

Series W709 AGS Butterfly Valves (175 psi/1270 kPa)

PRODUCT DESCRIPTION



The Series W709 AGS (Advanced Groove System) grooved end butterfly valve offers an easily installed choice to cumbersome, multi-bolt wafer, lug-type or flanged valves. The valves has excellent flow characteristics with low torque operation. The resilient EPDM seat is rated for water services up to +230°F/+110°C. For services with oil content, the valve is available with Grade "T" nitrile seat, rated for petroleum, air with oil vapors, vegetable and mineral oils up to +180°F/+82°C.

The offset disc is polyphenylene sulfide (PPS) coated for corrosion resistance. It securely retains the resilient seat for bi-directional working pressure to 175 psi (1270 kPa). For higher pressure service to 300 psi/2065 kPa, Victaulic offers the Series W706 AGS valve. Request 20.06 for more information.

The single piece body is cast of durable ductile iron (ASTM A-536, grade 65-45-15), as is the narrow profile disc. The disc rides on stout stainless steel (17-4 PH) upper and lower stems with all other wetted hardware of stainless steel construction.

Series W709 AGS butterfly valves 14 - 24"/350 - 600 mm are available with a handwheel gear operator. Memory stops and chain wheels are available options, as are electric, pneumatic or hydraulic actuators in two or three-way configurations.

Series W709 AGS valves are designed for direct connection with Victaulic AGS grooved couplings. Request publication 20.02 for W07 AGS rigid or 20.03 for W77 AGS flexible coupling information.

For higher pressure services, Victaulic W706 AGS butterfly valves are available rated to 300 psi/ 2065 kPa. Request 20.06 for details.

! WARNING

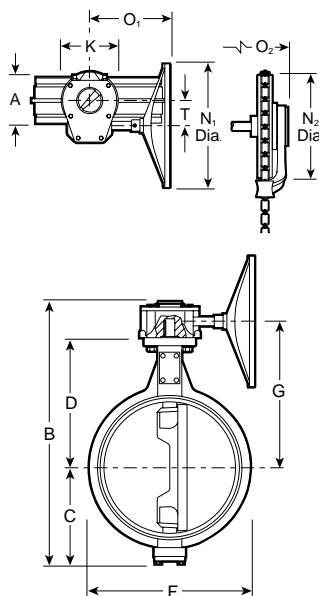
Victaulic AGS products use a patent-pending groove profile that requires the use of special AGS rolls. AGS products must not be used on pipe that has been grooved using standard grooving rolls.

Failure to use AGS products on AGS grooved pipe could result in serious personal injury, property damage, joint leakage or joint separation.

DIMENSIONS

Series W709 AGS Butterfly Valve

With Standard Gear Operator



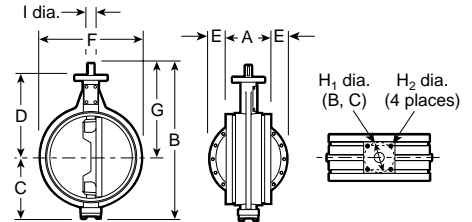
Nom. Size In. mm	Actual Out. Dia. In. mm	Dimensions – Inches/millimeters												No. Turns to Close	Aprx. Wgt. Ea. Lbs. kg
		E - E A	Over. Hgt. B	C	D	F	G	K	Handwheel		Chain Wheel		T		
									N ₁	O ₁	N ₂	O ₂			
14 350	14.000 355.6	10.00 254	26.00 6660	9.68 246	12.89 327	16.00 406	14.48 368	5.43 138	19.69 500	11.35 288	21.50 546	14.48 368	2.80 71	8.5	143.7 65.2
16 400	16.000 406.4	10.50 267	28.46 723	10.94 278	14.10 358	18.00 457	15.69 399	5.43 138	19.69 500	11.35 288	21.50 546	14.48 368	2.80 71	8.5	171.7 77.9
18 450	18.000 457.2	11.00 279	30.76 781	12.31 313	15.00 381	20.00 508	16.59 421	5.43 138	19.69 500	11.35 288	21.50 546	14.48 368	2.80 71	8.5	217.7 98.7
20 500	20.000 508.0	11.50 292	34.09 866	14.06 357	16.10 409	23.00 584	18.00 457	8.66 220	19.69 500	14.34 364	21.50 546	17.50 444	4.11 105	13.75	333.0 151.0
24 600	24.000 609.6	12.00 305	40.95 1040	16.06 408	20.10 511	26.70 678	22.27 566	11.22 285	27.60 700	16.10 408	30.00 762	19.20 488	5.12 130	21	521.5 236.3



