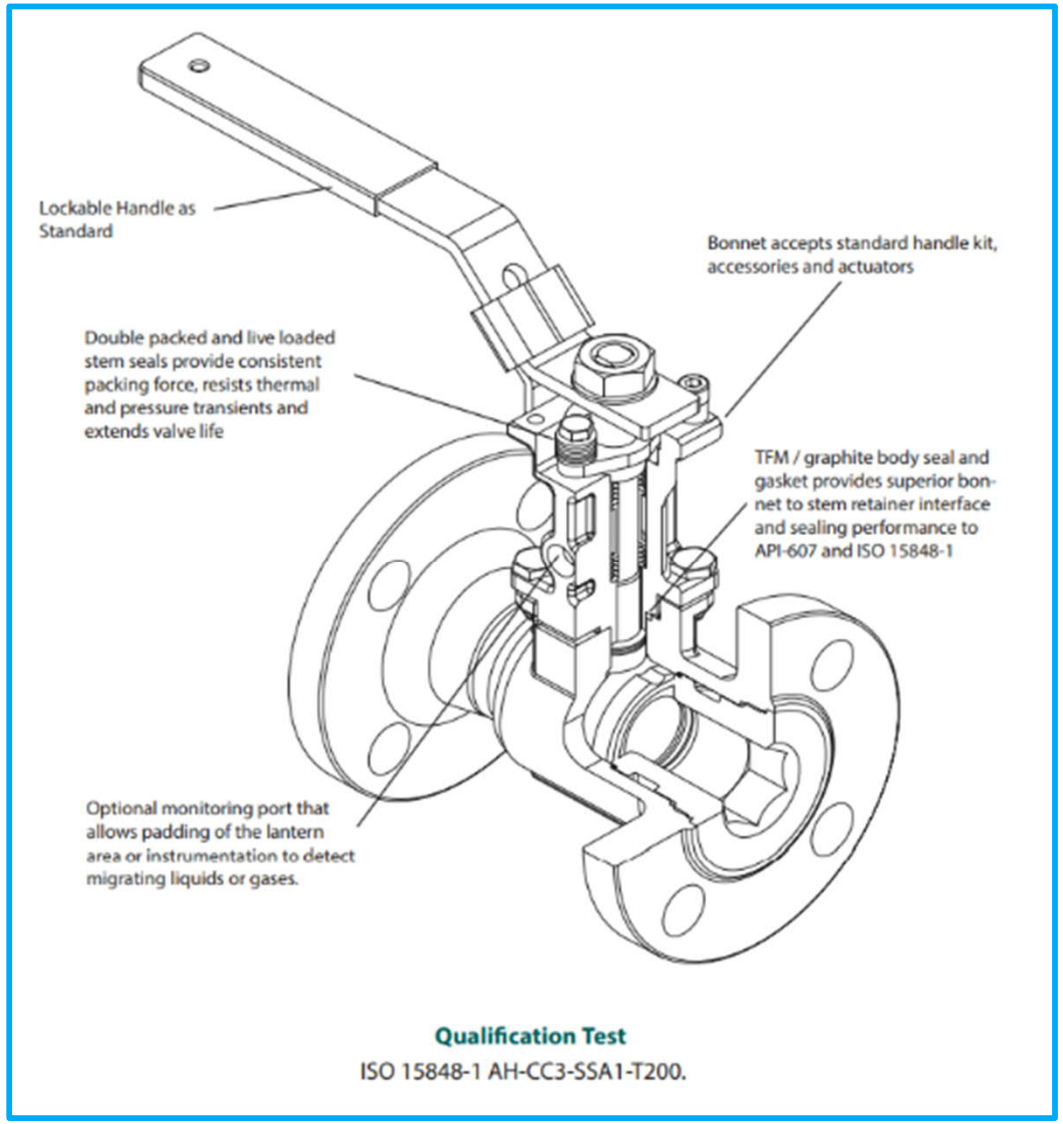
Customer success story

- Eastman Chemical, Springfield, MA
- Placed under EPA consent decree
- Required products to meet EPA requirements and monitoring
- Neles provided emissions test data and test certificates for standard product
- EPA approved Neles™ Jamesbury™ products and customer installed them
- EPA monitoring confirmed performance

