BULLETIN 100
SEPTEMBER 2014

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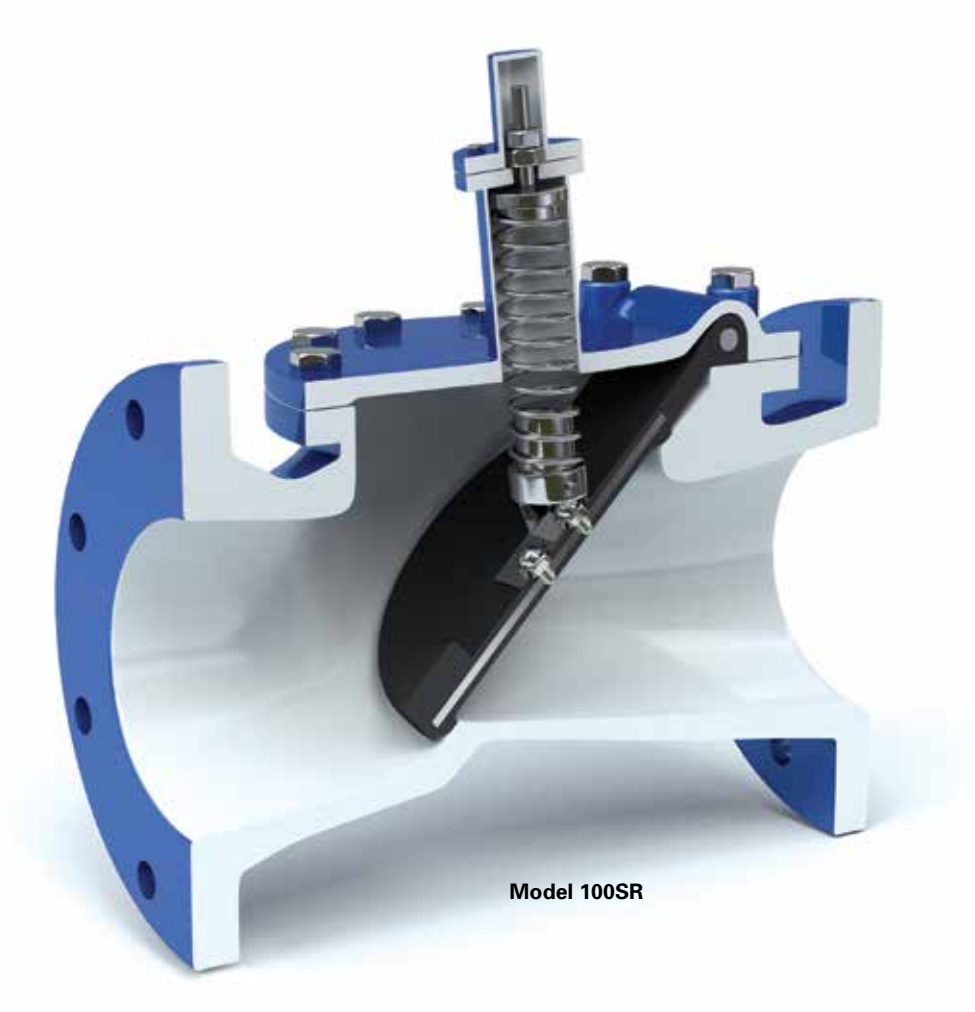
APCO RUBBER FLAPPER SWING CHECK VALVES



Model 100SR

Series 100
Series 100R
Series 100SR
Series 100SA

- Ductile Iron Standard 2"-24" (50-600mm)
- For water or sewage applications
- Ultra simplicity in design engineering
- Relatively no maintenance required
- Precision molded, steel reinforced rubber flapper
- Bubble tight seating
- Unrestricted full flow area
- ISO flange connections available
- Meets AWWA C508

APCO Rubber Flapper Swing Check Valves

Description of Operation and Materials

APCO rubber flapper swing check valves are uniquely simple in design but durable for use on a variety of applications.

