



## Double Block And Bleed (DBB) Plug Valve

### Application

Double block and bleed plug valves and venting function valves are suitable for use in pipelines carrying aviation kerosene, crude oil, light oil, natural gas, liquefied gas, pipeline gas, chemical media, etc., serving as ideal devices for cutting off the medium.

### Feature

- 1.Non-contact Sealing:** The seals do not touch during operation, preventing wear and ensuring long life with low operating torque.
- 2.Easy Maintenance:** The valve can be serviced in-line by simply replacing the slide plates, eliminating pipeline removal.
- 3.Full-Bore Design:** Provides zero flow resistance and allows for pipeline pigging.
- 4.Hard Chrome-Plated Body:** The internal sealing surface is hard and smooth for enhanced durability.
- 5.Advanced Seal Construction:** Features a molded fluoroelastomer seal backed by a fire-safe metal-to-metal seal.
- 6.Automatic Pressure Relief (Optional):** Prevents cavity

### Technical Specifications

- Designed and manufactured: API 6D.
- Flange connection dimensions: ANSI B16.5, JB 79, HG 20592, GB/T 9113.
- Structural length of the valve: ANSI B16.10, GB 12221-89, JB/T 5298.
- Inspection and test: API 598 and API 6D.

PRESSURE TEST								
Pressure level	150Lb	1.6MPa	300Lb	2.5MPa	600Lb	4.0MPa	900Lb	6.4MPa
Strength test	3.0MPa	2.4MPa	7.7MPa	3.75MPa	15.4MPa	6.0MPa	23.0MPa	9.6MPa
High pressure seal test	2.2MPa	1.8MPa	5.62MPa	2.75MPa	11.23MPa	4.4MPa	16.85MPa	7.1MPa
Low pressure seal test	0.6MPa	0.6MPa	0.6MPa	0.6MPa	0.6MPa	0.6MPa	0.6MPa	0.6MPa





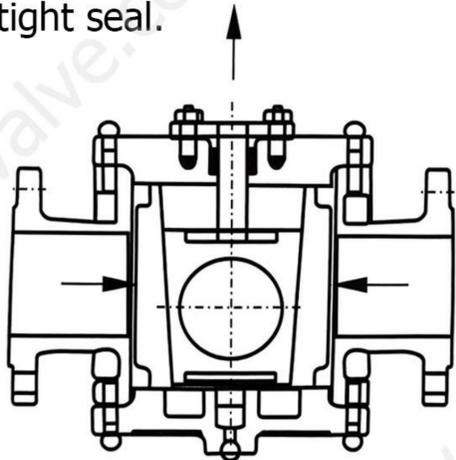
## Double Block And Bleed (DBB) Plug Valve

### Working Principle

The key to the working principle of the double-block-and-bleed valve and venting function valve lies in the movement of the two sealing slides mounted on the plug.

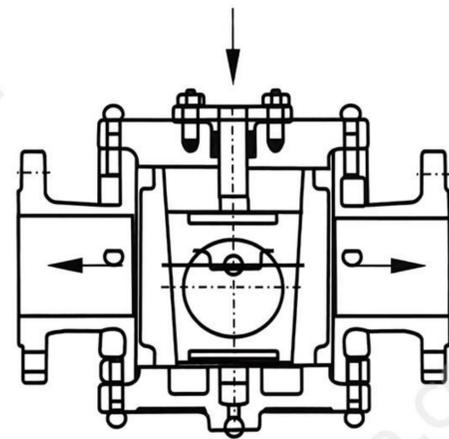
#### Valve Closing

Rotate the handwheel 90° to turn the plug and slides, then lower the plug. This pushes the slides against the valve body, compressing the elastic seals to form a tight seal.



#### Valve Opening

Raise the plug to retract the slides from the sealing surfaces. Once fully clear, rotate the handwheel 90° to open the valve fully.



### About Sealing

The elastic sealing ring, compression-molded into the sliding plate, compresses during operation. A secondary, fire-safe metal-to-metal seal between the machined plate and valve body prevents over-compression.

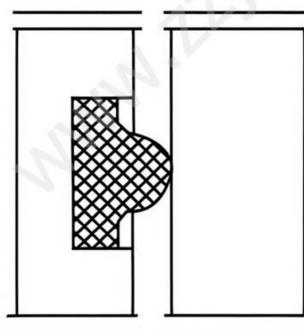
### Double Block and Bleed and Release

Isolates pipeline sections with two shut-off valves.  
Vents any leakage via the central bleed valve for safety.

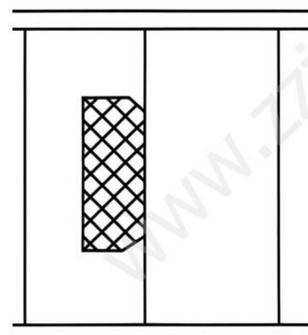
### Dual Sealing Mode

Two independent sealing surfaces are pressed against both ends of the valve port (double block).  
When the valve is closed, the bleed valve is opened to verify sealing performance (bleed).

Before the elastic sealing ring is compressed



After the elastic sealing ring is compressed





## ■ Double Block And Bleed (DBB) Plug Valve

### Analysis of DBB Plug Valves

The Double Block and Bleed (DBB) Valve surpasses conventional valves in sealing and lifespan, integrating critical functions like fire safety and online maintenance to optimize pipeline design and reduce operating costs.

Dual Sealing: Combines resilient primary seals and metal-to-metal secondary seals.

Fire-Safe Design: Meets industry standards for fire safety.

Full-Bore Design: Minimizes pressure drop and allows for pipeline pigging.

Online Maintenance: Enables maintenance under pressure, reducing downtime.

Double Block and Bleed (DBB): Provides positive isolation and allows for cavity pressure relief.