Optional Emission-Pak™ for hazardous applications

NELES

When double-packing or leak-off monitoring port is desired

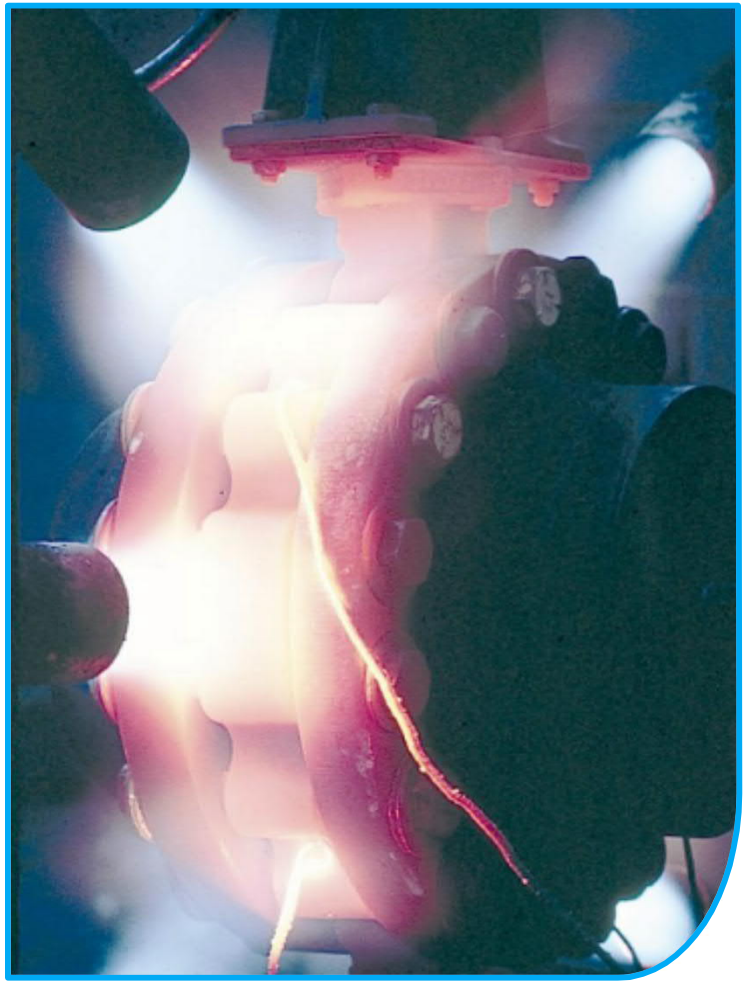


- Available option for 4000, 7000, and 9000 series valves
- Available with or without monitoring port
- Same sealing performance as standard valve without Emission-Pak™
- Useful for lethal media or highly hazardous applications where monitoring for leaks is essential or to inject pressure above packing to prevent leak

API-607, 7th Edition

Fire Test for Quarter-turn Valves and Valves equipped with Nonmetallic Seats

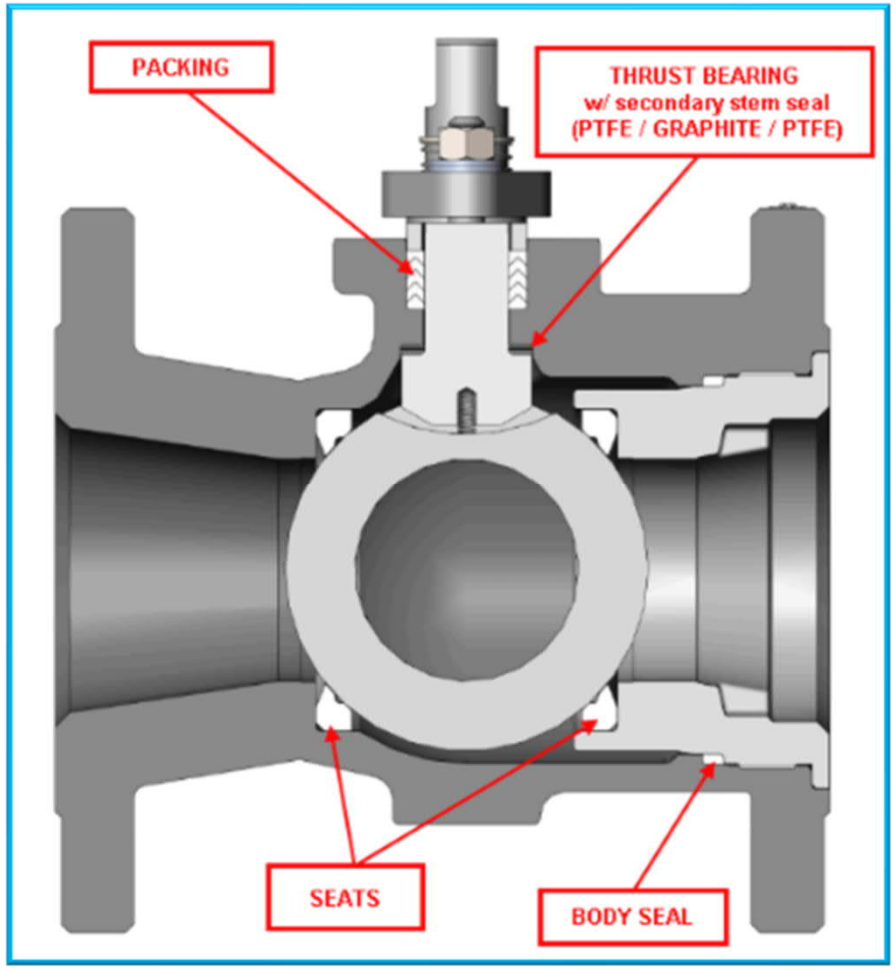
- Proves the valve design is capable of limited exposure to fire and not leak enough to feed and expand the fire
- Fire duration is 30 min “maximum time required to extinguish most fires”
- Test Temperature is 1400ºF – 1800ºF “typical for petroleum-based fire”
- Completely envelop the valve in flames
- Test pressures:
  - Nonmetallic seated valves Class 150 and 300 is 0.2MPa (30 psi), based on remaining pressure head when pumps are shutdown
- Measure through and external leakage before cooldown
- Cooldown is forced with water spray within 5 min
- Post cooldown pressure test for through and external leakage and operate valve



