

ASME B36.19M-2018
[Revision of ASME B36.19M-2004 (R2015)]

Stainless Steel Pipe

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AN AMERICAN NATIONAL STANDARD



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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 American National Standards Institute (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 A409. 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 ANSI 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 ANSI 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. A formula to calculate the SI plain end mass, kg/m, using SI diameters and thicknesses, was added, and the calculations were added. 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 text of the standard was revised in the 2004 edition to conform to the format and content, as appropriate, of ASME B36.10M-2004. A new table was added, combining the information in the previous tables into a single table. Also, the roster of the disbanded B36 Committee was replaced by the roster of the B32 Committee. The 2004 edition was approved as an American National Standard on June 23, 2004.

The 2018 edition revises some of the outside diameters and plain end masses in [Table 2-1](#) (formerly Table 1). A number of editorial revisions have also been made to [Table 2-1](#) and [sections 1, 2, 4, 5, and 7](#). The 2018 edition was approved as an American National Standard on August 13, 2018.

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Metal and Metal Alloy

Wrought Mill Product Nominal Sizes

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The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Proposing a Case. Cases may be issued to provide alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee web page.

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Interpretations. Upon request, the B32 Standards Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B32 Standards Committee.

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If the Inquirer is unable to use the online form, he/she may mail the request to the Secretary of the B32 Standards Committee at the above address. The request for an interpretation should be clear and unambiguous. It is further recommended that the Inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry in one or two words.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. Please provide a condensed and precise question, composed in such a way that a "yes" or "no" reply is acceptable.
Proposed Reply(ies):	Provide a proposed reply(ies) in the form of "Yes" or "No," with explanation as needed. If entering replies to more than one question, please number the questions and replies.
Background Information:	Provide the Committee with any background information that will assist the Committee in understanding the inquiry. The Inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in the format described above may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

Moreover, ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Standard requirements. If, based on the inquiry information submitted, it is the opinion of the Committee that the Inquirer should seek assistance, the inquiry will be returned with the recommendation that such assistance be obtained.

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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.

2 SIZE

The size of all pipe in Table 2-1 is identified by the dimensionless designator nominal pipe size (NPS) [diamètre nominal (DN)]. 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 manufacture of pipe NPS $\frac{1}{8}$ (DN 6) to NPS 12 (DN 300), inclusive, is based on a standardized outside diameter (O.D.). This O.D. was originally selected so that pipe with a standard O.D. and having a wall thickness that was typical of the period would have an inside diameter (I.D.) approximately equal to the nominal size. Although there is no such relation between the existing standard thicknesses — O.D. and nominal size — these nominal sizes and standard O.D.s continue in use as “standard.”

The manufacture of pipe NPS 14 (DN 350) and larger proceeds on the basis of an O.D. 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 2-1. The wall thicknesses for NPS 14 to NPS 22, inclusive (DN 350 to DN 550, inclusive), of Schedule 10S; NPS 12 (DN 300) of Schedule 40S; and NPS 10 and NPS 12 (DN 250 and DN 300) of Schedule 80S are not the same as those of ASME B36.10M, Welded and Seamless Wrought Steel Pipe. 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.

5 WEIGHTS/MASSES

The nominal weights (masses)¹ of steel pipe are calculated values and are tabulated in Table 2-1.

(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 O.D. only in mathematical equations or formulas)

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

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

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

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

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. (406.4 mm) (the symbol D is used for O.D. only in mathematical equations or formulas)

M_{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 ASME B1.20.1, Pipe Threads, General Purpose (Inch).

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

¹ The different grades of stainless steel have different specific densities and hence their weights (masses) may be less than or greater than the values listed in Table 2-1 would indicate [see Table 2-1, General Note (e)].

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 2-1](#) to suit the value computed to fulfill the conditions for which the pipe is desired.

