DBOY (S)

SERIES 3 CONTROL VALVE

Armstrong®

EXPERIENCE MATTERS™

DBOY (S)-3 Control Valve

Nuclear Power Plant Valves

12" DDBOY(S)(X)

8" DDBOY(S)(X)

DBOY Series Control Valves are rugged, reliable units specially designed for use in steam, water, gas, vapor, and non-corrosive liquid service. The balanced cage-throttling design permits these valves to be operated with small, compact and economical actuators against fluid pressure drops up to 1480 psig and temperatures up to 800°F.

SIZES 2" – 8"
ANSI CLASS 125/250, 150/300, 600

- **High Flow Capacities** provide larger flow area, reduced body velocity and pressure loss
- **Bolted Actuator Yoke** guarantees easy disassembly
- **Controlled Seat Loading** maintains constant seat gasket load
- **Hung Cage Design** allows thermal expansion without seat damage
- **Hardened/Stainless Steel Trim** provides twice the service life of 316 stainless trim
- **Rugged Plug Seal** with three times the wear surface of competitive valves for long lasting leak tight seal
- **Multiple Cage Options** for maximum versatility
- **Balanced Plug Design** provides smooth high pressure control
- **Ultra Compact Actuators** install in tight spaces
- **Tighter Shutoff Design** provides exceptional performance up to Class VI

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Armstrong owns the exclusive rights to manufacture these legacy brands and OEM spare parts, adhering to the original specifications and drawings, and quality backed by the outstanding service, technical support and expertise Armstrong is known for. Armstrong International and its contractual representatives have exclusive rights to sell these product brands.

APPLICATION DATA

- Control systems for food, pulp and paper, chemical, petrochemical, power & other industries
- HVAC systems
- Feed water and fuel system controls in boiler rooms
- Packaged systems (OEM) such as heat exchangers, water purification systems & vaporizers, metal cleaning and plating

OPTIONS

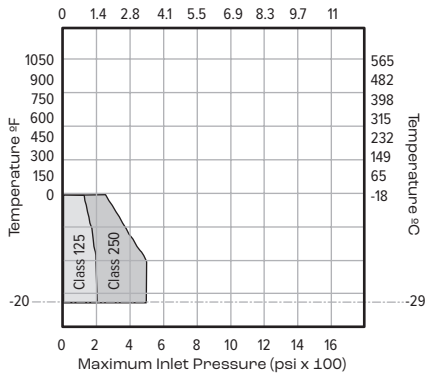
- 35, 55, 85 or 135 sq. in. Actuator, Reverse or Direct
- Soft Seats
- Threaded, Socketweld, Flanged and Buttweld End Connections
- Positioners
- Noise and Cavitation Reducing Trim
- Reduced Flow Cage
- Alternate Packings for Severe Service
- High Temperature Trim

MODELS

- U841 — Cast Iron
- U843 — Carbon Steel
- U845 — Chrome Moly

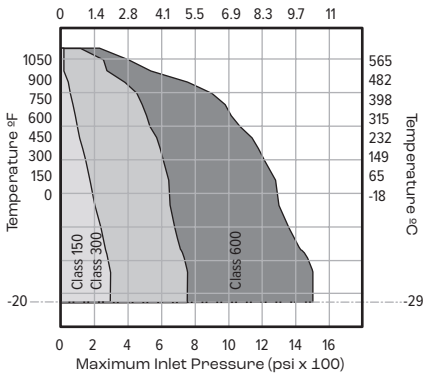
CAST IRON

A126 Class B Maximum Inlet Pressure (MPa)



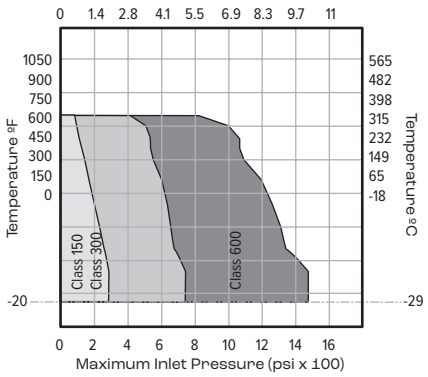
CHROME MOLY

A2117WC9 Maximum Inlet Pressure (MPa)



