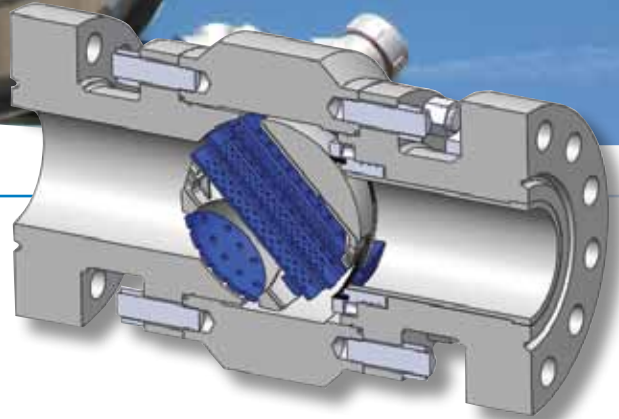
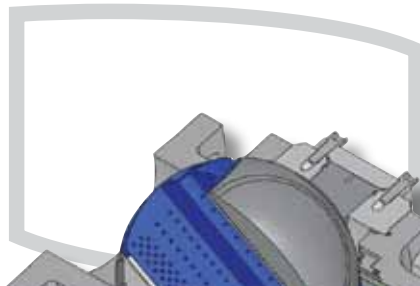




**QTCV-T4 Quiet Trim Control Valve
Superior Performance Ball Control Valves
for Natural Gas Applications**







Optimize Your System's Performance

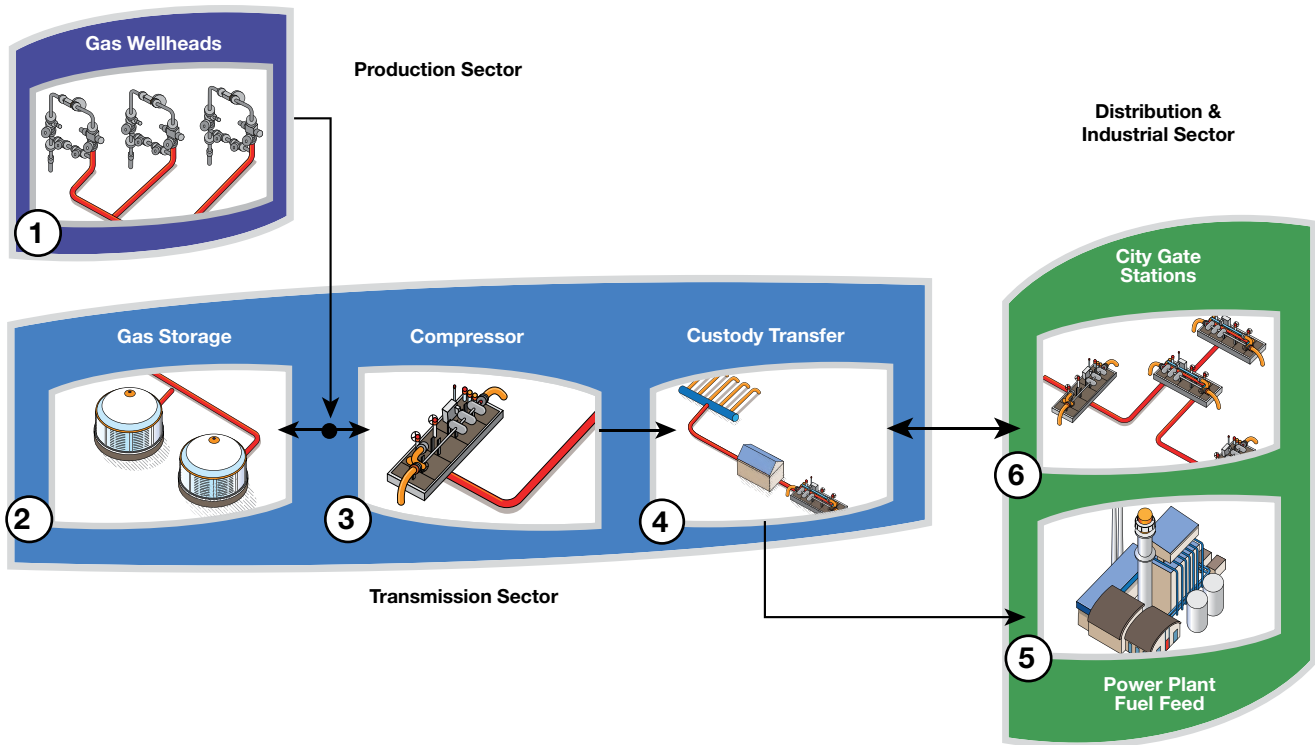
Today's natural gas systems are pushing the limits to ensure maximum capacity and operation efficiency. As a result of trying to meet increasing market demands, many regulator station designs are exceeding the performance envelope of other control valve manufacturers. When it comes to high demand natural gas regulation requirements, the rugged Becker QTCV-T4 Quiet Trim Control Valve series offers a pedigree of reliability that will optimize your system's performance.

The QTCV-T4 is the ideal solution for demanding applications that require aggressive noise attenuation, high pressure differentials, large mass flow volumes and extreme precision. In addition, the QTCV-T4 can handle a variety of media from sweet natural gas to multiphase service to corrosive sour gas.

