FLOWSERVE

Worcester Controls
Products for the Defence Industry

Experience In Motion

FLOWSERVE FLOW CONTROL (UK) LTD

QUALITY STATEMENT

BS EN ISO 9001

FM 00707

It is the policy of the Company to provide products and services that satisfy performance, reliability, safety, customer and legislative requirements so as to ensure the long term satisfaction and loyalty of our customers.

It is the responsibility of all employees to ensure this goal is met by a commitment to professionalism and a pride in the business.

ISO 9001 and the standards specified and detailed in our relevant manuals, procedures and issued work instructions are a minimum requirement and it is incumbent on all employees, from the most senior manager down, not only to strive to exceed them but to ensure that we are able continually to improve the quality of the goods and services we supply and the effectiveness of our Quality Management System.

It is only in this way that we will preserve and continue to maintain our reputation for having the highest quality products and the best available supporting services.

The Quality Policy and Company objectives are continuously reviewed to ensure their continuing suitability, adequacy and effectiveness. Such reviews are conducted in the 6-month Management Review by Senior Management.

BS EN ISO 9001

PED 97/23/EC

ATEX 94/9/EC

SIL BS EN 60508-1 & 2

Lloyd's Register Type Approval

44 / 45

Over 30 years ago, Worcester Controls' original three-piece valve was responsible for the development of the UK ball valve market. Today, Worcester's Series 44 has become renowned throughout the world as the industry standard. The valve's wide range of field applications is testimony to its ability to provide long life and tight shut-off. For you the customer, this proven track record of reliability means peace of mind when selecting a ball valve.

As part of the original design philosophy, the three-piece valve eliminates the need for the customer to provide pipe flanges, as the ends supplied are suitable for connection directly onto the pipe. In addition they allow highly flexible permutations in terms of body construction materials as well as seat and seal materials. Furthermore, valve design variations and a range of body connectors mean that the Series 44/45 range can match the specific requirements of virtually any service application.

As well as long-term reliability and design flexibility the Series 44 and 45 range is notable for its ease of maintenance. By removing 3 of the 44's body bolts or 5 of the 45's body bolts, the valve body can be simply swung out of line, thereby facilitating dismantling and re-assembly.

Remote actuation is also straightforward, where torque efficiency ensures a compact valve/actuator package facilitated by accurate alignment of the valve and actuator giving the complete package an extended life. The Norbro pneumatic and electric actuators are featured on page 16 of this brochure.

APPROVALS

The Worcester 44 Series is to both NES 359 and NES 360 in a wide range of materials from nickel aluminium bronze to low magnetic permeability stainless steels.

SIZE RANGE

The Series 44/45 range of valves is available in 13 nominal bore sizes from ¼"-8" (8-200mm). A full bore version of this product is also available in sizes ¼"-6" (8-150mm).

BODY CONNECTORS

Both Series 44 and 45 are offered in a variety of screwed, socket weld, butt weld or solder ends with options including extended weld ends to allow welding in-line without dismantling. Please note that different types of end connector can be bolted to the body to match specific customer requirements.

In addition, the design permits the valve to be simply manifolded or bolted direct to vessels, tanks, etc.

STEM

The stainless steel stem is of blow-out proof design (i.e. inserted from inside the body). The standard assembly is anti-static while other options include alternative stem materials eg. high tensile steel for problem applications.

BALL

The ball features a pressure equalising hole to balance pressure between the flow bore and the valve cavity when the valve is in the open position.

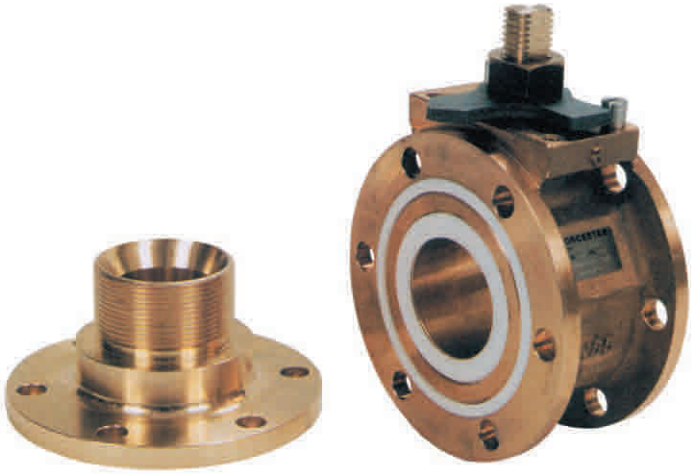
SPECIAL APPLICATION BUILDS

Special build variations of the 44/45 range are available for the following applications:

- Oxygen
- Helium
- Vacuum
- Nuclear
- Ammonia
- Slurries
- Sour Gas

For other special applications please consult Worcester.

