ASTM - A53/A53M

SPECIFICATION FOR PIPE, STEEL, BLACK AND HOTDIPPED, ZINC-COATED,WELDED AND SEAMLESS

This specification covers seamless and welded black and hot-dipped galvanized steel pipe in NPS 1⁄8 to NPS 26 [DN 6 to DN 650]. It shall be permissible to furnish pipe having other dimensions provided such pipe complies with all other requirements of this specification.

A. Manufacture :-

1. The steel for both seamless and welded pipe shall be made by one or more of the following processes: open-hearth, electric-furnace, or basic-oxygen.
2. This specification covers the following types and grades:
   Type F — Furnace-butt welded, continuous welded Grade A,
   Type E — Electric-resistance welded, Grades A and B, and
   Type S — Seamless, Grades A and B.
3. Type F is not intended for flanging.
4. When Types S and E are required for close coiling or cold bending, Grade A is the preferred grade.
5. This provision is not intended to prohibit the cold bending of Grade B pipe.
6. Type E is furnished either nonexpanded or cold expanded at the option of the manufacturer.

B. Chemical Composition :-

The steel shall conform to the requirements as to chemical composition in Table 1.

Table 1

	C	Mn	P	S	Cu[A]	Ni[A]	Cr[A]	Mo[A]	V[A]
Type S (seamless pipe)									
Open-hearth, electric-furnace, or basic oxygen									
Grade A	0.25	0.95	0.05	0.045	0.4	0.4	0.4	0.15	0.08
Grade B	0.3	1.2	0.05	0.045	0.4	0.4	0.4	0.15	0.08
Type E (electric-resistance-welded)									
Open-hearth, electric-furnace, or basic									

oxygen									
Grade A	0.25	0.95	0.05	0.045	0.4	0.4	0.4	0.15	0.08
Grade B	0.3	1.2	0.05	0.045	0.4	0.4	0.4	0.15	0.08
Type F (furnace-welded pipe)									
Open-hearth, electric-furnace, or basic oxygen									
Grade A	0.3	1.2	0.05	0.045	0.4	0.4	0.4	0.15	0.08

[A] *The combination of these five elements shall not exceed 1.00%.*

C. <u>Tensile Requirements :-</u>

The material shall conform to the requirements as to tensile properties prescribed in Table 2.

Table 2

	Type F	**Types E and S**	
	Open-Hearth, Basic Oxygen, or Electric- Furnace, Grade A	**Grade A**	**Grade B**
Tensile strength, min, psi [MPa]	48 000 [330]	48 000 [330]	60 000 [415]
Yield strength, min, psi [MPa]	30 000 [205]	30 000 [205]	35 000 [240]
Elongation in 2 in. [50 mm]	[A,B]	[A,B]	[A,B]

[A] *The minimum elongation in 2 in. [50 mm] shall be that determined by the following equation:*

$$e = 625\,000\ [1940]\ A^{0.2} IU^{0.9}$$

where: *e = minimum elongation in 2 in. [50 mm] in percent rounded to the nearest percent*

A = cross-sectional area of the tension specimen, rounded to the nearest 0.01 in.2 [1 mm2], based on the specified outside diameter or the nominal specimen width and specified wall thickness. If the area calculated is equal to or greater than 0.75 in.2 [500 mm2], then the value 0.75 in.2 [500 mm2] shall be used, and

U = specified tensile strength, psi [MPa]

[B] *See Table 2A or Table 2B, whichever is applicable, for minimum elongation values for various size tension specimens and grades.*

- *Tabulated in Table 2A are the minimum elongation values calculated by the equation given in Table 2.*

Table 2A

Area, A, in.^{2}	Tension Test Specimen			Elongation in 2 in., min, %	
	Nominal Wall Thickness, in.			Specified Tensile Strength, psi	
	3⁄4 in. Specimen	1 in. Specimen	1(1⁄2) in. Specimen	48 000	60 000
0.75 and greater	0.994 and greater	0.746 and greater	0.497 and greater	36	30
0.74	0.980–0.993	0.735–0.745	0.490–0.496	36	29
0.73	0.967–0.979	0.726–0.734	0.484–0.489	36	29
0.72	0.954–0.966	0.715–0.725	0.477–0.483	36	29
0.71	0.941–0.953	0.706–0.714	0.471–0.476	36	29
0.7	0.927–0.940	0.695–0.705	0.464–0.470	36	29
0.69	0.914–0.926	0.686–0.694	0.457–0.463	36	29
0.68	0.900–0.913	0.675–0.685	0.450–0.456	35	29
0.67	0.887–0.899	0.666–0.674	0.444–0.449	35	29
0.66	0.874–0.886	0.655–0.665	0.437–0.443	35	29
0.65	0.861–0.873	0.646–0.654	0.431–0.436	35	29
0.64	0.847–0.860	0.635–0.645	0.424–0.430	35	29
0.63	0.834–0.846	0.626–0.634	0.417–0.423	35	29
0.62	0.820–0.833	0.615–0.625	0.410–0.416	35	28
0.61	0.807–0.819	0.606–0.614	0.404–0.409	35	28
0.6	0.794–0.806	0.595–0.605	0.397–0.403	35	28
0.59	0.781–0.793	0.586–0.594	0.391–0.396	34	28
0.58	0.767–0.780	0.575–0.585	0.384–0.390	34	28
0.57	0.754–0.766	0.566–0.574	0.377–0.383	34	28
0.56	0.740–0.753	0.555–0.565	0.370–0.376	34	28
0.55	0.727–0.739	0.546–0.554	0.364–0.369	34	28
0.54	0.714–0.726	0.535–0.545	0.357–0.363	34	28
0.53	0.701–0.713	0.526–0.534	0.351–0.356	34	28
0.52	0.687–0.700	0.515–0.525	0.344–0.350	34	27
0.51	0.674–0.686	0.506–0.514	0.337–0.343	33	27

