ASME B36.10M-2004
(Revision of ASME B36.10M-2000)

Welded and Seamless Wrought Steel Pipe

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FOREWORD

In March 1927, the American Standards Association authorized the organization of a Sectional Committee on Standardization of Dimensions and Material of Wrought Steel and Wrought Iron Pipe and Tubing for the purpose of unifying the standards of these commodities in force in this country. The American Society for Testing and Materials and The American Society of Mechanical Engineers were designated as sponsors, and the first meeting of the Sectional Committee was held in Pittsburgh, Pennsylvania, on May 18, 1928.

The dimensions of commercial pipe in general use in the United States at the time conformed rather generally to those recommended by the ASME Committee on Standard Pipe and Pipe Threads published in 1886 (ASME Transactions, Vol. VIII, p. 29). On these standards an enormous industry has been built and the satisfactory use of this product proves the soundness of the original design and specification.

Increasingly severe service demands at the time of the Committee's organization had been met by using the nearest available pipe or tubing for heavier sections such as casing, mechanical tubing, etc., with resulting uneconomical multiplicity of wall thicknesses.

Subsequently, the Committee, with the cooperation of the industry, made a survey of existing practice as the logical starting point for the development of an American Standard. From this survey, a table was designed to provide a selection of wall thicknesses of pipe to cover the power piping requirements of industry where strength to resist internal pressure governs selection and was later expanded to include pipe diameters and thicknesses used in other industries.

The original intent of the Committee was to establish a system of Schedule Numbers for pipe size/wall thickness combinations which would have an approximately uniform relationship equal to 1000 times the *P/S* expression contained in the modified Barlow formula for pipe wall thickness as defined in the Appendix to this standard. The resulting Numbers departed so far from existing wall thicknesses in common use that the original intent could not be accomplished. The Schedule Numbers were then adopted strictly as a convenient designation system for use in ordering.

In all cases, the designer must base his selection on the rules and allowable stresses set by the code which governs his particular construction. The table is dimensionally complete for all sizes and wall thicknesses within its scope, but some of the larger, heavier wall sections are beyond the capability of seamless mill production and must be obtained from forged and bored billets or other sources.

The first issue of this standard was given with the designation American Standard "tentative" by the American Standards Association in November 1935. Subsequent slight revisions to Table 1 and the footnotes of the dimensional tables were approved and the ASA changed the designation to American Standard; the date of ASA approval was April 28, 1939.

Further revisions were made by the Sectional Committee. The list of specifications in Table 1 was revised where necessary and slight revisions in wall thicknesses of some of the large sizes of the heavy schedules were made where *P/S* values were out of line.

It was the hope in 1939 that the designation of pipe used commercially by all industry as Standard weight, Extra-Strong, and Double Extra-Strong would gradually be replaced by Schedule Number designation. However, owing to customs of over 50 years' standing, demand and production of pipe to these traditional dimensions is undiminished. Consequently, in response to a demand from users, accepted practice for dimensions and weights of commercial wrought steel and welded wrought iron pipe were added. These changes were designated an American Standard on February 23, 1950.

Subcommittee No. 1 was reorganized in 1957. In addition to necessary editorial changes, a simplified format was selected for the tables of weights and dimensions so as to include and identify the sizes and weights of API Standards 5L and 5LX. These changes to the standard were approved and it was designated an American Standard on December 21, 1959.

The standard was revised in 1969. A uniform method to calculate the plain end weight of steel pipe was included, and minor adjustments were made in the tabulated weights of steel pipe in

Table 2 to conform to this new method. Additional sizes and thicknesses of steel pipe that had come into common use were also added to Table 2. Inasmuch as API Standard 5L no longer included wrought iron pipe, reference to this API Standard was deleted from Table 3. These changes to the standard were approved and it was designated an American National Standard on February 3, 1970.

Further revisions were made to the standard in 1975. Additional sizes and thicknesses of steel pipe that had been added to API specifications were added to Table 2. Table 3, Dimensions and Weights of Welded Wrought Iron Pipe, was deleted in its entirety, since wrought iron pipe is no longer produced. These changes in the standard were approved and it was designated an American National Standard on June 5, 1975.

The standard was revised in 1978 to include SI metric dimensions. The outside diameter 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 millimeter, 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 metric dimensions were added to Table 2. A formula to calculate the SI metric plain end mass, in kilograms per meter, using SI metric diameters and thicknesses was added to section 5. The SI metric plain end mass was calculated and was added to Table 2. These changes in the standard were approved and it was designated an American National Standard on July 18, 1979.

Further revisions were made in 1984. The ANSI designations, which are no longer in use, were deleted from Table 1, and the list of specifications was revised to agree with current ASTM and API specifications. Additional sizes and thicknesses which had been added to API specifications were added to Table 2. That edition was approved as an American National Standard on August 19, 1985.

The next edition included additional wall thicknesses and was approved by the American National Standards Institute on August 24, 1995.

The 1996 edition contained revisions to Table 2, adding pipe sizes, changing some plain end weights and masses, identifying metric pipe by the dimensionless designator DN, and eliminating the API Specification column. The 1996 edition was approved as an American National Standard on September 23, 1996.

The 2000 edition contained revisions to Table 2 to include the revised density for steel incorporated into Section 5 previously. Table 1 was deleted and other editorial changes to Sections 1, 2, 3, 5, 8, and 9 were made. The 2000 edition was approved as an American National Standard on December 1, 2000.

The current edition contains revisions to Section 5 and Table 1. It corrects the equation for nominal plain end weight. It adds the missing DN schedule numbers in Table 1. This edition was approved as an American National Standard on June 23, 2004.

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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WELDED AND SEAMLESS WROUGHT STEEL PIPE

1 SCOPE

This Standard covers the standardization of dimensions of welded and seamless wrought 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. Pipe 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.

2 SIZE

The size of all pipe is identified by the nominal pipe size.

The manufacture of pipe NPS $\frac{1}{8}$ (DN 6) to 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 thickness — 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 of steel pipe are calculated values and are tabulated in Table 1.

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 to be used for OD only in mathematical equations or formulas)
W_{pe} = nominal plain end mass, rounded to the nearest 0.01 lb/ft
t = specified wall thickness, rounded to the nearest 0.001 in.

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 to the nearest 1.0 mm for outside diameters larger than 16 in. (406.4 mm) (the symbol D is to be 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).

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

8 WALL THICKNESS DESIGNATIONS

The wall thickness designations Standard, Extra-Strong, and Double Extra-Strong have been commercially used designations for many years. As explained in the Foreword, the Schedule Numbers were subsequently added as a convenient designation for use in ordering pipe. Standard and Schedule 40 are identical for up to NPS 10 (DN 250), inclusive. All larger sizes of Standard