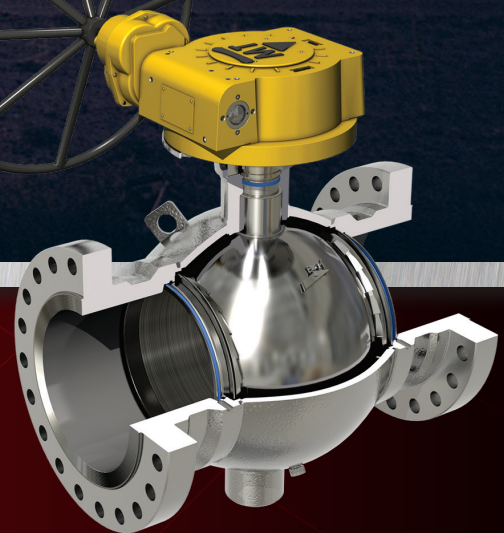


CAMERON T31MAX High-efficiency Fully Welded Ball Valve

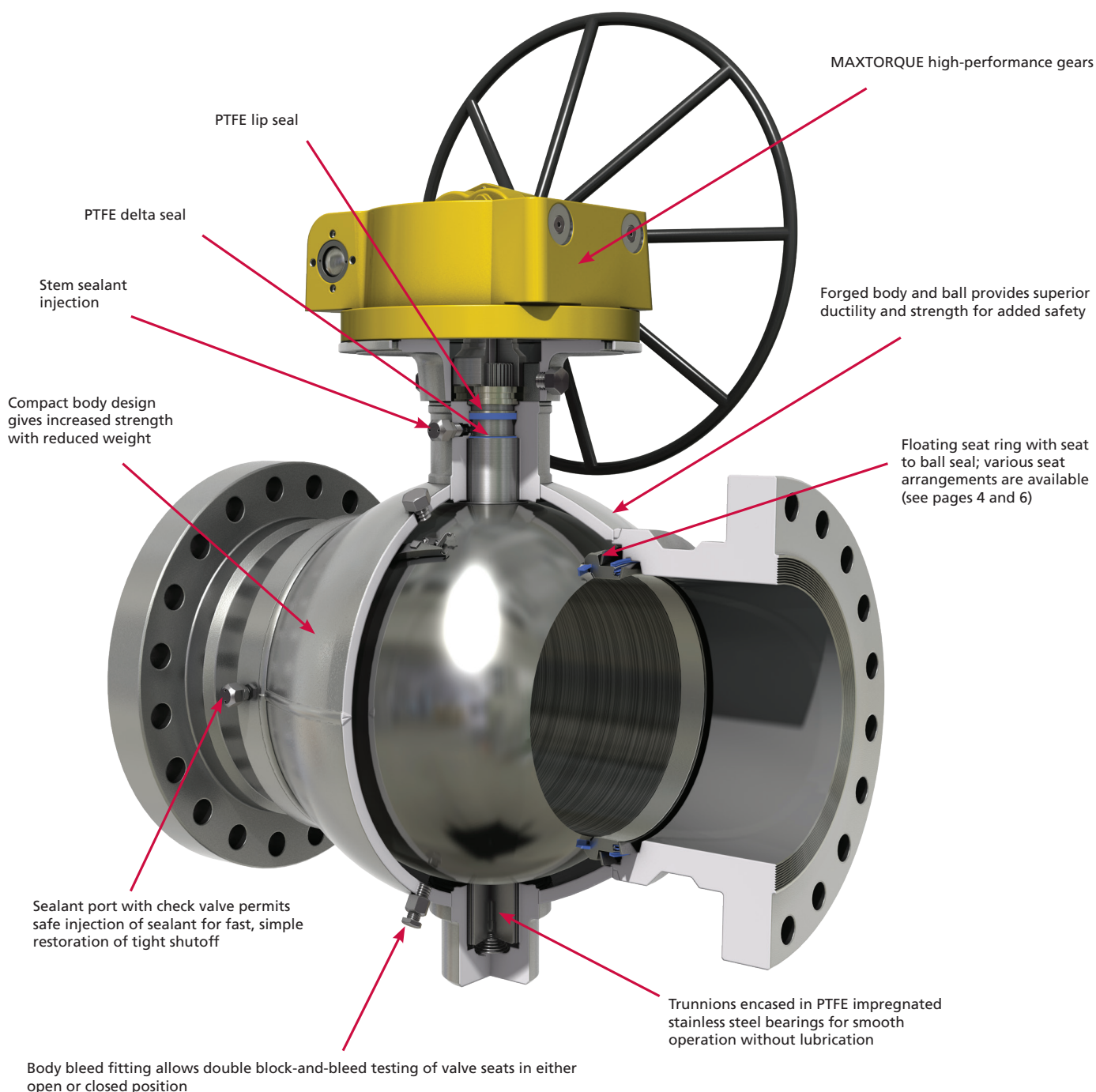
TECHNOLOGY



CAMERON T31MAX High-efficiency Fully Welded Ball Valve

As one of the most trusted valves in the petroleum industry, the CAMERON T31MAX provides the strength of forged components with a lightweight and compact spherical design. Combined with Cameron's MAXTORQUE™ high-efficiency gear operator, the package gives new meaning to the words "user friendly."

CAMERON fully welded ball valves satisfy ASME/ANSI 150 through 2500 (PN 20 through PN 420) and API 2000 through 10,000 standards. Made of forged steel to ensure uniform fine grain structure and toughness, they can be specified in sizes from 2" to 56" (50 mm to 1400 mm).



