



DELAYED COKING

Top Unheading Valve

and Integrated Safety System

INNOVATIVE TECHNOLOGY





Improved safety
and reduced maintenance

Leadership and Experience

DeltaValve's extensive experience in designing and building engineered severe-service industrial valves and equipment for delayed coking has made us a world-recognized industry leader. In 2001, DeltaValve 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 new valve technology revolutionized coke drum unheading by replacing traditionally unsafe and unreliable manual or semi-automated unheading equipment, with a fully automated system. The result has been a safer working environment, reduced downtime, and increased productivity.

In 2016, DeltaValve was acquired by CIRCOR and is a key brand within its energy group.

Today DeltaValve continues to develop new and innovative products to address some of the most challenging applications in delayed coking.

DeltaValve offers a full range of delayed coking products including:

- Top and bottom unheading valves
- CenterFeed™ injection devices
- Isolation valves
- Auto-switch boring/cutting tools
- Cutting tool enclosures/blowout diverters
- Aftermarket, spare parts, and field services
- Installation services

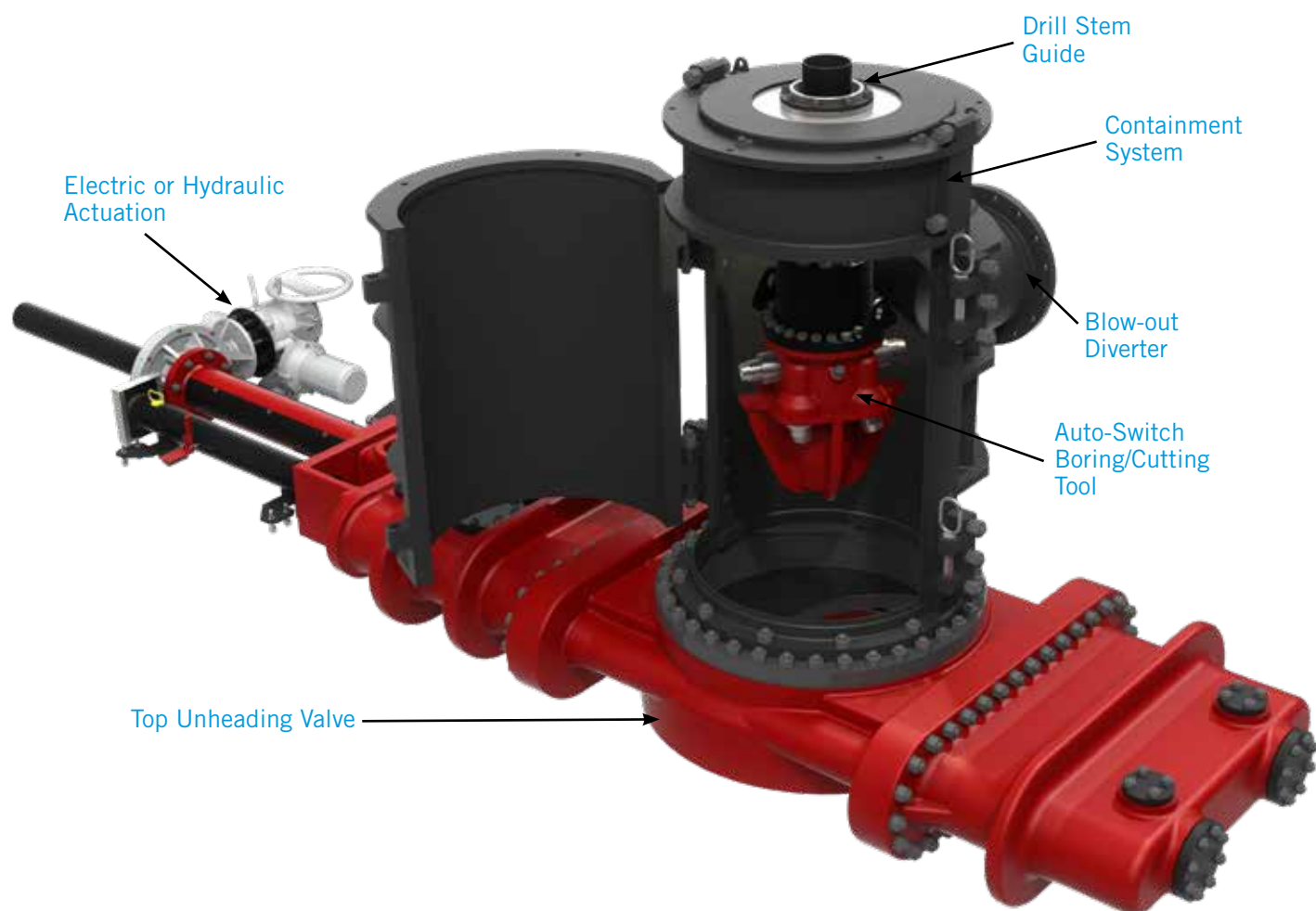
At DeltaValve we strive to deliver safe and reliable products at the very best value for our customers. Our goal is to be "Best in Class" in all we do.





