CIRCOR

Energy
Aerospace & Defense
Industrial

Isolation Valves for Delayed Coker Service

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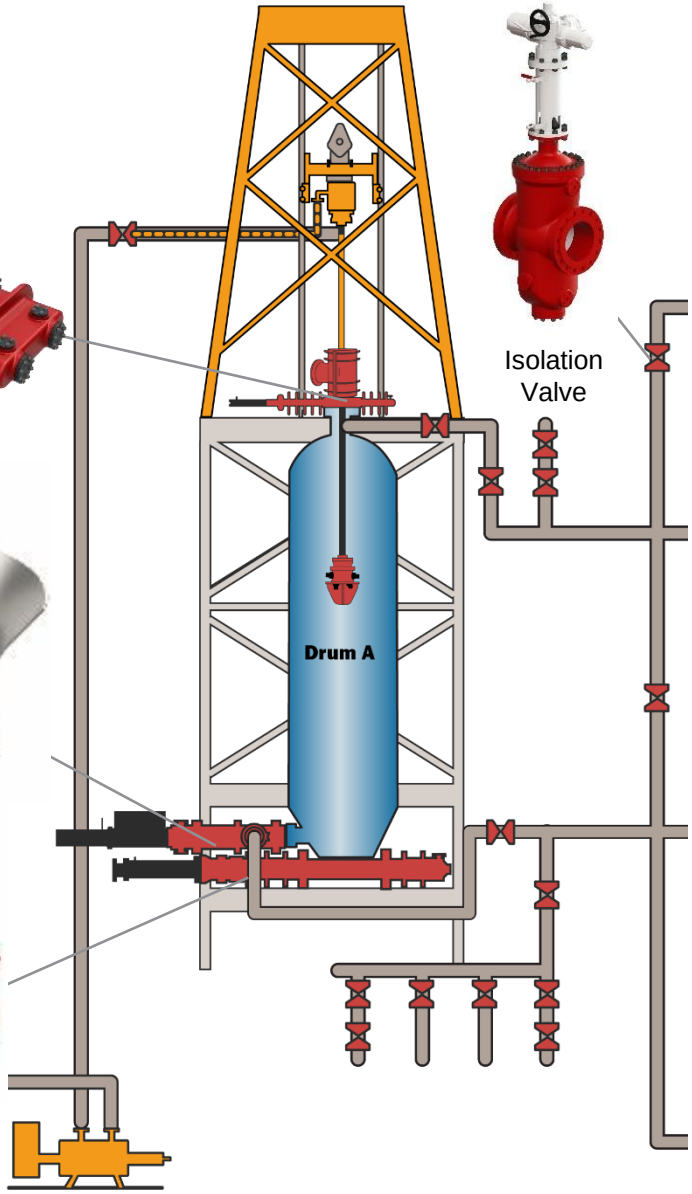
CIRCOR | Refinery Valves
DeltaValve

November 2-6, 2020

DeltaValve Innovation and Experience

Top Unheading Valve
with Integrated Safety System

Bottom
Unheading Valve



Isolation
Valve

1,000+ Units Sold

100+ Refineries Satisfied

25+ Countries Served

Millions of safe cycles

Leading Global Supplier

Operational Challenges in Delayed Coker Unit Service

Use of ball and wedge type valves in DCU service can have operational challenges, including:

- Significant steam usage
- High installation and operational costs
- High cost of maintenance and repair

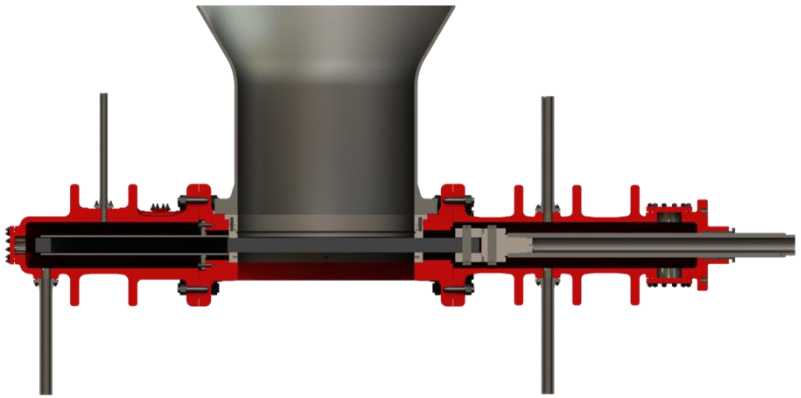
DeltaValve's isolation valves for service in the delayed coker address each of these issues

DeltaValve Isolation Valves

Bottom Unheading Valve vs. Isolation Valve Technology

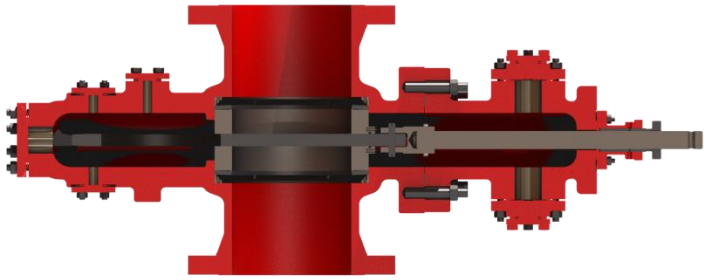
DeltaValve Bottom Unheading Valves

- Proven technology since 2001
- Dual metal seats (live loaded)
- Double block and purge
- Horizontal orientation



DeltaValve Isolation Valves

- Proven technology since 2007
- Dual metal seats (live loaded)
- Double block and purge
- Any orientation



DeltaValve Isolation Valves

Design Overview

Size: 6” – 54”+ (DN150 – DN1350+), 150# – 900#

Double block and purge isolation

Static purge for ultra low purge steam consumption

- 2 kg per hour per inch of diameter
- Tested per API-598

Fully bi-directional isolation

Dual, live loaded, self cleaning metal seats

Fully in-line serviceable

- Valve removal is not necessary for repair/rebuild or maintenance.