With only three major parts: Body, Flapper & Cover, there is relatively no maintenance. However, should maintenance be required, the flapper can be replaced in a matter of minutes. The valve body seat is on an angle of 45° to the centerline of the pipe, permitting horizontal or vertical flow up installation. With the flapper full open, there is a straight unobstructed flow passage, so all foreign matter is flushed away by the flowing medium. This eliminates clogging. Due to this unobstructed flow passage the pressure drop is considerably lower through the APCO Rubber Flapper Check than through conventional swing check valves.

Normally made of Cast or Ductile Iron, but readily supplied in Stainless Steel or Bronze, the valve can be lined or coated with various materials.

The flapper is normally Buna-N but can be compression molded from various synthetic rubbers. A steel disc for strength and a steel bar are molded inside the flapper. A hi-strength fabric is integrally molded over the disc and bar to form a flexible joint permitting millions of flexes without failure. For operation with aggressive media, Buna-N has excellent abrasion resistant qualities. When the valve is assembled the flapper is firmly clamped between body and cover. This feature eliminates problems of moving parts, shafts, pins, bearings, bushings, packings (as required in conventional check valves). Further, this flapper design eliminates jamming or sticking in the open position and the O-ring seal molded into the disc face assures positive sealing, even at lower pressures. Recommended for buried service with stainless steel cover bolts. Rated 125#/150# Class for 175 psi differential pressure. Higher pressure class available.

Backflow Device Optional Feature on 3" and Larger

Often Pump Station Operators find it convenient to force open the Swing Check Valve by its outside lever, for the purpose of Backflushing, Priming Pumps, or to Drain the System. This is a dangerous procedure! The APCO Backflow Device meets OSHA requirements for safety because it is easily activated without risk of injury to operating personnel during a backflow procedure. This Backflow Device is positive and will not slip during full backflow.

Backflow Device

The Backflow Device can be removed for service without removing the check valve or taking the pump out of service. Size 3" and 4" (80 and 100mm) Backflow Devices are constructed of Bronze ASTM B-584 as approved by U.S. Navy for fleet service.

Should your next pump station design require a by-pass or backflow through the check valve for any reason…do it safely!

Specify APCO Series 100 Rubber Flapper Swing Check Valves with a Backflow Device.

104P3 Story

Notice there are two 4" (100mm) APCO Rubber Flapper Swing Check Valves!

Model 104 is a full size 4" (100mm) check valve for normal water service.

Model 104P3, designed specifically for raw sewage with a flow area thru the seat almost twice (23.76", 604mm) that of standard pipe (12.73", 323mm), permitting the 104P3 to pass a 3" (76mm) diameter solid as required by many states and municipalities for 4" (100mm) check valves used on sewage.

This feature is of special interest to sewage lift station designers.

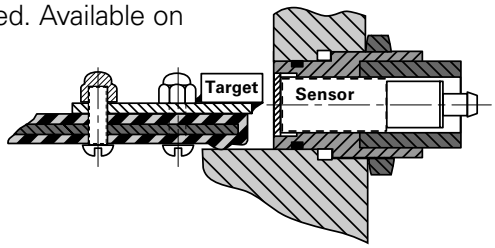
Flow Control Option
Need to Throttle or Shut-Off Flow?

The Flow Control device is used to restrict the position of the flapper for the purpose of regulating flow into the system or to create a false head on the pump.

The device is mounted on the cover of the valve and when manually operated will prevent the flapper from fully opening. With this device, the Rubber Flapper Check Valve can be used as a stop check.

Proximity Switch Option
Need a Signal That the Check Valve is Open?

An inductive type Proximity Switch can be furnished mounted on the valve body with its target mounted internally on the flapper. This transmits an electrical signal indicating when the flapper is open or closed. Available on Series 100 and 100R.