0.5	0.660–0.673	0.495–0.505	0.330–0.336	33	27
0.49	0.647–0.659	0.486–0.494	0.324–0.329	33	27
0.48	0.634–0.646	0.475–0.485	0.317–0.323	33	27
0.47	0.621–0.633	0.466–0.474	0.311–0.316	33	27
0.46	0.607–0.620	0.455–0.465	0.304–0.310	33	27
0.45	0.594–0.606	0.446–0.454	0.297–0.303	33	27
0.44	0.580–0.593	0.435–0.445	0.290–0.296	32	27
0.43	0.567–0.579	0.426–0.434	0.284–0.289	32	26
0.42	0.554–0.566	0.415–0.425	0.277–0.283	32	26
0.41	0.541–0.553	0.406–0.414	0.271–0.276	32	26
0.4	0.527–0.540	0.395–0.405	0.264–0.270	32	26
0.39	0.514–0.526	0.386–0.394	0.257–0.263	32	26
0.38	0.500–0.513	0.375–0.385	0.250–0.256	32	26
0.37	0.487–0.499	0.366–0.374	0.244–0.249	31	26
0.36	0.474–0.486	0.355–0.365	0.237–0.243	31	26
0.35	0.461–0.473	0.346–0.354	0.231–0.236	31	25
0.34	0.447–0.460	0.335–0.345	0.224–0.230	31	25
0.33	0.434–0.446	0.326–0.334	0.217–0.223	31	25
0.32	0.420–0.433	0.315–0.325	0.210–0.216	30	25
0.31	0.407–0.419	0.306–0.314	0.204–0.209	30	25
0.3	0.394–0.406	0.295–0.305	0.197–0.203	30	25
0.29	0.381–0.393	0.286–0.294	0.191–0.196	30	24
0.28	0.367–0.380	0.275–0.285	0.184–0.190	30	24
0.27	0.354–0.366	0.266–0.274	0.177–0.183	29	24
0.26	0.340–0.353	0.255–0.265	0.170–0.176	29	24
0.25	0.327–0.339	0.246–0.254	0.164–0.169	29	24
0.24	0.314–0.326	0.235–0.245	0.157–0.163	29	24
0.23	0.301–0.313	0.226–0.234	0.151–0.156	29	23
0.22	0.287–0.300	0.215–0.225	0.144–0.150	28	23
0.21	0.274–0.286	0.206–0.214	0.137–0.143	28	23

0.2	0.260–0.273	0.195–0.205	0.130–0.136	28	23
0.19	0.247–0.259	0.186–0.194	0.124–0.129	27	22
0.18	0.234–0.246	0.175–0.185	0.117–0.123	27	22
0.17	0.221–0.233	0.166–0.174	0.111–0.116	27	22
0.16	0.207–0.220	0.155–0.165	0.104–0.110	27	22
0.15	0.194–0.206	0.146–0.154	0.097–0.103	26	21
0.14	0.180–0.193	0.135–0.145	0.091–0.096	26	21
0.13	0.167–0.179	0.126–0.134	0.084–0.090	25	21
0.12	0.154–0.166	0.115–0.125	0.077–0.083	25	20
0.11	0.141–0.153	0.106–0.114	0.071–0.076	25	20
0.1	0.127–0.140	0.095–0.105	0.064–0.070	24	20
0.09	0.114–0.126	0.086–0.094	0.057–0.063	24	19
0.08	0.100–0.113	0.075–0.085	0.050–0.056	23	19
0.07	0.087–0.099	0.066–0.074	0.044–0.049	22	18
0.06	0.074–0.086	0.055–0.065	0.037–0.043	22	18
0.05	0.061–0.073	0.046–0.054	0.031–0.036	21	17
0.04	0.047–0.060	0.035–0.045	0.024–0.030	20	16
0.03	0.034–0.046	0.026–0.034	0.017–0.023	19	16
0.02	0.020–0.033	0.015–0.025	0.010–0.016	17	14
0.01 and less	0.019 and less	0.014 and less	0.009 and less	15	12

- *Tabulated in Table 2B are the minimum elongation values calculated by the equation given in Table 2.*

Table 2B

Area, A, mm^2	**Tension Test Specimen**			**Elongation in 50 mm, min, %**	
	Nominal Wall Thickness, mm			**Specified Tensile Strength, Mpa**	
	19 mm Specimen	**25 mm Specimen**	**38 mm Specimen**	**330**	**415**
500 and greater	26.3 and greater	20 and greater	13.2 and greater	36	30
480–499	25.3–26.2	19.2–19.9	12.7–13.1	36	30

460–479	24.2–25.2	18.4–19.1	12.1–12.6	36	29
440–459	23.2–24.1	17.6–18.3	11.6–12.0	36	29
420–439	22.1–23.1	16.8–17.5	11.1–11.5	35	29
400–419	21.1–22.0	16.0–16.7	10.6–11.0	35	29
380–399	20.0–21.0	15.2–15.9	10.0–10.5	35	28
360–379	19.0–19.9	14.4–15.0	9.5–9.9	34	28
340–359	17.9–18.9	13.6–14.3	9.0–9.4	34	28
320–339	16.9–17.8	12.8–13.5	8.5–8.9	34	27
300–319	15.8–16.8	12.0–12.7	7.9–8.4	33	27
280–299	14.8–15.7	11.2–11.9	7.4–7.8	33	27
260–279	13.7–14.7	10.4–11.1	6.9–7.3	32	26
240–259	12.7–13.6	9.6–10.3	6.4–6.8	32	26
220–239	11.6–12.6	8.8–9.5	5.8–6.3	31	26
200–219	10.5–11.5	8.0–8.7	5.3–5.7	31	25
190–199	10.0–10.4	7.6–7.9	5.0–5.2	30	25
180–189	9.5–9.9	7.2–7.5	4.8–4.9	30	24
170–179	9.0–9.4	6.8–7.1	4.5–4.7	30	24
160–169	8.4–8.9	6.4–6.7	4.2–4.4	29	24
150–159	7.9–8.3	6.0–6.3	4.0–4.1	29	24
140–149	7.4–7.8	5.6–5.9	3.7–3.9	29	23
130–139	6.9–7.3	5.2–5.5	3.5–3.6	28	23
120–129	6.3–6.8	4.8–5.1	3.2–3.4	28	23
110–119	5.8–6.2	4.4–4.7	2.9–3.1	27	22
100–109	5.3–5.7	4.0–4.3	2.7–2.8	27	22
90–99	4.8–5.2	3.6–3.9	2.4–2.6	26	21
80–89	4.2–4.7	3.2–3.5	2.1–2.3	26	21
70–79	3.7–4.1	2.8–3.1	1.9–2.0	25	21
60–69	3.2–3.6	2.4–2.7	1.6–1.8	24	20
50–59	2.7–3.1	2.0–2.3	. . .	24	19
40–49	2.1–2.6	1.6–1.9	. . .	23	19

30–39	1.6–2.0	. . .	. . .	22	18

D. Bending Requirements :-

1. For pipe NPS 2 [DN 50] and under, a sufficient length of pipe shall be capable of being bent cold through 90° around a cylindrical mandrel, the diameter of which is twelve times the outside diameter of the pipe, without developing cracks at any portion and without opening the weld.
2. When ordered for close coiling, the pipe shall stand being bent cold through 180° around a cylindrical mandrel, the diameter of which is eight times the outside diameter of the pipe, without failure.
3. Double-extra-strong pipe over NPS 1(1⁄4) [DN 32] need not be subjected to the bend test.

