



Designation: **C 43 – 03a**

Standard Terminology of Structural Clay Products¹

This standard is issued under the fixed designation C 43; 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 terminology contains terms and definitions of terms associated with the standards specific to masonry units and roofing tile manufactured by firing clay and shale raw materials.

1.2 The definitions and definitions of terms in this terminology pertain to Specifications C 32, C 34, C 56, C 62, C 126, C 212, C 216, C 279, C 410, C 652, C 902, C 1088, C 1167, C 1261, C 1272 and Test Methods C 67.

1.3 Generic terminology for masonry is found in Terminology C 1232. Terminology C 1232 also applies to masonry units manufactured by firing clay and shale raw materials.

¹ This terminology is under the jurisdiction of ASTM Committee C15 on Manufactured Masonry Units and is the direct responsibility of Subcommittee C15.08 on Terminology.

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*A Summary of Changes section appears at the end of this standard.

2. Referenced Documents

2.1 ASTM Standards:²

- C 32 Specification for Sewer and Manhole Brick (Made from Clay or Shale)
- C 34 Specification for Structural Clay Load-Bearing Wall Tile
- C 56 Specification for Structural Clay Non-Load-Bearing Tile
- C 62 Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)
- C 67 Test Methods for Sampling and Testing Brick and Structural Clay Tile
- C 126 Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units
- C 212 Specification for Structural Clay Facing Tile
- C 216 Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)
- C 279 Specification for Chemical-Resistant Masonry Units
- C 410 Specification for Industrial Floor Brick
- C 652 Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)
- C 902 Specification for Pedestrian and Light Traffic Paving Brick
- C 1088 Specification for Thin Veneer Brick Units Made from Clay or Shale
- C 1167 Specification for Clay Roof Tiles
- C 1232 Terminology of Masonry
- C 1261 Specification for Firebox Brick for Residential Fireplaces
- C 1272 Specification for Heavy Vehicular Paving Brick
- C 1405 Specification for Glazed Brick (Single-Fired, Solid Brick Units)

3. Terminology

3.1 Terms and Definitions:

RAW MATERIALS

clay, n—an earthy or stony mineral aggregate consisting essentially of hydrous silicates of alumina, plastic when sufficiently pulverized and wetted, rigid when dry, and vitreous when fired to a sufficiently high temperature.

fire clay, n—a sedimentary clay of low flux content.

reactive particulates, n—a particle or particles present in a clay body, which when near the surface may flake off or cause an eruption (pop-outs) of the surface when exposed to the weather.

shale, n—a thinly stratified, consolidated, sedimentary clay with well-marked cleavage parallel to the bedding.

surface clay, n—an unconsolidated, unstratified clay, occurring on the surface.

MANUFACTURE

cells/core holes, n—continuous openings or perforations within extruded clay products.

DISCUSSION—The extent of permissible openings is specified for each product as the percentage of gross area in the normal bedding surface plane that must be net (solid) area. Core hole is generally used for brick while cell is used for structural tile. Cells are distinguished from core holes by being larger in size. As an illustration, cells must be larger than 1 in.² (645 mm²) under Specification C 34, and 1½ in.² (968 mm²) under Specification C 652.

coring, v—the process of perforating structural clay products, generally performed during extrusion by supporting cores (rods) within the shaping cap of the extruder.

extrusion, n—shaping of brick by pushing plastic clay or shale through a die opening that forms the peripheral dimensions of the brick.

DISCUSSION—The column of extrudate is then cut into sections to provide the third dimension of the brick. Water is added to the clay or shale in sufficient quantities to permit laminar flow through the extrusion machine. The consistency of the extrudate may vary from stiff and capable of supporting several times its weight to soft and deformable under slight loads.

fired bond, n—bond developed between particulate constituents of brick solely as the result of the firing process.

DISCUSSION—The bond may result from fusion or melting of one or more constituents of the composition or the surface of particles. Other thermal mechanisms such as sintering and interparticle reaction may be responsible for the bond.

The higher the heat treatment, the greater the extent of bonding and consequently the greater the developed strength and the lower the resulting porosity. The bond development should be sufficient to provide the specified strength, porosity, and durability for any particular product.

firing, v—process of heating the material to elevated temperatures.

DISCUSSION—The temperatures are usually in excess of 1706°F (930°C). The extent of firing is a function of both time and temperature. The firing develops the inter-particulate bond, the strengths, the pore structure, and the color of the product. The extent of firing should be sufficient to produce

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

the levels of these properties required by the specifications for the particular product.

incipient fusion, *n*—beginning of the development of fired bond.

molding, *v*—shaping of brick by dropping, throwing, or vibrating wet clay or shale in a mold cavity shaped to provide the peripheral dimensions of the brick.

DISCUSSION—Sufficient water is mixed with the clay or shale to produce a soft consistency.

