



- Oliver Valves in the early 80's pioneered this concept, which has very much now become a standard world wide. Each Double Block & bleed has a unique number recording its factory history and we are now way above 100,000 of these units in installation worldwide.
- A smaller unit vs the traditional hook-up, bringing both piping and instrumentation isolation into one unit – this means;
- Less weight, which is significant on the top side of a platform, when you combine all the pressure instrument take-offs. Typical installation it is reduced from 33kg to 7kg, a weight reduction of 75%!
- Weight reduction is also an issue when take-off is horizontal, this instills a bending moment and could cause critical fracture of pipeline interface and is generally overcome by adding more stanchions & cussetting to support traditional installation, which adds even more weight.
- Cost reduction – typically 30% saving over traditional installation, which jumps up to 70% in the case of valves made from exotic materials for more exacting processes!
- Cost saving on site – the cost of one factory tested component, as opposed to different piping valves, instrument valves, flanges, connections and flanged seal rings and then the cost to raise purchase orders and expediting department to chase the parts in goods receivable, etc., and then the shipping costs are larger and weightier, specs must all be taken into account, rises in cost can be 30% of the overall cost. Coded welders could be required as well.
- Safety – including spool pieces the type of valve, i.e. standard 3-piece valve used in installation may have as many as nine additional leak points.
- Health & safety legislation is moving more and more towards testing at a considerable cost to each one of these joints after installation, cost of which can be excessive.
- Health & Safety – USA and abroad process safety management document OCEA 3132, here in the UK Health & Safety Executive application HSG253 which is readily downloadable free, states double block & bleed must be used. All these documents stem from the Piper Alpha disaster over 20 years ago and the P36 disaster in Brazil, both of which indicated double block & bleed as a marked improvement for safety.
- The 'top-hat' or T-section forging use of the body of the valve, and the H section use of flange to flange variance is upset forged, which means the grain flow of the material flows into the flange, making for a very strong body.
- First isolation is to a full piping valve ASME V111 specification, ball configurations whether they be standard 2-ball valves isolate and needle valve vent, 3-needle valves or 3-ball valves are all firesafe certified valves.
- Delivery – the DBB part machine program that was set-up many years ago, in which we machined all aspects of the double block & bleed apart from one aspect, the customer specifies which is the flange, which leads to very quick lead times.
- Any different variations, including vent and injection, ball range, exotic materials, all the options available from standard ball and needle valves.



1 ADVANCED DESIGNS

Our products conform to the latest international design specifications and are approved by leading companies.

2 TOUGH HANDLES

Rugged, 316 stainless steel, low torque, quarter turn handles will not rust in offshore service.

3 POSITIVE STOP PINS

A 316 stainless steel pin held into the body by a machined anti-vibration spline assures an absolute 90° turn.

4 HIGH PERFORMANCE SEATS

Unique enclosed seats offer great process compatibility but restrict creep or distortion in service. Our approach achieves high levels of seat integrity at low and high pressures.

5 FIRESAFE BALL VALVES

Go metal to metal in a fire to reduce leakage due to seat destruction.

6 BALL

This precision machined component is super finished assuring low operating torques.

7 THROUGH BORE OF BALL VALVES

True positive 90° opening combined with clear through bores across the range allows rodding.

8 PRECISION PROCESS THREADS

Super finished screwcut – not tapped threads – using advanced CNC machines ensure easy assembly and leak tight threads with reduced risk of galling.

9 SOLID BACKSEATED ANTI-BLOWOUT SPINDLE

Precision, rugged one piece stem incorporates anti-blow out feature and maintains seal integrity at all pressures. Anti-vibration lock nuts are standard to all products.

10 BODY SEALS

Totally contained 'O' ring type body seals for body integrity and additionally protecting internal body threads from process media.

11 DROP FORGED BODY

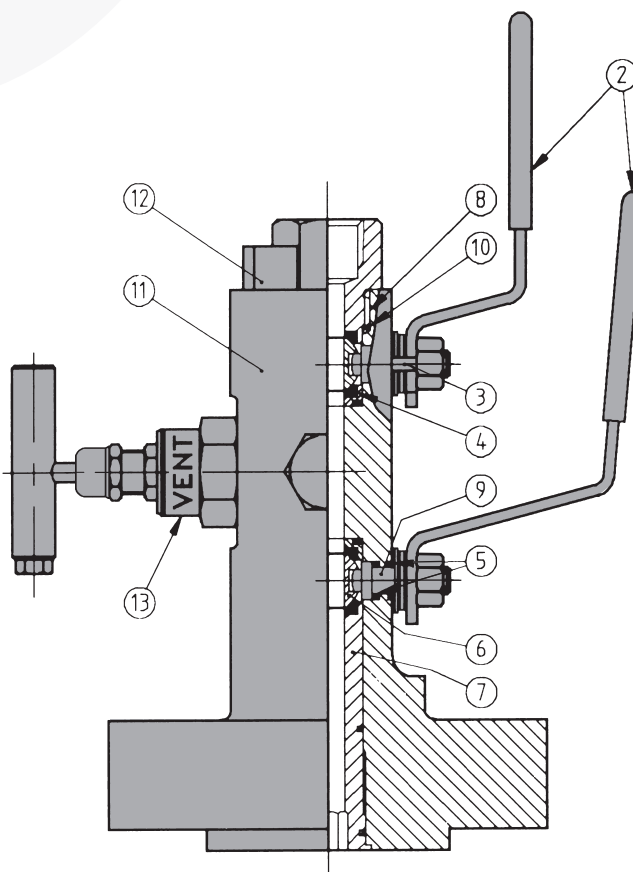
A rigid one piece drop forged body, eliminates potential leak points experienced with conventional hook ups.

12 'BLOK-LOK' (PATENT PENDING)

Anti-removable pin, non-welded connector locking system which prevents accidental disassembly when in service.

13 HEAVY DUTY FIRESAFE NEEDLE VALVES

Oliver's proven heavy duty needle pattern head unit features a rugged firesafe and tested construction.



EXPLOSIVE DECOMPRESSION

Explosive decompression occurs when gas at high pressure permeates into seal materials. When the gas pressure is reduced the absorbed gas expands which can cause the seals to swell and blister. Oliver Valves only use seal material within their 'Double Block and Bleed Valve' range that are resistant to explosive decompression.

OPTIONS

CARBON STEEL DOUBLE BLOCK AND BLEED VALVES have stainless steel end adaptors, seal housings and inserts as standard construction. The parts mentioned can also be made from carbon steel if specifically requested. Plating as standard with painting options available.

HANDLE LOCKING - /HL Oliver unique handle locking system will prevent accidental operation – tamper-proof.

