

ICS 83.140.30

CCS G 33



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 19812.7-2024

**Plastic equipment for water saving irrigation - Part 7: Plastic
valve for micro-irrigation**

塑料节水灌溉器材 第7部分:微灌用塑料阀门

Issued on: March 15, 2024

Implemented on: October 1, 2024

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

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1 Scope

The document lays down the requirements on materials, classification, appearance, colour, dimensions and physical and mechanical properties for plastic valves for micro-irrigation made mainly from polyvinyl chloride resin or polyethylene resin, valves for short in what follows; it describes the matching test methods and lays down the inspection rules, marking, packaging, transport and storage.

It applies to micro-irrigation water conveyance and distribution pipe network systems in which the water temperature is not above 45 °C and the maximum operating pressure MOP is not above 1.0 MPa.

3 Terms and definitions

The terms and definitions of GB/T 19278 and GB/T 37842 apply, together with the following.

3.1 Plug valve: a valve whose closure member, the plug, is driven by the stem and turns about the axis of the stem. Taken from GB/T 21465-2008, 2.2.1.7.

4 Materials

4.1 The material used to make a PVC-U body is mainly unplasticized polyvinyl chloride resin, to which only the necessary additives are added, the additives being evenly dispersed. In the printed text this sentence names the resin as rigid polyethylene while giving the abbreviation PVC-U.

4.2 The material used to make a PE body is mainly polyethylene resin, to which only the necessary additives are added, the additives being evenly dispersed.

4.3 The material used to make the valve does not favour the growth of bacteria and algae.

4.4 The material used to make the valve protects it against ultraviolet light by means of carbon black or another material.

4.5 The material used to make the valve withstands attack by fertilizers and pesticides.

4.6 A small amount of clean reprocessed material from the maker's own production of the same kind of product may be used.

4.7 The rubber sealing material used meets Annex C of GB/T 10002.1-2023.

4.8 The materials chosen for the seals, the stem, the ball and the other parts ensure that the valve performs as Clause 6 requires, and do not affect its performance adversely.

5 Classification

5.1 By connection: solvent cemented socket valves, elastomeric sealing ring socket valves, butt fusion valves, socket fusion valves and threaded valves.

5.2 By material: PVC-U valves and PE valves.

5.3 By flow area: full open valves, full bore valves and reduced bore valves.

5.4 By construction: ball valves and plug valves.

6 Requirements

6.1.1 Appearance of ball valves: the inner and outer surfaces are smooth and free of cracks, bubbles, peeling, foreign matter, uneven colour and decomposition discolouration lines.

6.1.2 Colour of ball valves: PVC-U ball valves are generally grey and PE ball valves generally black; other colours may be agreed between supplier and purchaser.

6.1.3.1 Connection dimensions. Solvent cemented socket and elastomeric sealing ring socket PVC-U ball valves meet the dimensional requirements of GB/T 10002.2. Elastomeric sealing ring socket, butt fusion and socket fusion PE ball valves meet those of GB/T 13663.3. Threaded connection dimensions meet GB/T 7306.1 and GB/T 7306.2. Connection dimensions for other connection types may be agreed between supplier and purchaser.

6.1.3.2 Flow area. The flow areas of full open, full bore and reduced bore valves meet Tables 1, 2 and 3 respectively. Each of the three tables is laid out with nominal outside diameters of the connected pipe from 20 mm to 110 mm down the side and six pipe series

across the top, and gives for every combination a minimum flow area in square millimetres. Every row of the extracted tables carries one value per pipe series, matching the six columns.

6.1.4.1 Physical properties of ball valves, Table 4. For PVC-U ball valves: density 1 350 to 1 550 kilograms per cubic metre, tested by 7.4; Vicat softening temperature at least 74 °C, tested by 7.5; oven test as GB/T 8803 provides, tested by 7.6. For PE ball valves: density 940 to 980 kilograms per cubic metre, tested by 7.4; oxidation induction time at 200 °C at least 20 min, tested by 7.7.

