



Designation: A252 – 98 (Reapproved 2007)

## Standard Specification for Welded and Seamless Steel Pipe Piles<sup>1</sup>

This standard is issued under the fixed designation A252; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

### 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 of the values in inch-pound units to values in SI units.

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*:<sup>2</sup>
- 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

<sup>1</sup> 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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<sup>2</sup> 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.

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

### 3. Terminology

3.1 *Definitions*—Definitions of terms used in this specification shall be in accordance with Terminology A941.

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

3.1.2 *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.

**TABLE 1 Tensile Requirements**

NOTE—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 <sup>A</sup>	1.25 <sup>A</sup>	1.0 <sup>A</sup>

<sup>A</sup> Table 2 gives the computed minimum values:

**TABLE 2 Calculated Minimum Elongation Values<sup>A</sup>**

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

<sup>A</sup> 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.

## 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 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 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:

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

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

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  $\pm 1$  % 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.

## 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 $\pm 1$ 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.

**TABLE 3 Common Sizes and Weights Per Unit Length<sup>A</sup>**

Outside Diameter, in.	Nominal Wall Thickness, in. <sup>B</sup>	Weight per Unit Lengths, lb/ft <sup>C</sup>	Outside Diameter, in. <sup>B</sup>	Nominal Wall Thickness, in. <sup>B</sup>	Weight per Unit Lengths, lb/ft <sup>C</sup>			
6	0.134	8.40	12	0.134	17.00			
	0.141	8.83		0.141	17.87			
	0.156	9.75		0.150	19.00			
	0.164	10.23		0.164	20.75			
	0.172	10.72		0.172	21.75			
8	0.141	11.85	12 <sup>3/4</sup>	0.179	22.62			
	0.172	14.39		0.188	23.74			
	8 <sup>5/8</sup>	0.109		9.92	0.203	25.60		
				12.79	0.219	27.58		
15.54				0.230	28.94			
16.96				0.250	31.40			
18.28				0.281	35.20			
19.68				0.312	38.98			
22.38				0.109	14.73			
24.72				0.134	18.07			
27.7				0.141	19.01			
27.73				0.150	20.20			
28.58			0.164	22.07				
30.45			0.172	23.13				
33.07	0.179	24.05						
38.33	0.188	25.25						
43.43	0.203	27.23						
10	0.109	11.53	14	0.219	29.34			
		12.67		0.230	30.78			
		14.13		0.250	33.41			
		14.86		0.281	37.46			
		15.79		0.312	41.48			
		17.24		0.330	43.81			
		18.07		0.344	45.62			
		18.79		0.375	49.61			
		19.72		0.438	57.65			
		21.26		0.203	27.23			
		22.90		0.219	29.34			
		24.02		0.230	30.78			
		26.06		0.250	33.41			
		10 <sup>3/4</sup>		0.109	12.40	14	0.134	19.86
					13.64		0.141	20.89
15.21	0.150		22.21					
15.99	0.164		24.26					
17.00	0.172		25.43					
18.56	0.179		26.45					
19.45	0.188		27.76					
20.23	0.203		29.94					
21.23	0.219		32.26					
	0.230		33.86					
	0.250	36.75						
	0.281	41.21						
	0.312	45.65						