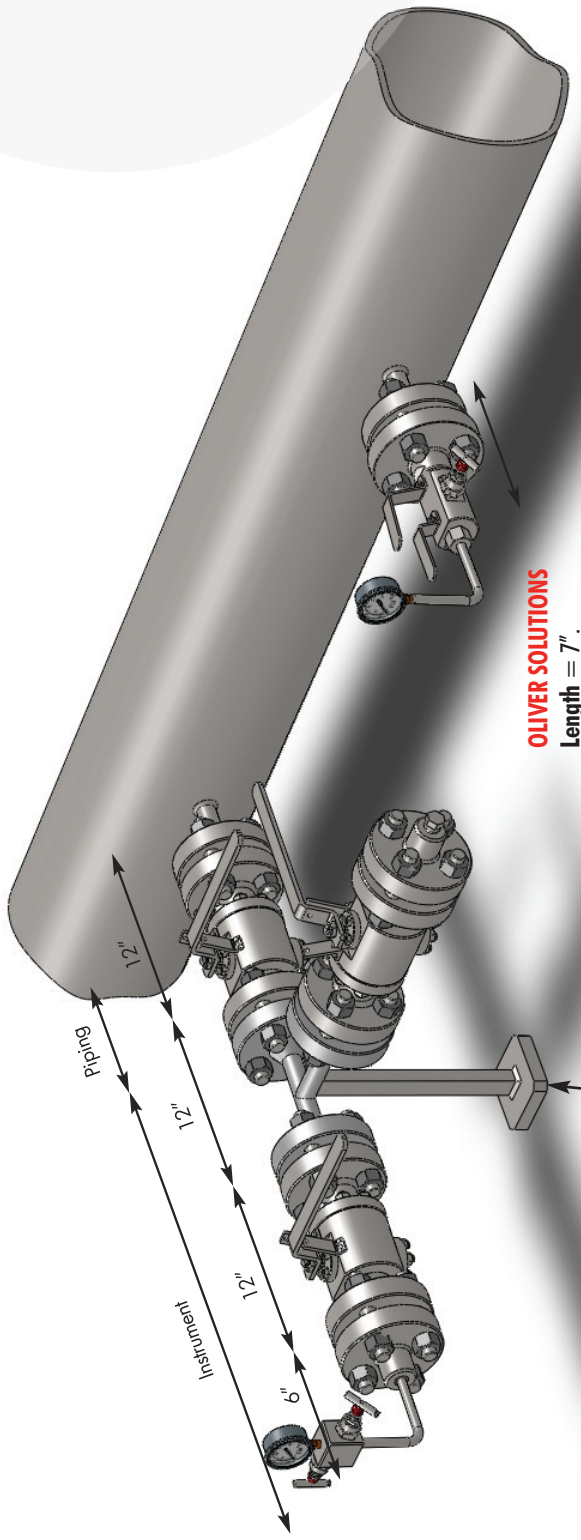
SPANNER ACTUATION - /SA Oliver tamper-proof spanner actuation – for ball valve handles only.

STANDARD

FIRESAFE - /FS Firesafe construction compliant with BS 6755 part 2, API 607 and API 6FA. Fully certified to Lloyds type approval certificate numbers 88/0345, 91/0117, 92/0140 and 93/00068. High temperature Graphite replaces PTFE for seals.

NACE - /NA Compliance to NACE specification MR-01-75 latest revision – suitable for sour service – resistant to sulphide stress corrosion cracking. 316 stainless steel is solution annealed for trims.





YOUR PROBLEM
 Length = 40".
 Weight = 100kg (based on 1.5" 1500 class).
 • 3 Ball & needle valve manifolds.
 • 24 Bolts.
 • 6 Gaskets.

Pipe support required due to high bending, movement / additional weight.

OLIVER SOLUTIONS
 Length = 7".
 Weight = 7kg
 • 1 valve.
 • 4 Bolts.
 • 1 Gasket.

Your Key Selling Points

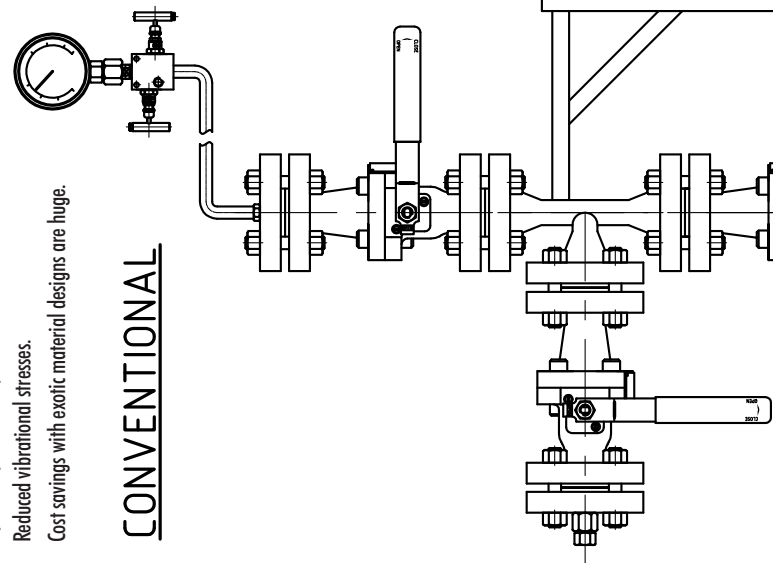
- We eliminate a terrific amount of space when compared with welding three individual valves together.
- We save a huge amount of direct labour and site installation costs.
- We have reduced leakage points massively - a huge benefit as fugitive emissions are so important.
- We have reduced costs.
- We only have one component to be ordered, not many as in the old applications, which can save on inventory and site confusion.
- We can get away from local site support by reducing the bending moment.
- We can bring the pressure instrument a lot closer to the point of pressure measurement thus saving space which is most important on skip mounting applications.
- Unique numbering system on each valve recording factory history (the "original manufacture being over 25 years and 200,000+ sold).



Oliver's unique approach offers the designer of sampling, draining, injection and pressure instrument take-off points a simple, rigid, compact, safe, low-cost option to "CONVENTIONAL PRACTICE". Our double block and bleed valves are used in critical applications, where cost, weight and space saving are paramount for:

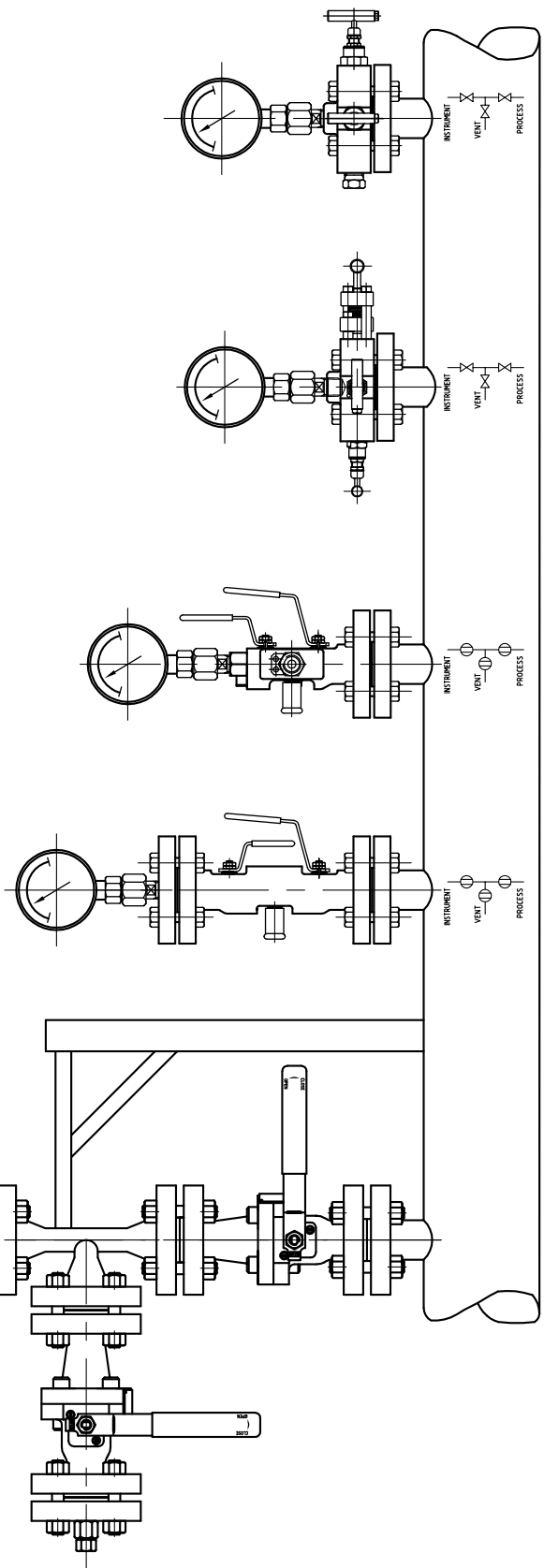
- Pressure instrument take-off points.
- Sampling systems, where a pipeline probe is integral with our valve.
- Chemical injection systems, where a check valve is part of our valve assembly.
- Drains for tanks and pipes, where space is restricted.
- High pressure firesafe diverter valves.
- Hydraulic power unit systems.
- Reduced vibrational stresses.
- Cost savings with exotic material designs are huge.