APCO Series 100 & 100R

Applications:

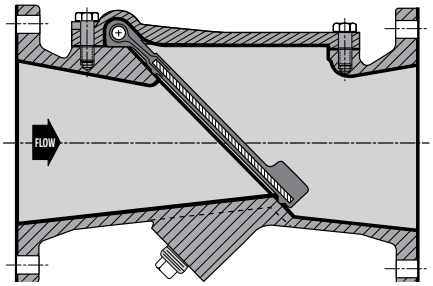
- Raw Sewage
- Water Systems
- Industrial Wastes
- Chemical Lines
- Erosive Services
- Ash Service
- Acid Lines
- Tailings Systems
- Light Slurries
- Corrosive Services
- Leaching Lines
- Scrubbers
- Brine & Salt Water Systems
- Unique 45° Angle Seat Provides Non-Slamming Feature
- Cycle Tested Flapper

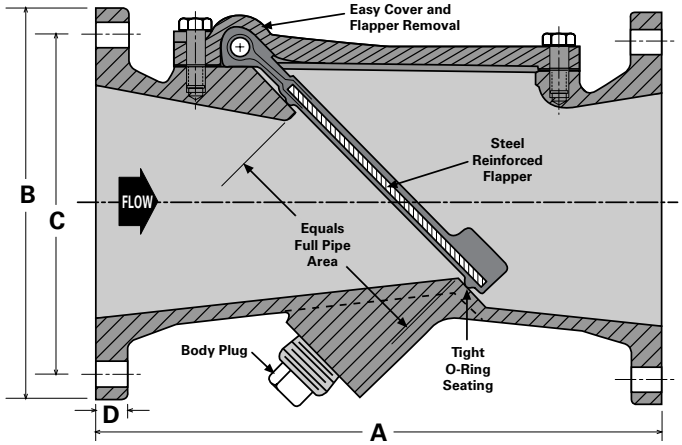
Materials of Construction:

- Cast Iron
- Ductile Iron
- Bronze
- Stainless Steel

Series 100R Rubber Lined Check Valve

Engineer: Note that unlike other check valves, our Rubber Flapper Swing Check Valve is specially designed for rubber lining. Sharp corners and crevices are not present and the smooth body and cover contours readily accept lining or coating. The result after lining is a totally encapsulated valve without any exposed metal surfaces.





Dimensions for 125#/150 Class Valves							
Model	**Size**	**A**	**B**	**C**	**D**	**No. of Flange Bolts/ Hole Size**	**Weight (Approx. lbs/kg)**
102	2" / 50	8 / 203	6 / 152	4.75 / 121	.625 / 16	4 - .625 / 16	19 / 8.6
102.5	2.5" / 65	8.5 / 216	7 / 178	5.5 / 140	.688 / 17	4 - .625 / 16	20 / 9
103	3" / 80	9.5 / 241	7.5 / 191	6 / 152	.75 / 19	4 - .625 / 16	21 / 10
104	4" / 100	11.5 / 292	9 / 229	7.5 / 191	.938 / 24	8 - .625 / 16	38 / 17
*104P3	4" / 100	13.75 / 349	9 / 229	7.5 / 191	.938 / 24	8 - .625 / 16	70 / 32
105	5" / 125	13.75 / 349	10 / 254	8.5 / 216	.938 / 24	8 - .75 / 19	74 / 34
106	6" / 150	15 / 381	11 / 279	9.5 / 241	1 / 25	8 - .75 / 19	100 / 45
108	8" / 200	19.5 / 495	13.5 / 343	11.75 / 298	1.125 / 29	8 - .75 / 19	185 / 84
110	10" / 250	24.5 / 622	16 / 406	14.25 / 362	1.188 / 30	12 - .875 / 22	335 / 152
112	12" / 300	27.5 / 699	19 / 483	17 / 432	1.25 / 32	12 - .875 / 22	475 / 215
114	14" / 350	31 / 787	21 / 533	18.75 / 476	1.375 / 35	12 - 1 / 25	640 / 290
116	16" / 400	32 / 813	23.5 / 597	21.25 / 540	1.438 / 37	16 - 1 / 25	950 / 431
118	18" / 450	36 / 914	25 / 635	22.75 / 578	1.563 / 40	16 - 1.125 / 29	1250 / 567
120	20" / 500	40 / 1016	27.5 / 699	25 / 635	1.688 / 43	20 - 1.125 / 29	1550 / 703
124	24" / 600	48 / 1219	32 / 813	29.5 / 749	1.875 / 48	20 - 1.25 / 32	2000 / 907