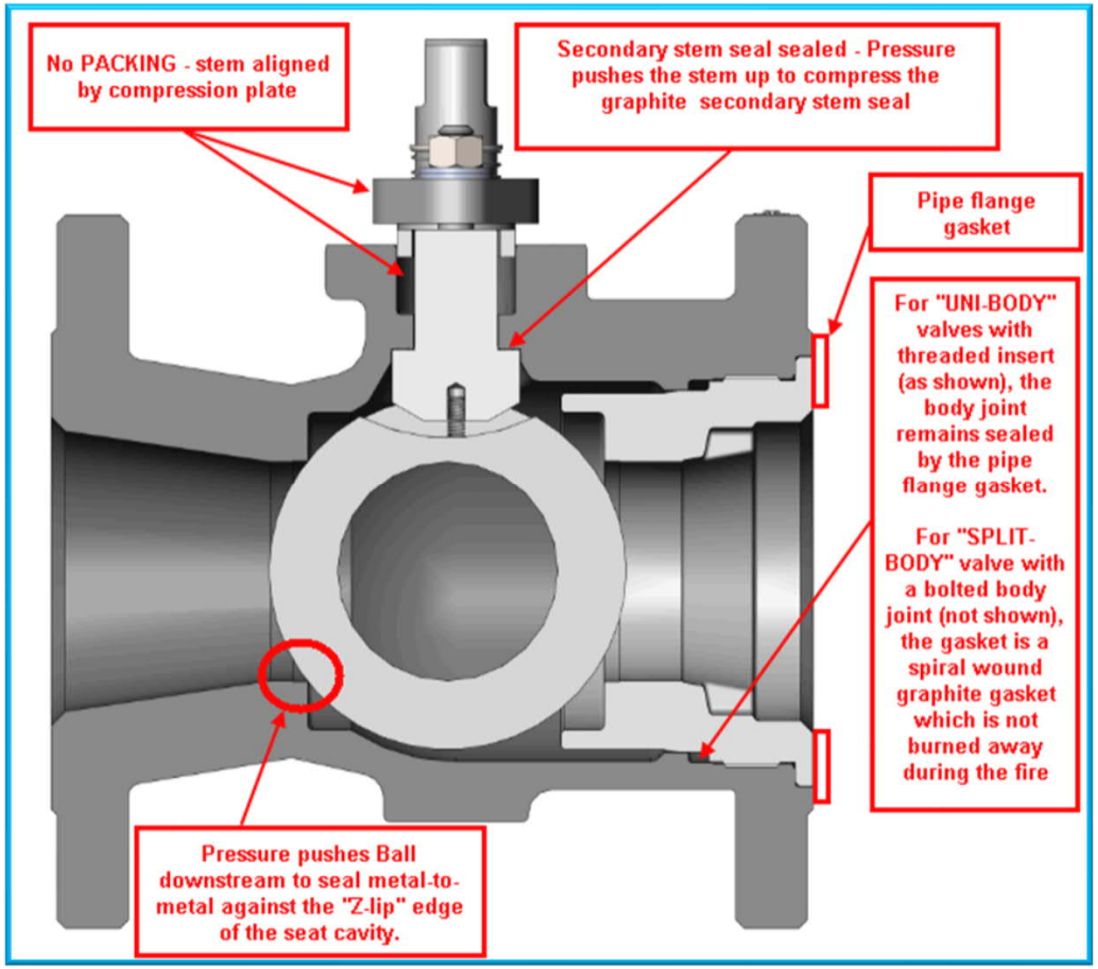
Neles™ Jamesbury™ Fire-tite™ ball valve design

Post Fire-Test the Polymeric parts are burned away

Pre-burn



Post-burn



Neles™ Jamesbury™ Fire-tite™ ball valve design

Post Fire-Test the Polymeric parts are burned away

Post-burn

NELES

Questions?

