

Delayed Coking Coke Drum Bottom Unheading Valve

Low Maintenance

Small Footprint,
Lighter Design

Ultra Low Steam
Consumption

Hydraulic and
Electric Actuation



**CURTISS
WRIGHT**



DeltaValve

The Value of a Trusted Partner

DeltaValve's extensive experience in designing and building engineered severe-service industrial valves and equipment for delayed cokers has made us a world-recognized industry leader. In 2001, we designed, engineered, and installed the world's first fully automated, fully enclosed coke drum unheading valve at the Chevron refinery in Salt Lake City, Utah. This valve revolutionized coke drum unheading by replacing traditionally unsafe and unreliable manual or semi-manual unheading equipment, with a fully automated system. The result has been a safer work environment, reduced downtime, and increased productivity.



Today we offer a full range of products for delayed coking including top and bottom coke drum unheading valves, isolation valves, hydraulic and electric actuation, controls and interlocks, auto-switch coke cutting tools and enclosures, and the retractable center-feed injection device. We listen to our customers and strive to provide innovative products that are designed and engineered to meet the critical service requirements of delayed coking.

DeltaValve is a trusted partner; delivering safe, reliable products while providing the best value for our customers. From the moment a customer contacts us, through delivery, installation, and beyond, we are there to provide unparalleled products, service, and support. We continually strive to make our products and services best in class.

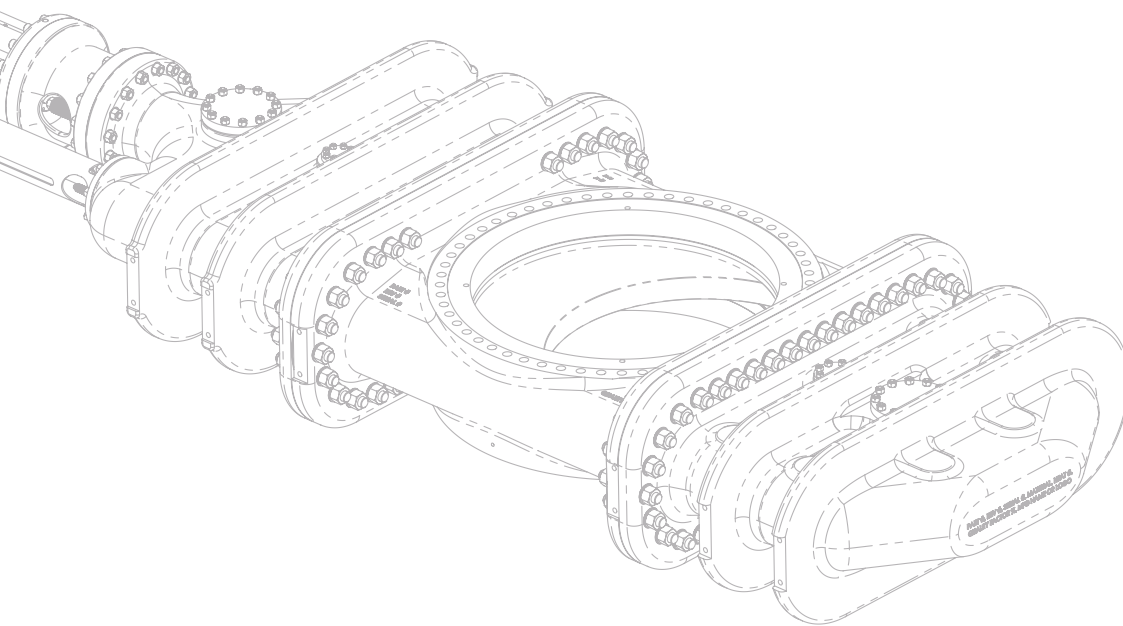
Delayed Coking Coke Drum Bottom Unheading Valve



Redesigned with smaller body and bonnet components, the new unheading valve is lighter than earlier versions, maintaining its reputation as the smallest and lightest fully automated bottom unheading valve in the world. The small footprint of the unheading valve makes it ideal for both space-constrained retrofit and new installation applications.

The new unheading valve is available with traditional hydraulic actuation or with our “planetary roller screw” electric actuation. With a fully sealed housing to prevent contamination and optimize lubrication, the electric actuator requires only minimal maintenance. Furthermore, the electric actuator can dramatically reduce the overall cost of installation when compared to hydraulics.

