ASME B36.19M-2004

(Revision of ANSI/ASME B36.19M-1985)

Stainless Steel Pipe

AN AMERICAN NATIONAL STANDARD



The American Society of Mechanical Engineers

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STAINLESS STEEL PIPE

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FOREWORD

This Standard for corrosion resistant piping, designated categorically as *stainless,* is based on the same principles that formed the background for the development of ASME B36.10M, Welded and Seamless Wrought Steel Pipe, and reference is made to this source of information.

The more recent development of the highly alloyed stainless steels has brought about a minor conflict with convention. With these newer materials, the need for standards is just as great and the present types of threads are just as satisfactory, but the basic cost of the metal is much higher and the art of fusion welding has developed concurrently. The character of stainless steel permits the design of thin-wall piping systems without fear of early failure due to corrosion, and the use of fusion welding to join such piping has eliminated the necessity of threading it. For these reasons, the wall thickness dimensions shown under Schedule 10S have been developed, based on the conventional formula, but then modified to correspond to the nearest Birmingham Wire Gage (B.W.G.) number.

Following publication of the 1949 edition, a demand developed for a still lighter wall pipe. A Schedule 5S was determined cooperatively by representatives of chemical companies, processing industries, and manufacturers of welding fittings. This was endorsed by the American Standards Association (ASA) Chemical Industry Correlating Committee and the Manufacturers Standardization Society of the Valve and Fittings Industry. The new schedule was included in the revised standard that was approved by ASA (now ANSI) on April 7, 1952.

In 1956, it was recommended that the wall thickness of 12 in. 5S be lessened, and a new revision of the standard was issued shortly after its approval by ASA on February 27, 1957. In this fourth edition, dimensions were expanded beyond 12 in. pipe size by inclusion of, and reference to, ASTM Specification A 409. This revision was approved by ASA on October 29, 1965.

The B36 Standards Committee membership was asked in March 1970 for recommendations as to what action should be taken on ANSI B36.19-1965 since, according to ANSI procedures, this standard was due for revision or affirmation. The B36 Standards Committee recommended reaffirmation. This action was approved by the Secretariat and by the American National Standards Institute on May 26, 1971.

In 1975, the B36 Standards Committee undertook a review of the standard, considering its acceptability and usefulness. The results were favorable; some editorial refinements and updating were proposed, along with the incorporation of factors for conversion to SI (metric) units. The revision was approved by the Standards Committee, the Secretariat, and subsequently the American National Standards Institute on October 4, 1976.

The standard was revised in 1984 to include SI (metric) dimensions. The outside diameters and wall thicknesses were converted to millimeters by multiplying the inch dimensions by 25.4. Outside diameters larger than 16 in. were rounded to the nearest 1 mm, and outside diameters 16 in. and smaller were rounded to the nearest 0.1 mm. Wall thicknesses were rounded to the nearest 0.01 mm. These converted and rounded SI dimensions were added in Table 2A. A formula to calculate the SI plain end mass, kg/m, using SI diameters and thicknesses, was added to para. 5. The SI plain end mass was calculated for each size and thickness, and added in Table 3A. These changes in the standard were approved by the Standards Committee, the Sponsor, and ANSI, and it was designated an American National Standard on October 7, 1985.

The current edition revises the text to conform to the format and content, as appropriate, of ASME B36.10M-2004. Tables 2, 2A, 3, and 3A are replaced with a new Table 1, combining the information in the previous tables into a single table. Also, the roster of the disbanded B36 Committee is replaced by the roster of the B32 Committee. This edition was approved as an American National Standard on June 23, 2004.

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ASME B32 COMMITTEE
Metal and Metal Alloy
Wrought Mill Product Nominal Sizes

(The following is the roster of the Committee at the time of approval of this Standard.)

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STAINLESS STEEL PIPE

1 SCOPE

This Standard covers the standardization of dimensions of welded and seamless wrought stainless steel pipe for high or low temperatures and pressures.

The word *pipe* is used, as distinguished from *tube,* to apply to tubular products of dimensions commonly used for pipeline and piping systems. Pipes NPS 12 (DN 300) and smaller have outside diameters numerically larger than their corresponding sizes. In contrast, the outside diameters of tubes are numerically identical to the size number for all sizes.

The wall thicknesses for NPS 14 through 22, inclusive (DN 350–550, inclusive), of Schedule 10S; NPS 12 (DN 300) of Schedule 40S; and NPS 10 and 12 (DN 250 and 300) of Schedule 80S are not the same as those of ASME B36.10M. The suffix "S" in the schedule number is used to differentiate B36.19M pipe from B36.10M pipe. ASME B36.10M includes other pipe thicknesses that are also commercially available with stainless steel material.

2 SIZE

The size of all pipe in Table 1 is identified by the nominal pipe size.

