

DIN EN 12516-2:2015-01 (E)

Industrial valves - Shell design strength - Part 2: Calculation method for steel valve shells

Contents		Page
Foreword		4
1	Scope	7
2	Normative references	7
3	Symbols and units	7
4	General conditions for strength calculation	12
5	Design pressure	13
6	Nominal design stresses for pressure parts other than bolts	13
6.1	General	13
6.2	Steels and cast steels other than defined in 6.3, 6.4 or 6.5	14
6.3	Austenitic steel and austenitic cast steel with a minimum rupture elongation not less than 30 %	14
6.4	Austenitic steel and austenitic cast steel with a minimum rupture elongation not less than 35 %	15
6.5	Ferritic and martensitic cast steel	15
6.6	Creep conditions	15
7	Calculation methods for the wall thickness of valve bodies	15
7.1	General	15
7.2	Wall thickness of bodies and branches outside crotch area	16
7.2.1	General	16
7.2.2	Cylindrical bodies or branches	16
7.2.3	Spherical bodies or branches	17
7.2.4	Conical bodies or branches	17
7.2.5	Bodies or branches with oval or rectangular cross-sections	19
7.3	Wall thickness in the crotch area	26
7.4	Examples of pressure-loaded areas A_p and metallic cross-sectional areas A_f	27
7.4.1	General	27
7.4.2	Cylindrical valve bodies	28
7.4.3	Spherical valve bodies	30
7.4.4	Oval and rectangular cross-sections	31
7.4.5	Details	32
8	Calculation methods for bonnets and covers	35
8.1	General	35
8.2	Covers made of flat plates	35
8.2.1	General	35
8.2.2	Circular cover without opening, with	40
8.2.3	Circular covers with concentric circular opening, with	41
8.2.4	Non-circular covers (elliptical or rectangular)	42
8.2.5	Special covers made of flat circular plates for specific load and clamping conditions	43
8.3	Covers consisting of a spherically domed end and an adjoining flanged ring	55
8.3.1	General	55
8.3.2	Wall thickness and strength calculation of the spherical segment	56
8.3.3	Calculation of the flanged ring	57
8.3.4	Reinforcement of the stuffing box area	59

8.4	Dished heads	59
8.4.1	General remarks	59
8.4.2	Solid dished heads	60
8.4.3	Dished heads with opening	61
8.4.4	Allowances on the wall thickness	63
9	Calculation method for pressure sealed bonnets and covers	64
10	Calculation methods for flanges	66
10.1	General	66
10.2	Circular flanges	66
10.2.1	General	66
10.2.2	Flanges with tapered neck	67
10.2.3	Flanges greater than DN 1 000	69
10.2.4	Welding neck with tapered neck according to Figure 48	70
10.2.5	Weld-on flanges	71
10.2.6	Reverse flanges	74
10.2.7	Loose flanges	74
10.3	Oval flanges	76
10.3.1	Oval flanges in accordance with Figure 54	76
10.3.2	Oval flanges in accordance with Figure 55	78
10.4	Rectangular or square flanges	80
10.4.1	Rectangular or square flanges in accordance with Figure 57	80
10.4.2	Rectangular slip-on flanges in accordance with Figure 58	80
10.5	Calculation of the bolt diameter	81
10.5.1	Design temperature	81
10.5.2	Diameter of the nominal tensile stress	81
10.5.3	Load cases	82
10.5.4	Safety factors and allowances	82
11	Calculation methods for glands	82
11.1	Loads	82
11.2	Gland bolts	83
11.3	Gland flanges	83
11.4	Other components	83
12	Fatigue	83
13	Marking	83
Annex A (informative) Characteristic values of gaskets and joints		84
Annex B (informative) Calculation procedure		96
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC		98
Bibliography		99