PENTAIR

YARWAY

Controls the destructive forces inherent in high pressure drop service through rapid energy dissipation

Features

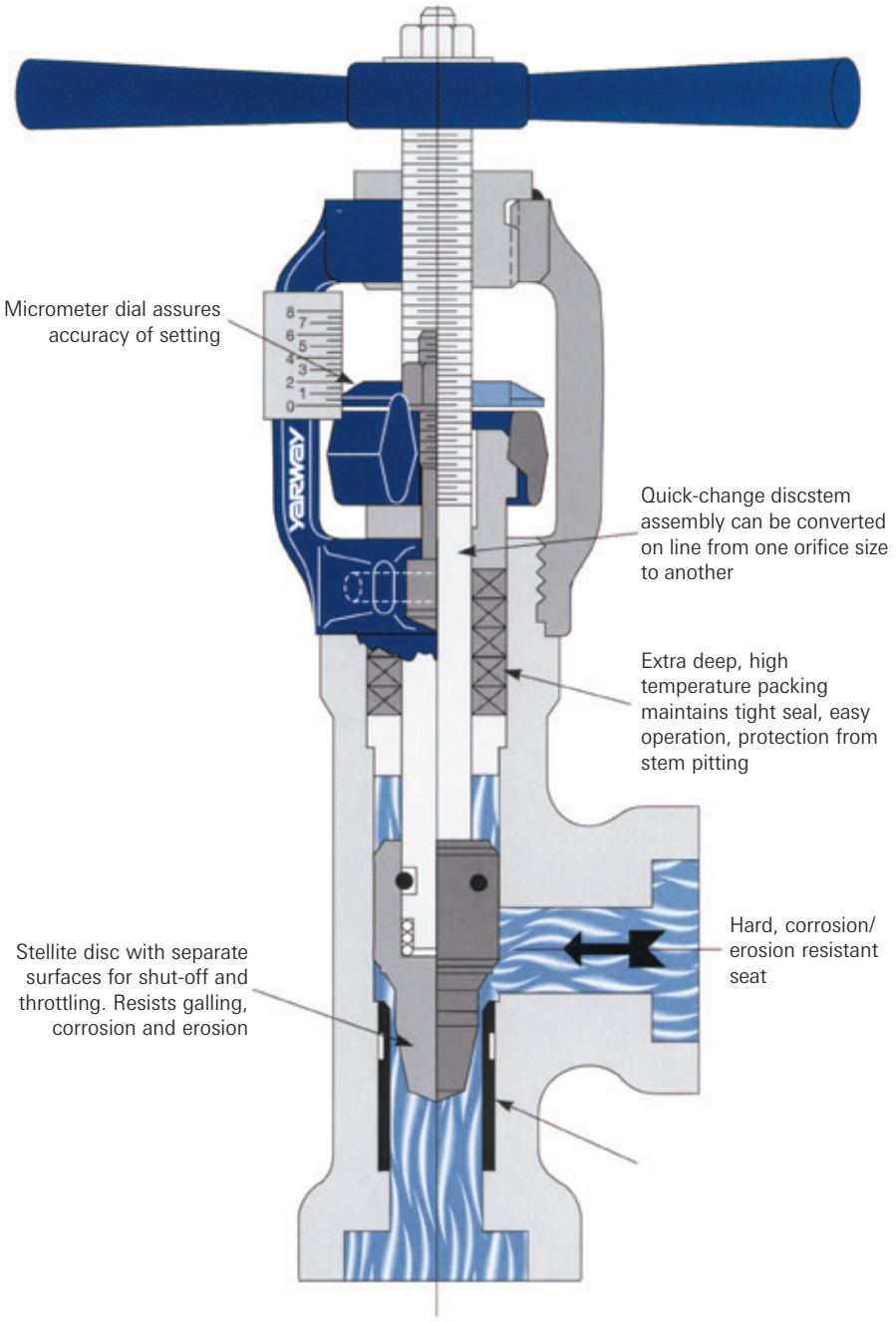
- Dual range throttling - primary range plus a super capacity blast range.
- Rapid energy dissipation - controls the destructive forces inherent in high pressure drop service.
- Accurate and repeatable settings - micrometer dial assures setting accuracy and positive resetting capability.
- Quick-change disc - insert an interchangeable stem-disc into the same valve body to convert from one orifice size to another.
- Guided-disc - eliminates disc vibration and chatter.
- Loose disc: Disc design provides multiposition seating and assures positive alignment of seat and disc surfaces. This gives sure protection against premature failures from seat-to-disc "grind" prevalent in valves of integral stem-disc design.
- Dual-purpose disc - separate surfaces for shutoff and throttling.
- Stellite seat - resists corrosion and wiredrawing.
- In-line repair - Yarway reseating tool can be used to cut a new seat in-line.
- Resetting capability: The Hy-Drop® valve has positive resetting capability to accommodate multiple-operation programs with accurate flow control variations.
- In-line repair:Yarway reseating tool can be used to cut a new seat without removing the valve from the piping.
- Motor actuation: For local or remote operation.
- Pneumatic actuation: For automatic control.