### Structure of Double & Bleed Valve

#### 1. Valve Body

The valve body primarily comprises components such as the body, core, disc, and end cover. The valve core is secured by trunnions and features dovetail guides on its wedge surfaces that connect to the two valve discs. As the primary seal, the disc's cylindrical surface achieves Class B hard-seal precision. A groove on this surface, embedded with a rubber seal, enables a hard-soft dual seal.

#### 2. Actuator

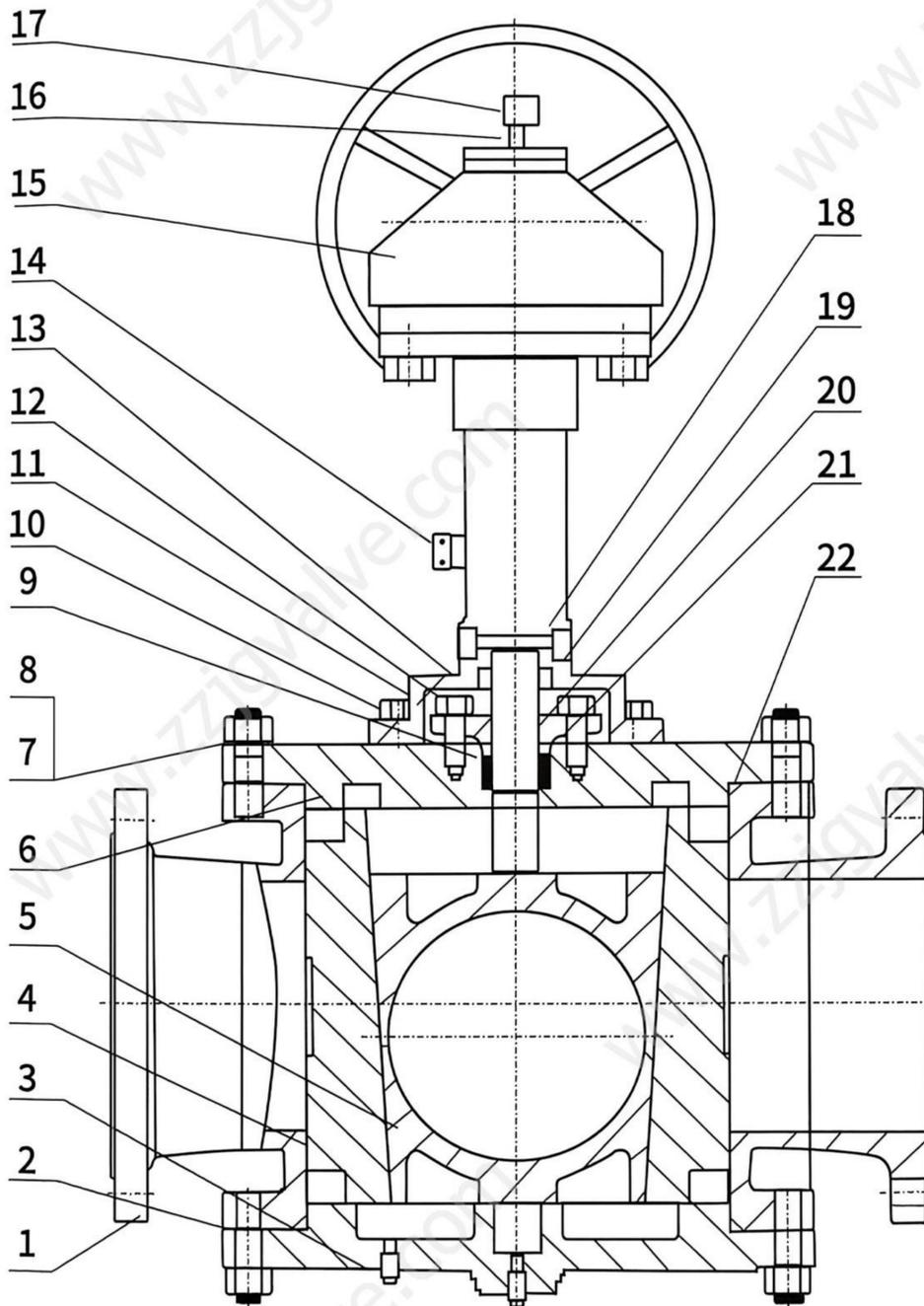
The actuator, primarily composed of an indicator plate, handwheel, main shaft, sleeve, ball pin, and bracket, is fixed to the end cover. It connects to the valve core rod via a linkage pin. As the executive mechanism, the actuator operates as follows:

Closing: Rotating the handwheel clockwise first turns the valve core 90°, aligning the discs with the valve body's flow channel. The core then moves linearly downward, driving the discs to expand radially against the inner wall until the soft seal compresses into its groove, completing the shut-off.

Opening: Rotating the handwheel counterclockwise first raises the valve core linearly. After reaching a specific position, it then rotates 90° to open the flow path.



## Double Block And Bleed (DBB) Plug Valve



MAIN PARTS MATERIALS		
NO.	Part name	Material
1	Body	WCB
2	Bottom cover	WCB
3	Plug	35#
4	Slide	QT500-7
5	Cock	WCB
6	Cover	WCB
7	Stud	35#
8	Nut	45#
9	Packing	Flexible graphite
10	Bolt	35#
11	Packing gland	WCB
12	Bolt	35#
13	Bracket	WCB
14	Bolt	35#
15	Manipulator	Component
16	Indicator rod	ICr13
17	Indicator	21401
18	Pin	65Mn
19	Dustproof device	Pvc
20	O-ring	Fluororubber
21	O-ring	Fluororubber
22	O-ring	Fluororubber

**Full Bore DBB Plug Valve**

In the closed position, the valve employs a dual-sealing design with both upstream and downstream discs. Each disc features a combination of soft and hard seals to ensure zero leakage. The soft seal rotates without contact to prevent wear, while the hard seal provides protection and fire safety.