Top Head Safety System

Safety and efficiency can be achieved on the cutting deck with DeltaValve's comprehensive top head safety system. This system incorporates the top unheading valve, the cutting tool enclosure, and the auto-switch boring/cutting tool into one complete system. This enclosed system provides maximum safety by fully automating the top unheading and coke cutting process and eliminating the requirement for personnel on the cutting deck.





Top Unheading Valves

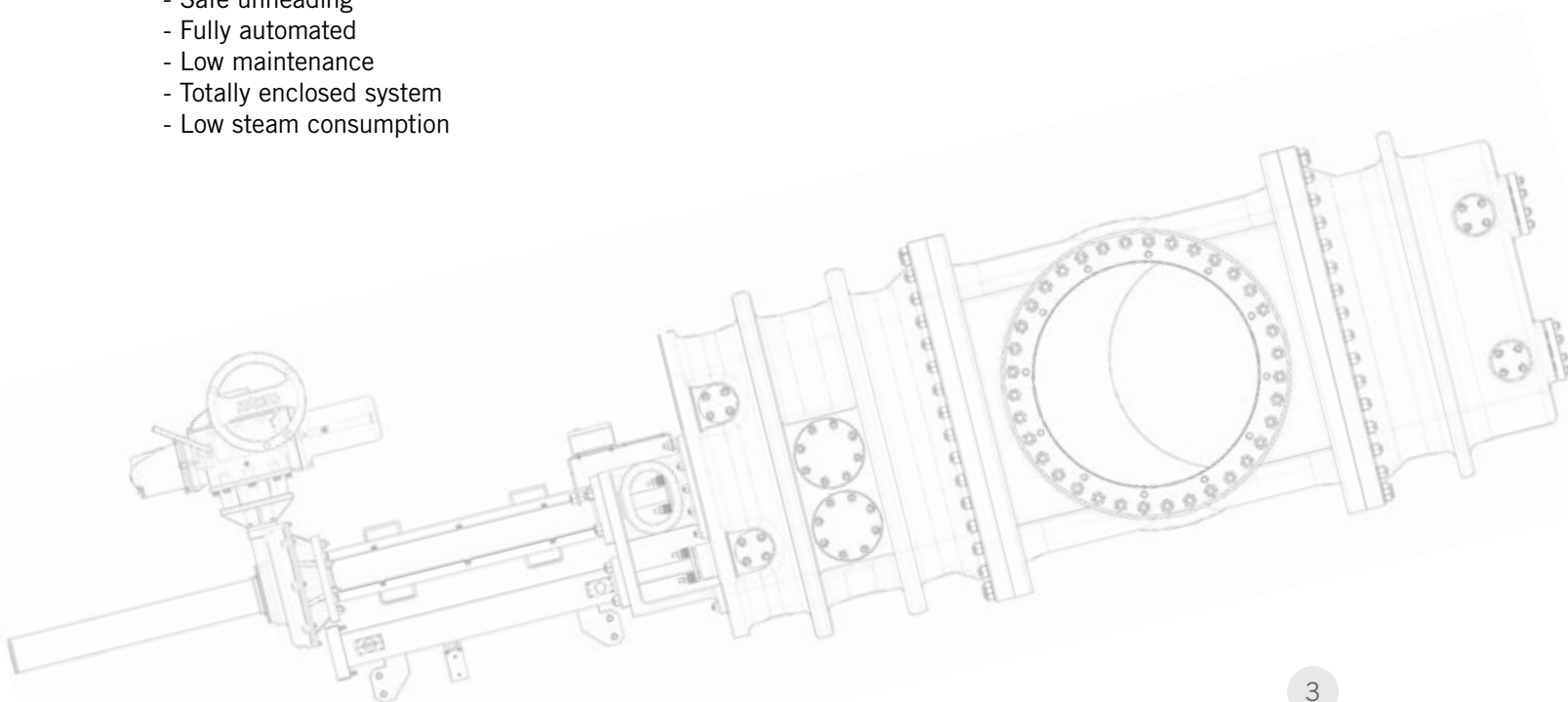
DeltaValve's top unheading valves are available in 36, 30, and 24 inch sizes, and are part of an enclosed system which permanently connects to the top flange of a coke drum. With this valve, top drum unheading can be safely accomplished with the push of a single button from a remote location, allowing operators to be removed from the cutting deck and protecting them from potential coke drum eruptions and top head blowouts.

Available with either electric or hydraulic actuation, the valve includes tight-sealing seat technology and is designed to operate maintenance free from turnaround to turnaround. The valve uses double block and purge sealing technology, and its seal condition can be continuously and positively monitored and verified by measuring steam purge pressure and flow.