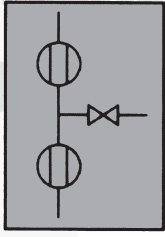
CONVENTIONAL



OLIVER VALVES SOLUTIONS

- DOUBLE BLOCK AND BLEED VALVE TO FLANGE
- DOUBLE BLOCK AND BLEED BLEED FLANGE TO SCREW
- DOUBLE BLOCK AND BLEED AND BLEED SLIMLINE MONO FLANGE
- DOUBLE BLOCK AND BLEED BLEED MONO FLANGE

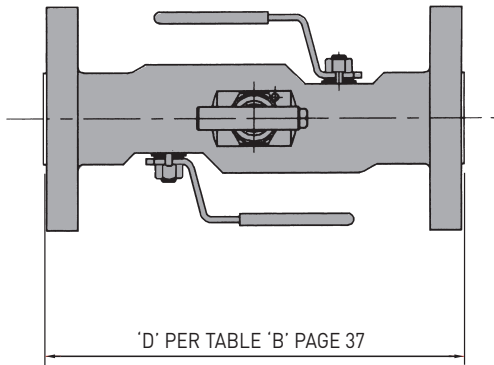
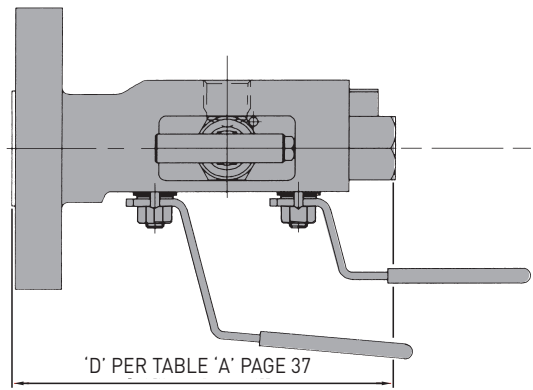




Machined from a single piece 'grain flow controlled' forging. This valve features two in-line ball pattern primary and secondary isolating valves with a heavy duty needle valve vent, offering 'through to process' rodding in bore sizes from 10mm to 20mm (0.4" to 0.8").

This all forged manifold comprises two in-line ball primary and secondary isolating valves with a heavy duty needle valve vent. Offering through to process rodding in bore sizes from 10mm to 14mm (0.4" to 0.55").

D TYPE DOUBLE BLOCK & BLEED



FLANGE TO PIPE – THREE BORES – THREE STANDARD MATERIALS

SIZE RANGES		
BALL VALVE BORE 0.40"/10mm CV 6.3	BALL VALVE BORE 0.55"/14mm CV 11.7	BALL VALVE BORE 0.80"/20mm CV 27.9
Flange size 1/2" NB to 2" NB, Flange Classes 150 to 2500 RF & RTJ	Flange size 3/4" NB to 2" NB, Flange Classes 150 to 2500 RF & RTJ	Flange size 1" NB to 2" NB, Flange Classes 150 to 2500 RF & RTJ Option – 3" NB, 150 to 2500
Outlet connection: 1/2" NPT female standard. Vent connection: 1/2" NPT female standard.	Outlet connection: 3/4" NPT female standard. Vent connection: 1/2" NPT female standard.	Outlet connection: 1" NPT female stan- dard. Vent connection: 1/2" NPT female standard.

CARBON STEEL

Standard specification – ASTM A350 LF2 body material with BS970 316 S11/S31 barstock stainless steel trims, Inserts. End adaptors with PTFE seats and PTFE/Graphite seals and gland packings. Standard 1/4 turn lever 1/2 turn to vent. All end adaptors have Oliver BLOK-LOK protection against accidental disassembly.

DUPLEX STAINLESS STEEL

Standard specification – ASTM A182 F51 body material with UNS S31803 barstock steel trims, Inserts, End adaptors with PTFE seats and PTFE/Graphite seals and gland packings. Standard 1/4 turn lever 1/2 turn to vent. All end adaptors have Oliver BLOK-LOK protection against accidental disassembly.

FLANGE TO FLANGE – THREE BORES – THREE STANDARD MATERIALS

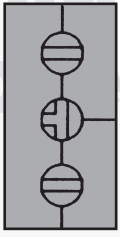
SIZE RANGES		
BALL VALVE BORE 0.40"/10mm CV 6.3	BALL VALVE BORE 0.55"/14mm CV 11.7	BALL VALVE BORE 0.80"/20mm CV 27.9
Flange size 1/2" NB to 2" NB, Flange Classes 150 to 2500 RF & RTJ	Flange size 3/4" NB to 2" NB, Flange Classes 150 to 2500 RF & RTJ	Flange size 1" NB to 2" NB, Flange Classes 150 to 2500 RF & RTJ
Outlet connection: Flange size & Class can be different from inlet. Vent connection: 1/2" NPT female standard.	Outlet connection: Flange size & Class can be different from inlet. Vent connection: 1/2" NPT female standard.	Outlet connection: 1" NPT female stan- dard. Vent connection: 1/2" NPT female standard.

STAINLESS STEEL

Standard specification – ASTM A182 F316 body material with BS970 316S11/S31 barstock stainless steel trims, Inserts, End adaptors with PTFE seats and PTFE/Graphite seals and gland packings. Standard 1/4 turn lever 1/2 turn to vent. All end adaptors have Oliver BLOK-LOK protection against accidental disassembly.

STANDARD	
NACE:	Conformance to NACE MR-01-75 (latest revision).
FIRESAFE:	Firesafe construction.
OPTIONS	
INJECTION:	Available for chemical injection service (page 43).
SAMPLING:	Available for sampling service (page 43).

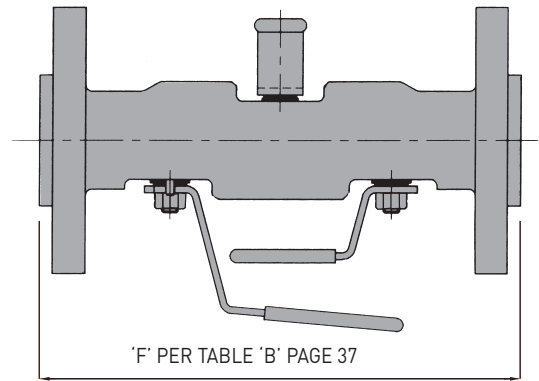
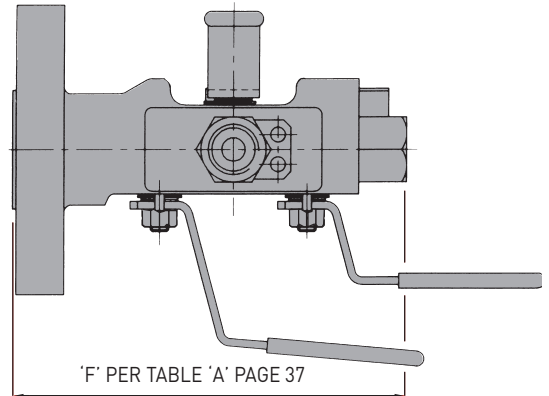




Machined from a single piece 'grain flow controlled' forging. This valve features two in-line ball pattern primary and secondary isolating valves with ball valve vent, offering 'through to process' rodding in bore sizes from 10mm to 14mm (0.4" to 0.55").