The manufacture of pipe NPS $\frac{1}{8}$ (DN 6) through NPS 12 (DN 300), inclusive, is based on a standardized outside diameter (OD). This OD was originally selected so that pipe with a standard OD and having a wall thickness that was typical of the period would have an inside diameter (ID) approximately equal to the nominal size. Although there is no such relation between the existing standard thicknesses — OD and nominal size — these nominal sizes and standard ODs continue in use as "standard."

The manufacture of pipe NPS 14 (DN 350) and larger proceeds on the basis of an OD corresponding to the nominal size.

3 MATERIALS

The dimensional standards for pipe described here are for products covered in ASTM specifications.

4 WALL THICKNESS

The nominal wall thicknesses are given in Table 1.

5 WEIGHTS

The nominal weights[1] of steel pipe are calculated values and are tabulated in Table 1.

(a) The nominal plain end weight, in pounds per foot, is calculated using the following formula:

$$W_{pe} = 10.69(D - t)t$$

where

D = outside diameter to the nearest 0.001 in. (the symbol D is used for OD only in mathematical equations or formulas)

W_{pe} = nominal plain end weight, rounded to the nearest 0.01 lb / ft

t = specified wall thickness, rounded to the nearest 0.001 in.

(b) The nominal plain end mass, in kilograms per meter, is calculated using the following formula:

$$W_{pe} = 0.0246615(D - t)t$$

where

D = outside diameter to the nearest 0.1 mm for outside diameters that are 16 in. (406.4 mm) and smaller, and 1.0 mm for outside diameters larger than 16 in. (the symbol D is used for OD only in mathematical equations or formulas)

W_{pe} = nominal plain end mass, rounded to the nearest 0.01 kg / m

t = specified wall thickness, rounded to the nearest 0.01 mm

6 PERMISSIBLE VARIATIONS

Variations in dimensions differ depending upon the method of manufacture employed in making the pipe to the various specifications available. Permissible variations for dimensions are indicated in each specification.

7 PIPE THREADS

Unless otherwise specified, the threads of threaded pipe shall conform to ANSI / ASME B1.20.1, Pipe Threads, General Purpose (Inch).

[1] The different grades of stainless steel have different specific densities and hence may weigh more or less than the values listed in Table 1 would indicate [see Table 1, General Note (e)].

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Schedules 5S and 10S wall thicknesses do not permit threading in accordance with ANSI/ASME B1.20.1.

8 WALL THICKNESS SELECTION

When the selection of wall thickness depends primarily upon capacity to resist internal pressure under given conditions, the designer shall compute the exact value of wall thickness suitable for conditions for which the pipe is required, as prescribed in detail in the ASME Boiler and Pressure Vessel Code, ASME B31 Code for Pressure Piping, or other similar code, whichever governs the construction. A thickness shall be selected from the schedules of nominal thickness contained in Table 1 to suit the value computed to fulfill the conditions for which the pipe is desired.

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Table 1 Dimensions of Welded and Seamless Stainless Steel Pipe and Nominal Weights of Steel Pipe, Plain End