The QTCV-T4 provides unmatched benefits including:

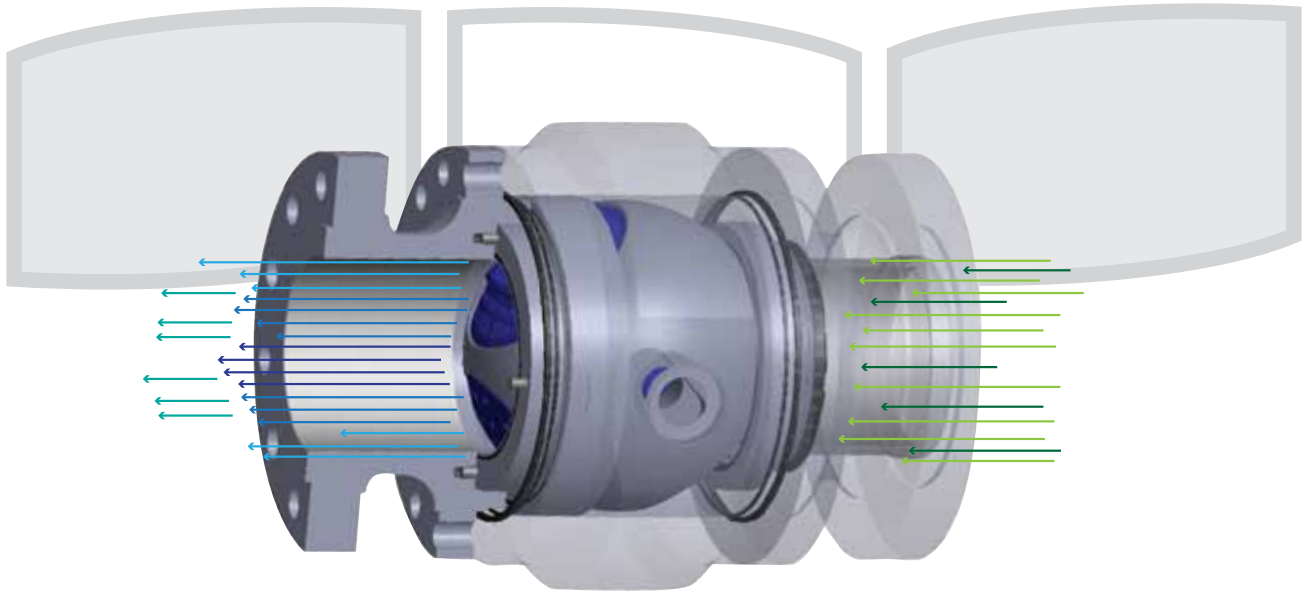
- Decreased Station Footprint
- Improved System Operating Efficiency
- Increased Reliability and Life Span
- Reduction of Manual Operation and Maintenance
- Significant Decrease in Fugitive Emissions
- Simpler and Safer Operating Conditions for Field Personal

Providing Exceptional Performance, All Around



From production to distribution, natural gas requirements vary per application. The QTCV-T4 addresses an extensive range of operating requirements through its patented T-Ball® design.

Item	Application	Sector	Control	Performance Features Required					
				Aggressive Noise Attenuation	Dirt & Debris Resistance	High Capacity	High Pressure Differential	Wide Flow Range (Turndown)	Bi-Directional Flow
1	Gas Production	Production	PCV	•	•	•	•	•	
2	Gas Storage	Transmission	FCV, PCV	•	•	•	•	•	•
3	Compressor Anti-Surge	Transmission	Surge Control	•	•	•	•	•	
4	Custody Transfer	Transmission	FCV, PCV	•		•	•	•	•
5	City Gate Station	Distribution	FCV, PCV	•		•	•	•	•
6	Power Plant Fuel Gas	Industrial	FCV, PCV	•		•	•	•	•



Superior Flow Capacity

Size for size, the T-Ball® offers superior flow capacity compared to cage style valves. The QTCV-T4 features a control trim design that permits less restriction and greatest capacity when demand requires.

Aggressive Noise Attenuation

The QTCV-T4 provides the maximum noise attenuation of the T-Ball® range. The multi-stage trim design dissipates kinetic energy by forcing the fluid through a series of pressure reducing holes and angles. This frictional path decreases velocity and vibration – providing up to 25 dBA of noise attenuation.

Wide Controllability

Natural gas systems often call for control of a wide range of flow rates. QTCV-T4 rotary design offers high turndown ratio (200:1) for excellent control range. A wide flow range can be controlled by a single run where cage style valves require multiple runs and valves.

Minimize Emissions

The rotary quarter turn design of a T-Ball® provides quick, easy and low impact automation. The constant linear motion forces associated with globe and axial valves can cause damage to stem packing, releasing fugitive emissions. The quarter turn design incorporates pressure seal seating technology that does not require excessive forces to ensure flow shutoff.

Compact Size

The high capacity T-Ball® design allows for the valve to be one or two sizes smaller than cage style valves. Not only does this reduce the station footprint, but less material and resources are required to support the valve.

Bi-Directional Control

T-Ball® provides standard bi-directional flow capability without sacrificing control accuracy. This can reduce a system's assets up to 50% – cage style valves may require a valve and supporting materials for each direction.

High Pressure Differential

Through an aggressive multi-stage pressure let down design, the QTCV-T4 is capable of handling pressure differentials over 1500 psid (104 bar). For extremely severe conditions, Tungsten Carbide overlay can be applied to provide further erosion resistance.

Customized Configurations

Applications vary in service requirements. The T-Ball® can be configured in an array of exotic materials, ANSI class ratings, and end connections. Material selection is based on fluid composition and process conditions to maximize performance and service life. For the most aggressive applications, metal-to-metal seating is available.