44 / 45



MATERIALS OF CONSTRUCTION

ITEM AND DESCRIPTION	¼-2"	2½"	3-6"	8"
BODY				
Carbon Steel ASTM A105	●			
Carbon Steel ASTM A216 WCB		●	●	●
Stainless Steel ASTM A351 CF8M		●	●	●
Stainless Steel ASTM A182 F316	●			
Aluminium BS1472 HF30TF	●			
Aluminium BS1490 LM25TF		●	●	
Nickel Aluminium Bronze DG SHIPS 1043	●			
Brass BS2872 CZ122	●			
Gunmetal DG SHIPS 203A		●	●	
Silicon Aluminium Bronze DG SHIPS 1044	●			
BALL				
Stainless Steel 316	●	●	●	●
Nickel Aluminium Bronze DG SHIPS 1043	●	●		
Nickel Aluminium Bronze NES 747 PT1			●	
Brass BS2874 CZ121 (¼-1")	●			
BS2871 CZ126 (1¼-2")	●			
Gunmetal BS1400 LG4		●	●	
Titanium ASTM B348 G12 (¼-1")	●			
ASTM B337 (1¼-2")	●	●	●	

ITEM AND DESCRIPTION	¼-2"	2½"	3-6"	8"
BODY CONNECTOR				
Carbon Steel ASTM A105	●	●	●	
Carbon Steel ASTM A216 WCC				●
Stainless Steel ASTM A351 CF3M				●
Stainless Steel ASTM A182 F312	●	●	●	
Aluminium BS1472 HF30TF	●			
Aluminium BS1490 LM25TF		●	●	
Nickel Aluminium Bronze DG SHIPS 1043	●			
Brass BS2872 CZ122	●			
Gunmetal DG SHIPS 203A		●	●	
Silicon Aluminium Bronze DG SHIPS 1044	●			
STEM				
Stainless Steel 316	●	●	●	●
Stainless Steel BS970 431S29	●	●	●	●
Nickel Aluminium Bronze DG SHIPS 1043	●	●		
Brass BS2874 CZ112	●			

SEATS

Please refer to pages 13-15

ALTERNATIVE MATERIALS OF CONSTRUCTION

In addition to the standard material options listed above, body and trim materials are available in Hastelloy, Monel and other exotic metals - Please consult Worcester Controls.

OPTIONAL FEATURES

- Locking facility
- Lagging extensions
- Limit switches
- Gear-box operators
- Pneumatic/electric actuation

F44

The Series F44 is a fire-safe variant of the renowned Worcester three-piece range of ball valves. The major benefits of Worcester's three-piece valves are their inherent ease of maintenance and compact lightweight design. The F44 has been fire-tested in accordance with SS6755 Part 2 and features two encapsulated graphite body seals and a graphite gland seal assembly for dependable, leak-tight integrity. In addition high tensile body connector screws are used for their strength in fire conditions, along with an integral location spigot to ensure correct alignment of the body connector.

Worcester's new, modular Series F88 is the first of a range of high performance valves designed to extend still further the life and capabilities of standard three-piece valves for a variety of applications.

APPROVALS

The Worcester F44 Series is to NES 359 for service with high pressure fuel systems.

The new Worcester F88 Sense conforms to BS5351, BS6755 Parts 1 and 2, ISO 10497, ANSI B.16-34, BS5500 and NACE MR.01.75.93.

SIZE RANGE

This series is available in 8 nominal bore sizes from ¼"-2" (8-50mm) and full bore from ½"-1½" (15-40mm).

MATERIALS OF CONSTRUCTION

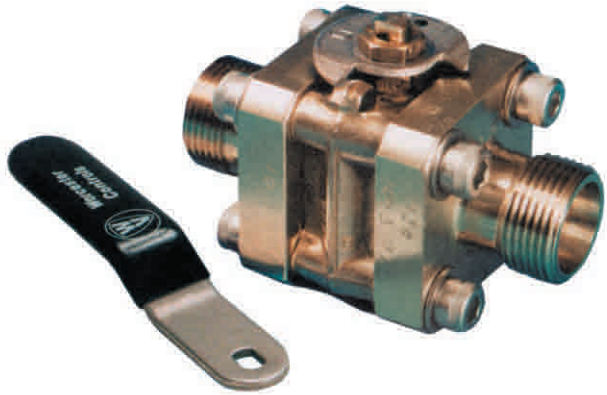
The valve body and end connectors are available in the following materials:
Carbon Steel ASTM A105
Stainless Steel ASTM A182 F316 [Ends F316L]
Stainless Steel BS970 316S16
Trim materials are available as stainless steel 316.
Also available are other exotic metals - please consult Worcester Controls for further details.

BODY CONNECTORS

The standard variation available with the 44/45 Series range also are available for use with the F44 and F88 Series.

STEM	BENEFITS
• Graphite gland seal	For optimum stem sealing integrity
• Encapsulated graphite body seal	For leak-tight capability in fire conditions
• Metal-to-metal ball/fire lip seal	To minimise leakage through the valve after a fire
• High tensile bolts	Maintains integrity of pressure vessel during fire
• Compact size	Takes less space
• Lightweight	Minimise need for pipe supports
• Three-piece design	For simple maintenance

5HP44



Worcester's 5HP44 has been developed specifically for use on high pressure systems.

Typical media would be oil, inhibited water or nitrogen gas.

The 5HP44 is derived from Worcester's proven Series 44 three-piece valve, and incorporates a number of product features, all designed to optimise the valves performance. These include high pressure seals, thicker flanges on the body connectors, high tensile bolting, special acetal resin seats and a high strength stem,

Compared with other types of high pressure valves, the 5HP44 offers greater flow rates and easier operation (whether manual or automated).

SIZE RANGE

The Series 5HP44 is available in 8 nominal bore sizes from ¼"-2' (8-50mm) and full bore from ½"-1½ (15-40mm).

PRESSURE RANGE

It has been designed to accommodate non-shock hydraulic pressures of up to 345 bar (5000psi). However corresponding maximum gas pressures are 207 bar (3000psi) for valve sizes ¼"-1" (8-25mm) and 165 bar (2400psi) for valve sizes 1¼"-2" (32-50mm).

