



## Standard Specification for Clay Flue Linings<sup>1</sup>

This standard is issued under the fixed designation C 315; 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 establishes the criteria for acceptance, prior to installation, of clay flue linings used for conveying hot gases in masonry chimneys.

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

### 2. Referenced Documents

#### 2.1 ASTM Standards:

C 67 Test Methods for Sampling and Testing Brick and Structural Clay Tile<sup>2</sup>

C 301 Test Methods for Vitrified Clay Pipe<sup>2</sup>

C 896 Terminology Relating to Clay Products<sup>2</sup>

### 3. Terminology

3.1 *Definitions*—Clay, fire clay, shale, and surface clay are as defined in Terminology C 896.

### 4. Classification

4.1 *Types*—Flue linings acceptable under this specification shall be designated as rectangular nonmodular, rectangular modular, round or oval.

### 5. Materials and Manufacture

5.1 Flue linings shall be manufactured from fire clay, shale, surface clay, or a combination of these materials that when formed and fired to suitable temperatures, shall yield a product that is strong, durable, serviceable, and conforms to this specification.

### 6. Physical and Chemical Requirements

#### 6.1 Absorption:

6.1.1 The absorption of clay flue linings shall not exceed 8.0 % when tested in accordance with Test Methods C 301.

6.1.2 *Test Specimens*— Five dry test specimens shall be obtained from the five flue liners to be tested and shall measure as closely as possible to 4 in. (100 mm) by 4 in. (100 mm) per

side. All rough edges shall be ground off and loose particles removed.

6.1.3 If any of the test specimens fail to meet the requirements, the manufacturer shall be allowed to retest on two additional specimens for each one that failed. The flues will be acceptable if all the subsequent specimens for retest meet the requirements.

#### 6.2 Acid Resistance:

6.2.1 This is a test used to determine the resistance of clay flue liners to the action of acids encountered in chimneys. This test shall be performed only when specified.

6.2.2 The flue liner shall be acceptable if the acid soluble material does not exceed 0.25 % when tested in accordance with Test Methods C 301.

6.2.3 *Test Specimens*— Select one test specimen from each size of flue liner. The specimens shall measure about 2 in. (50 mm) by 2 in. (50 mm) per side and weigh not more than 200 g. They shall be sound pieces with all edges freshly broken, free of cracks or shattered edges, and shall be thoroughly cleaned.

#### 6.3 Freeze-Thaw Cycle Test:

6.3.1 When flue liners are tested in accordance with Test Methods C 67, Section 8 on structural clay tile, there shall be no breakage and the percentage of weight loss shall not exceed 0.5 %.

6.3.2 *Test Specimens*— Five dry test specimens shall be obtained from the five flue liners to be tested and shall measure as closely as possible to 4 in. (100 mm) by 4 in. (100 mm) per side. All rough edges shall be ground off and loose particles removed.

### 7. Sizes and Dimensions

7.1 Flue linings shall be specified and furnished in the dimensions prescribed in Tables 1-4.

7.2 Variations in dimensions in Tables 1-4 shall not exceed  $\pm 1/2$  in. ( $\pm 13$  mm) for outside dimensions. Permissible wall thickness variation is  $\pm 1/8$  in. ( $\pm 3$  mm) for all flue liners, except that there shall be no limit for plus variation in round flue linings. Variations in dimensions of round flue lining shall not exceed those shown in Table 3. The maximum difference in the diagonal dimensions of rectangular modular flue lining shall not exceed  $1/2$  in. (13 mm) for sizes up to and including 12 in. (305 mm) by 12 in. (305 mm) and  $3/4$  in. (19 mm) for larger sizes.

<sup>1</sup> This specification 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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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.05.

**TABLE 1 Rectangular Nonmodular Clay Flue Linings—Standard Dimensions**

Outside Dimensions, in. (mm)	Nominal Wall Thickness in. (mm)	Outside Corner Radius Max., in. (mm)
4½ by 8½ (115 by 215)	⅝ (16)	1 (25)
4½ by 13 (115 by 330)	¾ (19)	1 (25)
8½ by 8½ (215 by 215)	¾ (19)	2 (50)
8½ by 13 (215 by 330)	⅞ (23)	2 (50)
8½ by 17¾ (215 by 450)	1 (25)	2 (50)
13 by 13 (330 by 330)	⅞ (23)	3 (75)
13 by 17¾ (330 by 450)	1 (25)	4 (100)
17¾ by 17¾ (450 by 450)	1¼ (32)	4 (100)
20 by 20 (510 by 510)	1⅜ (35)	5 (130)
20 by 24 (510 by 610)	1½ (38)	5 (130)
24 by 24 (610 by 610)	1⅝ (41)	6 (150)

**TABLE 2 Rectangular Modular Clay Flue Linings—Standard Dimensions**

Outside Dimensions, in. (mm)	Nominal Wall Thickness, in. (mm)	Outside Corner Radius, max., in. (mm)
3½ by 7½ (90 by 190)	⅝ (16)	1 (25)
3½ by 11½ (90 by 290)	⅝ (16)	1 (25)
7½ by 7½ (190 by 190)	⅝ (16)	2 (50)
7½ by 11½ (190 by 290)	¾ (19)	2 (50)
11½ by 11½ (290 by 290)	⅞ (23)	3 (75)
11½ by 15½ (290 by 395)	1 (25)	3 (75)
15½ by 15½ (395 by 395)	1⅛ (29)	4 (100)
15½ by 19½ (395 by 495)	1¼ (32)	4 (100)
19½ by 19½ (495 by 495)	1⅜ (35)	5 (130)
19½ by 23½ (495 by 595)	1½ (38)	5 (130)
23½ by 23½ (595 by 595)	1⅝ (41)	6 (150)

7.3 Dimensions in Tables 1-4 are not to be used to determine the effective area of the flue liner. Consult manufacturer or use actual measurements to determine effective areas of the liners for sizing purposes.