The valve core and trunnion are an integrated unit, supported by sliding (or rolling for DN>500) bearings. This monolithic structure minimizes friction, allows for precise machining of sealing clearances, and ensures the seal remains unaffected by pressure differentials across the valve—a key difference from standard ball or gate valves.



## Double Block And Bleed (DBB) Plug Valve

### Fire Safety and Sealing Performance

In oil and gas systems, handling flammable media necessitates valves with reliable sealing and fire resistance. Double block and bleed valves achieve this with a combined soft and hard seal design. The soft seal ensures zero leakage during normal operation. During a fire, if the soft seal fails, the hard seal engages as the primary barrier to prevent major leakage.

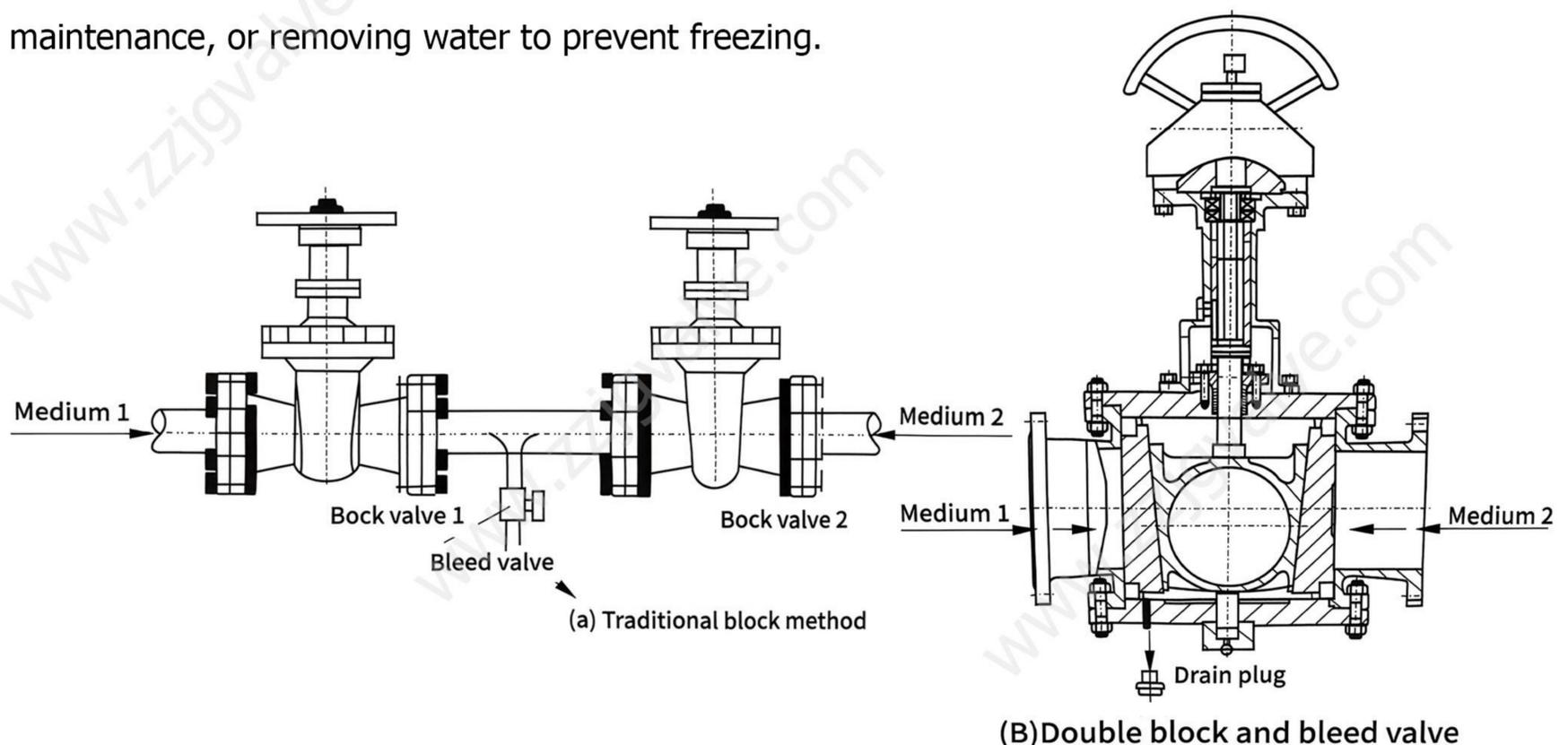
This design offers an advantage over gate valves, which use hard seals for fire safety but may not guarantee long-term zero leakage, and ball valves, which provide excellent normal sealing with soft seals but typically lack fire-safe capabilities.

### Online Maintenance Capability

The valve allows for online maintenance without pipeline removal or depressurization. If the soft seal is damaged or the actuator fails, both can be repaired or replaced in-situ. This contrasts with gate or ball valves, which typically require removal from the line for seal repair, often leading to extended downtime or complete valve replacement.

### Double Block and Bleed Function

The double block and bleed (DBB) function prevents media mixing by providing two sealing points and a bleed port. Traditional setups require two separate valves with a bleed valve in between (Fig. 2a). In contrast, a single double block and bleed valve integrates this function (Fig. 2b). Its bottom bleed plug allows for venting leakage from either seal, draining sediment, evacuating residual media for maintenance, or removing water to prevent freezing.

