



Designation: A252/A252M – 19

Standard Specification for Welded and Seamless Steel Pipe Piles¹

This standard is issued under the fixed designation A252/A252M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification covers nominal (average) wall steel pipe piles of cylindrical shape and applies to pipe piles in which the steel cylinder acts as a permanent load-carrying member, or as a shell to form cast-in-place concrete piles. Pipe piles are produced as both welded and seamless products.

1.2 This specification is expressed in both inch-pound units and SI units; however, unless the purchase order or contract specifies the applicable *M* specification designation (SI units), the inch-pound units shall apply. The values stated in either inch-pound or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from two systems may result in nonconformance with the standard.

1.3 The text of this specification contains notes and footnotes that provide explanatory material. Such notes and footnotes, excluding those in tables and figures, do not contain any mandatory requirements.

1.4 The following precautionary caveat pertains only to the test method portion, Section 16 of this specification. *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.09 on Carbon Steel Tubular Products.

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2. Referenced Documents

2.1 ASTM Standards:²

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products

A941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

3. Terminology

3.1 Definitions:

3.1.1 Definitions of terms used in this specification shall be in accordance with Terminology A941.

3.1.2 *defect*—an imperfection of sufficient size or magnitude to be cause for rejection.

3.1.3 *heat lot*—a group of pipe piles of the same outside diameter, nominal wall thickness, and steel heat.

3.1.4 *imperfection*—any discontinuity or irregularity found in the pipe.

4. Ordering Information

4.1 Orders for material under this specification shall contain information concerning as many of the following items as are required to describe the desired material adequately:

4.1.1 Quantity (feet or number of lengths),

4.1.2 Name of material (steel pipe piles),

4.1.3 Method of manufacture (seamless or welded),

4.1.4 Grade (Tables 1 and 2),

4.1.5 Product analysis (specify if product analysis is required, if not ladle analysis will be used) (see Section 9),

4.1.6 Size (outside diameter and nominal wall thickness),

4.1.7 Weight (specify if each piece must be weighed) (see 12.1),

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

*A Summary of Changes section appears at the end of this standard

TABLE 1 Tensile Requirements

NOTE 1—Where an ellipsis (...) appears in this table, there is no requirement.

	Grade 1	Grade 2	Grade 3
Tensile strength, min, psi [MPa]	50 000 [345]	60 000 [415]	66 000 [455]
Yield point or yield strength, min, psi [MPa]	30 000 [205]	35 000 [240]	45 000 [310]
Basic minimum elongation for nominal wall thicknesses $\frac{5}{16}$ in. [7.9 mm] or more:			
Elongation in 8 in. [203.2 mm], min, %	18	14	...
Elongation in 2 in. [50.8 mm], min, %	30	25	20
For nominal wall thicknesses less than $\frac{5}{16}$ in. [7.9 mm], the deduction from the basic minimum elongation in 2 in. [50.8 mm] for each $\frac{1}{32}$ - in. [0.8 mm] decrease in nominal wall thickness below $\frac{5}{16}$ in. [7.9 mm], in percentage points	1.50 ^A	1.25 ^A	1.0 ^A

^A Table 2 gives the computed minimum values:

TABLE 2 Calculated Minimum Elongation Values^A

Nominal Wall Thickness		Elongation in 2 in. [50.8 mm], min, %		
in.	[mm]	Grade 1	Grade 2	Grade 3
$\frac{5}{16}$ or 0.312	[7.9]	30.00	25.00	20.00
$\frac{3}{32}$ or 0.281	[7.1]	28.50	23.75	19.00
$\frac{1}{4}$ or 0.250	[6.4]	27.00	22.50	18.00
$\frac{7}{32}$ or 0.219	[5.6]	25.50	21.25	17.00
$\frac{3}{16}$ or 0.188	[4.8]	24.00	20.00	16.00
$\frac{11}{64}$ or 0.172	[4.4]	23.25	19.50	15.50
$\frac{5}{32}$ or 0.156	[4.0]	22.50	18.75	15.00
$\frac{9}{64}$ or 0.141	[3.6]	21.75	18.25	14.50
$\frac{1}{8}$ or 0.125	[3.2]	21.00	17.50	14.00
$\frac{7}{64}$ or 0.109	[2.8]	20.25	16.75	13.50

^A The above table gives the calculated minimum elongation values for various nominal wall thicknesses. Where the specified nominal wall thickness is intermediate to those shown above, the minimum elongation value shall be determined as follows:

Grade	
1	$E = 48t + 15.00$ [$E = 1.90t + 15.00$]
2	$E = 40t + 12.50$ [$E = 1.56t + 12.50$]
3	$E = 32t + 10.00$ [$E = 1.25t + 10.00$]

where:

E = elongation in 2 in., %, and

t = specified nominal wall thickness, in. [mm].

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4.1.8 Lengths (single random, double random, or uniform) (see Section 13),

4.1.9 End finish (Section 15), and

4.1.10 ASTM specification designation and year of issue,

4.1.11 Location of purchaser's inspection (see 19.1), and

4.1.12 Bar coding (see 22.2).

5. Materials and Manufacture

5.1 The piles shall be made by the seamless, electric resistance welded, flash welded, or fusion welded process. The seams of welded pipe piles shall be longitudinal, helical-butt, or helical-lap.

NOTE 1—For welded pipe piles, the weld should not fail when the product is properly fabricated and installed and subjected to its intended end use.

