

# T-Series

Reduced torque. Absolute isolation.



**MOGAS**<sup>®</sup>  
A Flowserve Company

***T-Series trunnion isolation valves are ideal for the following applications:***

**Oil & Gas**

Drains and secondary isolation applications for:

- Heater vessels
- Steam applications
- Vents
- High pressure air
- Quench and flash vessels
- High cycle applications

**Power Generation**

- Boiler feed water
- Fuel gas lines

**Chemical / Petrochemical**

- Hydrocarbon
- Vapor products
- Slurry
- Liquid
- Large diameter applications
- Amines, MDEA

**Refining**

- Oxygen, hydrogen, nitrogen
- Cold, high pressure separation
- Cutting water pump isolation
- Reactor overhead line
- Amines

**Autoclave**

- Steam/recovery plant

**Slurry Transportation**

- By-pass lines
- Underground dewatering
- Seawater pipelines
- Industrial waste water

# MOGAS Quality in a Trunnion

## Reduced Torque. Absolute Isolation.

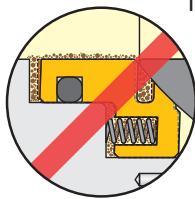
For almost half a century MOGAS built its reputation as a pre-eminent manufacturer of severe service ball valves. The T-Series trunnion valve continues that tradition using the same proven process cycle: valve expertise, service support, industry knowledge and a desire to innovate. Today, we are the dominant severe service technology company, and provide world-renowned services and the best severe service, application-specific products.



### Safety

Safety isn't expensive. It's priceless. And it's built into all MOGAS products. The T-Series trunnion ball valves provide a high level of integrity (SIL 3) for tight shutoff. Safety features include a unique upper bonnet design that minimizes fugitive emissions, and a blowout-proof anti-static stem that prevents sparking from static electricity buildup.

### Reliability and Durability



In applications with even low concentration of silt, ash, dust or rust, trunnion designs that use coil springs accumulate these fine particles in the spring pocket. This results in little or no free motion in the spring area, which can cause deflection of the seat and seizure of valve. Preferentially, the MOGAS T-Series trunnion design uses durable pressure-energized disc springs that provide constant pressure evenly distributed around the seat. It also incorporates a plug trunnion, which is simpler to maintain than the block trunnion design, and eliminates leakage associated with typical plate-supported trunnions. **Design features on pages 4–5.**

### Lowest Cost of Ownership

Because MOGAS valves are more durable and have a long life cycle, they cost less over time. T-Series valves offer many features that contribute to a longer lasting valve, such as a wider ball/seat sealing surface, compared to competitor seat faces. This means reliable isolation and less downtime from unplanned shutdowns.

### Service

When you select MOGAS products, service is a big part of what comes with them. The MOGAS commitment to service means more than basic maintenance. It also means timely access to our knowledgeable and experienced team of experts, anytime, anywhere in the world. And when our team becomes part of your team, you can trust that we will do everything we can to come through for you. **See page 10 for service details.**

### Warranty

Every MOGAS valve comes with a statistically driven, application-specific PERFORMANCE GUARANTEE...*plus a Lifetime Warranty on materials and workmanship*. Contact us and ask us how we can guarantee the performance of our valve in your application.



*This 36-inch T-Series trunnion valve replaced a valve that was under constant repair in a mining operation. See case study on page 9.*

# Features and Benefits

## Metal-seated or Soft-seated Designs

### 1 Independent actuator mounting pad attached to body

- Precision machined to ensure precise stem alignment
- Body absorbs torsional load from actuator operation transmitted through brackets

