Designation: C 1283 – 00ε1

Standard Practice for Installing Clay Flue Lining[1]

This standard is issued under the fixed designation C 1283; 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.

ε[1] NOTE—"Cone 10" was inadvertently changed to "5," and was editorially corrected back to "10" in February 2002.

1. Scope

1.1 This practice covers the minimum requirements for installing clay flue lining as a lining for residential masonry chimneys not exceeding 40 ft (12.2 m) in height.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values stated in parentheses are for informational purposes only.

1.3 *This standard does not purport to address all of the safety concerns, 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:*

C 24 Test Method for Pyrometric Cone Equivalent (PCE) of Fireclay and High Alumina Refractory Materials[2]

C 27 Classification of Fireclay and High-Alumina Refractory Brick[2]

C 55 Specification for Concrete Brick[3]

C 90 Specification for Loadbearing Concrete Masonry Units[3]

C 99 Test Method for Modulus of Rupture of Dimension Stone[4]

C 129 Specification for Nonloadbearing Concrete Masonry Units[3]

C 145 Specification for Solid Load-Bearing Concrete Masonry Units[3]

C 170 Test Method for Compressive Strength of Dimension Stone[4]

C 199 Test Method for Pier Test for Refractory Mortars[2]

C 216 Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)[3]

C 270 Specification for Mortar for Unit Masonry[3]

C 315 Specification for Clay Flue Linings[3]

C 652 Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)[3]

C 896 Terminology Relating to Clay Products[3]

3. Terminology

3.1 *General*—Terminology C 896 should be used for clarification of definitions in this practice.

4. Foundation

4.1 The foundation shall be deep enough so that frost penetration and seasonal volume changes in the soil will not affect its stability.

4.2 The foundation shall be placed, with respect to adjacent structures existing or anticipated, to minimize the possibility of mutual damage by construction operations or by transmission of additional loads to the supporting soils.

4.3 The foundation supports the chimney and shall be sized to carry all superimposed loads. Most building codes, however, disallow the use of chimney walls as structural elements to support other building components unless specific construction allowances are made. When designing the foundation, care shall be taken to account for soil types and conditions.

4.4 Concrete footings and foundations shall conform to local building codes.

4.4.1 In the absence of a local building code, concrete with a minimum 28 day compressive strength of 3000 psi (21 mPa) shall be used.

4.5 Where a chimney or fireplace is added to the outside of the exterior wall of an existing structure, the following shall apply:

4.5.1 The new footing shall be installed at the same level or below the existing footing, provided the level is below the frost line and the new footing is placed on soil with adequate bearing capacity.

4.5.2 The existing drainage provision shall not be obstructed.

5. Chimney Construction

5.1 *Materials*:

5.1.1 *Flue Linings*— Specification C 315.

5.1.2 *Refractory Mortar*—Test Method C 24, cone 10, and Test Method C 199.

5.1.3 *Concrete Block*— Specification C 90, Specification

[1] This practice is under the jurisdiction of ASTM Committee C-4 on Vitrified Clay Pipe and is the direct responsibility of Subcommittee C04.20 on Methods of Test and Specifications.

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[2] *Annual Book of ASTM Standards*, Vol 15.01.

[3] *Annual Book of ASTM Standards*, Vol 04.05.

[4] *Annual Book of ASTM Standards*, Vol 04.07.

C 129, Specification C 145.

5.1.4 *Brick*—Specification C 55, Specification C 216, Grade SW.

5.1.5 *Mortar*—Specification C 270.

5.1.6 *Firebrick*—Classification C 27.

5.1.7 *Natural Stone*— Test Method C 170, Test Method C 99.

5.2 The chimney consists of a flue liner and the chimney wall. When used to vent a fireplace, the chimney is constructed directly on the smoke chamber.

5.3 The flue lining shall start from a point not less than 8 in. (205 mm) below the entrance of the lowest chimney connector.

5.4 Flue liners shall be installed ahead of the construction of the chimney walls, one flue liner carefully bedded on the other using refractory mortar. All joints of flue linings shall be 1⁄16 in. (1.6 mm) to 1⁄8 in. (3 mm) thick, and struck flush so as to produce a straight, smooth, fully aligned flue. Liners shall be placed in such a manner as to minimize ledges or steps within the flue passage.

5.5 Flue liners shall be surrounded by masonry on all four sides but shall not be bonded to the surrounding masonry. The flue liner shall contact the chimney wall only as necessary for support and alignment in order to permit the flue liner, which is filled with hot gases and smoke to expand and contract freely. The separation of the flue liner form the surrounding masonry shall not exceed the wall thickness of the flue liner. In some areas, local building codes for seismic zones may require additional anchoring or reinforcements.

5.6 The flue lining shall extend the entire height of the chimney. The lining shall be carried up as vertically as possible. When offsets are necessary, the maximum slope shall be no greater than 30° from vertical.

5.7 When more than one flue is contained in a chimney, a separation shall be provided between adjacent flues. The separation shall be solid masonry wythes (partitions) not less than 4 in. (102 mm) nominal in thickness and bonded into the chimney walls.

5.8 Adjustments to the liner size or shape shall be made with a masonry saw.

5.9 Openings in the flue liner for connections shall be manufactured or machine cut.

5.10 Chimney walls shall be constructed of solid masonry units at least 4 in. (102 mm) nominal thickness. Wall thickness for natural stone shall be 12 in. (305 mm) minimum.