DIMENSIONS

Series W709 AGS Butterfly Valve

Without Gear Operator



Nominal Size In./mm	Actual Out. Dia. In./mm	Dimensions Inches/millimeters										Aprx. Wgt. Each w/o Oper. Lbs./kg
		End to End A	Overall Height B	C	D	E	F	G	Mounting †			
									H ₁	H ₂	I Dia.	
14 350	14.000 355.6	10.00 254	24.45 621	9.68 246	12.89 327	1.16 29	16.00 406	14.77 375	4.96 126	0.578 15	1.38 35	125.0 56.7
16 400	16.000 406.4	10.50 267	27.14 689	10.94 278	14.10 358	1.90 48	18.00 457	16.20 412	4.96 126	0.578 15	1.50 38	153.0 69.4
18 450	18.000 457.2	11.00 279	29.56 751	12.31 313	15.00 381	2.64 59	20.00 508	17.25 438	4.96 126	0.578 15	1.75 45	199.0 90.3
20 500	20.000 508.0	11.50 292	32.64 829	14.06 357	16.10 409	3.42 87	23.00 584	18.58 472	5.50 140	0.675 17	2.00 51	285.0 129.3
24 600	24.000 609.6	12.00 305	38.89 988	16.06 408	20.10 511	5.17 131	26.70 678	22.83 580	6.50 165	0.844 21	2.25 57	451.0 204.6

† Key: **14"** – Woodruff #1008 ⁵/₁₆ X 1; **16"** – Woodruff #1210 ³/₈ X 1¹/₄; **18"** – Woodruff #1212 ³/₈ X 1¹/₂; **20 & 24"** – ¹/₂ Sq.

Note: Dimensions provided "without operator" are for sizing data only. Series W709 AGS should never be installed without operators.

Note: Series W709 AGS valves have longer E to E dimensions and AGS groove dimensions and cannot be used to replace existing Series 709 butterfly valves.

PERFORMANCE

C_v Values

Series W709 AGS butterfly valves have excellent flow characteristics due to the narrow profile disc design with separate upper and lower stems.

C_v values for flow of water at +60°F/+16°C with various disc positions are shown in the tables at right.

Formulas for C_v Values:

$$\Delta P = \frac{Q^2}{C_v^2}$$

$$Q = C_v \times \sqrt{\Delta P}$$






Where:

Q = Flow (GPM)