### 2 Simple disc spring design

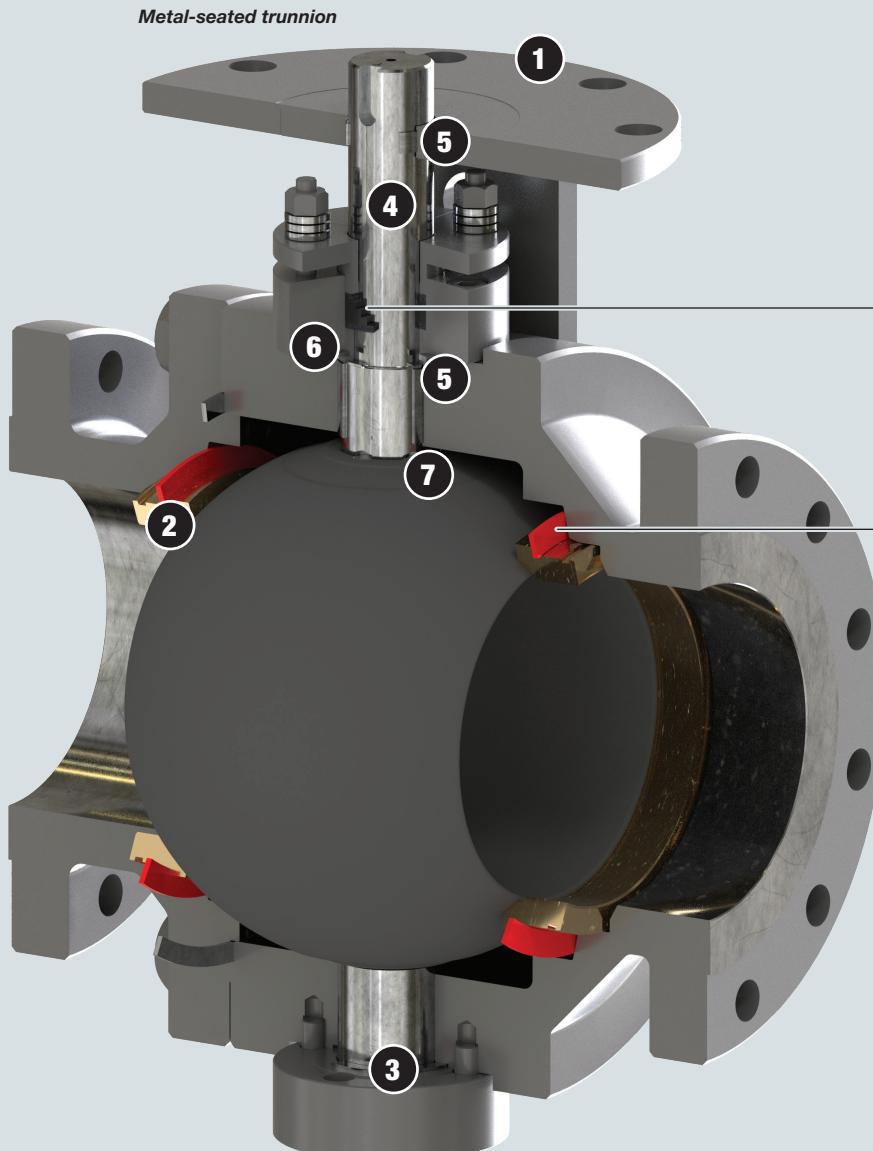
- Durable design compared to multiple coil springs
- Particle tolerant
- Consistent support around seat circumference

### 3 Plug / stem lower trunnion design

- Enhances serviceability
- Eliminates complexity and leakage associated with typical plate-supported trunnions

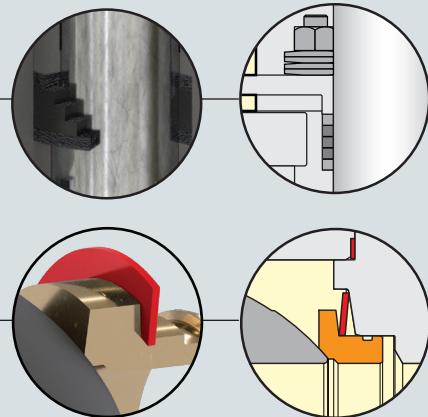
### 4 Blowout-proof anti-static stem

- Unique upper bonnet design minimizes fugitive emissions
- Anti-static design prevents sparking from static electricity buildup