B16.10 double flanged face to face configurations

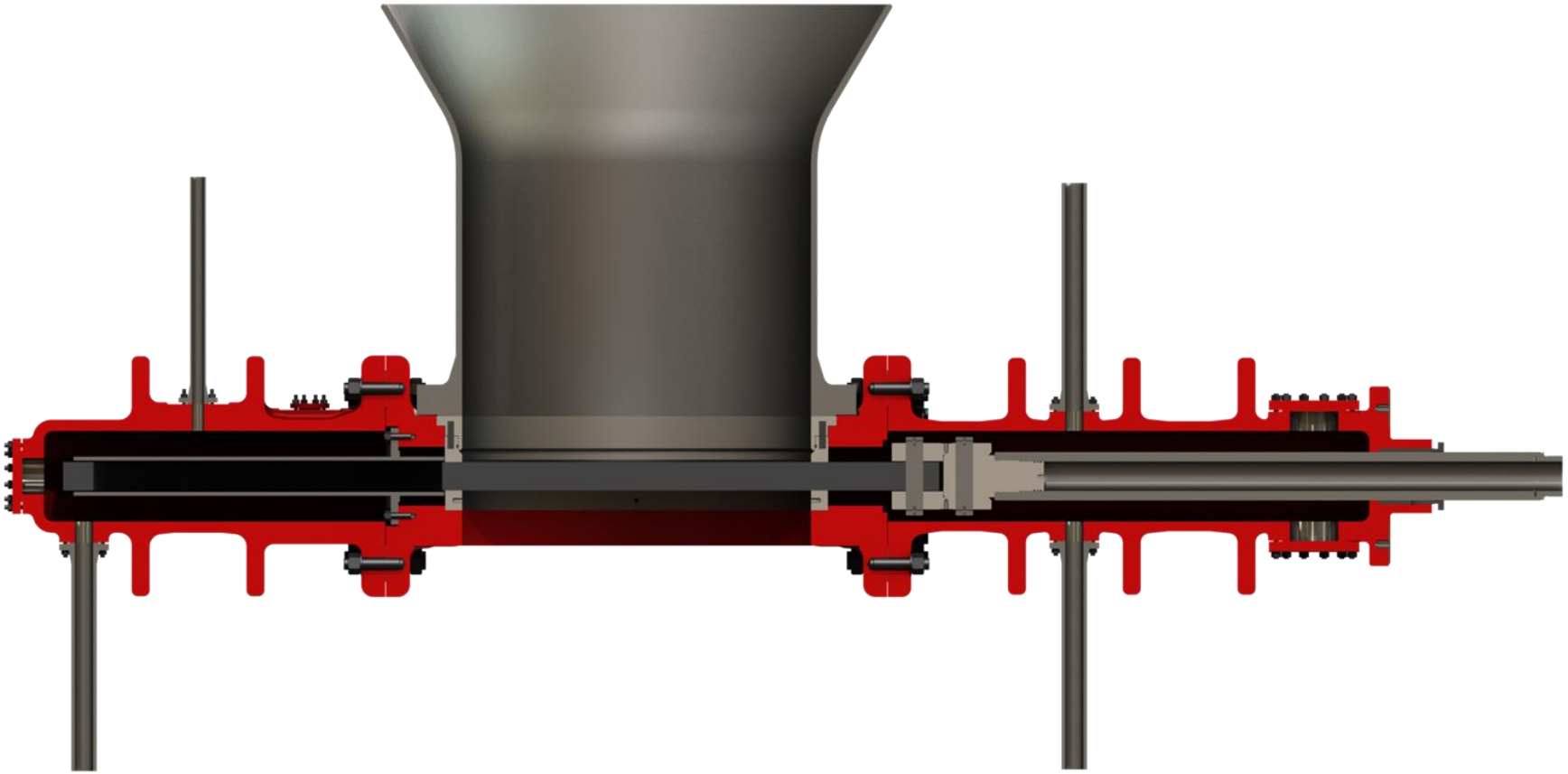
- (Ball, Gate, and Wedge Plug Valves)

DV Isolation Valve Model: GV852

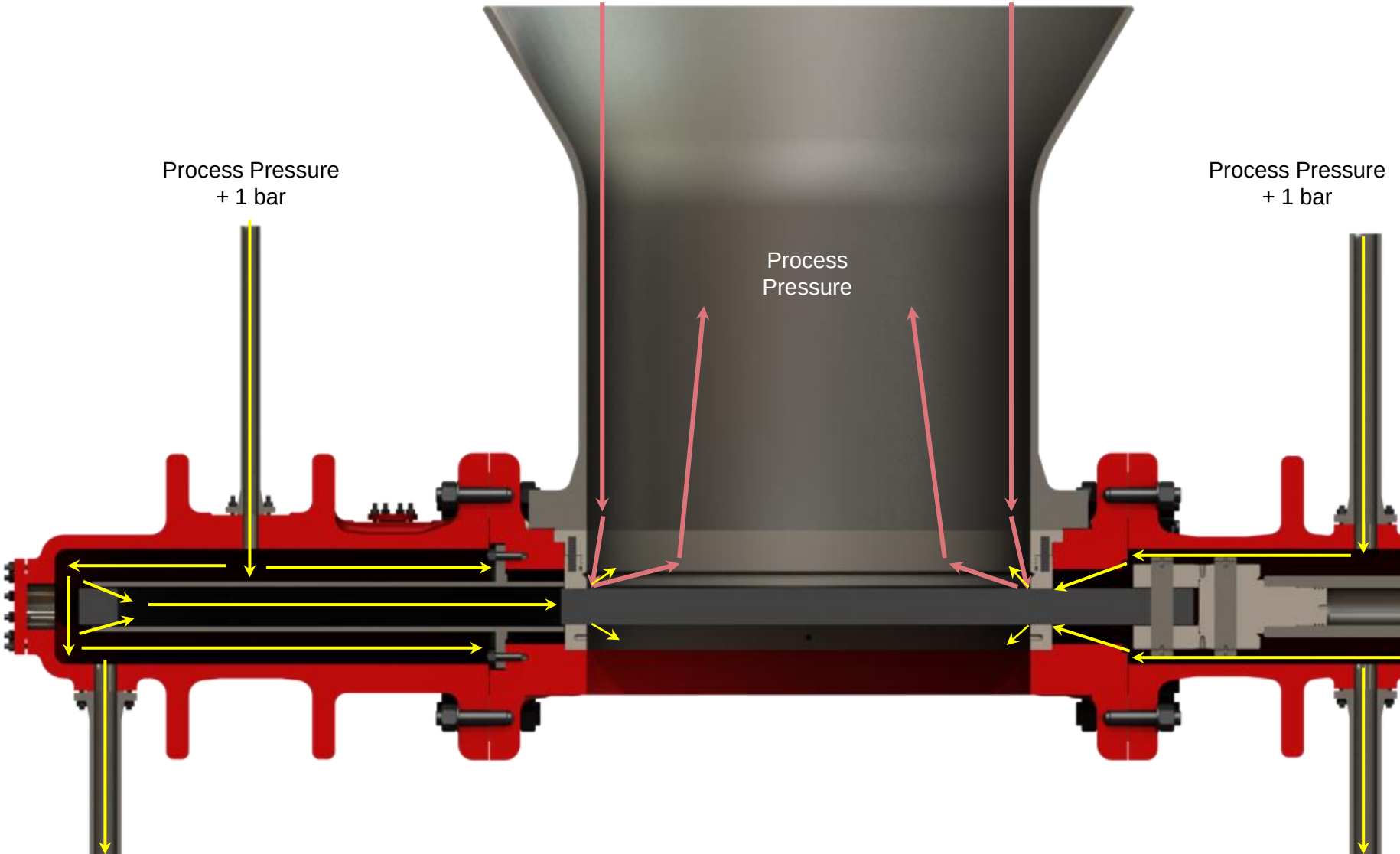
- Sealed Body Cavity
- For use in dirty service; solids, high temperature, etc.