Key Advantages:

- Safe unheading
- Fully automated
- Low maintenance
- Totally enclosed system
- Low steam consumption





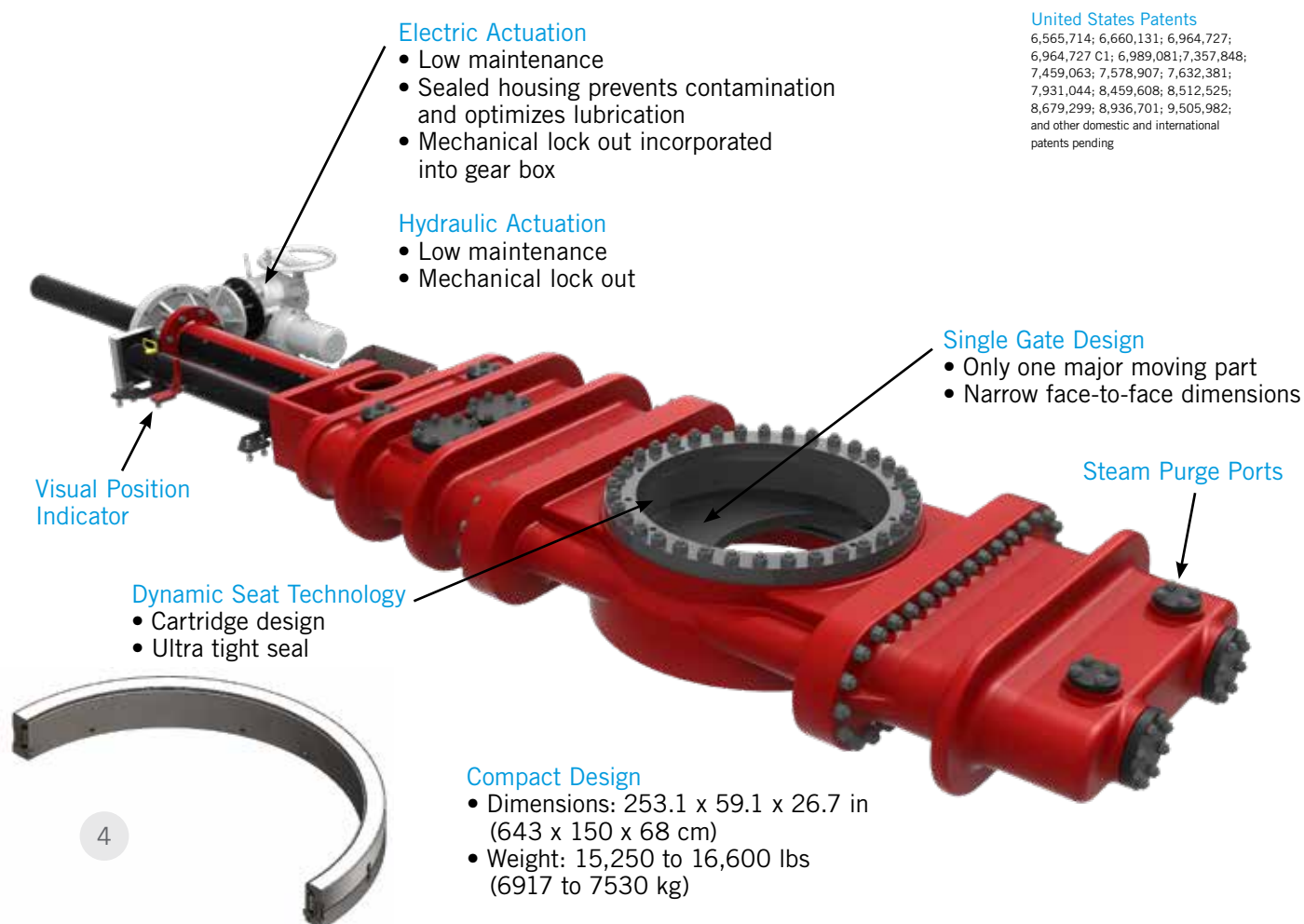
Valve Design

Single Gate

DeltaValve's top unheading valve incorporates a single gate. This simple design reduces potential failures and consequently reduces down-time and maximizes production. The single gate design also has a significantly narrower face-to-face dimension, smaller overall footprint, and reduced weight when compared to a dual gate design.

Seat Configuration

Through a combination of high-cycle springs and a bellows seal with actively compressed packing, our dynamic seat design forms an ultra-tight radial seal, providing lower steam consumption and optimal operational life.