General application

The Hy-Drop® throttling valve is designed for continuous blowdown, but also works well for sampling, high pressure vents, boiler feed pump bypass relief, high pressure drop services associated with erosive and wiredrawing characteristics - or where velocity is sufficient to destroy valves of conventional globe or even venturi designs.

Technical data

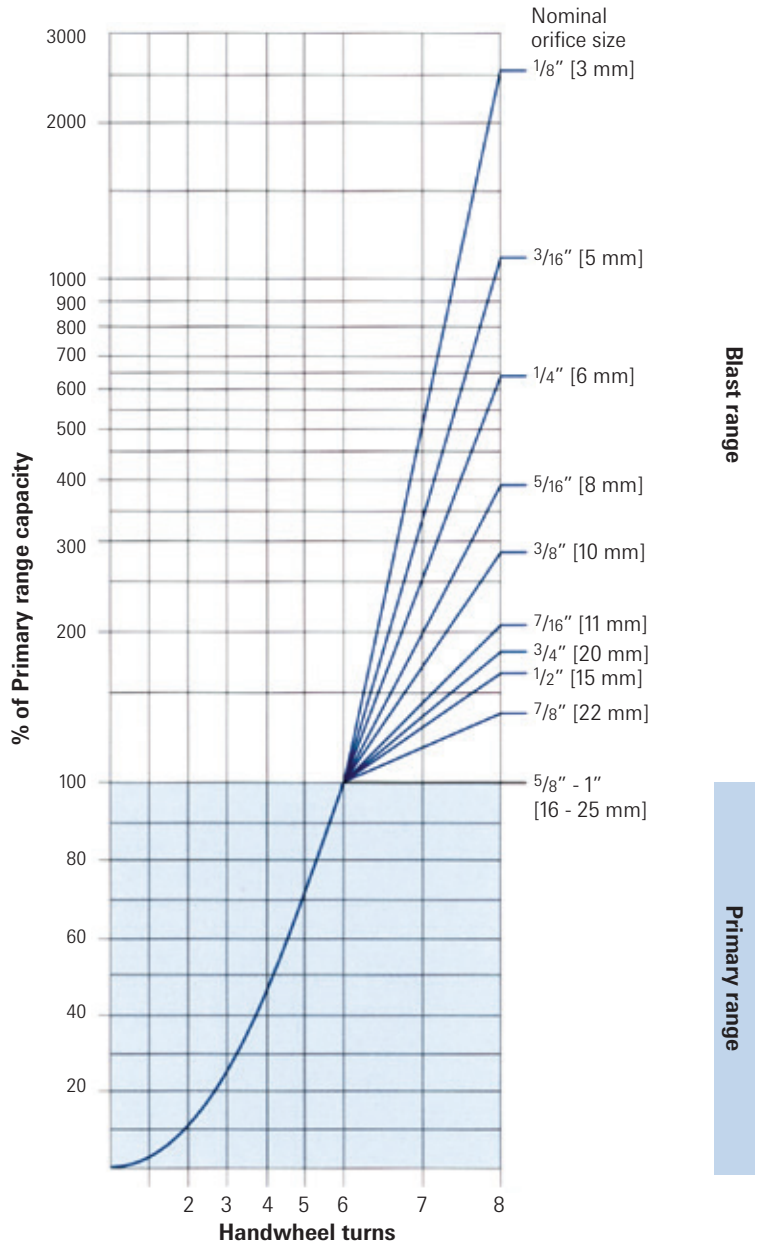
Size range	: 1" and 1½"
Pressure class	: 1700 and 2700 psi
Materials	: ASTM A105, ASME A182 F22