DeltaValve Isolation Valves

Utilizing Proven Bottom Unheading Valve Technology

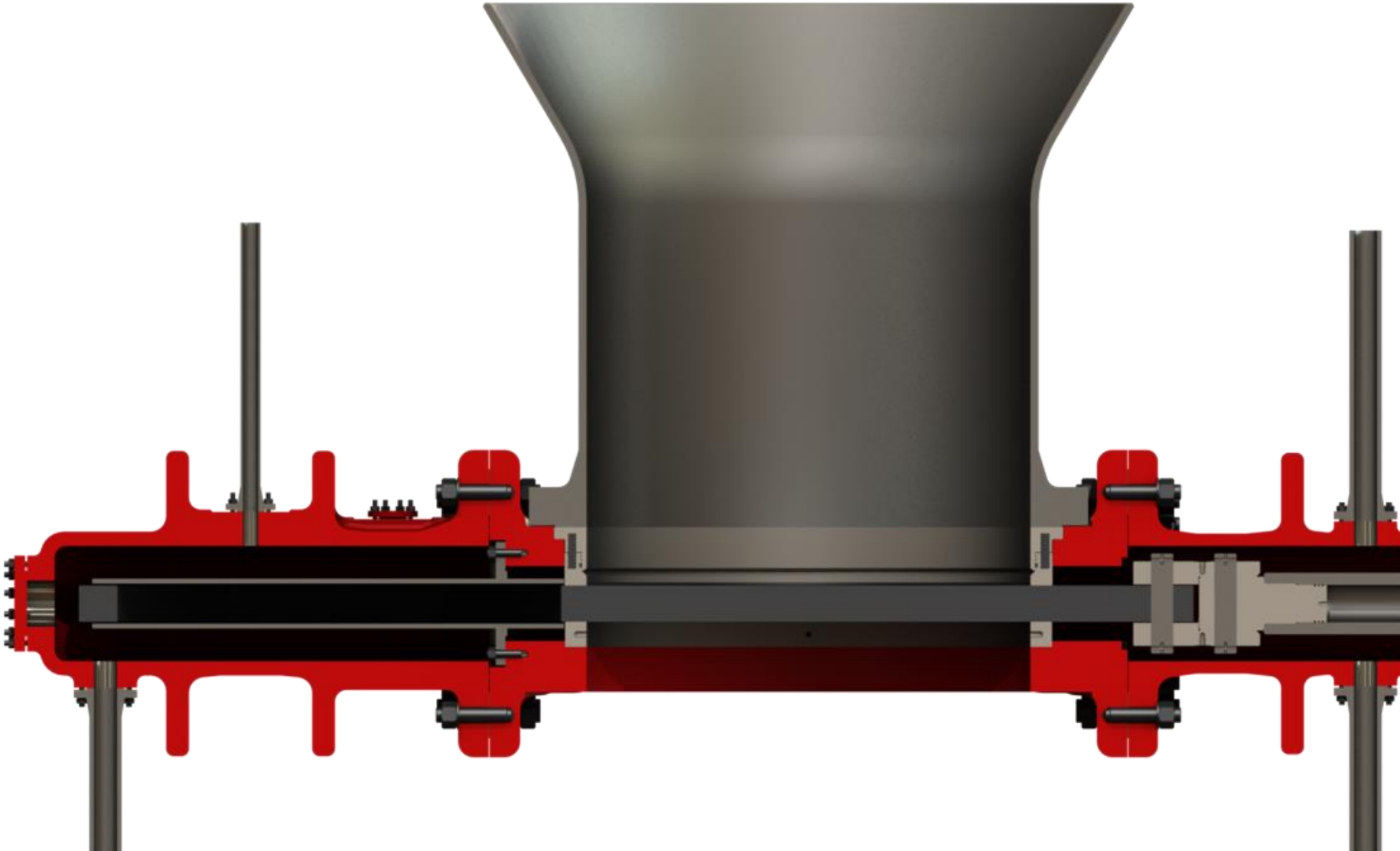


Utilizing Proven Bottom Unheading Valve Technology



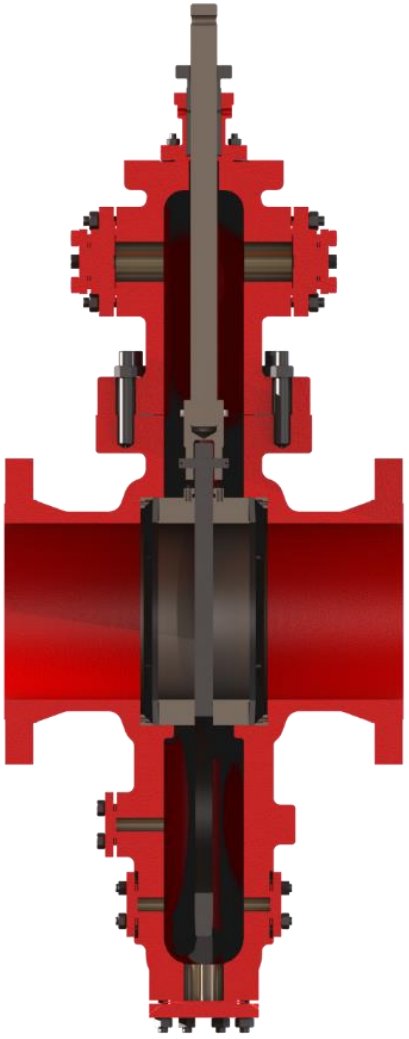
DeltaValve Isolation Valves

Utilizing Proven Bottom Unheading Valve Technology



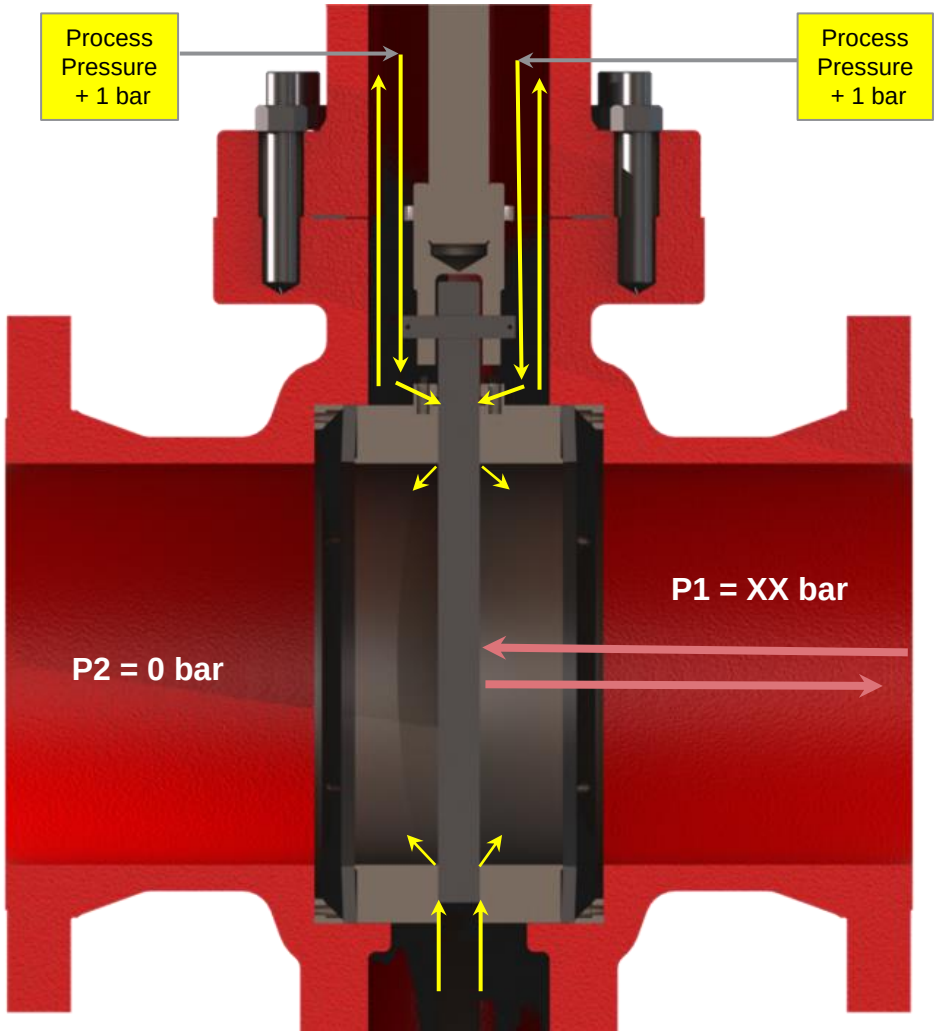
DeltaValve Isolation Valves

Double Block and Purge



DeltaValve Isolation Valves

Double Block and Purge



Model GV852 – Sealed Body Cavity