Natural Gas applications vary in requirements, the QTCV-T4 series includes a selection of pressure ratings, end connections and trim and body materials.

Product Range	
Size	NPS 4 to NPS 20 100 mm to 500 mm
Pressure Ratings	ANSI Class 150 to 2500
End Connections	RFFE, RTJ, Weld End
Temperature Range	-60° C to 176° C -76° F to 349° F

Performance	
Turndown	200:1
Noise Attenuation	up to 25 dBA
Minimum Control Limit	½ of Cv
Maximum Control Limit	85% of Cv
ANSI Shut Off Rating	Soft Seat - Tested up to Class VI Metal Seat - Tested up to Class V

1. Consult engineering for additional product configurations.

Materials of Construction	
Body	ASTM A350 LF2 CS* ASTM A350 LF3 CS ASTM A350 LF6 CS Duplex Inconel 625 316 SS 410 SS 17-4PH
Ball and Seat Ring Material	ENP ASTM A350 LF2 CS* AISI 4140 Duplex Inconel 625 Tungsten Carbide Overlay 316 SS 17-4PH
Throttling Trim	17-PH SS* Duplex
Stem Material	AISI 4140* 17-4PH SS 316 SS

* Indicates standard material construction, alternative material selected on process conditions.

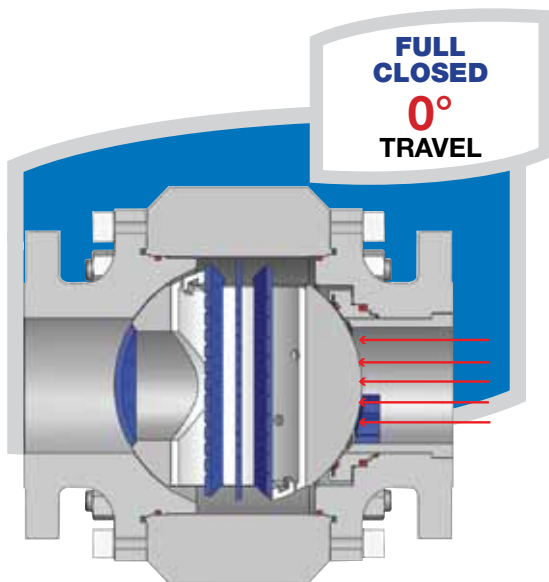
1. Additional and alternative material available upon request.

Our products are engineered, built and tested in accordance with the industry's international standards to ensure the quality of our products.

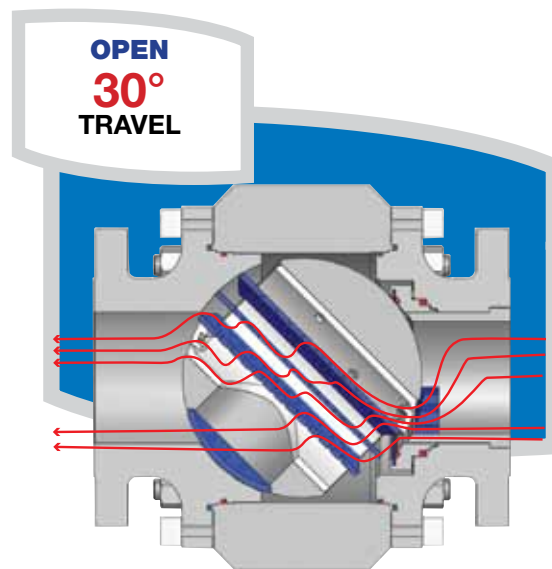
Standard	Description
ASME B16.5	Valve Flange Dimensions
ASME B16.10	Valve Face-to-Face/End-to-End Dimensions
ASME B16.25	Valve Butt Weld Ends
ASME B16.34	Valve Design, Test & Performance
API6D	Specification for Pipeline Valves
API 6FA*	Specification for Fire Test for Valves
API 607*	Fire Test for Soft-Seated Quarter-turn Valves
CRN*	Canadian Registration Number
NACE MR0175	Petroleum and Natural Gas Industries - Materials for use in H ₂ S containing environments in oil and gas production
ATEX Dir. 94/9/EC*	Equipment for use in Explosive Atmospheres
PED 27/23/EC*	EU Pressure Equipment Directive
GOST-R*	Russian Gosstandart Certificate
RTN*	Rostekhnadzor

*Available upon request.

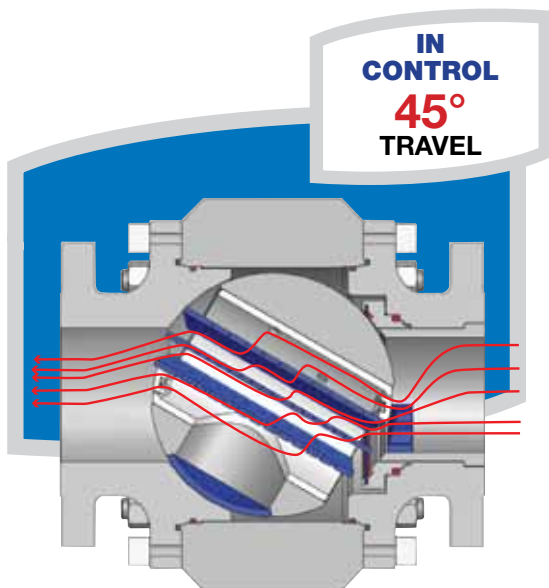
QTCV-T4 Demonstrates a Superior Control Range