MAXTORQUE HIGH-PERFORMANCE GEARS

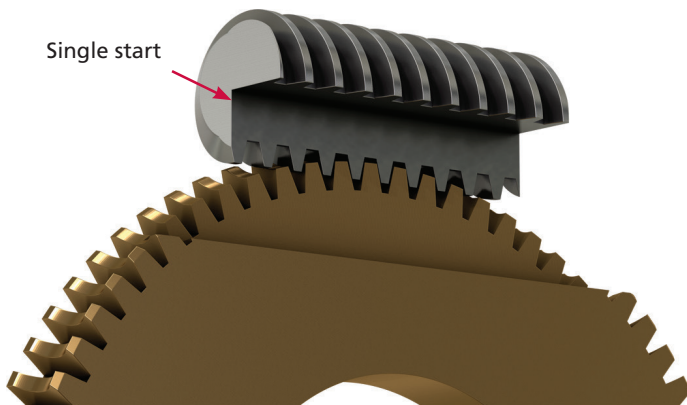
MAX Series Benefits

- Reduced work to close by up to 75%
 - Reduced turns and/or input force required to operate
 - Increased speed to close by up to 75% with the same input
- Reduced need for actuators
- Near-zero backlash for improved process control
- Smaller EMOs reduce cost of actuation packages
- Smaller actuation packages reduce weight and piping loads

MAX Series Drive Train Features

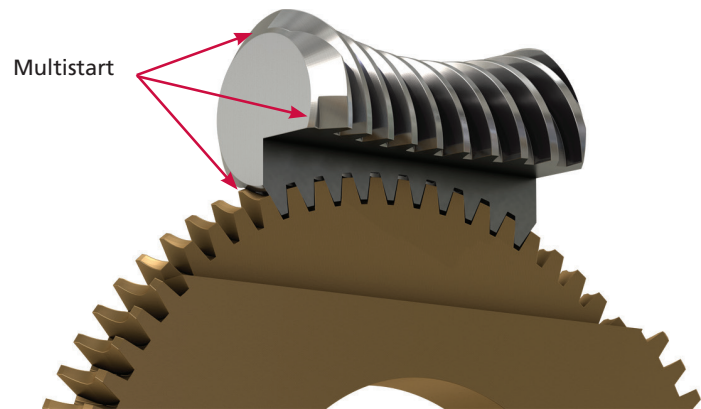
- 70% base efficiency
- Double O-ring sealing system
- 6 to 12+ teeth in contact versus 1.5 to 2.5
- Rugged ductile iron housings (carbon steel utilized above 100,000 ft-lb)
- Bronze gears