Fully sealed body cavity at all times

Zero cross valve leakage with purge

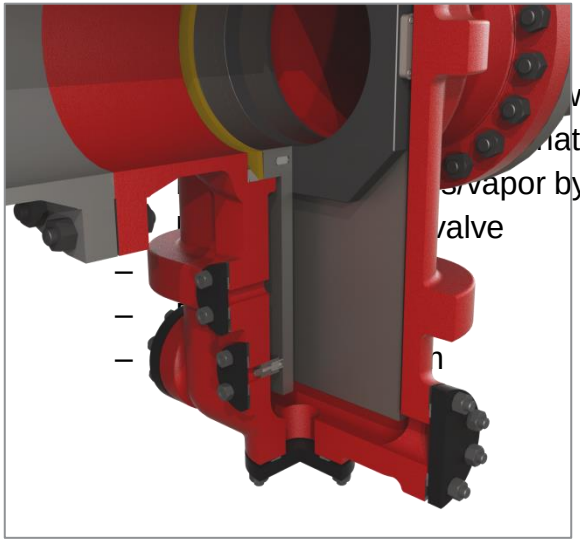
Designed for continuous static purge

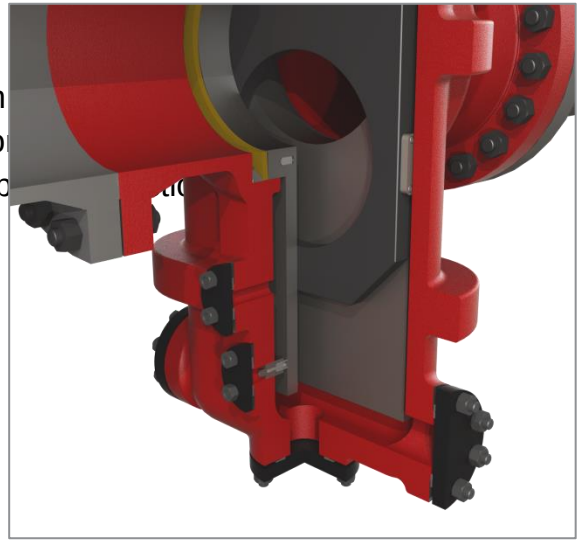
Can be tested in partially open position

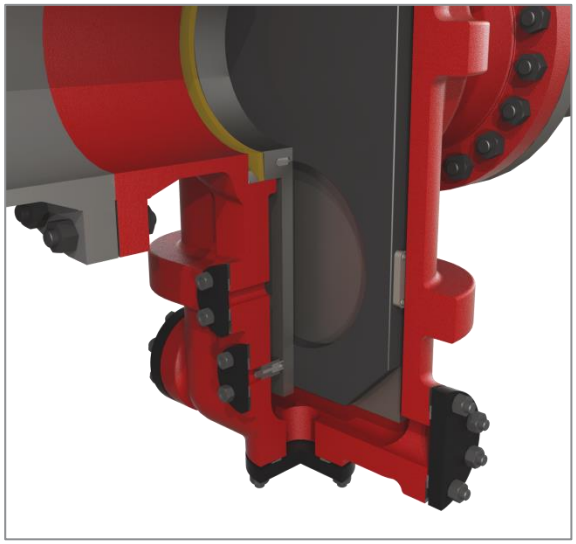
Seats extend into lower bonnet

Seat extensions:

- Cover both surfaces of gate over full stroke
- Fully live loaded and purge pressure assisted
- Ground and polished to valve seat tightness