7.4 Flue linings are available in various lengths. The variation in length shall not exceed ±¼ in./ft (±21 mm/m). The maximum difference in length of the opposite sides of flue linings shall not exceed ¼ in./ft (21 mm/m) of length.

## 8. Workmanship, Finish, and Appearance

8.1 Flue linings shall be well burned and substantially free of laminations.

8.2 Blisters shall not exceed 3 in. (75 mm) in diameter, and blisters or pimples shall not project more than ⅛ in. (3 mm) above the surface, in sizes up to and including 17¾ by 17¾ in. (450 by 450 mm). For larger sizes, blisters shall not exceed 4 in. (100 mm) in diameter nor project more than ½ in. (13 mm) above the surface.

8.3 Chips shall not exceed 2 in. (50 mm) in length, 2 in. (50

**TABLE 3 Round Clay Flue Linings—Standard Dimensions**

Nominal Inside Diameter, in. (mm)	Permissible Variation in Inside Diameter, ± in. ± (mm)	Nominal Wall Thickness, in. (mm)
6 (150)	¼ (6)	⅝ (16)
7 (180)	¼ (6)	¾ (19)
8 (205)	¼ (6)	¾ (19)
10 (255)	⅝ (8)	⅞ (23)
10¾ (275)	⅝ (10)	1 (25)
12 (305)	⅝ (10)	1 (25)
15 (380)	⅝ (10)	1⅛ (29)
18 (455)	⅞ (11)	1¼ (32)
21 (535)	⅞ (11)	1⅝ (41)
24 (610)	½ (13)	1⅝ (41)
27 (685)	⅞ (14)	2 (50)
30 (760)	⅝ (16)	2⅛ (54)
33 (840)	1⅛ (17)	2¼ (57)
36 (915)	1¼ (32)	2½ (64)

**TABLE 4 Oval Clay Flue Linings—Standard Dimensions**

Outside Dimensions, in. (mm)	Nominal Wall Thickness, in. (mm)	Nominal Outside Corner Radius, in. (mm)
8½ by 12¾ (215 by 325)	¾ (19)	4¼ (110)
8½ by 16¾ (215 by 425)	1 (25)	4¼ (110)
10 by 17¾ (255 by 450)	1 (25)	5 (130)
12¾ by 16¾ (325 by 425)	1 (25)	6⅜ (160)
12¾ by 21 (325 by 535)	1⅛ (29)	6⅜ (160)
16¾ by 16¾ (425 by 425)	1 (25)	6⅜ (160)
16¾ by 21 (425 by 535)	1⅞ (30)	6⅜ (160)
21 by 21 (535 by 535)	1¼ (32)	6⅜ (160)

mm) in width, and a depth of more than one half the wall thickness.

## 9. Inspection

9.1 Inspection of the material shall be agreed upon by the purchaser and supplier as part of the purchase contract and shall be performed by a competent inspector employed by the purchaser. Inspection shall be made at the factory or promptly at the point of delivery. All flue linings accepted shall be plainly marked by the inspector. Rejected flue linings shall not be defaced but shall be replaced by the manufacturer or seller, without additional cost, with flue linings that meet the requirements of this specification.

## 10. Product Marking

10.1 Flue linings furnished under this specification shall be marked on the material with the name, brand, or trademark of the manufacturer and ASTM C315. Such marking may be indented into the surface of the material during manufacturing.

## 11. Keywords

11.1 chimney; clay; flue; flue lining; masonry; venting; vitrified

## SUPPLEMENTARY REQUIREMENTS

These requirements apply only to Federal/Military procurement, not domestic sales or transfers.

### S1. Government/Military Procurement

S1.1 *Responsibility for Inspection*—Unless otherwise specified in the contract or purchase order, the producer is responsible for the performance of all inspection and test requirements specified herein. The producer may use his own or any other suitable facilities for the performance of the inspection and test requirements specified herein, unless the purchaser disapproves. The purchaser shall have the right to perform any of the inspections and tests set forth in this specification where such inspections are deemed necessary to ensure that material conforms to prescribed requirements.

NOTE S1.1—In U.S. Federal contracts, the contractor is responsible for inspection.

### S2. Packaging and Marking for U.S. Government Procurement:

S2.1 *Packaging*—Unless otherwise specified in the contract, the materials shall be packaged in accordance with the supplier's standard practice in a manner ensuring arrival at destination in satisfactory condition and which will be acceptable to the carrier at lowest rates. Containers and packing shall comply with Uniform Freight Classification rules or National Motor Freight Classification rules.

S2.2 *Marking*—Marking for shipment shall be in accordance with Fed. Std. No. 123 for civil agencies and MIL-STD-129 for military agencies.

NOTE S2.1—The inclusion of U.S. Government procurement requirements should not be construed as an indication that the U.S. Government uses or endorses the products described in this document.

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