U.S. Customary Units				Schedule	SI Units			
NPS	OD, in.	Wall, in.	W_{pe}, lb/ft	No.	DN	OD, mm	Wall, mm	W_{pe}, kg/m
1/8	0.405	... (1)	...	5S	6	10.3	... (1)	...
1/8	0.405	0.049 (1)	0.19	10S	6	10.3	1.24 (1)	0.28
1/8	0.405	0.068	0.24	40S	6	10.3	1.73	0.37
1/8	0.405	0.095	0.31	80S	6	10.3	2.41	0.47
1/4	0.540	... (1)	...	5S	8	13.7	... (1)	...
1/4	0.540	0.065 (1)	0.33	10S	8	13.7	1.65 (1)	0.49
1/4	0.540	0.088	0.43	40S	8	13.7	2.24	0.63
1/4	0.540	0.119	0.54	80S	8	13.7	3.02	0.80
3/8	0.675	... (1)	...	5S	10	17.1	... (1)	...
3/8	0.675	0.065 (1)	0.42	10S	10	17.1	1.65 (1)	0.63
3/8	0.675	0.091	0.57	40S	10	17.1	2.31	0.84
3/8	0.675	0.126	0.74	80S	10	17.1	3.20	1.10
1/2	0.840	0.065 (1)	0.54	5S	15	21.3	1.65 (1)	0.80
1/2	0.840	0.083 (1)	0.67	10S	15	21.3	2.11 (1)	1.00
1/2	0.840	0.109	0.85	40S	15	21.3	2.77	1.27
1/2	0.840	0.147	1.09	80S	15	21.3	3.73	1.62
3/4	1.050	0.065 (1)	0.68	5S	20	26.7	1.65 (1)	1.02
3/4	1.050	0.083 (1)	0.86	10S	20	26.7	2.11 (1)	1.28
3/4	1.050	0.113	1.13	40S	20	26.7	2.87	1.69
3/4	1.050	0.154	1.48	80S	20	26.7	3.91	2.20
1	1.315	0.065 (1)	0.87	5S	25	33.4	1.65 (1)	1.29
1	1.315	0.109 (1)	1.41	10S	25	33.4	2.77 (1)	2.09
1	1.315	0.133	1.68	40S	25	33.4	3.38	2.50
1	1.315	0.179	2.17	80S	25	33.4	4.55	3.24
1 1/4	1.660	0.065 (1)	1.11	5S	32	42.2	1.65 (1)	1.65
1 1/4	1.660	0.109 (1)	1.81	10S	32	42.2	2.77 (1)	2.69
1 1/4	1.660	0.140	2.27	40S	32	42.2	3.56	3.39
1 1/4	1.660	0.191	3.00	80S	32	42.2	4.85	4.47
1 1/2	1.900	0.065 (1)	1.28	5S	40	48.3	1.65 (1)	1.90
1 1/2	1.900	0.109 (1)	2.09	10S	40	48.3	2.77 (1)	3.11
1 1/2	1.900	0.145	2.72	40S	40	48.3	3.68	4.05
1 1/2	1.900	0.200	3.63	80S	40	48.3	5.08	5.41
2	2.375	0.065 (1)	1.61	5S	50	60.3	1.65 (1)	2.39
2	2.375	0.109 (1)	2.64	10S	50	60.3	2.77 (1)	3.93
2	2.375	0.154	3.66	40S	50	60.3	3.91	5.44
2	2.375	0.218	5.03	80S	50	60.3	5.54	7.48
2 1/2	2.875	0.083 (1)	2.48	5S	65	73	2.11 (1)	3.69
2 1/2	2.875	0.120 (1)	3.53	10S	65	73	3.05 (1)	5.26
2 1/2	2.875	0.203	5.80	40S	65	73	5.16	8.63
2 1/2	2.875	0.276	7.67	80S	65	73	7.01	11.41
3	3.500	0.083 (1)	3.03	5S	80	88.9	2.11 (1)	4.52
3	3.500	0.120 (1)	4.34	10S	80	88.9	3.05 (1)	6.46
3	3.500	0.216	7.58	40S	80	88.9	5.49	11.29
3	3.500	0.300	10.26	80S	80	88.9	7.62	15.27

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Table 1 Dimensions of Welded and Seamless Stainless Steel Pipe and Nominal Weights of Steel Pipe, Plain End (Cont'd)