**SINGLE ENVELOPING
WORM GEAR**



**Standard gears
Maximum Tooth Contact of 2.96**

**DOUBLE ENVELOPING
WORM GEAR**



**MAXTORQUE
Tooth Contact of 6.6 to 10.7**

TYPICAL PROJECT SAVINGS

Project Scope			MAXTORQUE Solution		Direct Gas Estimated		Gas-Over-Oil Estimated	
Qty.	Valve Size	Class	Gear Cost Each	Total Gear Cost	Each	Total	Each	Total
9	30"	600#	\$5200	\$46,800	\$11,000	\$99,000	\$15,000	\$135,000
4	30"	600#	\$5200	\$20,800	\$11,000	\$44,000	\$15,000	\$60,000
12	30"	600#	\$5200	\$62,400	\$11,000	\$132,000	\$15,000	\$180,000
12	30"	600#	\$5200	\$62,400	\$11,000	\$132,000	\$15,000	\$180,000
4	36"	600#	\$7800	\$31,200	\$14,000	\$56,000	\$17,000	\$68,000
4	36"	600#	\$7800	\$31,200	\$14,000	\$56,000	\$17,000	\$68,000
Total: 45				\$254,800		\$519,000		\$691,000
Estimated Savings						\$264,200		\$436,200

WORK REDUCTION

Work Reduction*

Size	Class	Rated Torque (in-lb)	MAX Series Break Rim Pull (lb)	Break Rim Pull Conventional Technology	MAX Series Turns to Close	Turns to Close Conventional Technology	Turn Reduction
24"	600	144,520	76	64	39	190	151
30"	600	261,740	77	59	78	297	219
36"	600	383,040	75	61	118	297	179

* Assumes API standards on rim pull and handwheel diameter.

Reduction Rim Pull and Turns*

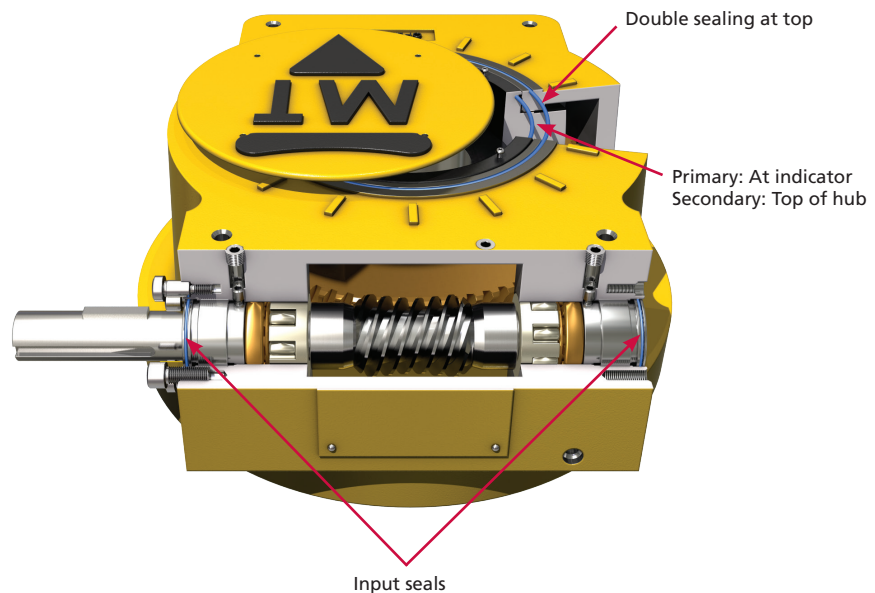
Size	Class	Rated Torque (in-lb)	MAX Series Break Rim Pull (lb)	Break Rim Pull Conventional Technology	MAX Series Turns to Close	Turns to Close Conventional Technology	Turn Reduction
24"	600	144,520	39	64	84	190	106
30"	600	261,740	40	59	151	297	146
36"	600	383,040	40	61	217	297	80

* Assumes API standards on handwheel diameter.