Designed for stem seal adjustment

Competitor design

Inaccessible with actuator mounted

Permanent locking tab

NELES

Challenge

Difficult adjustment

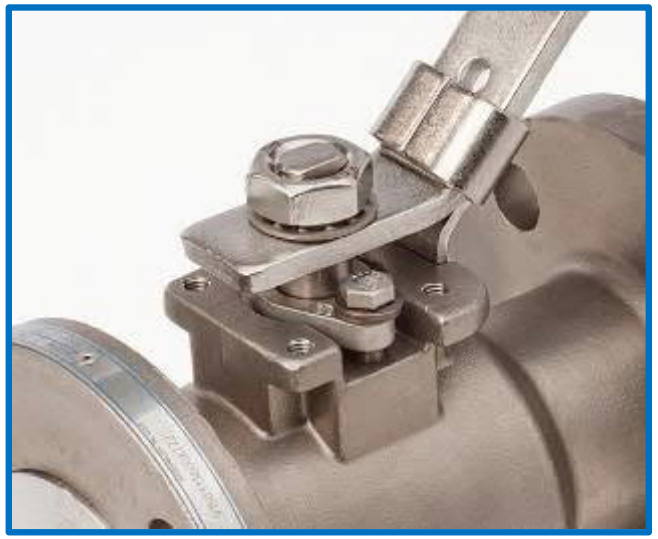
Solution

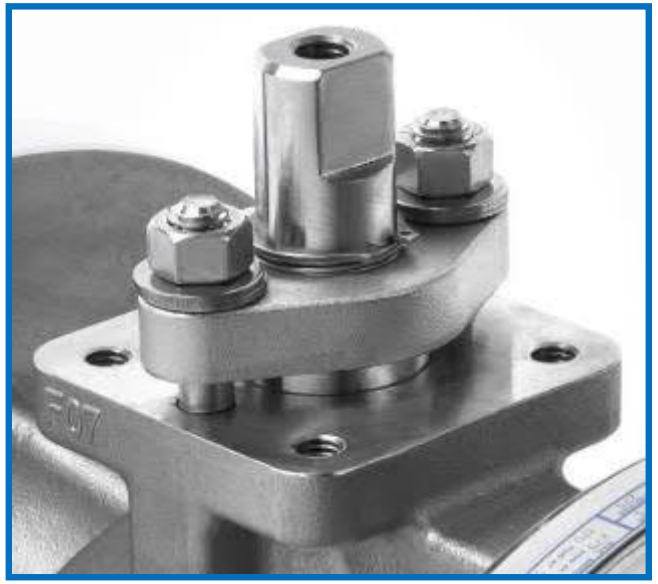
Compression plate design & access built in

Designed for stem seal adjustment

Compression plate design & access built in

- Adjustment screws separate from stem
- Designed to ensure access
- Gland bolting is sized to prevent overloading the stem packing





NELES

Challenge

Difficult adjustment

Solution

Compression plate design & access built in

Designed for stem seal adjustment

Access & tooling size

Competitor valves using nuts on stem to compress packing require a wrench size that will easily crush the seal when tightened

Jamesbury adjustment is easy and accessible

Designed for stem seal adjustment

Competitor design examples

Access to the packing is not possible when actuator is mounted. Even with actuator removed, access to the stem seal adjustment nut is difficult.

Designed for automated assembly performance

Complete Neles™ assembly

- Valves designed for automation
- Interface tolerances optimized
- Ergonomic factors considered in design
- Neles™ owns responsibility

NELES

Challenge

Who is responsible?

Determining responsibility when there are multiple suppliers involved

Solution

Complete Neles assembly

Designed for automated assembly performance

Innovative mounting kit design

- Engineered cast machined stainless brackets
- Interface surface with actuator is machined to be parallel with actuator face and perpendicular to stem axis
- Self-aligning coupling
  - Coupling aligns with bracket with PTFE bearing
  - Coupling is machined with extension feature that ensures alignment with stem
- Automatically provides correct alignment of stem and actuator drive, eliminating lateral forces

NELES

Challenge

Ensuring proper alignment between valve and actuator interfaces

Solution

Innovative mounting kit design

Designed for automated assembly performance

Ensuring alignment

Competitor coupling allows misalignment in drive slot and tilting of the coupling axis relative to stem axis

Neles coupling is machined with extensions that fully align to stem

Competitor bracket is made from rectangular tube stock
Does not ensure alignment with coupling