Permanently connected to the bottom of a coke drum, the unheading valve creates a fully enclosed system from the top of the coke drum to the coke accumulation pit. The bottom unheading valve is designed for fully automated, safe and reliable operation. Unheading can now be achieved with the push of a button from a remote location.



Bottom Unheading Valve

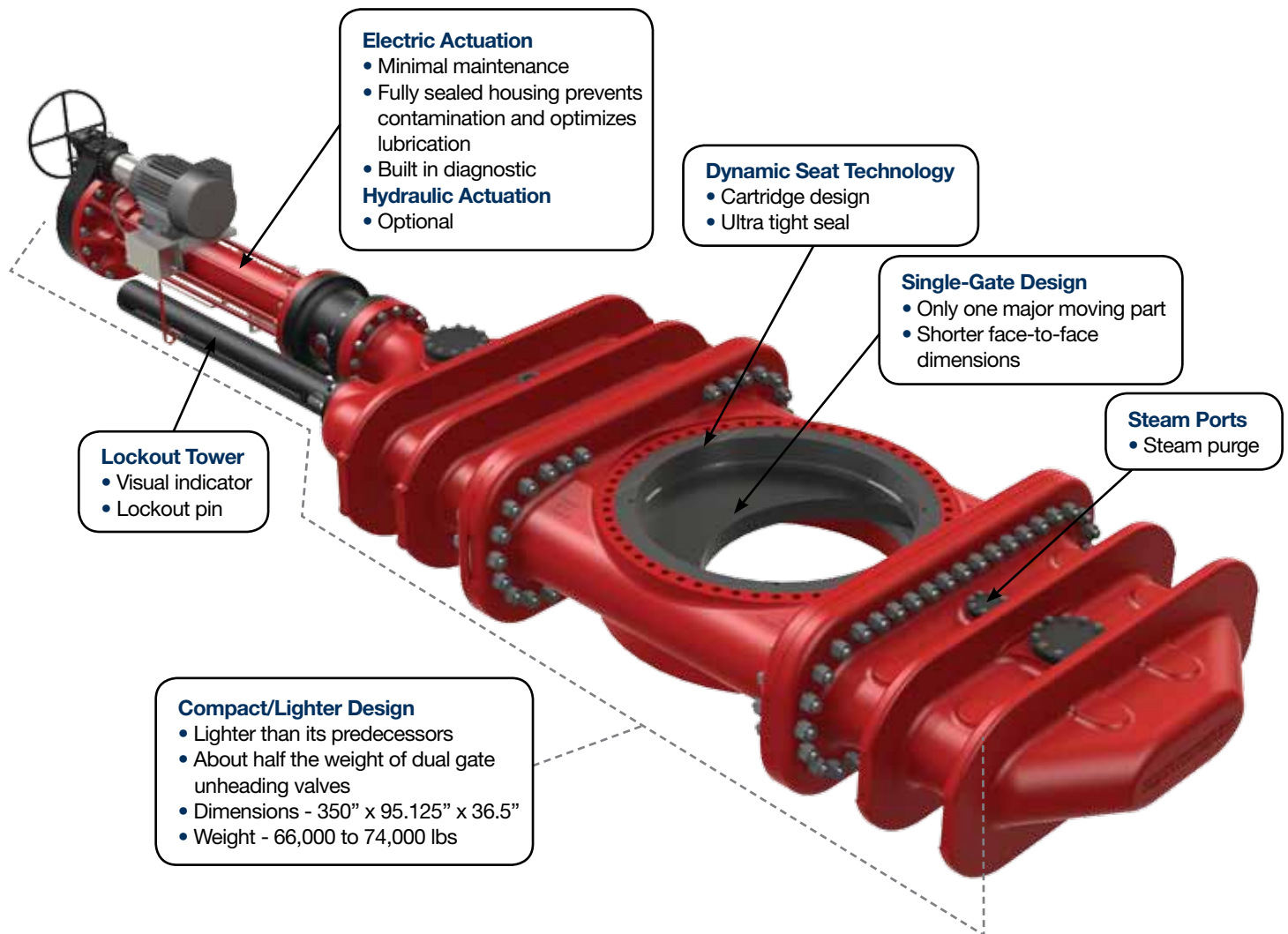
Key Features, Engineering and Design

Single Gate Versus Double Gate Design

Compared to complicated double gate unheading valve designs which can have many moving parts, the single gate design of DeltaValve's unheading valve has only one single major moving part. This simplicity of design significantly reduces the possibility of failure, less potential down-time and more production. Additionally, DeltaValve's single gate design has a shorter face-to-face and a smaller overall footprint as compared to the larger and heavier double gate design.