C_v = Flow Coefficient

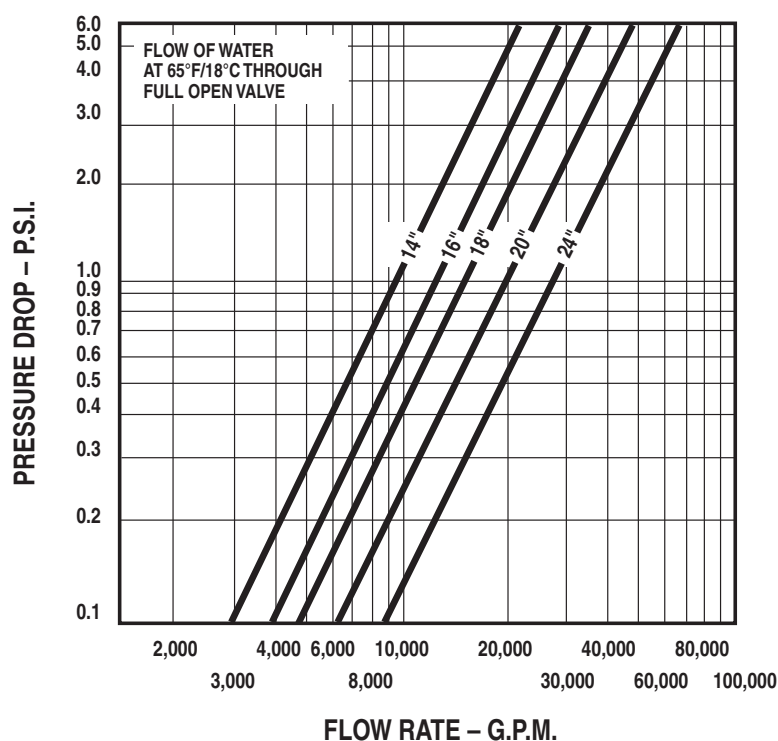
ΔP = Pressure Drop (psi)

Nominal Size In./mm	Actual Outside Dia. In./mm	C _v (Full Open)	Nominal Size In./mm	Actual Outside Dia. In./mm	C _v (Full Open)	Nominal Size In./mm	Actual Outside Dia. In./mm	C _v (Full Open)
14 350	14.000 355.6	9360	18 450	18.000 457.2	15900	24 600	24.000 609.6	28900
16 400	16.000 406.4	12400	20 500	20.000 508.0	19800			

Nominal Size In./mm	Actual Outside Dia. In./mm	FLOW COEFFICIENTS – C _v									
		Disc Position (Degrees open)									
		70°	60°	50°	40°	30°					
14 350	14.000 355.6						4350	3040	2130	1490	900
16 400	16.000 406.4						5680	3940	2730	1880	1130
18 450	18.000 457.2						7200	4970	3420	2340	1400
20 500	20.000 508.0						8810	6010	4080	2740	1610
24 600	24.000 609.6						12700	8580	5760	3800	2210

NOTE: Because of strong dynamic effects, flow instabilities and poor control, Victaulic butterfly valves should only be used for throttling with the disc between 30° and 75° open.

FLOW CHARACTERISTICS



MAXIMUM ALLOWABLE PRESSURE DROPS

Nominal Size Inches/mm	Actual Outside Diameter Inches/mm	Maximum Allowable Pressure Drops* – psi/kPa					
		Disc Position (Degrees open)					
		90°	70°	60°	50°	40°	30°
14 350	14.000 355.6	0.54 4	2.5 17	5.1 35	10 69	21 145	59 407
16 400	16.000 406.4	0.54 4	2.6 18	5.4 37	11 76	24 165	65 448
18 450	18.000 457.0	0.54 4	2.6 18	5.5 38	12 83	25 172	70 483
20 500	20.000 508.0	0.54 4	2.7 19	5.8 40	13 90	28 193	81 558
24 600	24.000 610.0	0.54 4	2.8 19	6.1 42	14 97	31 214	82 565

*Based on a maximum recommended velocity of 16 ft./sec.

Note: High pipeline velocities and/or throttling with the disc less than 30 degrees open, may result in noise, vibration, cavitation, severe line erosion, and/or loss of control.

WARNING

Failure to follow instructions, operating restrictions and warnings can result in serious personal injury and damage to the equipment.

- Do not exceed the maximum allowable pressure drop (psi) as described in the table above.

MAXIMUM ALLOWABLE FLOW RATES

The maximum allowable flow rate has been determined using the maximum allowable pressure drop and the C_V values. The Victaulic Series W709 AGS butterfly valves are rated to the full valve working pressure for ON-OFF service. To ensure proper operation of the valves when the valves are open, flow through the valves should not exceed the values in the tables below.

