



Standard Specification for Chemical-Resistant Carbon Brick¹

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1. Scope

1.1 This specification covers machine made solid uncured carbon brick produced from either metallurgical or petroleum calcined coke, baked to a minimum 1850°F (1010°C), and suitable for use in masonry construction which will be exposed to various chemicals. These units are designed primarily for industries using hydrofluoric acid, fluoride salts, and high concentrations of alkalis such as sodium and potassium hydroxide. Carbon brick are normally used with carbon filled chemical-resistant mortars.

1.2 *This standard does not purport to address 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 67 Test Methods of Sampling and Testing Brick and Structural Clay Tile²

C 561 Test Method for Ash in a Graphite Sample³

C 904 Terminology Relating to Chemical-Resistant Non-metallic Materials²

C 1106 Test Methods for Chemical Resistance and Physical Properties of Carbon Brick²

3. Terminology

3.1 **Definitions**—For definitions of terms used in this specification, see Terminology C 904.

4. Significance and Use

4.1 The chemical-resistant carbon brick meeting this specification is intended for use in acid and alkaline service at varying temperatures. Physical stress imposed on the brick attributable to thermal shock or pressure differential may or may not be a consideration. The corrosion resistance and structural integrity of the brick are dependent on the type and purity of the carbon and binder used when the brick is manufactured.

TABLE 1 General Guide to Chemical Resistance of Carbon Brick

NOTE 1—This table is intended for use as a general guide to the resistance of carbon brick in immersion service at ambient temperatures. Specific recommendations should be obtained from the carbon brick manufacturer. Carbon brick can be used to 650°F (340°C). Over 650°F (340°C), strict environmental control is paramount to ensure that the environment is non-oxidizing.

Medium	Chemical Resistance ^A
Nitric Acid, to 40 %	R
Hydrofluoric Acid, to 40 %	R
Blend—25 % Nitric, 10 % Hydrofluoric, 65 % Water	R
Hydrochloric Acid, to 35 %	R
Phosphoric Acid, to 75 %	R
Sulfuric Acid, to 50 %	R
Sodium Hydroxide, to 50 %	R
Potassium Hydroxide, to 50 %	R

^A R = Recommended.

4.2 The performance of the brick as tested in Test Methods C 1106 or other tests or other qualifying data should be reviewed between the purchaser and the seller.

5. Sampling

5.1 The brick shall be sampled in accordance with Test Methods C 67.

6. Chemical Resistance

6.1 Carbon brick are inherently non-wetting and highly resistant to many acids, alkalis, salts, and solvents and combinations of these chemicals at varying temperatures and concentrations.

6.2 The carbon brick shall be tested in accordance with Test Methods C 1106 using a chemical and thermal environment.

6.3 To comply with this specification, the carbon brick shall exhibit chemical resistance to those chemical media stated in Table 1 when carried out at ambient temperature in accordance with Test Methods C 1106.

7. Physical Properties

7.1 The carbon brick shall comply with the values shown in

TABLE 2 Physical and Chemical Requirements

Property	Value
Compressive Strength, psi (MPa), min	6000 (41)
Modulus of Rupture, psi (MPa), min	1500 (10)
Water Absorption, %, max	10
Ash, %, max	8

¹ This specification is under the jurisdiction of ASTM Committee C-3 on Chemical-Resistant Nonmetallic Materials and is the direct responsibility of Subcommittee C03.02 on Mortar and Monolithics.

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² Annual Book of ASTM Standards, Vol 04.05.

³ Annual Book of ASTM Standards, Vol 15.01.