CARBON STEEL

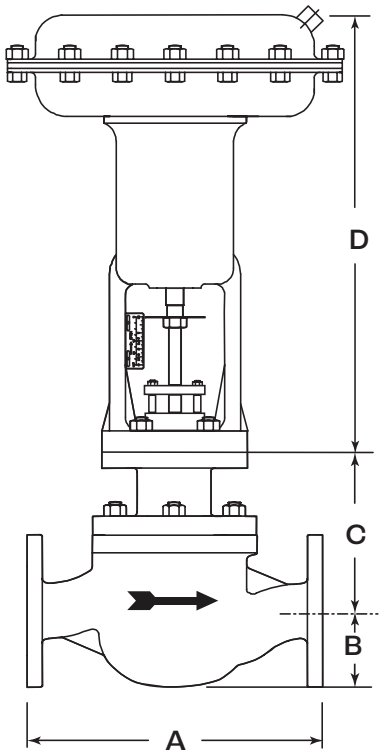
A216 Gr. WCB - Standard Class Maximum Inlet Pressure (MPa)



DBOY (S)-3 Control Valve Dimensions and Weights

Size	"A", "B" and "C" Dimensions - inches (mm)									
	A				B				C	
	NPT	125, 150 (ND-16)	250, 300 (ND-25[2] ND-40)	600 (ND-100)	CI	CS NPT[1], 150 (ND-16)	CS 300 (ND-40)	CS 600 (ND-100)	CI	CS
2 (50)	9¼ (235)	10 (254)	10½ (267)	11¼ (286)	3¾ (95)	3 (76)	3¼ (83)	3¼ (83)	7¼ (184)	7⅛ (181)
2½ (65)	–	10⅞ (276)	11½ (292)	12¼ (311)	4⅜ (111)	3½ (89)	3¾ (95)	3¾ (95)	6⅝ (168)	6⅝ (168)
3 (80)	–	11¾ (299)	13¼ (337)	13¼ (337)	4½ (114)	3¾ (95)	4⅛ (105)	4⅛ (105)	6⅞ (175)	6⅞ (175)
4 (100)	–	13⅞ (352)	14½ (368)	15½ (394)	5½ (140)	4½ (114)	5 (127)	5⅜ (137)	8⅛ (206)	8⅞ (219)
6 (150)	–	17¾ (451)	18⅝ (473)	20 (508)	5⅞ (149)	5½ (140)	6¼ (159)	7 (178)	9¾ (248)	9¾ (248)
8 (200)	–	21⅜ (543)	22⅜ (568)	24 (610)	7⅝ (194)	6¾ (172)	7½ (191)	8¼ (210)	12¼ (311)	12¼ (311)

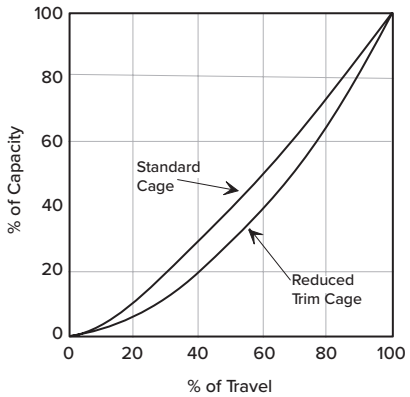
Size	"D" Dimensions - inches (mm)											
	D											
2 (50)	35	35R	55	55R	55(A)	55AR	85	85R	85A	85AR	135	135R
2 (50)	12⅜ (314)	12⅜ (314)	15¼ (387)	18 (457)	–	–	–	–	–	–	–	–
2½ (65)	–	–	–	–	15¼ (387)	18 (457)	19⅝ (499)	23¼ (591)	–	–	–	–
3 (80)	–	–	–	–	15¼ (387)	18 (457)	19⅝ (499)	23¼ (591)	–	–	–	–
4 (100)	–	–	–	–	15¼ (387)	18 (457)	19⅝ (499)	23¼ (591)	–	–	–	–
6 (150)	–	–	–	–	–	–	–	–	22¼ (565)	25⅞ (657)	27⅜ (695)	32¼ (819)
8 (200)	–	–	–	–	–	–	–	–	–	–	27⅜ (695)	32¼ (819)



Note:
Go to controlvalvesandheaters.com for 10/0.4.3 and 10/0.4.4 for Actuator dimensions with HOD and Handjack

Size	Weights[3] - pounds (kg)						
	CI			CS			
	NPT	125	250	NPT	150	300	600
2 (50)	80 (36.3)	85 (39)	88 (40)	45 (20.4)	85 (39)	88 (40)	90 (41)
2½ (65)	–	125 (57)	130 (59)	–	125 (57)	130 (59)	135 (61)
3 (80)	–	145 (66)	152 (69)	–	145 (66)	152 (69)	158 (72)
4 (100)	–	190 (86)	198 (90)	–	190 (86)	198 (90)	205 (903)
6 (150)	–	460 (209)	480 (218)	–	450 (204)	470 (213)	485 (220)
8 (200)	–	625 (284)	640 (290)	–	600 (272)	635 (288)	660 (299)

Inherent Flow Characteristics



1. NPT available in 2" only.
2. BWE same as 300
3. Weights are approximate.

DBOY (S)-3 Control Valve Hung Cage Design

Unlike competitor's valves (which use the cage to compress the seat ring into the body), our cage is suspended in the body from a machined shoulder.