Nominal Size Inches/mm	Actual Outside Diameter Inches/mm	MAXIMUM ALLOWABLE FLOW RATES – GPM/LPM					
		Disc Position (Degrees open)					
		90°	70°	60°	50°	40°	30°
14 350	14.000 355.6	6880 26050	6890 26090	6900 26130	6910 26160	6910 26160	6890 26090
16 400	16.000 406.4	9120 34530	9120 34530	9130 34570	9140 34610	9130 34570	9140 34610
18 450	18.000 457.0	11700 44300	11700 44300	11700 44300	11700 44300	11700 44300	11800 44680
20 500	20.000 508.0	14600 55280	14600 55280	14600 55280	14600 55280	14600 55280	14600 55280
24 600	24.000 610.0	21300 80650	21300 80650	21200 80270	21200 80270	21200 80270	21200 80270

Note: High pipeline velocities and/or throttling with the disc less than 30 degrees open, may result in noise, vibration, cavitation, severe line erosion, and/or loss of control.

WARNING

Failure to follow instructions, operating restrictions and warnings can result in serious personal injury and damage to the equipment.

- Do not exceed the maximum allowable pressure drop (psi) as described in the table above.

VALVE TORQUE REQUIREMENTS

Series W709 AGS butterfly valves have low torque requirements for operating the valve. This results in less manual effort, smaller gear operators or smaller actuators to open and close the valve.

Nominal Size Inches/mm	Actual Outside Diameter Inches/mm	OPERATING TORQUES Inch Pounds per psi/Newton Meters per kPa					
		Disc Position (Degrees open)					
		90°	70°	60°	50°	40°	30°
14 350	14.000 355.6	620 10.2	460 7.5	270 4.4	140 2.3	110 1.8	90 1.5
16 400	16.000 406.4	970 15.9	710 11.6	420 6.9	220 3.6	160 2.6	130 2.1
18 450	18.000 457.0	1430 23.5	1050 17.2	620 10.2	330 5.4	240 3.9	200 3.3
20 500	20.000 508.0	2050 33.6	1500 24.6	890 14.6	470 7.7	340 5.6	280 4.6
24 600	24.000 610.0	3700 60.7	2700 44.3	1600 26.2	830 13.6	600 9.8	490 8.0

 **WARNING**

Failure to follow instructions, operating restrictions and warnings can result in serious personal injury and damage to the equipment.

- Do not exceed the maximum allowable torque (In. Lb.) as described in the last two columns of the above table.

Nominal Size Inches/mm	Actual Outside Diameter Inches/mm	Seating/Unseating Torque Inch Pounds/Newton Meters				
		Differential Pressure – psi/kPa				
		0/0	50/345	100/690	150/1035	175/1200
14 350	14.000 355.6	2970 335.6	3830 432.7	4600 519.8	5200 587.6	5500 621.5
16 400	16.000 406.4	3875 437.8	4820 544.6	5620 635.1	6250 706.3	6500 734.5
18 450	18.000 457.0	4900 553.6	6005 678.5	6820 770.7	7350 830.6	7500 847.5
20 500	20.000 508.0	6060 684.7	7310 825.9	10200 1152.6	14700 1661.1	17500 1977.5
24 600	24.000 610.0	8720 985.2	10130 1144.5	14800 1672.4	21400 2418.2	24000 2712.0

Source – These torque values were derived from test data with non-lubricated valves in water at ambient temperatures with EPDM seals. For other material and service conditions, apply a suitable service factor.

Torque Factors – All torque values are for normal conditions (i.e. the valve is operated at least once a quarter, disc corrosion is expected to be minor, the media is clean and non-abrasive, and the chemical effects upon the elastomer are minor).

Typical fluid torque factors commonly used in the industry are – Water: 1.0; Lubricated service: 0.8; Dry gases: Lubricated nitrile “T” seat seals are recommended for dry gases wherever chemically appropriate. See material torque factor below.

