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 $1 \times 10^{-2}$ with $1 \times 10^{-5}$ 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 ∆P – 50 psi throttling
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

Boses 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.
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.

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

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

\[ \frac{1}{8}, \frac{1}{4}, 1, 1\frac{1}{2}, 2 \] in.

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 6 Source Inspection
V 32 Oval Handle
V 36 Certificate of Compliance
V 48 Extended Lever Handle

V 59 Extended Oval Handle
V 60 OSHA Lockout
V 66 Certificate of Compliance for European Valve Orders
V 73 Cavity Filler Seats

FCF WCABR1035
Series WK 44 Clean Valves

5
Surface Finish Measurements

<table>
<thead>
<tr>
<th>RMS (microinch)</th>
<th>RMS (micron)</th>
<th>AA Ra (microinch)</th>
<th>Grit Size</th>
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<td>14</td>
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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.

Flow Coefficient

<table>
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<tr>
<th>Valve Size</th>
<th>CV</th>
<th>In Equivalent Length of Pipe (feet) WK only (Schedule 40)</th>
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<tr>
<td>1 1/2&quot;</td>
<td>82</td>
<td>24</td>
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<tr>
<td>2&quot;</td>
<td>120</td>
<td>36</td>
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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.

One-Piece Seat and Seals
Not for use on steam service.

Separate Seats and Seals
### Dimensions (Inches)

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<tr>
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<tbody>
<tr>
<td>¼&quot;</td>
<td>3.50</td>
<td>5.53</td>
<td>1.55</td>
<td>1.76</td>
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<td>1.50</td>
<td>2.00</td>
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</table>

### 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

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Material</th>
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<tbody>
<tr>
<td>1</td>
<td>Body</td>
<td>Stainless Steel ASTM A351 CF3M</td>
</tr>
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<td>2</td>
<td>Pipe Ends</td>
<td>Stainless Steel ASTM A351 CF3M</td>
</tr>
<tr>
<td>3</td>
<td>Ball</td>
<td>Stainless Steel ASTM A 479 316L</td>
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<tr>
<td>4</td>
<td>Stem</td>
<td>Stainless Steel ASTM A 479 316L</td>
</tr>
<tr>
<td>5*</td>
<td>Seat/Body Seal</td>
<td>TFE-Virgin / UHMWPE / Polyfill / TFM</td>
</tr>
<tr>
<td>6</td>
<td>Seal Protector</td>
<td>PEEK</td>
</tr>
<tr>
<td>7</td>
<td>Thrust Bearing</td>
<td>Polyfill (UHMWPE with UHMWPE seats)</td>
</tr>
<tr>
<td>8</td>
<td>Follower</td>
<td>Stainless Steel AISI 316L</td>
</tr>
<tr>
<td>9</td>
<td>Belleville Washers</td>
<td>Stainless Steel AISI 301</td>
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<td>Thrust Bearing</td>
<td>PEEK (UHMWPE with UHMWPE seats)</td>
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<td>11</td>
<td>Stem Seals</td>
<td>Polyfill (UHMWPE with UHMWPE seats)</td>
</tr>
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<td>12</td>
<td>Handle</td>
<td>Stainless Steel, Plastic-Coated Sleeve</td>
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<td>13</td>
<td>Body Bolts</td>
<td>Stainless Steel ASTM F593-316 GR.2</td>
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<td>Body Nuts</td>
<td>Stainless Steel ASTM A194 GR.8</td>
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<tr>
<td>15</td>
<td>Lockwasher</td>
<td>Stainless Steel AISI 300 Series</td>
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<tr>
<td>16</td>
<td>Retaining Nuts</td>
<td>Stainless Steel AISI 300 Series Zinc-Plated</td>
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<td>TFE / UHMWPE / Polyfill / TFM</td>
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<td>18*</td>
<td>Seats</td>
<td>TFE / UHMWPE / Polyfill / TFM</td>
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<tr>
<td>19</td>
<td>Stop Pin</td>
<td>Stainless Steel ASTM A276 – 300 Series</td>
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*Valve will contain Item 5 or 17 and 18, depending on style ordered.

### How to Order

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Options</th>
<th>Product Series</th>
<th>Body &amp; Pipe Ends</th>
<th>Ball &amp; Stem</th>
<th>Seat*</th>
<th>Body Seal</th>
<th>TC</th>
<th>End Connection</th>
<th>Porting &amp; Variations</th>
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<tbody>
<tr>
<td>1&quot;</td>
<td>PT</td>
<td>WK44</td>
<td>6 – 316L Stainless Steel</td>
<td>6 – 316L Stainless Steel</td>
<td>One-Piece Seat &amp; Seal: P – Polyfill</td>
<td>Blank: One-Piece seat/seal</td>
<td>TC – Quick Disconnect</td>
<td>XBO – Extended Butt Weld</td>
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<td></td>
<td>T – TFE</td>
<td>T – TFE</td>
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<td>V1 – 90 deg porting</td>
<td>V1 – 90 deg porting</td>
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<td></td>
<td></td>
<td>TFM – TFM</td>
<td>– TFE</td>
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<td>V2 – 180 deg porting</td>
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<td>U – UHMWPE</td>
<td>– S.S. gasket</td>
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<td>V6 – Source Inspection</td>
<td>V6 – Source Inspection</td>
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</tbody>
</table>

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.

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