This eliminates bonnet gasket leakage, cage deformation, sticking plugs, seat gasket and body washout which can occur with cage retained seat designs. The hung cage design utilizes a 17-4 Ph stainless steel Belleville load ring to maintain a constant seat gasket load, even in high temperature cycling service.

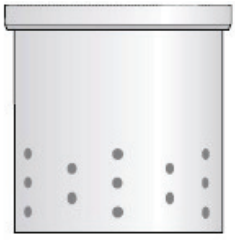
Our DBOY (S)-3 Control Valves are specifically designed for high pressure drop service. Pressure drop, high velocities and throttling occur between the cage window and the plug, thereby protecting the seat ring and tight shutoff capability of the valve.

Standard Cage

The full ported, standard cage provides maximum flow with minimum pressure drop. The inherent modified linear flow characteristic provides excellent low flow control, high rangeability and maximum flow per given body size.

40% Reduced Trim Cage

This otional cage reduces the maximum Cv and flow to 40% of the normal, full port valve. Used to provide body velocity control, future flow expandability, or to correct for oversized valve conditions.



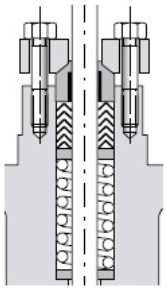
Anti-Cavitation Cage

The Les-Cav cage controls the effects of valve cavitation providing a normal valve/ trim life expectancy in cavitating conditions. Diametrically opposed holes, increase the valves cavitation index (Kc) and direct impinging flow to the center of the cage, preventing mechanical trim/body damage.

Noise Reducing Cage

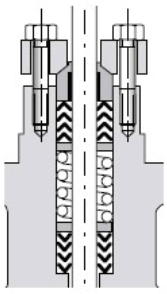
The Les-Sonic cage is designed to reduce fluid generated noise up to 10dBA in steam, gas or any compressible fluid service. When used in conjunction with a Les-Sonic silencing orifice, noise attenuations of 15-20dBA can be achieved.

PACKING CONFIGURATIONS



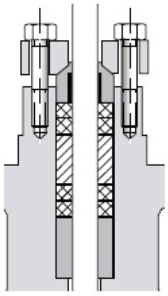
PTFE – V-ring

Live-loaded PTFE V-ring packing provides the most maintenance free stem seal. The V-ring packing is both presssure energized and live-loaded by a 304 stainless steel spring to automatically compensate for packing wear. Maximum service temperature is 460°F (238°C)



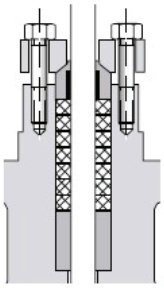
Double PTFE – V-ring

Inverted sets of PTFE V-ring packing provide tight sealing in valves which may be controlling pressure or vacuum at different times. Maximum temperature 460°F (238°C).



High Temperature Laminated Graphite

Precision die-cut laminated graphite rings provide a reliable, tight stem seal to operating temperatures of 800°F (426°C).



Braided Teflon® Graphite

Split rings allow packing replacement without removal of actuator. Graphite impregnated PTFE provdes 500°F (260°C) service temparture better memory an sealing than pure PTFE rings, lowered stem hysteresis, and is ideal for fluids that contain suspended particles.

DBOY (S)-3 Control Valve Trim Material Selection

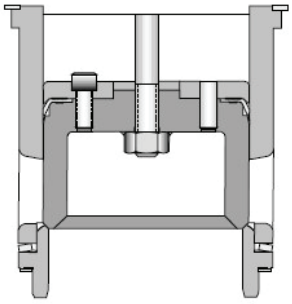
Our balanced Plug design allows line pressure under the plug to build up above the plug, effectively cancelling out any unbalanced stem force due to pressure. In addition to providing smooth, high pressure control, balanced plugs allow use of small, light, cost effective actuators. Class III, IV or VI shutoff can be provided.