General description

Valves used for throttling services have always been subject to rapid deterioration in the form of erosion, cavitation damage, and wiredrawing of vital parts. Even venturi valves and other special configurations are vulnerable. The Hy-Drop® throttling valve embodies a unique concept, which so controls the destructive forces inherent in highpressure-drop service that deterioration of parts is virtually eliminated. Rapid energy dissipation is essential to the throttling process, and the Hy-Drop® valve actually encourages this at the same time containing its destructive capability. The basis for this concept is in the configuration of the flow path as determined by the shape of the valve disc and seat. Fluid flowing through the annulus between disc and cylindrical seat accelerates smoothly until it reaches the blunt end of the disc. At this point, the flow area increases abruptly at its center and the resulting pressure drop at the core of the flow path causes rapid expansion of the fluid toward the core. Thus, the essential vaporization and turbulence occur at the center, within a layer of unvaporized fluid which continues to flow along—and protect—the sleeve wall. With this configuration, the vaporization process is so efficient that the vapor formed is momentarily super-saturated and the remaining liquid subcooled, until equilibrium is re-established a short distance down the sleeve passage.

Valve rangeability



Dual-range throttling

The Hy-Drop® valve provides throttling through the primary range of conventional throttling valves plus a supercapacity blast range for purging foreign particles from the line or for accelerated drainage of the system during startup or shutdown.

Turns 3 through 6 of the T-handle provide throttling in the primary range. From the sixth to the eighth handwheel turn on the Hy-Drop® valve, the disc is elevated beyond the point where it influences control in the primary range. Size availability is provided per the following schedule:

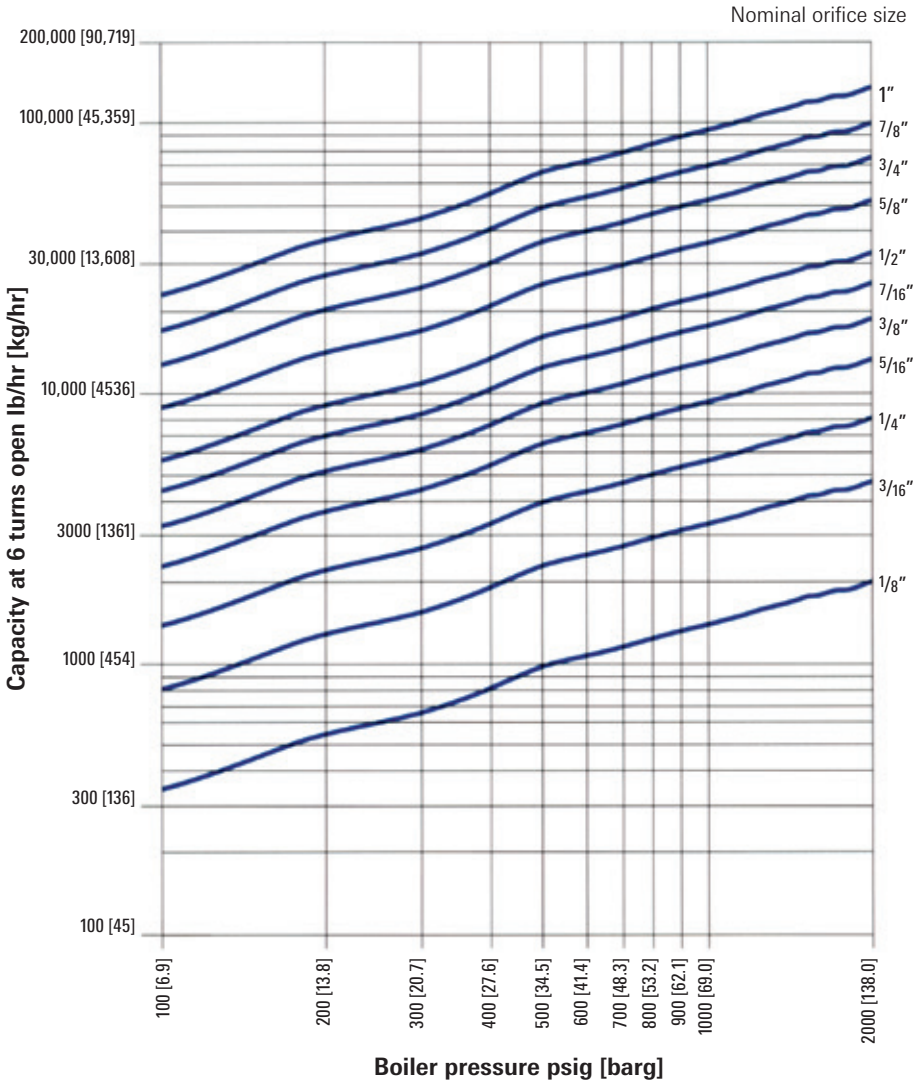
Valve size	Nominal orifice sizes	Seat diameter
1" [25 mm]	1/8" to 5/8" [3 to 16 mm]	5/8" [16 mm]
1 1/2" [40 mm]	1/8" to 5/8" [3 to 16 mm]	5/8" [16 mm]
1 1/2" [40 mm]	3/4" to 1" [20 to 25 mm]	7/8" [22 mm]

Note: Not recommended for operations below three turns.

Valve/trim selection
Consult your Pentair sales representative for size verification on all applications. Valve selector curve displays the expected flow rates for traditional continuous blowdown applications. Refer to the formulas for steam, liquid or gas service.

Flow rate calculation formulas
Rate of flow, pressure drop, or valve size can be determined by using the Yarway valve flow coefficient, C_V, in the following formulas:

Valve selector curve - continuous blowdown (flashing water)



Note: Consult your Pentair sales representative when pressure exceeds 2000 psig.

Liquid

Q = U.S. gpm

$$C_V = \frac{Q\sqrt{G}}{\sqrt{\Delta p}}$$

W = lb/hr (Flowing conditions)

$$C_V = \frac{W}{500\sqrt{\Delta p}\sqrt{G}}$$

Gas

Q = Volumetric flow (SCFH)

$$C_V = \frac{Q}{963}\sqrt{\frac{GT}{\Delta p(P_1+P_2)}}$$

K_V = metric flow coefficient (1 m³/hr water with 1 bar pressure drop)

$K_V = 0.865\ C_V$

Convert data to Imperial units and use procedures above.