E. Flattening Test :-

1. The flattening test shall be made on pipe over NPS 2 [DN 50] with all thicknesses extra strong and lighter.

F. Hydrostatic Test :-

1. The hydrostatic test shall be applied, without leakage through the pipe wall, to each length of pipe except as provided in point G.2 for seamless pipe.
2. Each length of plain-end pipe shall be hydrostatically tested to the pressures prescribed in Table 3A, and each threaded-and-coupled length shall be hydrostatically tested to the pressures prescribed in Table 3B.
3. The minimum hydrostatic test pressure required to satisfy these requirements need not exceed 2500 psi [17 200 kPa] for NPS 3 [DN 80] and under, nor 2800 psi [19 300 kPa] for all sizes over NPS 3 [DN 80]. This does not prohibit testing at a higher pressure at the manufacturer's option.
4. The hydrostatic pressure shall be maintained for not less than 5 s for all sizes of seamless and electric welded pipe.

Table 3A: DIMENSIONS, WEIGHTS, AND TEST PRESSURES FOR PLAIN END PIPE

NPS Designator	DN Designator	Outside Diameter, in. [mm]	Nominal Wall Thickness, in. [mm]	Nominal Weight [Mass] per Unit Length, Plain End, lb/ft [kg/m]	Weight Class	Schedule No.	Test Pressure,[A] psi [kPa]	
							Grade A	Grade B
1⁄8	6	0.405 [10.3]	0.068 [1.73]	0.24 [0.37]	STD	40	700 [4800]	700 [4800]
			0.095 [2.41]	0.31 [0.47]	XS	80	850 [5900]	850 [5900]
1⁄4	8	0.540 [13.7]	0.088 [2.24]	0.43 [0.63]	STD	40	700 [4800]	700 [4800]
			0.119 [3.02]	0.54 [0.80]	XS	80	850 [5900]	850 [5900]
3⁄8	10	0.675 [17.1]	0.091 [2.31]	0.57 [0.84]	STD	40	700 [4800]	700 [4800]
			0.126 [3.20]	0.74 [1.10]	XS	80	850 [5900]	850 [5900]

1⁄2	15	0.840 [21.3]	0.109 [2.77]	0.85 [1.27]	STD	40	700 [4800]	700 [4800]
			0.147 [3.73]	1.09 [1.62]	XS	80	850 [5900]	850 [5900]
			0.188 [4.78]	1.31 [1.95]	...	160	900 [6200]	900 [6200]
			0.294 [7.47]	1.72 [2.55]	XXS	...	1000 [6900]	1000 [6900]
3⁄4	20	1.050 [26.7]	0.113 [2.87]	1.13 [1.69]	STD	40	700 [4800]	700 [4800]
			0.154 [3.91]	1.48 [2.20]	XS	80	850 [5900]	850 [5900]
			0.219 [5.56]	1.95 [2.90]	...	160	950 [6500]	950 [6500]
			0.308 [7.82]	2.44 [3.64]	XXS	...	1000 [6900]	1000 [6900]
1	25	1.315 [33.4]	0.133 [3.38]	1.68 [2.50]	STD	40	700 [4800]	700 [4800]
			0.179 [4.55]	2.17 [3.24]	XS	80	850 [5900]	850 [5900]
			0.250 [6.35]	2.85 [4.24]	...	160	950 [6500]	950 [6500]
			0.358 [9.09]	3.66 [5.45]	XXS	...	1000 [6900]	1000 [6900]
1(1⁄4)	32	1.660 [42.2]	0.140 [3.56]	2.27 [3.39]	STD	40	1200 [8300]	1300 [9000]
			0.191 [4.85]	3.00 [4.47]	XS	80	1800 [12400]	1900 [13100]
			0.250 [6.35]	3.77 [5.61]	...	160	1900 [13100]	2000 [13800]
			0.382 [9.70]	5.22 [7.77]	XXS	...	2200 [15200]	2300 [15900]
1(1⁄2)	40	1.900 [48.3]	0.145 [3.68]	2.72 [4.05]	STD	40	1200 [8300]	1300 [9000]
			0.200 [5.08]	3.63 [5.41]	XS	80	1800 [12400]	1900 [13100]
			0.281 [7.14]	4.86 [7.25]	...	160	1950 [13400]	2050 [14100]
			0.400 [10.16]	6.41 [9.56]	XXS	...	2200 [15200]	2300 [15900]
2	50	2.375 [60.3]	0.154 [3.91]	3.66 [5.44]	STD	40	2300 [15900]	2500 [17200]
			0.218 [5.54]	5.03 [7.48]	XS	80	2500 [17200]	2500 [17200]
			0.344 [8.74]	7.47 [11.11]	...	160	2500 [17200]	2500 [17200]
			0.436 [11.07]	9.04 [13.44]	XXS	...	2500	2500 [17200]