The piston seal is critical to maintaining tight shutoff in any cage valve. The heavy cupwasher style PTFE plug seal has three times the cross sectional area and wear surface of competitive valves. This provides tight shutoff longer than competitor's designs at both low and high pressures.

Balance Plug Trim Material

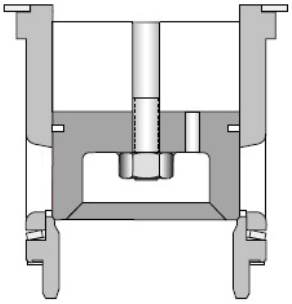
Trim	Max. Service Temp.	Plug	Seat Ring	Stem	Gaskets	ANSI/ISA 70-2 Shutoff
Standard Balanced	500°F (260°C)	AISI 410 SS w/PTFE	AISI Type 400 SS[1]	AISI Type 316 SS	Filled Type 304 SS	IV
High Temperature	800°F (426°)	AISI 410 SS w/ Ni-Resist Seal	AISI Type 400 SS Stellite®	AISI Type 316 SS	Inconel Graphite	III
Soft Seated	460°F (238°)	AISI 410 SS w/ PTFE Seal	AISI Type 400 SS w/ PTFE Insert	AISI Type 316 SS	Filled Type 304 SS	VI

1. Stellite® seat optional. STELLITE® is a trademark of Stoody Deloro Stellite, Inc.



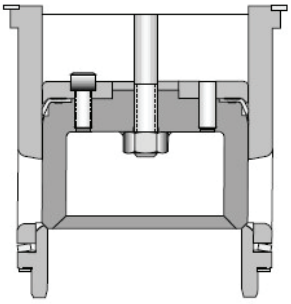
Standard Balanced Plug

Balanced plug design eliminates large stem forces allowing the use of small, cost-effective actuators. Provides smooth throttling control even at pressures to 1000 psi. Standard PTFE plug seal provides ANSI Class IV tight shutoff to temperatures of 500°F (260°C). (Flow over seat only)



High-Temp Balanced Plug

Balanced plug with high-temp ni-resist or carbon plug seal provides ANSI Class III shutoff at temperatures up to 800°F (426°C).

