

## CODE

- (c) Thickness of the casing shall not be less than 1.7 mm.
- (d) Casing shall be seamless, or provided with seams of strength equal to the basic material, and be of a configuration that will provide confinement to the cast-in-place concrete.
- (e) Ratio of yield strength of the steel casing to  $f'_c$  shall be at least 6, and yield strength shall be at least 210 MPa.
- (f) Nominal diameter of the member shall be less than or equal to 400 mm.

**13.4.2.4** The use of allowable strengths greater than those specified in Table 13.4.2.1 shall be permitted if accepted by the building official in accordance with 1.10 and justified by load tests.

### 13.4.3 Strength design

**13.4.3.1** Strength design in accordance with this section is permitted for all deep foundation members.

**13.4.3.2** The strength design of deep foundation members shall be in accordance with 10.5 using the compressive strength reduction factors of Table 13.4.3.2 for axial load without moment, and the strength reduction factors of Table 21.2.1 for tension, shear, and combined axial force and moment. The provisions of 22.4.2.4 and 22.4.2.5 shall not apply to deep foundations.

**Table 13.4.3.2—Compressive strength reduction factors  $\phi$  for deep foundation members**

Deep foundation member type	Compressive strength reduction factors $\phi$	
Uncased cast-in-place concrete drilled or augered pile <sup>[1]</sup>	0.55	(a)
Cast-in-place concrete pile in rock or within a pipe, tube, <sup>[2]</sup> or other permanent casing that does not satisfy 13.4.2.3	0.60	(b)
Cast-in-place concrete-filled steel pipe pile <sup>[3]</sup>	0.70	(c)
Metal cased concrete pile confined in accordance with 13.4.2.3	0.65	(d)
Precast-nonprestressed concrete pile	0.65	(e)
Precast-prestressed concrete pile	0.65	(f)

<sup>[1]</sup>The factor of 0.55 represents an upper bound for well understood soil conditions with quality workmanship. A lower value for the strength reduction factor may be appropriate, depending on soil conditions and the construction and quality control procedures used.

<sup>[2]</sup>For wall thickness of the steel pipe or tube less than 6 mm.

<sup>[3]</sup>Wall thickness of the steel pipe shall be at least 6 mm.

### 13.4.4 Cast-in-place deep foundations

**13.4.4.1** Cast-in-place deep foundations that are subject to uplift or where  $M_u$  is greater than  $0.4M_{cr}$  shall be reinforced, unless enclosed by a structural steel pipe or tube.

## COMMENTARY

members designed to be composite with steel pipe or casing are covered in AISC 360.

Potential corrosion of the metal casing should be considered; provision is based on a non-corrosive environment.

**R13.4.2.4** Geotechnical and load test requirements for deep foundation members can be found in the IBC.

### R13.4.3 Strength design

**R13.4.3.2** The strength design of deep foundation members is discussed in detail in ACI 543R.

If cast-in-place concrete drilled or augered piles are subject to flexure, shear, or tension loads, the strength reduction factors should be adjusted accordingly, considering the soil conditions, quality-control procedures that will be implemented, likely workmanship quality, and local experience. Guidance for adjustment factors is provided in ACI 543R.

### R13.4.4 Cast-in-place deep foundations