							[17200]	
2(1⁄2)	65	2.875 [73.0]	0.203 [5.16]	5.80 [8.63]	STD	40	2500 [17200]	2500 [17200]
			0.276 [7.01]	7.67 [11.41]	XS	80	2500 [17200]	2500 [17200]
			0.375 [9.52]	10.02 [14.90]	...	160	2500 [17200]	2500 [17200]
			0.552 [14.02]	13.71 [20.39]	XXS	...	2500 [17200]	2500 [17200]
3	80	3.500 [88.9]	0.125 [3.18]	4.51 [6.72]	...	...	1290 [8900]	1500 [1000]
			0.156 [3.96]	5.58 [8.29]	...	...	1600 [11000]	1870 [12900]
			0.188 [4.78]	6.66 [9.92]	...	...	1930 [13330]	2260 [15600]
			0.216 [5.49]	7.58 [11.29]	STD	40	2220 [15300]	2500 [17200]
			0.250 [6.35]	8.69 [12.93]	...	...	2500 [17200]	2500 [17200]
			0.281 [7.14]	9.67 [14.40]	...	...	2500 [17200]	2500 [17200]
			0.300 [7.62]	10.26 [15.27]	XS	80	2500 [17200]	2500 [17200]
			0.438 [11.13]	14.34 [21.35]	...	160	2500 [17200]	2500 [17200]
			0.600 [15.24]	18.60 [27.68]	XXS	...	2500 [17200]	2500 [17200]
3(1⁄2)	90	4.000 [101.6]	0.125 [3.18]	5.18 [7.72]	...	...	1120 [7700]	1310 [19000]
			0.156 [3.96]	6.41 [9.53]	...	...	1400 [6700]	1640 [11300]
			0.188 [4.78]	7.66 [11.41]	...	...	1690 [11700]	1970 [13600]
			0.226 [5.74]	9.12 [13.57]	STD	40	2030 [14000]	2370 [16300]
			0.250 [6.35]	10.02 [14.92]	...	...	2250 [15500]	2500 [17200]

			0.281 [7.14]	11.17 [16.63]	...	...	2500 [17200]	2500 [17200]
			0.318 [8.08]	12.52 [18.63]	XS	80	2800 [19300]	2800 [19300]
4	100	4.500 [114.3]	0.125 [3.18]	5.85 [8.71]	...	...	1000 [6900]	1170 [8100]
			0.156 [3.96]	7.24 [10.78]	...	...	1250 [8600]	1460 [10100]
			0.188 [4.78]	8.67 [12.91]	...	...	1500 [10300]	1750 [12100]
			0.219 [5.56]	10.02 [14.91]	...	...	1750 [12100]	2040 [14100]
			0.237 [6.02]	10.80 [16.07]	STD	40	1900 [13100]	2210 [15200]
			0.250 [6.35]	11.36 [16.90]	...	...	2000 [13800]	2330 [16100]
			0.281 [7.14]	12.67 [18.87]	...	...	2250 [15100]	2620 [18100]
			0.312 [7.92]	13.97 [20.78]	...	...	2500 [17200]	2800 [19300]
			0.337 [8.56]	15.00 [22.32]	XS	80	2700 [18600]	2800 [19300]
			0.438 [11.13]	19.02 [28.32]	...	120	2800 [19300]	2800 [19300]
			0.531 [13.49]	22.53 [33.54]	...	160	2800 [19300]	2800 [19300]
			0.674 [17.12]	27.57 [41.03]	XXS	...	2800 [19300]	2800 [19300]
5	125	5.563 [141.3]	0.156 [3.96]	9.02 [13.41]	...	...	1010 [7000]	1180 [8100]
			0.188 [4.78]	10.80 [16.09]	...	...	1220 [8400]	1420 [9800]
			0.219 [5.56]	12.51 [18.61]	...	...	1420 [9800]	1650 [11400]
			0.258 [6.55]	14.63 [21.77]	STD	40	1670 [11500]	1950 [13400]
			0.281 [7.14]	15.87 [23.62]	...	...	1820 [12500]	2120 [14600]
			0.312 [7.92]	17.51 [26.05]	...	...	2020	2360 [16300]

							[13900]	
			0.344 [8.74]	19.19 [28.57]	...	...	2230 [15400]	2600 [17900]
			0.375 [9.52]	20.80 [30.94]	XS	80	2430 [16800]	2800 [19300]
			0.500 [12.70]	27.06 [40.28]	...	120	2800 [19300]	2800 [19300]
			0.625 [15.88]	32.99 [49.11]	...	160	2800 [19300]	2800 [19300]
			0.750 [19.05]	38.59 [57.43]	XXS	...	2800 [19300]	2800 [19300]
6	150	6.625 [168.3]	0.188 [4.78]	12.94 [19.27]	...	...	1020 [7000]	1190 [8200]
			0.219 [5.56]	15.00 [22.31]	...	...	1190 [8200]	1390 [9600]
			0.250 [6.35]	17.04 [25.36]	...	...	1360 [9400]	1580 [10900]
			0.280 [7.11]	18.99 [28.26]	STD	40	1520 [10500]	1780 [12300]
			0.312 [7.92]	21.06 [31.32]	...	...	1700 [11700]	1980 [13700]
			0.344 [8.74]	23.10 [34.39]	...	...	1870 [12900]	2180 [15000]
			0.375 [9.52]	25.05 [37.28]	...	...	2040 [14100]	2380 [16400]
			0.432 [10.97]	28.60 [42.56]	XS	80	2350 [16200]	2740 [18900]
			0.562 [14.27]	36.43 [54.20]	...	120	2800 [19300]	2800 [19300]
			0.719 [18.26]	45.39 [67.56]	...	160	2800 [19300]	2800 [19300]
			0.864 [21.95]	53.21 [79.22]	XXS	...	2800 [19300]	2800 [19300]
8	200	8.625 [219.1]	0.188 [4.78]	16.96 [25.26]	...	...	780 [5400]	920 [6300]
			0.203 [5.16]	18.28 [27.22]	...	...	850 [5900]	1000 [6900]
			0.219 [5.56]	19.68 [29.28]	...	...	910 [6300]	1070 [7400]
			0.250 [6.35]	22.38 [33.31]	...	20	1040 [7200]	1220 [8400]