Seat Seal

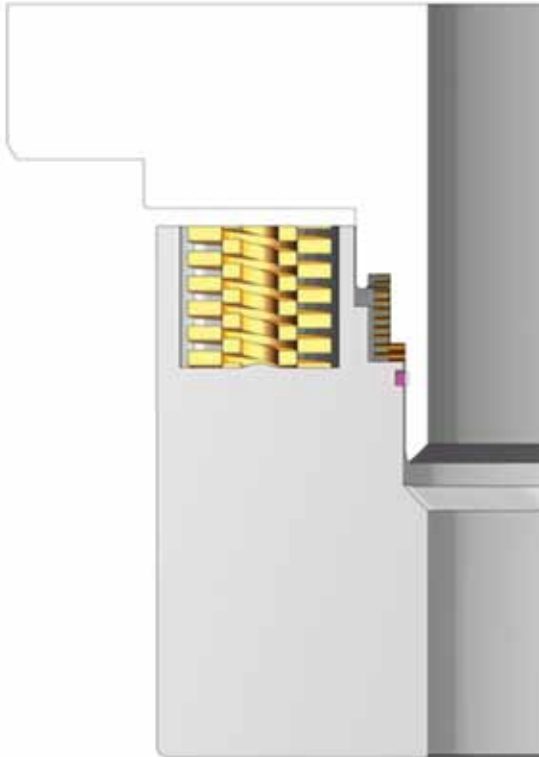
Improved upper and lower seats allow for the use of longer Inconel coil springs, which hold a lower stress state than shorter springs. This provides for an extended spring life. These features, in addition to more robust packing, combine to provide ultra-low steam consumption.



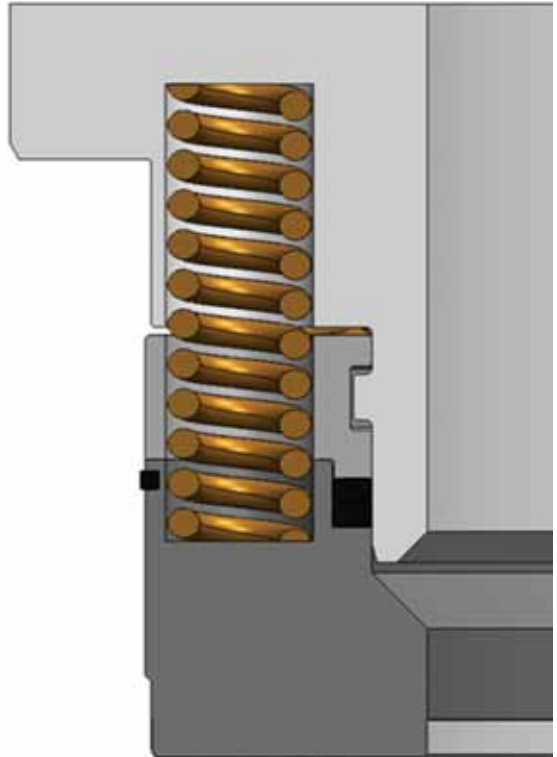
Bottom Unheading Valve Unheading Seat Design

Compared to previous bottom unheading valve seats, the upgraded seat design provides up to 60 percent more springs. Tighter spacing and a more even load distribution, results in a consistent seal against the valve gate. Inconel coil springs have also been implemented in the new seat design and maintain a lower overall stress state due to their longer length. The lower spring stress results in extended spring life and longer leak free operation of the valve.