* Will pass a 3" diameter solid.
Larger sizes through 48" available on request. Higher pressure class available.

Inch
Millimeter

Standard Rubber Hardness Durometer of Flapper to be Determined by Operating Pressure.		
Valve Size	**Operating Pressure, PSI**	
	10 to 80	**81 to 175**
2" (50mm) to 8" (200mm)	45 Durometer	70 Durometer
10" (250mm) and Larger	70 Durometer	
Always specify operating pressure when ordering.		

Lining and Flapper Materials			
Lining	**Flapper**	**Operating Temperature Range Valve Size**	
		°F	**°C**
—	Buna-N	-70 to 250	-57 to 121
Rubber	—	-40 to 180	-40 to 82
Neoprene	Neoprene	-40 to 250	-40 to 121
Hypalon	Hypalon	-40 to 195	-40 to 90
—	Viton*	-40 to 450	-40 to 232

Other Materials Available.
* Viton is a registered name of DuPont.

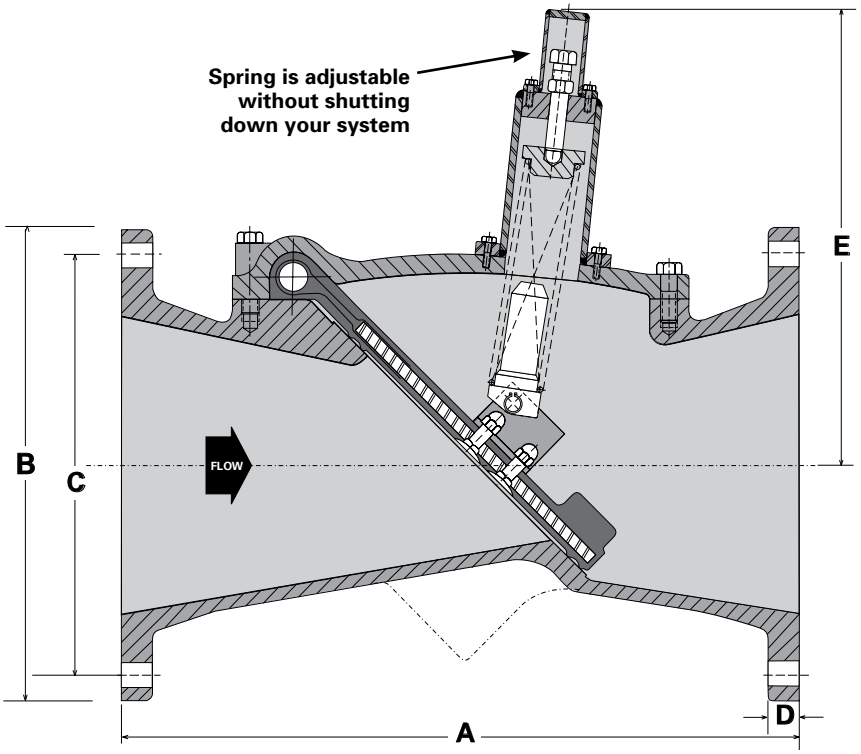
APCO Series 100SR - Spring Return Check Valve

APCO has manufactured Rubber Flapper Swing Check Valves (RFSCV) since 1965. We have many thousands of units in the field that have been operating successfully for decades. From time to time, engineers or end users have a difficult high head application where rapid flow reversal causes standard style Swing Check Valves to slam. The APCO 100SR was developed in 1978 to eliminate or minimize slam in these types of installations. The APCO 100SR has successfully managed surges (due to rapid flow reversal) even in tough vertical 'flow up' installations. See comparison graph on page 5.