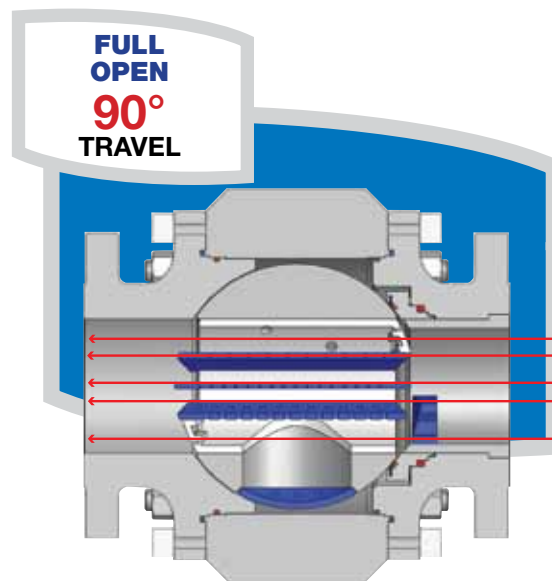
A. Double Piston Effect Seat ensures bi-directional flow shutoff up to ANSI Class VI in a single seat design



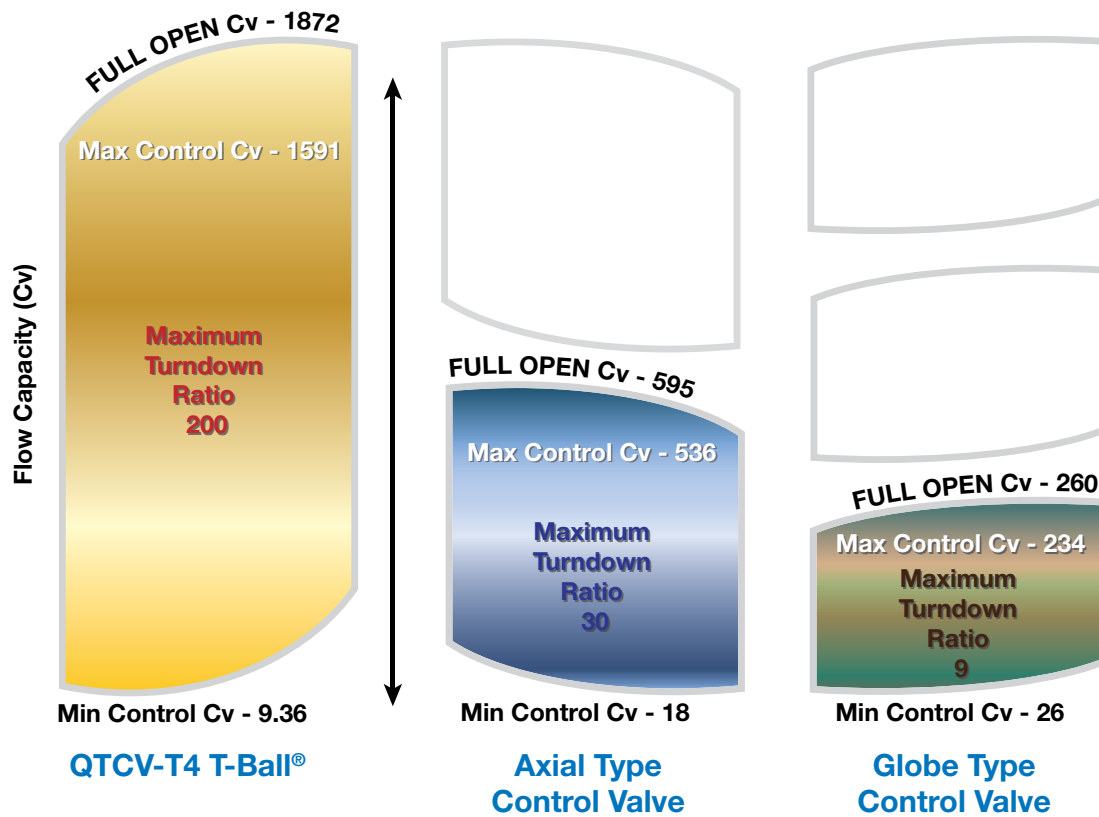
B. Wide rangeability provides excellent control during low flow operating conditions



C. Maximum noise attenuation is achieved as the noise attenuator plates are engaged during higher flow rates.



D. Superior capacity is crucial when upstream pressure diminishes and flow rates significantly increase, requiring minimum pressure differential



1. To achieve the same capacity as a QTCV-T4, approximately two axial style valves are required or three globe style valves