Sealing System Prevents Particulate and Water Ingress

Quality Manufacturing

- Rigorous PC/PLC cycle testing and qualification
- Direct-mount capability reduces cost and chance of stem misalignment/valve failure
- Designed to handle torques in excess of 1,000,000 ft-lb
- Made in Maine, USA



STANDARD SEAT DESIGN

In service since the early 1960s, the standard seat arrangement has proven to be of sound design. This arrangement is available in all CAMERON fully welded ball valves and includes all features and benefits indicated on the preceding pages.

Features and Benefits

Upstream Sealing

At low pressure, seat-to-ball contact is maintained by Belleville springs. At higher pressures, seat contact is reinforced by line pressure.

Automatic Internal Relief of Body Pressure

Relief of excess body cavity pressure is automatic, avoiding dangerous pressure buildup. Any pressure exceeding downstream line pressure by approximately 200 psi pushes the downstream seat away from the ball, allowing the pressure to relieve into the pipeline.

Rotating Seat Rings

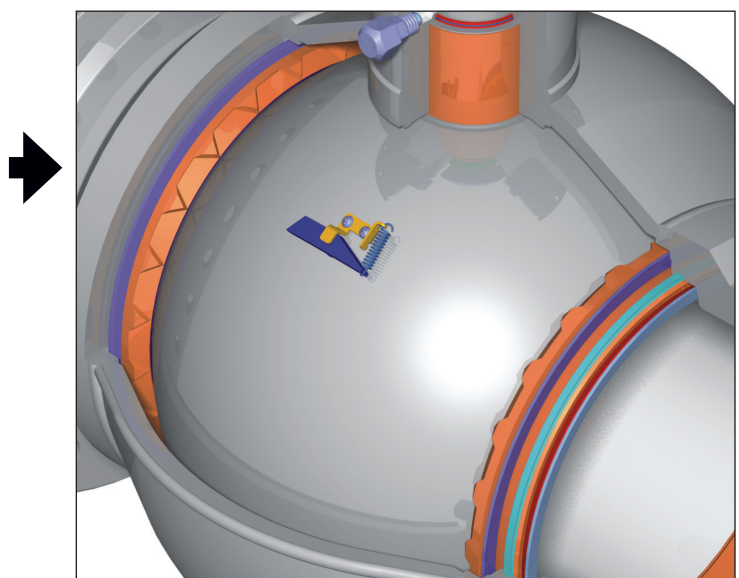
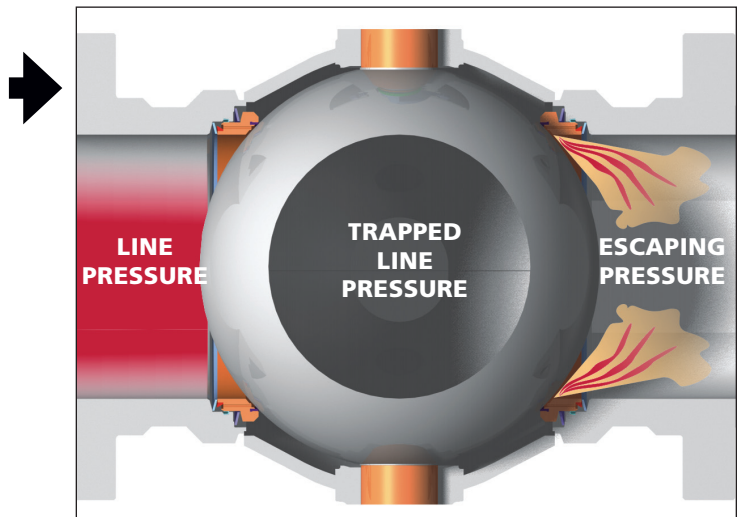
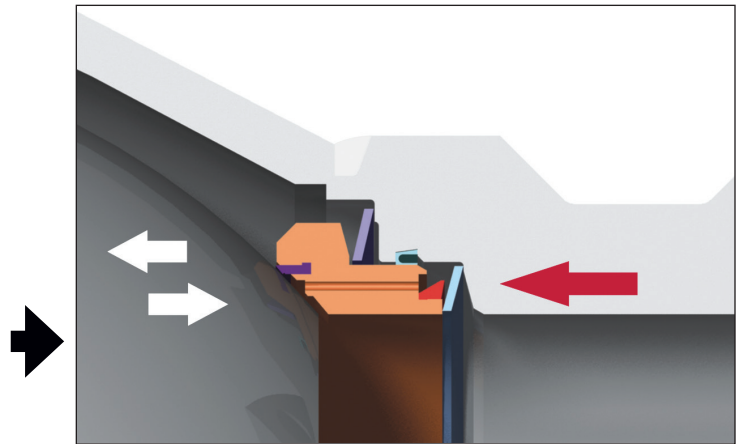
The exclusive rotating seat feature is standard in the CAMERON fully welded ball valve sizes 14" (350 mm) and larger. Both seats rotate 15 degrees each time the valve is closed, exposing a new pinch point and evenly distributing seat wear.