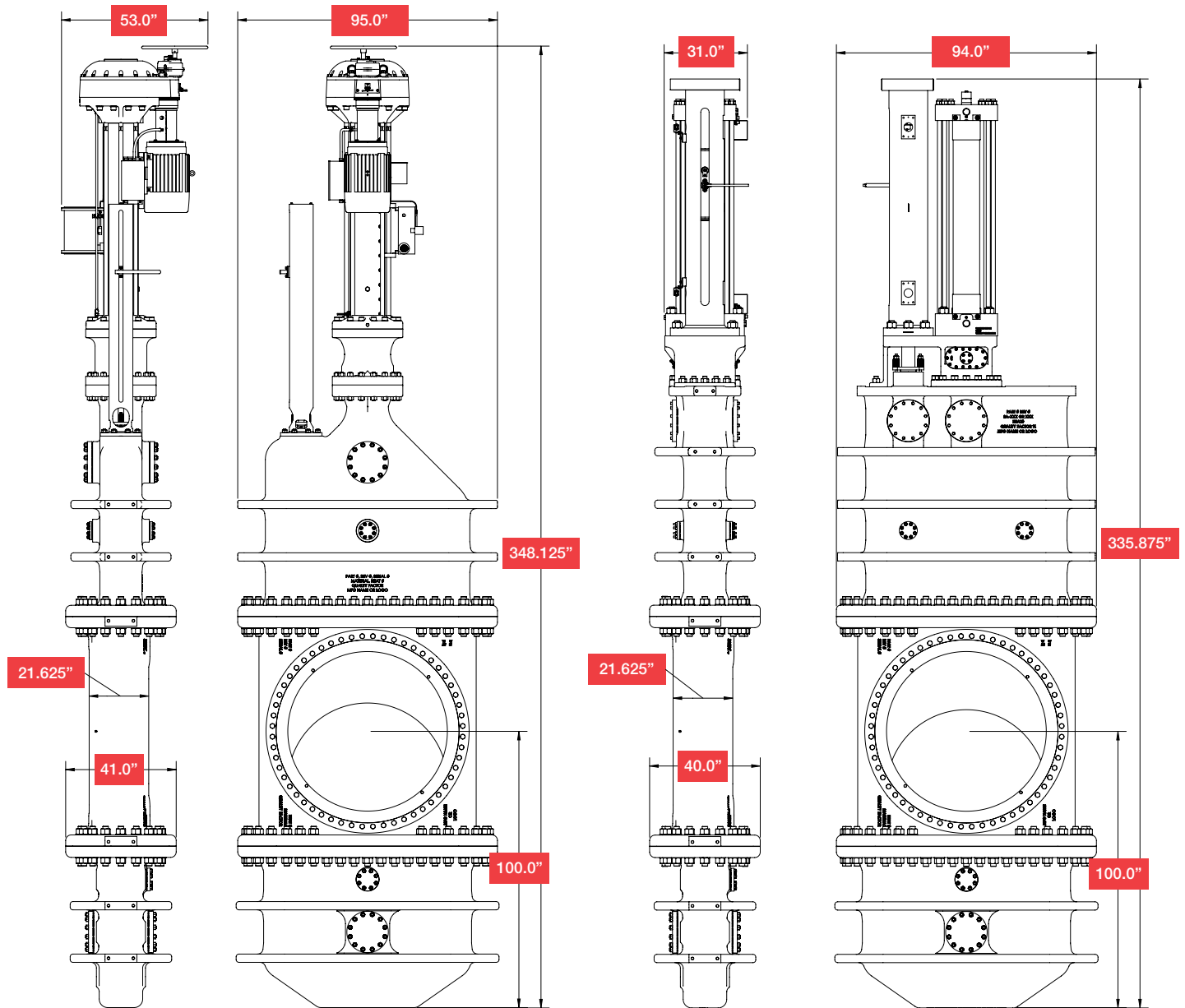
Former Seat Design



Upgraded Seat Design



Bottom Unheading Valve Technical Specifications



Bottom Unheading Valve
with Electric Actuator

Dimensions	348.125" x 95.0" x 40.0"
Weight	66,000 lbs.

Bottom Unheading Valve
with Hydraulic Actuator

Dimensions	335.875" x 95.0" x 40.0"
Weight	74,000 lbs.