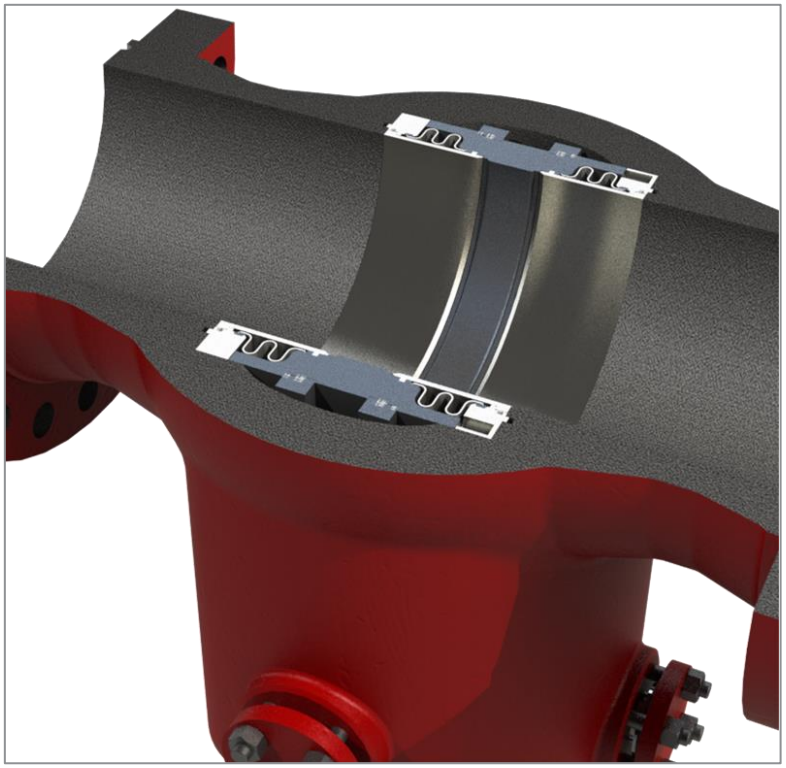


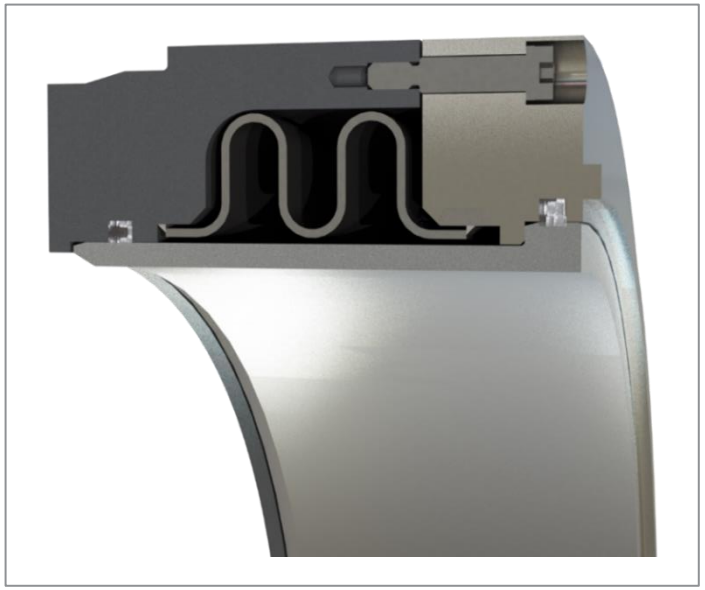


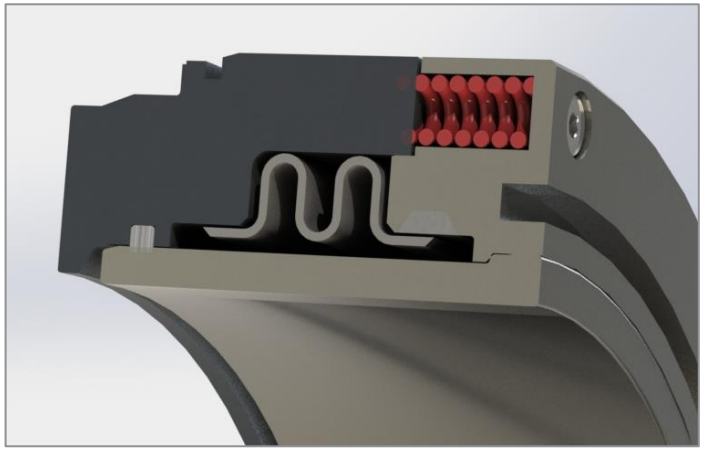
Delayed Coking Isolation Valves

DeltaValve – Critical Service Sealing Technology

- Dynamic Spring Loaded Seats
- Welded Inconel Bellows Barrier
- **ZERO** process leakage across two seats
- Proven time tested reliable technology
- Utilized for all DeltaValve Critical Service



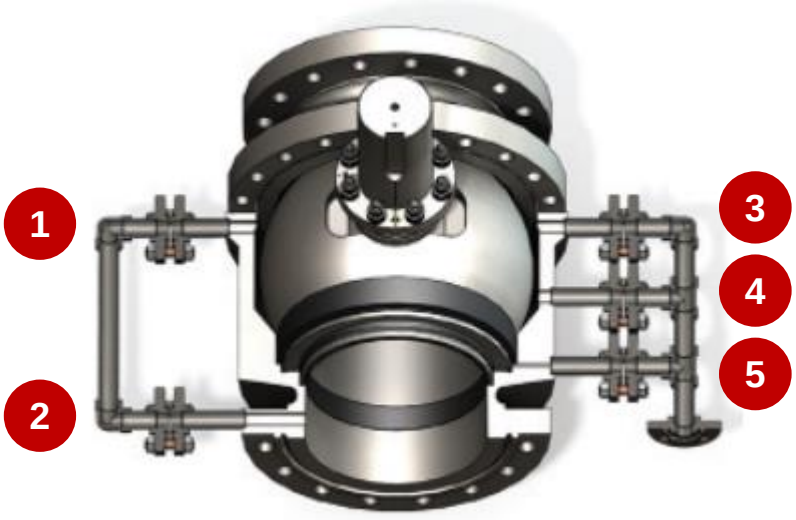




DeltaValve Isolation Valves

Steam Port Comparisons

Ball Valve Steam/Purge Ports



DV Isolation Valve Steam/Purge Ports

1 port verses 5 ports per valve; costs of DeltaValve installation can be significantly lower:

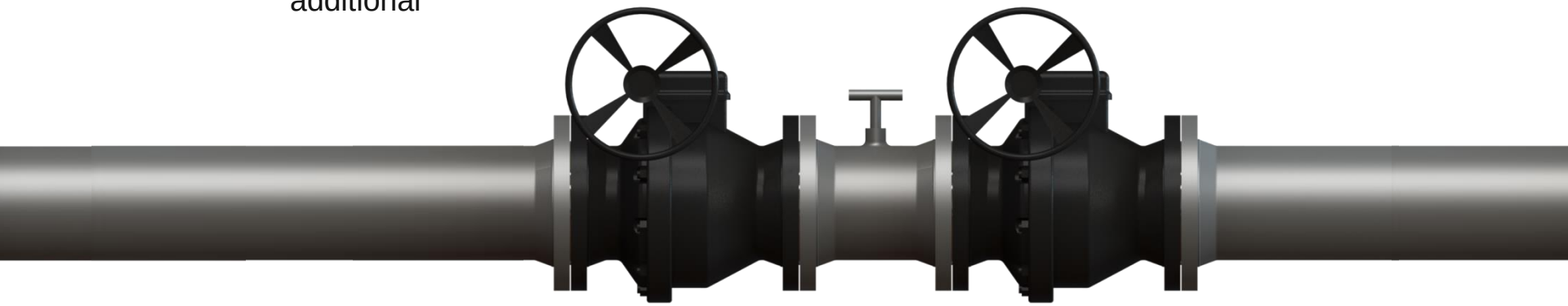
- Reduced piping costs
- Lower engineering costs for piping layouts
- Fewer fixtures, joints, and supports