5.10.1 Products for chimney wall masonry construction are those (brick, block, or stone) that are either 100 % solid or those which meet the requirements of Specification C 55, Specification C 145, Specification C 216 Grade SW, or Specification C 652.

5.11 The chimney shall be adequately anchored to the building to provide stability against wind and seismic loads.

5.12 All joints exposed to weather shall be compacted and well tooled.

5.13 Masonry chimneys shall extend 3 ft (915 mm) above the highest point of the structure where chimneys pass through the roof of a building and at least 2 ft (610 mm) above any portion of any structure within 10 ft (3 m) (measured horizontally from the vertical chimney line).

6. Clearances

6.1 The minimum air space clearance between interior masonry chimneys and combustible materials shall be at least 2 in. (51 mm). Any chimney with at least one interior wall shall be treated as interior. When masonry chimneys are constructed as part of masonry walls or concrete walls, combustible materials shall not be placed in contact with the masonry wall within 12 in. (305 mm) of the inside surface of the flue liner.

6.2 The minimum air space clearance between exterior masonry chimneys and combustible materials shall be at least 1 in. (25 mm).

6.3 Exposed combustible trim and the edges of sheeting materials, such as wood siding, shall be permitted to abut the masonry chimney sidewalls, provided such combustible trim or sheeting is a minimum of 12 in. (30.5 mm) from the inside surface of the flue liner.

6.4 All spaces between chimneys, floors, and ceilings through which chimneys pass shall be firestopped with noncombustible material. The firestopping of spaces between chimneys and wood joists, beams, or headers shall be galvanized steel not less than 26 gage in thickness or noncombustible sheet material not more than ½ in. (13 mm) thick.

7. Openings For Chimney Connections

7.1 The chimney connection shall be made by either a metal or masonry thimble. The thimble shall be installed on a ¼ in. (6 mm) per foot slope toward the appliance. This is to allow any liquid creosote to be fed back into the appliance for reburning.

7.2 A minimum of 12 in. (305 mm) of masonry separation shall be provided between clay thimbles and combustible materials.

7.3 The thimble shall pass through the flue lining and be flush with the inside of the flue lining wall. In certain flue and thimble size combustions, it may be necessary to butt the thimble to the outside wall of the flue liner. The area around a clay thimble shall be sealed with a refractory mortar.

7.4 The opening for a flue pipe connection shall be positioned to maintain the specified clearances from combustible construction, as specified ion Section 6.

7.5 The stovepipe shall be positioned so that horizontal movement will not cause it to back out of the thimble or protrude into the flue.

8. Chimney Caps and Terminations

8.1 All masonry chimneys shall have a chimney cap that slopes downward from the flue liner to the edge of the chimney cap (see Fig. 1).

8.2 Chimney caps shall overhang the chimney wall by at least 2 in. (51 mm).

8.3 Chimney caps are of the following types and construction:

8.3.1 Precast,

8.3.2 Cast-in-place concrete,

8.3.3 Metal,

8.3.4 Stone.

8.3.5 Precast, cast-in-place concrete, stone chimney caps shall have a drip slot on the underside at least 1½ in. (38 mm) away from the chimney wall.

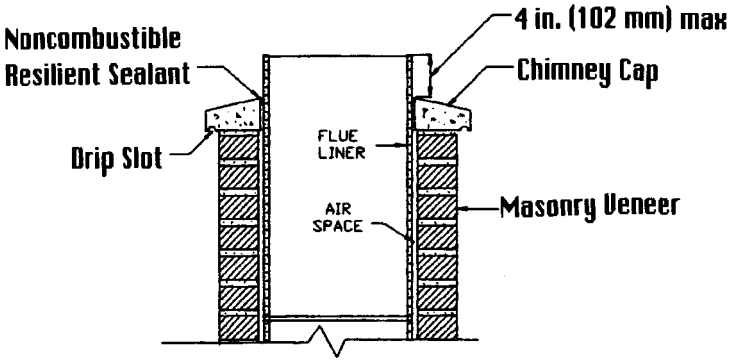

FIG. 1 Chimney Cap

8.3.6 Cast-in-place chimney caps shall be approximately 4 in. (102 mm) in thickness and reinforced with at least ½ in. (13 mm) mesh galvanized hardware cloth located halfway into the filled form. The reinforcing shall be continuous around the corners.

8.3.7 Precast concrete and stone chimney caps shall be a minimum of 2 in. (51 mm) in thickness. The cap shall fit loosely around the flue liner to permit expansion of the flue, but shall be sealed as specified in 8.4.

8.3.8 Metal chimney caps must lap down the chimney face at least 4 in. (102 mm), and a noncombustible resilient sealant shall be used between the metal cap and the flue liner and between the base of the metal flap and the chimney.

8.4 Chimney caps shall be separated from the flue lining by a bond break, and this separation shall be sealed with a noncombustible resilient sealant to prevent water entering the chimney. This is a maintenance joint and should be checked and renewed as needed (see Fig. 1).

8.5 Clay flue linings shall extend above the chimney cap by not more than 4 in. (102 mm).

9. Special Conditions

9.1 Special features shall be permitted in the design and construction of chimneys where condensation may occur.

9.1.1 Flues with joints that provide improved characteristics for containing condensation shall be permitted. Socketed and overlapping joints manufactured as an integral part of the flue liner are acceptable.

9.1.2 A condensate drain installed at the bottom of the chimney shall be permitted.

10. Keywords

10.1 chimney; chimney caps; clay; fireplace; flue; flue lining; lining; masonry; stove pipe; venting