

VALVE SEALING PROGRAM

ENGINEERED SOLUTIONS AND COMPREHENSIVE SERVICE



A HISTORY OF PROVEN RESULTS

Knowledge, Experience, and Service

Chesterton® has over a century of experience in providing sealing solutions for a wide variety of tough valve sealing applications. Customers can benefit from Chesterton's sealing knowledge and experience.

We provide high-reliability sealing solutions designed specifically for valve applications. Chesterton sealing solutions increase reliability, simplify installation with standardization, and extend sealing performance throughout your plant.

Our in-field program specialists and applications engineers have both the industry and product knowledge to deliver this high-level service.



Chesterton Valve Sealing Program

The Standard for Leak-Free Valve Performance

Chesterton Valve Sealing Program results are proven by years of plant service. By combining the best achievable control technology with expert service, plants can maximize operating efficiencies. This program has become a reliable choice for valve asset managers, from the largest refineries to nuclear power plants around the world.

Program Components Include:

Pre-turnaround and outage planning

- In-plant survey
- Certified training for mechanics and valve shops
- On-site staged inventory

Turnaround/outage support

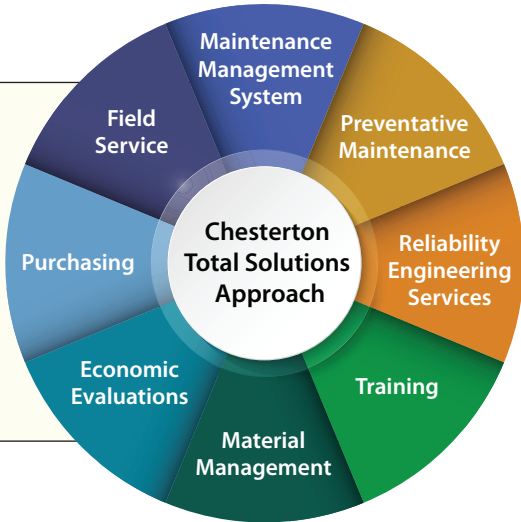
- On-site support
- Troubleshooting
- Valve ID and tracking

Best achievable valve sealing technology

- Engineering application data bank
- Optimized packing configurations
- Application specific gland torques
- Off-the-shelf kits for the world's most common control valves



Our Total Solutions Approach
Valve sealing concerns on turnarounds and outages are minimized with our total solutions approach. Chesterton's combination of outstanding service integrated with advanced, engineered sealing solutions delivers proven results.



Control Valve Solutions

Air Operated Valves (AOV)

Common AOV Sealing Concerns

1. Valve Stem Leakage

- Frequent stem actuation can cause loss of packing gland load that leads to stem leakage.
- PTFE v-rings will relax and wear in service. Braided packing will consolidate in service and lose gland load.

2. Poor Valve Responsiveness

- Control valve responsiveness is critical to process quality and control. High packing friction from graphite rings causes poor step response and process control, especially in lower temperature valves.
- Friction causes valves to constantly hunt for the correct position, resulting in continuous stem actuation.

3. Variations in Valve Performance

- Variations in packing friction can cause unit start-up problems. Inconsistent gland loading and sealing system designs can be factors.
- Slip-stick stem actuation can be common with low temperature packing systems.
- High friction packing designs often require valve actuator resizing.

4. Frequent Valve Adjustments

- Tightening packing glands in the field to reduce valve leakage can be all too common. Once re-tightened, uncontrolled packing friction can limit operability.

5. Poor Valve Reliability

- Poor control valve reliability can have a dramatic effect on production costs, even before the valve is removed from service. Removing control valves from service can be expensive.

Chesterton AOV Solutions

Chesterton offers a variety of kits and packing systems:



5800E WedgeSeal Packing System

For emissions and temperatures greater than 230°C (450°F)



1724E PTFE Sealing System

For maximum chemical compatibility

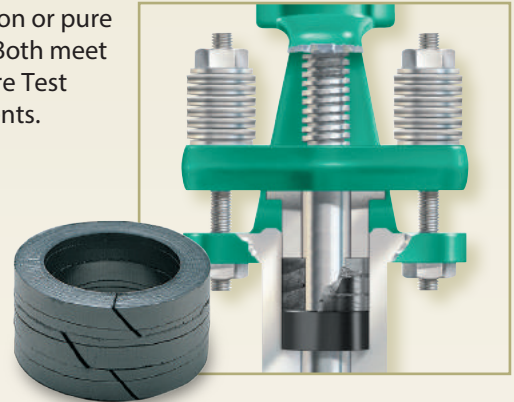
Valve Pack Warranty

Chesterton 1724E packing for emissions will not leak in excess of 100 ppm as measured by EPA Method 21 for a period of 5 years. See a Chesterton representative for conditions and details of this warranty.