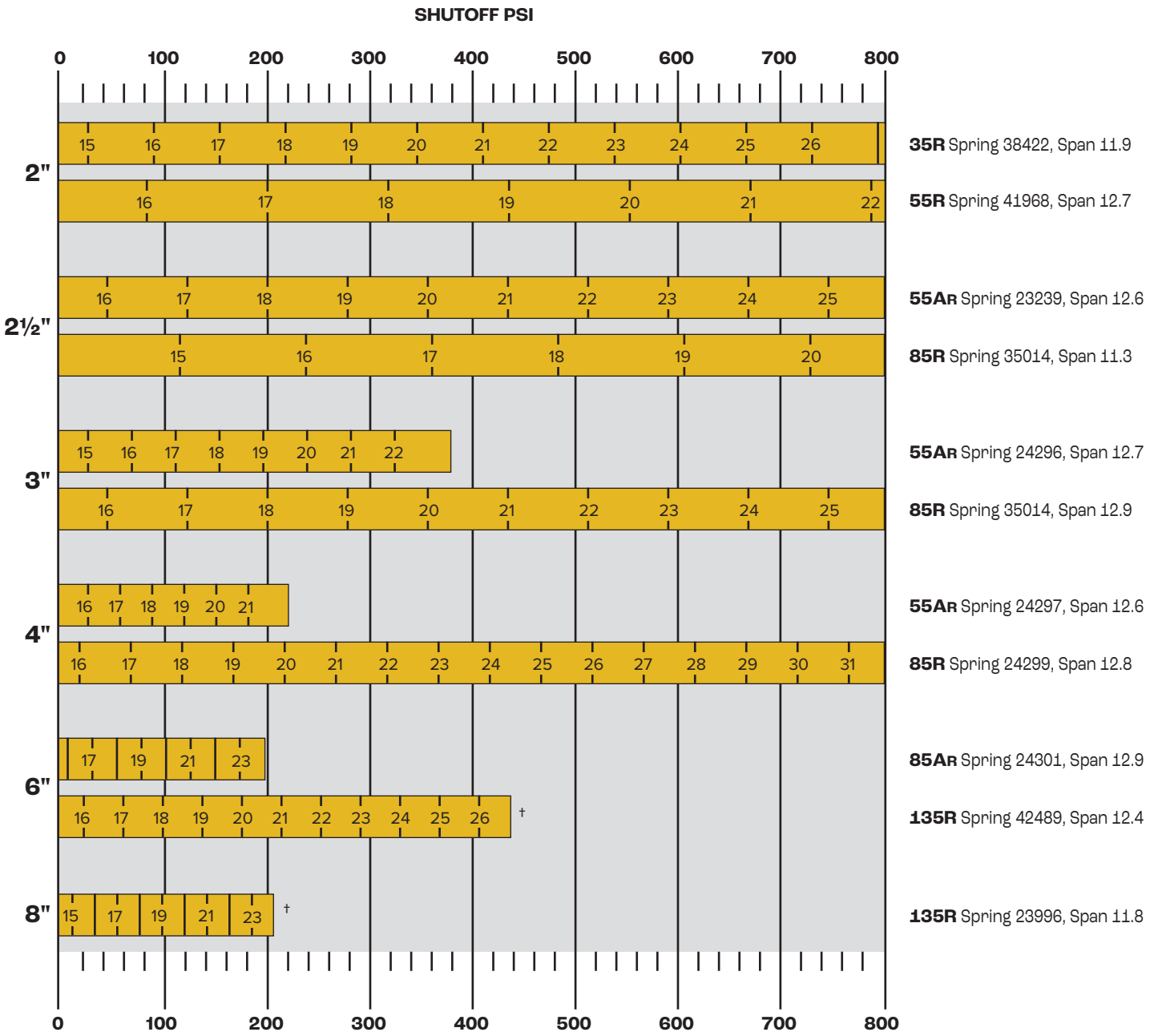


Soft Seated Trim

Balanced plug with PTFE plug seal and an optional seat design with PTFE insert provide ANSI Class VI bubble tight shut-off at temperatures up to 460°F (238°C). (Flow over seat only)