This all forged manifold comprises two in-line ball primary and secondary isolating valves with ball valve vent. Offering through to process rodding in bore sizes from 10mm to 14mm (0.4" to 0.55").

F TYPE DOUBLE BLOCK & BLEED



FLANGE TO PIPE – TWO BORES – THREE STANDARD MATERIALS

SIZE RANGES	
BALL VALVE BORE 0.40"/10mm CV 6.3	BALL VALVE BORE 0.55"/14mm CV 11.7
Flange size 1/2" NB to 2" NB, Flange Classes 150 to 2500 RF & RTJ	Flange size 3/4" NB to 2" NB, Flange Classes 150 to 2500 RF & RTJ
Outlet connection: 1/2" NPT female standard. Vent connection: 1/2" NPT female standard.	Outlet connection: 3/4" NPT female standard. Vent connection: 1/2" NPT female standard.

CARBON STEEL

Standard specification – ASTM A350 LF2 body material with BS970 316 S11/S31 barstock stainless steel trims, Inserts. End adaptors with PTFE seats and PTFE/Graphite seals and gland packings. Standard 1/4 turn lever 1/2 turn to vent. All end adaptors have Oliver BLOK-LOK protection against accidental disassembly.

DUPLEX STAINLESS STEEL

Standard specification – ASTM A182 F51 body material with UNS S31803 barstock steel trims, Inserts, End adaptors with PTFE seats and PTFE/Graphite seals and gland packings. Standard 1/4 turn lever 1/2 turn to vent. All end adaptors have Oliver BLOK-LOK protection against accidental disassembly.

Note: 20mm Bore available in Bolted construction only.

FLANGE TO FLANGE – TWO BORES – THREE STANDARD MATERIALS

SIZE RANGES	
BALL VALVE BORE 0.40"/10mm CV 6.3	BALL VALVE BORE 0.55"/14mm CV 11.7
Flange size 1/2" NB to 2" NB, Flange Classes 150 to 2500 RF & RTJ	Flange size 3/4" NB to 2" NB, Flange Classes 150 to 2500 RF & RTJ
Outlet connection: Flange size & Class can be different from inlet. Vent connection: 1/2" NPT female standard.	Outlet connection: Flange size & Class can be different from inlet. Vent connection: 1/2" NPT female standard.

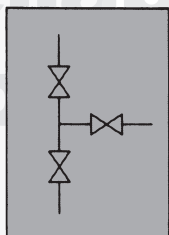
STAINLESS STEEL

Standard specification – ASTM A182 F316 body material with BS970 316S11/S31 barstock stainless steel trims, Inserts, End adaptors with PTFE seats and PTFE/Graphite seals and gland packings. Standard 1/4 turn lever 1/2 turn to vent. All end adaptors have Oliver BLOK-LOK protection against accidental disassembly.

STANDARD	
NACE:	Conformance to NACE MR-01-75 (latest revision).
FIRESAFE:	Firesafe construction.
OPTIONS	
INJECTION:	Available for chemical injection service (page 43).
SAMPLING:	Available for sampling service (page 43).



reliability
under
pressure



Machined from a single piece 'grain flow controlled' forging. This valve features primary and secondary valve & vent with heavy duty needle valves, offering 5.4mm (0.23") bores and metal seated valves.

This all forged manifold comprises three heavy duty needle valves. Offering 5.4mm (0.23") bores and metal seated valves.

Valves have three heavy duty metal seated needle valves with 5.4mm (0.23") bores.

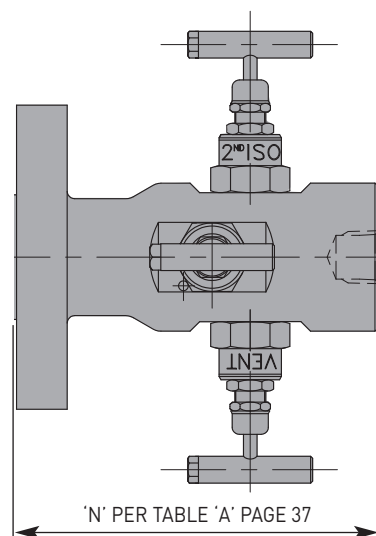
CARBON STEEL

Standard specification – ASTM A350 LF2 body material with BS970 316 S11/S31 barstock stainless steel trims and head units with Graphite seals and gland packings. Needle valves have non-rotating hard tip giving metal to metal closure and screw down tee bar operators.

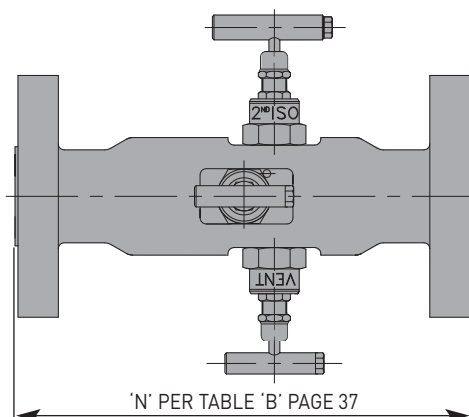
DUPLEX STAINLESS STEEL

Standard specification – ASTM A182 F51 body material with UNS S31803 barstock steel trims and head units with Graphite seals and gland packings. Needle valves have non-rotating hard tip giving metal to metal closures and screw down tee bar operators.

N TYPE DOUBLE BLOCK & BLEED



FLANGE TO PIPE – ONE BORE – THREE STANDARD MATERIALS



FLANGE TO FLANGE – ONE BORE – THREE STANDARD MATERIALS

STAINLESS STEEL

Standard specification – ASTM A182 F316 body material with BS970 316S11/S31 barstock stainless steel trims and head units with Graphite seals and gland packings. Needle valves have non-rotating hard tip giving metal to metal closure and screw down tee bar operators.

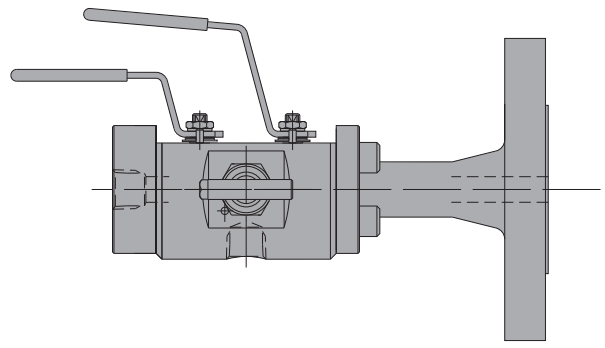
STANDARD	
NACE:	Conformance to NACE MR-01-75 (latest revision).
FIRESAFE:	Firesafe construction.



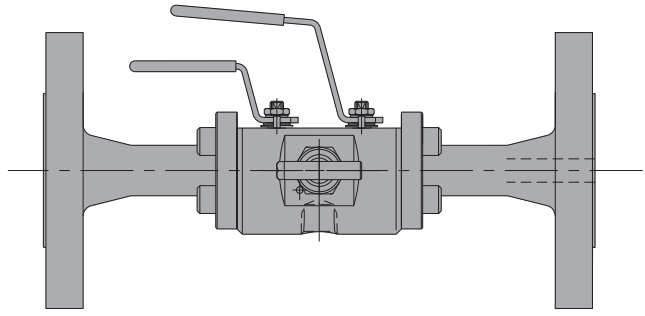
BOLTED CONSTRUCTION DOUBLE BLOCK & BLEED

- Increased speed of delivery.
- Proven manufacturing performance.
- Flexible choice of end connectors at a significantly reduced lead time.
- Designed to ASME VIII & ANSI B16.34.
- Complements the existing one piece range.
- NACE & firesafe to API 607 REV 4 and BS 6755 Part 2 as standard.
- From 1/2" class 150 through to 2" 2500.
- Materials from carbon steel, stainless steel to more exotic alloys.

