TILTED DISC® CHECK VALVE
Val-Matic® Specification

1 Scope
1.1 This specification covers the design, manufacture, and testing of 3 in. (80 mm) through 60 in. (1500mm) Tilted Disc Check Valves suitable for pressures up to 285 psig (1,965 kPa) water service.
1.2 The Check valves shall be of the Tilted Disc metal seated, full body type capable of accepting optional bottom or top mounted oil dashpots.

2 Standards, Approvals and Verification
2.1 The valves shall be certified to NSF/ANSI 61 Drinking Water System Components - Health Effects and certified to be Lead-Free in accordance with NSF/ANSI 372.
2.2 A 20 in. (500mm) valve or larger shall be proof of design cycle tested through 250,000 cycles in the horizontal position and leak tested at the rated pressure. The leakage rate shall be less than 1 fluid ounce per hour per inch of valve size after the test.
2.3 Manufacturer shall have a quality management system that is certified to ISO 9001 by an accredited, certifying body.

3 Connections
3.1 The valves shall be provided with drilled flanges in accordance with ANSI B16.42 for Class 150 ductile iron flanges. Ductile iron flanges shall be flat faced.
3.2 Flanged inspection ports shall be provided upstream and downstream of the valve disc for inspection or use with optional dashpots on 6 in. and larger valves.

4 Design
4.1 The valve body shall consist of two sections bolted together as a central diagonal flange inclined at an angle of 55 degrees. The inlet body section shall contain a seat ring positioned and captured by the diagonal flange. The outlet body section shall accept eccentrically located pivot pin trunnions with sealed covers and lubrication grease fittings.
4.2 The eccentric pivot trunnions shall be located to divide the disc into approximately 1/3 and 2/3 proportions and also allow the seating surface of the disc to rotate away from the seating surface of the seat ring without contact. Clearance shall be provided between the pivot pin and bushing when the disc is seated to prevent binding and to ensure a tight seal. The minimum pivot pin diameter shall be as shown below.

VALVE SIZE (IN):	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48
PIN DIAMETER (IN):	9/16	5/8	1-1/8	1-3/8	1-5/8	1-7/8	2 1/8	2-3/8	2-1/2	2-3/4	3-1/4	3-3/4	4-1/4	4-7/8	5-1/2

4.3 The flow area through the valve body inlet and outlet shall be equal to the nominal pipe size and gradually increase to an area 40 percent greater at the valve seat.
4.4 A position indicator shall be supplied on 6 in. and larger valves and visually show disc position at all times.
4.5 The valve disc and seat shall have a seating surface finish of 32 micro-inch or better to ensure positive seating at all pressure. The leakage rate shall not exceed one-half of the allowable rate allowed by AWWA Standard C508 or 0.5 oz (15 ml) per hour per inch (25.4 mm) of valve size.
4.6 6” (150mm) and larger valves should be capable of accepting a field installed Bottom Mounted Oil Dashpot.
4.7 The valve flow way shall be contoured and unrestricted to provide full flow areas at all locations within the valve. Full flow shall be based on an open stroke of 40 degrees to assure stabilization of the disc when open. Cv flow coefficients shall be verified by an independent testing laboratory.

5 Materials
5.1 The valve body shall be constructed of ASTM A536 Grade 65-45-12 ductile iron for Class 150 valves.
5.2 The disc in sizes up to 10 in. (250mm) shall be one-piece construction with integral seat and constructed of ASTM B148 Alloy C95400 aluminum bronze. 12 in. (300mm) and larger discs shall be ASTM A536 Grade 65-45-12 ductile iron. The disc seating ring shall be ASTM B271 Alloy C95500 centrifugally cast aluminum bronze. The mating seat ring located in the body shall be ASTM B271 Alloy C95400 centrifugally cast aluminum bronze.
5.3 The pivot pins shall be ASTM B505 Alloy C95500 aluminum bronze and shall be guided by a bushing constructed of ASTM B505 Alloy C95400 aluminum bronze (12 in./300mm and larger valves).

6 Options
6.1 Single or double bypass piping shall be provided when specified with piping and valves in sizes shown below.

