



Designation: A252 – 10

Standard Specification for Welded and Seamless Steel Pipe Piles¹

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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.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered 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 and health practices and determine the applicability of regulatory limitations prior to use.*

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:

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 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.

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 *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 Size (outside diameter and nominal wall thickness),
- 4.1.6 Lengths (single random, double random, or uniform) (see Section 13),
- 4.1.7 End finish (Section 15), and
- 4.1.8 ASTM specification designation and year of issue,
- 4.1.9 Location of purchaser's inspection (see 19.1), and
- 4.1.10 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 % phosphorus.

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.

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
$\frac{9}{32}$ 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	$E = 48t + 15.00$
2	$E = 40t + 12.50$
3	$E = 32t + 10.00$

where:

E = elongation in 2 in., %, and

t = specified nominal wall thickness, in.

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9. Product Analysis

9.1 Chemical analysis shall be in accordance with Test Methods, Practices, and Terminology **A751**.

9.2 It shall be permissible for the purchaser to make product analyses using samples from lots of pipe piles as follows:

Pipe Size Outside Diameter, in. (mm)	Number of Samples and Size of Lot
Under 14 (355.6)	2 from 200 pipe or fraction thereof
14 to 36, incl (355.6 to 914)	2 from 100 pipe or fraction thereof
Over 36 (914)	2 from 3000 ft (914 m) or fraction thereof

The product analyses shall conform to the requirement in **7.1**.

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

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:

$$W = 10.69(D - t)t \quad (1)$$

where:

W = weight per unit length, lb/ft,

D = specified outside diameter, in., and
 t = specified nominal wall thickness, in.

12. Permissible Variations in Weights and Dimensions

12.1 *Weight*—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).

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.

NOTE 2—The minimum permissible wall thickness on inspection is shown in **Table X1.1** (see Appendix) for various nominal wall thicknesses.

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 25 % of the specified nominal wall thickness shall be accept-

able. 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 25 % of the specified nominal wall thickness shall be considered to be defects. It shall be permissible for defects not deeper than $33\frac{1}{3}$ % 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 $30 +5, -0^\circ$, 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 lot of 200 lengths or fraction thereof of each size.

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 lot fail to conform to the applicable requirements prescribed in **Tables 1 and 2**, the lot shall be rejected or retested using two additional lengths from the lot, with each such test being required to conform to such specified requirements.