Steam

Saturated

W = lb/hr*

$$C_V = \frac{W}{2.1\sqrt{\Delta p(P_1+P_2)}}$$

Superheated

W = lb/hr*

$$C_V = \frac{(1+0.0007T_{SH})W}{2.1\sqrt{\Delta p(P_1+P_2)}}$$

*When Δp equals or exceeds $\frac{P1}{2}$, the term $\sqrt{\Delta p(P_1+P_2)}$ becomes 0.87P

C_V = valve flow coefficient

G = specific gravity (water at 60°F = 1)

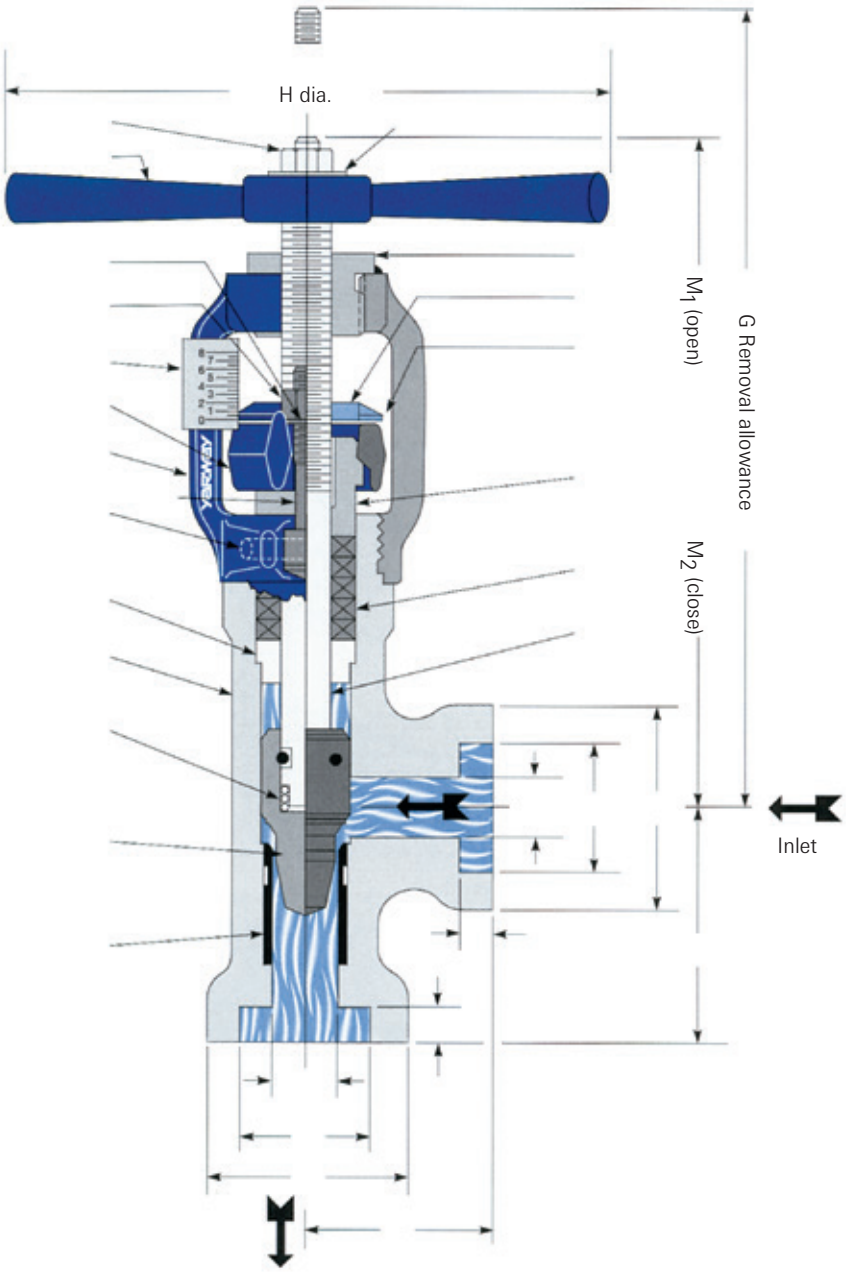
Δp = $(P_1 - P_2)$ = pressure drop psi

P_1 = inlet absolute pressure psia (14.7 + psig)

P_2 = outlet absolute pressure psia (14.7 + psig)