The Standard Series-100 RFSCV has a 35° Disc Stroke and will close relatively quickly. This Stroke is very short compared to conventional Style Swing Check Valves which typically have 80° to 90° disc travel. When you add the spring return to the RFSCV it causes the disc to speed up or accelerate to valve closure. Having the Valve closed before reverse flow takes place can in many instances, drastically reduce or even eliminate valve slam.*

Simplified Spring design also available. 100SA

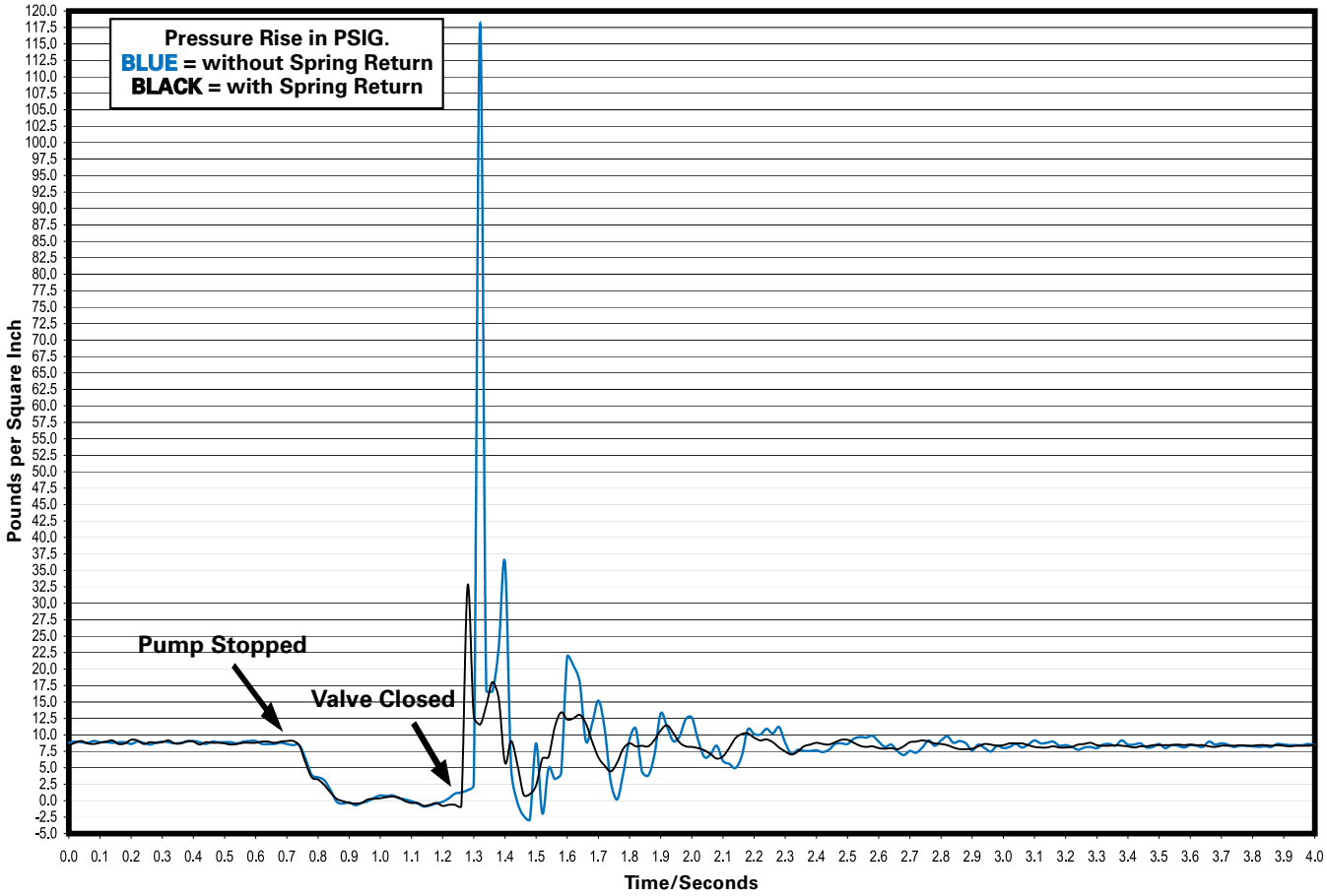
Position Disc Indicator also available on all Rubber Flapper Check Valve Series