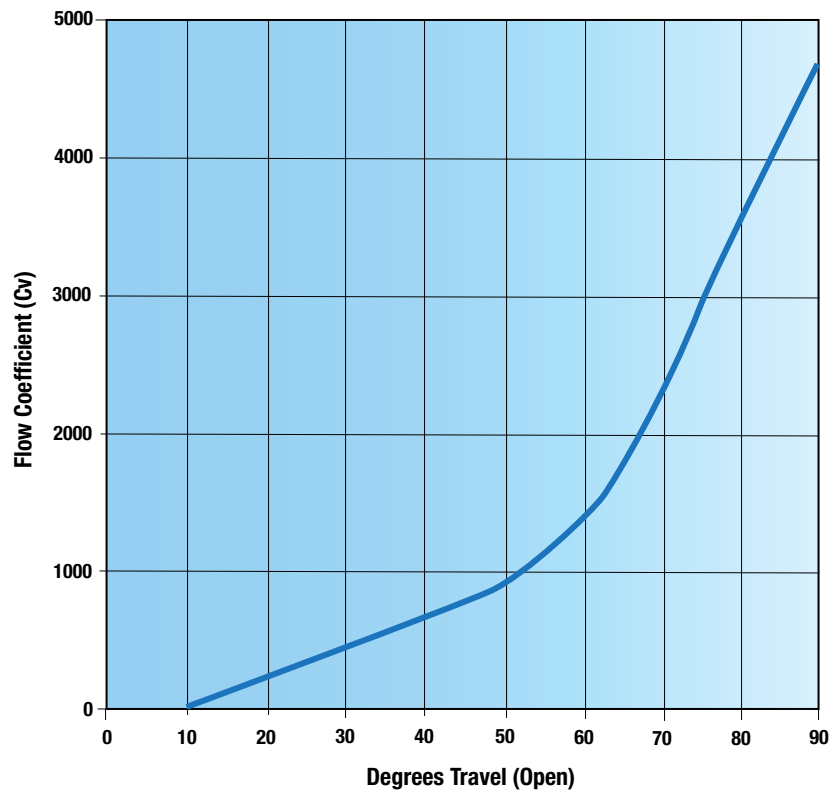
Fundamentally, the initial step in control valve selection is calculating the required flow capacity. For globe and axial style valves capacity can be an immediate limitation, resulting in the need to increase size—driving up overall project costs. Size for size, a QTCV-T4 offers the greatest capacity and maximized economy. Its high capacity design offers several unparalleled benefits:

- Less Infrastructure to Maintain
- Excess Capacity for Additional Noise Attenuation Technologies
- Smaller Valve and Piping
- Preparedness for Market Changes

Valve Size	Min	QTCV-T4 Valve Position (Degrees Open)									
		9 °	10 °	20 °	30 °	40 °	50 °	60 °	70 °	80 °	90 °
4" (100)		1.5	1.8	12.9	26.7	42.8	59.0	90	142	238	300
6" (150)		3.4	4.0	29.0	60.0	96.0	132	202	318	544	673
8" (200)		5.8	6.9	49.8	103	165	226	347	547	935	1157
10" (250)		9.36	11.2	81.0	167	267	366	561	884	1513	1872
12" (300)		13.5	16.2	116	240	385	527	808	1274	2179	2696
16" (400)		24	28.8	207	426	683	937	1435	2264	3872	4792
20" (500)		37.4	44.9	323	667	1067	1464	2243	3537	6050	7487
Xt		0.99	0.99	0.95	0.78	0.75	0.70	0.64	0.60	0.53	0.45
FL		0.96	0.96	0.96	0.94	0.94	0.92	0.88	0.85	0.77	0.67

NOTE: Due to Dresser's dedication to new product development and enhancement data provided is subject to change. Please check with our manufacturing facility for the most recent data."

Flow Profile for 16" (400 mm) QTCV-T4



The QTCV-T4's modified equal-percentage flow characteristic combines the benefits of both linear and equal-percentage. This design enables the valve to meet a large variety of application and control needs. This flow characteristic offers superior control in the low flow ranges and maximized capacity for high flow volumes.



Original Station Design



Buried Installation Solution

A U.K. city gate station's original capacity design had been far exceeded due to increased market demand. The station not only required additional capacity, but aggressive noise attenuation and the ability to maintain control at low flow volumes. The existing installation incorporated four runs of regulators with large in line silencers. The high capacity and turn down ratio of Becker T-Ball's allowed the station to be redesigned to only two buried runs, in turn eliminating silencers.

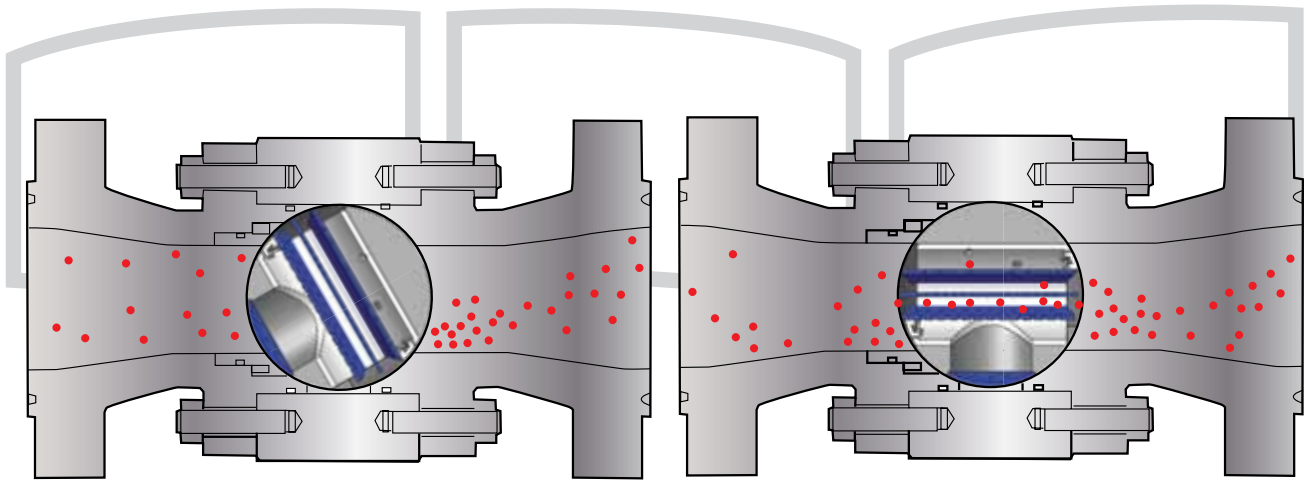
Minimize Operational Disturbances

It is not uncommon for high velocity concentrated debris, such as sand, to be flowing through the pipeline system. This can create two rapidly destructive problems:

- Erosion of internal valve components
- Clogging build up of debris leading to premature valve failure

Cage style valves utilize velocity control technologies, such as stacked disks and streamlined paths, to minimize the erosive effects of pipeline debris. This method only addresses half the problem because the drilled holes in cage style valves are still prone to clogging debris build up.