T_{SH} = superheat °F

T = absolute temperature of flowing medium (F + 460)



Dimensions and weights

ANSI pressure class [bar]	Fig no.	Size in. [mm]	Dimensions, in. [mm] A	B	D	E	F	G	H	M1	M2	P1	P2	Weight lb. [kg]
1700 [117]	5817	1 [25]	2 3/4 [70]	3 1/2 [89]	3 1/4 [82.6]	1.330 [33.7]	1/2 [12]	21 [533]	9 [228]	11 1/2 [292]	10 1/2 [267]	9/16 [14]	7/8 [22]	25 [11.3]
1700 [117]	5817	1 1/2 [40]	2 3/4 [70]	3 1/2 [89]	3 1/4 [82.6]	1.915 [48.6]	1/2 [12]	21 [533]	9 [228]	11 1/2 [292]	10 1/2 [267]	7/8 [22]	7/8 [22]	25 [11.3]
2700 [186]	5827	1 [25]	2 3/4 [70]	3 1/2 [89]	3 1/4 [82.6]	1.330 [33.7]	1/2 [12]	21 [533]	9 [228]	11 1/2 [292]	10 1/2 [267]	9/16 [14]	7/8 [22]	25 [11.3]
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Parts and materials

Item	Description	Material
1	Body	ASME SA-182 grade F22 or ASME SA-105
2	Gland	AISI 4140
3	Indicator	Aluminum
4	Stem	ASTM A582 type 416
5	Stuffing box bushing	AISI 410
6	Packing	Garlock 98 and graph lock
7	Indicator bushing	AISI 416
8	Split gland bushing	AISI 1018
9	Yoke bushing	ASTM 821 UNS C4 6400
10	Yoke	ASME SA-182 grade F22
11	T-Handle	ASTM A-47 grade 32510
12	Washer	Carbon steel
13	Hex Nut	Low carbon steel
14	Washer	Carbon steel
15	Indicator scale and nameplate	AISI 302
16	Spring	Inconel® X
17	Hex nut	ASME SA-194 grade 2H
18	Swing bolt	ASME SA-193 grade B7
20	Swing bolt pin	AISI 6150 or 8740
21	Disc	AMS-5385 (stellite no. 21)
22	Seat	AMS-5387 (stellite no. 6)

Water specific gravity table

Temperature		$\sqrt{G}$
60°F	[16°C]	1.000
100°F	[38°C]	0.997
200°F	[93°C]	0.982
300°F	[149°C]	0.958
400°F	[204°C]	0.927
500°F	[260°C]	0.887
600°F	[316°C]	0.824
700°F	[371°C]	0.659

Pressure/temperature ratings

Figure no.	Rating
5817-F22	1990 psig at 1000°F
5827-F22	3310 psig at 1000°F
5817-A105	2910 psig at 800°F
5827-A105	4625 psig at 800°F
F22	137 bar at 538°C
F22	228 bar at 538°C
A105	137 bar at 427°C
A105	319 bar at 427°C

Note:

1. All ratings are in accordance with ASME pressure/ temperature ratings (B16.34 - 1996) limited class.

Valve size, nominal orifice size and flow coefficients

Valve size inches [mm]	Nominal orifice size inches [mm]	Primary range coefficient C_V 3 turns	Primary range coefficient C_V 6 turns	Blast range coefficient C_V 8 turns
1" and 1½" [25 and 40]	⅛" [3]	0.1	0.3	7.7
1" and 1½" [25 and 40]	3/16" [5]	0.2	0.7	7.7
1" and 1½" [25 and 40]	¼" [6]	0.4	1.2	7.7
1" and 1½" [25 and 40]	5/16" [8]	0.6	2.0	7.7
1" and 1½" [25 and 40]	⅜" [10]	0.8	2.8	7.7
1" and 1½" [25 and 40]	7/16" [11]	1.1	3.8	7.7
1" and 1½" [25 and 40]	½" [15]	1.5	4.9	7.7
1" and 1½" [25 and 40]	5/8" [16]	2.3	7.7	7.7
1½" [40]	¾" [20]	3.3	11.0	20.0
1½" [40]	7/8" [22]	4.5	15.0	20.0
1½" [40]	1.0" [25]	6.0	20.0	20.0