Bottom Unheading Valve

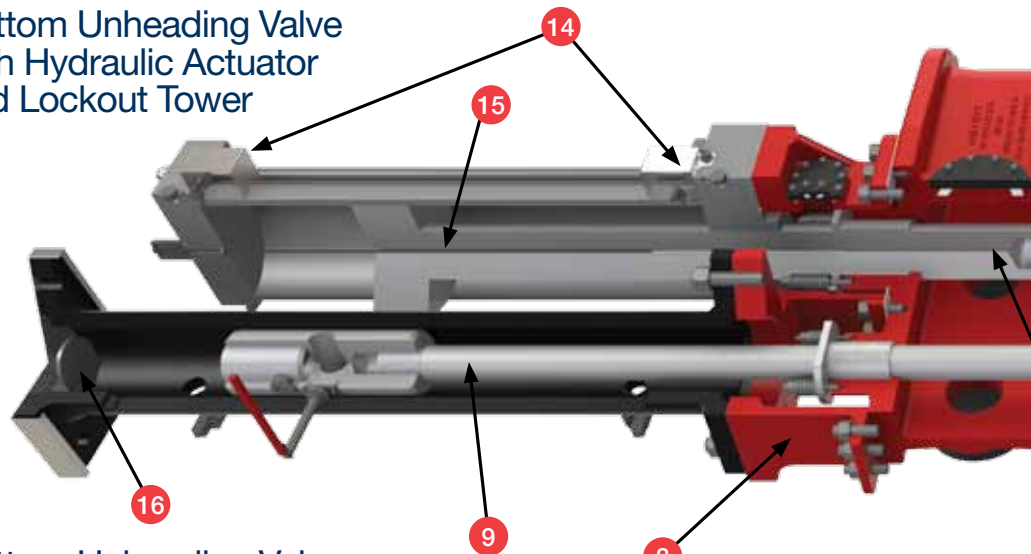
Technical Specifications



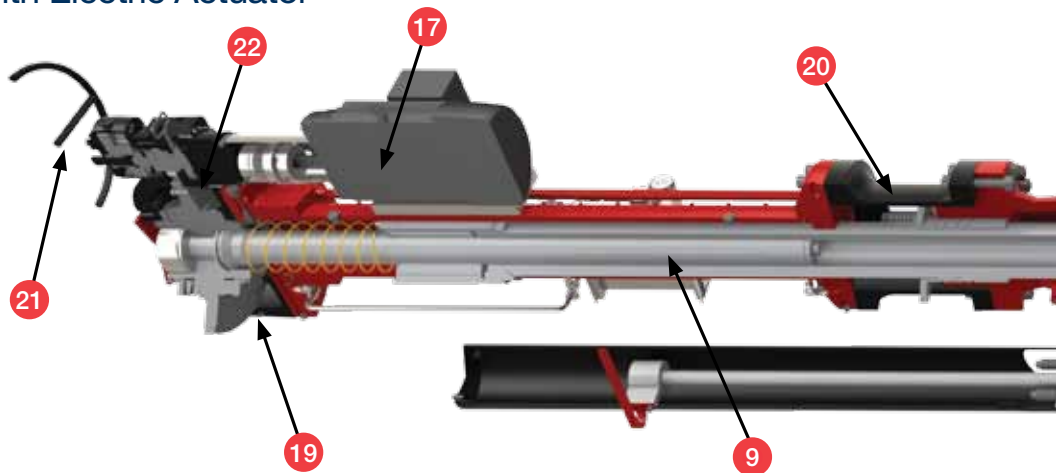
Parts and Materials

Design	Per ASME section VIII Div. 1, 2
Body Material	ASME SA217 Gr5
Bonnet Material	ASME SA217 WC9 - Optional ASTM SA216 WCC
Interlocks/Controls/HPU	Engineered to plant specifications
Purge Media	Steam
Shut-off	Zero leakage with differential steam purge
Drum Flange	57.75" (1467mm) Standard
Maximum Design Pressure	154 PSIG (1062 kPa) @ 940°F (505°C)