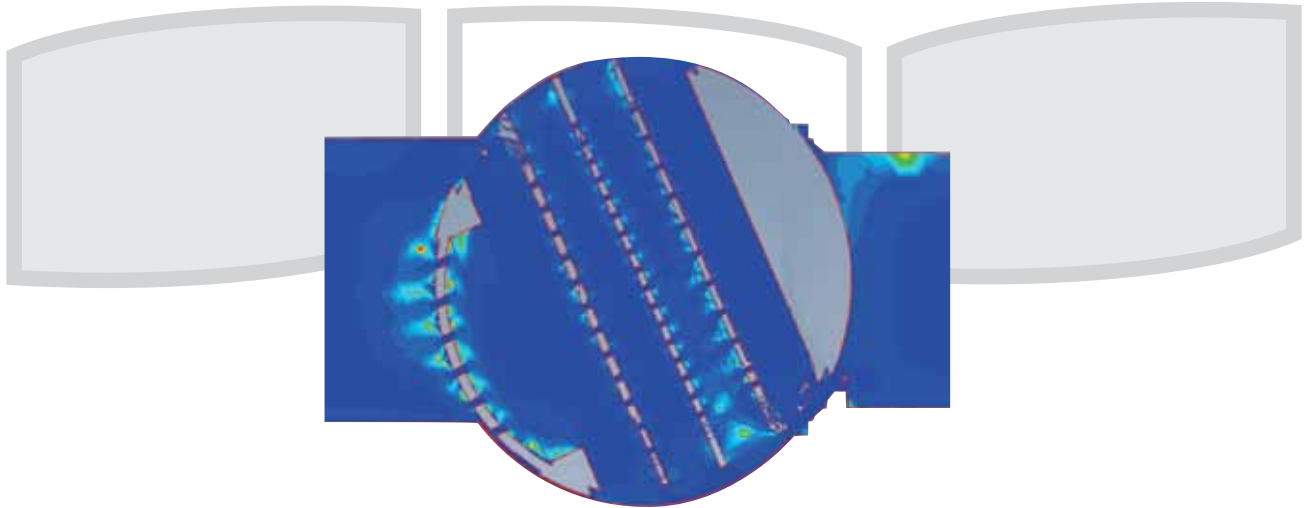
Every year major investments are made in capital and time to maintain and rebuild a station's assets. Over time, the natural gas industry has come to accept the high maintenance and poor service life of cage style valves. With a Becker T-Ball® this is no longer acceptable.



The QTCV-T4's patented multi-stage trim not only reduces fluid velocity to combat erosion but it also features a self cleaning non-clogging design. The T-Ball's® clean sweep feature allows debris to pass through even a slight opening of the control valve. The rotating element design literally sweeps pipeline debris downstream preventing any debris scouring, build up and clogging. The clean sweep feature reduces unplanned process downtime, maximizing your bottom line.

Attack Noise at Its Source

Utilizing remedies that attempt to muffle the noise source ignores the detrimental and costly damage that can be done to an entire system from excessive vibration. Excessive vibration can result in repeated fatigue failures of piping, control systems, and welds. The QTCV-T4's multistage trim attacks noise at its source—managing vibration and safely protecting your assets.

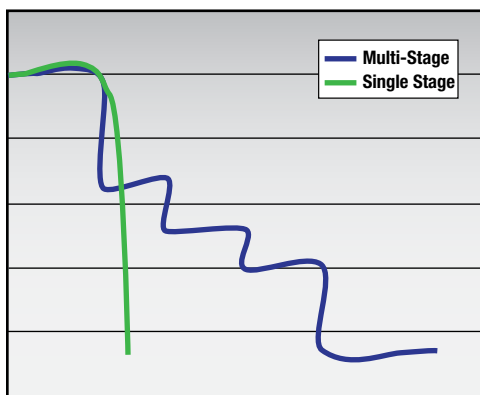


QTCV-T4 Turbulence Intensity

Each of the perforated plates shapes the flow passage to control turbulence, producing a steady flow pattern. There is little fluctuation in turbulent velocity, minimizing trim vibration and aerodynamic noise.

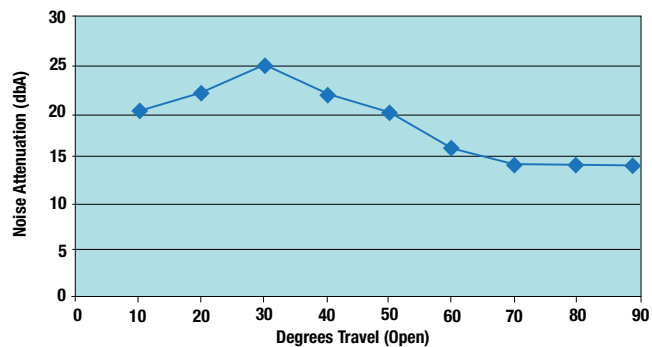
Applications that require large pressure differentials are especially susceptible to damage, as high velocities are a direct result of pressure reduction. With a QTCV-T4 fluid immediately begins to undergo a series of pressure letdowns as it enters the ball opening through an inlet diffuser. The T-4's innovative multi-stage design maximizes frictional resistance by combining horizontal and vertical perforated plates. Each pressure letdown plate reduces velocity and kinetic energy; the root cause of noise and vibration. Furthermore, the use of progressively increasing hole sizes dissipates energy and prevents excessive velocity.