6. Process

6.1 The steel shall be made by one or more of the following processes: open-hearth, basic-oxygen, or electric-furnace.

7. Chemical Composition

7.1 The steel shall contain no more than 0.050 % phosphorous.

8. Heat Analysis

8.1 Each heat analysis shall conform to the requirement specified in 7.1. When requested by the purchaser, the applicable heat analyses shall be reported to the purchaser or the purchaser's representative.

9. Product Analysis

9.1 When specified in the purchase order, a chemical analysis shall be performed in accordance with Test Methods, Practices, and Terminology A751.

9.2 It shall be permissible for the purchaser to make product analyses using two samples from each heat lot of pipe piles. The product analyses shall conform to the requirement in 7.1.

9.3 If the chemical compositions of both of the samples representing a heat lot fail to conform to the specified requirement, the heat lot shall be rejected or analyses of four additional samples selected from the heat lot shall be made, and each shall conform to the specified requirement. If the chemical composition of only one of the samples representing a heat lot fails to conform to the specified requirement, the heat lot shall be rejected or analyses of two additional samples

selected from the heat lot shall be made, and each shall conform to the specified requirement.

9.4 When a product analysis is not requested in the purchase order, the manufacturer shall provide the ladle analysis for the respective heat lot. This ladle analysis shall conform to the requirements in 7.1.

10. Tensile Requirements

10.1 The material shall conform to the requirements as to tensile properties prescribed in Tables 1 and 2.

10.2 The yield point shall be determined by the drop of the beam, by the halt in the gage of the testing machine, by the use of dividers, or by other approved methods. When a definite yield point is not exhibited, the yield strength corresponding to a permanent offset of 0.2 % of the gage length of the specimen, or to a total extension of 0.5 % of the gage length under load shall be determined.

11. Weights Per Unit Length

11.1 The weights per unit length for various sizes of pipe piles are listed in Table 3.

11.2 For pipe pile sizes not listed in Table 3, the weight per unit length shall be calculated as follows:

$$W = 10.69(D - t)t$$

$$[W = .0246615 (D - t)t] \quad (1)$$

where:

W = weight per unit length, lb/ft [kg/m],
 D = specified outside diameter, in. [mm], and
 t = specified nominal wall thickness, in. [mm].

12. Permissible Variations in Weights and Dimensions

12.1 *Weight*—When specified on the purchase order, each length of pipe pile shall be weighed separately and its weight shall not vary more than 15 % over or 5 % under its theoretical weight, calculated using its length and its weight per unit length (see Section 11). When not specified on the purchase order, the manufacturer shall ensure the pipe conforms to Section 11 by other methods.

12.2 *Outside Diameter*—The outside diameter of pipe piles shall not vary more than ± 1 % from the specified outside diameter.

12.3 *Wall Thickness*—The wall thickness at any point shall not be more than 12.5 % under the specified nominal wall thickness. The following calculation shall be used to determine the minimum wall thickness:

$$t_n \times 0.875 = t_m \quad (2)$$

where:

t_n = nominal wall thickness, and
 t_m = minimum permissible wall thickness.

The wall thickness is expressed to three decimal places, with rounding being in accordance with Practice E29.

13. Lengths

13.1 Pipe piles shall be furnished in single random lengths, double random lengths, or in uniform lengths as specified in the purchase order, in accordance with the following limits:

Single random lengths	16 to 25 ft [4.88 to 7.62 m], incl
Double random lengths	over 25 ft [7.62 m] with a minimum average of 35 ft [10.67 m]
Uniform lengths	length as specified with a permissible variation of ± 1 in.

13.2 Lengths that have been spliced at the mill by welding shall be acceptable as the equivalent of unspliced lengths provided tension test specimens cut from sample splices conform to the tensile strength requirements prescribed in Tables 1 and 2. The welding bead shall not be removed for this test. Such specimens shall be made in accordance with the provisions specified in Sections 16 – 18.

14. Workmanship, Finish, and Appearance

14.1 The finished pipe piles shall be reasonably straight and shall not contain imperfections in such number or of such character as to render the pipe unsuitable for pipe piles.

14.2 Surface imperfections having a depth not in excess of 12.5 % of the specified nominal wall thickness shall be acceptable. It shall be permissible to establish the depth of such imperfections by grinding or filing.

14.3 Surface imperfections having a depth in excess of 12.5 % of the specified nominal wall thickness shall be considered to be defects. It shall be permissible for defects not deeper than $3\frac{1}{3}$ % of the specified nominal wall thickness to be repaired by welding, provided that the defect is completely removed prior to welding.

15. Ends

15.1 Pipe piles shall be furnished with plain ends. Unless otherwise specified, pipe piles shall have either flame-cut or machine-cut ends, with the burrs at the ends removed. Where ends are specified to be beveled, they shall be beveled to an angle of 30 +5, –0°, measured from a line drawn perpendicular to the axis of the pipe pile.

16. Number of Tests

16.1 One tension test shall be made on one length or fraction thereof of each size, or one piece of skelp representing each heat lot.

16.2 A retest shall be allowed if the percentage of elongation of any test tension specimen is less than that prescribed in Tables 1 and 2 and any part of the fracture is more than $\frac{3}{4}$ in. [19 mm] from the center of the gage length for test specimens having a 2-in. [50 mm] gage length, or is outside of the middle third of the gage length for test specimens having an 8-in. [200 mm] gage length, as indicated by scribe scratches marked on the specimen before testing. A retest shall also be allowed if any part of the fracture is in an inside or outside surface imperfection.

16.3 It shall be permissible to discard any test specimen that shows defective machining or develops imperfections and substitute another test specimen.

17. Retests

17.1 If the results of the tension test representing any heat lot fail to conform to the applicable requirements prescribed in Tables 1 and 2, the heat lot shall be rejected or retested using