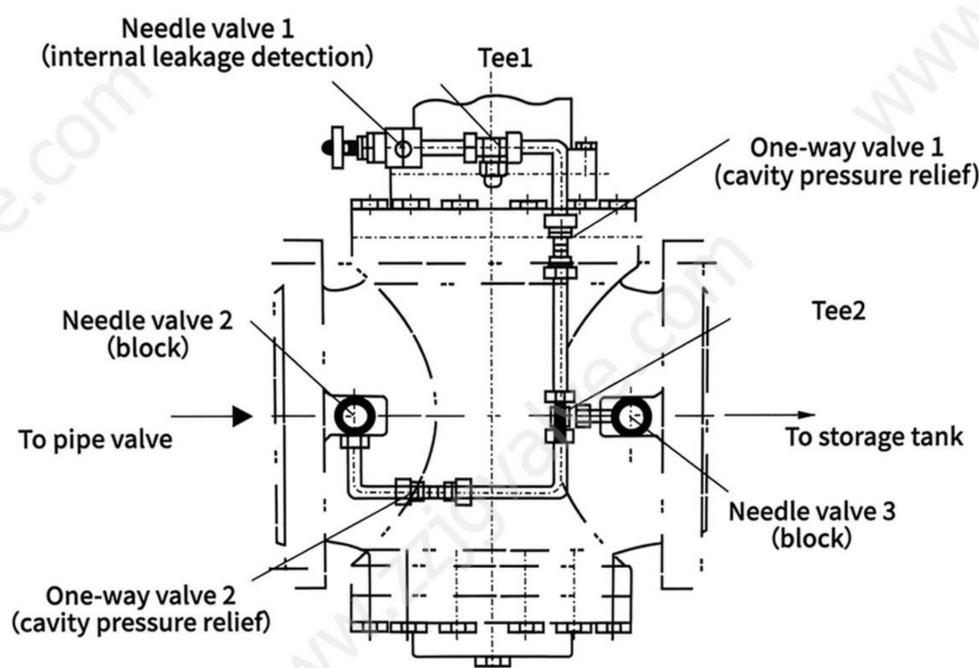




## Double Block And Bleed (DBB) Plug Valve

### With a Middle Cavity Pressure Relief Function

The API 6D specification stipulates that "for all double-sealed valves used in liquid service, a pressure differential relief function must be provided." The pressure differential to be relieved is generated by changes in ambient temperature. In the normally closed state, the pressure in the middle cavity of a double-sealed valve increases rapidly due to temperature rise. If this pressure differential is not relieved in a timely manner, it will severely impact the operation of the valve.



Comprehensive drawing of differential heat pressure relief and pipeline pressure reduction

#### (1) Manual Pressure Relief System:

This system typically uses a needle valve mounted on the end cover. It is suitable for liquids that can be safely vented in small quantities to the atmosphere.

#### (2) Differential Thermal Pressure Relief System:

This system consists of a pipeline with a check valve (see Figure 3). Needle Valve 1 (normally closed), Tee 1, Check Valve 1, Tee 2, and Needle Valve 3 (normally open) form the assembly. It is used when the medium cannot be vented to the atmosphere, typically relieving pressure to the upstream pipeline.

## Internal Leakage Test Function

Testing a standard valve's seal is difficult, but with a double block and bleed valve, it's straightforward: simply open the needle valve on the end cover. Any leakage across the seats will cause medium to weep from this port.

If the medium cannot be safely vented to the atmosphere, a pressure gauge can be connected to the needle valve. A pressure rise on the gauge indicates internal leakage.





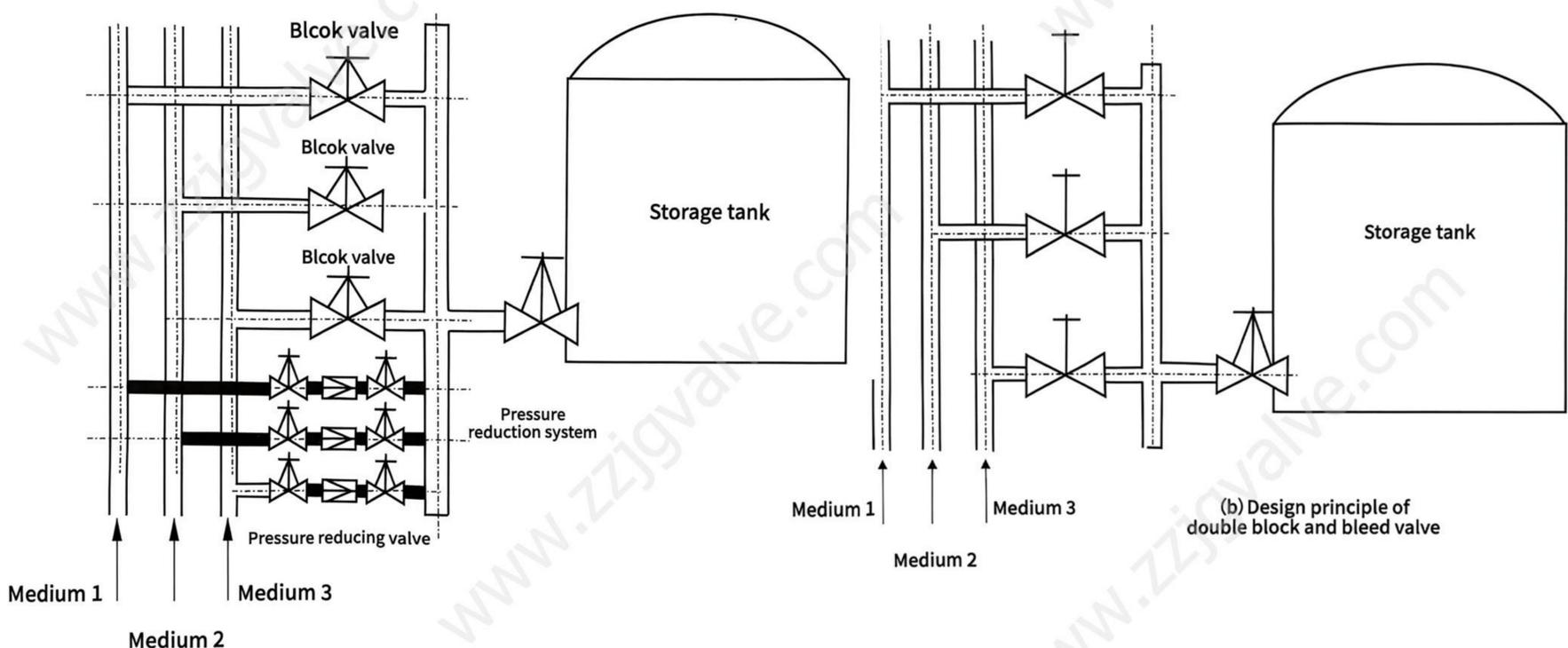
## Double Block And Bleed (DBB) Plug Valve

