



Standard Guide for Design and Construction of Brick Liners for Industrial Chimneys¹

This standard is issued under the fixed designation C1298; 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.

1. Scope

1.1 This guide covers procedures for the design, construction, and serviceability of brick liners for industrial chimneys. The structural design criteria are applicable to vertical masonry cantilever structures supported only at their base, either by a foundation, a concrete pedestal, or by some means from the outer concrete shell. Excluded from direct consideration are single-wythe, sectional brick linings that are supported on a series of corbels cast in the outer chimney shell.

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.

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:²

- C395 Specification for Chemical-Resistant Resin Mortars
- C466 Specification for Chemically Setting Silicate and Silica Chemical-Resistant Mortars
- C980 Specification for Industrial Chimney Lining Brick
- E447 Test Method for Compressive Strength of Laboratory Constructed Masonry Prisms (Withdrawn 1997)³
- E111 Test Method for Young's Modulus, Tangent Modulus, and Chord Modulus

¹ This guide is under the jurisdiction of ASTM Committee C15 on Manufactured Masonry Units and is the direct responsibility of Subcommittee C15.05 on Masonry Assemblies.

Current edition approved June 1, 2013. Published June 2013. Originally approved in 1995. Last previous edition approved in 2007 as C1298 – 95 (2007). DOI: 10.1520/C1298-95R13.

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

³ The last approved version of this historical standard is referenced on www.astm.org.

2.2 ACI Standard:

307–88 Practice for the Design and Construction of Cast-In-Place Reinforced Concrete Chimneys⁴

2.3 ASCE Standard:

ASCE 7-88 Minimum Design Loads for Buildings and Other Structures (Formerly ANSI A58.1)⁵

2.4 Other Standard:

1991 Uniform Building Code, International Conference of Building Code Officials, California⁶

3. Terminology

3.1 Notations:

- a = brick dimension in radial direction (in.)
- b = brick dimension in tangential direction (in.)
- c = brick chamfer (in.)
- C_e = chimney deflection due to earthquake loads (in.)
- d = outside diameter of brick liner (in.)
- D = mean liner diameter at a given elevation (in.)
- E_m = masonry modulus of elasticity as established by performing brick prism test or by past experience, psi
- f_b = critical liner buckling stress, psi
- f_d = maximum vertical compressive stress due to dead load, psi
- f_{de} = maximum vertical compressive stress due to the combined effect of earthquake and dead load, psi
- f_{dw} = maximum vertical compressive stress due to the combined effect of wind and dead load, psi
- f_m = average ultimate masonry compressive strength established by performing brick prism test or by past experience, psi
- f_v = maximum shear stress due to wind or earthquake, psi
- $F.S.$ = factor of safety
- h = total liner height (ft)
- h_e = height of liner above elevation being checked for buckling (ft)
- L_e = liner deflection due to earthquake loads (in.)
- P = constructional out-of-plumbness of liner with respect to shell (in.)
- r = average mean radius of liner (ft)
- S = shell deflection due to sun effect (in.)
- T = liner deflection due to differential temperature effects (in.)
- t = wall thickness (in.)
- v = coefficient of variation in brick prism tests
- W = shell deflection due to design wind loads (in.)
- α = coefficient of thermal expansion for brick liner (use 3.5×10^{-6} unless otherwise established) (in./in./°F)

⁴ Available from American Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333-9094, <http://www.aci-int.org>.

⁵ Available from American Society of Civil Engineers (ASCE), 1801 Alexander Bell Dr., Reston, VA 20191, <http://www.asce.org>.

⁶ Available from International Code Council (ICC), 5203 Leesburg Pike, Suite 600, Falls Church, VA 22041-3401, <http://www.intlcode.org>.