Dimensions for 125# Class Valves							
Model	**Size**	**A**	**B**	**C**	**D**	**E**	**No. of Flange Bolts/ Hole Size**
103SR	3" / 80	9.5 / 241	7.5 / 191	6 / 152	.75 / 19	8 / 203	4 - .75 / 19
104SR	4" / 100	11.5 / 292	9 / 229	7.5 / 191	.938 / 24	8 / 203	8 - .75 / 19
104P3SR	4" / 100	13.75 / 349	9 / 229	7.5 / 191	.938 / 24	12.25 / 311	8 - .75 / 19
105SR	5" / 125	13.75 / 349	10 / 254	8.5 / 216	.938 / 24	12.25 / 311	8 - .875 / 22
106SR	6" / 150	15 / 381	11 / 279	9.5 / 241	1 / 25	12.25 / 311	8 - .875 / 22
108SR	8" / 200	19.5 / 495	13.5 / 343	11.75 / 298	1.125 / 29	16 / 406	8 - .875 / 22
110SR	10" / 250	24.5 / 622	16 / 406	14.25 / 362	1.188 / 30	18.375 / 467	12 - 1 / 25
112SR	12" / 300	27.5 / 699	19 / 483	17 / 432	1.25 / 32	18.375 / 467	12 - 1 / 25
114SR	14" / 350	31 / 787	21 / 533	18.75 / 476	1.375 / 35	22.5 / 572	12 - 1.125 / 29
116SR	16" / 400	32 / 813	23.5 / 597	21.25 / 540	1.438 / 37	22.5 / 572	16 - 1.125 / 29
118SR	18" / 450	36 / 914	25 / 635	22.75 / 578	1.563 / 40	23 / 584	16 - 1.25 / 32
120SR	20" / 500	40 / 1016	27.5 / 699	25 / 635	1.688 / 43	23 / 584	20 - 1.25 / 32
124SR	24" / 600	48 / 1219	32 / 813	29.5 / 749	1.875 / 48	24.625 / 625	20 - 1.375 / 35