*Metal-seated trunnion*

*Below: Live loaded graphite stem packing*



*Above: Durable pressure-energized disc springs provide constant pressure evenly distributed around the seat.*

## 5 Independent upper and lower stem sleeve bearings

- Provides full stem support
- Reduces lateral load
- Prevents galling
- Extends packing life

## 6 Inner stem seal technology

- Reduces friction between anti-blowout shoulder and upper bonnet
- Prevents solids from migrating to soft stem packing, extending packing life

## 7 Low-hysteresis drive design

- Precision tolerances ensure accurate positional control
- Handles rapid cycling

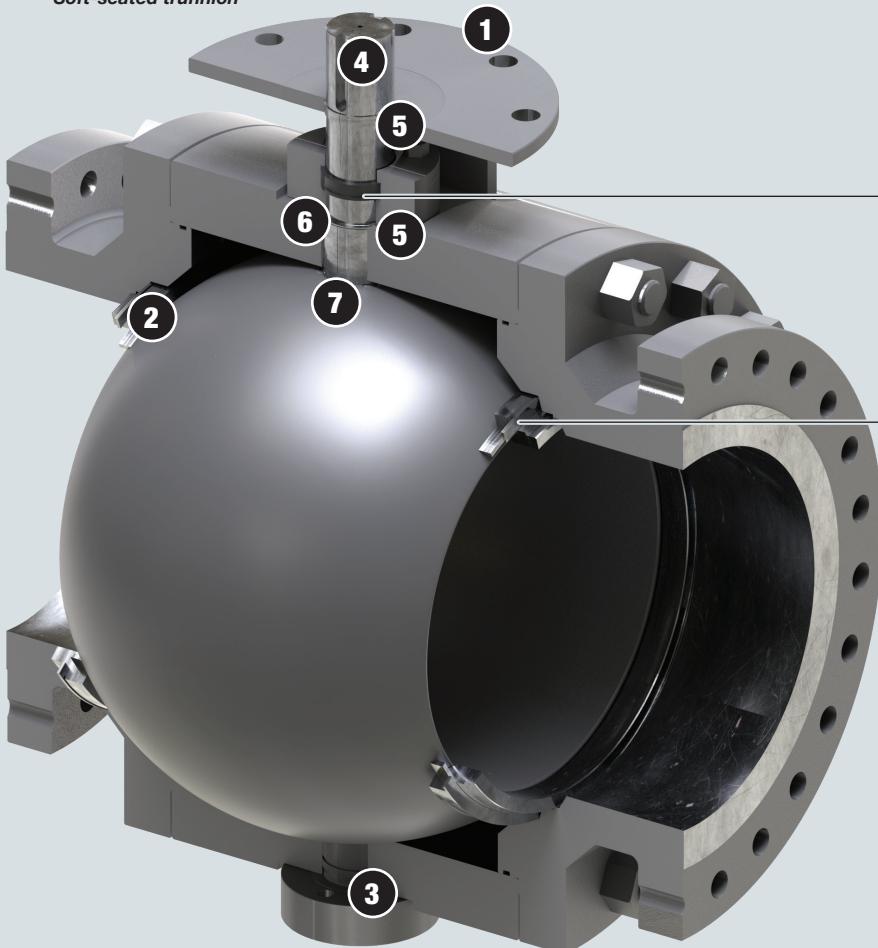
## Design

- 3 to 60 inch (80 to 1500 DN)
- Bi-directional
- API 6D or ASME B16.34
- Suitable temperature range: -50 to 400° F (-46 to 204° C)
- Suitable for high-cycle services