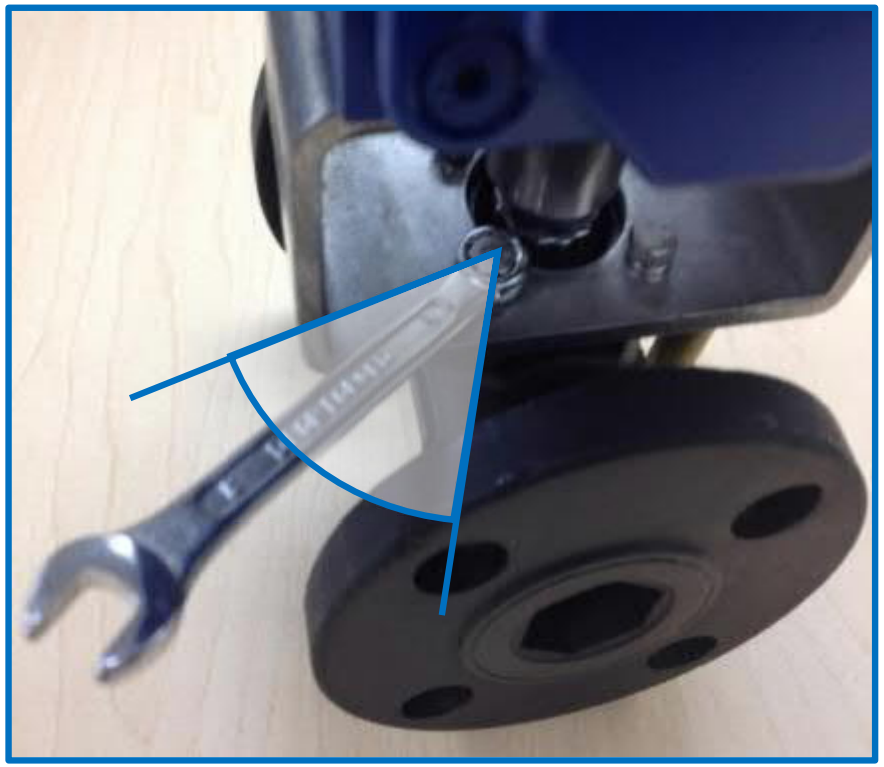
Neles bracket is machined and is aligned with coupling with PTFE bearing

Competitor bracket has limited access to fasteners making it difficult to assemble and properly tighten bracket bolting

Designed for easy assembly

Ease of access to fasteners

Neles bracket design provides easy access to bracket bolting and permits wide range of rotation for fast and correct assembly / disassembly



Competitor bracket design limits access to bracket bolting and limits range of rotation between side of bracket and valve flange.

Often multiple flipping-over of wrench is needed to tighten each bolt

Designed for automated assembly performance

Rugged design tolerates overload and software to ensure correct actuator size selection

- Stem dimensions are larger than competitor valves of the same size and pressure rating
- Ensure correct actuator size selection
- Bulletins with torque data
- Nelprof™ sizing software
- Linkage wizard

Jamesbury™ Brand stem (left) versus competitor

Note difference in drive connection size on each end. Which is more tolerant to stalled actuator overloading?