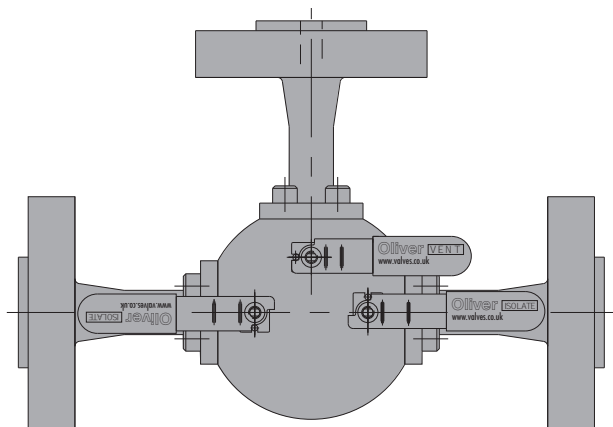
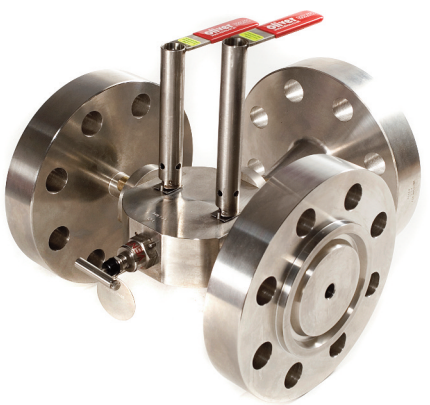
FLANGE TO PIPE



FLANGE TO FLANGE

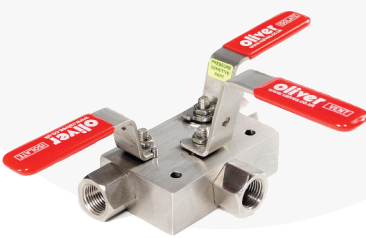


FLANGE X FLANGE X FLANGE

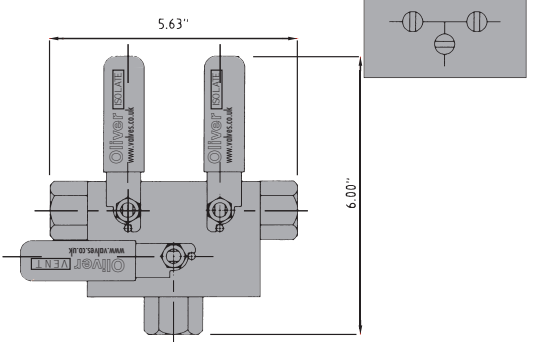


INSTRUMENT DOUBLE BLOCK & BLEED VALVES

L TYPE

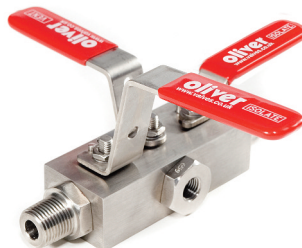


Barstock body with three balls arranged for sampling, chemical injection and double block and bleed of instrument. Surface mounting option available.

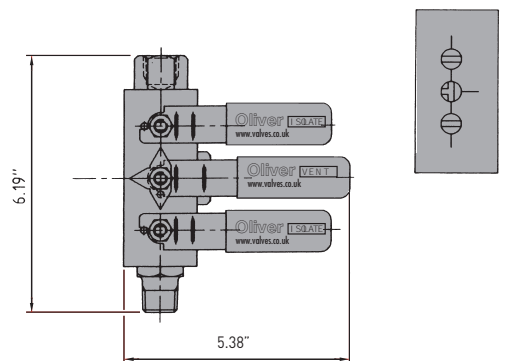


Note: 10, 14, 20mm Bore's available.

T TYPE

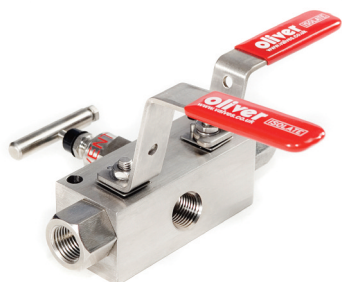


Barstock body with central 'T' ported ball valve for compact double block and bleed, sampling or chemical injection. Surface mounting and Cam Interlock options available.

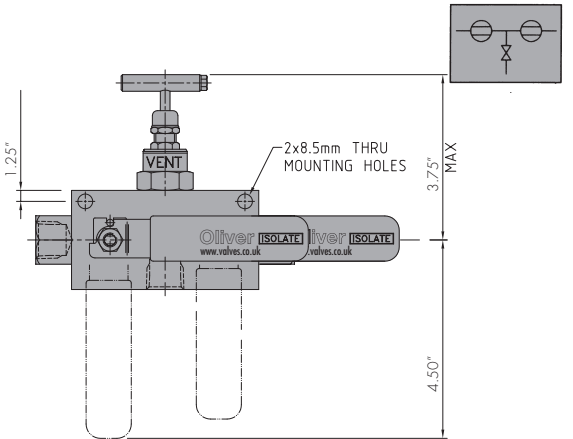


Note: 10, 14mm Bore's available.

ID TYPE



Barstock body with ball pattern primary isolating valve with two needle pattern valves for secondary isolating valve and vent valve.

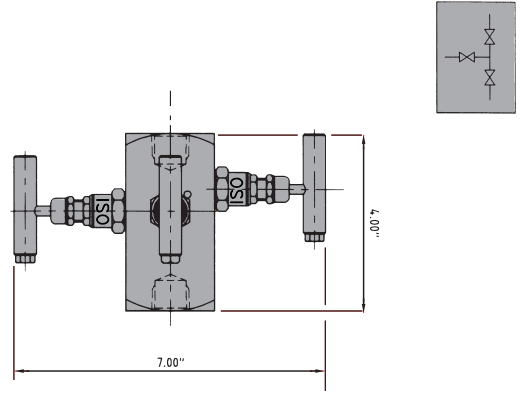


Note: 10, 14, 20mm Bore's available.
Bottom vent is also available.

IN TYPE



Barstock body with three needle pattern valves arranged for Double Block & Bleed of instrument.



Note: 5.4mm Bore size.

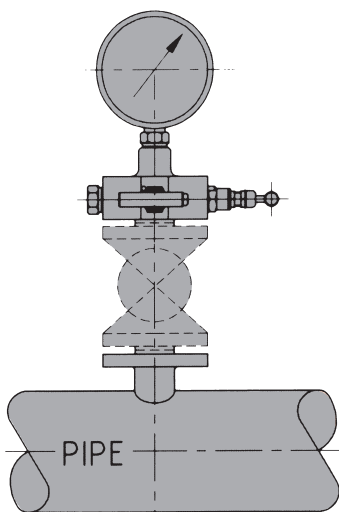


GAUGE BLOCK MONOFLANGE VALVES



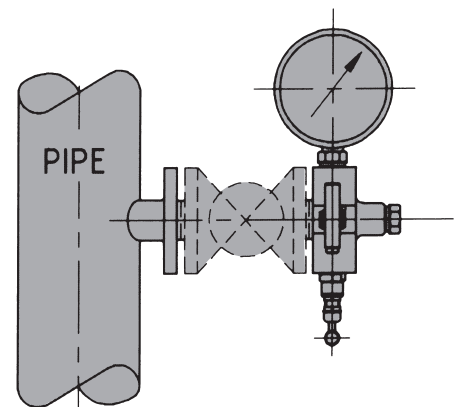
Gauge block monoflange valves work in conjunction with a pre-installed primary isolate valve. They provide very compact instrument Double Block and Bleed valving. This range is also available in a single block and Double Block and Bleed configuration's.