TEMPERATURE RANGE

Whilst acetal resin seats will tolerate temperatures up to 80°C the use of PEEK seats extends the valves temperature capability to 170°C, in conjunction with the appropriate stem and body seals.

MATERIALS OF CONSTRUCTION

The valve body and end connectors are available in the following materials:
Carbon Steel ASTM A105
Stainless Steel ASTM A182 F316 [Ends 316L]
Nickel Aluminium Bronze DGS 1043
Trim materials are available as stainless steel 316 or NAB DGS 1043. Also available in Hastelloy, Monet or any other exotic metals - please consult Worcester Controls for further details.

BODY CONNECTORS

The standard variations available with the 44/45 Series range also are available for use with the 5HP44 Series with the addition of further options such as connectors to be used with Keelaring Stud Couplings which is to NES 359.

STEM	BENEFITS
• High tensile cap-head screws	High pressure integrity
• Bottom entry stem	Blow-out proof safety
• Quarter turn design	Quick and easy operation
• High tensile stem	Greater operational reliability
• Nylatron thrust seal	Maximum stem integrity
• Three-piece design	For simple maintenance
• Wide range of body connectors	Greater pipe connection choice

55

Worcester's 55 Series range of ball valves is available as a one or two-piece fully flanged valve in either reduced or full-bore construction.

APPROVALS

The Worcester 55 Series is to both NES 359 and NES 360 in a wide range of materials from nickel aluminium bronze to low magnetic permeability stainless steel.

The valve is designed in accordance with BS5351 and tested in accordance with BS6756.

SIZE RANGE

The Series 55 range of valves is available from ½"-2" (15-50mm) reduced bore and up to 1" (25mm) full bore as a one-piece construction, and from 2½"-10" (65-250mm) reduced bore and 1½"-10" (40-250mm) full bore as a two-piece construction. Please note that this range of valves also includes a 5" (125mm) valve in both full and reduced bores.

FLANGE CONNECTORS

These are integral to the body and are available fully machined to BS1560 (ANSI B16.5) or alternatively to BS4504 (PN16/40).

Also available are flange connections, such as instantaneous hose couplings to BS336, and to specific Naval Standards if required - please consult Worcester Controls.

55

STEM

The standard stem is of a blow-out proof design (i.e. inserted from inside the body) and is anti-static as standard. For available options of materials of construction please refer to page 5 of this brochure.

BALL

The ball features a pressure equalising hole to balance the pressure between the flow bore and the valve cavity when the valve is in the open position. For available options of materials of construction please refer to page 5 of this brochure.

MATERIALS OF CONSTRUCTION

The valve body is available in the following materials:

Carbon Steel	ASTM A216 WCB
Stainless Steel	ASTM A351 CF8M
	ASTM A182 F316
	BS1 540 316C16

Leaded Gunmetal DG Ships 203A
Nickel Aluminium Bronze NES 747
In addition to the standard material options listed above, body and trim materials are available in Hastelloy, Monel and other exotic metals - please consult Worcester Controls.

OPTIONAL FEATURES

- Locking facility
- Extensions for rod-gearing
- Lagging extensions
- Limit switches
- Gear-box operators
- Pneumatic/electric actuation

18 / 19

THE MODULAR APPROACH TO FLEXIBILITY

As part of Worcester's policy of continuous product development the modular Series 18/19 multi-way valve has been introduced to satisfy the need for diverting media through a number of flow paths. Currently in use on marine, chemical and food services, the potential applications for this new valve are virtually limitless. For example, the Series 18/19 can be installed in place of two or more existing standard valves, thereby improving system integrity and reducing the number of actuators to only one.
The Series 18/19 is primarily of a firesafe design, complying with BS 5351 and is offered in both full and reduced bore. With its four seat design, it provides straight-through flow capability to minimise pressure drop.
This unique valve design is based on a modular principle which offers virtually limitless flow permutations.
In addition, the Series 18/19 is offered as either a high integrity valve for toxic media, or with retro-fitting steam jackets.

SIZE RANGE

The Series 18/19 is available in eight sizes ranging from ½"-6" (15 to 150mm).

BODY PORTING

The body is designed to allow for a maximum of five ports, but with the use of interchangeable inserts, the valve can be re-configured to suit customer requirements.

PIPE CONNECTIONS

FLANGES Another example of the modular flexibility of the Series 18/19 is the use of slip flanges which can accommodate ANSI/DIN and other standards up to and including Class 300 pressure rating. Furthermore, during installation, these flanges facilitate alignment of the valve in the pipework.

FACE TO FACE LENGTHS The screwed insert design allows for most ANSI/DIN face to face lengths, as well as longer non-standard dimensions.

SCREWED AND WELD ENDS As a variation on the above, the Series 18/19 can be supplied with either female screwed ends (NPT and BSP variants), socket weld or butt weld ends to suit schedule pipe to BS 1600. For further information, consult Worcester Controls.

BALLS

The parallel-ported ball is available in a variety of flow path configurations, for example 'L' port, 'T' port, double 'L' port or other designs. The problem of cross-contamination on diverter valves can be addressed by using a bottom-entry, three-flanged valve with an L-ported bell operated through 180°.

FLOW INDICATION

The valve is designed with a stem assembly incorporating foolproof orientation of ball to stem and stem to indicator, thus providing external indication of ball position to verify correct operating sequence, whether manual or actuated.

SEATS

A range of seat materials can be supplied to accommodate various media and pressure/temperature conditions. Worcester is probably unique in the British valve industry in manufacturing all its own soft seats, thereby retaining full control over quality.