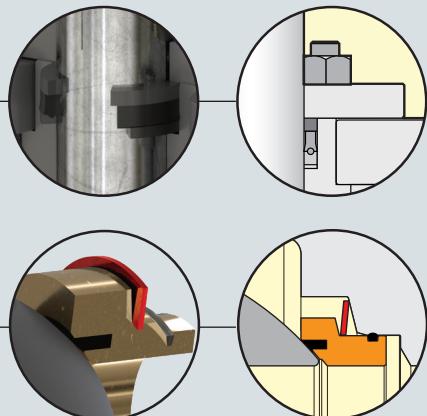
## Options

- ASME 150 to 2500 Class (not all size / pressure class combinations available)
- Metal seated or soft seated
- Fire safe design
- Cast or forged body; 2- or 3-piece
- Process and customer specific body and trim materials
- Process and customer specific coatings
- Adjustable or non-adjustable stem packing
- Spiral-wound body gasket or O-ring body joint seals

*Soft-seated trunnion*



*Below: PolyPak® stem packing*



*Above: Durable pressure-energized disc springs provide constant pressure evenly distributed around the seat.*

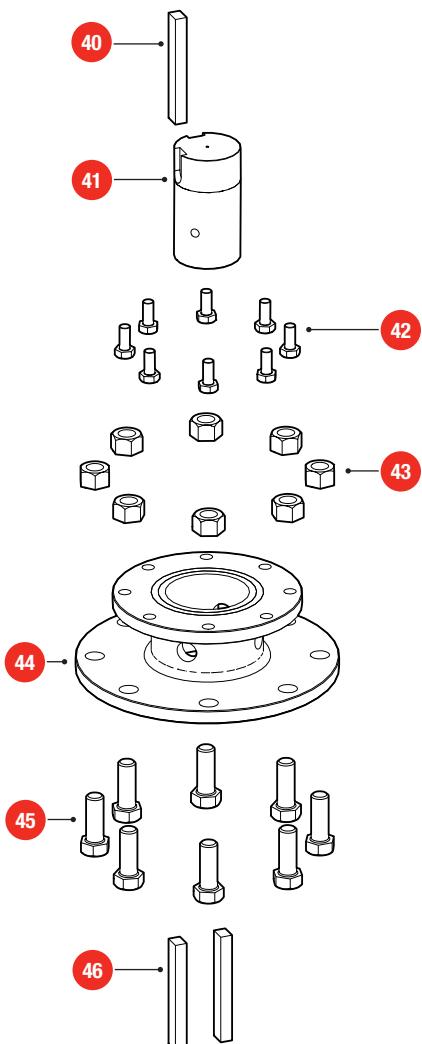
# Parts List

## Metal-seated

### Adaptor Part Reference Numbers

Item	Description
40	Actuator Key
41	Stem Adaptor
42	Actuator Mounting Bolts
43	Actuator Mounting Flange Nut
44	Actuator Mounting Flange
45	Actuator Mounting Flange Bolts
46	Stem Adaptor Keys

Actuator adaptation kit may vary depending on the actuator.