Challenge

Failure of valve to operate on demand

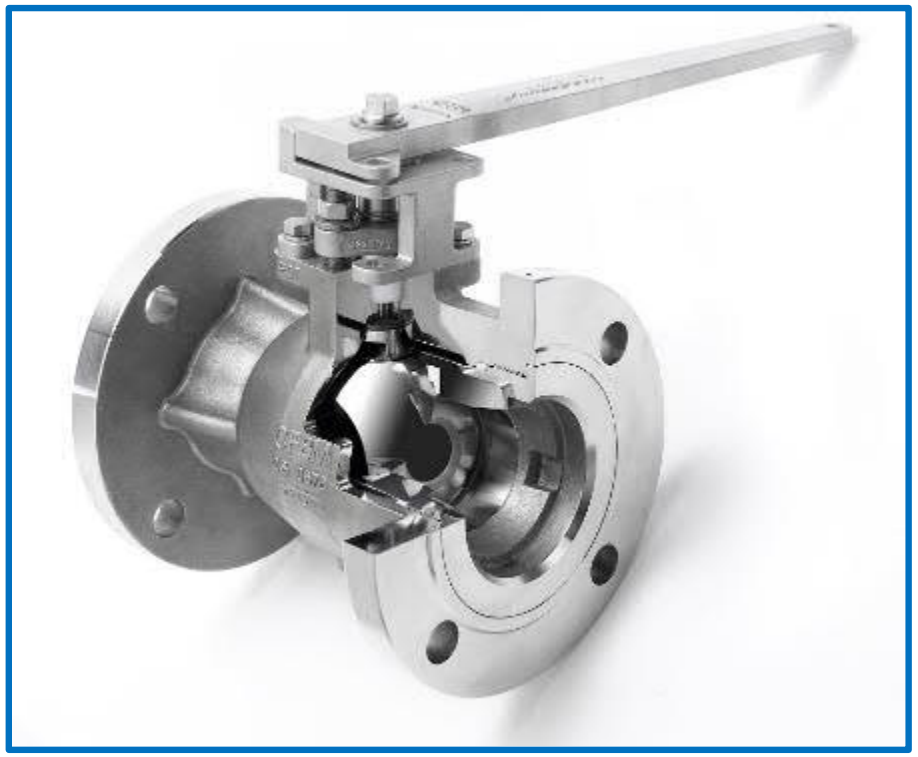
Solution

Rugged design and sizing & selection tools

Quality

Additional measures taken to ensure product quality

- Supplier selection & quality programs
- Material quality audits



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Challenge

Unacceptable product quality

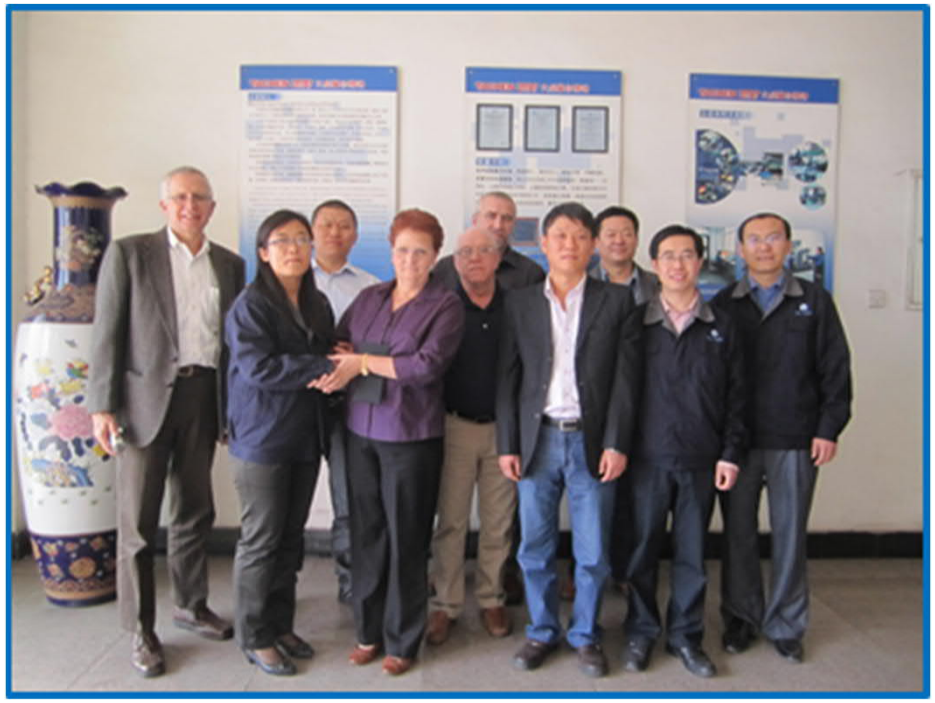
Solution

Additional quality processes

Supplier selection and quality programs

NELES

Supplier audit team



It is not easy to become a supplier to Neles™

Potential suppliers are audited by a cross-functional team of experts including Quality, Purchasing, and Engineering

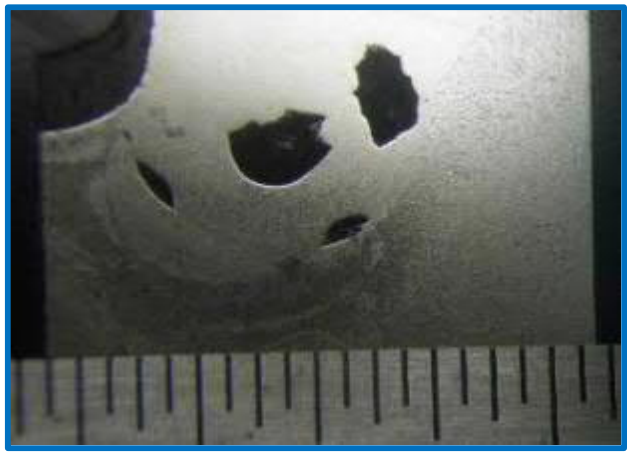
Supplier's end-to-end processes are reviewed for compliance with Neles requirements, including material quality

Correct chemistry

Heat treatment

Casting porosity

Improper weld repair



Material quality audits

Metallographic analysis is done for all suppliers and materials at least annually

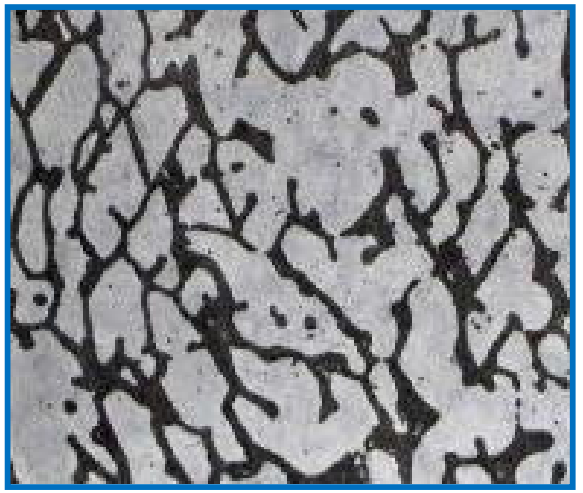
CORRECT

Properly annealed stainless steel will look like this when etched and viewed at 400x magnification

WRONG CHEMISTRY or INSUFFICIENT TIME or TEMPERATURE

If supplier only follows the minimum times and temperatures during heat treatment, alloy elements may not fully combine

QUENCH TOO SLOW or NOT SOLUTION ANNEALED AT ALL



If the supplier does not fully quench in an agitated cool liquid bath, alloy elements critical to providing corrosion resistance will release from mixture

Material quality audits

Why this is important

If not properly annealed, stainless steel in Nitric acid, corrosion in just 3 weeks penetrated through the wall

Questions?

