

ICS 23.060.01
CCS J 16



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

GB 26640-2011

**[GB/T 26640-2011] Specification for minimal thickness of the
shell of valves
(English Translation)**

Issued on: June 16, 2011

Implemented on: September 1, 2012

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine of the PRC**

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1 Scope

This Standard specifies the wall thickness requirements for iron and steel valves such as ball valves, butterfly valves, gate valves, globe valves, check valves, plug valves and diaphragm valves.

The parameter ranges of the valves to which this Standard applies are:

- a) Steel valves with nominal pressure PN 10~PN 760. Nominal pressure PN 760 is only suitable for welded end valves;
- b) Flange connection, wafer connection, and butt-welding connection end steel valves with nominal dimension not greater than DN 1250;
- c) Socket-welded end and threaded connection end steel valves with nominal dimension not greater than DN 100;
- d) Iron valves with nominal pressure PN 1.0~PN 25;
- e) Iron valves with nominal dimension not greater than DN 3000.

2 Normative references

The following documents contain the provisions which, through reference in this Standard, constitute the provisions of this Standard. For the dated references, their subsequent amendments (excluding corrections) or revisions do not apply to this Standard. However, the parties who enter into agreement based on this Standard are encouraged to investigate whether the latest editions of these documents are applicable.

For undated reference documents, the latest editions apply to this Standard.

GB/T 12224-2005 General requirements for industrial steel valves (ASTM B16.34a:1998, NEQ)

GB/T 14976 Stainless steel seamless tubes for fluid transport (GB/T 14976-2002, ASTM A269:2000, NEQ)

3.1.1 Look up table to determine minimal thickness

The thickness t_m of the steel valve body shall not be less than that specified in Table 1; except for the end dimensions specified in 3.1.3~3.1.6, 3.1.8, as well as in 6.2 and 6.7 of GB/T 12224-2005.

When using Table 1, the values in the middle of the listed values can be obtained by linear interpolation.

Unlined valve body thickness is measured from the inner surface in contact with the fluid. The minimal thickness shall not include the thickness of the liner, insert or bushing.

3.1.2 Calculation of minimal thickness

When the thickness value cannot be found from Table 1, it can be calculated by formula (1). The minimal thickness values in Table 1 are larger than those calculated using formula (1).

Where:

t_m - Calculated shell thickness, in millimeters (mm);

P_c - The value is 0.1 times the nominal pressure, in megapascals (MPa);

d - The inside diameter of the end of valve body, in accordance with the provisions of Appendix A, in millimeters (mm);

n - Coefficient. When $P_c \leq 2.5$ MPa, $n=3.8$; when $P_c > 2.5$ MPa, $n=4.8$;

S - Stress coefficient. $S=48.3$ MPa.

Formula (1) does not apply to valves with nominal pressure greater than PN 760.

The actual value in Table 1 is about 3 mm~5 mm thicker than the value obtained by formula (1). Additional thickness is required to account for assembly stress, valve opening-closing stress, non-circular shape, and stress concentration. Therefore, the manufacturer shall add a certain thickness allowance to the calculated thickness value, to ensure that the valve meets the strength requirements.

intermediate pressure ratings

The minimal thickness of the shell at the intermediate pressure level is determined by the linear insertion method by formulas (4) and (5):

Where:

P_{rd} - Nominal pressure of intermediate pressure level;

t_m - The minimal thickness of the shell for the intermediate pressure level, in millimeters (mm);

P_d - Working pressure at design temperature, in megapascals (MPa);

P_1 - The low value of pressure adjacent to P_d , in megapascals (MPa);

P_2 - The high value of pressure adjacent to P_d , in megapascals (MPa);

P_{r1} - Nominal pressure P_N corresponding to P_1 ;

P_{r2} - Nominal pressure P_N corresponding to P_2 ;

t_1 - The minimal thickness of the nominal pressure P_{r1} , in millimeters (mm);

t_2 - The minimal thickness of the nominal pressure P_{r2} , in millimeters (mm).

Use the design temperature and working pressure P_d to check the pressure-temperature rating specified in 3.1.1 of GB/T 12224-2005. Then determine the low value P_1 of rated pressure adjacent to P_d and the adjacent high value P_2 . P_1 and P_2 are rated values equivalent to pressure levels P_{r1} and P_{r2} . Determine the intermediate pressure level P_{rd} corresponding to the design condition and use formula (4) to calculate.

Use the appropriate inside diameter d in Table 1, to determine the minimal thicknesses t_1 and t_2 for the nominal pressures P_{r1} and P_{r2} , respectively. Determine the minimal thickness corresponding to the design condition and use formula (5) to calculate.

3.1.6 Wall thickness of valve body ends

a) Butt-welding end

The shell thickness of the flow passage part of the valve body welding groove shall not be less than the required value t_m in 3.1.1 or 3.1.4. The thickness at a distance of $1.33 t_m$ from the welding end shall not be less than $0.77 t_m$.

b) Socket-welded end and threaded connection end

The distance FROM the centerline of the basic cylindrical flow passage TO the outer surface of the valve body flow passage shall not be less than 0.5 times the nominal outside diameter of the tube listed in GB/T 14976.

3.1.7 Local area

When the thickness of the shell in the local area is less than the minimal thickness, it is acceptable when all the following constraints are met.

a) Areas less than the minimal thickness can be enclosed by a circle with a diameter not greater than $0.35 \cdot d$. For the valve body neck, $d_0=d'$ and $t_0=t'$ (see 3.1.3).

For all other local areas, $d_0=d$ (see 3.1.2) and $t_0=t_m$ (see corresponding 3.1.1 or

3.1.4);

b) The measured thickness is not less than $0.75 t_0$;

c) The distance between the edges of the surrounding circles is not less than $1.75 t_0$.

3.1.8 Additional thickness allowance

Due to the influence of factors such as piping system load, operation (closing and opening) load, non-circular shape, and stress concentration, additional thickness allowance is required for the shell thickness checked according to Table 1. Because there are many factors to be considered for the additional thickness allowance, the additional thickness allowance is determined by the manufacturer's design and calculation.

For inclined stem steel valves (which enlarge the intersecting surfaces and openings of the valve body cavity) and assembly-welded body steel valves, additional reinforcement may be required, to ensure adequate strength and rigidity.

3.1.9 Wafer-type steel valves

For wafer-type steel valves (such as butterfly valves), the wall thickness shall meet the requirements of flange connection steel valves and the following requirements (see Figure 2).

a) The required minimal thickness t_m of the valve body shall be the minimum distance measured outward FROM the inner circumference of the valve body TO the outer circumference of the valve body; or the distance FROM the inner circumference of the valve body TO the tangent to the inside of the flange bolt hole.

b) The inside thickness (e in Figure 2) of the through hole or threaded blind hole near the valve stem passage shall not be less than 0.25 times the required wall thickness of the valve body neck; but not less than 2.5 mm.

c) The inside thickness (f in Figure 2) of the hole parallel to the valve body passage shall not be less than $0.25 t_m$; but not less than 2.5 mm. The sum of the inside thickness and the outside thickness shall not be less than the valve body thickness t_m .

d) The minimal thickness (j in Figure 2) of the valve body between two adjacent holes in the valve body wall shall not be less than $0.25 t_m$; but not less than 2.5 mm.

e) The inside thickness (c in Figure 2) of radial blind hole is not less than $0.75 t_m$.

3.2 Requirements for minimal thickness of the shell of various types of steel valves