Weights and Dimensions

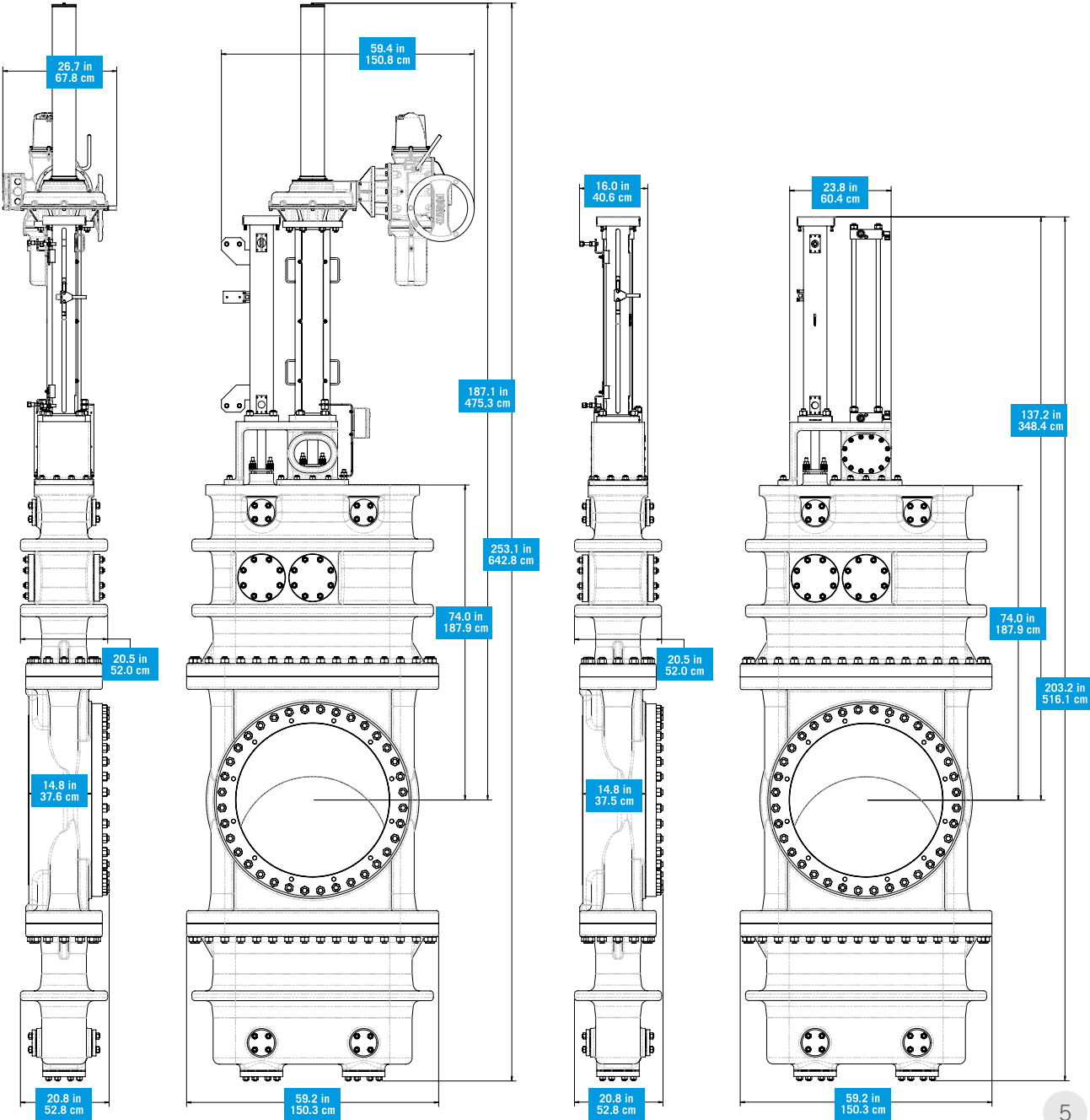
36" Top Unheading Valve with Electric Actuation

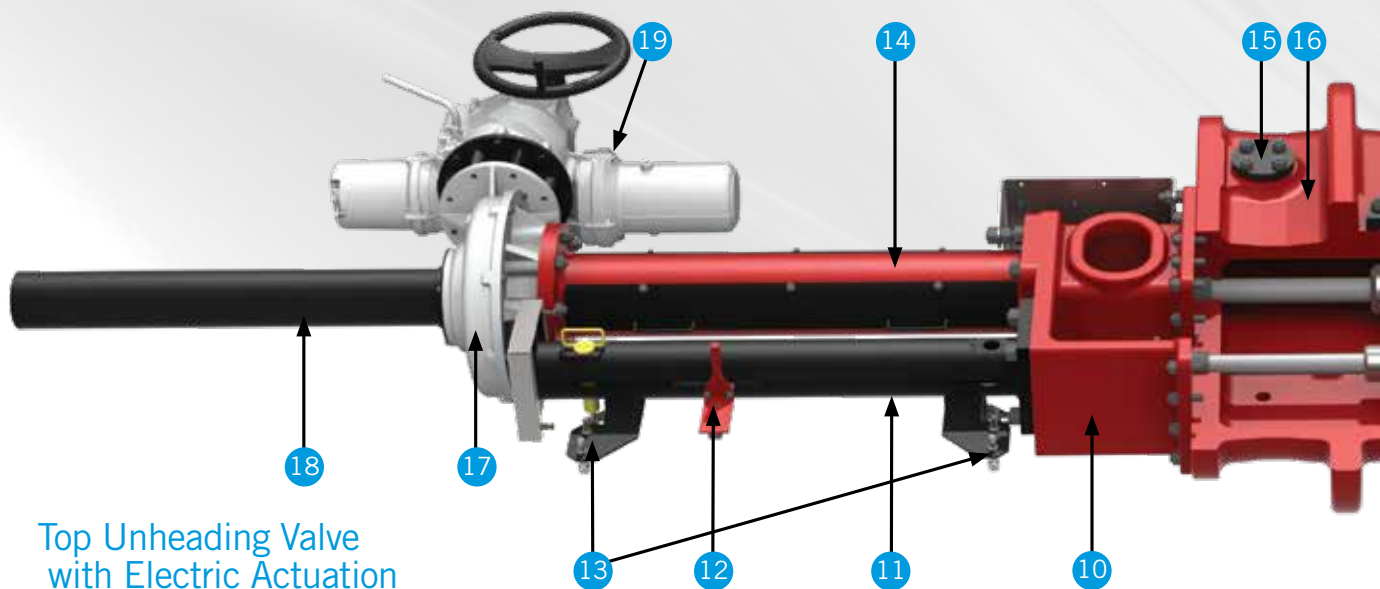
Dimensions	253.1 x 59.1 x 26.7 in (643 x 150 x 68 cm)
Weight	16,600 lbs (7530 kg)