How to Specify

Size _____

Yarway figure _____

Hy-Drop® throttling valve, suitable for high pressure-drop services; to be of integral bonnet design and angle pattern. Valve to possess dual range capability as permitted by the nominal orifice size which is herein specified to be. Quick-change plug to be provided to accommodate future demands of change in original orifice size without replacement or change in valve body; loose disc design to afford multi-position seating and to provide two separate elemental surfaces for the separate functions of shut-off and throttling; disc to be of solid Stellite. Valve to be provided with socketwelding ends.

Sizes

Connection: Hy-Drop® throttling valve is made in two pipe sizes, 1" and 1½". Socketwelding ends are provided. For other connection content consult your Pentair sales representative.

Other products

Yarway blow-off valves
Basic requirements for the design and use of blow-off valves are established by the ASME power boiler code, section 1. The general form of a valve, the materials of its construction, allowable boiler pressures, and the installation of the valve are all determined by the code. Yarway blow-off valves are designed in conformance with code requirements per ASME section 1, ANSI B31.1, and ANSI B16.34.
Yarway valves are especially designed for the punishment of blow-off service in boiler systems with pressures up to 3,206 psig.
The rugged construction of these valves can successfully withstand the combination of problems inherent in the service – a service in which high pressures result in high velocities which can cause wiredrawing and cavitation of metal services.
Two broad categories of Yarway blow-off valves are available – those that operate on a sliding principle and those that operate on a seat-and-disc principle. They are summarized below.

Seatless valves for pressures to 935 psig (Class 250 to 600)
The seatless blow-off valve is a sliding plunger type, opened and closed by means of a handwheel and nonrising stem, and sealed against leakage by packing rings above and below the ports. Ample flow area is provided in the hollow plunger; absence of projections or pockets prevents accumulation of scale and sediment that can impede flow and shorten the life of the valve. Annular space in the body permits pressure to surround the plunger, making the valve a fully balanced unit easy to operate at high pressures.
This valve is available in angle or straightway styles, cast iron or steel construction, and flanged ends. Pressure classes are 250, 300 and 600.

Hardseat valves for pressures to 2455 psig (Class 600 and 1500)
The hardseat valve has a seat and disc design with flow entering under the seat. It is opened and closed by means of a handwheel and threaded rising stem. The stuffing box bushing and threaded yoke bushing provide a simple, sturdy guide for the stem. This valve has been designed with thick stellite facings on the disc and seat to provide the hard wearing, anti-galling surfaces characteristic of stellite.
Usual installation of this valve allows the flow to enter below the seat. As the valve is opened, the lip on the end of the disc restricts flow until the beveled edge or seating surface of the disc is well away from the seat. This minimizes wiredrawing and protects the sealing faces. The valve should be opened rapidly and fully to help increase the life of the internal parts.
Hardseat valves are available in angle or straightway styles, socketweld or flanged end connections with manual or electric motor actuation. Class ratings are 600 and 1500.

Unit tandem valves for pressures to 3206 psig (Class 300 to 2500)
The Yarway unit tandem valve features a one-piece steel block which serves as a common body for both blowing and sealing valves. This construction eliminates interconnecting welds, or bolts and gaskets where flanged valves are required, and makes the unit tandem a compact design.
For valves with basic pressure rating to 600 psi (medium pressure unit tandem) the inlet valve is a hardseat type and the discharge valve is of the seatless type. For basic pressure ratings above 600 to 2500 psi, both inlet and discharge valves are hardseat type.
All features of the Yarway single valves are contained in the unit tandem design with the additional advantage of a one-piece, heavy duty construction.