Material Torque Factors – “E” = 1.0; “O” = 1.2; “T” = 0.8

Cycling Factor – Torque will typically increase as the valve is cycled. A factor of 1.5 should be applied for the first 5000 cycles and another 1.5 applied for all additional cycles. The higher number should be used if there are more than one cycle per hour.

Actuation Factor – There are no actuation safety factors applied. A factor consistent with the consequences of not actuating should be applied. A minimum factor of 1.2 is recommended for directly actuated valves and 1.5 for 3-way assemblies.

Combining Torque Factors – When multiple torque factors apply, they are combined by multiplying them. Example: For an EPDM seal and a 5000 cycle factor the combined factor would be 1.0 X (1.5) = 1.5.

Note – Under certain high flow conditions, the hydrodynamic torque can exceed the seating torque. Large butterfly valves are not recommended for use in a free discharge condition, such as filling an empty line with fluid at the full rated pressure.

Contact Victaulic for other services.

MATERIAL SPECIFICATIONS

Body: Ductile iron conforming to ASTM A-536, grade 65-45-15

Body Coating:

Exterior: Polyphenylene sulfide (PPS) prime coat

Interior: PPS prime and top coats, UL classified in accordance with ANSI/NSF 61 for cold +86°F/+30°C and hot +180°F/+82°C potable water service.

Disc: Ductile iron conforming to ASTM A-536, black PPS coated.

Seat: PPS coated

Disc/Seal*:

- **Grade “E” EPDM**

EPDM (Green color code). Temperature range -30°F to +230°F/-34°C to +110°C. Recommended for cold and hot water service within the specified temperature range plus a variety of dilute acids, oil-free air and many chemical services. NOT RECOMMENDED FOR PETROLEUM SERVICES.

- **Grade “T” nitrile**

Nitrile (Orange color code). Temperature range -20°F to +180°F/-29°C to +82°C.

Recommended for petroleum products, air with oil vapors, vegetable and mineral oils within the specified temperature range. Not recommended for hot water services over +150°F/+66°C or for hot dry air over +140°F/+60°C.

*Services listed are General Service Recommendations only. It should be noted that there are services for which these gaskets are not recommended. Reference should always be made to the latest Victaulic Gasket Selection Guide for specific gasket service recommendations and for a listing of services which are not recommended.

Stem–Upper/Lower: Stainless steel 17-4 PH

Bearing: Reinforced PTFE

Thrust Washer: Bronze

Disc Driving Pin: 17-4 PH stainless steel

Shoulder Screws: Type 304 stainless steel

Stem Seal: EPDM

- **Optional:** Nitrile

Bottom Cover Plate O-ring: EPDM

- **Optional:** Nitrile

Cover Plate: Steel

Gasket Retaining Segment: 302 stainless steel

Seal Retaining Screw: 304 stainless steel.

Butterfly Valve Figure Numbering System for Series W706 AGS/W709 AGS

W - 180 - 1 5 8 2 - 20

Type	Size		Pressure Rating	Body	Disc/Trim	Bracket	Operator
	Actual Inches	Fig. No.					
W	14" 16" 18" 20" 24"	140 160 180 200 240	1 - 175 psi (2) 3 - 300 psi (3)	5 - PPS coated iron 9 - Special*	3 - Iron disc w/fluoro-elastomer Seat/ Stainless Steel stems- "O" 7 - Iron disc w/Nitrile Seat/ Stainless Steel stems- "T" 8 - Iron disc w/EPDM Seat/ Stainless Steel stems- "E" 9 - Special*	0 - No Bracket 2 - Standard 9 - Special*	00 - Bare 20 - Gear operator 21 - Gear operator with memory stop 22 - Gear operator with chain wheel 23 - Gear operator with AWWA square oper. nut 24 - Gear operator with memory stop and chain wheel 29 - Non-std. gear operator*

NOTES:
(2) Series W709 AGS
(3) Series W706 AGS
* Details required

This product shall be manufactured by Victaulic or to Victaulic specifications. All products to be installed in accordance with current Victaulic installation/assembly instructions. Victaulic reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligations.