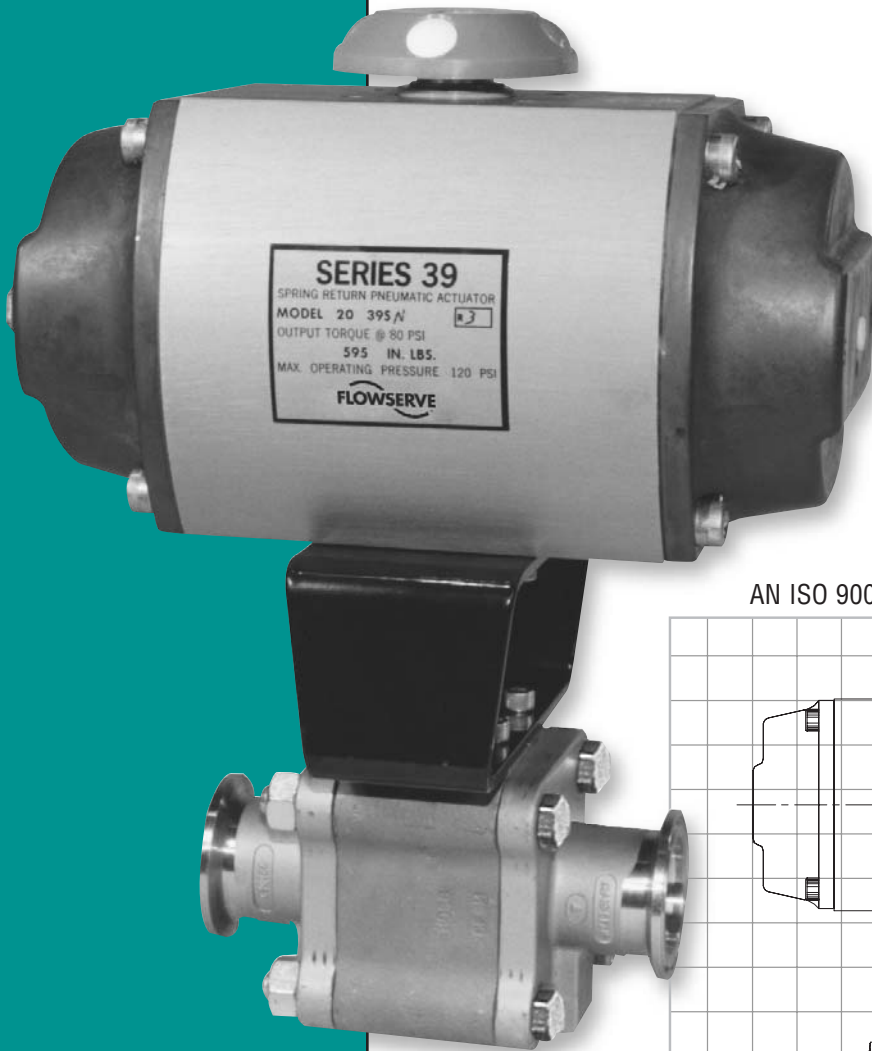


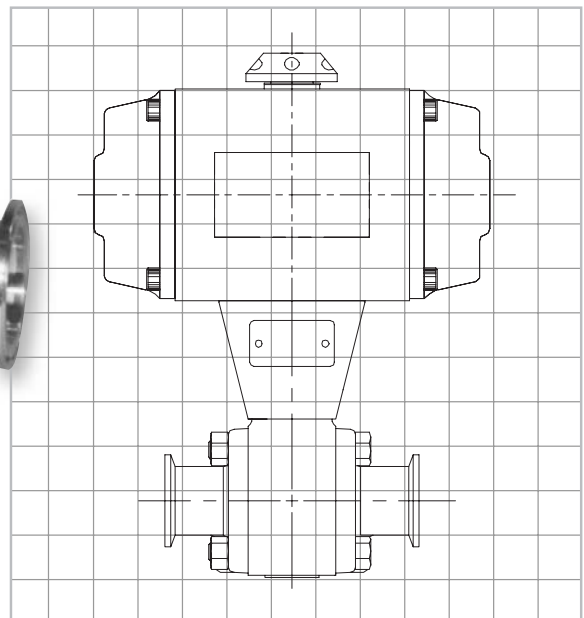


Worcester Controls

FCD WCABR1035-00
(Part PB WK 44)



AN ISO 9001 REGISTERED COMPANY



Series WK 44 Clean Valves

*Stainless Steel Ball Valves for
High-Purity and Aseptic Processes*

Worcester Controls Series WK 44 Clean Valves bring a new dimension of production efficiency to high-purity and aseptic processes

Series WK 44 Clean Valves are operating dependably in processes in the pharmaceutical, biotech, food, cosmetic, paint, chemical and other industries where microbes, media deposits, particle generation and cross-contamination can threaten the quality of the product. The high-purity design, high vacuum rating, high cycle life and pressure/temperature rating of these valves help assure quality production with minimum downtime. They last many times longer than diaphragm valves and prevent catastrophic failure.

High-Purity Design

All interior wetted surfaces on the clean valves are 316L with a standard finish to 30 Ra. Electropolishing to 15 Ra or better is optionally available. Both ensure zero cross-contamination and negligible particle generation.

Outstanding Sealing/Shutoff

Seats of TFE, UHMWPE and Polyfill® ensure bubbletight sealing over a wide range of pressures and temperatures plus compatibility with a variety of media. WK 44 Valves are vacuum-rated to 1×10^{-3} with 1×10^{-5} torr optional.

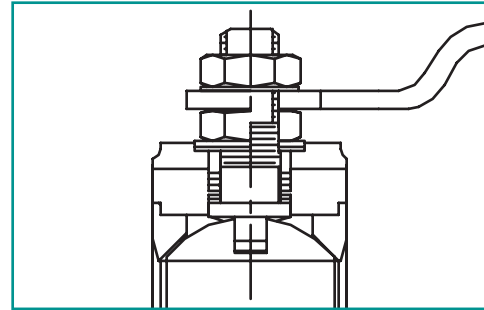
Purging and Draining Capabilities

Worcester Controls clean valves are steam or gas purgeable. Dual purge ports can be installed on the pipe ends for gas sparging during welding of the XBO ends. They can also be welded to the valve body for sterilization, draining and cleaning of the ball cavity between cycles.

Valves Designed for Automation

A growing percentage of high-purity and aseptic processes require fail-safe operation and automatic on/off or throttling control. Worcester Controls has the pneumatic and electronic, computer-compatible controls for your installation.

Leak-Tight Stem Design



Separate Seats and Body Seals

Separate seats and seals are optionally available on standard two-way valves only, and are recommended for the following process conditions:

- Operating pressures over 800 psi
- Thermal variations exceeding 200°F
- Lowest particle generation
- Steam service or steam purge
 - TFE – 50 WSP maximum on/off only
 - UHMWPE – Unsuitable for steam service
 - Polyfill® – 250 WSP maximum on/off
 - Maximum P: 150, maximum ΔP – 50 psi throttling



Seating materials compatible with almost any media. Temperatures to 500°F, pressures to 500 psi.

Bottom-entry stem for safety.

Simple quarter-turn handle operation with visual indication of flow.

Quick-disconnect or XBO pipe ends.

20 Ra standard interior finish. Available electropolished to 10 Ra finish.

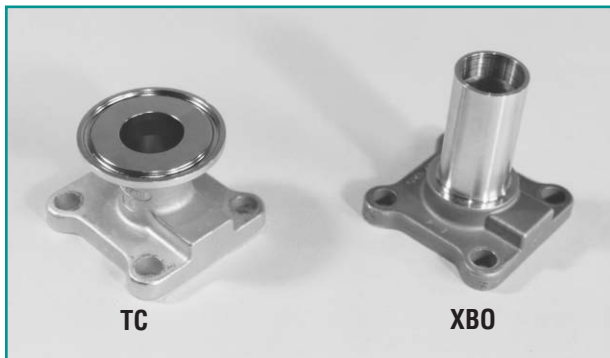
Seat/body seals eliminate potential leak paths and contamination trap areas.

Parallel bored ball maximizes flow rates, minimizes pressure drops, eliminates solids build-up.

Three-piece design facilitates installation, allows interchangeability of ends, and is easily maintained.

316L construction has superior corrosion resistance and allows welding and prevents rouging.

End Connections



Standard end connections for tubing are Quick Disconnect (TC) and Extended Butt Weld (XBO) for use with orbital welders. Service pressure ratings of Quick Disconnect ends vary according to the type of clamp fittings and gaskets used (consult Flowserve). XBO ends are rated to 800 psi with one-piece seats, and 1500 psi if using separate seats and seals. Valves with end connections compatible with compression fittings are available through the Custom Products Department.

Aseptic Purge Connections

Bosses for purge connections are integrally cast into the standard pipe ends of our Series WK 44 Clean Valves. VCR® and VCO® face seal fittings can be welded to the pipe ends or to the valve body according to individual purging requirements.

Diverter and Three-Way Valves



Series WK 44 Clean Valves are available as a directional ball valve with a third connection at the bottom of the valve body. Using standard one-piece seat/seals, the valve can function as a diverter valve by accepting media through the bottom inlet port and directing it out either of two outlets. As a three-way valve, media can flow through either side inlet to a single bottom outlet.

The WK 44 Directional Ball Valve is available with two different ball port configurations. Porting V1 shuts off alternate side ports at 0° and 90° positions. Porting V2 shuts off one side at 0°, the opposite side at 180° and both sides at 90°. There is no mechanical stop at 90° on the V2 style.

The Series WK 44 Directional Ball Valves are not available with separate seats and seals and may not be used for steam service or applications with thermal cycles over 200°F.



V1

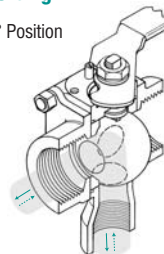


V2



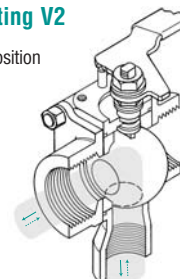
Porting V1

0° Position

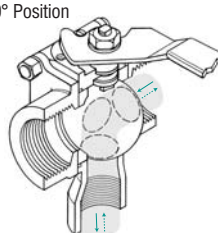


Porting V2

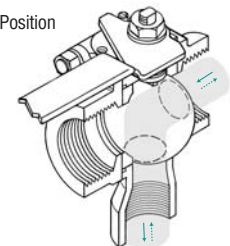
0° Position



90° Position



180° Position





Applications

Microelectronics Manufacturing

- High vacuum
- High-purity gases
- Toxic gases
- Solvent lines
- Instrumentation tie-ins

Pharmaceutical/Biotech

- High-purity water
- Sterile steam
- Flush-bottom tank valves
- Cleaning: acids, caustics, deionized water
- Gas and air sparging
- Media and nutrient inlets

Sterile Steam/Distillation

- Sterile steam
- Distilled water
- Recirculation loops

Cosmetics and Creams

- Oils
- Shampoos, detergents
- White wax

Lyophilization (Freeze-Drying)

- High vacuum
- Cryogenic liquids
- Super-cooled oils
- Sterile steam
- High-purity inert gases

Food Processing

- Wine and spirits
- Hot cooking oils
- Steam
- Water feed lines
- Retort lines

Automation

Pneumatic and Electric Controls

Easy automation is also assured by our Series 39 Pneumatic or Series 75 Electric Actuators. Both are backed by our exclusive two-year warranty. The Series 39 Actuator with fail-safe feature is the toughest, most versatile rotary actuator available.