MATERIALS OF CONSTRUCTION

While standard materials of construction are stainless steel or carbon steel, this valve can be manufactured in potentially any available material to allow full compatibility with the pipework/process conditions. The photograph above shows the valve in nickel aluminium bronze.

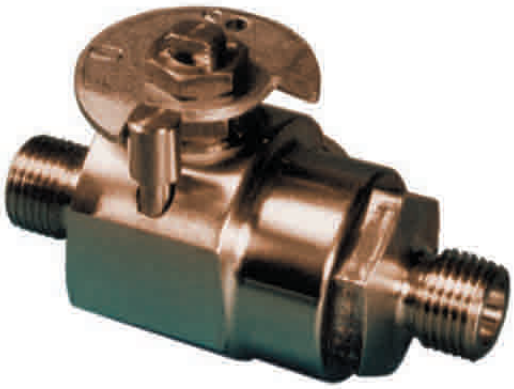
ACTUATION

The introduction of Norbro's 180° Series 33 pneumatic actuator now allows two or three position capability between 0 and 180°. This can also be achieved with Norbro's Series 75 electric actuator. Together with the ISO mounting platform on the valve, this provides for an easily assembled, yet fully integrated multi-way valve system.

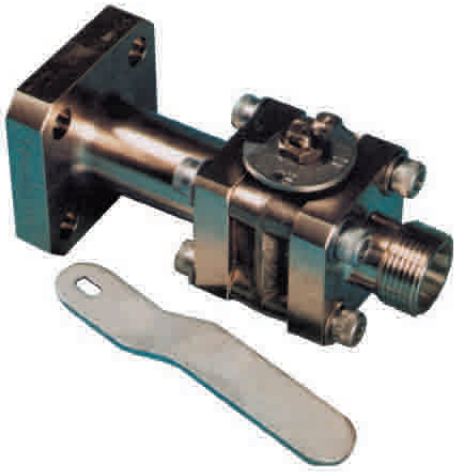
For further details on the Multiway valve see brochure PB16

Customised Valves

Worcester Controls have over thirty years experience in the conception, design and manufacture of unique products to meet precisely our customers exacting requirements. Our policy is to provide new, advanced-design valves and actuatom which has put us in the fore-front when products are required for critical applications of a highly specialised nature. Some of these customised valves are shown on the following pages.



8mm HP42 Series ball valve in nickel aluminium bronze suitable for high pressure instrumentation systems up to 280 bar. Also available in stainless steel and to class 1, 2 and 3 specifications.



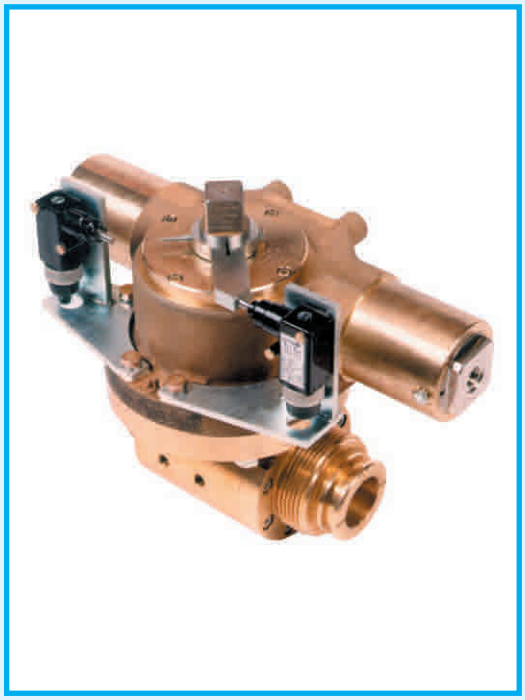
Class 2 nickel aluminium bronze 44 Series ball valve with dissimilar ends. One end has an extended flanged connector and the other is fitted with a male threaded connector.

Valve manifold assemblies manufactured in nickel aluminium bronze and carbon steel fitted with Worcester 44 Series nickel aluminium bronze ball valves.

Class 1 nickel aluminium bronze submarine hull valve fitted with hydraulic operated actuator,

Customised Valves

50mm Class 1 nickel aluminium bronze submarine ballast tank valve fitted with hydraulic operated actuator.



40mm nickel aluminium bronze emergency blow high pressure ball valve complete with integral pneumatic actuator.

65mm Class 2 nickel aluminium bronze ball valve and hydraulic actuator for submerged seawater applications in submarines.

65mm Class 1 nickel aluminium bronze ball valve with universal jointed drive shaft for remote actuation applications.

Seats

SEAT MATERIALS

PTFE SEATS (T)
Made from virgin PTFE, suitable up to a pressure of 69 bar (1000 p.s.i.) and temperatures between -30°C and +230°C (depending on pressure). PTFE is the most common sealing material and is suitable for almost all media as PTFE has excellent chemical resistance. Seat colour white with six relief slots.

RE-INFORCED PTFE SEATS (R)
Suitable for temperatures from -80°C to +230°C at pressures up to 103 bar (1500 p.s.i.), these seats are made from glass reinforced PTFE. They are therefore stronger than virgin PTFE seats and have higher pressure/temperature ratings. Chemical resistance is the same as virgin PTFE. These seats can be identified as being either white with a blue stripe or plain white with seven relief slots.