DBOY (S)-3 Control Valve
Shut-Off Table – Reverse Acting

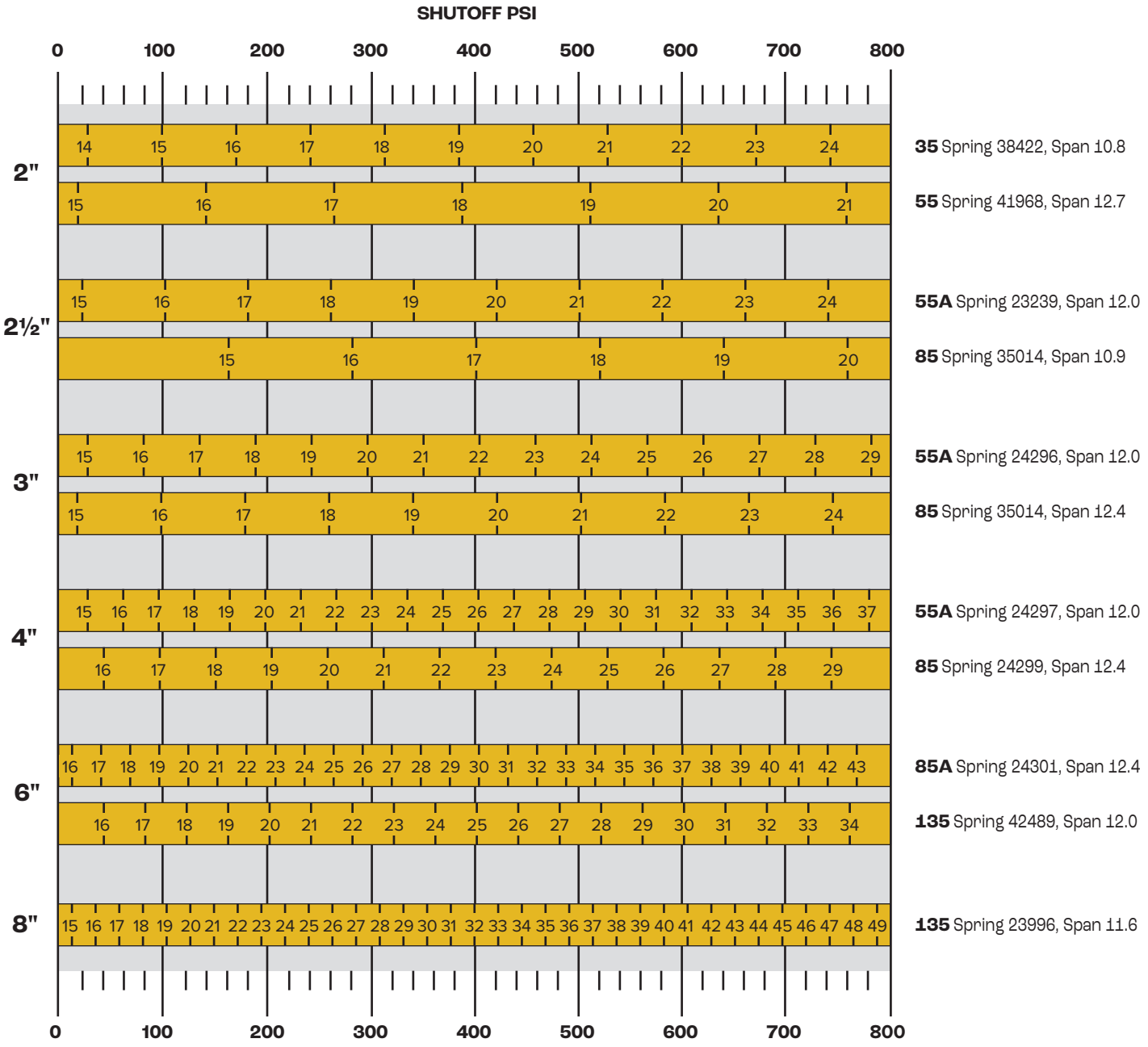
ACTUATOR SHUTOFF TABLE



† For shutoff pressure above this value, consult factory.

DBOY (S)-3 Control Valve
Shut-Off Table – Direct Acting

ACTUATOR SHUTOFF TABLE



35 Spring 38422, Span 10.8

55 Spring 41968, Span 12.7

55A Spring 23239, Span 12.0

85 Spring 35014, Span 10.9

55A Spring 24296, Span 12.0

85 Spring 35014, Span 12.4

55A Spring 24297, Span 12.0

85 Spring 24299, Span 12.4

85A Spring 24301, Span 12.4

135 Spring 42489, Span 12.0

135 Spring 23996, Span 11.6

DBOY (S)-3 Specifications

BODY ASSEMBLY
- Style: Single seated, top entry bolted bonnet, globe style body, cage guided balanced plug

ANSI BODY RATINGS
- Class 125 & 250 Cast Iron
- Class 150, 300, & 600 Steel and Alloy Steel

BODY/BONNET MATERIALS
- Cast Iron, ASTM A126 Class B
- Carbon Steel, ASTM A216 Gr WCB
- Chrome Moly, ASTM A217 Gr WC9

SIZES
- 2"-8" (50-200mm)

END CONNECTIONS
- ANSI Class all Integral Flanged, 2-8" Threaded, NPT - 2" only, (ANSI 250 Cast Iron Bodies), (ANSI 600 Carbon Steel & Alloy Steel)
- Socketweld - 2" only, (ANSI 600 Class) Buttweld Ends
- DIN Flanges: ND-16, ND-25, ND-40, ND-64, ND-100

BONNET
- Bolted Bonnet, Standard

BODY/BONNET BOLTING
- ASTM A-193 GRB7 Studs
- ASTM A-194 GR2H Nuts

STEM PACKING
- PTFE V-Rings, -40 to 460˚F (-22 to 238˚C)
- PTFE/Graphite, -40 to 500˚F (-22 to 260˚C)
- Laminated Graphite,-320 to 800˚F (-195 to 426˚C)

PACKING STUDS, NUTS & FOLLOWER
- 300 Series Stainless Steel

GASKETS
- Body/Bonnet and Seat Ring/Body: Filled
- 304 stainless steel: 500˚F (260˚C) Max.
- Inconel/Graphite: 800˚F (426˚C) Max.

TRIM SIZES
- Full Port
- 40% reduced
- Custom, contact factory

PLUG (PISTON) SEAL MATERIALS
- Standard TFE/Graphite - max. temp. 500˚F (260˚C) (Class IV shutoff)
- Ni-Resist - max. temp. 800˚F (426˚C) (Class III shutoff)

FLOW CHARACTERISTICS
- Modified Linear, Standard
- Equal Percentage (w/ CAM Characterized Positioner)

SHUTOFF CLASS (ANSI / ISA 70-2)
- Standard trim, 0-500˚F (-18 to 260˚C) - Max. Class IV (.01% Cv)
- Metal/PTFE seats - Class VI, bubble tight to 460˚F (238˚C)
- High-temp trim, 0-800˚F (-18 to 426˚C), Class III (.1% Cv)
- For optional Class IV or V shutoff above 500˚F, (260˚C) contact factory

