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Standard Specification for Vitrified Clay Liner Plates¹

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1. Scope

1.1 This specification establishes the criteria for the acceptance of vitrified clay liner plates used to protectively line or face pipe, culverts, abutments, structures, or appurtenances.

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*:²

C 43 Terminology of Structural Clay Products

C 301 Test Methods for Vitrified Clay Pipe

3. Terminology

3.1 *Definitions*:—*Clay, fire clay, shale, and surface clay are defined in Terminology C 43.*

4. Classification

4.1 Liner plates manufactured in accordance with this specification shall be known as curved liner plates or flat liner plates.

5. Materials and Manufacture

5.1 Liner plates shall be manufactured from fire clay, shale, surface clay, or a combination of these materials that, when formed into liner plates and fired to suitable temperatures, yield a product that is strong, durable, serviceable, free of objectionable defects, and conform to this specification.

6. Physical and Chemical Requirements

6.1 *Absorption*—The absorption of liner plates shall not exceed 6 %.

6.2 *Acid Resistance*:

6.2.1 This test is used to determine the resistance of liner plates to the action of acids. The test shall be performed only when specified.

6.2.2 Liner plates shall be acceptable if the acid-soluble matter does not exceed 0.25 %.

7. Dimensions and Permissible Variations

7.1 *Tenon Ribs*:

7.1.1 Liner plates shall have either three or five longitudinal, monolithic, dovetail tenon ribs uniformly and symmetrically spaced on the back of the plate (see Note 1). When five tenon ribs are used, the outer fin of the exterior tenons shall be eliminated so that parallel jointing faces between abutting plates may be achieved.

NOTE 1—Special liner plates are available for linings where tenon ribs are not desired. They are furnished in the same thickness, length, and width as standard liner plates.

7.1.2 Tenon ribs shall be of trapezoidal cross section to firmly key or attach the plate into the backup material with a mortising type of fastening. The ratio of the dimension of the larger base to the smaller base shall be about 8 to 5, with the smaller base

² 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*, Vol. 04.05, Standards volume information, refer to the standard's Document Summary page on the ASTM website.

dimension to be $\frac{5}{8} \pm \frac{1}{8}$ in. (16 ± 3.2 mm). The smaller base of the trapezoid shall be adjacent to the liner plate.

7.2 Length:

7.2.1 Length is the overall dimension of the liner plate when measured in the same direction as the tenon ribs.

7.2.2 Liner plates shall be available in standard lengths of 6 in. (1520 mm), 9 in. (~~229~~ 230 mm), 12 in. (305 mm), 18 in. (~~457~~ 460 mm), or 24 in. (610 mm), with a tolerance of + 0, - 1/4 in./ft of length (+ 0, - 21 mm/m of length).

7.3 Width:

7.3.1 The width of curved liner plates shall be $9\frac{1}{4} \pm \frac{1}{8}$ in. (235 ± 3.2 mm) measured along the radial arc.

7.3.2 The width of flat liner plates shall be $9 \pm \frac{1}{8}$ in. (~~229~~ 230 ± 3.2 mm).

7.4 **Thickness**—Liner plates, both flat and curved, shall be $\frac{3}{4} \pm \frac{1}{16}$ in. (19 ± 1.6 mm) thick. Tenon ribs shall be $\frac{1}{2}$ in. $\pm \frac{1}{16}$ in. (13 ± 1.6 mm) thick, which provides an overall thickness, at the tenon rib, of $1\frac{1}{4} \pm \frac{1}{8}$ in. (32 ± 3.2 mm).

7.5 **Design**—Liner plates are designed to be used in the numbers and with radii corresponding to inside diameters as designated in Table 1.

8. Workmanship, Finish, and Appearance

8.1 Liner plates shall be uniformly vitrified throughout their thickness and have a homogeneous structural texture. They shall be free of chips that are more than $\frac{1}{4}$ by $\frac{3}{4}$ in. (6.4 by 19 mm) in surface dimension or that have a depth greater than $\frac{1}{64}$ in. (4.4 mm). They shall be free of well-defined cracks and shall have no blister with a dimension exceeding $\frac{1}{2}$ in. (13 mm) and no blister shall project more than $\frac{1}{8}$ in. (3.2 mm) above the surface of the liner plate. The edges shall be straight and the corners square to a degree that will permit smooth and adequate peripheral joints. Faces intended to beplane or faces intended to be curved shall have no distortion greater than 1 % of the largest dimension of the face.

9. Test Methods

9.1 Perform tests in accordance with Test Methods C 301.

10. Acceptance Testing

10.1 If required, 10 plates per 1000 shall be tested by passing through a hollow gage having the maximum allowed dimensions

TABLE 1 Vitrified Clay Liner Plate Dimensions

Inside Diameter of Structure in.	(mm)	Number of Liner Plates to the Circle	Face Radius in.	(mm)
36	(914)	12	18	(457)
42	(1067)	14	24	(533)
42	(1070)	14	21	(533)
48	(1219)	16	26 $\frac{1}{4}$	(667)
48	(1220)	16	26 $\frac{1}{4}$	(667)
54	(1372)	18	26 $\frac{1}{4}$	(667)
54	(1370)	18	26 $\frac{1}{4}$	(667)
60	(1524)	20	33	(838)
60	(1520)	20	33	(838)
66	(1676)	22	33	(838)
66	(1680)	22	33	(838)
72	(1829)	24	33	(838)
72	(1830)	24	33	(838)
78	(1981)	26	45	(1143)
78	(1980)	26	45	(1140)
84	(2134)	28	45	(1143)
84	(2130)	28	45	(1140)
90	(2286)	30	45	(1143)
90	(2290)	30	45	(1140)
96	(2438)	32	45	(1143)
96	(2440)	32	45	(1140)
102	(2591)	34	45	(1143)
102	(2590)	34	45	(1140)
108	(2743)	36		
108	(2740)	36		
114	(2896)	38		
114	(2900)	38		
120	(3048)	40		
120	(3050)	40		
126	(3200)	42		
132	(3353)	44		
132	(3350)	44		
138	(3505)	46		
138	(3510)	46		
144	(3658)	48		
144	(3660)	48		

flat plates to be used

herein specified for the plate shape, and a straight length-wise opening to ensure compliance of shape, with regard to transverse or longitudinal warp.

10.2 If any of the specimens fail to meet the test requirements, a retest of two additional specimens for each specimen failed shall be allowed.

10.3 Liner plates shall be acceptable when the appropriate number of retest specimens all meet the specified requirements.

11. Keywords

11.1 abutment; acid resistance; appurtenances; chemical resistance; clay; culvert; curved liner plates; liner plate; protective lining; sewer; straight liner plates; 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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