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Table 2-1 Dimensions of Welded and Seamless Stainless Steel Pipe and Nominal Weights (Masses) of Steel Pipe, Plain End

NPS (DN)	Schedule No.	Outside Diameter, in. (mm)	Wall Thickness, in. (mm)	Plain End Weight (Mass), lb/ft (kg/m)
$\frac{1}{8}$ (6)	5S	0.405 (10.3)	... [Note (1)]	...
$\frac{1}{8}$ (6)	10S	0.405 (10.3)	0.049 (1.24) [Note (1)]	0.19 (0.28)
$\frac{1}{8}$ (6)	40S	0.405 (10.3)	0.068 (1.73)	0.24 (0.37)
$\frac{1}{8}$ (6)	80S	0.405 (10.3)	0.095 (2.41)	0.31 (0.47)
$\frac{1}{4}$ (8)	5S	0.540 (13.7)	... [Note (1)]	...
$\frac{1}{4}$ (8)	10S	0.540 (13.7)	0.065 (1.65) [Note (1)]	0.33 (0.49)
$\frac{1}{4}$ (8)	40S	0.540 (13.7)	0.088 (2.24)	0.43 (0.63)
$\frac{1}{4}$ (8)	80S	0.540 (13.7)	0.119 (3.02)	0.54 (0.80)
$\frac{3}{8}$ (10)	5S	0.675 (17.1)	... [Note (1)]	...
$\frac{3}{8}$ (10)	10S	0.675 (17.1)	0.065 (1.65) [Note (1)]	0.42 (0.63)
$\frac{3}{8}$ (10)	40S	0.675 (17.1)	0.091 (2.31)	0.57 (0.84)
$\frac{3}{8}$ (10)	80S	0.675 (17.1)	0.126 (3.20)	0.74 (1.10)
$\frac{1}{2}$ (15)	5S	0.840 (21.3)	0.065 (1.65) [Note (1)]	0.54 (0.80)
$\frac{1}{2}$ (15)	10S	0.840 (21.3)	0.083 (2.11) [Note (1)]	0.67 (1.00)
$\frac{1}{2}$ (15)	40S	0.840 (21.3)	0.109 (2.77)	0.85 (1.27)
$\frac{1}{2}$ (15)	80S	0.840 (21.3)	0.147 (3.73)	1.09 (1.62)
$\frac{3}{4}$ (20)	5S	1.050 (26.7)	0.065 (1.65) [Note (1)]	0.68 (1.02)
$\frac{3}{4}$ (20)	10S	1.050 (26.7)	0.083 (2.11) [Note (1)]	0.86 (1.28)
$\frac{3}{4}$ (20)	40S	1.050 (26.7)	0.113 (2.87)	1.13 (1.69)
$\frac{3}{4}$ (20)	80S	1.050 (26.7)	0.154 (3.91)	1.48 (2.20)
1 (25)	5S	1.315 (33.4)	0.065 (1.65) [Note (1)]	0.87 (1.29)
1 (25)	10S	1.315 (33.4)	0.109 (2.77) [Note (1)]	1.41 (2.09)
1 (25)	40S	1.315 (33.4)	0.133 (3.38)	1.68 (2.50)
1 (25)	80S	1.315 (33.4)	0.179 (4.55)	2.17 (3.24)
$1\frac{1}{4}$ (32)	5S	1.660 (42.2)	0.065 (1.65) [Note (1)]	1.11 (1.65)
$1\frac{1}{4}$ (32)	10S	1.660 (42.2)	0.109 (2.77) [Note (1)]	1.81 (2.69)
$1\frac{1}{4}$ (32)	40S	1.660 (42.2)	0.140 (3.56)	2.27 (3.39)
$1\frac{1}{4}$ (32)	80S	1.660 (42.2)	0.191 (4.85)	3.00 (4.47)
$1\frac{1}{2}$ (40)	5S	1.900 (48.3)	0.065 (1.65) [Note (1)]	1.28 (1.90)
$1\frac{1}{2}$ (40)	10S	1.900 (48.3)	0.109 (2.77) [Note (1)]	2.09 (3.11)
$1\frac{1}{2}$ (40)	40S	1.900 (48.3)	0.145 (3.68)	2.72 (4.05)
$1\frac{1}{2}$ (40)	80S	1.900 (48.3)	0.200 (5.08)	3.63 (5.41)
2 (50)	5S	2.375 (60.3)	0.065 (1.65) [Note (1)]	1.61 (2.39)
2 (50)	10S	2.375 (60.3)	0.109 (2.77) [Note (1)]	2.64 (3.93)
2 (50)	40S	2.375 (60.3)	0.154 (3.91)	3.66 (5.44)
2 (50)	80S	2.375 (60.3)	0.218 (5.54)	5.03 (7.48)
$2\frac{1}{2}$ (65)	5S	2.875 (73)	0.083 (2.11) [Note (1)]	2.48 (3.69)
$2\frac{1}{2}$ (65)	10S	2.875 (73)	0.120 (3.05) [Note (1)]	3.53 (5.26)