TRIM MATERIAL COMBINATIONS
- See chart on page 5

ACTUATORS
- Standard: Spring and Diaphragm
- Optional: Piston, Double Acting/Spring Return Hydraulic Electric, Electro-Hydraulic

DBO(Y)(S)-3 C_V

Valve Size (in.)	Full Port		40% Reduced		Les Sonic		Les Cav		Stroke (in.)	Seat Dia.	Unbalanced Area (in^2)
	C_V[1]	Range	C_V[1]	Range	C_V[1]	Range	C_V[1]	Range			
2	65	30:1	26	20:1	48	30:1	32	14:1	0.750	2.3	0.14
2½	90	40:1	36	25:1	70	40:1	40	17:1	0.875	2.9	0.18
3	125	40:1	50	25:1	97	40:1	63	20:1	1.00	3.5	0.21
4	205	50:1	82	30:1	156	50:1	103	25:1	1.25	4.6	0.28
6	435	50:1	174	30:1	349	50:1	217	25:1	2.00	6.9	0.42
8	760	50:1	304	30:1	579	50:1	304	25:1	2.75	9.2	0.56

Sizing Coefficients

Case Type	Liquid		Gas
	C_L	K_C	X_T
Standard	.8	.65	.7
Les Cav	.9	.79	N/A
Les Sonic	N/A	N/A	.65

1. Minimum Cv controllable is Cv from table divided by rangeability.

DBOY (S)-3 Control Valve Order Code

	Class	Material			Valve Size	End Connection	Actuator	Bonnet Packing	Trim Form	Trim Material	Accessories
Code	U	8	4	1	F	2	A	1	S	J	4
Position	1	2	3	4	5	6	7	8	9	10	11

Class - Position 1

U

Material - Position 2, 3 & 4

841 = Iron
843 = Carbon Steel
845 = Chrome Moly, WC9
XXX = Other

Valve Size - Position 5

F = 2
G = 2½
H = 3
J = 4
K = 6
L = 8

End Connection - Position 6

1 = Threaded
2 = Flanged 150 Steels, Flanged 125 Iron
3 = Flanged 300 Steels, Flanged 250 Iron
4 = SWE Steels
5 = BWE 40 Steels
6 = ND 16 Steels & Iron
7 = ND 40 Steels, ND 10 Iron (8" only)
9 = BWE 80 Steels
0 = ND 100 Steels
A = RTJ 300 Steels
B = RTJ 600 Steels
C = SWE Sch. 80 Steels
D = ND64 Steels

Actuator - Position 7

A = 35
B = 35R
C = 35 HOD
D = 35R HOD
E = 55[1]
F = 55R[1]
G = 55A
H = 55AR[1]
I = 55 HOD[1]
J = 55R HOD[1]
K = 55A HOD[1]
L = 55AR HOD[1]
M = 85/85A[2]
N = 85R/85AR[2]
P = 85/85A HOD[2]
Q = 85R/85AR HOD[2]
R = 135
S = 135R
T = 135 HOD
U = 135R HOD
V = 270
W = 270R
X = w/o Actuator
Y = 270 HOD
Z = 270R HOD

DigiDBOY: Specify X for actuator (position 7). Specify actuator, mounting kit and each option as a separate line item. See page 10.

Bonnet & Packing - Position B

1 = Standard Bonnet, braided Teflon® graphite package
2 = Standard Bonnet, PTFE package
3 = Standard bonnet, laminated graphite package
4 = Standar bonnet, double Teflon® package

Trim Form - Position 9

S = Full capacity
T = Reduced 40% capacity
V = Les cav
W = Les sonic

Trim Material - Position 10

J = Standard 400 SS
L = Stellite® hard faced
P = DBOS, Hi-Temp HF
V = TFE soft seat

Accessories - Position 11

1 = 1 Accessory
2 = 2 Accessory
3 = 3 Accessory
4 = 4 Accessory
5 = 5 Accessory
6 = 6 Accessory
7 = 7 Accessory
8 = 8 Accessory
9 = 9 Accessory
0 = 0 Accesory

1. 55/R used on 2" D(D)BOY(S)-3; 55A/AR used on 2½" - 4"valves. 2. 85A/AR used on 6" D(D)BOY(S)-3; 85/R used on 2½" - 4"valves.