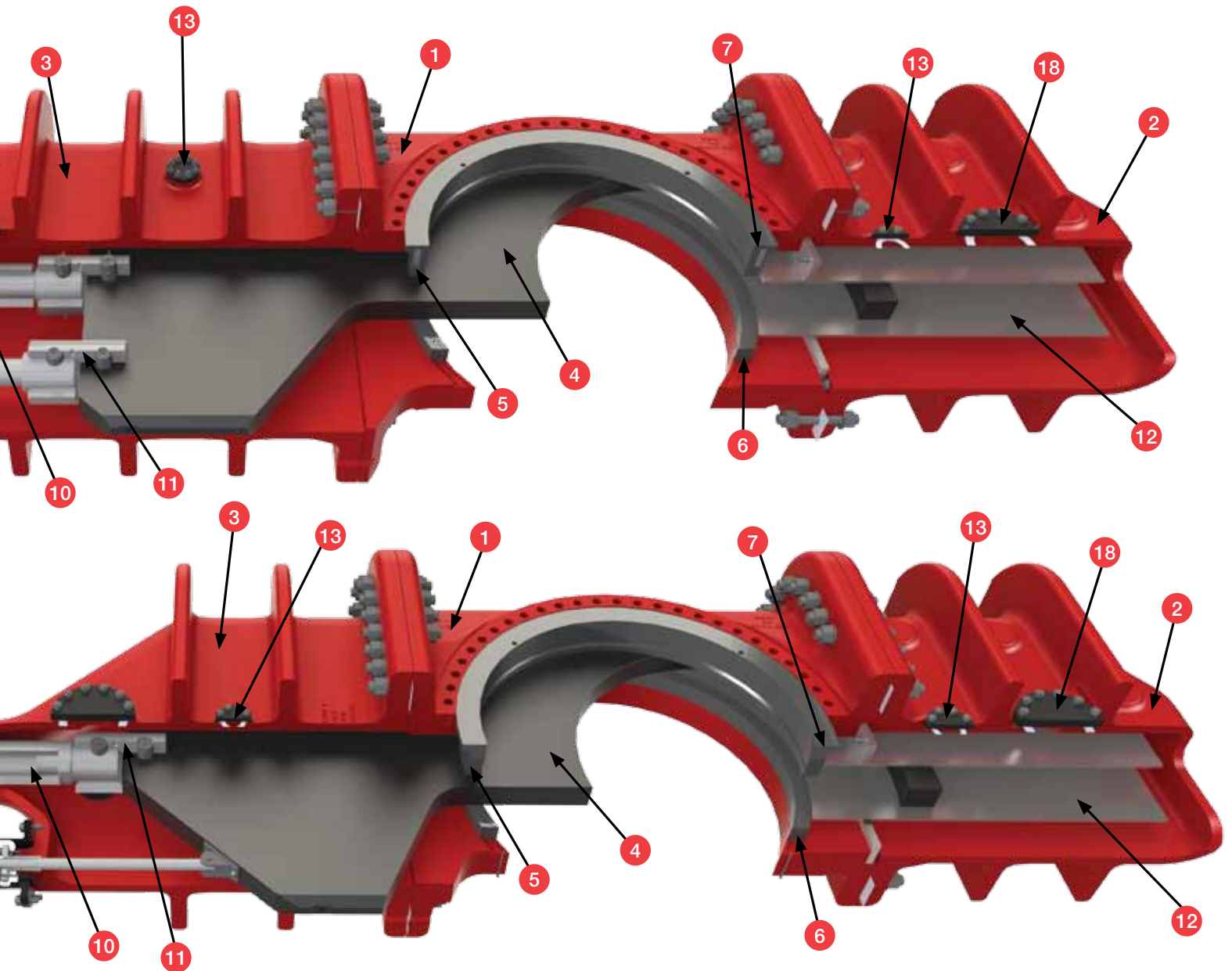
Bottom Unheading Valve with Hydraulic Actuator and Lockout Tower



Bottom Unheading Valve with Electric Actuator



Item	Description	Item	Description
1	Body	12	Shroud
2	Lower Bonnet	13	Blind Flange
3	Upper Bonnet	14	Actuator Proximity Switch
4	Gate	15	Actuator Cylinder Assembly
5	Dynamic Upper Seat	16	Linear Variable Differential Transformer
6	Static Lower Seat	17	Electric Motor
7	Seat Retainer	18	Lower Bonnet Access Cover
8	Cooling Box/Packing Access	19	Actuator Gear Box
9	Actuator Stem	20	Actuator Standoff/Packing Access
10	Adjustment Rod	21	Auxiliary HandWheel
11	Actuator Clevis	22	Torque Limiting Coupler