			0.277 [7.04]	24.72 [36.31]	...	30	1160 [7800]	1350 [9300]
			0.312 [7.92]	27.73 [41.24]	...	...	1300 [9000]	1520 [10500]
			0.322 [8.18]	28.58 [42.55]	STD	40	1340 [9200]	1570 [10800]
			0.344 [8.74]	30.45 [45.34]	...	...	1440 [9900]	1680 [11600]
			0.375 [9.52]	33.07 [49.20]	...	...	1570 [10800]	1830 [12600]
			0.406 [10.31]	35.67 [53.08]	...	60	1700 [11700]	2000 [13800]
			0.438 [11.13]	38.33 [57.08]	...	...	1830 [12600]	2130 [14700]
			0.500 [12.70]	43.43 [64.64]	XS	80	2090 [14400]	2430 [16800]
			0.594 [15.09]	51.00 [75.92]	...	100	2500 [17200]	2800 [19300]
			0.719 [18.26]	60.77 [90.44]	...	120	2800 [19300]	2800 [19300]
			0.812 [20.62]	67.82 [100.92]	...	140	2800 [19300]	2800 [19300]
			0.875 [22.22]	72.49 [107.88]	XXS	...	2800 [19300]	2800 [19300]
			0.906 [23.01]	74.76 [111.27]	...	160	2800 [19300]	2800 [19300]
10	250	10.750 [273.0]	0.188 [4.78]	21.23 [31.62]	...	...	630 [4300]	730 [5000]
			0.203 [5.16]	22.89 [34.08]	...	...	680 [4700]	800 [5500]
			0.219 [5.56]	24.65 [36.67]	...	...	730 [5000]	860 [5900]
			0.250 [6.35]	28.06 [41.75]	...	20	840 [5800]	980 [6800]
			0.279 [7.09]	31.23 [46.49]	...	...	930 [6400]	1090 [7500]
			0.307 [7.80]	34.27 [51.01]	...	30	1030 [7100]	1200 [8300]
			0.344 [8.74]	38.27 [56.96]	...	...	1150 [7900]	1340 [9200]
			0.365 [9.27]	40.52 [60.29]	STD	40	1220 [8400]	1430 [9900]
			0.438 [11.13]	48.28 [71.87]	...	...	1470 [10100]	1710 [11800]
			0.500 [12.70]	54.79 [81.52]	XS	60	1670	1950 [13400]

							[11500]	
			0.594 [15.09]	64.49 [95.97]	...	80	1990 [13700]	2320 [16000]
			0.719 [18.26]	77.10 [114.70]	...	100	2410 [16600]	2800 [19300]
			0.844 [21.44]	89.38 [133.00]	...	120	2800 [19300]	2800 [19300]
			1.000 [25.40]	104.23 [155.09]	XXS	140	2800 [19300]	2800 [19300]
			1.125 [28.57]	115.75 [172.21]	...	160	2800 [19300]	2800 [19300]
12	300	12.750 [323.8]	0.203 [5.16]	27.23 [40.55]	...	...	570 [3900]	670 [4600]
			0.219 [5.56]	29.34 [43.63]	...	...	620 [4300]	720 [5000]
			0.250 [6.35]	33.41 [49.71]	...	20	710 [4900]	820 [5700]
			0.281 [7.14]	37.46 [55.75]	...	...	790 [5400]	930 [6400]
			0.312 [7.92]	41.48 [61.69]	...	...	880 [6100]	1030 [7100]
			0.330 [8.38]	43.81 [65.18]	...	30	930 [6400]	1090 [7500]
			0.344 [8.74]	45.62 [67.90]	...	...	970 [6700]	1130 [7800]
			0.375 [9.52]	49.61 [73.78]	STD	...	1060 [7300]	1240 [8500]
			0.406 [10.31]	53.57 [79.70]	...	40	1150 [7900]	1340 [9200]
			0.438 [11.13]	57.65 [85.82]	...	...	1240 [8500]	1440 [9900]
			0.500 [12.70]	65.48 [97.43]	XS	...	1410 [9700]	1650 [11400]
			0.562 [14.27]	73.22 [108.92]	...	60	1590 [11000]	1850 [12800]
			0.688 [17.48]	88.71 [132.04]	...	80	1940 [13400]	2270 [15700]
			0.844 [21.44]	107.42 [159.86]	...	100	2390 [16500]	2780 [19200]
			1.000 [25.40]	125.61 [186.91]	XXS	120	2800 [19300]	2800 [19300]
			1.125 [28.57]	139.81 [208.00]	...	140	2800 [19300]	2800 [19300]
			1.312 [33.32]	160.42 [238.68]	...	160	2800	2800 [19300]

							[19300]	
14	350	14.000 [355.6]	0.210 [5.33]	30.96 [46.04]	...	...	540 [3700]	630 [4300]
			0.219 [5.56]	32.26 [47.99]	...	...	560 [3900]	660 [4500]
			0.250 [6.35]	36.75 [54.69]	...	10	640 [4400]	750 [5200]
			0.281 [7.14]	41.21 [61.35]	...	...	720 [5000]	840 [5800]
			0.312 [7.92]	45.65 [67.90]	...	20	800 [5500]	940 [6500]
			0.344 [8.74]	50.22 [74.76]	...	...	880 [6100]	1030 [7100]
			0.375 [9.52]	54.62 [81.25]	STD	30	960 [6600]	1120 [7700]
			0.438 [11.13]	63.50 [94.55]	...	40	1130 [7800]	1310 [9000]
			0.469 [11.91]	67.84 [100.94]	...	...	1210 [8300]	1410 [9700]
			0.500 [12.70]	72.16 [107.39]	XS	...	1290 [8900]	1500 [10300]
			0.594 [15.09]	85.13 [126.71]	...	60	1530 [10500]	1790 [12300]
			0.750 [19.05]	106.23 [158.10]	...	80	1930 [13300]	2250 [15500]
			0.938 [23.83]	130.98 [194.96]	...	100	2410 [16600]	2800 [19300]
			1.094 [27.79]	150.93 [224.65]	...	120	2800 [19300]	2800 [19300]
			1.250 [31.75]	170.37 [253.56]	...	140	2800 [19300]	2800 [19300]
			1.406 [35.71]	189.29 [281.70]	...	160	2800 [19300]	2800 [19300]
			2.000 [50.80]	256.56 [381.83]	...	...	2800 [19300]	2800 [19300]
			2.125 [53.97]	269.76 [401.44]	...	...	2800 [19300]	2800 [19300]
			2.200 [55.88]	277.51 [413.01]	...	...	2800 [19300]	2800 [19300]
			2.500 [63.50]	307.34 [457.40]	...	...	2800 [19300]	2800 [19300]
16	400	16.000 [406.4]	0.219 [5.56]	36.95 [54.96]	...	...	490 [3400]	570 [3900]
			0.250 [6.35]	42.09 [62.64]	...	10	560 [3900]	660 [4500]