Chesterton AOV Solutions

Chesterton 5800 WedgeSeal Solution

The WedgeSeal packing system reduces stem friction and gland loads. The WedgeSeal arrangement transfers gland force with predictable precision. Innovative, WedgeSeal sealing rings are available in low friction, PTFE mesh over graphite construction or pure graphite. Both meet API 589 Fire Test requirements.



1. Maximum Sealability

- The WedgeSeal packing system transfers gland force efficiently to enhance sealing.
- Packing volume loss and relaxation is minimized with low PTFE content.

2. Valve Responsiveness

- 5800T WedgeSeal combines the friction characteristics of PTFE with the physical characteristics of graphite for unmatched performance. Step response below 1% is typical to maximize process control.
- The WedgeSeal system minimizes valve hunting and improves process quality and production yields.

3. Consistent Performance

- Engineered sets ensure valve performance and repeatability.
- Wiper rings are available for abrasive service.

4. Low Maintenance

- Valve live loading stores 800% more elastic energy to maintain optimized gland load.
- Frequent valve adjustments are eliminated.

5. Valve Reliability

- Chesterton valve reliability programs have resulted in 90% reductions in valve failures.

Motor Operated Valves (MOV)

Common MOV Sealing Concerns

1. Packing Consolidation and Friction

- Deep stuffing boxes with too many packing rings increase consolidation, leading to valve stem leakage.
- Excessive packing friction reduces valve operability. These high torque and energy requirements can cause slow response and electrical trips.

2. Thermal Stem Taper and System Vibration

- Thermal cycles and stem actuation create thermal gradients in the stem and packing set, requiring a dynamic valve sealing system.
- Premature packing failures can often be traced to system vibration and transient pressure fluctuations.

3. Poor Stem Support

- Large valve stems often rely on soft graphite and PTFE packing for support, resulting in packing set distortion. This is especially a concern with non-vertical and unequaled pressure configurations.

4. Stem and Stuffing Box Corrosion

- Unchecked galvanic corrosion will lead to not only poor valve reliability, but also expensive repairs.

Common Critical Applications

- Refinery Slide Valves
- Severe Service Control Valves
- Reformer Valves
- MSIV Valves

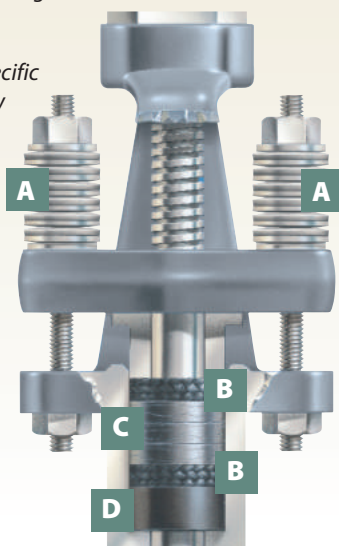
Chesterton MOV Solutions

A *Live Loading Assemblies* store elastic energy by automatically adjusting the gland to maintain optimal loading on the packing set.

B *Braided Graphite Rings* function as a combination wiper and anti-extrusion ring.

C *Die-Formed Graphite Rings* engineered to specific construction and density for high performance sealing.

D *Split Carbon Spacer* reduces the number of packing rings to produce optimum 5-ring sealing arrangement.

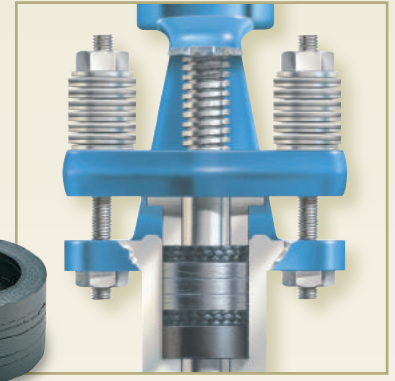


Chesterton MOV Solutions

Chesterton 5300 Solution

The 5300 sealing system meets the sealing requirements of MOVs. These valves are often difficult to seal due to their demanding services and physical size. MOVs are often critical to plant operation and safety and leave no margin for error.

Chesterton 5300 is sealing hundreds of thousands of globe valves across the globe with both leak- and problem-free performance.



1. Sealing and Operation

- The packing system uses a rigid carbon bushing to reduce the number of packing rings and eliminate excessive consolidation. Pure graphite sealing rings reduce or eliminate volume loss in the packing set in both high temperature and high pressure applications.
- Engineered gland loads combine with predictable 5300 sealing ring performance to create a reliable, low friction sealing solution.