Service & support

Local distributor & Neles support

- Product bulletins, installation & maintenance (IMO) documents readily available on our website
- Local sales and service expertise
- Neles repair kits and stocking
- Neles Service Center support
- Neles factory technical returns support

NELES

Challenge

Lack of local service and support

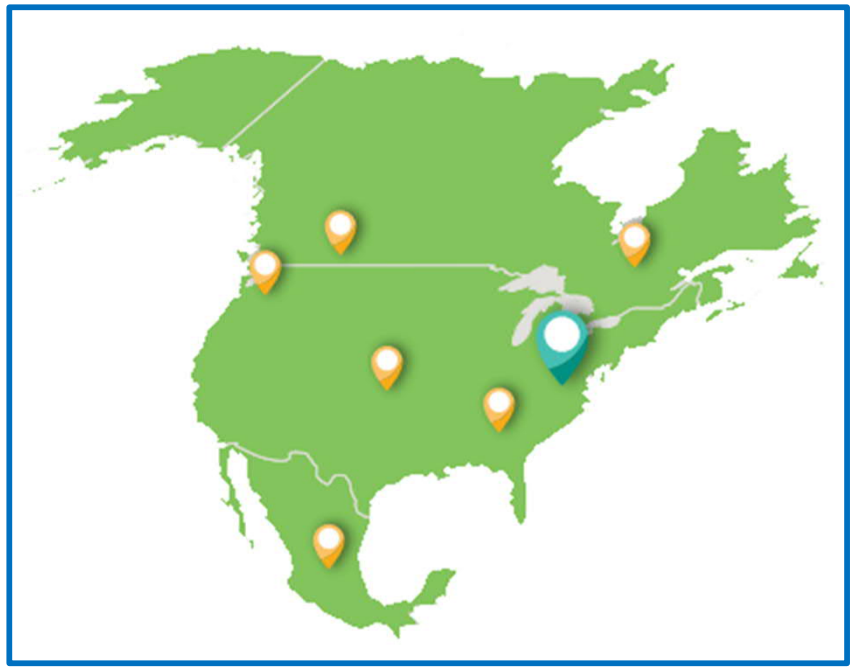
Availability of spare parts

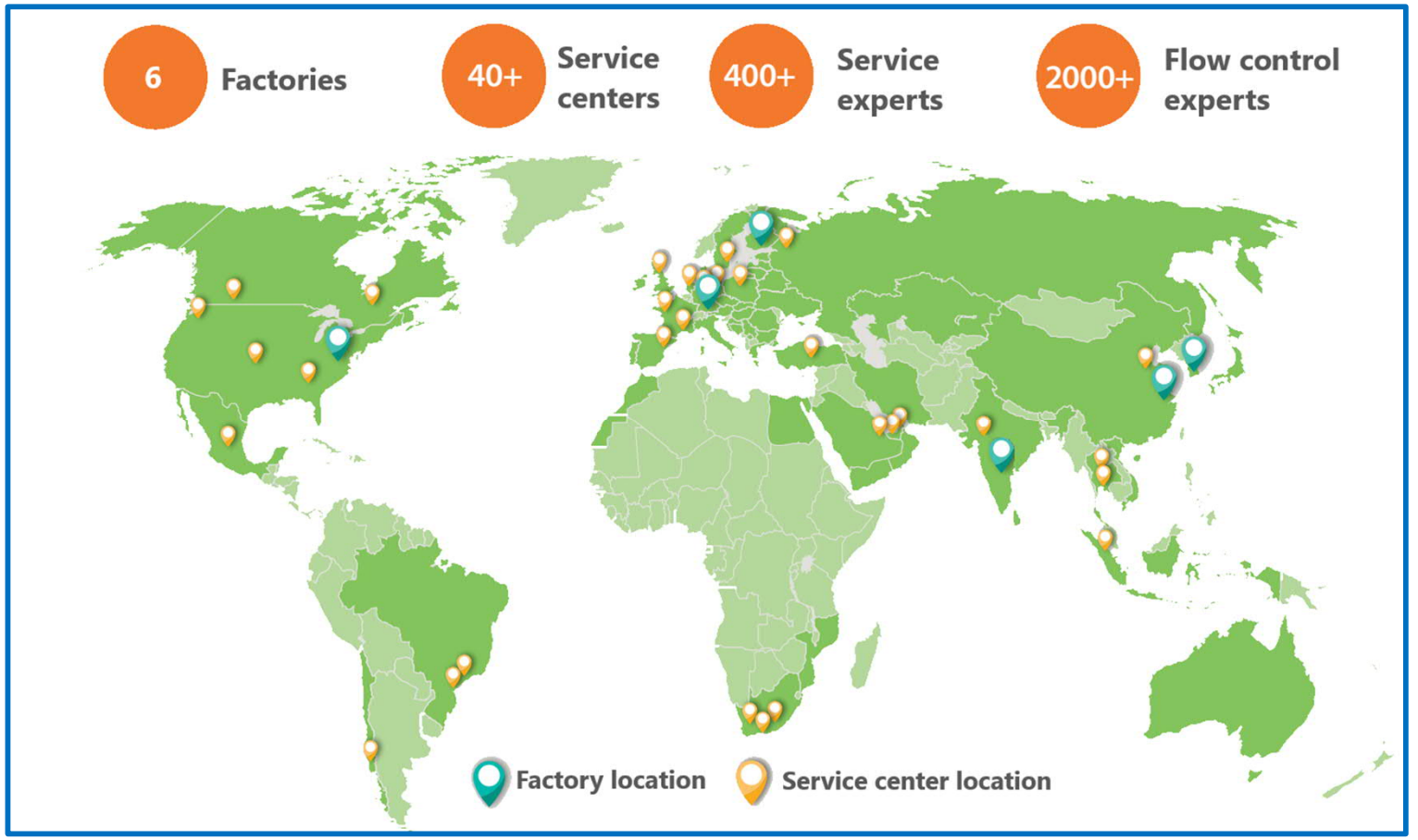
Solution

Local distributor & Neles support

Service & support

Regional and global network





Jamesbury™ Brand Ball Valves

Product scope

Jamesbury™ Brand thread end ball valves

NELES

Series 100 – Utility

DN 8 – 50 (NPS 1/4 - 2)
CWP 138 bar (2,000 psi)
NPT Threaded end

Series 5H – Utility

DN 8 – 50 (NPS 1/4 - 2)
CWP 310 bar (4,500 psi)
NPT Threaded end

Series 3000 – Utility

DN 8 – 50 (NPS 1/4 - 2)
CWP 138 bar (2,000 psi)
Double-reduced bore
NPT Threaded end

Jamesbury™ Brand thread end ball valves

NELES

Series 6F – Utility

DN 8 – 50 (NPS 1/4 - 2)
CWP 41 bar (600 psi)
NPT Threaded end
Unique split body

Series 2000 – Utility