			0.281 [7.14]	47.22 [70.30]	...	...	630 [4300]	740 [5100]
			0.312 [7.92]	52.32 [77.83]	...	20	700 [4800]	820 [5700]
			0.344 [8.74]	57.57 [85.71]	...	...	770 [5300]	900 [6200]
			0.375 [9.52]	62.64 [93.17]	STD	30	840 [5800]	980 [6800]
			0.438 [11.13]	72.86 [108.49]	...	...	990 [6800]	1150 [7900]
			0.469 [11.91]	77.87 [115.86]	...	...	1060 [7300]	1230 [8500]
			0.500 [12.70]	82.85 [123.30]	XS	40	1120 [7700]	1310 [9000]
			0.656 [16.66]	107.60 [160.12]	...	60	1480 [10200]	1720 [11900]
			0.844 [21.44]	136.74 [203.53]	...	80	1900 [13100]	2220 [15300]
			1.031 [26.19]	164.98 [245.56]	...	100	2320 [16000]	2710 [18700]
			1.219 [30.96]	192.61 [286.64]	...	120	2740 [18900]	2800 [19300]
			1.438 [36.53]	223.85 [333.19]	...	140	2800 [19300]	2800 [19300]
			1.594 [40.49]	245.48 [365.35]	...	160	2800 [19300]	2800 [19300]
18	450	18.000 [457]	0.250 [6.35]	47.44 [70.60]	...	10	500 [3400]	580 [4000]
			0.281 [7.14]	53.23 [79.24]	...	...	560 [3900]	660 [4500]
			0.312 [7.92]	58.99 [87.75]	...	20	620 [4300]	730 [5000]
			0.344 [8.74]	64.93 [96.66]	...	...	690 [4800]	800 [5500]
			0.375 [9.52]	70.65 [105.10]	STD	...	750 [5200]	880 [6100]
			0.406 [10.31]	76.36 [113.62]	...	...	810 [5600]	950 [6500]
			0.438 [11.13]	82.23 [122.43]	...	30	880 [6100]	1020 [7000]
			0.469 [11.91]	87.89 [130.78]	...	...	940 [6500]	1090 [7500]
			0.500 [12.70]	93.54 [139.20]	XS	...	1000 [6900]	1170 [8100]
			0.562 [14.27]	104.76 [155.87]	...	40	1120 [7700]	1310 [9000]
			0.750 [19.05]	138.30 [205.83]	...	60	1500 [10300]	1750 [12100]
			0.938 [23.83]	171.08 [254.67]	...	80	1880	2190 [15100]

							[13000]	
			1.156 [29.36]	208.15 [309.76]	...	100	2310 [15900]	2700 [18600]
			1.375 [34.92]	244.37 [363.64]	...	120	2750 [19000]	2800 [19300]
			1.562 [39.67]	274.48 [408.45]	...	140	2800 [19300]	2800 [19300]
			1.781 [45.24]	308.79 [459.59]	...	160	2800 [19300]	2800 [19300]
20	500	20.000 [508]	0.250 [6.35]	52.78 [78.55]	...	10	450 [3100]	520 [3600]
			0.281 [7.14]	59.23 [88.19]	...	...	510 [3500]	590 [4100]
			0.312 [7.92]	65.66 [97.67]	...	...	560 [3900]	660 [4500]
			0.344 [8.74]	72.28 [107.60]	...	...	620 [4300]	720 [5000]
			0.375 [9.52]	78.67 [117.02]	STD	20	680 [4700]	790 [5400]
			0.406 [10.31]	84.04 [126.53]	...	...	730 [5000]	850 [5900]
			0.438 [11.13]	91.59 [136.37]	...	...	790 [5400]	920 [6300]
			0.469 [11.91]	97.92 [145.70]	...	...	850 [5900]	950 [6500]
			0.500 [12.70]	104.23 [155.12]	XS	30	900 [6200]	1050 [7200]
			0.594 [15.09]	123.23 [183.42]	...	40	1170 [8100]	1250 [8600]
			0.812 [20.62]	166.56 [247.83]	...	60	1460 [10100]	1710 [11800]
			1.031 [26.19]	209.06 [311.17]	...	80	1860 [12800]	2170 [15000]
			1.281 [32.54]	256.34 [381.53]	...	100	2310 [15900]	2690 [18500]
			1.500 [38.10]	296.65 [441.49]	...	120	2700 [18600]	2800 [19300]
			1.750 [44.45]	341.41 [508.11]	...	140	2800 [19300]	2800 [19300]
			1.969 [50.01]	379.53 [564.81]	...	160	2800 [19300]	2800 [19300]
24	600	24.000 [610]	0.250 [6.35]	63.47 [94.46]	...	10	380 [2600]	440 [3000]
			0.281 [7.14]	71.25 [106.08]	...	...	420 [2900]	490 [3400]

			0.312 [7.92]	79.01 [117.51]	...	...	470 [3200]	550 [3800]
			0.344 [8.74]	86.99 [129.50]	...	...	520 [3600]	600 [4100]
			0.375 [9.52]	94.71 [140.88]	STD	20	560 [3900]	660 [4500]
			0.406 [10.31]	102.40 [152.37]	...	...	610 [4200]	710 [4900]
			0.438 [11.13]	110.32 [164.26]	...	...	660 [4500]	770 [5300]
			0.469 [11.91]	117.98 [175.54]	...	...	700 [4800]	820 [5700]
			0.500 [12.70]	125.61 [186.94]	XS	...	750 [5200]	880 [6100]
			0.562 [14.27]	140.81 [209.50]	...	30	840 [5800]	980 [6800]
			0.688 [17.48]	171.45 [255.24]	...	40	1030 [7100]	1200 [8300]
			0.938 [23.83]	231.25 [344.23]	...	...	1410 [9700]	1640 [11300]
			0.969 [24.61]	238.57 [355.02]	...	60	1450 [10000]	1700 [11700]
			1.219 [30.96]	296.86 [441.78]	...	80	1830 [12600]	2130 [14700]
			1.531 [38.89]	367.74 [547.33]	...	100	2300 [15900]	2680 [18500]
			1.812 [46.02]	429.79 [639.58]	...	120	2720 [18800]	2800 [19300]
			2.062 [52.37]	483.57 [719.63]	...	140	2800 [19300]	2800 [19300]
			2.344 [59.54]	542.64 [807.63]	...	160	2800 [19300]	2800 [19300]
26	650	26.000 [660]	0.250 [6.35]	68.82 [102.42]	...	...	350 [2400]	400 [2800]
			0.281 [7.14]	77.26 [115.02]	...	...	390 [2700]	450 [3100]
			0.312 [7.92]	85.68 [127.43]	...	10	430 [3000]	500 [3400]
			0.344 [8.74]	94.35 [140.45]	...	...	480 [3300]	560 [3900]
			0.375 [9.52]	102.72 [152.80]	STD	...	520 [3600]	610 [4200]
			0.406 [10.31]	111.08 [165.28]	...	...	560 [3900]	660 [4500]
			0.438 [11.13]	119.69 [178.20]	...	...	610 [4200]	710 [4900]
			0.469 [11.91]	128.00 [190.46]	...	...	650 [4500]	760 [5200]
			0.500 [12.70]	136.30 [202.85]	XS	20	690 [4800]	810 [5600]
			0.562 [14.27]	152.83 [227.37]	...	...	780 [5400]	910 [6300]