VXI SEATS (H)
A 25% glass filled PTFE material suitable for temperatures from -30°C to +260°C at corresponding pressures up to 130 bar (1500 p.s.i.). This material has a greater pressure/temperature capability than 15% glass filled PTFE. Seats are blue in colour.

FLUOROFILL SEATS (P)
A carbon, glass and graphite filled PTFE material suitable for temperatures ranging between -197°C to +260°C, at corresponding pressures up to 103 bar (1500 p.s.i.). An excellent seat material for steam and thermal services as well as good abrasion resistance, due to its high cycling capabilities it is the recommended soft seat for modulating control applications. Seat material black. For control valve applications, refer to Worcester's brochure PB30.

ACETAL RESIN SEATS (Y/D)
Machined from acetal homopolymer, these seats are rated at pressures up to 345 bar (5000 p.s.i.) depending on application. The temperature range is -30°C to +80°C, but please note that this material should not be used on oxygen service. Colour off-white. For certain applications, a PTFE-filled social seat (Lubetal) is available. Colour green.

PEEK SEATS (A/X)
PEEK is Poly Ether Ether Ketone. This seat is rated at pressures up to 345 bar (5000 p.s.i.) at corresponding temperatures of -30°C to +280°C, demonstrating outstanding pressure capabilities at elevated temperatures. PEEK has excellent chemical and abrasion resistance. Colour brown up to 1¼" (32mm) and black on larger sizes.

METAL SEATS (N)
Suitable for -7°C to +280°C at 69 bar (1000 p.s.i.). In 316L sintered metal filled with PTFE, this material combines the strength and abrasion resistance of metal with the lubricity of PTFE. The seat is grey in colour, has a seal groove in the back face, and is noticeably heavier than plastic seats. These seats do not have relief slots. Maximum allowable pressure drop for liquid is 34 bar (500 p.s.i.) and 10 bar (150 p.s.i.) for steam. A graphite-impregnated metal seat is also available for higher temperature applications.

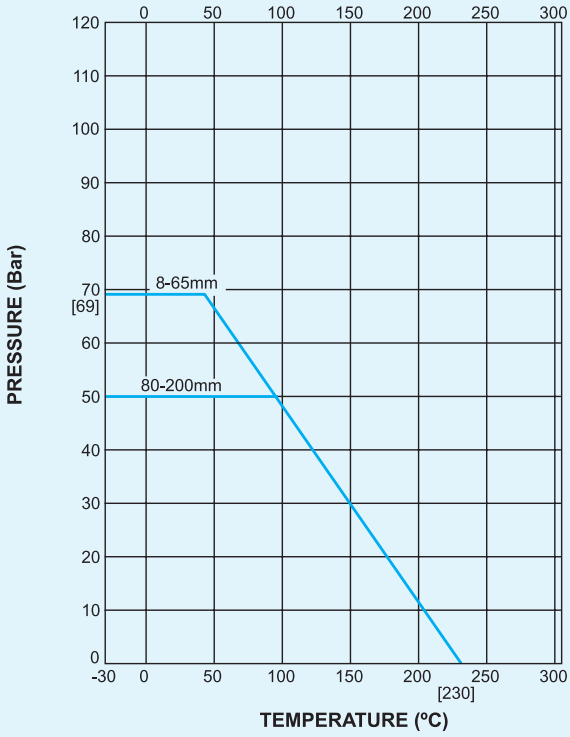
OTHER MATERIALS AVAILABLE
- Carbon filled
- Lubetal
- Kel-F
- Buna
- PCTFE
- UHMWPE
- FEP
- Vespel

Ths is an indication of seat material capabilities but is dependent on valve size, build and application. For further information, consult Worcester.

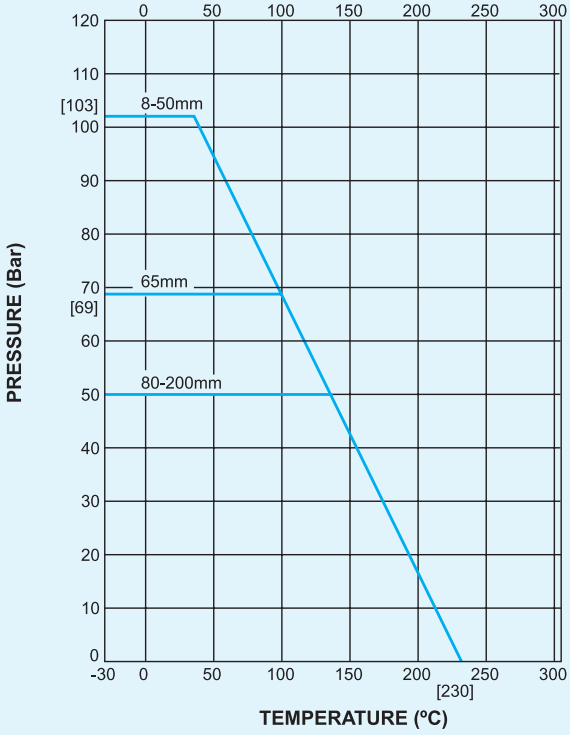
Seats

PRESSURE TEMPERATURE RATINGS ¼" - 8" (8-200mm)