This concept creates a convoluted flow path which attacks and manages noise and vibration at its source.



Noise Attenuation

A QTCV-T4 flow pattern is similar to that of a cascading waterfall where water gradually descends over a series of rock steps, reducing kinetic energy and creating the tranquil sound of flowing water. A plunge waterfall, however, could be falling from the same height, but its single drop and high kinetic energy results in a thunderous crashing sound.



QTCV-T4 Noise Attenuation Profile

The QTCV-T4 exhibits continuous noise attenuation through its upstream and downstream diffusers. A maximum noise attenuation of 25 dBA is achieved when the ball rotates to approximately 30° open and all noise attenuator plates and diffusers are engaged.

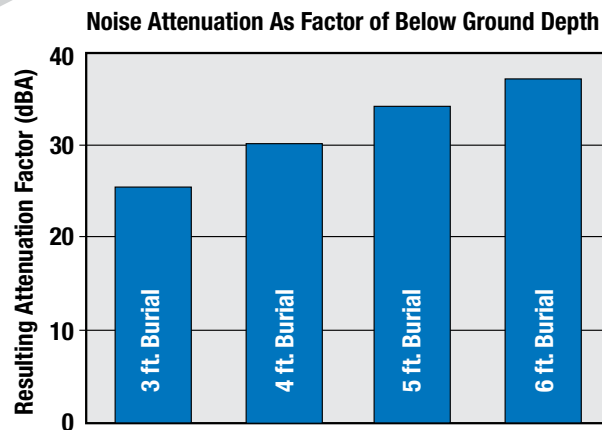
Commitment to the Environment

Sustainable and environmentally friendly technology is a continuously growing industry trend. The environmental impact of noise and pollution from natural gas regulating stations is becoming an increasingly important design consideration.

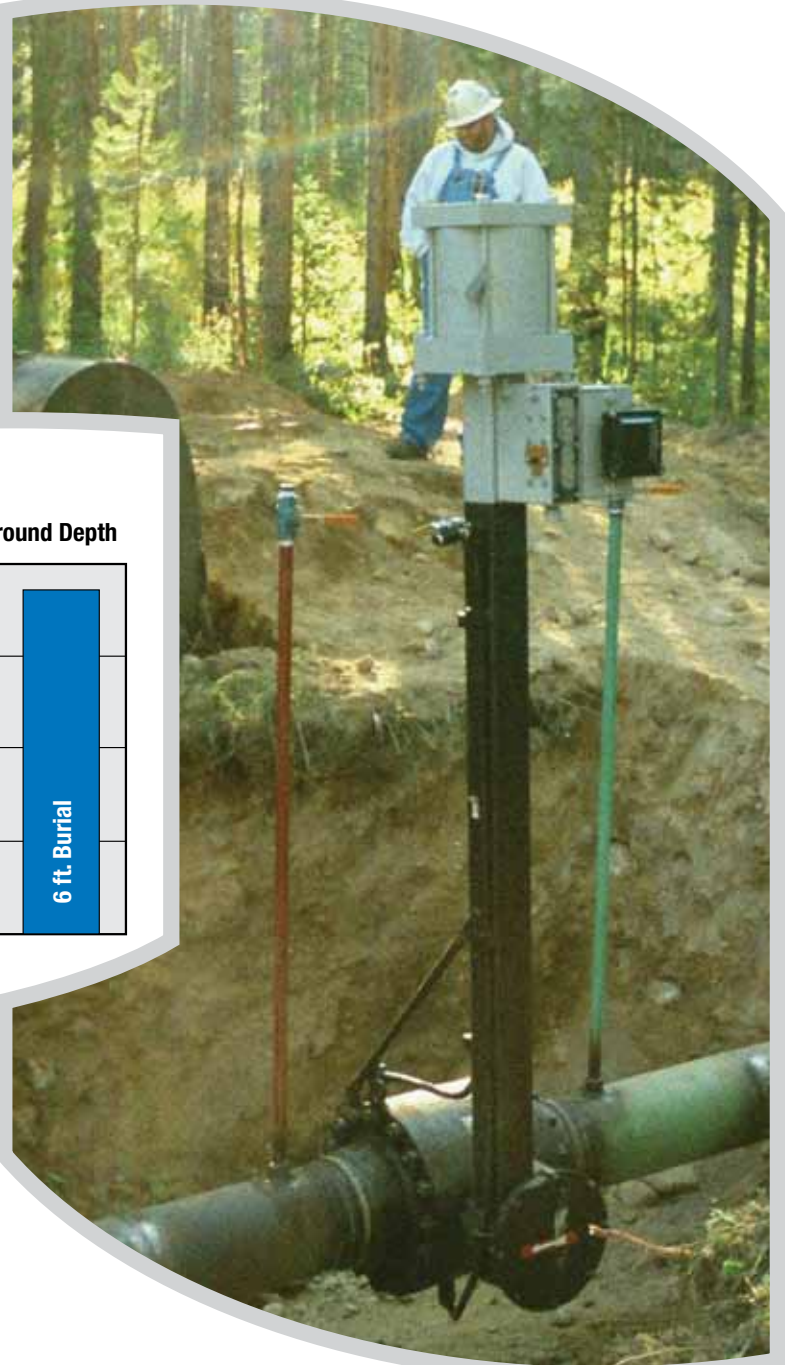
Many methods of handling excessive noise, such as downstream silencers, extra-thick pipe, and enclosure buildings, only offer a partial solution and multiply project costs. Buried installation of T-Ball® control valves can easily be configured with a robust extended stem design. This can eliminate ambient noise problems (up to 37 dBA) by the earth's absorption of noise producing vibrations. Due to the T-Ball's inherent non-clogging, low maintenance design, your station is not required to be frequently unearthed and serviced.