### Fire Safe Design & Overpressure Protection

In pipeline design for tank farms, overpressure protection is a critical consideration. When the primary isolation valve is closed, the pipeline segment remains filled with fluid. A subsequent rise in ambient temperature can cause rapid pressure buildup within this trapped volume. If the temperature increase is significant, the resulting pressure may exceed the pipeline's pressure rating, potentially leading to leaks or failure. Therefore, pressure relief systems are essential.

A conventional overpressure protection design is shown in Figure 4(a). It involves a dedicated relief loop piped between the upstream and downstream sides of the main valve. This loop typically consists of two block valves (such as gate, ball, or globe valves) with a relief valve installed between them. However, this system is costly, space-intensive, and adds operational complexity.

Figure 4(b) illustrates a design using a double block and bleed (DB&B) valve as the main isolation valve. Here, the pressure relief function is integrated directly into the valve body. This approach offers a significantly simpler design, requires minimal space, and is a more economical solution.

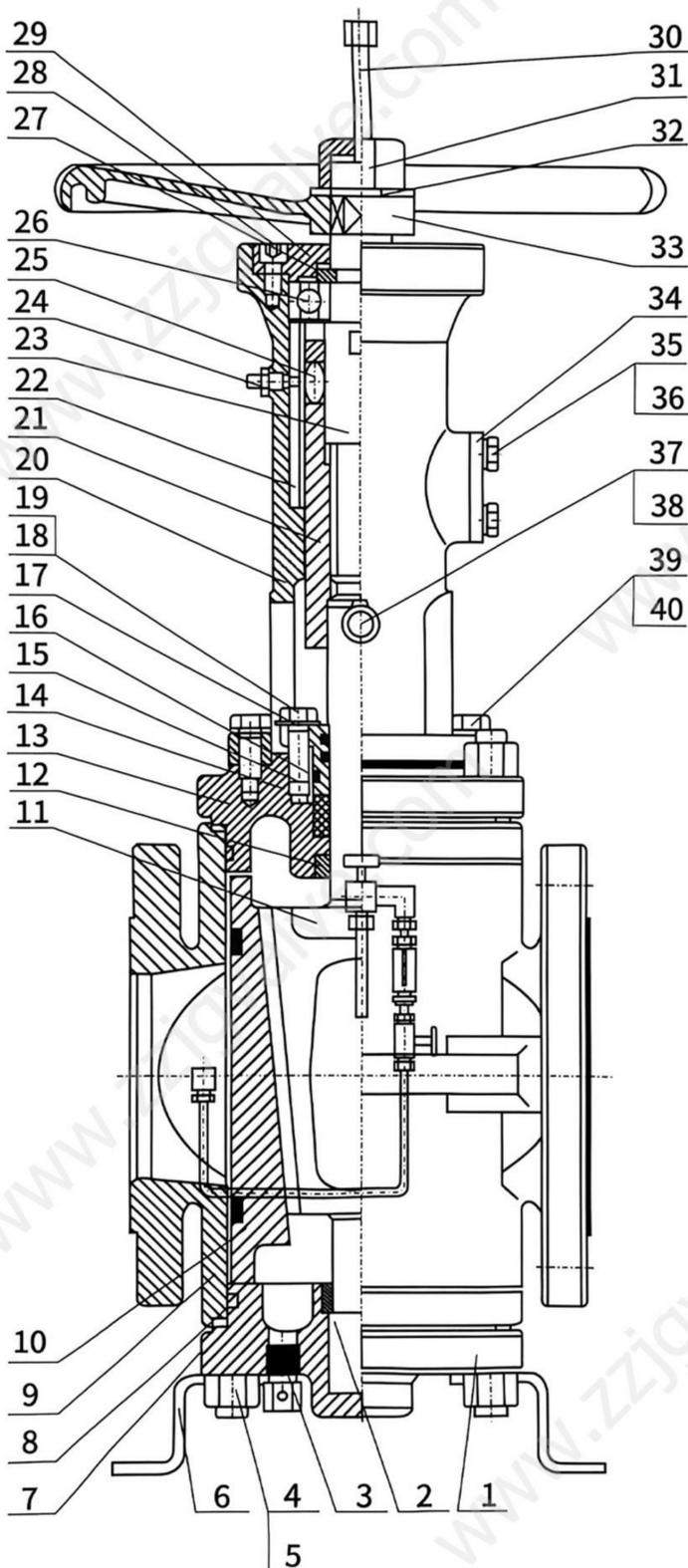




## Double Block And Bleed (DBB) Plug Valve

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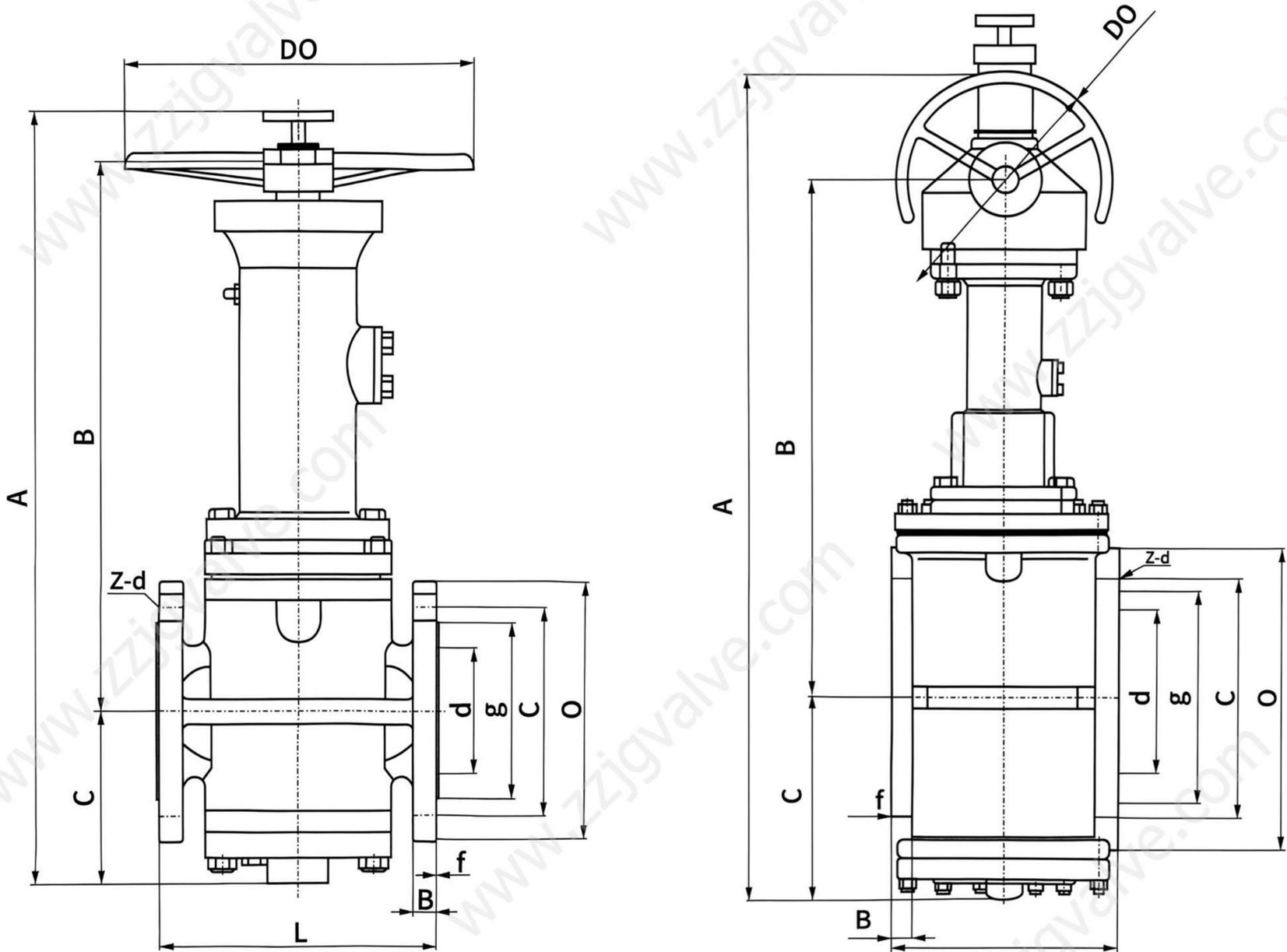


Reduced Bore DBB Plug Valve

MAIN PARTS MATERIALS		
NO.	Part name	Material
1	Bottom cover	A216 WCB
2	Shaft sleeve	C28000
3	Blowdown valve	SS304
4	Stud	A193 B7
5	Nut	A194 2H
6	Columns	Q235A