Our unique Pulsair for the Series 39, with all electric positioner/controller, internal solenoids, and mechanical and proximity limit switches provide on/off or proportional control to your system with the feedback you require. Refer to Brochures WCABR1019 and WCABR1018.



Series 75



Series 39

3" and 4" Clean Valves

The Series WK 74

Worcester's Clean Valves are optionally available in 3" and 4" sizes with TC Quick Disconnect and XBO ends. Designated WK 74 valve.

Environment Control

Worcester Controls assembles all clean service and cryogenic valves in a Class 100 work area.

Testing and Inspections

U.V. Light Test:

All wetted components are U.V. light inspected to confirm that all surfaces are free of fluorescent oils or greases.

Wipe Test:

All wetted components are then wipe tested using Whatman #44 paper, to ensure all surfaces are free of grit, dirt and contamination.

Helium Leak Test:

Once assembled, all valves are pressurized internally with 80 psi of helium. They are then mass spectrometer tested for both through and external leaks. No leakage is permitted.

Vacuum Sealed:

After all testing has been completed, clean valves are double vacuum-sealed in 4 mil plastic bags that are nested one inside of the other. This ensures product integrity up to the point of delivery.



Specifications

Valve Sizes	½", ¾", 1", 1½", 2"
Styles	Two-way valve, bi-directional flow; directional valve, bi-directional flow. V1 Porting, 90° operation; V2 Porting, 180° operation with shutoff.
*Valve Pressure Rating	TC – varies according to clamp type and gasket material. Consult Flowserve. XBO – 1500 psi (800 psi for one-piece seat/body seal)
*Vacuum Rating	1 x 10 ⁻³ torr (1 x 10 ⁻⁵ torr optional)
*Seat Pressure/Temperature Rating	Refer to curves on page 6
Body and Pipe Ends	316L stainless steel to ASTM A351-CF3M
Interior Surface Finish	30 Ra standard, 15 Ra optional (electropolish), 6-10 Ra optional (mechanical polish)
Ball	Solid parallel bore (no vent hole). 316L stainless steel to ASTM A479
Stem	One-piece, bottom-entry, 316L stainless steel to ASTM A479
Seats	One-piece seat/seal of TFE, Polyfill or UHMWPE Separate seats and seals: Seats – TFE, Polyfill, UHMWPE Seals – TFE, UHMWPE or TFE coated stainless steel "S" gasket
Stem Seal	Polyfill with TFE or Polyfill seats; UHMWPE with UHMWPE seats
Thrust Bearing	Polyfill with TFE or Polyfill seats; UHMWPE with UHMWPE seats
Seal Protector	PEEK
External Parts	300 series stainless steel
Operation	Lever handle, pneumatic or electric automation for on/off or throttling control
Standards and Approvals	Materials of construction comply with FDA (21CFR) requirements. USDA approval (with TFE or UHMWPE seats)

***NOTE:** The final valve pressure and temperature rating is established by the rating of three items: end connections, one or two-piece seats/seals, and seat material. The lowest rating prevails.

V-Numbered Variations Listing:

V 3 Upstream Relief Hole	V 59 Extended Oval Handle
V 6 Source Inspection	V 60 OSHA Lockout
V 32 Oval Handle	V 66 Certificate of Compliance for European Valve Orders
V 36 Certificate of Compliance	V 73 Cavity Filler Seats
V 48 Extended Lever Handle	

Surface Finish Measurements

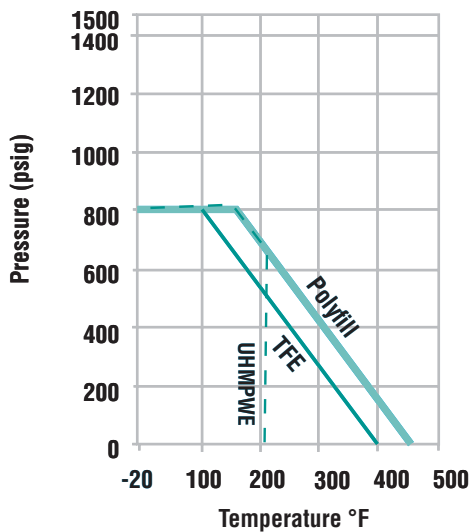
RMS (microinch)	RMS (micron)	AA Ra (microinch)	Grit Size
160	4.06	142	36
98	2.49	87	60
80	2.03	71	80
58	1.47	52	120
34	.86	30	180
17	.43	15	240
14	.36	12	320