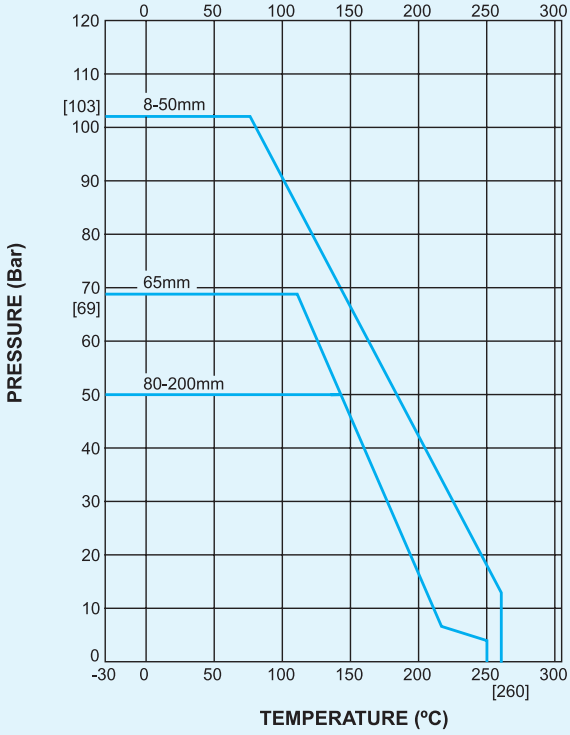
VIRGIN PTFE (T)



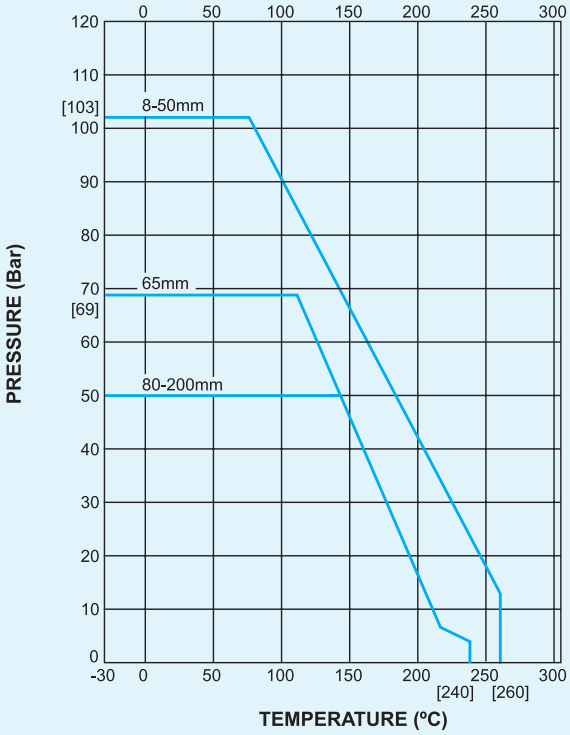
RE-INFORCED PTFE (R)



FLUOROFILL (P)

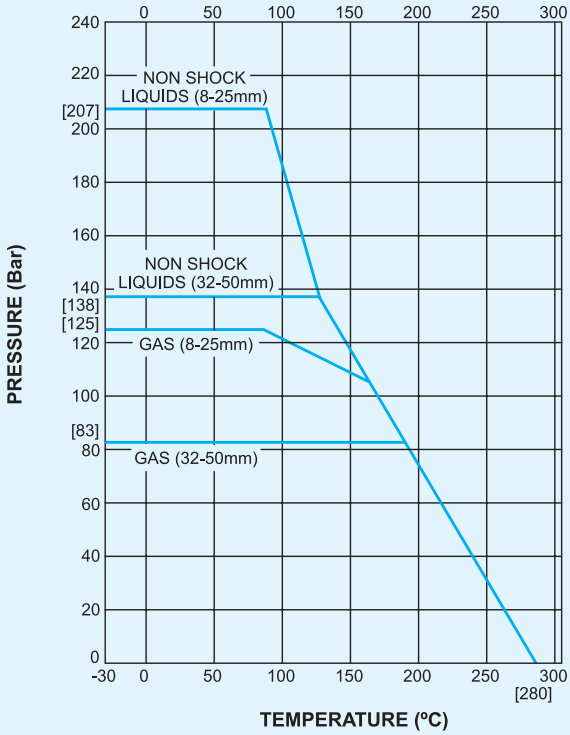


VXI (H)

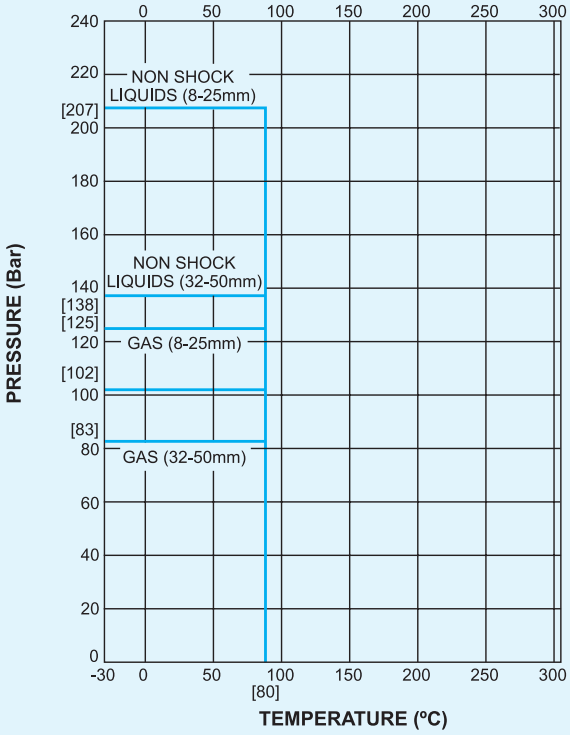


Seats

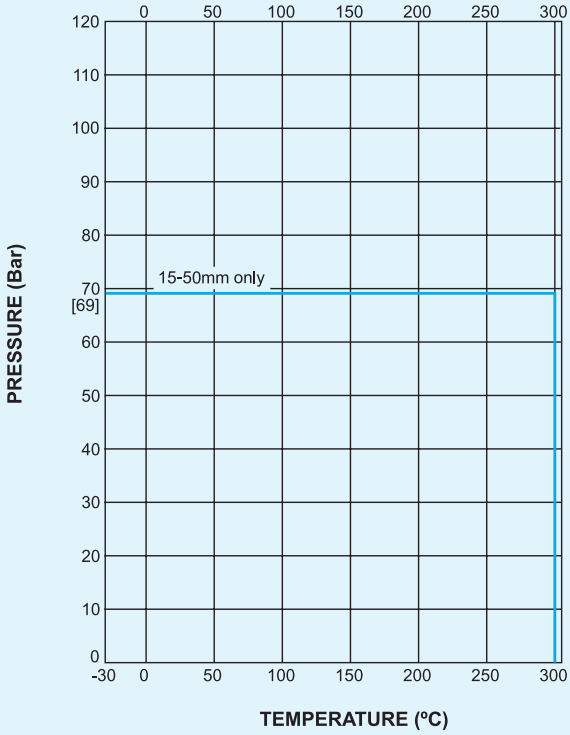
PEEK (A/X)



ACETAL (Y)



METAL (N) ALPHA



IMPORTANT NOTE

The information given in these pressure/temperature graphs indicate the maximum performance capabilities of these seat materials.

The full potential of virgin and re-inforced PTFE can be realised in the standard three-piece valve build. For flanged valves please refer to the relative pressure/temperature graphs for the flange valve ratings.

For applications requiring the greater pressure/temperature capabilities of the other seat materials, it is essential that the appropriate valve build is specified. Sealing integrity at low pressure may not be maintained following constant use at high pressure.

It should be noted that for the Series 44, with brass and aluminium bronze materials, the maximum cold working pressure is 69 bar, and with aluminium, 25 bar.

To ensure that the correct valve is supplied, please consult Worcester Controls.

Norbro

SERIES 40R PNEUMATIC ACTUATOR

Since its earliest days, the name Norbro has been a by-word for high performance pneumatic actuators.

Norbro's rack and pinion design, combined with its reliability, ease of maintenance and quality of construction, has established the 40R as the world's leading quarter turn actuator. In addition, its modular design allows for simple attachment of a variety of ancillaries (eg. solenoids, switches, etc).

The 40R is available in a wide range of sizes for efficient and economical torque matching, and of course is compatible with all quarter-turn valves, with simple mounting kit assemblies.

All are available in either double acting or failsafe spring return designs.

The Norbro 40R Series actuators are to NES 360 and have been successfully shock tested to 198.3G.

SERIES 75 ELECTRIC ACTUATOR

The Norbro Series 75 electric actuator is a compact, versatile unit designed to provide direct positive automatic operation of valves requiring 90° (and 180°) operation.

The Series 75 combines efficiency, safety and reliability and operates from either AC supplies or with DC motors.

It is constructed from light-weight materials and is available a with a variety of housings designed to BASEEFA, Name and CSA standards.

Easy to install and maintain, the Series 75 electric actuator provides the answer for a variety of low cost automated packages, and of course with the benefit of low energy consumption.

The Series 75 electric actuator has also been successfully shock tested up to 60G.

V-Flow

HIGH PERFORMANCE CONTROL VALVES

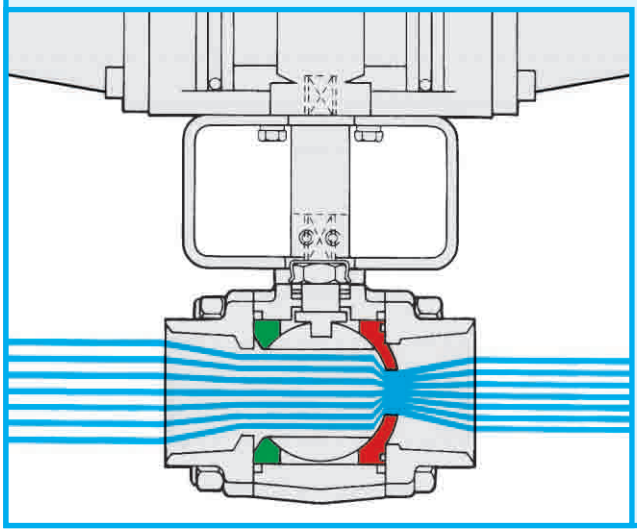
TRADITIONAL CONTROL VALVES

The most common control valves for industrial processes have been single and double ported globe valves powered by spring diaphragm or cylinder actuators with yoke type mounting brackets. Although globe valves offer good flow characteristics and can take high pressure drops, they have many features that become problems in high performance throttling applications. These include slow response to control signals, bulky actuators, sticking valve stems, leaking packings, limited flow capacity, excessive weight, poor shutoff capability, inability to function with fluids containing solids/fibres, high initial purchase price, difficult maintenance and poor interface with PLC or central computers.

Conventional throttling butterfly valves as well as segmented ball valves and cam action rotary valves have made advances but serious limitations remain; difficult maintenance, high purchase cost and sheer weight. They also have the friction, hysteresis and low response problems associated with adapting linear actuators and positioners for rotary actuation and control.