Distributed Seat Wear

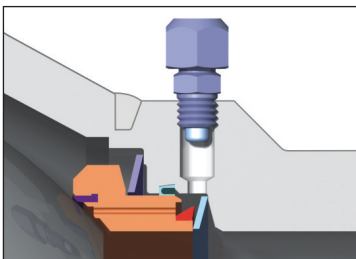
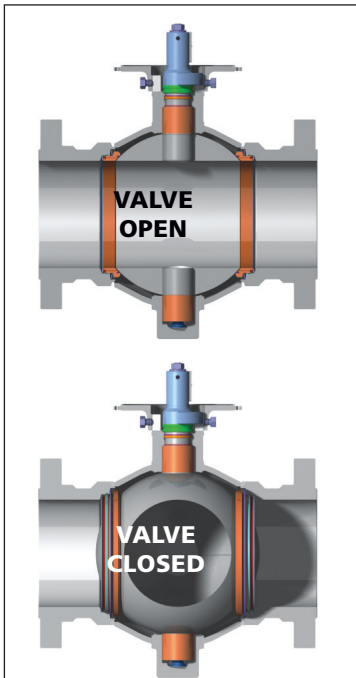
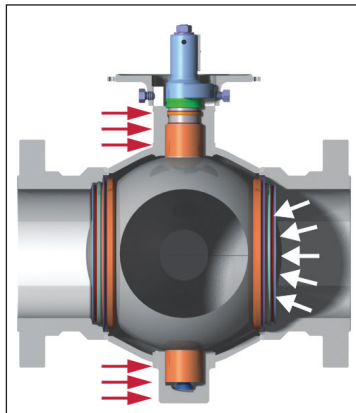
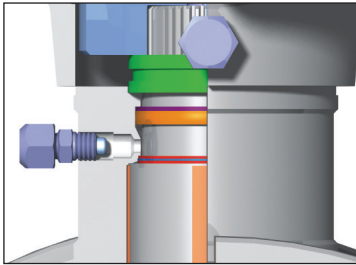
The pinch point is the area of the seat insert that experiences an increased velocity when the valve is seated closed and unseated open. This is where the seat seal experiences the most wear, and in most valves, where a leak path begins. By rotating the seat ring, the pinch point wear is distributed throughout the seat seal, providing an increase in seat life.