VALVE SIZE:	6-8 in. (150-200mm)	10-14 in. (250-350mm)	16-24 in. (400-600mm)	30-60 in. (750-1500mm)
By-Pass Size:	1.5 in. (38mm)	2 in. (50mm)	3 in. (75mm)	4 in. (100mm)

6.2 A NEMA-4 machine tool type limit switch with DPDT contacts shall be provided when specified. The switch shall be mounted to the inspection cover and have an adjustable trip arm for sensing the closed position.
6.3 A bottom mounted oil dashpot shall be factory installed (12" and larger) in the upstream inspection port when specified to provide hydraulic control of the final 10% of valve closure and reduce water hammer normally associated with rapid flow reversal conditions on pump shut down. The dashpot shall consist of a high pressure hydraulic cylinder with a minimum bore size as shown below, adjustable external flow control valve, pressurized oil reservoir and piping designed to control the closing speed of the last 10% of travel in 1-5 seconds. A dashpot spacer which connects the cylinder to the valve shall have an air gap to prevent hydraulic fluid from entering the valve and contaminating the water system. A snubber rod fitted with O-ring seals and rod wiper scrapers shall make contact with the lower portion of the disc during closure.

VALVE SIZE:	6-10 in. (150-250mm)	12-14 in. (300-350mm)	16-24 in. (400-600mm)	30-36 in. (750-900mm)	42-48 in. (1000-1200mm)	54-60 in. (1400-1500mm)
Cylinder Size:	1.5 in. (38mm)	2 in. (50mm)	2.5 in. (64mm)	3.25 in. (83mm)	4 in. (100mm)	5 in. (125mm)

6.4 A top mounted oil dashpot shall be factory installed in the downstream inspection port when specified to provide independent hydraulic control of the valve opening and closing strokes to reduce water hammer normally associated with pump operation. The dashpot shall consist of a high pressure hydraulic cylinder with a minimum bore size as shown below and with internal cushion adjustment, two external flow control valves, a pressurized oil reservoir with a minimum size as shown below, a stainless steel non-pressurized reservoir, and piping. The unit shall independently control the opening and closing stroke in the range of 5-30 seconds. Additionally, the closing stroke shall be two-stage with the last 10% of closing travel dampened with the internal cylinder cushion. A dashpot spacer which connects the cylinder to the valve shall have an air gap to prevent hydraulic fluid from entering the valve and contaminating the water system. A connecting rod with a minimum diameter as shown below and fitted with O-ring seals and rod wiper scrapers shall be linked to an integrally cast clevis on the disc. The connecting rod shall be attached to the cylinder rod with a quick change coupling constructed of 17-4 PH stainless steel. The cylinder rod, connecting rod, and coupling shall be held in place by coupling retainer to allow decoupling of the cylinder while the check valve is under pressure.

VALVE SIZE:	6 in.	8-10 in.	12-14 in.	16-18 in.	20-24 in.	30 in.	36-42 in.	48-60 in.
	(150mm)	(200-250mm)	(300-350mm)	(400-450mm)	(600-700mm)	(750mm)	(900-1000mm)	(1200-1500mm)
Cylinder Size:	2.5" (64mm)	3.25" (83mm)	4" (100mm)	5" (125mm)	6" (150mm)	7" (175mm)	8" (200mm)	10" (250mm)
Reservoir Size:	.1 gal (.38L)	.3 gal. (1.1L)	.6 gal. (2.3L)	1.1 gal. (4.2L)	2.5 gal. (9.5L)	6.0 gal. (23L)	6.0 gal. (23L)	10 gal. (38L)
Rod Diameter:	1" (25mm)	1.375" (35mm)	1.75" (44mm)	2" (50mm)	2.5" (64mm)	3.5" (89mm)	4" (100mm)	5" (125mm)

6.5 The valve interiors and exteriors shall be coated with an NSF/ANSI 61 certified fusion bonded epoxy in accordance with AWWA C550 when specified.

7 Manufacture
7.1 The valves shall be hydrostatically tested at 1.5 times their rated cold working pressure. Additional tests shall be conducted per AWWA, ANSI, MSS or API standards when specified. When requested, the manufacturer shall provide test certificates, dimensional drawings, parts list drawings, and operation and maintenance manuals.
7.2 The exterior of the valve shall be coated with a universal alkyd primer. The valve interior shall be coated with an epoxy coating approved for potable water.
7.3 The Tilted Disc® Check Valves shall be Series #9600, 9600B (with bottom oil dashpot), or 9600T (with top oil dashpot) as manufactured by Val-Matic® Valve & Mfg. Corporation, Elmhurst, IL. USA or approved equal.