### Valve Part Reference Numbers

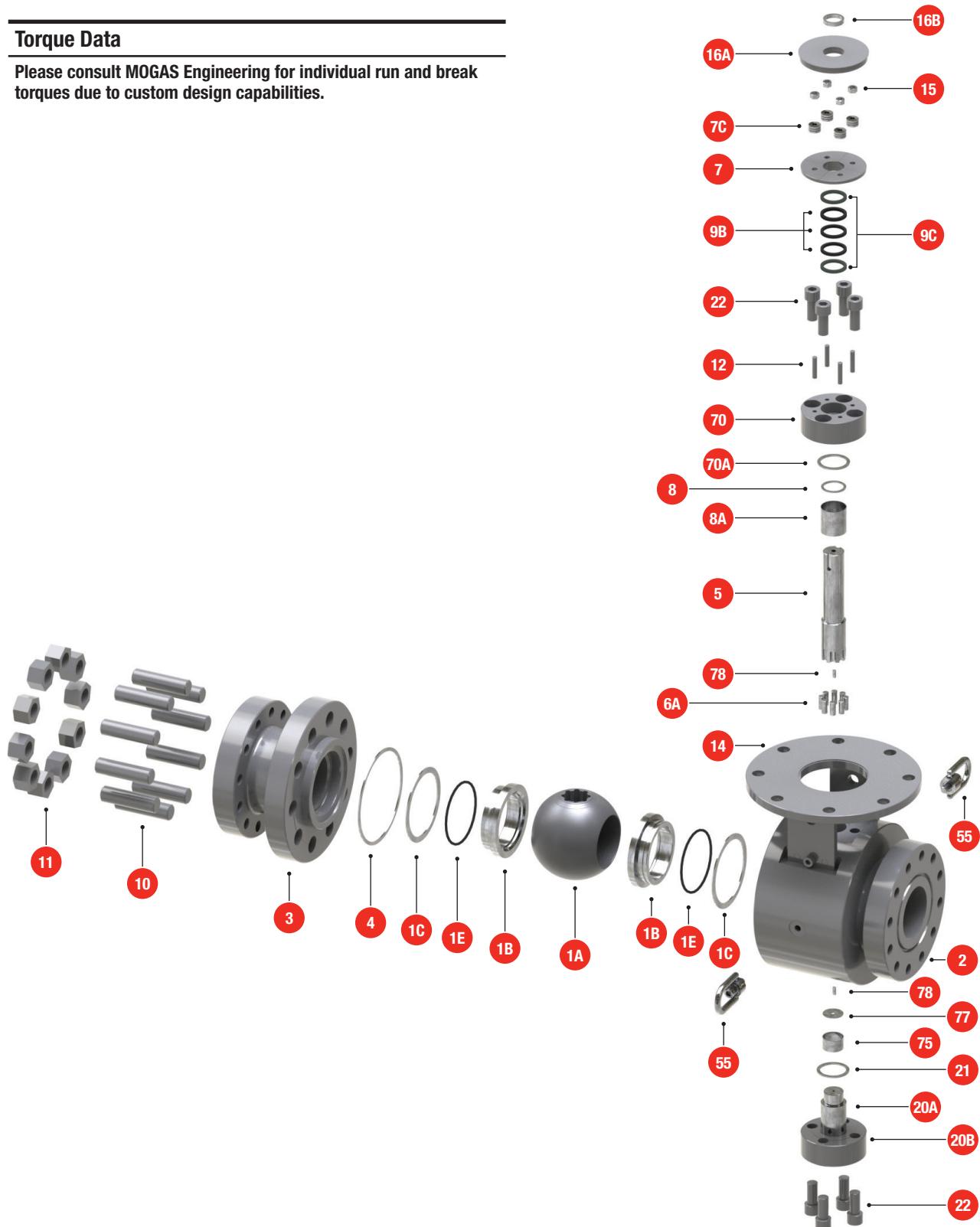
Item	Description
1A	Ball
1B	Seat Ring
1C	Disc Spring
1D	Seat Insert for soft-seated valves
1E	Seat O-Ring
1H	Backup Ring for ASME Class 900 and up
2	Body
3	End Connection 2-piece design (qty 1); 3-piece design (qty 2)
4	Body / End Connect Seal for spiral wound gasket
4A	Backup Ring for ASME Class 900 and up
5	Stem
6A	Drive Pins
7	Gland Plate / Flange
7C	Live Load Springs
8	Stem Thrust Bearing
8A	Stem Sleeve Bearing
9A	Stem Packing Backup Ring Soft Seat only
9B	Stem Packing Soft Seat: PolyPak®
9C	Stem Packing Anti-extrusion Ring Soft Seat: PIP ring
10	Body Stud
11	Body Nut
12	Gland Stud
14	Mounting Flange
15	Gland Nut
16A	Mounting Flange Bushing
16B	Mounting Flange Sleeve Bearing
20A	Plug Trunnion
20B	Trunnion Plate
21	Trunnion Seal O-ring or spiral wound gasket
22	Bonnet & Trunnion Capscrews
55	Hoist Ring
70	Bonnet
70A	Bonnet Seal O-ring or spiral wound gasket
75	Trunnion Sleeve Bearing
77	Trunnion Thrust Bearing
78	Anti-Static Device

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## Torque Data

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Please consult MOGAS Engineering for individual run and break torques due to custom design capabilities.