36" Top Unheading Valve with Hydraulic Actuation

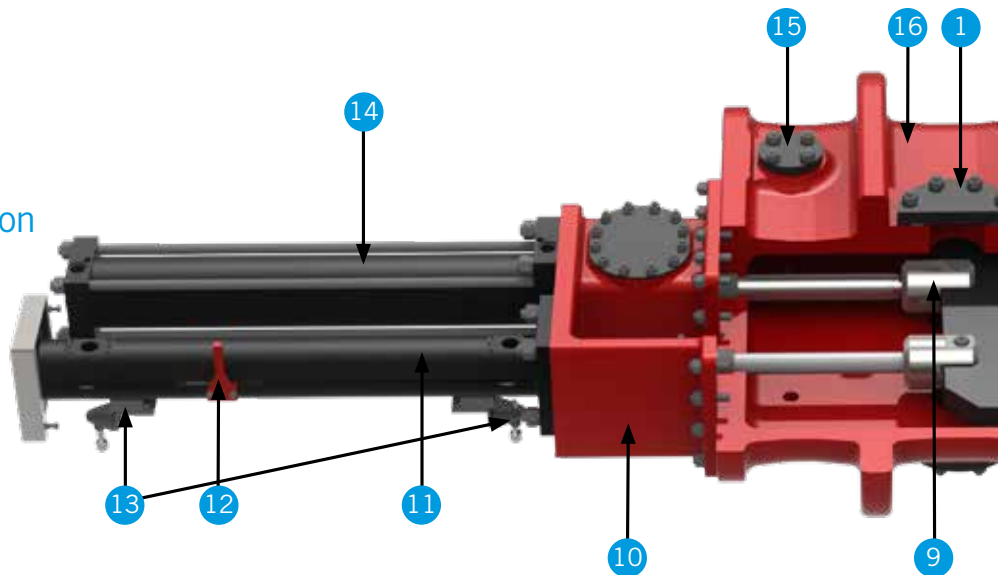
Dimensions	203.2 x 59.2 x 20.8 in (516 x 150 x 53 cm)
Weight	15,250 lbs (6917 kg)

Please contact DeltaValve for dimensions and weights for 30 or 24 inch top unheading valves.