2. Resiliency

- Resilient packing set combined with stored elastic energy accommodates stem taper and vibration sealing issues. Stable graphite rings minimize temperature gradients, resulting in relaxation and thermal expansion concerns.

3. Stem Guidance

- Close clearance carbon bushing supports heavy stem side loads.

4. Corrosion Inhibitor

- A proprietary passive corrosion inhibitor prevents corrosion by blocking galvanic corrosion.

Block Valve Solutions

General Service

Common Block Valve Sealing Concerns

1. Excessive Stem Friction

- High breakaway packing friction often requires operators to use valve keys and bars to operate valves.
- Bypass seat leakage is often a result of excessive force being used to manually open and close valves, causing valve seat cracks.

2. Large Packing Inventory

- Too many packing configurations and materials are required to seal the plant's block valves.
- High pressures often require anti-extrusion rings and specialized arrangements.

3. Stem and Stuffing Box Corrosion

- A galvanic corrosion condition cell is created when graphite contacts metal.
- Pitted stem and stuffing boxes are much too common.

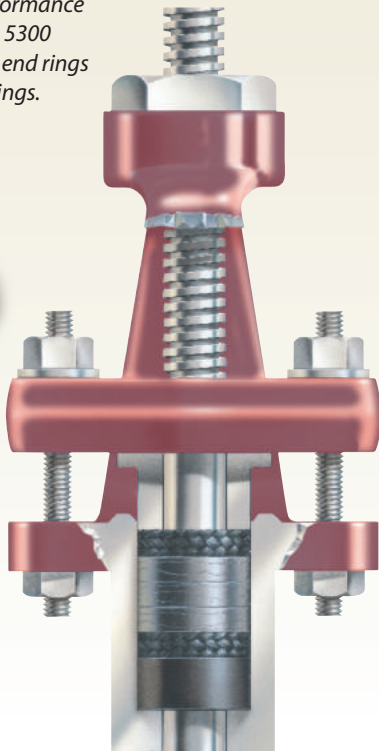
4. Valve Stem Leakage

- Block valves are the most common valve in plants and often experience costly leakage.
- Packing consolidates in the stuffing box due to loss of packing volatiles at high temperatures.

Chesterton Block Valve Sealing Solutions

Chesterton 5300 Solution

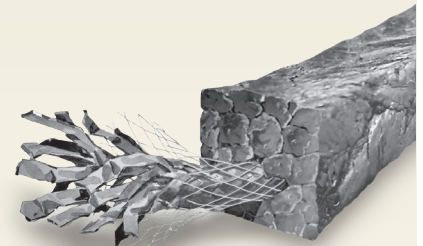
Chesterton 5300 engineered sealing sets deliver maximum performance on the most critical valves. 5300 is used with either braided end rings or 5600 high density GTP rings.



Chesterton Block Valve Sealing Solutions

Chesterton 1601 Solution

The 1601 packing combines layers of graphite strands braided into one. Each strand is reinforced by an Alloy 600 mesh covering and is braided to form a dense pliable packing. The 1601 is a high temperature non lubricated and a passive corrosion inhibitor packing that can be certified for nuclear service.



1. Low Friction

- Proprietary construction reduces surface contact while graphite platelets and surface lubricants reduce stem friction.
- 1601 is a long term, low friction, non-hardening packing used in both high and low temperature applications.

2. Standardization

- Reduce inventory and complexity with one standard spool of packing.
- Seals pressures to 345 bar g (5000 psig) and temperatures to 650°C (1200°F) off the spool.

3. Corrosion Control

- 1601 minimizes stem replacements, stuffing box machining and costly leakage. 1601 incorporates passive corrosion inhibitors to minimize galvanic corrosion. Unlike active inhibitors such as zinc, passive inhibitors are not consumed.

4. Sealability

- Long-term sealability is maintained as a result of the quality and design of Chesterton 1601.

Emissions Service

Common Block Valve Sealing Concerns

1. Excessive Stem Friction

- Breakaway friction can make valve operation difficult and unreliable.
- Excessive force used to open and close the valve can cause internal damage to the valve and packing.

2. Packing Inventory and Installation

- Multiple packing styles used to seal block valves.
- Two packing styles installed for one valve application.

3. Stem and Stuffing Box Corrosion

- Degradation of stem and/or bore due to pitting.