# Temperature/Pressure Ratings

## ASME B16.34

### Temperature / Pressure – Standard Class Ratings

Class	Material	Temperature, °F				Temperature, °C			
		-20 to 100	200	300	400				
ASME 150	A105	285	260	230	200	19.6	17.7	15.8	13.8
	A182-F316	275	235	215	195	19.0	16.2	14.8	13.7
	A182-F51	290	260	230	200	20.0	17.7	15.8	13.8
	B564 Gr N06600	290	260	230	200	20.0	17.7	15.8	13.8
ASME 300	A105	740	680	655	635	51.1	46.6	45.1	43.8
	A182-F316	720	620	560	515	49.6	42.2	38.5	35.7
	A182-F51	750	745	665	615	51.7	50.7	45.9	42.7
	B564 Gr N06600	750	750	730	705	51.7	51.5	50.3	48.6
ASME 600	A105	1480	1360	1310	1265	102.1	93.2	90.2	87.6
	A182-F316	1440	1240	1120	1025	99.3	84.4	77.0	71.3
	A182-F51	1500	1490	1335	1230	103.4	101.3	91.9	85.3
	B564 Gr N06600	1500	1500	1455	1410	103.4	103.0	100.3	97.2
ASME 900	A105	2220	2035	1965	1900	153.2	139.8	135.2	131.4
	A182-F316	2160	1860	1680	1540	148.9	126.6	115.5	107.0
	A182-F51	2250	2230	2000	1845	155.1	152.0	137.8	128.0
	B564 Gr N06600	2250	2250	2185	2115	155.1	154.6	150.6	145.8
ASME 1500	A105	3705	3395	3270	3170	255.3	233.0	225.4	219.0
	A182-F316	3600	3095	2795	2570	248.2	211.0	192.5	178.3
	A182-F51	3750	3720	3335	3070	258.6	253.3	229.6	213.3
	B564 Gr N06600	3750	3750	3640	3530	258.6	257.6	250.8	243.4
ASME 2500	A105	6170	5655	5450	5280	425.5	388.3	375.6	365.0
	A182-F316	6000	5160	4660	4280	413.7	351.6	320.8	297.2
	A182-F51	6250	6200	5560	5120	430.9	422.2	382.7	355.4
	B564 Gr N06600	6250	6250	6070	5880	430.9	429.4	418.2	405.4

### Industry Codes and Standards

The following partial list of industry codes and standards are referenced in the manufacturing of MOGAS valves: API, ASTM, ATEX, CRN, DIN, FCI, GOST-R, ISA, ISO, NACE, NBBI, PED, SIL, TA-Luft, TUV. For a complete list, download our Design Conformance Standards from our Media Centre at [mogas.com](http://mogas.com).

ASME	Title
B16.5	Steel Pipe Flanges & Flanged Fittings
B16.10	Face to Face & End to End Dimensions of Valves
B16.11	Forged Fittings Socket Welding and Threaded
B16.25	Butt-welding Ends
B16.34	Valve – Flanged, Threaded & Welded End
FCI 70-2	Control Valve Seat Leakage
PED	Title
2014/68/EU	Pressure Equipment Directive

MSS	Title
SP-25	Standard Marking System for Valves, Flanges & Unions
SP-55	Quality Standard for Steel Castings for Valves, Flanges & Fittings
SP-61	Pressure Testing of Steel Valves
API	Title
598	Valve Inspection & Test
607 / 6FA	Fire Test for Quarter Turn Valves
6D	Specification for Pipeline Valves

British Standard	Title
BS 6755	Testing of Valves Part 1 – Specification for Production Pressure Testing Requirements Part 2 – Specification for Fire Type Testing Requirements
NACE	Title
MR-0103	Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments

# Case Study

## Seawater Transport

Not all end users understand what defines a 'severe service' valve. And not all valve companies have the experience to truly understand the severity of an end user's process.