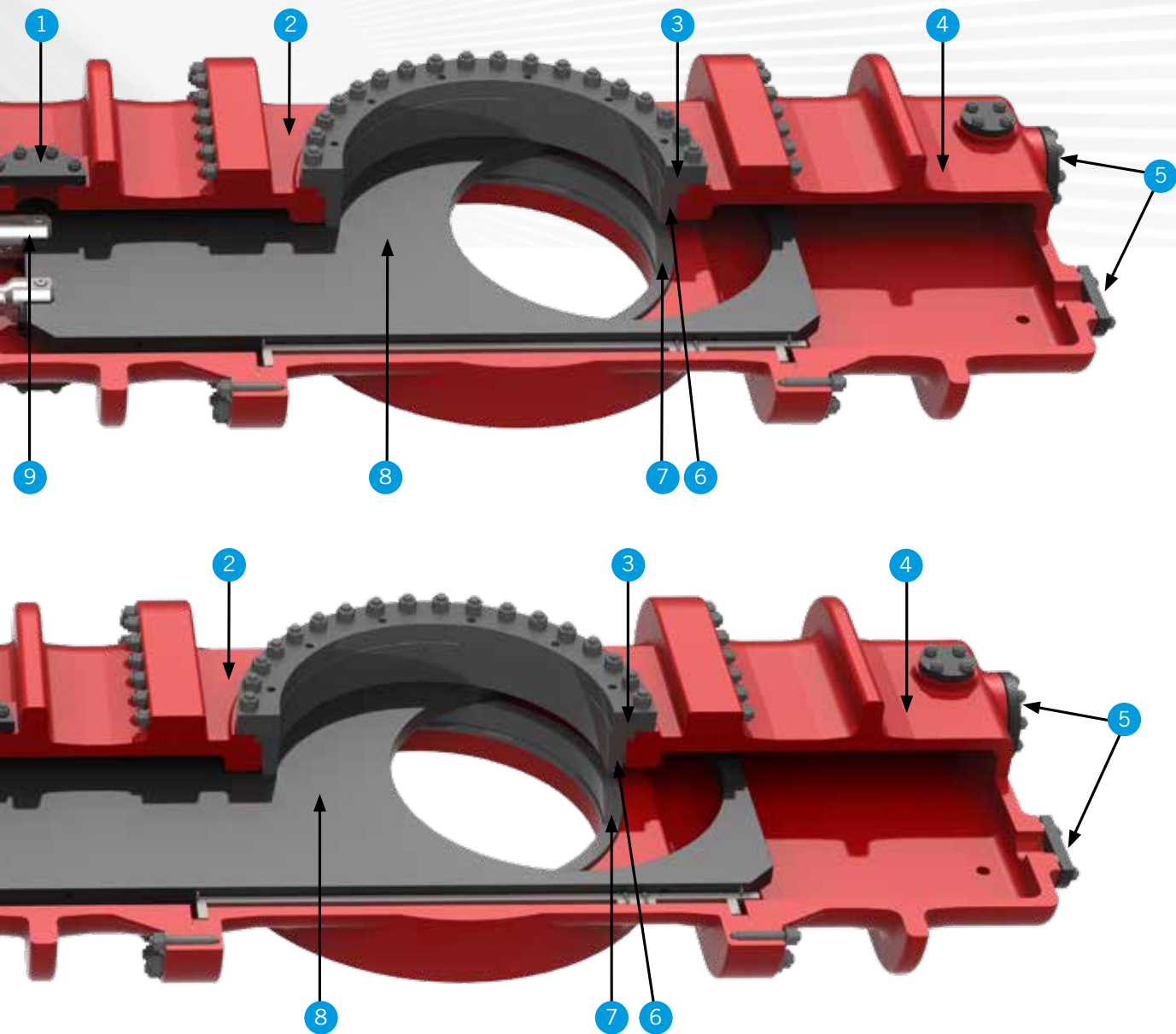


Top Unheading Valve
with Hydraulic Actuation



Parts and Materials

Design Standard	Per ASME BPVC Section VIII Div. 1 & 2
Body Material	ASME SA217 C5
Bonnet Material	ASME SA217 C5 — optional ASME SA216 WCC
Interlocks/Controls/HPU	Engineered to plant specifications
Purge Media	Steam
Shut-off	Double block and purge with 100% verifiable positive isolation
Drum Flange	24" (609mm), 30" (762mm), 36" (914mm) standard
Maximum Design Pressure	105 PSIG (723.4 kPa) @ 900°F (482°C)



Item	Description
1	Bonnet Access Cover
2	Body
3	Seat Retainer
4	Lower Bonnet
5	Access Ports
6	Upper Seat
7	Lower Seat
8	Gate
9	Actuator Clevis
10	Standoff/Yoke

Item	Description
11	Lockout Tower
12	Visual Indicator
13	Proximity Switch
14	Electric Actuator Yoke/Hydraulic Cylinder
15	Steam Purge Port
16	Upper Bonnet
17	Gear Box
18	Rising Stem Cover
19	Electric Actuator