Inch
Millimeter

Comparison Graph

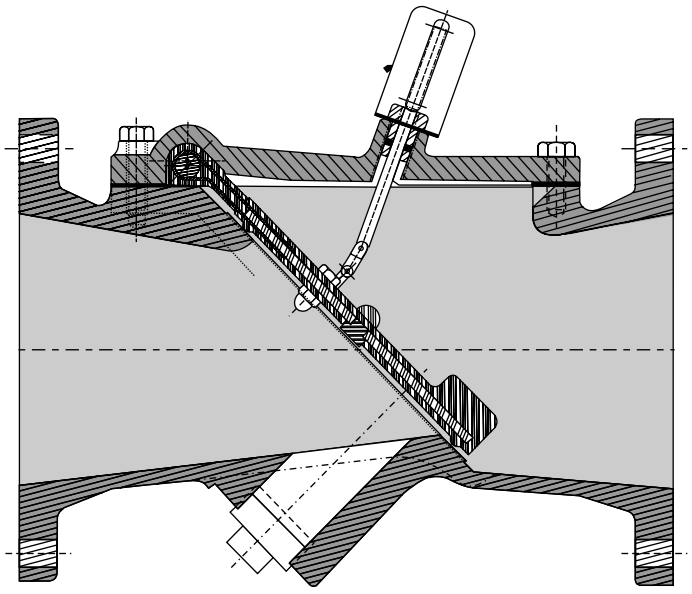


This graph compares the closing characteristics of the check valve with and without the spring assisted closure. The installation is vertical "flow up" and the power failure simulation for the test is identical. The pressure rise (blue line) generated from the valve closure without the spring assist is 120 psi. The pressure rise (black line) with the spring assisted closure is only 23 psi. This represents a 97 psi reduction in the pressure surge. Also, subsequent wave patterns are more subdued and rounded. On site closure noise (valve slam) and pipe displacement disappeared with the APCO 100SR.

APCO, the originator of the Spring Return Rubber Flapper Swing Check Valve.

Position Disc Indicator (PDI) Available Sizes 4" to 24"

The PDI is mounted to the cover and clearly identifies the position of the flapper.



Specifications

Series 100 Rubber Flapper Swing Check Valve

The Rubber Flapper Swing Check Valve shall have a heavily constructed cast or ductile iron body and cover. The body shall be long pattern design (not wafer) with integrally cast-on end flanges. The flapper shall be Buna-N having an O-ring seating edge and be internally reinforced with steel.

Flapper to be captured between the body and the body cover in a manner to permit the flapper to flex from closed to full open position. Flapper shall be easily removed without the need to remove the valve from line. Check Valves to have full pipe size flow area. Seating surface to be on a 45° angle requiring the flapper to travel only 35° from closed to full open position for minimum head loss, and non-slam closure characteristics.

Buna-N flapper which creates an elastic spring effect to assist the flapper to close against a slight head to prevent or minimize slamming.

Valve designed for 175 psi differential pressure for water, sewage, oil or gas (higher pressures available). The valve shall be suitable for buried service, in which case, stainless cover bolts must be furnished.

When necessary to prime or backflush a clogged pump, an external backflow device can be furnished—sizes 3" (80mm) and larger.

Body & cover	Cast iron	ASTM A126 GR.B
	Bronze	ASTM 584
	Stainless steel	ASTM A296 or 351
	Ductile iron (Standard 2"-24")(50-600mm)	ASTM A536 Gr.65-45-12
Flapper	Buna-N or other elastomers	
Exterior paint	Universal Metal Primer	FDA approved for potable water contact

*Bronze components meet current lead-free requirements.

Series 100R Rubber Flapper Swing Check Valve

The Rubber Flapper Swing Check Valve shall have a heavily constructed ductile iron body and cover. The body shall be long pattern design (not wafer), with integrally cast-on end flanges. The flapper shall be Buna-N (or other elastomers) having an O-ring seating edge and be internally reinforced with steel.

The body and cover shall be lined with ⅛" (3mm) thick natural rubber. The lining shall be autoclaved to the body and cover and cured to 55 durometer shore A ± 5. the lining shall be tested in conformance with ASTM d573.