- Block and bleed configuration has multi gauge ports for orientation of valve on horizontal and vertical pipelines.
- Gauge block monoflange valves to be used in conjunction with primary isolate.
- Use standard or heavy duty needle valves, for different pressures.
- Valves designed to connect to ASME B16.5 flanges.
- Block, Block and Bleed, Double Block and Bleed options.
- Weight, space and hook - up time saving.
- Leak paths greatly reduced.



HORIZONTAL PIPING PRESSURE MEASUREMENT

Modular construction allows easy installation after an existing primary isolate valve. Dual instrument connections enable instrument to be mounted vertically on either horizontal or vertical line mounting application.



VERTICAL PIPING PRESSURE MEASUREMENT



reliability
under
pressure

SLIMLINE PRIMARY ISOLATE VALVES

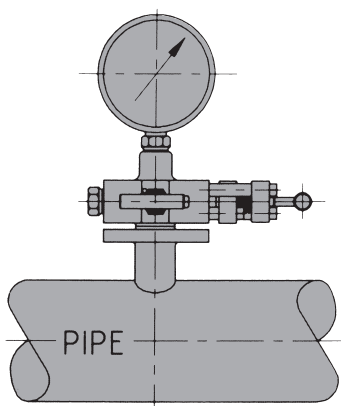


"Slimlines" incorporate a primary isolate piping valve and combine also the instrument Block and Bleed functions. They are designed to replace the traditional primary isolate valve. Our primary isolate valve is of outside screw and yoke construction and is designed to ASME VIII specifications. First isolation outside screw and yoke valves can be supplied to NACE & Firesafe specifications.

This standard configuration of Double Block and Bleed Style Slimline is shown with standard needle valves for bleed and secondary isolation.

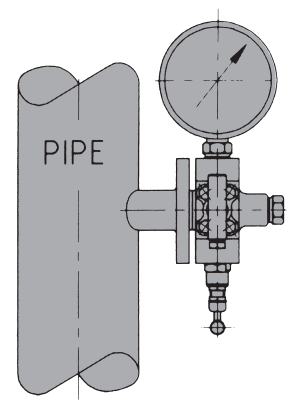
Also available as double block and single block.

- Slimline primary isolate valves replace traditional isolate valve and instrument hook-up.
- GOSY primary isolate design to ASME VIII.
- Block and bleed configuration has multi gauge ports for orientation of valve on horizontal and vertical pipelines.
- Gauge block monoflange valves to be used in conjunction with primary isolate.
- Use standard or heavy duty needle valves, for different pressures.
- Valves designed to connect to ASME B16.5 flanges.
- Block, Block and Bleed, Double Block and Bleed options.
- Weight, space and hook - up time saving.
- Leak paths greatly reduced.



HORIZONTAL PIPING PRESSURE MEASUREMENT

Slimline can be installed as the primary isolate valve, in either single block, block and bleed or double block and bleed versions. Dual instrument connections enable instrument to be mounted vertically on either horizontal or vertical line mounting application.

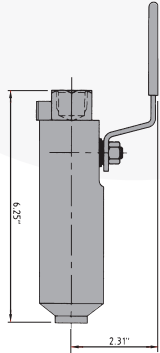


VERTICAL PIPING PRESSURE MEASUREMENT

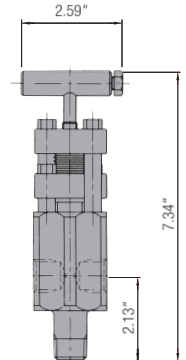


This family of valves is designed for welding into a process line. Offered in many configurations with heavy duty needle valves or ball valves.

SINGLE BLOCK (BALL VALVE)



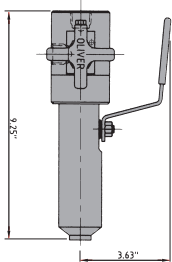
PRIMARY GAUGE OUTSIDE SCREW AND YOKE VALVE



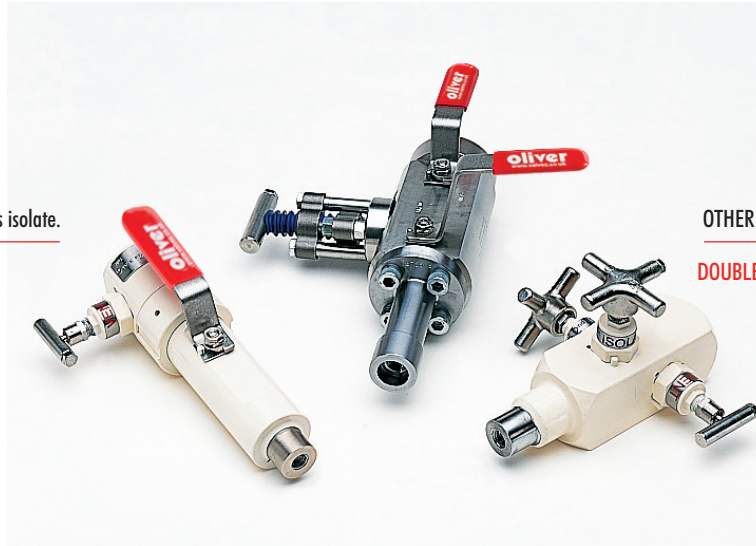
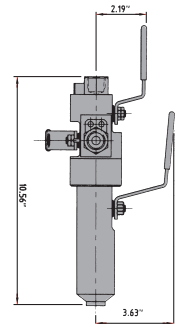
OTHER OPTIONS Heavy duty Needle valve as isolate.

OTHER OPTIONS Available with handle locking.

BLOCK AND BLEED (BALL VALVE – ISOLATE) (NEEDLE VALVE – VENT)



DOUBLE BLOCK AND BLEED (ALL BALL VALVES)



OTHER OPTIONS Ball valve as isolate and Ball valve as vent.

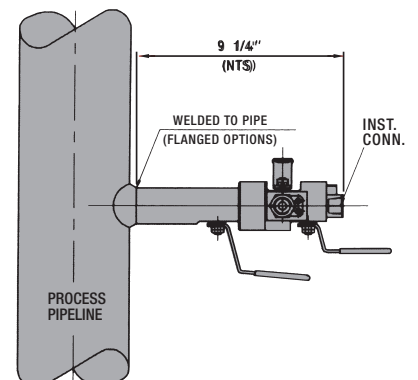
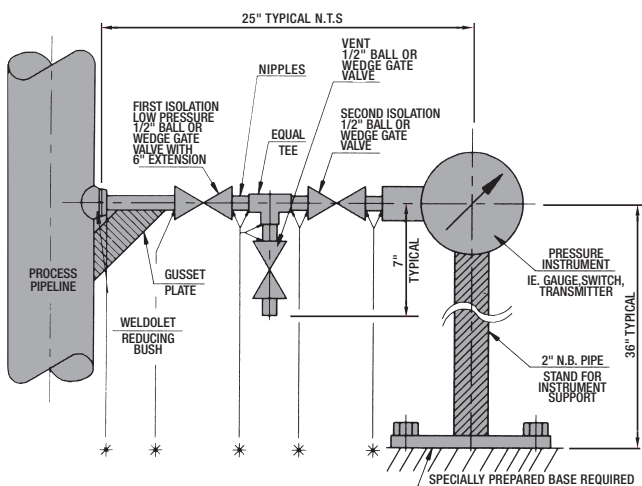
OTHER OPTIONS Two Ball valves as blocks and one Needle valve as vent. Three Needle valves as blocks and vent.

Major Weaknesses with Traditional Installation

- Cost of installation.
- Overall Size.
- Increased Gland Emission Risk.
- High bending moments hence need for gusset plates.
- Large number of potential leak points within assembly.
- Increased installation time due to complex arrangement.
- On-site welding due to gusset plates.
- Large number of items to stock and to purchase.