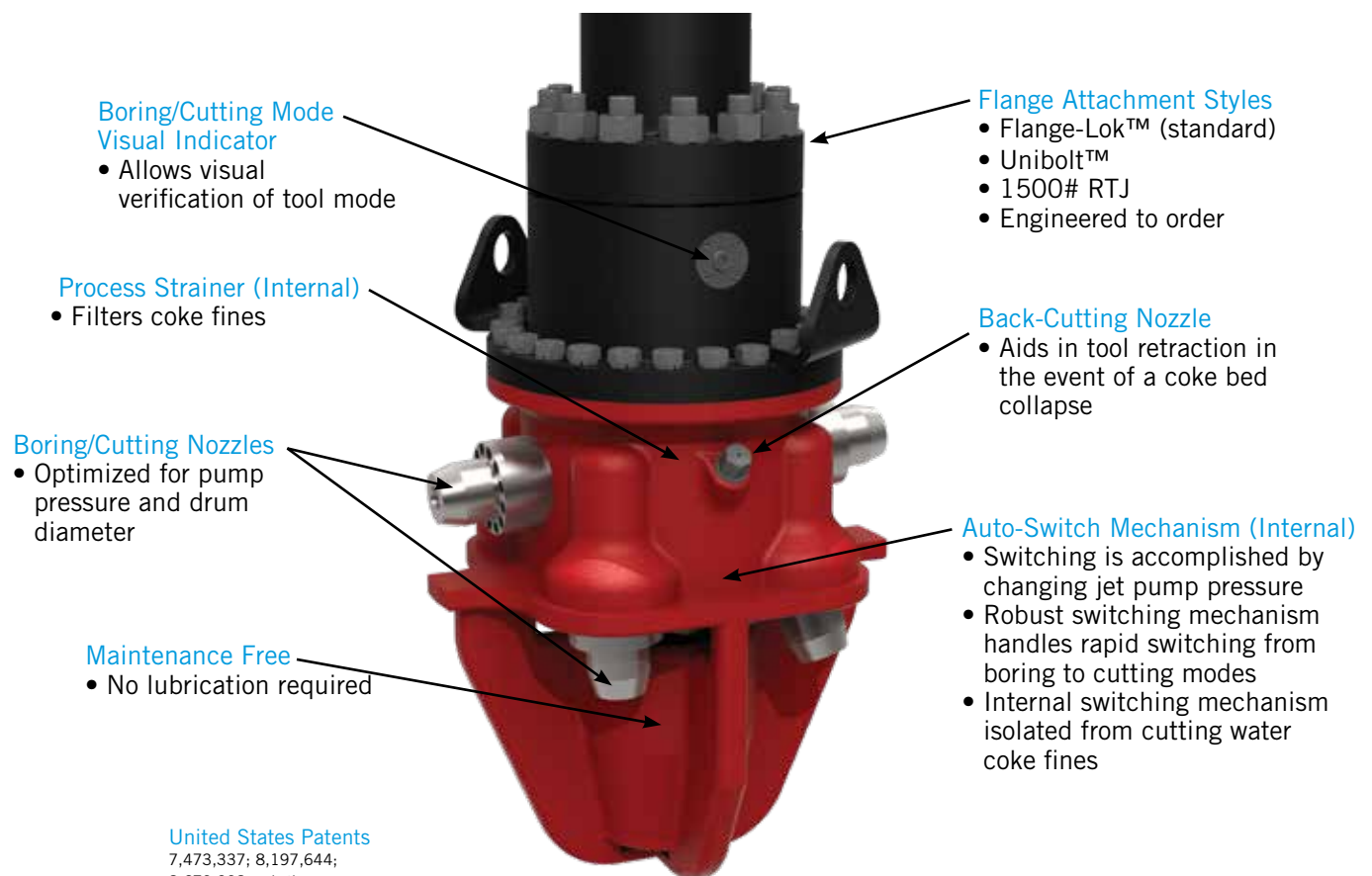


Remote switching from boring to cutting modes

Auto-Switch Boring/Cutting Tool

DeltaValve's auto-switch boring/cutting tool allows the tool to remain in the drum when switching between boring/cutting modes. The auto-switch tool, in combination with the cutting tool enclosure and top unheading valve, provide maximum coker safety on the cutting deck.

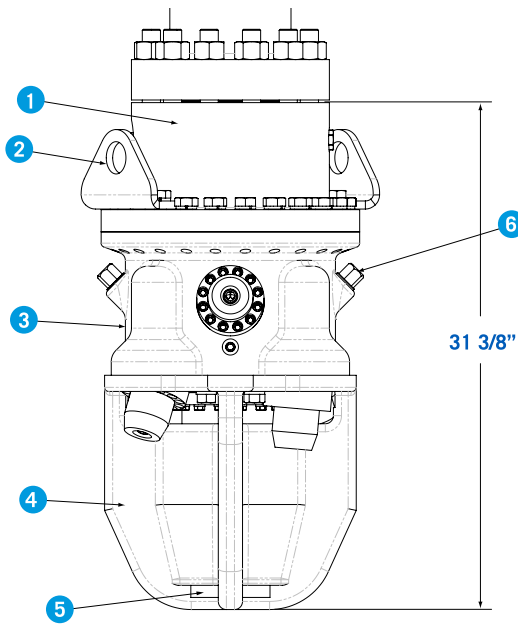
Performance of the cutting nozzles is optimized for each pump pressure and drum diameter combination. Flow channels within the auto-switch tool are configured to provide maximum boring and cutting force. Switching between modes is accomplished by remotely changing line pressure, and the boring/cutting modes are distinguished by different steady state pressures displayed at the operator's panel as well as a visual indicator on the tool.



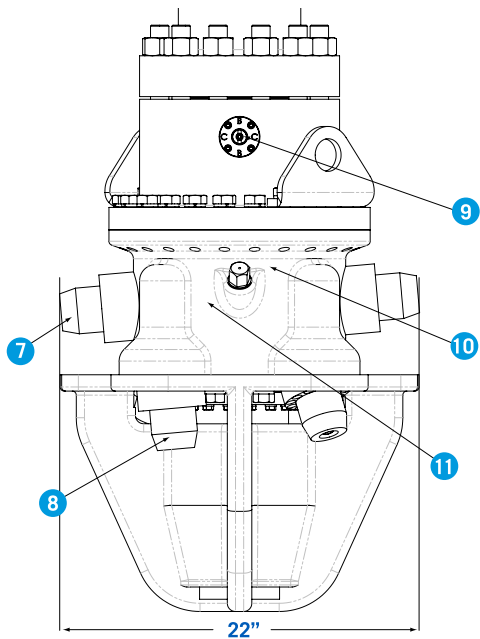


Technical Specifications

Construction:	Cast
Body Material:	SA-487 CA6NM
Nozzle Material:	ASTM A479 316 Electroless nickel plating
Connections:	Flange-Lok™, Unibolt™, RTJ, Engineered to specs.
Cutting Water Pressures:	2500 to 5500 psi
Pressure Envelope:	Engineered to comply with ASME Sec. VIII, Div. I allowable stresses for materials
Switch Force:	Nitrogen spring
Switch Pressure:	100 - 500 psi
Dimensions:	31 3/8" x 22"
Weight:	950 lbs. +/-



Item	Description
1	Top Flange
2	Lifting Eyes
3	Body
4	Lower Guard
5	Return Spring
6	Back Cutting Nozzle



Item	Description
7	Cutting Nozzle
8	Boring Nozzle
9	Visual Mode Indicator
10	Switching Mechanism (internal)
11	Coke Strainer (internal)



Encloses boring/cutting tool
Guides and stabilizes drill stem
Diverts top head blow-outs

Cutting Tool Enclosure

The cutting tool enclosure mounts directly to the DeltaValve top unheading valve. The enclosure is designed to protect personnel and equipment by containing the cutting tool when not in the drum and also diverting coke, steam, and water away from the cutting deck in the event of a drum eruption. The built-in drill stem guide controls and stabilizes the drill stem during coke boring and cutting.