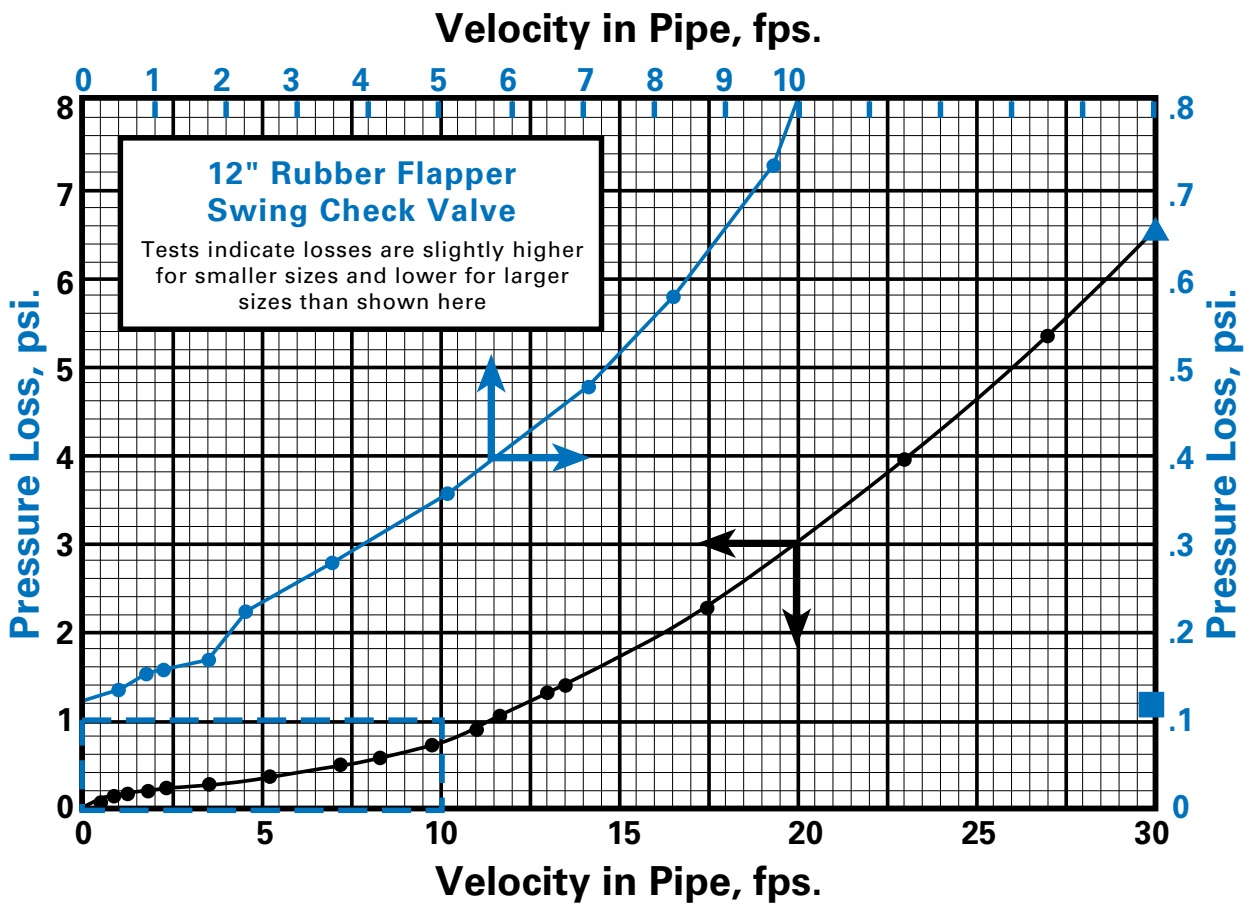
Flapper to be captured between the body and the body cover in a manner to permit the flapper to flex from closed to full open position during flow through the valve. Flapper shall be easily removed without need to remove valve from line. Check Valves to have full pipe size flow area. Seating surface to be on a 45° angle requiring the flapper to travel only 35° from closed to full open position.

Buna-N flapper (hi-strength coated fabric) which creates an elastic spring effect, molded internally to assist the flapper to close against a slight head to prevent slamming.

When necessary to prime or backflush a clogged pump, an external backflow device can be furnished—sizes 3" (80mm) and larger.

Materials of construction shall be certified in writing to conform to ASTM specifications as follows:

Body & cover	Cast or Ductile Iron (2"-24")(50-600mm)	ASTM A536 Gr.65-45-12
Flapper	Buna-N	
Lining	Natural Rubber	
Exterior paint	Universal Metal Primer	FDA approved for potable water contact



●●■▲ **Actual Test Points**

■ **Pressure head to unseat flapper with downstream pipe full (discharge side). Flapper submerged and bouyant**

▲ **Pressure head to unseat flapper, downstream pipe empty**

Flow Tests Conducted September 1975
Colorado State University
Complete Test Report Available Upon Request

Sales and Service

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