Seat Pressure/Temperature Ratings

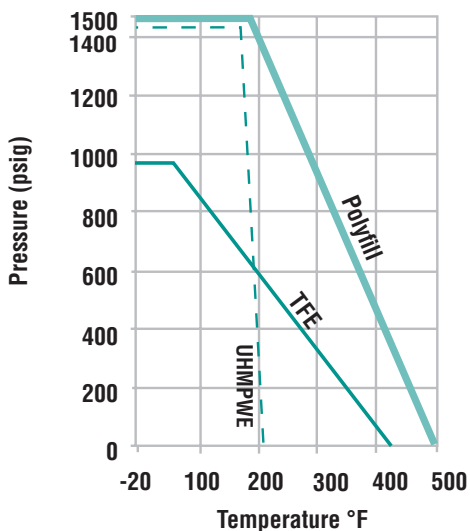
When selecting seat/seal materials, keep in mind that the rating of Quick Disconnect valves may be lower depending on the type of clamp and gasket materials. Consult Flowserve.

One-Piece Seat and Seals

Not for use on steam service.



Separate Seats and Seals



Flow Coefficient

C_v valves and equivalent lengths of pipe

Valve Size	C _v		In Equivalent Length of Pipe (feet) WK only (Schedule 40)
	WK	WK V1, V2	
1/2"	8	3.2	3.1
3/4"	12	5	6.3
1"	32	10	3.1
1 1/2"	82	24	4.3
2"	120	36	7.5

