

Changes shown by

SCOPE

- I 1.1 This practice covers the material, design, construction and installation of piling, including sheet piling, for all land and marine construction.
- I 1.2 **An asterisk (*) indicates that additional information from the Owner, or approval by the Owner, is required.**

SUMMARY OF ADDITIONAL REQUIREMENTS

- I 2.1 **Table 1** lists codes, publications, specifications and standards that shall be used with this practice as applicable.

TABLE 1

CODES, PUBLICATIONS, SPECIFICATIONS, AND STANDARDS	
ACI Standard	
318	Building Code Requirements for Reinforced Concrete
ACI Publication	
543	Recommendations for Design, Manufacture, and Installation of Concrete Piles
AISC Specification	
	Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design
API Standard	
5L	Line Pipe
ASTM Standards	
A 36 / A 36M	Structural Steel
A 53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
A 106	Seamless Carbon Steel Pipe for High-Temperature Service
A 148 / A 148M	Steel Castings, High-Strength, for Structural Purpose
A 252	Welded and Seamless Steel Pipe Piles
A 328 / A 328M	Steel Sheet Piling
A 572 / A 572M	High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality
A 690 / A 690M	High-Strength Low-Alloy Steel H-Piles and Sheet Piling for Use in Marine Environments
A 857 / A 857M	Steel Sheet Piling, Cold Formed, Light Gage
D 25	Round Timber Piles
D 1143	Piles Under Static Axial Compressive Load
D 2899	Establishing Design Stresses for Round Timber Piles
D 4945	High-Strain Dynamic Testing of Piles
D 5882	Low Strain Integrity Testing of Piles
AWPA Standards	
C3	Piles-Preservative Treatment by Pressure Processes
M4	Care of Preservative Treated Wood Products
AWS Code	
D1.1	Structural Welding Code
SSPC Specification	
SP 5	White Metal Blast Cleaning

- I * 2.2 **Local codes and standards** may be substituted for the ones referenced herein provided the following provisions are met:
 - a. The resultant design meets the safety and serviceability criteria attained through this practice.
 - b. Substitution is accepted by the authorities where the facility is to be located and by the Owner's Engineer.

MATERIALS

- R 3.1 **Wood piles** shall be per **ASTM D 25** and the following:
 - a. **Piles for land structures** shall be pressure treated per **AWPA C3** for FOUNDATION PILES.
 - b. **Piles for marine facilities** (fresh and salt water) shall be pressure treated per **AWPA C3** for MARINE PILES.

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MATERIALS (Cont)

- c. Proposals to use **species other than those in AWPA C3** or to use untreated timber piles shall be submitted for approval by the Owner's Engineer.
- d. **Preservative-treated piles** shall be protected and surface injuries treated per **AWPA M4**.
- R 3.2 **Steel foundation piles** shall have a minimum specified yield strength of not more than 52 ksi (360 MPa). Higher yield strength steel, and grades of steel other than covered in **Table 1**, may be acceptable but are subject to approval by the Owner's Engineer.
- R 3.3 **Steel for Sheet Piling, Corners, Wyes, Tees, and Crosses** shall be **ASTM A328, A572 Grade 50, or A690**.
- I *3.4 **Proposals to use "used sheet piling"** shall be submitted for approval by the Owner's Engineer.
- R 3.5 **Steel for reinforcing tips** for piling shall be **ASTM A148 Grade 40**.
- R 3.6 **Strength of all welds** including the type of joint preparation and percent penetration shall be developed for the specific application and submitted for approval. Welding procedure and welder qualification shall be per **AWS D1.1**.
- I *3.7 Proposals to use materials other than those specified shall be submitted for approval by the Owner's Engineer. Proposal information shall include complete details of materials, welding procedures, inspection methods and acceptance criteria.

DESIGN

- I *4.1 **The type of piles, allowable loads, and estimated penetrations** will be provided, based on results of a soils investigation for the specific facility.
- R 4.2 **Uncased, cast-in-place concrete displacement piles** shall not be used in cohesive soils.
- R 4.3 **Drilled piers** with enlarged bases formed by underreaming methods shall not be used in soils containing cobbles and boulders, or in soils prone to sloughing or caving.
- R 4.4 **Spacing of piles** shall take into consideration the potential for causing uplift or damage to previously driven piles.
- R 4.5 **Center-to center spacing** of piles in a group shall not be less than 3 times the diameter of the shaft or diagonal of a pile, or less than 2-1/2 ft (750 mm). For tapered piles, the diameter shall be taken 3 ft (1 m) below the cutoff.
- R 4.6 **All piles capped with concrete** shall extend 3 in. (75 mm) minimum into the cap, except that wood piles shall extend 6 in. (150 mm) into the cap.
- R 4.7 **Piles shall be considered fixed at the top** only when sufficient reinforcement is provided in a concrete cap or section modulus in a steel cap, and sufficient anchorage to the cap is provided to develop the resulting bending moment.
- R 4.8 **Pile group efficiency** shall be considered when determining the load carrying capacity of a pile group.
- R 4.9 A **minimum corrosion allowance** of 1/16 in. (1.5 mm) shall be provided for steel piles (foundation piles and sheet piles) for permanent structures for land and fresh water exposure, and 1/8 in. (3 mm) for salt water exposure.

WOOD PILES

- R 4.10 **Wood pile design** shall comply with the following:
 - a. Allowable working stresses shall be per **ASTM D 2899**. Proposed allowable stresses for types of wood not covered therein shall be submitted for approval by the Owner's Engineer.
 - b. Allowable working stresses may be increased by one-third for short duration loads such as wind or earthquake.
 - c. Driving stresses shall not exceed 2.5 times the allowable working stress per **ASTM D 2899**.
 - d. Wood piles shall not be used for heated storage tanks or other facilities where elevated temperatures can contact the piles.

CONCRETE PILES

- R *4.11 **If injurious materials are present in the soil or water**, the type of cement will be specified.