U.S. Customary Units				Schedule	SI Units			
NPS	OD, in.	Wall, in.	W_{pe}, lb/ft	No.	DN	OD, mm	Wall, mm	W_{pe}, kg/m
3½	4.000	0.083 (1)	3.48	5S	90	101.6	2.11 (1)	5.18
3½	4.000	0.120 (1)	4.98	10S	90	101.6	3.05 (1)	7.41
3½	4.000	0.226	9.12	40S	90	101.6	5.74	13.57
3½	4.000	0.318	12.52	80S	90	101.6	8.08	18.64
4	4.500	0.083 (1)	3.92	5S	100	114.3	2.11 (1)	5.84
4	4.500	0.120 (1)	5.62	10S	100	114.3	3.05 (1)	8.37
4	4.500	0.237	10.80	40S	100	114.3	6.02	16.08
4	4.500	0.337	15.00	80S	100	114.3	8.56	22.32
5	5.563	0.109 (1)	6.36	5S	125	141.3	2.77 (1)	9.46
5	5.563	0.134 (1)	7.78	10S	125	141.3	3.40 (1)	11.56
5	5.563	0.258	14.63	40S	125	141.3	6.55	21.77
5	5.563	0.375	20.80	80S	125	141.3	9.53	30.97
6	6.625	0.109 (1)	7.59	5S	150	168.3	2.77 (1)	11.31
6	6.625	0.134 (1)	9.30	10S	150	168.3	3.40 (1)	13.83
6	6.625	0.280	18.99	40S	150	168.3	7.11	28.26
6	6.625	0.432	28.60	80S	150	168.3	10.97	42.56
8	8.625	0.109 (1)	9.92	5S	200	219.1	2.77 (1)	14.78
8	8.625	0.148 (1)	13.41	10S	200	219.1	3.76 (1)	19.97
8	8.625	0.322	28.58	40S	200	219.1	8.18	42.55
8	8.625	0.500	43.43	80S	200	219.1	12.70	64.64
10	10.750	0.134 (1)	15.21	5S	250	273.1	3.40 (1)	22.61
10	10.750	0.165 (1)	18.67	10S	250	273.1	4.19 (1)	27.79
10	10.750	0.365	40.52	40S	250	273.1	9.27	60.31
10	10.750	0.500 (2)	54.79	80S	250	273.1	12.70 (2)	81.56
12	12.750	0.156 (1)	21.00	5S	300	323.9	3.96 (1)	31.25
12	12.750	0.180 (1)	24.19	10S	300	323.9	4.57 (1)	35.99
12	12.750	0.375 (2)	49.61	40S	300	323.9	9.53 (2)	73.88
12	12.750	0.500 (2)	65.48	80S	300	323.9	12.70 (2)	97.47
14	14.000	0.156 (1)	23.09	5S	350	355.6	3.96 (1)	34.34
14	14.000	0.188 (1), (2)	27.76	10S	350	355.6	4.78 (1), (2)	41.36
14	14.000	0.375 (2)	54.62	40S	350	355.6	9.53 (2)	81.33
14	14.000	0.500 (2)	72.16	80S	350	355.6	12.70 (2)	107.40
16	16.000	0.165 (1)	27.93	5S	400	406.4	4.19 (1)	41.56
16	16.000	0.188 (1), (2)	31.78	10S	400	406.4	4.78 (1), (2)	47.34
16	16.000	0.375 (2)	62.64	40S	400	406.4	9.53 (2)	93.27
16	16.000	0.500 (2)	82.85	80S	400	406.4	12.70 (2)	123.31
18	18.000	0.165 (1)	31.46	5S	450	457	4.19 (1)	46.79
18	18.000	0.188 (1), (2)	35.80	10S	450	457	4.78 (1), (2)	53.31
18	18.000	0.375 (2)	70.65	40S	450	457	9.53 (2)	...
18	18.000	0.500 (2)	93.54	80S	450	457	12.70 (2)	...
20	20.000	0.188 (1)	39.82	5S	500	508	4.78 (1)	59.32
20	20.000	0.218 (1), (2)	46.10	10S	500	508	5.54 (1), (2)	68.65
20	20.000	0.375 (2)	78.67	40S	500	508	9.53 (2)	117.15
20	20.000	0.500 (2)	104.23	80S	500	508	12.70 (2)	155.13

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Table 1 Dimensions of Welded and Seamless Stainless Steel Pipe and Nominal Weights of Steel Pipe, Plain End (Cont'd)

U.S. Customary Units				Schedule	SI Units			
NPS	OD, in.	Wall, in.	W_{pe}, lb/ft	No.	DN	OD, mm	Wall, mm	W_{pe}, kg/m
22	22.000	0.188 (1)	43.84	5S	550	559	4.78 (1)	65.33
22	22.000	0.218 (1), (2)	50.76	10S	550	559	5.54 (1), (2)	75.62
22	22.000	...	...	40S	550	559	...	...
22	22.000	...	...	80S	550	559	...	...
24	24.000	0.218 (1)	55.42	5S	600	610	5.54 (1)	82.58
24	24.000	0.250 (1)	63.47	10S	600	610	6.35 (1)	94.53
24	24.000	0.375 (2)	94.71	40S	600	610	9.53 (2)	141.12
24	24.000	0.500 (2)	125.61	80S	600	610	12.70 (2)	187.07
30	30.000	0.250 (1)	79.51	5S	750	762	6.35 (1)	118.34
30	30.000	0.312 (1)	99.02	10S	750	762	7.92 (1)	147.29
30	30.000	...	...	40S	750	762	...	...
30	30.000	...	...	80S	750	762	...	...

GENERAL NOTES:

(a) 1 in. = 25.4 mm.

(b) For tolerances, see para. 6.

(c) 1 lb/ft = 1.4895 kg/m.

(d) Weights are given in pounds per linear foot (kilograms per meter) and are for carbon steel pipe with plain ends.

(e) The different grades of stainless steel permit considerable variations in weight. The ferritic stainless steels may be about 5% less, and the austenitic stainless steels about 2% greater, than the values shown in this Table, which are based on weights for carbon steel.

NOTES:

(1) These wall thicknesses do not permit threading in accordance with ANSI/ASME B1.20.1.

(2) These dimensions do not conform to ASME B36.10M.

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AMERICAN NATIONAL STANDARDS FOR PRODUCT SIZES

Preferred Metric Sizes for Flat Metal Products. . . . . B32.3M-1984(R1994)
Preferred Metric Sizes for Round, Square, Rectangle and Hexagon Metal Products . . . . . B32.4M-1980(R1994)
Preferred Metric Sizes for Tubular Metal Products Other Than Pipe . . . . . B32.5-1977(R1994)
Welded and Seamless Wrought Steel Pipe B36.10M-2004
Stainless Steel Pipe B36.19M-2004

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