Bottom Unheading Valve Actuation

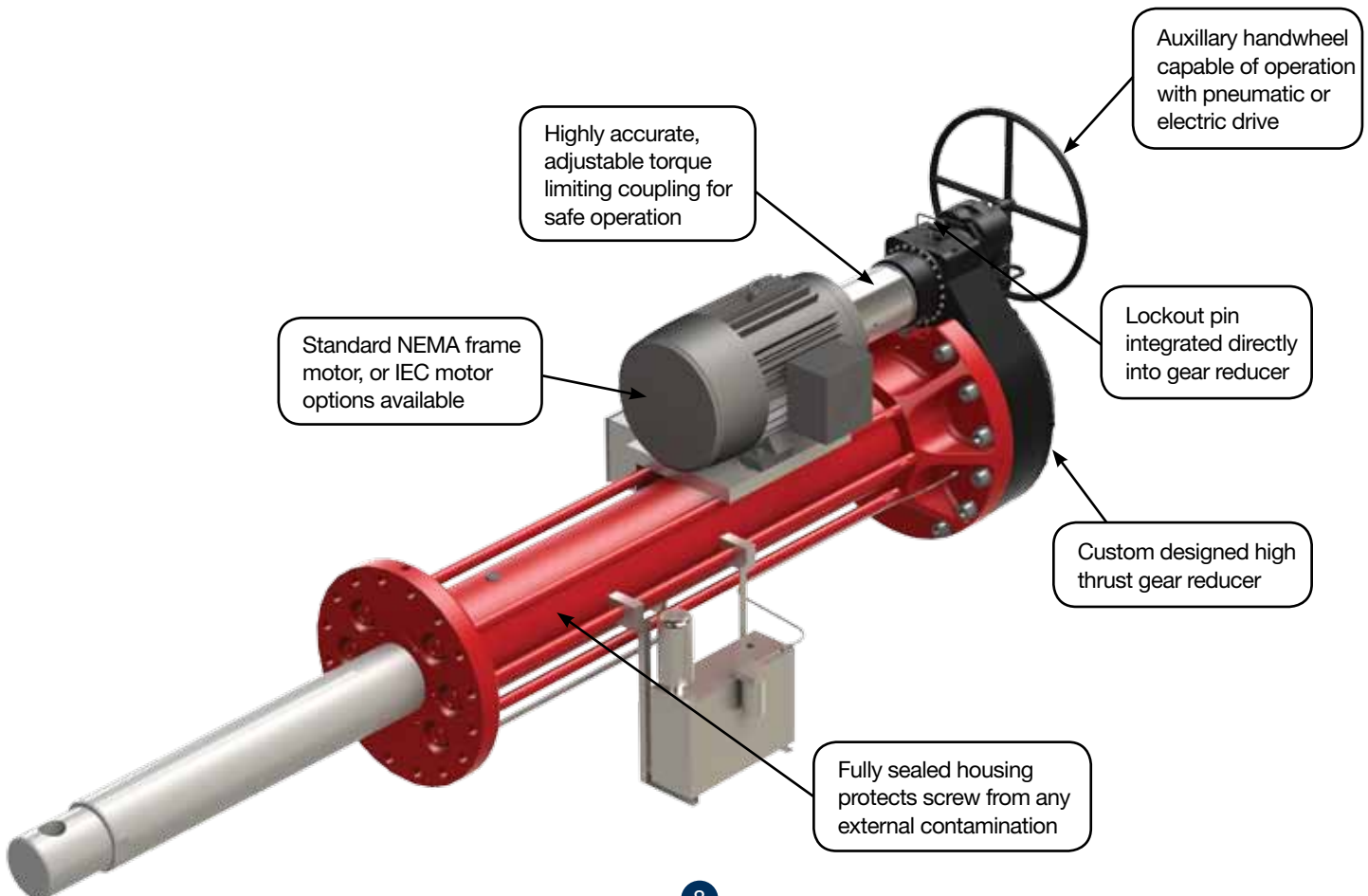


The bottom unheading valve is available with an optional planetary roller-screw electric actuator. Intended for reliable and dependable service, this design has been optimized through extensive load testing by DeltaValve and includes a minimum life-expectancy on the screw and gear reducer of seven years. With one open and one closed stroke per day, 365 days a year, this electric actuator was tested and achieved a 12-year operational lifespan.

Multiple lubrication options are available to fit refinery-specific requirements. These roller-screw lubrication alternatives include oil bath, grease, and recirculating oil pump.

Actuator maintenance is simple, requiring a lube oil change once per year. The fully sealed housing prevents contamination and optimizes lubrication. Full-featured diagnostic systems are also available to monitor the condition of the roller-screw and nut, so that any preventative maintenance can be scheduled and performed with zero down-time.

In addition to reduced maintenance expenses, this electric actuator can dramatically reduce costs of installation and related controls when compared to hydraulic actuation systems. To meet specific zone and safety regulations of the various regulatory and code requirements found around the world, each actuator is custom built with numerous position and end-of-stroke sensor options.



Bottom Unheading Valve Control System

DeltaValve's programmable logic controller (PLC) provides unparalleled safety, performance, reliability, and is a perfect complement to our unheading valves. The custom-built PLC processor can be manufactured with simplex processors or redundant processors and power supplies to maximize PLC applications. The PLC program uses configurable function blocks to insure consistent, predictable, and repeatable performance. The unheading application logic incorporates internal sequence controls, interlocks, and permissives to maximize safety and minimize the possibility of operator error. The PLC logic manages the hydraulic power unit circuits to only allow hydraulic pressure to the appropriate unheading device when the process is safe. Our high-performance HPU incorporates redundant pumps trains, redundant filters, and is fully instrumented to maximize reliability and accessibility.



DeltaValve

Assurance of Quality



Customer satisfaction is critical to our success. DeltaValve provides its customers with the highest level of quality in products and services by complying with, and continually improving, all aspects of the ISO 9001:2008 certified quality management system.