7	Winding gasket	SS304+Graphite
8	O-rings	Viton
9	Body	A216 WCB
10	Slide	QT500-7+Viton
11	Cock	A216 WCB
12	Shaft sleeve	C28000
13	Bonnet	A216 WCB
14	Packing	Flexible graphite
15	Packing gland	A216 WCB
16	O-rings	Viton
17	O-rings	Viton
18	Outer hexagon bolt	8.8
19	Flat washer	A3
20	Holder	A216 WCB
21	Drive sleeve	QT500-7
22	Locating sleeve	1045
23	Transmission shaft	A182 F6a
24	Oilcup	M10X1
25	Rolling pin	T10
26	Deepgroove ball bearings	GCr15
27	Split ring	A276 410
28	Hexagon socket screw	8.8
29	Bearing gand	Q235A
30	Indicator rod	Q235A
31	Pressing sleeve nut	1035
32	Butterfly spring	65Mn
33	Handwheel	QT400-18
34	Guidepin	A276 410
35	Outer hexagon bolt	8.8
36	Springwashers	65Mn
37	Pin shaft	A276 410
38	Retaining ring	65Mn
39	Outer hexagon bolt	8.8
40	Springwashers	65Mn



## Double Block And Bleed (DBB) Plug Valve



**Main Dimensions  
150LB Reduced Bore, Handwheel, Gear Operation**

DN	IN	L	O	C	g	d	B	f	A	B	C	DO	Z-d
50	2	178	Φ150	Φ120.5	Φ92	49	16.5	2	530	382	135	Φ200	4-Φ19
75	3	203	Φ190	Φ152.5	Φ127	74	19.5	2	590	395	129	Φ250	4-Φ19
100	4	229	Φ230	Φ190.5	Φ157	100	24.5	2	671	425	171	Φ300	8-Φ19
150	6	267	Φ280	Φ241.5	Φ216	150	26	2	805	520	210	Φ350	8-Φ22
200	8	292	Φ345	Φ298.5	Φ270	201	29	2	1096	645	253	Φ400	8-Φ22
250	10	330	Φ405	Φ362	Φ324	252	31	2	1283	753	280	Φ500	12-Φ25
300	12	356	Φ485	Φ432	Φ381	303	32.5	2	1385	777	331	Φ550	12-Φ25
350	14	381	Φ535	Φ476.5	Φ413	334	35.5	2	1395	790	341	Φ550	12-Φ29
400	16	406	Φ595	Φ540	Φ470	385	37	2	1654	948	406	Φ600	16-Φ29
450	18	864	Φ635	Φ578	Φ533.5	436	40.1	2	1680	960	420	Φ600	16-Φ32
500	20	914	Φ700	Φ635	Φ584	487	43.3	2	1892	1060	482	Φ600	20-Φ32