DN 8 – 50 (NPS 1/2 - 3)
CWP 69 bar (1,000 psi)
Full bore
NPT Threaded end

Eliminator – Process

DN 8 – 50 (NPS 1/4 - 2)
CWP 138 bar (2,000 psi)
ASME Class 600
NPT Threaded end

Jamesbury™ Brand thread end, weld end ball valves

NELES

Series 3A/3C – Utility

DN 8 – 50 (NPS 1/4 - 2)
CWP 69 bar (1,000 psi)
NPT Threaded end
Socket weld

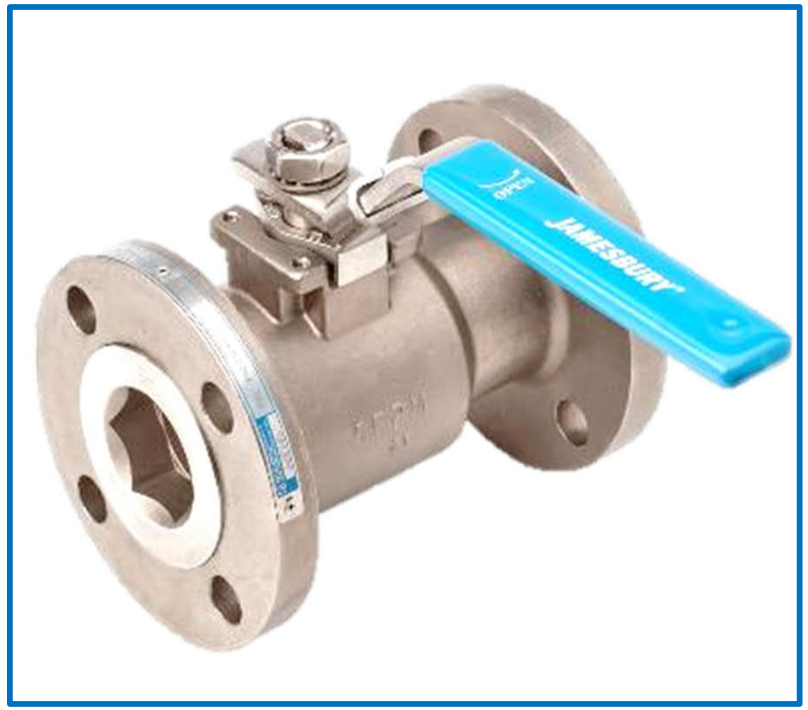
Series 4000 – Process

DN 15 – 65 (NPS 1/2 – 2 1/2)
CWP 172 bar (2,500 psi)
ASME Class 800
NPT, Socket weld, Butt weld

Jamesbury™ Brand flanged ball valves

NELES

Series 7000 RP – Process



DN 15 – 500 (NPS 1/2 – 20)
ASME Class 150, 300
Floating and Trunnion

Series 9000 FP – Process

DN 15 – 600 (NPS 1/2 – 24)
ASME Class 150, 300
Floating and Trunnion

Product demonstrator kit

Available from factory

Questions?

Thank you for your time today, we hope this session was informative

Please contact steve.atherton@neles.com or danielle.fisher@neles.com for any additional questions or information

See our website, Neles.com for product information and guidance

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