[A] *The minimum test pressure for outside diameters and wall thicknesses not listed shall be computed by the formula given below. The computed test pressure shall be used in all cases with the following exceptions:*

(1) When the wall thickness is greater than the heaviest wall thickness shown for a given diameter, the test pressure for the heaviest wall listed shall be the required test pressure.

(2) For Grades A and B in sizes under NPS 2 [DN 50], when the wall thickness is lighter than the lightest shown for a given diameter, use the test pressure given for the lightest wall thickness of the table for the diameter involved.

(3) For all sizes of Grades A and B pipe smaller than NPS 2 [DN 50], the test pressure has been arbitrarily assigned. Test pressures for intermediate outside diameters need not exceed those for the next larger listed size.

$$P = 2St/D$$

where: P = *minimum hydrostatic test pressure, psi [kPa]),*
S = *0.60 times the specified minimum yield strength, psi [kPa],*
t = *nominal wall thickness, in. [mm], and*
D = *specified outside diameter, in. [mm].*

Table 3B: DIMENSIONS, WEIGHTS, AND TEST PRESSURES FOR THREADED AND COUPLED PIPE

NPS Designator	DN Designator	Outside Diameter, in. [mm]	Nominal Wall Thickness, in. [mm]	Nominal Weight [Mass] per Unit Length, Threaded and Coupled, lb/ft [kg/m]	Weight Class	Schedule No.	Test Pressure, psi [kPa]	
							Grade A	Grade B
1⁄8	6	0.405 [10.3]	0.068 [1.73]	0.25 [0.37]	STD	40	700 [4800]	700 [4800]
			0.095 [2.41]	0.32 [0.46]	XS	80	850 [5900]	850 [5900]
1⁄4	8	0.540 [13.7]	0.088 [2.24]	0.43 [0.63]	STD	40	700 [4800]	700 [4800]
			0.119 [3.02]	0.54 [0.80]	XS	80	850 [5900]	850 [5900]
3⁄8	10	0.675 [17.1]	0.091 [2.31]	0.57 [0.84]	STD	40	700 [4800]	700 [4800]
			0.126 [3.20]	0.74 [1.10]	XS	80	850 [5900]	850 [5900]
1⁄2	15	0.840 [21.3]	0.109 [2.77]	0.86 [1.27]	STD	40	700 [4800]	700 [4800]
			0.147 [3.73]	1.09 [1.62]	XS	80	850 [5900]	850 [5900]
			0.294 [7.47]	1.72 [2.54]	XXS	...	1000 [6900]	1000 [6900]
3⁄4	20	1.050 [26.7]	0.113 [2.87]	1.14 [1.69]	STD	40	700 [4800]	700 [4800]
			0.154 [3.91]	1.48 [2.21]	XS	80	850 [5900]	850 [5900]
			0.308 [7.82]	2.45 [3.64]	XXS	...	1000 [6900]	1000 [6900]
1	25	1.315 [33.4]	0.133 [3.38]	1.69 [2.50]	STD	40	700 [4800]	700 [4800]

			0.179 [4.55]	2.19 [3.25]	XS	80	850 [5900]	850 [5900]
			0.358 [9.09]	3.66 [5.45]	XXS	...	1000 [6900]	1000 [6900]
1(1⁄4)	32	1.660 [42.2]	0.140 [3.56]	2.28 [3.40]	STD	40	1000 [6900]	1100 [7600]
			0.191 [4.85]	3.03 [4.49]	XS	80	1500 [10300]	1600 [11000]
			0.382 [9.70]	5.23 [7.76]	XXS	...	1800 [12400]	1900 [13100]
1(1⁄2)	40	1.900 [48.3]	0.145 [3.68]	2.74 [4.04]	STD	40	1000 [6900]	1100 [7600]
			0.200 [5.08]	3.65 [5.39]	XS	80	1500 [10300]	1600 [11000]
			0.400 [10.16]	6.41 [9.56]	XXS	...	1800 [12400]	1900 [13100]
2	50	2.375 [60.3]	0.154 [3.91]	3.68 [5.46]	STD	40	2300 [15900]	2500 [17200]
			0.218 [5.54]	5.08 [7.55]	XS	80	2500 [17200]	2500 [17200]
			0.436 [11.07]	9.06 [13.44]	XXS	...	2500 [17200]	2500 [17200]
2(1⁄2)	65	2.875 [73.0]	0.203 [5.16]	5.85 [8.67]	STD	40	2500 [17200]	2500 [17200]
			0.276 [7.01]	7.75 [11.52]	XS	80	2500 [17200]	2500 [17200]
			0.552 [14.02]	13.72 [20.39]	XXS	...	2500 [17200]	2500 [17200]
3	80	3.500 [88.9]	0.216 [5.49]	7.68 [11.35]	STD	40	2200 [15200]	2500 [17200]
			0.300 [7.62]	10.35 [15.39]	XS	80	2500 [17200]	2500 [17200]
			0.600 [15.24]	18.60 [27.66]	XXS	...	2500 [17200]	2500 [17200]
3(1⁄2)	90	4.000 [101.6]	0.226 [5.74]	9.27 [13.71]	STD	40	2000 [13800]	2400 [16500]
			0.318 [8.08]	12.67 [18.82]	XS	80	2800 [19300]	2800 [19300]

