

DIN EN 545:2011-09 (E)

Ductile iron pipes, fittings, accessories and their joints for water pipelines - Requirements and test methods

Contents		Page
Foreword		6
1	Scope	7
2	Normative references	7
3	Terms and definitions	8
4	Technical requirements	12
4.1	General	12
4.2	Pressure class	13
4.3	Dimensional requirements	14
4.4	Material characteristics	18
4.5	Coatings and linings for pipes	19
4.6	Coatings for fittings and accessories	21
4.7	Marking of pipes, fittings and accessories	22
4.8	Leak tightness	23
5	Performance requirements for joints and pipe saddles	23
5.1	General	23
5.2	Flexible joints	23
5.3	Restrained flexible joints	25
5.4	Flanged joints as cast, screwed, welded and adjustable	25
5.5	Pipe saddles	26
6	Test methods	27
6.1	Pipe dimensions	27
6.2	Straightness of pipes	28
6.3	Tensile testing	28
6.4	Brinell hardness	30
6.5	Works leak tightness test for pipes and fittings	30
6.6	Zinc mass	30
6.7	Thickness of paint coatings	31
6.8	Thickness of cement mortar lining	31
7	Performance test methods	32
7.1	Compressive strength of the cement mortar lining	32
7.2	Leak tightness of flexible joints	32
7.3	Leak tightness and mechanical resistance of flanged joints	35
7.4	Leak tightness and mechanical resistance of pipe saddles	36
8	Tables of dimensions	37
8.1	Socket and spigot pipes	37
8.2	Flanged pipes	40
8.3	Fittings for socketed joints	40
8.4	Fittings for flanged joints	56
9	Evaluation of conformity	73
9.1	General	73
9.2	Initial performance testing	73
9.3	Factory production control (FPC)	75

Annex A (normative) Allowable pressures	80
A.1 General	80
A.2 Socket and spigot pipes (see 8.1)	80
A.3 Fittings for socketed joints (see 8.3)	80
A.4 Flanged pipes (see 8.2) and fittings for flanged joints (see 8.4)	81
A.5 Accessories	81
Annex B (informative) Longitudinal bending resistance of pipes	82
Annex C (informative) Diametral stiffness of pipes	83
Annex D (informative) Specific coatings, field of use, characteristics of soils	86
D.1 Alternative coatings	86
D.2 Field of use in relation to the characteristics of soils	87
Annex E (informative) Field of use, water characteristics	89
Annex F (informative) Calculation method of buried pipelines, heights of cover	90
F.1 Calculation method	90
F.2 Heights of cover	92
Bibliography	93
Tables Table 1 Limit deviations on thickness of fittings	14
Table 2 Limit deviation on internal diameter	15
Table 3 Maximum DN for limit deviations on internal diameter for pressure classes	15
Table 4 Standardized lengths of socket and spigot pipes	15
Table 5 Standardized lengths of flange pipes	16
Table 6 Permissible deviation on lengths of fittings	16
Table 7 Limit deviations on length	18
Table 8 Tensile properties	18
Table 9 Thickness of cement mortar lining	21
Table 10 DN groupings for performance tests	23
Table 11 Performance tests for joints	24
Table 12 Bending moments for flange joint performance tests	26
Table 13 Performance tests for pipe saddles	27
Table 14 Dimensions of test bar	29
Table 15 Works test pressure for pipes not centrifugally cast, fittings and accessories	30
Table 16 Dimensions of pipes of preferred pressure classes	38
Table 17 Dimensions of pipes	39
Table 18 Dimensions of flanged sockets	41

Table 19	Dimensions of flanged spigots and collars	43
Table 20	Dimensions of double socket 90° and 45° bends	45
Table 21	Dimensions of double socket 22,5° and 11,25° bends	47
Table 22	Dimensions of all socket tees	49
Table 23	Dimensions of double socket tees with flanged branch, DN 40 to 250	51
Table 24	Dimensions of double socket tees with flanged branch, DN 300 to DN 700	52
Table 25	Dimensions of double socket tees with flanged branch, DN 800 to DN 2 000	53
Table 26	Dimensions of double socket tapers	55
Table 27	Dimensions of double flanged 90° and 90° duckfoot bends	57
Table 28	Dimensions of double flanged 45° bends	59
Table 29	Dimensions of double flanged 22,5° and 11,25° bends	61
Table 30	Dimensions of all flanged tees, DN 40 to DN 250	62
Table 31	Dimensions of all flanged tees, DN 300 to DN 700	63
Table 32	Dimensions of all flanged tees, DN 800 to DN 2000	64
Table 33	Dimensions of double flanged tapers	66
Table 34	Dimensions of PN 10 and PN 16 blank flanges	68
Table 35	Dimensions of PN 25 and PN 40 blank flanges	70
Table 36	Dimensions of PN 10 and PN 16 reducing flanges	71
Table 37	Dimensions of PN 25 and PN 40 reducing flanges	73
Table 38	Number of test samples for initial performance testing	75
Table 39	Minimum frequency of product testing as part of FPC	77
Table 40	Maximum batch sizes for tensile testing	78
Table A.1	Fittings pressure class	81
Table A.2	Flanged pipe and fittings pressures	81
Table B.1	Longitudinal bending moment resistance of pipes	82
Table C.1	Diametral stiffness of pipes of preferred pressure classes	85
Table E.1	Field of use for cement mortar linings	89
Table F.1	Heights of cover for pipes of preferred pressure classes	92
Figures Figure 1	Leak tightness test of joints (internal pressure)	33
Figure 2	Leak tightness test of joints (external pressure)	34
Figure 3	Strength and leak tightness test for flanged joints	35

Figure 4 Leak tightness test for pipe saddles	36
Figure 5 Socket and spigot pipes	37
Figure 6 Flanged sockets	40
Figure 7 Flanged spigots	42
Figure 8 Collars	42
Figure 9 Double socket 90° (1/4) bends	44
Figure 10 Double socket 45° (1/8) bends	44
Figure 11 Double socket 22°30' (1/16) bends	46
Figure 12 Double socket 11°15' (1/32) bends	46
Figure 13 All socket tees	48
Figure 14 Double socket tees with flanged branch	50
Figure 15 Double socket tapers	54
Figure 16 Double flanged 90° (1/4) bends	56
Figure 17 Double flanged duckfoot 90° (1/4) bends	57
Figure 18 Double flanged 45° (1/8) bends	58
Figure 19 Double flanged 22°30' (1/16) bends	60
Figure 20 Double flanged 11°15' (1/32) bends	60
Figure 21 All flanged tees	61
Figure 22 Double flanged tapers	65
Figure 23 Blank flanges PN 10	67
Figure 24 Blank flanges PN 16	67
Figure 25 Blank flanges PN 25	69
Figure 26 Blank flanges PN 40	69
Figure 27 Reducing flanges PN 10	70
Figure 28 Reducing flanges PN 16	71
Figure 29 Reducing flanges PN 25	72
Figure 30 Reducing flanges PN 40	72