Major Advantages of Oliver Solution

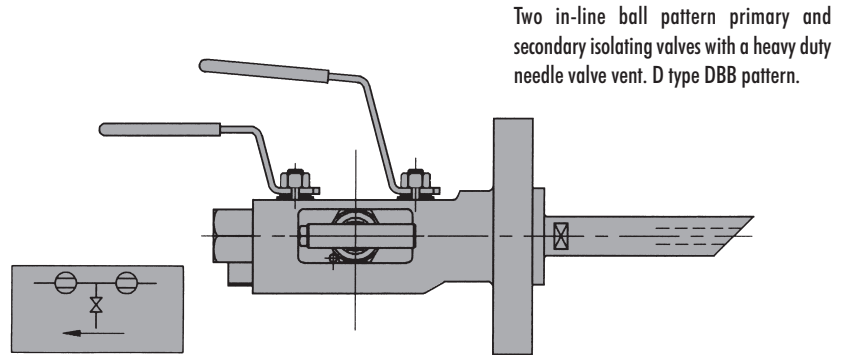
- Safe Hook Up by Elimination of many potential leak points.
- Very cost competitive installation.
- Major space saving.
- Major weight saving.
- Compact/lightweight significantly reduces bending moments and pipework stresses.
- Firesafe to BS 6755 Pt 2, API 607 and API 6FA.
- Simplification of installation – direct labour time savings.
- Wide range of 6000 PSI, Ball, Needle and Check Valve styles.
- Wide range of materials and configurations (including NACE) on fast deliveries.
- One item only to stock.
- Greatly reduced maintenance.



SAMPLING DOUBLE BLOCK & BLEED VALVES

Sampling the process stream can be accomplished with this valve design, where a sample can be taken even at full system pressure directly from the process line. The product allows double isolation from process for safety. The orientation of the sample nozzle is fixed at the assembly stage and can be specified to suit the application.

The flanged body drop forging is machined to ANSI B16.5 flange dimensions with the forged body section incorporating two isolation valves and one bleed valve. A custom designed sampling probe extends from the flange connection into the process media for correct removal of the sample. If projections into the process line cannot be allowed the valve can be supplied without a probe. Sampling valves can be provided with either a single flange connection and screwed connection or double flange connections in the following styles:-



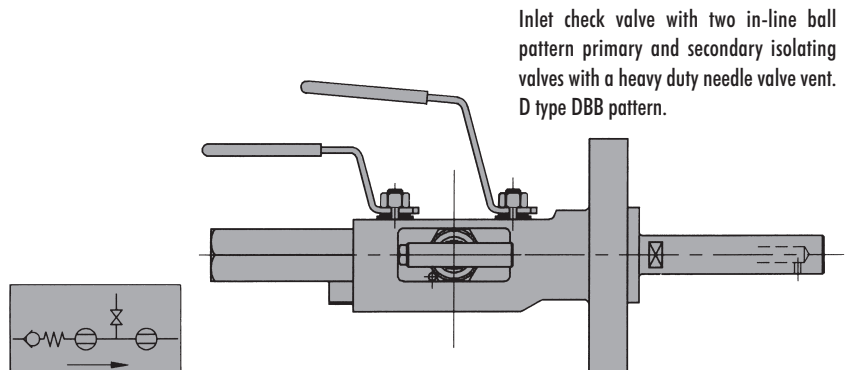
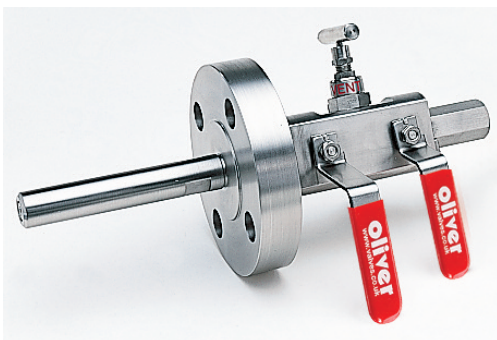
Two in-line ball pattern primary and secondary isolating valves with a heavy duty needle valve vent. D type DBB pattern.

INJECTION DOUBLE BLOCK & BLEED VALVES

Injection of chemicals and other media onto the process stream can be accomplished with this valve design. The valve inlet houses a one way check valve which opens for injection and goes normally closed to eliminate process fluid outflow. The orientation of the injection nozzle is fixed at the assembly stage and can be specified to suit the application.

The flanged body forging is machined to ANSI B16.5 flange dimensions and incorporates two isolating valves and a bleed needle valve. The injection probe extends from the flange connection into the centre of the process stream for the correct positioning of the injection media. Injection valves can be provided with either a single flange connection and screwed connection or double flange connections in the following styles:-

The N Type double block and bleed with injection facility is also available.



Inlet check valve with two in-line ball pattern primary and secondary isolating valves with a heavy duty needle valve vent. D type DBB pattern.

FLANGE SIZE 11/2" NB, FLANGE CLASSES 150 TO 2500 RF & RTJ. OPTION, FLANGE SIZE 2" NB, FLANGE CLASSES 150 TO 2500 RF & RTJ. OTHER BALL VALVE BORE SIZES AND FLANGE SIZES CAN BE ACCOMMODATED.

NOZZLE TECHNICAL INFORMATION

PROBE LENGTH:

This length is manufactured to suit customer requirements for the correct positioning of the injection orifice, up to a maximum length of 24". The position of the injection orifice can also be rotated at assembly to suit orientation relative to the valve handles.

PROBE MATERIALS:

The standard material is 316 stainless steel but other materials can be used to suit customer requirements.

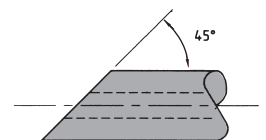
INJECTION NOZZLES:

The standard orifice is a 0.125" (3mm) diameter hole but other arrangements can be accommodated including swirl pattern spray nozzles to improve dispersion of the media.

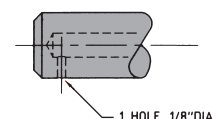
CHECK VALVE:

This poppet type spring return valve has a Viton soft seat, and offers bore sizes of 10mm (CV2.0) or 12mm (CV4.6) or 16mm (CV7.2). Alternatively flange to flange styles of 6mm (CV2.0) max or 10mm (CV2.0) (maximum temperature 120°C) can be furnished. For Methanol injection specify Kalrez 'O' ring material for check valve seat.