4	100	4.500 [114.3]	0.237 [6.02]	10.92 [16.23]	STD	40	1900 [13100]	2200 [15200]
			0.337 [8.56]	15.20 [22.60]	XS	80	2700 [18600]	2800 [19300]
			0.674 [17.12]	27.62 [41.09]	XXS	...	2800 [19300]	2800 [19300]
5	125	5.563 [141.3]	0.258 [6.55]	14.90 [22.07]	STD	40	1700 [11700]	1900 [13100]
			0.375 [9.52]	21.04 [31.42]	XS	80	2400 [16500]	2800 [19300]
			0.750 [19.05]	38.63 [57.53]	XXS	...	2800 [19300]	2800 [19300]
6	150	6.625 [168.3]	0.280 [7.11]	19.34 [28.58]	STD	40	1500 [10300]	1800 [12400]
			0.432 [10.97]	28.88 [43.05]	XS	80	2300 [15900]	2700 [18600]
			0.864 [21.95]	53.19 [79.18]	XXS	...	2800 [19300]	2800 [19300]
8	200	8.625 [219.1]	0.277 [7.04]	25.53 [38.07]	...	30	1200 [8300]	1300 [9000]
			0.322 [8.18]	29.35 [43.73]	STD	40	1300 [9000]	1600 [11000]
			0.500 [12.70]	44.00 [65.41]	XS	80	2100 [14500]	2400 [16500]
			0.875 [22.22]	72.69 [107.94]	XXS	...	2800 [19300]	2800 [19300]
10	250	10.750 [273.0]	0.279 [7.09]	32.33 [48.80]	...	...	950 [6500]	1100 [7600]
			0.307 [7.80]	35.33 [53.27]	...	30	1000 [6900]	1200 [8300]
			0.365 [9.27]	41.49 [63.36]	STD	40	1200 [8300]	1400 [9700]
			0.500 [12.70]	55.55 [83.17]	XS	60	1700 [11700]	2000 [13800]
12	300	12.750 [323.8]	0.330 [8.38]	45.47 [67.72]	...	30	950 [6500]	1100 [7600]
			0.375 [9.52]	51.28 [76.21]	STD	...	1100 [7600]	1200 [8300]
			0.500 [12.70]	66.91 [99.4]	XS	...	1400 [9700]	1600 [11000]

G. Non-destructive Electric Test :-

1. Type E Pipe:
   The weld seam of each length of ERW pipe NPS 2 [DN 50] and larger shall be tested with a non-destructive electric test in accordance with Practice E 213, E 309, or E 570 as follows:
   i. Ultrasonic and Electromagnetic Inspection — Any equipment utilizing the ultrasonic or electromagnetic principles and capable of continuous and uninterrupted inspection of the weld seam shall be used.
   ii. Reference Standards — The length of the reference standards shall be determined by the pipe manufacturer, and they shall have the same specified diameter and thickness as the product being inspected.
   iii. Acceptance Limits — Table 4 gives the height of acceptance limit signals in percent of the height of signals produced by reference standards.
2. Seamless Pipe ;
   i. As an alternative to the hydrostatic test, and when specified by the purchaser, the full body of each seamless pipe shall be tested with a non-destructive electric test in accordance with Practices E 213, E 309, or E 570.
   ii. Different techniques employed for the detection of imperfections are as follow:
      a. The ultrasonic testing referred to in this specification is capable of detecting the presence and location of significant longitudinally or circumferentially oriented imperfections
      b. The eddy current examination referenced in this specification has the capability of detecting significant discontinuities, especially of the short abrupt type.
      c. The flux leakage examination referred to in this specification is capable of detecting the presence and location of significant longitudinally or transversely oriented discontinuities.
      d. The hydrostatic test referred to in point F.2 has the capability of finding imperfections of a size permitting the test fluid to leak through the tube wall and may be either visually seen or detected by a loss of pressure.

Table 4

Type Notch	Size of Hole		Acceptance Limit Signal, %
	in.	mm	
N10, V10	1⁄8	3.2	100
B.P.	...	...	80

H. End Finish :-

1. When ordered with plain ends, the pipe shall be furnished to the following practice, unless otherwise specified.
   i. NPS 1 1⁄2 [DN 40] and Smaller — Unless otherwise specified on the purchase order, end finish shall be at the option of the manufacturer.

ii. NPS 2 [DN 50] and Larger —
   a. Pipe of standard or extra strong weights, or in wall thickness less than 0.500 in. [12.7 mm], other than double extra strong pipe, shall be plain-end beveled with ends beveled to an angle of 30°, +5°, -0°, measured from a line drawn perpendicular to the axis of the pipe, and with a root face of 1⁄16 in. ± 1⁄32 in. [1.6 mm ± 0.8 mm].
   b. Pipe with wall thicknesses over 0.500 in. [12.7 mm], and all double extra strong, shall be plain-end square cut.

2. When ordered with threaded ends, the pipe ends shall be provided with a thread in accordance with the gaging practice and tolerances of ANSI B1.20.1.
3. When ordered with couplings, one end of each length of pipe shall be provided with a coupling

I. <u>Lengths :-</u>

1. Unless otherwise specified, pipe lengths shall be in accordance with the following regular practice.
2. Pipe of weights lighter than extra strong shall be in single-random lengths of 16 to 22 ft [4.88 to 6.71 m], but not more than 5% of the total number of threaded lengths are permitted to be jointers (two pieces coupled together). When ordered with plain ends, 5% are permitted to be in lengths of 12 to 16 ft [3.66 to 4.88 m].
3. Pipe of extra-strong and heavier weights shall be in random lengths of 12 to 22 ft [3.66 to 6.71 m]. Five percent are permitted to be in lengths of 6 to 12 ft [1.83 to 3.66 m].
4. When extra-strong or lighter pipe is ordered in double-random lengths, the minimum lengths shall be not less than 22 ft [6.71 m], with a minimum average for the order of 35 ft [10.67 m].
5. When lengths longer than single random are required for wall thicknesses heavier than extra-strong, the length shall be subject to negotiation.

J. <u>Galvanized Pipe :-</u>

1. Galvanized pipe ordered under this specification shall be coated with zinc inside and outside by the hot-dip process.
2. The zinc used for the coating shall be any grade of zinc conforming to Specification B6.

MARKING OF SEAMLESS PIPE

Hydro	NDE	Marking
Yes	No	Test pressure
No	Yes	NDE
Yes	Yes	Test pressure/NDE

Keyword :

- astm a53 specification

- astm a53 grade b
- astm a53 pdf free download
- astm a53 pdf download
- astm a53 pdf specification