6.1.4.2 Mechanical properties of ball valves, Table 5. For PVC-U ball valves the items are the drop test, with no fracture; the internal pressure test on the body, with no fracture and no leakage, at a test temperature of 20 °C +/- 2 °C, a test pressure of 4.2 times PN, a test time of 1 h and water-air as the medium; the torque test, in which the torque needed to open or close the ball valve fully at a differential pressure equal to the nominal pressure PN is not above the value declared by the maker; the fatigue test, with no deformation and no leakage after 2 500 continuous opening and closing operations; and the tightness test, covering a seat test with the valve closed and a seal test with the valve half open, with no leakage during the test. For PE ball valves the items are the internal pressure test on the body, with no fracture and no leakage, at 20 °C +/- 2 °C, 1.55 times PN, 100 h and water-air; the same torque test; the same fatigue test; and the same tightness test. The tightness test carries three sets of parameters, one at 20 °C +/- 2 °C for 60 s at 0.05 MPa with air-water, one at 20 °C +/- 2 °C for 15 s at 1.1 times PN with water-air, and, according to whether the nominal diameter is at most 50 mm or above 50 mm, one at 20 °C +/- 2 °C for 15 s or 30 s at 1.5 times PN with water-air. A footnote allows air-water as the test medium where the test pressure is not above 0.6 MPa, water-air being used in case of dispute. The parameter cells of Table 5 run together in the extraction; only those where the parameter labels and their values pair one to one are carried across here.

6.1.5 Lead limit for ball valves: the lead content of a PVC-U ball valve is not above 200 mg/kg.

6.2.1 Appearance of plug valves: the inner and outer surfaces are smooth and free of cracks, bubbles, peeling, foreign matter, uneven colour and decomposition discolouration lines.

6.2.2 Colour of plug valves is agreed between supplier and purchaser.

6.2.3 Dimensions of plug valves are agreed between supplier and purchaser.

6.2.4 Mechanical properties of plug valves, Table 6: an internal pressure test on the body with no fracture and no leakage, at 20 °C +/- 2 °C, 1.5 times PN, 1 h and water-air, tested by 7.9; and a tightness test covering a seat test with the valve closed and a seal test with the valve half open, with no leakage during the test, at 20 °C +/- 2 °C, 1.5 times PN and 15 s with water-air, tested by 7.12.

6.2.5 Lead limit for plug valves: the lead content is not above 200 mg/kg.

7 Test methods

7.1 Unless otherwise stated, specimens are conditioned and tested at 23 °C +/- 2 °C according to GB/T 2918, the conditioning time being not less than 24 h.

7.2 Appearance and colour are judged by eye.

7.3 Dimensions are measured according to GB/T 8806. The mean internal diameter of the smallest flow passage is measured and its minimum flow area calculated.

7.4 Density is determined by the immersion method of GB/T 1033.1 on a specimen taken from the body.

7.5 Vicat softening temperature is determined according to GB/T 8802 on a specimen taken from the body.

7.6 The oven test is carried out according to GB/T 8803.

7.7 Oxidation induction time is determined according to GB/T 19466.6. In preparing the specimens, samples are cut from the inner and the outer surface of the body and tested with the original surface facing up; three specimens are run and the lowest result is taken.

7.8 The drop test is carried out according to GB/T 8801, the specimen being the valve body.

7.9 The internal pressure test on the body is carried out according to GB/T 27726.

7.10 The torque test is carried out according to Annex B of GB/T 28494-2012.

7.11 The fatigue test is carried out according to Annex C of GB/T 28494-2012, with the following additions: the inlet of the valve is held at PN with water at 15 °C to 30 °C as the test medium; with the valve fully open the water velocity reaches 1 m/s +/- 0.2 m/s; with the valve fully closed the outlet pressure stays at atmospheric pressure for not less than 5 s; during the torque test the clamps at the two ends of the valve exert no axial force on it and the torque device exerts no lateral force on the stem; and the open and closed steps are then repeated.

7.12 The tightness test is carried out according to GB/T 27726.

7.13 The lead limit is tested according to GB/T 26125. Sample pre-treatment uses a closed acid digestion system, and lead is determined by inductively coupled plasma optical emission spectrometry, by inductively coupled plasma mass spectrometry or by atomic absorption spectrometry. In case of dispute the result by inductively coupled plasma mass spectrometry decides.

8 Inspection rules