Design Standards

The DeltaGuard coke drum unheading valves are designed per ASME and the Boiler and Pressure Vessel Code.

Unheading valves may include the following certifications per international standards:

- Pressure Equipment Directive (PED) (97/23/EC)
- GOST-R
- Canadian Registration Number (CRN)

DeltaValve complies with international certifications and standards, and has unheading valves installed in over 100 refineries in approximately 20 countries around the world.

Quality Assurance Documents Included in Quote Package

- Quality assurance manual
- ISO 9001:2008 certificate
- Additional international certifications as required



Quality Control

Final Assembly

The components for the bottom unheading valves are assembled and tested at our facilities in Houston, Texas and Salt Lake City, Utah. Every part is thoroughly inspected and reviewed before being installed as part of our strict quality control protocols.

DeltaValve

Complementary Products

Top Unheading Valve

Used in conjunction with the auto-switch cutting tool, the DeltaValve coke drum top unheading valve and cutting tool enclosure/blowout diverter create an inherently safe work environment. The top unheading valve mounts directly to the drum to create a permanent top head connection. Just like the DeltaValve bottom unheading valve, the top heading valve uses patented dynamic seating technology that is tight-sealing, robust, and highly reliable.



Cutting Tool Enclosure/Blowout Diverter

The cutting tool enclosure/blowout diverter is designed to protect personnel and equipment by directing coke, steam, and water from drum eruptions up and away from the cutting deck. The built-in drill stem guide controls and stabilizes the drill stem during coke boring and cutting. The enclosure mounts directly to the DeltaValve top unheading valve and, when used in conjunction with the auto-switch coke cutting tool that is housed within the enclosure when not in the drum, creates a safe coke cutting operation.



DeltaValve

Additional Specialized Equipment



Auto-Switch Coke Cutting Tool

The innovative DeltaValve auto-switch coke cutting tool provides a high level of safety during de-coking operations by allowing the tool to remain in the drum during switching between cutting/boring modes. The auto-switch tool and enclosure, in combination with the DeltaValve top unheading valve, provides maximum coker safety on the top unheading deck by removing personnel from the area.

Isolation Valves and Controls

DeltaValve's reliable, low-maintenance, tight shut-off isolation valves are designed for extreme temperatures and harsh applications. They provide for quick, efficient in-line removal of all internal components. Steam purge ports are capable of operating continuously in the partially open (throttling) position, while isolating body internals from the process. These valves are available with a complete suite of electric and hydraulic actuator options and complete PLC-based isolation valve control systems with safety interlocks and sequence controls.

DeltaGlide®

This device is designed to facilitate the installation of the DeltaValve bottom unheading valve and provide support during coking cycles, it also maintains alignment of valve components during maintenance and inspection.

Transition Spool

Designed to incorporate a permanent side inlet feed connection and create a permanent connection between the DeltaValve bottom unheading valve and the coke drum.

Safety Instrumented Systems

Designed in compliance with IEC 61508 to provide an independent layer of protection to mitigate coker safety risks.

Coker Automation

DeltaValve's programmable logic controller (PLC) provides unparalleled safety, performance and reliability. The custom-built PLC can be manufactured with simplex or redundant processors and power supplies, configurable function blocks, internal sequence controls, interlocks, permissives, and more. The PLC logic manages the hydraulic power unit circuits to allow hydraulic pressure only to the appropriate unheading device when the process is safe.

Contact Sales

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DeltaValve

Field Services

Our field service technicians provide a superior level of service, providing 24-7 coverage to reduce downtime by responding to our customers' needs in a timely and efficient manner. DeltaValve's network of technicians are highly trained to evaluate, troubleshoot, and resolves issues. They are backed by our engineering group allowing for quick access to technical expertise, drawings, bills of materials, and other relevant data to expedite practical and reliable solutions.

Core services of the DeltaValve field service team are:

- DeltaValve equipment installations
- Site acceptance tests
- Commissioning supervision
- Site audits
- Turnaround service
- Maintenance and repair
- Equipment rebuilds
- Equipment storage
- Hydraulic flush services
- Electrical loop checks
- On-site training
- Bolt tensioning/torquing

In order to respond to our customers' requirements, DeltaValve has sizeable service facilities staffed with our certified, dedicated technicians in the United States, Canada, and Europe. We are also planning such facilities globally to meet the demands of our growing list of worldwide customers.

Contact Field Services

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Quality
ISO 9001