Table 2-1 Dimensions of Welded and Seamless Stainless Steel Pipe and Nominal Weights (Masses) of Steel Pipe, Plain End (Cont'd)

NPS (DN)	Schedule No.	Outside Diameter, in. (mm)	Wall Thickness, in. (mm)	Plain End Weight (Mass), lb/ft (kg/m)
2½ (65)	40S	2.875 (73)	0.203 (5.16)	5.80 (8.63)
2½ (65)	80S	2.875 (73)	0.276 (7.01)	7.67 (11.41)
3 (80)	5S	3.500 (88.9)	0.083 (2.11) [Note (1)]	3.03 (4.52)
3 (80)	10S	3.500 (88.9)	0.120 (3.05) [Note (1)]	4.34 (6.46)
3 (80)	40S	3.500 (88.9)	0.216 (5.49)	7.58 (11.29)
3 (80)	80S	3.500 (88.9)	0.300 (7.62)	10.26 (15.27)
3½ (90)	5S	4.000 (101.6)	0.083 (2.11) [Note (1)]	3.48 (5.18)
3½ (90)	10S	4.000 (101.6)	0.120 (3.05) [Note (1)]	4.98 (7.41)
3½ (90)	40S	4.000 (101.6)	0.226 (5.74)	9.12 (13.57)
3½ (90)	80S	4.000 (101.6)	0.318 (8.08)	12.52 (18.64)
4 (100)	5S	4.500 (114.3)	0.083 (2.11) [Note (1)]	3.92 (5.84)
4 (100)	10S	4.500 (114.3)	0.120 (3.05) [Note (1)]	5.62 (8.37)
4 (100)	40S	4.500 (114.3)	0.237 (6.02)	10.80 (16.08)
4 (100)	80S	4.500 (114.3)	0.337 (8.56)	15.00 (22.32)
5 (125)	5S	5.563 (141.3)	0.109 (2.77) [Note (1)]	6.36 (9.46)
5 (125)	10S	5.563 (141.3)	0.134 (3.40) [Note (1)]	7.78 (11.56)
5 (125)	40S	5.563 (141.3)	0.258 (6.55)	14.63 (21.77)
5 (125)	80S	5.563 (141.3)	0.375 (9.53)	20.80 (30.97)
6 (150)	5S	6.625 (168.3)	0.109 (2.77) [Note (1)]	7.59 (11.31)
6 (150)	10S	6.625 (168.3)	0.134 (3.40) [Note (1)]	9.30 (13.83)
6 (150)	40S	6.625 (168.3)	0.280 (7.11)	18.99 (28.26)
6 (150)	80S	6.625 (168.3)	0.432 (10.97)	28.60 (42.56)
8 (200)	5S	8.625 (219.1)	0.109 (2.77) [Note (1)]	9.92 (14.78)
8 (200)	10S	8.625 (219.1)	0.148 (3.76) [Note (1)]	13.41 (19.97)
8 (200)	40S	8.625 (219.1)	0.322 (8.18)	28.58 (42.55)
8 (200)	80S	8.625 (219.1)	0.500 (12.70)	43.43 (64.64)
10 (250)	5S	10.750 (273.0)	0.134 (3.40) [Note (1)]	15.21 (22.61)
10 (250)	10S	10.750 (273.0)	0.165 (4.19) [Note (1)]	18.67 (27.78)
10 (250)	40S	10.750 (273.0)	0.365 (9.27)	40.52 (60.29)
10 (250)	80S	10.750 (273.0)	0.500 (12.70) [Note (2)]	54.79 (81.53)
12 (300)	5S	12.750 (323.8)	0.156 (3.96) [Note (1)]	21.00 (31.24)
12 (300)	10S	12.750 (323.8)	0.180 (4.57) [Note (1)]	24.19 (35.98)
12 (300)	40S	12.750 (323.8)	0.375 (9.53) [Note (2)]	49.61 (73.86)
12 (300)	80S	12.750 (323.8)	0.500 (12.70) [Note (2)]	65.48 (97.44)
14 (350)	5S	14.000 (355.6)	0.156 (3.96) [Note (1)]	23.09 (34.34)
14 (350)	10S	14.000 (355.6)	0.188 (4.78) [Notes (1), (2)]	27.76 (41.36)
14 (350)	40S	14.000 (355.6)	0.375 (9.53) [Note (2)]	54.62 (81.33)