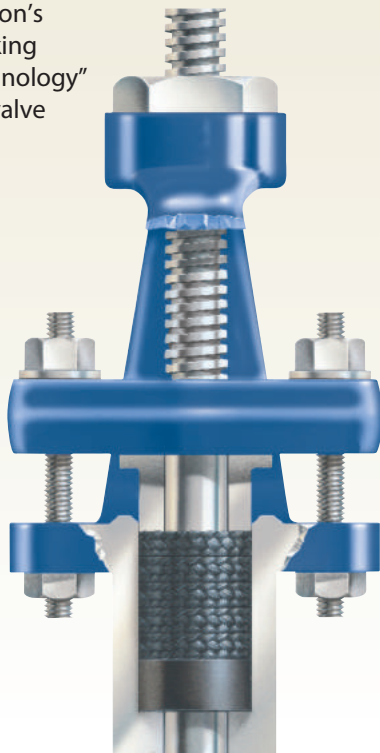
4. Emissions Control

- Block valves are a major source of fugitive emissions.
- Governmental and environmental regulations require tight control of VOC and VHAP emissions.
- Non compliance can result in costly fines.
- LDAR monitoring and reporting can add considerable expense.

Chesterton Block Valve Sealing Solutions

Chesterton 1622 Solution

1622 Low Emissions Valve Packing is Chesterton's certified "Low-Leaking Valve Packing Technology" solution for block valve emissions services.



Chesterton Block Valve Sealing Solutions

Chesterton 1622 Solution

The 1622 Low Emissions Valve Packing combines layers of graphite strands braided into one. Each strand is reinforced by an Alloy 600 mesh covering, has blocking agents added, and is braided to form a dense, flexible packing. The 1622 is then impregnated with high temperature blocking agents, lubricants, and a passive corrosion inhibitor.



1. Low Friction

- Proprietary construction reduces surface contact while graphite platelets and surface lubricants reduce stem friction.
- 1622 is a long-term, low friction, non-hardening packing used in both high and low temperature emissions applications.

2. Standardization

- Reduce inventory with one single standard style.
- Reduce installation errors that can be caused with using a two spool emissions packing.
- Reduce training with a simple, single spool installation.
- Seals pressures to 345 bar g (5000 psig) and temperatures to 650°C (1200°F).

3. Corrosion Control

- 1622 minimizes stem replacements, stuffing box machining, and costly leakage. 1622 incorporates passive corrosion inhibitors to minimize galvanic corrosion. Unlike active inhibitors such as zinc, passive inhibitors are not consumed.

4. Emissions Reduction

- Proprietary construction reduces emissions of VOCs and VHAPs to consent decree compliance requirements.
- 1622 has been independently tested to API 622 and Chevron Texaco standards.
- Reduce LDAR monitoring costs
- Meets certified "Low-Leaking Valve Packing Technology" requirements.
- Passes API 607 Fire Test

Valve Pack Warranty for Emissions

Chesterton 1622 packing will not leak in excess of 100 ppm for a period of 5 years. See your local Chesterton representative for conditions and details of warranty.

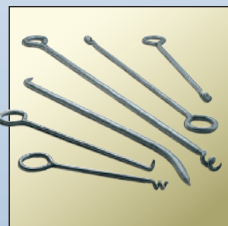
Packing Tools

Having the proper tools aids in the effective installation and removal of valve packings. Chesterton packing extractors, cutters, and tamping tools provide necessary equipment needed to properly install and remove packings.



Chesterton Sure-Cut Packing Cutter

The Sure-Cut Packing Cutter will save time, money, and braided packing while providing precision butt and skive cuts for the highest quality packing installations.



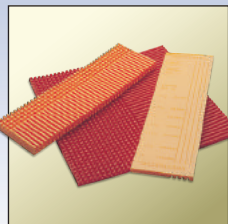
Chesterton 242 Stiff Packing Extractors

The 242 Stiff Packing Extractors are made of a special tool steel to withstand the roughest usage. The 242 packing tools are only sold in a complete set of six.



Chesterton 253 Flexible Packing Extractors

Extractors are used for strong pull packing removal. Constructed of high-strength aircraft cable, precision heat-treated extracting worn, and unbreakable rotary-swaged assembly. Sold in sets of four tools.



Chesterton 176 Tamping Tools

The Chesterton 176 Tamping Tools are applicable for use on valves and pumps to tamp the packing into the stuffing box.

Global Solutions, Local Service

Since its founding in 1884, the A.W. Chesterton Company has successfully met the critical needs of its diverse customer base. Today, as always, customers count on Chesterton solutions to increase equipment reliability, optimize energy consumption, and provide local technical support and service wherever they are in the world.

Chesterton's global capabilities include:

- Servicing plants in over 113 countries
- Global manufacturing operations
- More than 500 Service Centers and Sales Offices worldwide
- Over 1200 trained local Service Specialists and Technicians

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