DeltaValve Isolation Valves

Dual Valves with vent vs. Single Double block and purge valve

Dual Valves

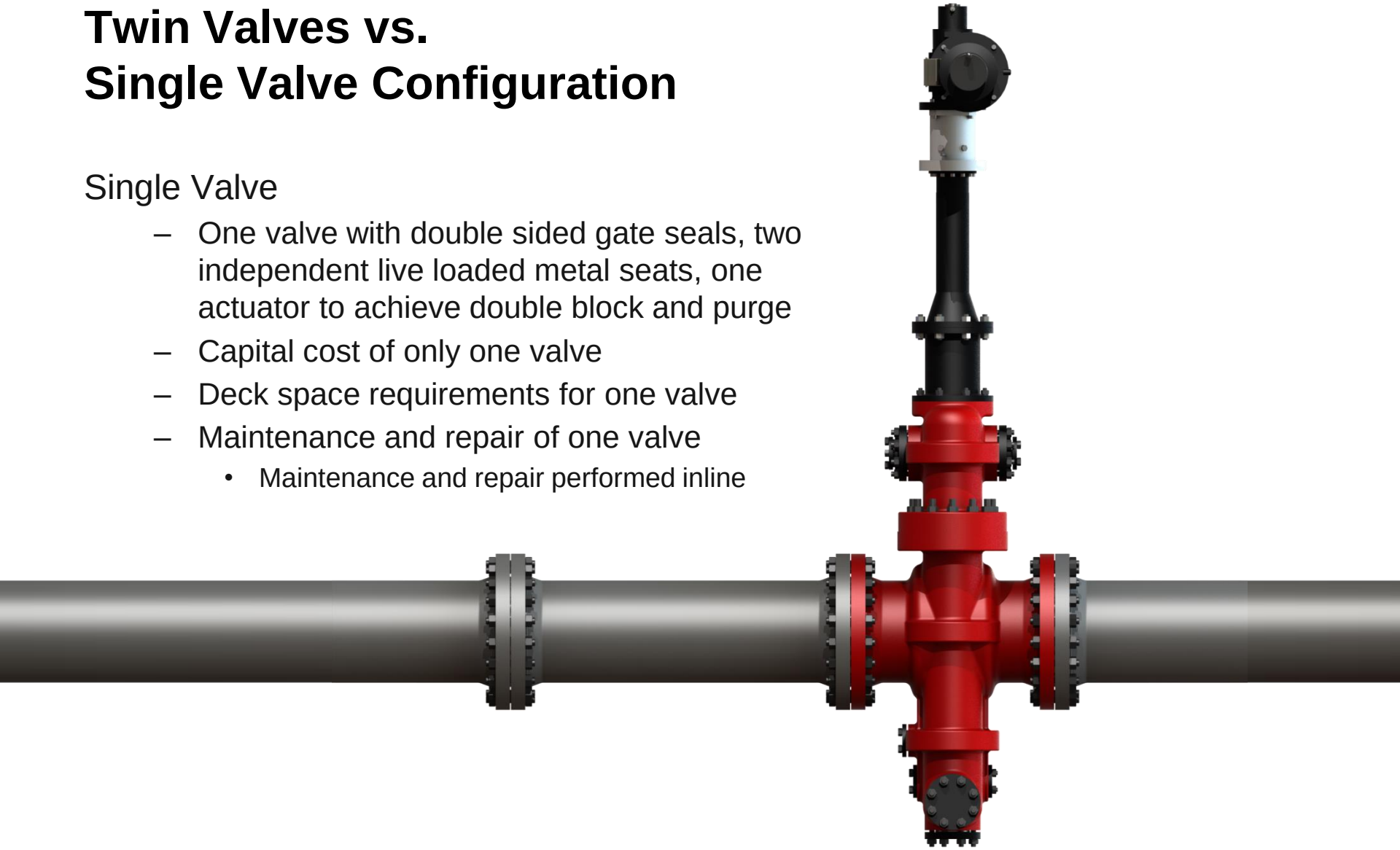
- Two double seated valves, with independent actuators, and vented spool to achieve double block and purge
- Capital cost of two valves
- Deck space to accommodate two valves
- Maintenance and repair of two valves:
  - Valves must be removed, lifted, shipped for repair, then shipped back, re-lifted, and re-installed
  - Cost for refurbishment is between 50% - 70% of initial capital cost, removal cost is additional



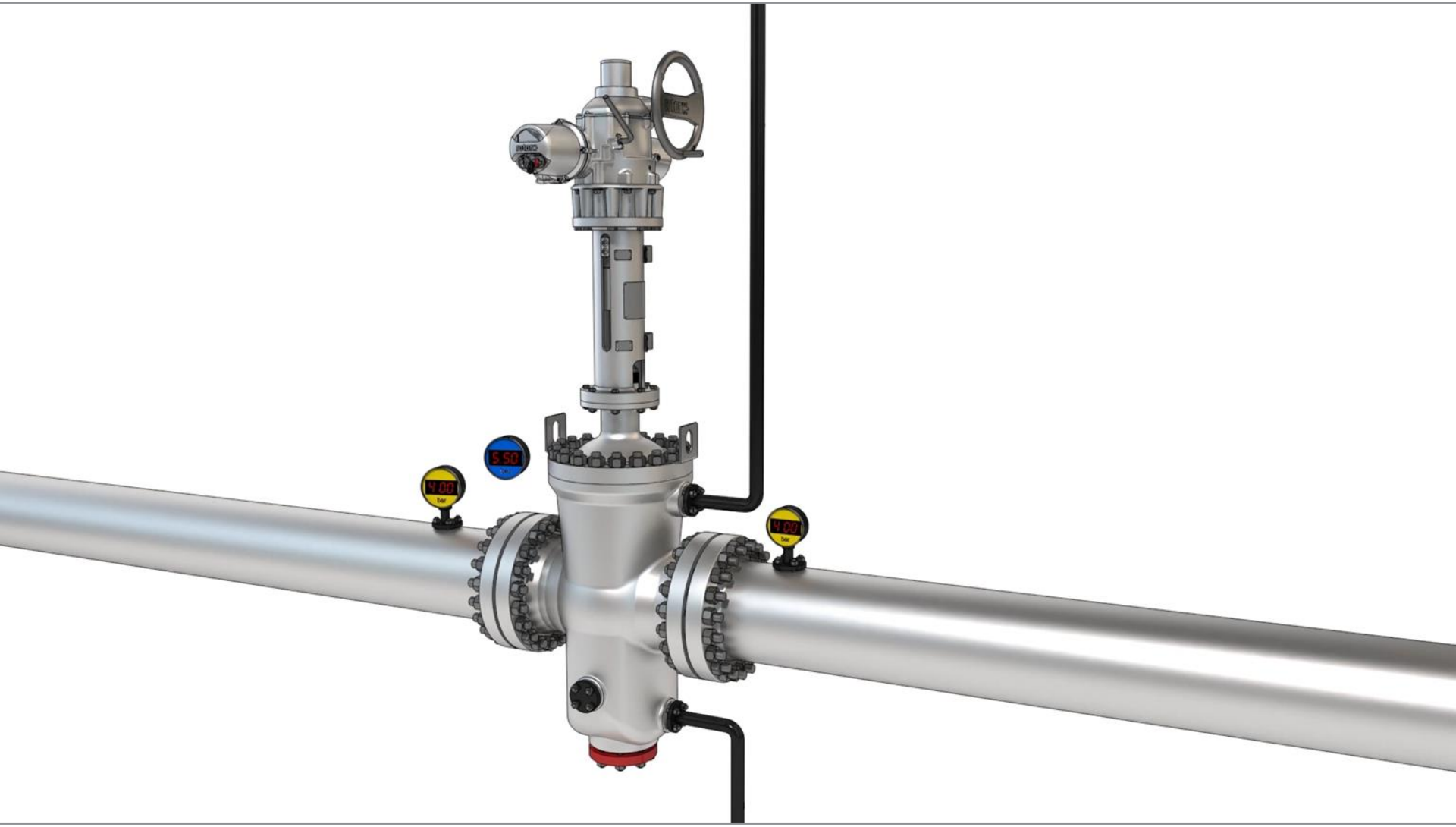
Twin Valves vs. Single Valve Configuration