Enclosure Door(s)

- Single or double door
- Right or left hinged
- Robust construction

Drill Stem Guide

- Centers drill stem

Blowout Diverter

- Directs drum eruptions away from the cutting deck

Direct Connect Flange

- Directly connects to the top unheading valve to create an enclosed containment system

Tool Access

- Easy access to cutting tool



State of the art
control systems

Control Systems

DeltaValve's Programmable Logic Controller (PLC) provides unparalleled safety, performance, and reliability. The custom-built PLC can be manufactured with simplex or redundant hardware configurations, configurable function blocks, internal sequence controls, interlocks, permissives, and more.

For hydraulic systems, the PLC logic manages the hydraulic power unit circuits to only allow hydraulic pressure to the appropriate unheading valve when the process is verified safe. Additionally our high-performance hydraulic power unit incorporates redundant equipment such as pump trains, and filters to maximize reliability. The hydraulic circuit is fully instrumented to provide real time status and includes alarms to facilitate preventative maintenance for a longer lasting robust system.

Safety Instrumented Systems

DeltaValve offers equipment and systems that are designed in compliance with customer specifications and IEC 61508, and readily integrate into plant safety systems.





Additional Delayed Coker Equipment



CenterFeed™ Injection Device

DeltaValve's innovative CenterFeed™ injection device addresses the issues of uneven thermal distribution and severe thermal transients experienced when using single or dual side feed configurations. The CenterFeed accomplishes this by simply returning feed streams to the center of the coke drum, resulting in more consistent operation during feed, steam strip, and quench cycles, all of which can contribute to reduced drum stresses and longer drum life. The CenterFeed can be configured with electric, electro-hydraulic, or hydraulic actuation, and can be integrated with any safety interlock system.



Bottom Unheading Valve

DeltaValve's bottom unheading valve connects to the bottom of the coke drum's transition spool and creates a totally enclosed system from the top head to the discharge chute. With the push of a button from a remote location, safe and reliable unheading can be achieved. The bottom unheading valve is inherently safe, easy to operate, and designed to be maintenance-free from turnaround to turnaround.



Isolation Valves and Controls

DeltaValve's line of isolation valves are designed for on/off as well as continuous operation 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 control systems with safety interlocks and sequence controls. This design provides for quick and efficient in-line removal or replacement of all internal components.



Installation Services

By managing the engineering, procurement, and construction work associated with the installation of our unheading valves and other equipment, we provide strategic value added services to our clients.

DeltaValve partners with engineering and construction companies who specialize in coker revamps. Together we have successfully managed numerous projects. Please contact us for references.



We offer the following:

- Project management
- Detailed engineering management
- Installation engineering management
- Procurement management
- Construction management
- Commissioning supervision
- Training



OEM Parts and Service



DeltaValve offers a full line of OEM spare parts for its entire product line. Additionally, DeltaValve's service technicians are available to respond to our customers' needs in a timely and efficient manner. Our 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 provided by the DeltaValve 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
- Valve/equipment maintenance and service

DeltaValve's network of global facilities offer support and technical assistance to our large and growing base of worldwide customers.



Quality control,
quality assurance

Quality

DeltaValve complies with all aspects of the ISO 9001:2015 certified quality management system, and provides customers with the highest level of quality.

DeltaValve Design Standards

Unheading valves

- ASME and BPVC, Section VIII Div. I and II

Isolation valves

- ASME B16.34, API 598 and API 600

Center feed devices

- ASME B31.3

DeltaValve maintains the following stamps and design certifications:

- ASME
- "U" Stamp, Division I
- "R" Stamp
- National Board Registration
- Pressure Equipment Directive (PED) (2014/68/EU)

DeltaValve manufactures to the following certifications per international requirements:

- Canadian Registration Number (CRN)
- TR CU (formerly GOST-R)
- KHK
- Others as required

DeltaValve has experience installing equipment in flameproof/explosion proof, non-incendiary, intrinsically-safe hazardous areas utilizing the following standards:

- | | | |
|---------|-----------|---------|
| • IECEx | • InMetro | • NEMA |
| • PESO | • UL | • TIIS |
| • ATEX | • KOSHA | • CSA |
| • JIS | • TR CU | • NEPSI |

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

Quality Assurance Documentation

- ISO 9001:2015 certificate
- Quality assurance manual
- Additional international certifications as required.



Final Assembly and Testing

Our equipment is assembled and tested at our facilities in Houston, Texas, Salt Lake City, Utah, and Coimbatore, India. As part of our quality control protocol, each critical component is inspected and reviewed before installation for proper functionality and product quality.



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