## Double Block And Bleed (DBB) Plug Valve

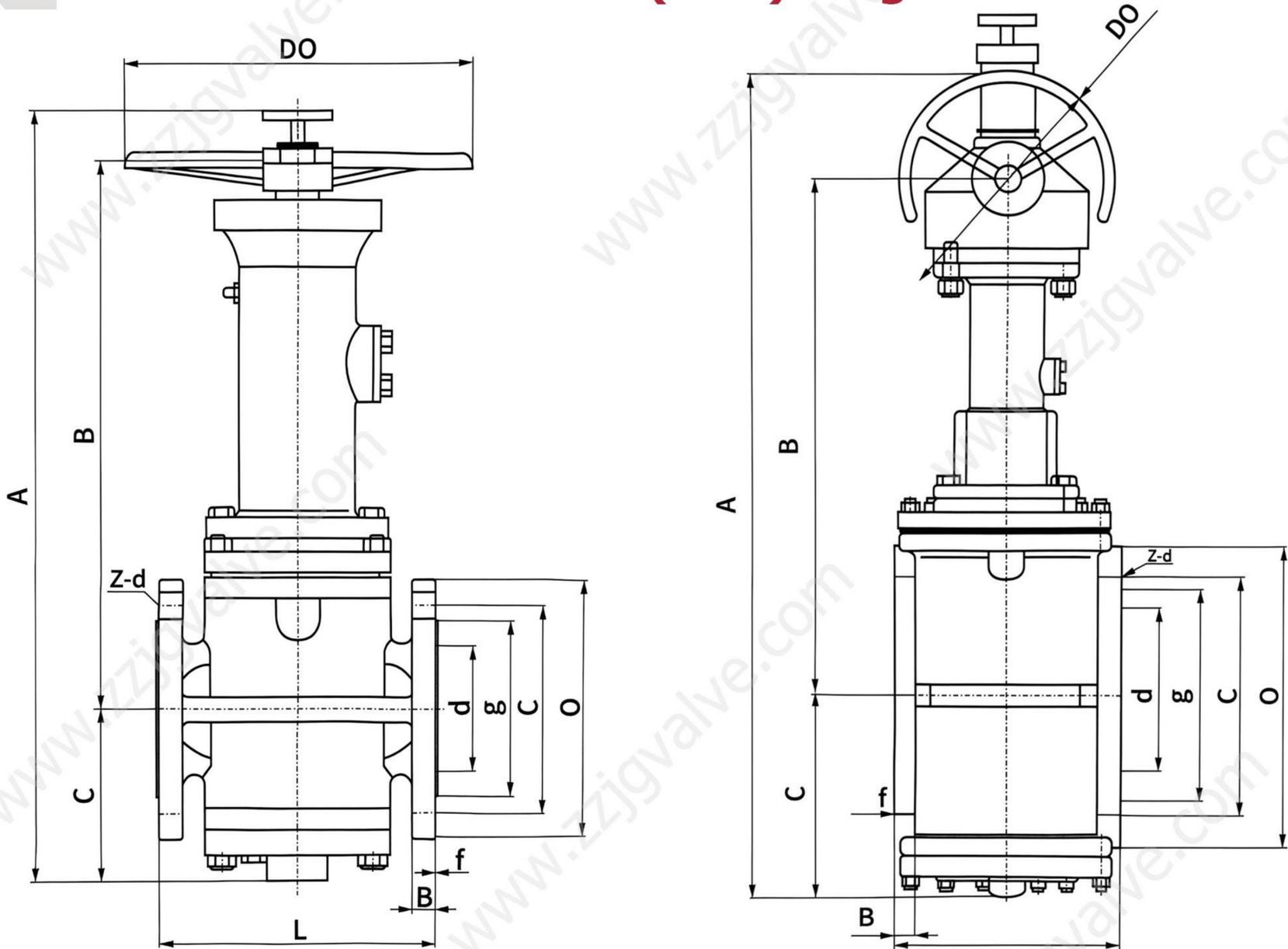
Main Dimensions 300LB Reduced Bore, Handwheel, Gear Operation													
DN	IN	L	O	C	g	d	B	f	A	B	C	D0	Z-d
50	2	216	Ø165	Ø127	Ø92	49	23	2	530	382	135	Ø200	8-Ø19
75	3	282	Ø210	Ø168.5	Ø127	74	29	2	590	395	129	Ø250	8-Ø22
100	4	305	Ø255	Ø200	Ø157	100	32.2	2	671	425	171	Ø300	8-Ø22
150	6	403	Ø320	Ø270	Ø216	150	37	2	805	520	210	Ø350	12-Ø22
200	8	419	Ø380	Ø330	Ø270	201	42	2	1096	645	253	Ø400	12-Ø25
250	10	457	Ø445	Ø387.5	Ø324	252	48.1	2	1283	753	280	Ø500	16-Ø29
300	12	502	Ø520	Ø451	Ø381	303	51.3	2	1385	777	331	Ø550	16-Ø32
350	14	762	Ø585	Ø514.5	Ø413	334	54.5	2	1395	790	341	Ø550	20-Ø32
400	16	838	Ø650	Ø571.5	Ø470	385	57.6	2	1654	948	406	Ø600	20-Ø35
450	18	914	Ø710	Ø628.5	Ø533.5	436	60.8	2	1680	960	420	Ø600	24-Ø35
500	20	991	Ø775	Ø686	Ø584	487	64	2	1892	1060	482	Ø600	24-Ø35