Single Valve

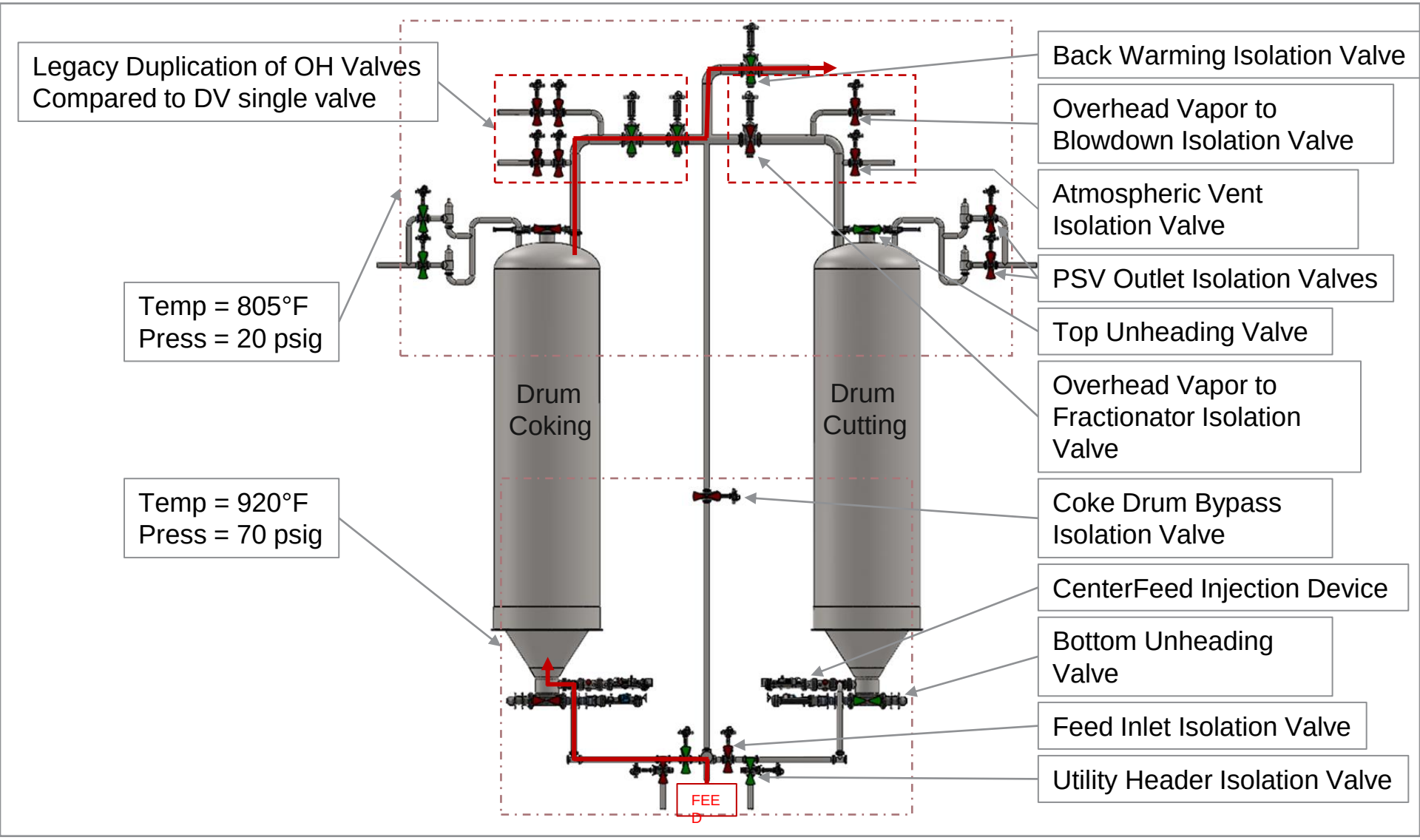
- One valve with double sided gate seals, two independent live loaded metal seats, one actuator to achieve double block and purge
- Capital cost of only one valve
- Deck space requirements for one valve
- Maintenance and repair of one valve
  - Maintenance and repair performed inline



DeltaValve Isolation Valves



DeltaValve Isolation Valves

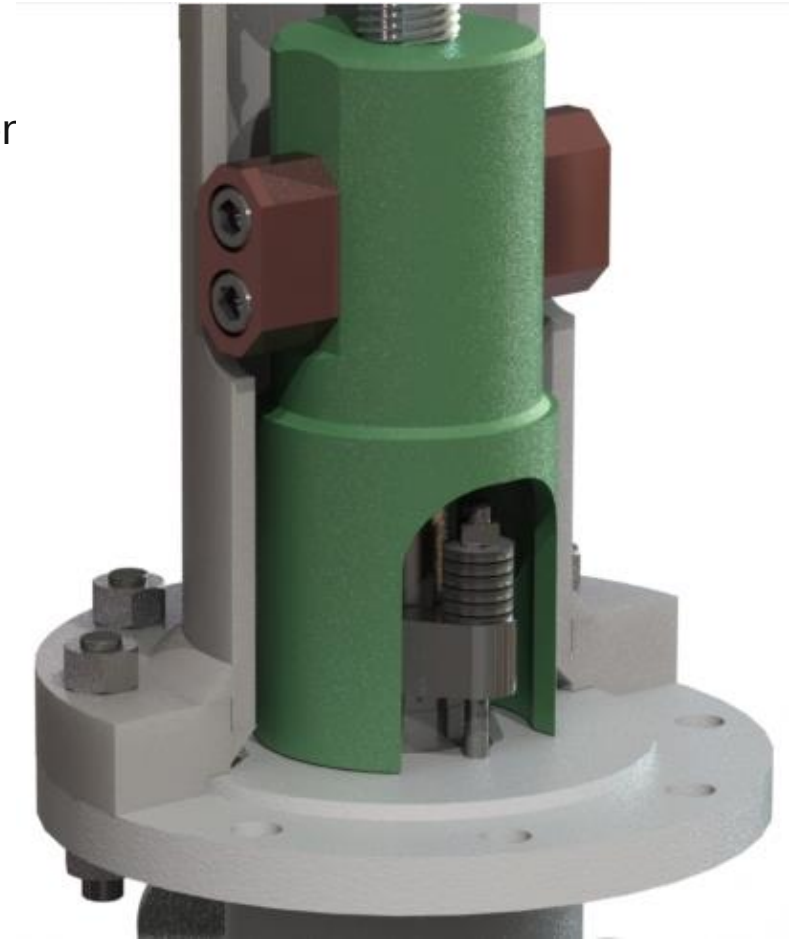


Delayed Coking Isolation Valves

Robust Design Features – Integrated Travel Limit Stops

- Isolation Valve is “Position Sealing” valve (not “Torque Seated”)
- Open and Close travel stops provided to prever valve internal damage or over-torqueing
- Non-adjustable, and Tamper-proof
- Valve will not stroke without Coupling