Table 2-1 Dimensions of Welded and Seamless Stainless Steel Pipe and Nominal Weights (Masses) of Steel Pipe, Plain End (Cont'd)

NPS (DN)	Schedule No.	Outside Diameter, in. (mm)	Wall Thickness, in. (mm)	Plain End Weight (Mass), lb/ft (kg/m)
14 (350)	80S	14.000 (355.6)	0.500 (12.70) [Note (2)]	72.16 (107.40)
16 (400)	5S	16.000 (406.4)	0.165 (4.19) [Note (1)]	27.93 (41.56)
16 (400)	10S	16.000 (406.4)	0.188 (4.78) [Notes (1), (2)]	31.78 (47.34)
16 (400)	40S	16.000 (406.4)	0.375 (9.53) [Note (2)]	62.64 (93.27)
16 (400)	80S	16.000 (406.4)	0.500 (12.70) [Note (2)]	82.85 (123.31)
18 (450)	5S	18.000 (457)	0.165 (4.19) [Note (1)]	31.46 (46.79)
18 (450)	10S	18.000 (457)	0.188 (4.78) [Notes (1), (2)]	35.80 (53.31)
18 (450)	40S	18.000 (457)	0.375 (9.53) [Note (2)]	70.65 (...)
18 (450)	80S	18.000 (457)	0.500 (12.70) [Note (2)]	93.54 (...)
20 (500)	5S	20.000 (508)	0.188 (4.78) [Note (1)]	39.82 (59.32)
20 (500)	10S	20.000 (508)	0.218 (5.54) [Notes (1), (2)]	46.10 (68.65)
20 (500)	40S	20.000 (508)	0.375 (9.53) [Note (2)]	78.67 (117.15)
20 (500)	80S	20.000 (508)	0.500 (12.70) [Note (2)]	104.23 (155.13)
22 (550)	5S	22.000 (559)	0.188 (4.78) [Note (1)]	43.84 (65.33)
22 (550)	10S	22.000 (559)	0.218 (5.54) [Notes (1), (2)]	50.76 (75.62)
22 (550)	40S	22.000 (559)
22 (550)	80S	22.000 (559)
24 (600)	5S	24.000 (610)	0.218 (5.54) [Note (1)]	55.42 (82.58)
24 (600)	10S	24.000 (610)	0.250 (6.35) [Note (1)]	63.47 (94.53)
24 (600)	40S	24.000 (610)	0.375 (9.53) [Note (2)]	94.71 (141.12)
24 (600)	80S	24.000 (610)	0.500 (12.70) [Note (2)]	125.61 (187.07)
30 (750)	5S	30.000 (762)	0.250 (6.35) [Note (1)]	79.51 (118.34)
30 (750)	10S	30.000 (762)	0.312 (7.92) [Note (1)]	99.02 (147.29)
30 (750)	40S	30.000 (762)
30 (750)	80S	30.000 (762)

GENERAL NOTES:

- (a) 1 in. = 25.4 mm.
 (b) For tolerances, see [section 6](#).
 (c) 1 lb/ft = 1.4895 kg/m.
 (d) Weights (masses) 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 (mass). 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 (masses) for carbon steel.

NOTES:

- (1) These wall thicknesses do not permit threading in accordance with ASME B1.20.1.
 (2) These dimensions do not conform to ASME B36.10M.