Prevents Buildup

In some services, a valve can experience harmful sediment buildup around the seat ring. This can cause the seat to stick and not seal properly. The CAMERON fully welded ball valves, with exclusive rotating seat, can handle these harsher services. As the seat rotates, it will prevent any buildup, or breaks up existing buildup.



FEATURES AND BENEFITS



Stem Seals

Delta seals and lip seals made of PTFE are incorporated in the upper stem area. PTFE is a low-friction, non-deteriorating material that is not subjected to rapid decompression explosion. Most valve sizes have a provision for sealant injection to establish a secondary seal.

Trunnion-supported Ball Allows Low-torque Operation

Regardless of size or pressure rating, every CAMERON fully welded ball valve is trunnion mounted. High-strength forged stems are located in PTFE impregnated stainless steels bearings for smooth operation. Trunnion mounted stems absorb the thrust from line pressure, preventing excess friction between the ball and seats, so even at full rated working pressure, operating torque stays low.

Double Block-and-bleed

Whether in the fully open or fully closed position, pressure on each side of the ball is blocked from the body cavity by the seat ring. The body cavity can then be bled down or drained through the body port. When you block-and-bleed a CAMERON fully welded ball valve, the following can be accomplished:

Test Valve Integrity

When the valve body is vented, the seat seal's integrity is verified. This test can be performed with the valve open or closed prior to facility maintenance. By verifying valve integrity, unforeseen valve leakage can be prevented.

Secondary Seat Seal

The sealant injection system provides a fast, simple way of restoring tight shutoff if any foreign object should damage the sealing surfaces. The injection system also can be used for routine flushing of the seat ring area in services where this may be required.

ALTERNATE SEAT DESIGN

The valve is available with double-acting and metal-to-metal seats to accommodate a variety of applications and customer preferences.

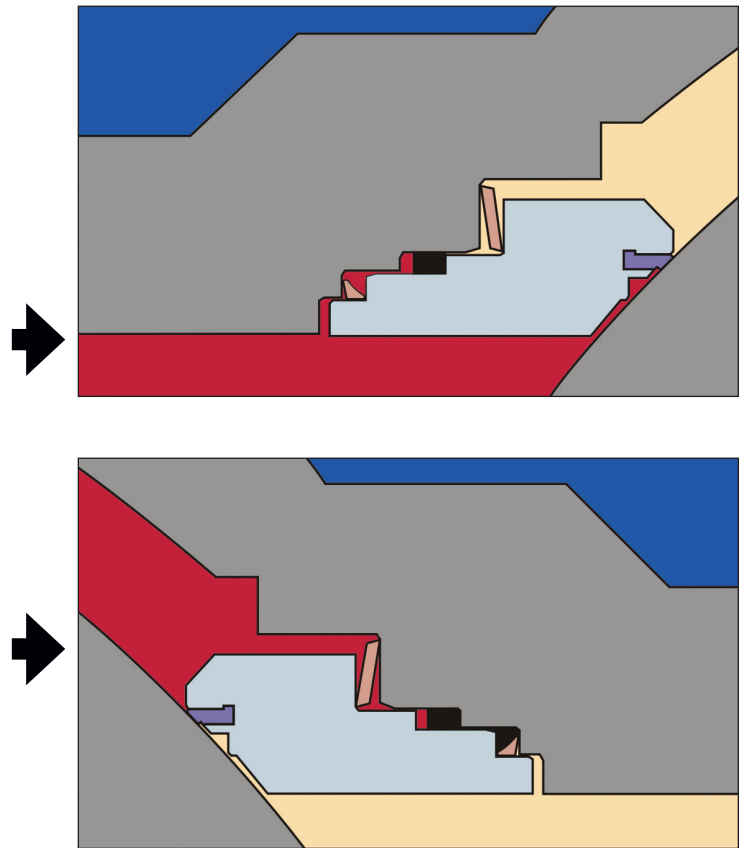
Double Acting

Conventional Upstream Sealing

With upstream pressure, the bi-directional body-to-seat seal is pushed toward the front sealing face of its retaining pocket. This creates an unbalanced pressure annulus between the body seal and the ID of the seat insert, forcing the seat insert against the ball.