Back-seat provides full open stop

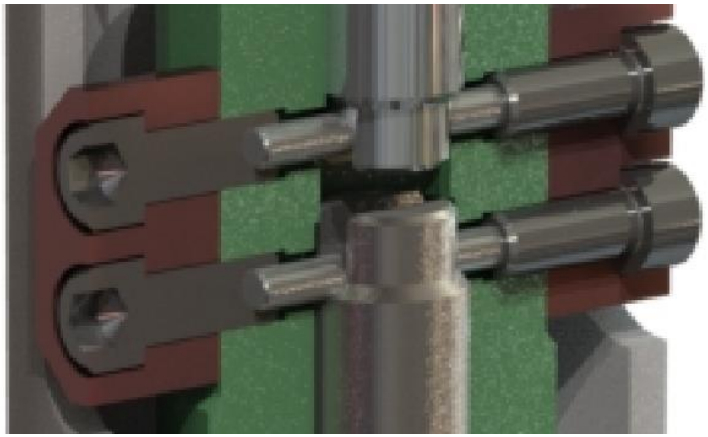


Coupling skirt provides full closed stop

Delayed Coking Isolation Valves

Robust Design Features – Advanced Stem Coupling

- Stem mechanism employs an advanced coupling design to provide robust and reliable connection.
- The Coupling (shown in green) isolates the torque and thrust loads.
- The Upper and Lower Stems have threaded ends to transmit the thrust.
- The slots on the stem end apply torque load into the shear pins.
- The Anti-rotation Blocks (shown in red) prevent Coupling from rotating
- Upper Shear Pin is designed to be weakest link (3.5 Safety Factor)



Easy access to Shear Pins – unbolt both capture bolts, remove broken pin, replace dowel pin

DeltaValve Isolation Valves Operational Performance

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November 24, 2014

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As requested, the following is an update on the performance and reliability of the DeltaValve Delayed Coker isolation valves we purchased and installed in our Salt Lake City Refinery.

In 2008, we installed six DeltaValve steam purged vapor overhead, in-line serviceable, isolation valves (2 each: 12", 14" and 16"). During our turnaround in October of 2012, after four years of maintenance free operation, we tested the valves and performed internal and external component inspection. Upon evaluation, all six valves were in excellent condition, and no major components (seats, gates, etc.) required replacement.

In reviewing the valve performance since installation, we confirm that the steam consumption rates remain exceptionally low. As a reminder, at our Salt Lake facility, each group of three valves operates on a single steam header that averages 180 lbs./hr. total consumption (approximately 60 lbs. per valve).

Our original Coker design from the 70's included one gate valve and one ball valve in series for coke drum vapor isolation. We were able to replace these two valves with one DeltaValve isolation valve because its dual seat design meets our safety standard for process and utility isolation. The system has worked without incident since installation in 2008, and has reduced our overall Coker valve operational and maintenance expense. Additionally, these valves were an integral part of our recently completed Valve Sequencing program.

The next planned inspection of these valves is in 2017, during our next scheduled turnaround.

If you have any questions, or need any additional information, please feel free to contact me directly.

Best Regards,

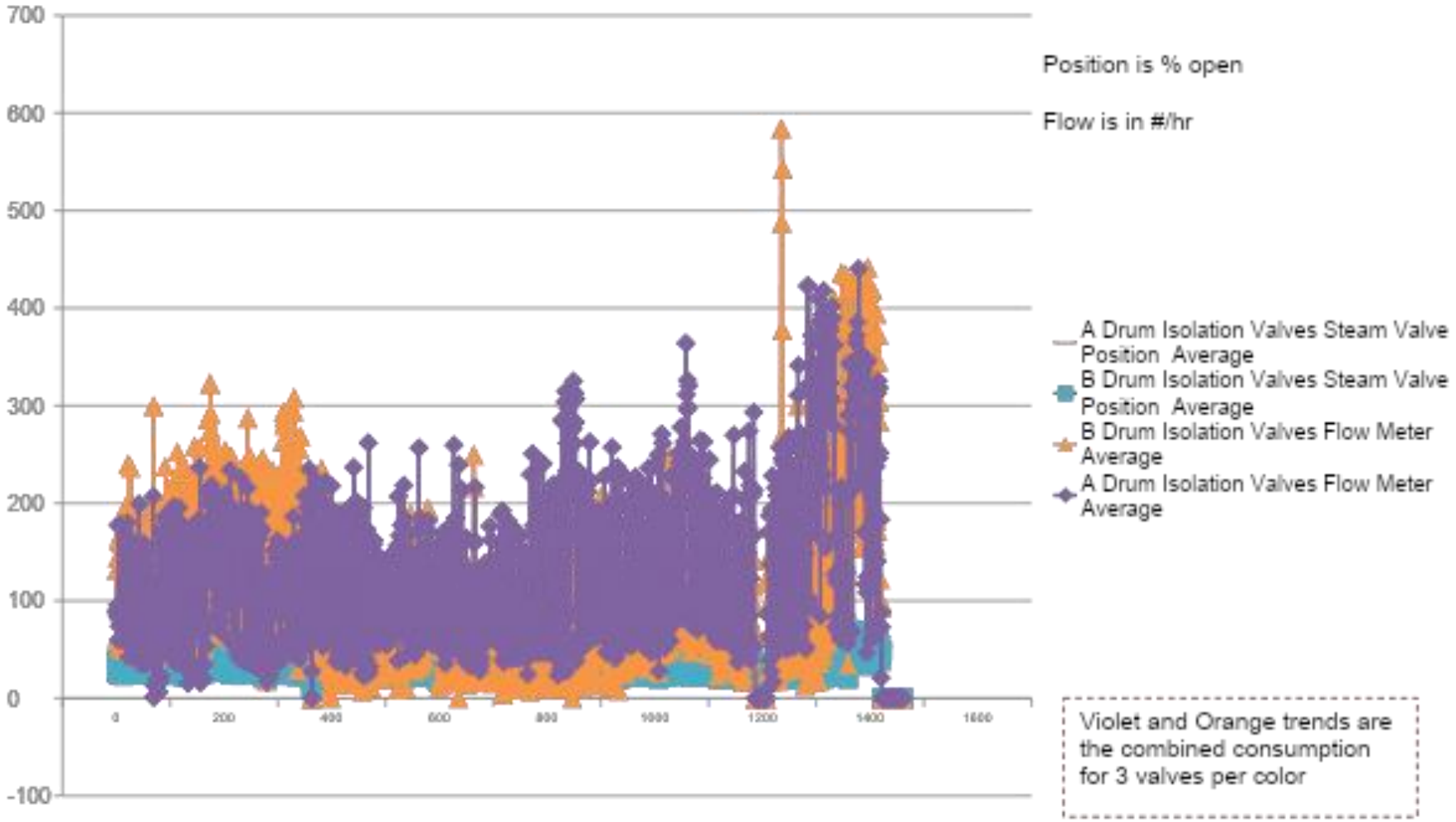
Dale Wilborn

Dale Wilborn
Chevron Coker Business Improvement Network Leader

DeltaValve Isolation Valves Operational Performance

CIRCOR

Four Year Steam Trend



DeltaValve Isolation Valve

- Technology proven since 2008
- 150+ units in use
- Ultra-low steam consumption
- In-line serviceable
- Low operating costs

Thank You

Questions?

www.deltavalve.com