

# DIN EN 545:2010-12 (E)

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

---

<b>Contents</b>		<b>Page</b>
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

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

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

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