Pressure Torque for Automated Valves

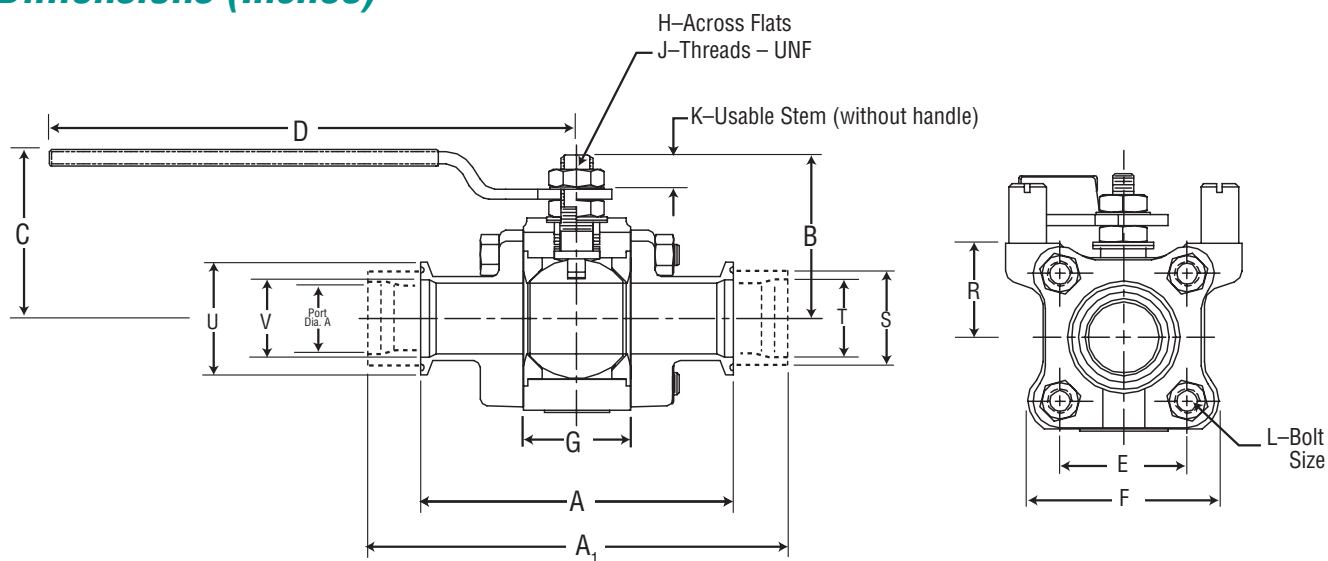
Valve Torque

Before the actuator can be sized for any given valve application, the amount of torque required by the valve must be determined. The operating torque of the ball valve is influenced by a number of factors. Some are design and material related, others are application (service conditions) related. Design application factors include system pressure, media and frequency of operation.

For complete valve operating torque data, refer to Worcester Controls Actuator Sizing Manual (WCASS0001). This publication explains the concept of valve torque, presents torque curves for each seat material, and provides correction factors for media and the type of service such as on/off operation, cycle frequency, etc.

Output torque charts for all Worcester Controls actuators are provided in the Actuator Sizing Manual.

Dimensions (Inches)