Besides optimum noise control and infrastructure reduction, buried service provides considerable benefits:

- Ability to Handle Higher Flow Volumes
- Minimize Ambient Heat Loss
- Additional Asset Security
- Safer Atmosphere for Operating Personnel
- Compliance with Environmental Regulations and City Ordinances



Burial depths typically range from 3 ft (1m) to 6 ft (2m) and can provide in excess of 37 dBA of additional noise attenuation.



A Proven Solution

Customer: Georgia Based Energy Services Holding Company
Installation: Texas USA
Application: Salt Dome Natural Gas Storage
Injection & Withdrawal Control Valve
(Pressure Control)



Requirements:

- Handle volatile market swings and peak-day rate demands
- Turn over gas inventory several times a year in response to extreme short term gas demand
- Simplified control algorithm for straightforward operation and maintenance
- Resistance to damaging hydrate formations from high pressure differentials
- Maintain reliable delivery to natural gas transmission systems and operators

Solution:

8" (200 mm) 1500 ANSI QTCV-T4

- High turndown ratio and capacity able to control both low and peak gas volumes
- Single bi-directional valve capable of both gas injection and withdrawal
- Gradual pressure reduction through multi-stage trim maintains higher temperatures preventing hydrate formation without additional heating devices
- Non-clogging design provides undisturbed, low maintenance operation

Customer: State Owned Gas & Oil Company
Installation: Venezuela
Application: Complex Natural Gas Processing



Requirements:

- Resistance to extremely erosive flow streams and impurities
- Maximize productivity by minimizing shut downs and overhauls
- Handle varying quality and quantity of byproducts produced
- Minimize fugitive emissions with hazardous composition for personnel safety

Solution:

6" (150 mm) 600 ANSI QTCV-T4
4" (100 mm) 300 ANSI QTCV-T4

- Tungsten carbide coating trim provides rugged barrier for extended protection against high velocity particles
- Inlet and outlet flow restricting trim creates distinct stages of velocity control, protecting downstream equipment
- Rugged design can withstand process and product content fluctuations
- Pressure seal seating technology combined with triple O-ring, and U-cup design minimize emissions and increase lifespan

A Proven Solution

Customer: Ontario Based Natural Gas Distribution Company

Installation: Ontario Canada

Application: City Gate Station



Requirements:

- Station near a residential area; noise pollution an environmental concern to nearby community
- Harsh low temperature environment frequently below freezing
- Pressure needs to be regulated to safe levels for distribution
- Installation in “green” environment; invasive aesthetics was a concern
- Natural gas demand and flow rates fluctuate hourly and seasonally

Solution:

8” (200 mm) 600 ANSI QTCV-T4
4” (100 mm) 300 ANSI QTCV-T4

- Buried installation (7 ft/ 2m) provided an addition 35 dBa noise attenuation, creating a cumulative of 50 dBa
- Buried installation below the frost line provides natural heat retention for normal operation and pressure regulation
- Compact station footprint with easily accessible and discrete control system
- Rangeability of rotary design able to maintain control with changing demand levels

Customer: Combined Gas & Electric Distribution Company

Installation: Nevada, USA

Application: Combined Cycle Power Plant



Requirements:

- Long term reliable performance under varying load and operating conditions
- Simplified, low maintenance design paramount to power plant uptime
- Fluctuation in gas feed demand necessitates rapid accurate response in a short system
- Maintain efficient and stable feed operation to fuel plant and power electrical grid

Solution:

6” (150mm) 600 ANSI QTCV-T4

- Multi-stage trim reduces premature failure due to damaging affects of noise and vibration on infrastructure
- Inherent rangeability able to handle both plant start up and peak loads in single valve
- Rotary design allows for fast-acting precise control valve movement
- Tighter shut-off class minimizes leaks and prevents reducing a power plant’s MW output

With an installation base in six continents, Becker control valves have earned their reputation for excellent control and reliability. Through a worldwide support network, Becker control valves is able to deliver comprehensive process control solutions and services to a global market.

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Fax: + 44 1965 52610

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Fax: + 1 847 437 2549

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About Dresser® Products

Dresser brand products are highly engineered, technically superior and are designed to help global customers meet and exceed requirements for mission critical energy applications.

About Dresser, Inc.

Dresser, Inc. is a leader in providing highly engineered infrastructure products for the global energy industry. The company has leading positions in a broad portfolio of products, including valves, actuators, meters, switches, regulators, piping products, natural gas-fueled engines, retail fuel dispensers and associated retail point-of-sale systems, and air and gas handling equipment. Leading brand names within the Dresser portfolio include Dresser Wayne® retail fueling systems, Waukesha® natural gas-fired engines, Masoneilan® control valves, Consolidated® pressure relief valves, and Roots® blowers. It has manufacturing and customer service facilities located strategically worldwide and a sales presence in more than 150 countries.

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