THE WORCESTER SOLUTION

Worcester's metal seat technology has opened a new chapter in the history of modulating control. It combines the simplicity of ball valves with the revolutionary characterized seat concept. The combination offers state of the art modulating control valves that are specifically designed for today's automated production needs. Worcester's new generation of advanced ball control valves virtually eliminates the problems associated with traditional control valves.



WHY ROTARY VALVES?

Industry turned to rotary valves to get more capacity [Cv] for its money, to reduce bulk and weight and to solve external leakage problems associated with globe control valve stem seals. In addition, many processes involving fluids with fibres and solids could not utilize conventional globe valves. But some throttling control problems were still not solved, including incompatibility with highly automated/computerized systems.

ADVANTAGES

- **Simplicity** Very low maintenance costs compared to globe and segmented ball rotary valves
- **Tight Shutoff** Exceeding Class VI and bubbletight
- **High Rangeability** Repeatable control through 95% travel
- **Low Cost** Purchase price substantially lower than competitive high pressure drop valves
- **Low Weight** About 30% lighter then comparable globe control assemblies
- **Compact Size** More room for other equipment
- **Shearing Action** Non-clogging control of fibres and solids
- **Low Flow Control** Cv down to .007 or better
- **Flexible Cv** Interchangeable seat angles or slots
- **Non-Clogging Flow Path** Straight through flow
- **Erosion Resistance** Self lubricated hard ball and seat surface, downstream throttling and straight path through the valves
- **Repeatability** Use of control couplings and matched ball and stem eliminates hysteresis
- **High Pressure Drop** Liquids up to 500 psi, steam up to 150 psi
- **High Temperatures** Above 200°C

Upstream resiliant or round metal seat
Characterised seat

Shock Testing

SHOCK TESTING

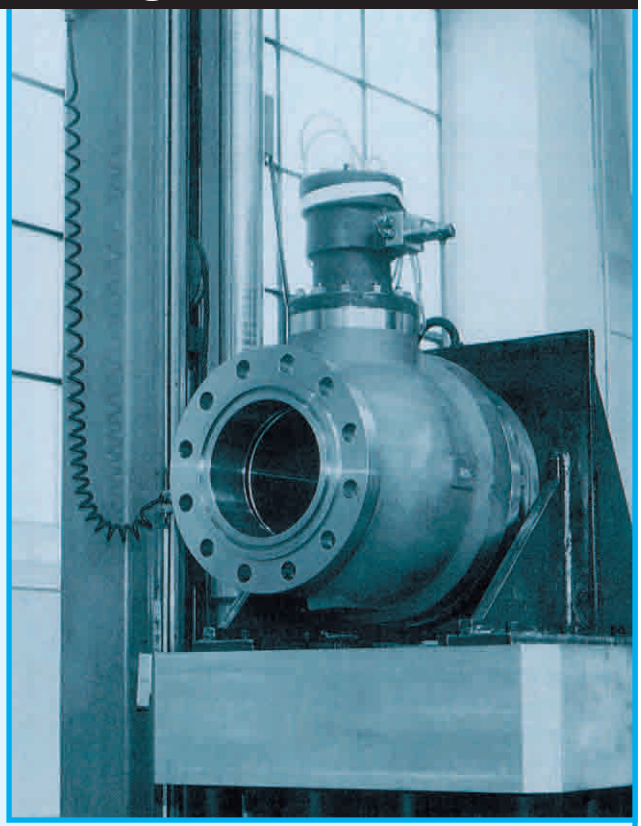
To meet the stringent Defence requirements Worcester valves and Norbro actuators have been subjected to a wide range of shock tests over the last twenty years. The successful results of these test have enabled Worcester Controls to become an approved supplier to navies throughout the world.

Shock tests have been carried out an our equipment to meet the Class I and Class II requirements of both submarines and surface warships including the conditions or BR 3021 Grade B and IEC 68-2-27 (1987 edition)

Shock tests have been successfully carried out up to 2000 G.

Approval has also been obtained on Worcester valves which have been subjected to underwater explosion tests.

For further information on specific requirements please contact our Technical Sales Office.



A 10" (250mm) fullbore Worcester valve undergoing shock tests.

Applications

Ball Valve Specialists for Navies Worldwide

TYPICAL APPLICATIONS

- Hull Valves.
- Seawater Displaced Systems.
- Diesel Exhaust Drain Valves.
- Condenser System Hull Valves.
- Auxiliary Vent and Blow.
- Hydraulic Systems - High Pressure Valves.
- Reverse Osmosis Plants.
- Air Purification Systems.
- Sanitary Systems.
- Air Systems.
- High Pressure Air Systems.
- Torpedo Tube Drains.
- Bilge and Tank Pumping.
- Drain Systems.
- Built-in Breathing Systems.
- Escape Systems.

- Battery Ventilation.
- Fuel Oil Systems.
- Air Induction and Exhaust Gas Systems.
- Lubricating Oil Systems.
- Internal Hydraulic Systems.
- External Hydraulic Systems.
- Low Pressure Air Systems.
- Seawater Cooling Systems.
- Air Conditioning Systems.
- Compensating Systems.
- Trim Systems.
- Main Ballasting Systems.
- Depth Gauge and Salinometer Systems.
- Speed Log Systems.
- Signal Ejectors.
- Torpedo Tube Flood and Drain Systems.
- Fresh Water Systems.
- Helium and Nitrogen Services.

Quality

Manufacturing Capability

Flexibility

Innovation

Over 30 Years Experience

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