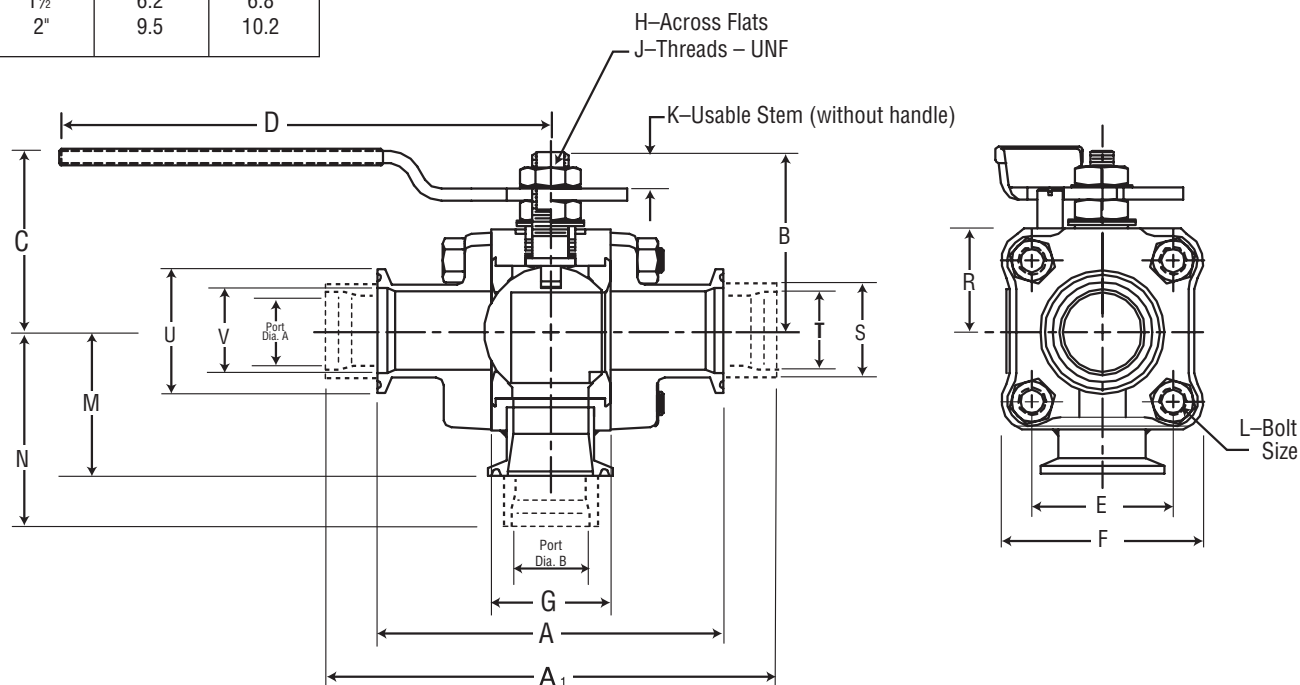


Valve Size	A	A'	B	C	D	E	F	G	H	J	K	L	M	N	R	Port A	Port B	XBO		TC	
																		S	T	U	V
½"	3.50	5.53	1.55	1.76	5.53	1.25	1.75	.813	.217	¼-24	.28	¼-20	1.66	2.94	.94	.37	.37	.50	.37	.986	.375
¾"	4.00	5.77	1.64	1.86	5.53	1.50	2.00	.969	.217	¼-24	.28	¼-20	1.76	3.03	1.03	.56	.52	.75	.62	.986	.625
1"	4.50	6.33	2.19	2.28	6.53	1.75	2.38	1.25	.296	⅜-20	.43	⅜-18	1.94	3.21	1.27	.81	.75	1.00	.87	1.986	.855
1½"	5.50	7.43	2.88	2.83	8.03	2.25	3.16	1.906	.343	⅜-18	.61	⅜-14	2.29	3.56	1.73	1.25	1.25	1.50	1.37	1.986	1.355
2"	6.25	7.60	3.06	3.02	8.03	2.62	3.56	2.218	.343	⅜-18	.60	½-13	2.44	3.72	1.92	1.50	1.50	2.00	1.87	2.518	1.855

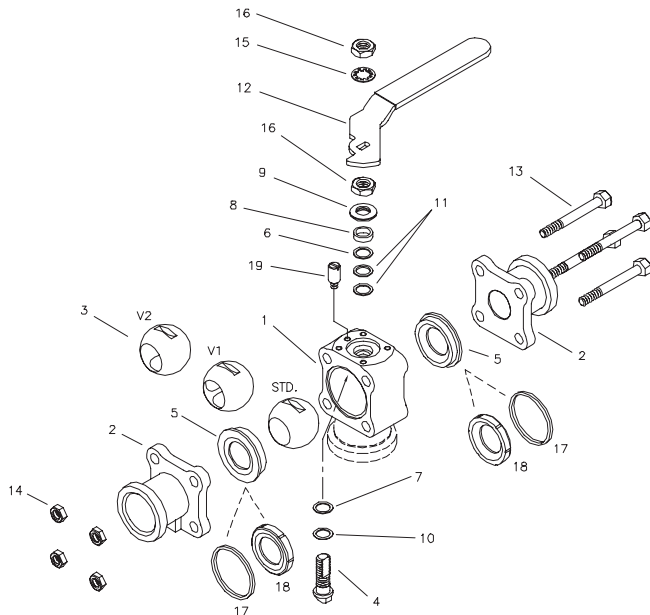
Valve Size	WK 44	WK 44 V1, V2
½"	1.1	1.5
¾"	1.8	2.3
1"	3.1	3.6
1½"	6.2	6.8
2"	9.5	10.2

Approximate Valve Weight (lb.)

Dimensions are for layout purposes only. For tolerances, contact Flowserve.
XBO end connections mate to standard O.D. tubing with .065 wall.



Part Identification and Materials of Construction



Item No.	Description	Material
1	Body	Stainless Steel ASTM A351 CF3M
2	Pipe Ends	Stainless Steel ASTM A351 CF3M
3	Ball	Stainless Steel ASTM A 479 316L
4	Stem	Stainless Steel ASTM A 479 316L
5*	Seat/Body Seal	TFE-Virgin / UHMWPE / Polyfill / TFM
6	Seal Protector	PEEK
7	Thrust Bearing	Polyfill (UHMWPE with UHMWPE seats)
8	Follower	Stainless Steel AISI 316L
9	Belleville Washers	Stainless Steel AISI 301
10	Thrust Bearing	PEEK (UHMWPE with UHMWPE seats)
11	Stem Seals	Polyfill (UHMWPE with UHMWPE seats)
12	Handle	Stainless Steel, Plastisol-Dipped Sleeve
13	Body Bolts	Stainless Steel ASTM F593-316 GR.2
14	Body Nuts	Stainless Steel ASTM A194 GR.8
15	Lockwasher	Stainless Steel AISI 300 Series
16	Retaining Nuts	Stainless Steel AISI 300 Series Zinc-Plated
17*	Body Seals	TFE-coated S.S. "S" gasket / TFE / UHMWPE
18*	Seats	TFE / UHMWPE / Polyfill / TFM
19	Stop Pin	Stainless Steel ASTM A276 – 300 Series