Applications

FEEDWATER CONTROL regulates level of water in boiler drum. The drum design is commonly based on HP, IP & LP applications. Valve receives water flow from pump and supplies water to drum to make up for that used to produce steam.

FEEDWATER RECIRCULATION valve insures that adequate flow is maintained through feedwater pump. The pump manufacturer calculates minimum flow required to prevent risk of premature pump failure due to bearings overheating or excessive thermal expansion of impeller blades.

AUXILIARY STEAM PRESSURE REDUCTION

1) Soot Blowers increase thermal efficiencies. Valve controls steam supplied to header from super heated source. PRV sees high pressure drop, intermittent operation and rapid load swings.
2) Building Heat, extraction steam control.
3) Pegging, Deaerators use super heated steam to heat and remove air from condensate normally closed against high differential pressure.

DRAIN VALVES, the presence of condensate in the turbine at startup or shutdown can be extremely damaging. As the steam temperature and pressure increase, the drain valves gradually throttle closed. These valves see a wide range of conditions, cool condensate followed by increasing temperature and pressure.

GLAND SEAL STEAM, valves are used to maintain constant steam pressure in gland to seal air from turbine. Application requires HP steam, throttling a low flow at high DP. Typically these valves operate in a split range mode. One pressure signal either loads or vents the gland.

ATTEMPERATOR SPRAY, SUPERHEAT, REHEAT - Spray Control valve – is used for controlling steam temperature to turbine. The purpose of valve is to maintain a tight temperature band resulting in maximum efficiency.
1) Superheat spray, low DP, turndown and accuracy are important.
2) Reheat spray, high DP, with Cavitation and seat leakage concerns as the valve operates close to the seat.

DBOY (S)-3 Linear Valve Specification Form

Armstrong
EXPERIENCE MATTERS

Project/Job _____
Unit/Customer _____
P.O./LCO File # _____
Item _____
Contract _____
MFR Serial # _____

Data Sheet _____ of _____
Spec _____
Tag _____
Dwg _____
Service _____

FLUID ☐ Steam ☐ Water ☐ Gas _____ ☐ Liquid _____ Crit Pres PC _____

SERVICE CONDITIONS

Flow ☐ #/hr ☐ gpm ☐ scfh ☐ _____
Inlet Pressure ☐ psig ☐ psia ☐ _____
Outlet Pressure ☐ psig ☐ psia ☐ _____
Temperature ☐ °C ☐ °F _____
Max Press/Temperature: _____/_____
Density/MW/SG _____/_____/_____
Viscosity _____ CP
Vapor Pressure ☐ psia ☐ _____
Required C_V _____ Noise (dBA) Allowable _____

Max. Flow	Norm. Flow	Min. Flow	Shut-off Pressure

LINE INFO Pipe Size In: _____ /Sch _____ Pipe Size Out: _____ /Sch _____

VALVE BODY & BONNET

Body Size in. ☐ 2 ☐ 2½ ☐ 3 ☐ 4 ☐ 6 ☐ 8
ANSI Class ☐ 125 ☐ 150 ☐ 250 ☐ 300 ☐ 600 ☐ Other _____
Body/Bonnet Material ☐ Cast Iron ☐ Cast Steel ☐ Cr Mo ☐ Other _____
End Conn. Inlet/Outlet: ☐ NPT ☐ SWE ☐ BWE Sch. _____ ☐ Int. Flanges ☐ Other _____

TRIM SIZE ☐ 100% ☐ 40% ☐ Les-Cav ☐ Les-sonic ☐ Other _____

ACTUATOR

Spring Action: ☐ Air to Open ☐ Air to Close ☐ Last Position ☐ Other _____ ☐ None
Available Air Supply Prssure: Max. _____ Min. _____
Manual Override: ☐ Yes ☐ No ☐ Type _____

SOLENOID ☐ Yes ☐ No ☐ Type_____ ☐ Voltage _____

POSITIONER ☐ Yes ☐ No ☐ Type_____ ☐ Pneu _____ ☐ E/P

SWITCH ☐ Yes ☐ No ☐ Type_____ ☐ Voltage _____

AIR SET ☐ Yes ☐ No ☐ Type_____ ☐ Range _____

OTHER ACCESSORIES ☐ Yes ☐ No ☐ Type_____

TEST ANSI/FCI Leakage Class: ☐ III ☐ IV ☐ V ☐ VI

Questions? Call (269) 279-3631.
Please submit completed form to: LCV@armstronginternational.com

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