### Challenge

A South American mining operation was commissioned, with commercial production to start the following year. The mine operated with the use of seawater transported through a pipeline from the cooling systems of a power plant 90 miles away. Fouling occurs in seawater and damages equipment through:

- crystallisation (from calcium carbonate, calcium sulphate and other salts)
- corrosion from oxidation
- biological growths from bacteria and organisms
- the settling of particulates, such as silt, mud and sand

These fouling factors, coupled with galvanic corrosion and debris-packed coil springs behind the seat, compromised the seal of the thermoplastic polymer seat. The valve began to leak past the O-ring at the end connection and body. Because the valve was located near the sea, corrosion to all external ferrous materials escalated.

Three repair attempts at significant costs were made by the original valve manufacturer to replace the sealing components with metal seats. Each repair survived for one day, and the OEM's customer support waned after each attempt.

### Solution

Ultimately, the solution came from industry and field knowledge, valve expertise, insanely customer-centric service and innovative valve designs. MOGAS design standards are ideal for corrosive environments, and has experience with seawater applications. Replacement valves were provided with a nickel-based super alloy inlays on all sealing surfaces and through the bore. These valves also used a metal-seated ball valve (not soft seating), supported by a live-loaded disc spring to maintain a tight seal. All external components were painted with an improved paint specification above industry standards to insulate from the salty humidity.

### Results

The single biggest reason the end user chose MOGAS was because of their proven customer service. Recognized industry-wide as experts in severe service technology, MOGAS service personnel local to the area were quickly on site to identify the problem and offer a lasting solution.

### Conditions

<b>Application:</b>	Seawater transport
<b>Temperature:</b>	85° F (30° C)
<b>Pressure:</b>	2,220 psig (153 bar g)
<b>Valve Model:</b>	T-Series (Trunnion)
<b>Valve Size:</b>	36 inch (900 dn)
<b>No. of Valves:</b>	1



*Material loss in the seat pocket was caused by galvanic corrosion, allowing leakage around the valve seats.*



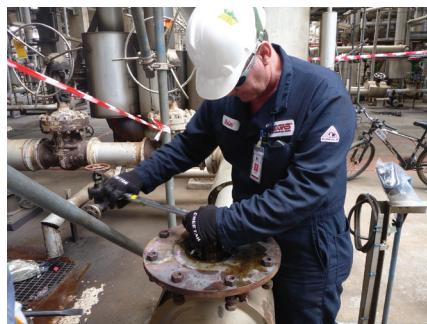
*Fine silt packed the coiled spring pockets preventing free motion and an effective seal.*

# Service

## Global Capabilities



**We provide exceptional service for unique locations—everyday, everywhere.**



MOGAS' proven process includes industry experts, innovative engineers, tenured manufacturing personnel and a support team whose motto is 'Anytime. Anywhere'.

### Service Excellence in Action

When you select MOGAS products, service is a big part of what comes with them. The MOGAS commitment to service means more than basic repairs. It also means timely access to our knowledgeable and experienced team of experts—anytime, anywhere in the world. And when our team becomes part of your team, you can trust that we will do everything we can to come through for you.

When you have a problem, our technical advisors get to the root of it. They will look at your entire application to accurately identify and solve the issue. Using a comprehensive approach helps you improve equipment reliability and operational efficiency, as well as reduce costs. Our core services include:

#### Project Support

- Installation, startup and commissioning
- Shutdown planning and implementation
- Procurement and contract management

#### Repair, Refurbish & Customization

- 24-hour emergency response
- Troubleshooting
- Valve performance analysis
- 3D finite analysis
- High pressure testing
- Online repair documentation

#### Preventive Maintenance

- Complete system inspection
- Routine maintenance, valve repacking
- Valve asset management



# Severe Service

## The MOGAS Definition

- Extreme temperatures
- High pressures
- Abrasive particulates
- Acidic products
- Heavy solids build-up
- Critical plant safety
- Large pressure differentials
- Velocity control
- Noise control

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