*Valve will contain Item 5 or 17 and 18, depending on style ordered.

How to Order

Valve Size	Options	Product Series	Body & Pipe Ends	Ball & Stem	Seat*	Body Seal	End Connection	Porting & Variations
1/2" 3/4" 1" 1 1/2" 2"	Blank – Std 30 Ra Finish E – No handle, automated stem build P – Electro-polished (15 Ra Finish) T – Directional Valve (V1 or V2) V – Vacuum	WK44	6 – 316L Stainless Steel	6 – 316L Stainless Steel	One-Piece Seat & Seal: P – Polyfill T – TFE TFM – TFM U – UHMWPE Separate Seat & Seal: P – Polyfill T – TFE TFM – TFM U – UHMWPE	Blank: One-Piece seat/seal T – TFE M – TFE coated S.S. gasket	TC – Quick Disconnect XBO – Extended Butt Weld	Blank – No variation V1 – 90 deg porting V2 – 180 deg porting V6 – Source Inspection V32 – Oval Handle V36 – Cert. of Comp. V48 – Ext lever handle V59 – Ext oval handle V60 – OSHA lockout V66 – Cert. of Comp. CE orders V72 – Cert. of Comp. PED orders V73 – Cavity filler seats V74 – Cert. of Comp. hydro test, CMTRs V75 – Cert. of Comp. BPE, CMTRs

Ordering Example: A 1" electropolished, directional, Series WK44 with 316L stainless body, pipe ends, ball and stem, TFE one-piece seat/body seal, Quick Disconnect ends and V1 porting.

*Standard WK44 clean valves are furnished with a one-piece combined seat and seal. If lowest particle generation is desired, specify separate seat and body seal.

Example: 1" WK 44 66 TT XBO designates a 1" Clean Valve with separate TFE seats, TFE seals, XBO ends.

Note: Std Cavity Filler Seat is a one-piece seat/seal design.

CAUTION: Ball Valves can retain pressurized media in the body cavity when closed. Use care when disassembling. Always open valve to relieve pressure prior to disassembly. Due to continuous development of our product range, we reserve the right to alter the dimensions and information contained in this leaflet as required.

Polyfill® is a registered trademark of Flowserve Corp. • VCR® and VCO® are registered trademarks of Cajon Company.

Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can (and often does) provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing and selection, installation, operation, and maintenance of Flowserve products. The purchaser/user should read and understand the Installation Operation Maintenance (IOM) instructions included with the product, and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

While the information and specifications contained in this literature are believed to be accurate, they are supplied for informative purposes only and should not be considered certified or as a guarantee of satisfactory results by reliance thereon. Nothing contained herein is to be construed as a warranty or guarantee, express or implied, regarding any matter with respect to this product. Because Flowserve is continually improving and upgrading its product design, the specifications, dimensions and information contained herein are subject to change without notice. Should any question arise concerning these provisions, the purchaser/user should contact Flowserve Corporation at any one of its worldwide operations or offices.

For more information about Flowserve Corporation, visit www.flowserve.com or call USA 1 800 225 6989.

FLOWSERVE CORPORATION
FLOW CONTROL DIVISION
 1978 Foreman Drive
 Cookeville, Tennessee 38501 USA
 Phone: 931 432 4021
 Facsimile: 931 432 5518