Downstream Sealing

With downstream pressure, the bi-directional body-to-seat seal is pushed toward the back sealing face of its retaining pocket. This creates an unbalanced pressure annulus between the OD of the seat insert and the body seal diameter, also forcing the seat insert against the ball.



Standards and Specifications

Double Acting – T32

SIZES

- 8" to 48" (200 mm to 1200 mm)

PRESSURE CLASSES

- ASME/ANSI Class 150 to 900 (PN 20 to PN 150)

OPERATING TEMPERATURES

- -50° F to 250° F (-46° C to 121° C)

ADDITIONAL FEATURES AND BENEFITS

The CAMERON T31MAX valve series offers the established features and benefits of the T31 valve with the addition of leading-edge Drive Train technology. The MAX valve series offers a product that adds power steering to one of the leading valves in the market.

In-line Replaceable Stem Seals

In the unlikely event of a stem seal needing replacement, this can be accomplished safely with the valve in service.

With the body cavity vented, all line pressure to the stem area also is vented. (Please contact your sales representative to obtain maintenance procedures.)

Safeguard Downstream Work

With the valve closed and the vent fitting open, the possibility of the line media reaching a work area is removed.

Fire-tested for Safety

CAMERON fully welded ball valves can be supplied to API 6FA, API 607 and ISO 10497 standards. Fire-test programs are ongoing. If industry standards change or customer requirements vary from above, please contact your sales representative.

HSE

CAMERON fully welded ball valves reduce the work required to operate the valves by up to 75% fewer turns. Less rim pull means less opportunity for injury.

Standards and Specifications

Sizes

- 2" to 56" (50 mm to 1400 mm) as full bore, reduced bore and Venturi bore

Pressure Classes

- ASME/ANSI Class 150 to 2500 (PN 20 to PN 420), API 2000 to 10,000 psi

Operating Temperatures

- From -50° F to 375° F (-46° C to 190° C)

End Connections

- Flanged, weld and weld-by-flange, etc.

Body Styles

- Fully welded

Standard Material

- Forged carbon steel

Optional Materials

- Seat/seal trim options include: regular, corrosion-resistant and sour (NACE MR0175)

CAMSERV™ Services for Valves and Actuation

WE BUILD IT. WE BACK IT.



Global Network and Local Support

Cameron is well-positioned to deliver total aftermarket support, quickly and efficiently, with unmatched OEM expertise. Our highly skilled engineers and technicians are available around the clock, seven days a week to respond to customer queries, troubleshoot problems and offer reliable solutions.

Easily Accessible Parts and Spare Valves

- OEM spare valves, actuators and parts (including non-Cameron brands)
- Handling, storage, packaging and delivery
- Dedicated stocking program

Comprehensive Aftermarket Services Portfolio

- Parts and spare valves
- Repair
- Field services
- Preventative maintenance
- Equipment testing and diagnostics
- Remanufacturing
- Asset preservation
- Customer property management
- Training and recertification services
- Warranty

Customized Total Valve CareSM (TVC) Programs

Customized asset management plans that optimize uptime, availability and dedicated services.

- Engineering consultancy
- Site management
- Flange management
- Startup and commissioning
- Spare parts and asset management
- Operational support



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Learn more about CAMERON T31MAX at:

www.c-a-m.com/valves



HSE Policy Statement

At Cameron, we are committed ethically, financially and personally to a working environment where no one gets hurt and nothing gets harmed.