Main Dimensions 600LB Reduced Bore, Handwheel, Gear Operation													
DN	IN	L	O	C	g	d	B	f	A	B	C	D0	Z-d
50	2	292	Ø165	Ø127	Ø92	49	25.4	2	530	382	135	Ø250	8-Ø19
75	3	356	Ø210	Ø168.3	Ø127	74	31.8	2	590	395	129	Ø300	8-Ø22
100	4	432	Ø275	Ø216	Ø157	100	38.1	2	671	425	171	Ø350	8-Ø25
150	6	559	Ø355	Ø292	Ø216	150	47.7	2	805	520	210	Ø350	12-Ø29
200	8	660	Ø420	Ø349	Ø270	201	55.6	2	1096	645	253	Ø400	12-Ø32
250	10	787	Ø510	Ø432	Ø324	252	63.5	2	1283	753	280	Ø500	16-Ø35
300	12	838	Ø560	Ø489	Ø381	303	66.7	2	1385	777	331	Ø550	20-Ø35
350	14	889	Ø605	Ø527	Ø413	334	69.9	2	1395	790	341	Ø550	20-Ø38
400	16	991	Ø685	Ø603	Ø470	385	76.2	2	1654	948	406	Ø600	20-Ø41
450	18	1092	Ø745	Ø654	Ø533.5	436	82.6	2	1680	960	420	Ø600	20-Ø44
500	20	1194	Ø815	Ø724	Ø584	487	88.9	2	1892	1060	482	Ø600	24-Ø44





## Double Block And Bleed (DBB) Plug Valve



**Main Dimensions  
PN16 Reduced Bore, Handwheel, Gear Operation**

DN	IN	L	O	C	g	d	B	f	A	B	C	DO	Z-d
50	2	178	Φ165	Φ125	Φ102	49	18	2	530	382	135	Φ200	4-Φ18
80	3	203	Φ200	Φ160	Φ138	74	20	2	590	395	129	Φ250	8-Φ18
100	4	229	Φ220	Φ180	Φ158	100	20	2	671	425	171	Φ300	8-Φ18
150	6	267	Φ285	Φ240	Φ212	150	22	2	805	520	210	Φ350	8-Φ22
200	8	292	Φ340	Φ295	Φ268	201	24	2	1096	645	253	Φ400	12-Φ22
250	10	330	Φ405	Φ355	Φ320	252	26	2	1283	753	280	Φ500	12-Φ26
300	12	356	Φ460	Φ410	Φ378	303	28	2	1385	777	331	Φ550	12-Φ26
350	14	381	Φ520	Φ470	Φ428	334	30	2	1395	790	341	Φ550	16-Φ26
400	16	406	Φ580	Φ525	Φ490	385	32	2	1654	948	406	Φ600	16-Φ30
450	18	864	Φ640	Φ585	Φ550	436	40	2	1680	960	420	Φ600	20-Φ30
500	20	914	Φ715	Φ650	Φ610	487	44	2	1892	1060	482	Φ600	20-Φ33





## Double Block And Bleed (DBB) Plug Valve

Main Dimensions PN25 Reduced Bore, Handwheel, Gear Operation													
DN	IN	L	O	C	g	d	B	f	A	B	C	D0	Z-d
50	2	216	Φ165	Φ125	Φ102	49	20	2	530	382	135	Φ200	4-Φ18
80	3	282	Φ200	Φ160	Φ138	74	24	2	590	395	129	Φ250	8-Φ18
100	4	305	Φ235	Φ190	Φ162	100	24	2	671	425	171	Φ300	8-Φ22
150	6	403	Φ300	Φ250	Φ218	150	28	2	805	520	210	Φ350	8-Φ26
200	8	419	Φ360	Φ310	Φ278	201	30	2	1096	645	253	Φ400	12-Φ26
250	10	457	Φ425	Φ370	Φ335	252	32	2	1283	753	280	Φ500	12-Φ30
300	12	502	Φ485	Φ430	Φ395	303	34	2	1385	777	331	Φ550	16-Φ30
350	14	762	Φ555	Φ490	Φ450	334	38	2	1395	790	341	Φ550	16-Φ33
400	16	838	Φ620	Φ550	Φ505	385	40	2	1654	948	406	Φ600	16-Φ36
450	18	914	Φ670	Φ600	Φ555	436	46	2	1680	960	420	Φ600	20-Φ36
500	20	991	Φ730	Φ660	Φ615	487	48	2	1892	1060	482	Φ600	20-Φ36

Main Dimensions PN40 Reduced Bore, Handwheel, Gear Operation													
DN	IN	L	O	C	g	d	B	f	A	B	C	D0	Z-d
50	2	216	Φ165	Φ125	Φ102	49	20	2	580	382	135	Φ250	4-Φ18
80	3	282	Φ200	Φ160	Φ138	74	24	2	590	395	129	Φ300	8-Φ18
100	4	305	Φ235	Φ190	Φ162	100	24	2	671	425	171	Φ350	8-Φ22
150	6	403	Φ300	Φ250	Φ218	150	28	2	805	520	210	Φ350	8-Φ26
200	8	419	Φ375	Φ320	Φ285	201	34	2	1096	645	253	Φ400	12-Φ30
250	10	457	Φ450	Φ385	Φ345	252	38	2	1283	753	280	Φ500	12-Φ33
300	12	502	Φ515	Φ450	Φ410	303	42	2	1385	777	331	Φ550	16-Φ33
350	14	762	Φ580	Φ510	Φ465	334	46	2	1395	790	341	Φ550	16-Φ36
400	16	838	Φ660	Φ585	Φ535	385	50	2	1654	948	406	Φ600	16-Φ39
450	18	914	Φ685	Φ610	Φ560	436	57	2	1680	960	420	Φ600	20-Φ39
500	20	991	Φ755	Φ670	Φ615	487	57	2	1892	1060	482	Φ600	20-Φ42