When insides of molds are sanded to prevent sticking of clay, the product is sand-struck brick. When the molds are wetted to prevent sticking, the product is water-struck brick.

pressing, *v*—shaping of brick by pressing clay or shale into a mold cavity which forms the peripheral dimensions of the brick.

DISCUSSION—Different subclassifications of pressing are defined by the quantity of water mixed with the clay or shale.

Dry pressing uses high forming pressures and low water contents usually between 0 and 5 %.

Plastic pressing uses low pressures and sufficient water to produce a plastic mixture.

Semi-dry pressing uses intermediate pressures and water quantities nominally between 5 and 14 %.

struck surface, *n*—the surface of a molded brick that is not in contact with the mold and from which the excess clay/shale mixture is removed.

webs, *n*—the partitions dividing tile or hollow brick into cells.

PRODUCT PROPERTIES

absorption, *n*—weight of water picked up by a clay masonry unit during immersion at prescribed conditions expressed in relation to the dry weight of the unit.

DISCUSSION—Two conditions of immersion are designated in standards relating to brick: 24 h in room temperature (60–86°F (15.5–30°C)) water or 5 h in boiling water. (Different time intervals are specified for structural tile and other products.) The resulting absorptions are termed *cold water absorption* and *boiling water absorption*.

Absorption values are used in brick and tile standards as one factor in classifying these products into durability grades. Absorptions are indicators of the extent of firing during manufacture as well as being indicators of durability.

impervious, *adj*—describes the state of having obtained that degree of vitrification evidenced visually by resistance to penetration of a specified dye.

initial rate of absorption, *n*—a measure of the suction of water upward into a dry brick from a bed face during one minute of exposure.

DISCUSSION—Initial rate of absorption (IRA) is a distinct property that offers different information from absorption. It is expressed as grams of water picked up in one minute by a net area of 30 in.² (194 cm²).

Initial rate of absorption is one factor influencing the quality of bond between brick and mortar. It is used in brick standards to recommend construction practices for enhancing mortar to brick bonding.

SURFACE FEATURES

coated finish, *n*—the surface feature resulting when mineral particles are applied to the column in the extrusion process to impart color, texture, opacity, or other characteristics.

combed finish, *n*—the surface texture resulting when faces are altered by more or less parallel scratches or scarfs in manufacture.

engobe, *n*—a slip, other than a glaze, that is not impervious and is applied to a ceramic body to function as a glaze undercoat or to impart color, texture, opacity, or other characteristics.

flushed finish, *n*—the surface feature resulting when faces have a range of color produced by the control of the atmospheric conditions in the kiln during firing.

glaze, *n*—an impervious facial finish composed of ceramic materials, fused during firing with the body of brick or tile, which is a semivitreous or vitreous surface and may be clear, white, or colored.

natural finish, *n*—the surface color obtained when units without materials added to the surfaces for appearance purposes are fired to the natural color of the material used in forming the body.

plaster-base finish, *n*—the surface texture intended for the direct application of plaster.

DISCUSSION—Plaster-base finishes may be smooth, scored, combed, or roughened.

roughened finish, *n*—the surface texture resulting when die surfaces are broken by mechanical means, such as wire cutting or wire brushing.

salt glaze, *n*—the surface feature resulting when faces have a lustrous glazed finish from the thermochemical reaction of the silicates of the clay body with vapors of salt or chemicals.

sand finish, *n*—the surface feature resulting when faces have sand applied either to the clay column in the extrusion process for appearance purposes or as the lubricant to the molds in the molding process.

slip, *n*—a suspension of clay and mineral particles in a water medium applied to a ceramic body that, when fired, may function as a glaze or an engobe.

smooth finish, n—the surface texture resulting when faces are not altered or marked in the extrusion process, but are left as formed by the die.

through-body color, n—the range of surface color obtained when units without materials added to the surfaces for appearance purposes are fired.

BRICK

acid-resistant brick, n—brick suitable for use in contact with chemicals, usually in conjunction with acid-resistant mortars. See Specification C 279.

brick, n—a solid masonry unit of clay or shale, usually formed into a rectangular prism while plastic and burned or fired in a kiln. Brick is a ceramic product.

building brick, n—brick for building purposes not especially produced for texture or color (formerly called common brick). See Specification C 62.

facing brick, n—brick made especially for facing purposes; see Specification C 216.

DISCUSSION—Facing brick is produced from selected clays and is available in typical face sizes, various colors, and in smooth, fine, medium, and coarse textures.

floor brick, n—smooth, dense brick, highly resistant to abrasion, used as finished floor surfaces. See Specification C 410.

hollow brick, n—a cellular masonry unit made from clay or shale and kiln-fired to produce designated properties; see Specification C 652.