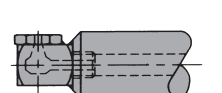
SAMPLE
NOZZLE

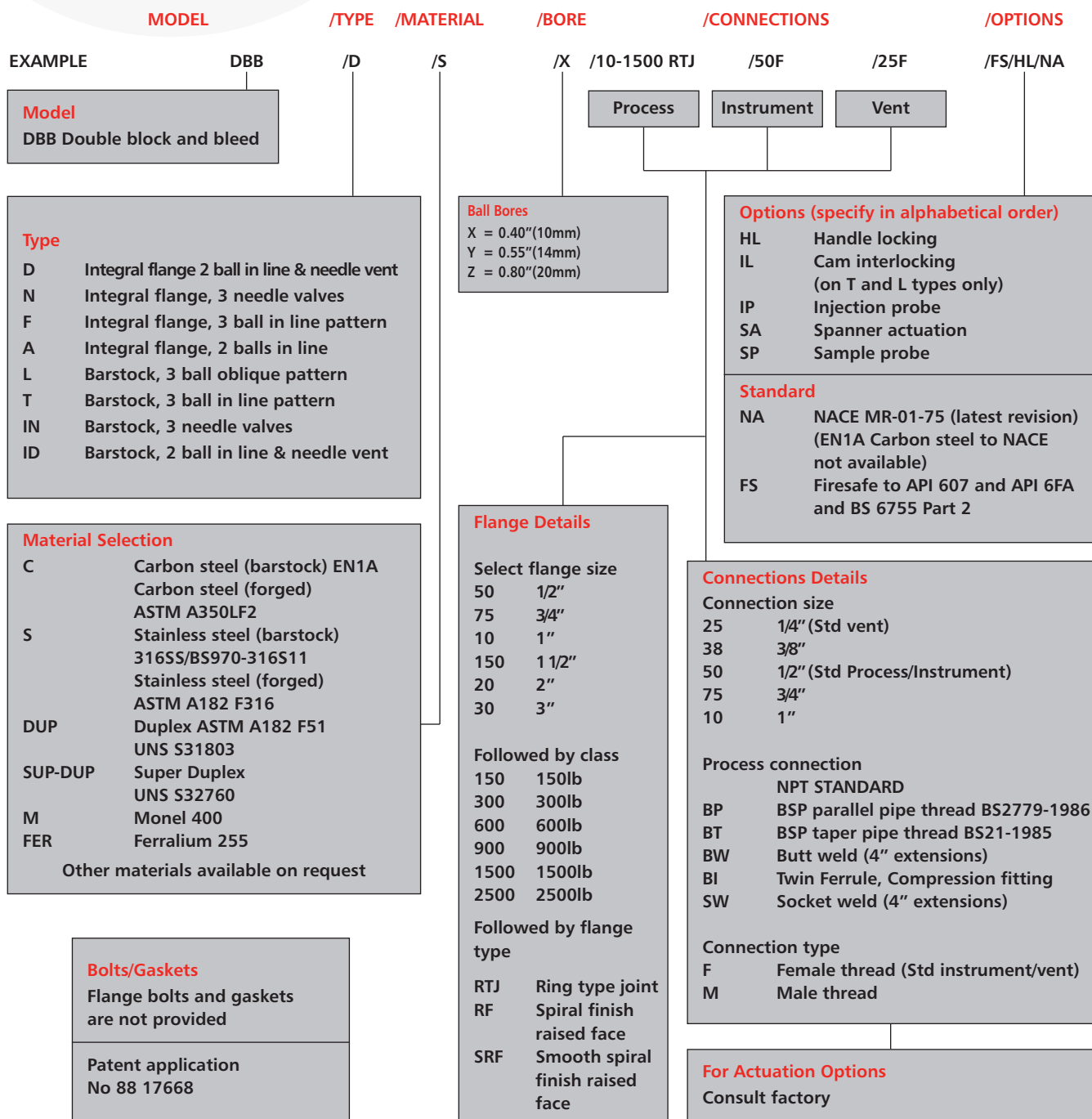


INJECTION
NOZZLE

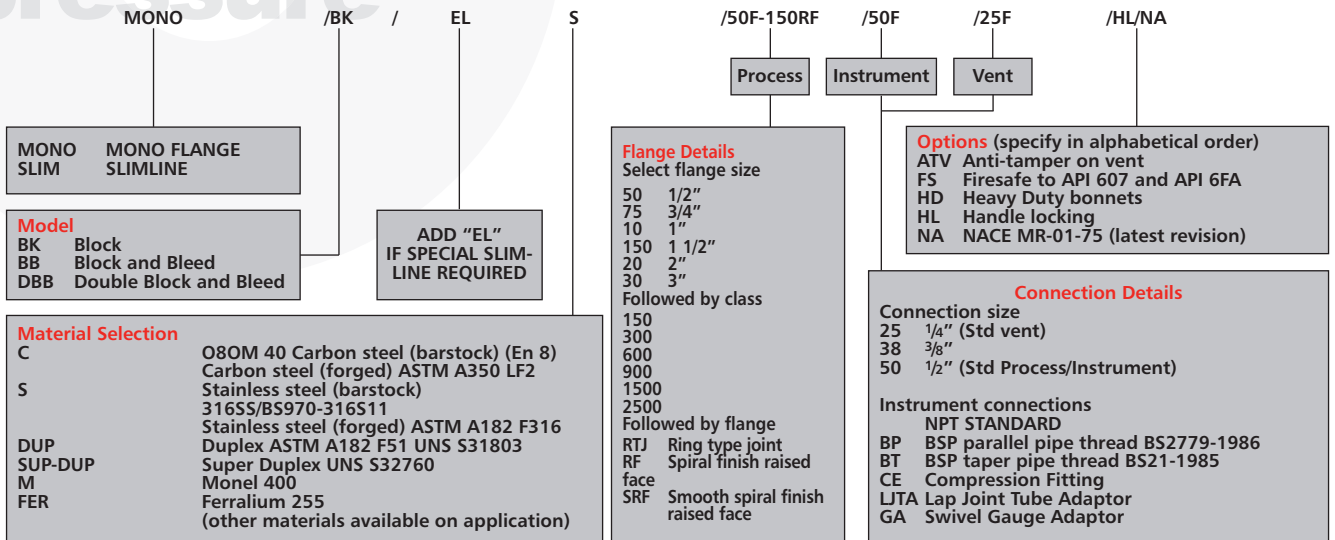


INJECTION
SWIRL
PATTERN
NOZZLE

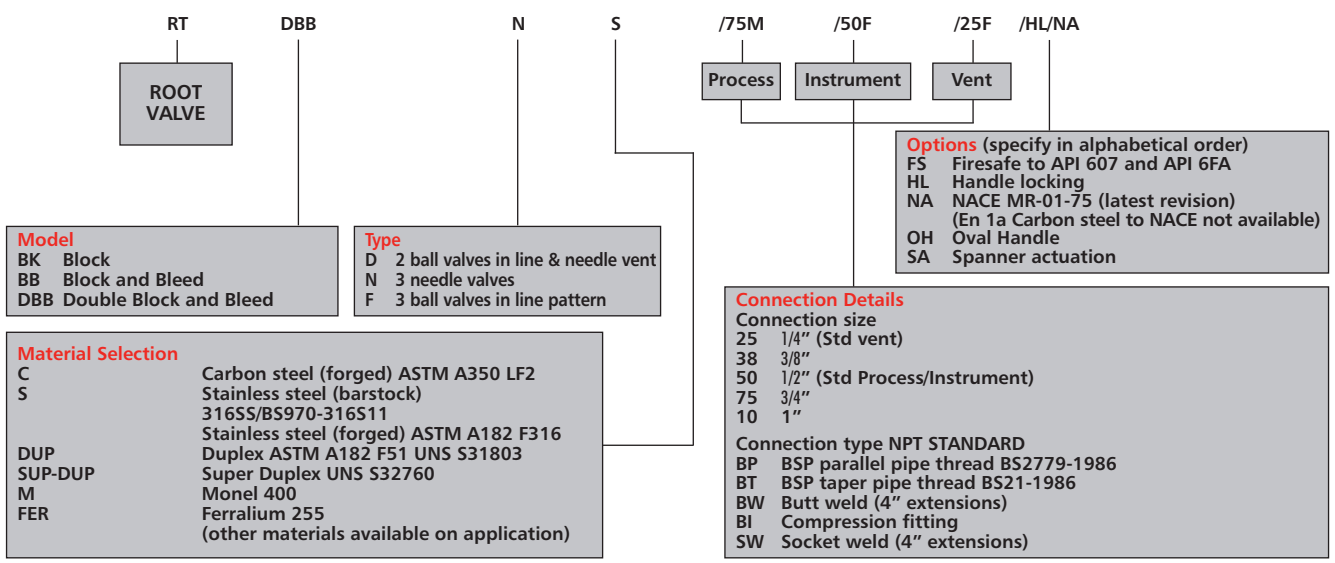




HOW TO ORDER SLIMLINE / MONO FLANGE VALVES



HOW TO ORDER ROOT VALVES



HOW TO ORDER GAUGE OUTSIDE SCREW AND YOKE VALVES