DISCUSSION—Hollow brick have larger percentages of void areas than permissible with solid brick. See Specification C 62 and Specification C 216.

paving brick, n—brick made to provide the wearing surface of highways, streets, driveways, walkways, patios, and similar applications. See Specifications C 902 and C 1272.

sewer brick, n—low absorption, abrasive-resistant brick intended for use in drainage structures. See Specification C 32.

specially-shaped brick, n—a brick manufactured to a basic shape of other than a rectangular prism.

STRUCTURAL CLAY TILE

end-construction tile, n—tile designed to receive its compressive stress parallel to the axes of the cells.

fireproofing tile, n—tile for use as a protection for structural members against fire.

furring tile, n—tile for lining the inside of walls and carrying no superimposed loads.

header tile, n—tile designed to provide recesses for brick header units in masonry faced walls.

loadbearing tile, n—tile for use in masonry constructions designed to carry superimposed loads. See Specification C 34.

nonloadbearing tile, n—tile for use in masonry constructions carrying no superimposed loads. See Specification C 56.

partition tile, n—tile for use in building interior partitions, subdividing areas into rooms, or similar constructions, and carrying no superimposed loads.

side-construction tile, n—tile designed to receive its compressive stress at right angles to the axes of the cells.

structural clay facing tile, n—tile designed for use in interior and exterior unplastered walls, partitions or columns. See Specification C 212.

structural clay tile, n—hollow burned-clay masonry building units with parallel cells or cores or both.

CLAY ROOF TILE

batten lugs, n—protrusions on the underside of tile designed to engage over the upper edge of tiling battens.

clay roof tile, n—a solid unit of clay or shale, or both, formed into any of a range of generally rectangular planar shapes while plastic and fired in kiln. Clay roof tile is a ceramic product. See Specification C 1167.

head lap, n—(1) the distance between the lower (nose) edge of an overlapping tile and the upper edge of the lapped unit in the course immediately below; (2) for *shingle tile only*—the distance between the lower (nose) edge of an overlapping shingle tile and the upper edge of the lapped unit in the second course below.

DISCUSSION—The head lap and side lap specified with a particular tile form the basis for determining area coverage of the specific design and the computation of the number of units required to cover a given area of roof. Tile is specified and sold on the basis of number of units required to cover one roofing square, that is, 100 ft.²(9.29 m²) of roof.

high profile tile, n—tile having a rise to width ratio greater than 1:4.

hip and ridge tile, n—tile designed for application to the hip or ridge of a roof.

interlocking tile, n—tile with a system of ribs or grooves enabling the lateral joining of adjacent tiles in the same course with the overlocking edge of one tile covering the underlocking edge of another forming the side lap.

DISCUSSION—In some tile designs, provision is also made for interlocking in the overlapping area of the head lap.

length, n—the maximum dimension of the tile measured parallel to the water channels or perpendicular to the eave of the roof.

low profile tile, n—tile having a rise to width ratio equal to, or less than 1:4.

nail hole, *n*—an appropriately sized opening such that tile shall not be fractured by the fastener and fixing process used to attach the tile to the roof deck.

non-interlocking tile, *n*—tile without restrictive ribs, grooves, or channels at the side lap or head lap.

nose, *n*—the lower visible edge of tile as applied on the roof.

nose lugs, *n*—projections on the underside of the nose of each tile contoured to fit into the main water courses of the tile immediately below, inhibiting the entry of wind-driven rain.

profile, *n*—the contour of the top surface of the tile when viewed from the nose end.

rise, *n*—the maximum dimension of the cross-sectional profile of the tile measured perpendicular to the roof surface as installed.

side lap, *n*—the distance by which the side edge of one tile overlaps the side edge of an adjacent tile in the same course; for interlocking tile this corresponds to the width of that part of the tile that contains the ribs, grooves, or channels which provide for interlocking. (See *Discussion* under **head lap**.)

thickness, *n*—a measurement of the cross section of the tile made perpendicular to its surface.

width, *n*—the maximum dimension of the tile measured perpendicular to the length.

SUMMARY OF CHANGES

Committee C15 has identified the location of the following selected changes to this standard since C 43–02 C 43–03 that may impact the use of this standard.

(1) In Section 3.1, the term "natural finish" was deleted and "through-body color", with a similar definition, was added.

Committee C15 has identified the following selected changes to this standard since C 43 – 02 that may impact the use of this standard.

(1) In 3.1, under “Surface Features” the definitions of terms for various finishes were revised to identify them as surface features.

(2) In 3.1, terminology for “impervious” was revised to indicate the use of a specific dye.

(3) In 3.1, the definition of “natural finish” was revised to exclude all applied surface treatments.

(4) In 3.1, the definition of “sand finish” was revised to clarify use for appearance purposes.

(5) Terminology for “bed surface,” “brick face,” and “exposed finish” was removed from 3.1, Terms and Definitions.

(6) In 3.1, the definitions of terms containing more than one sentence were revised to identify the remaining content as Discussion.

(7) In 3.1, a definition for “coated finish” was added under the heading “Surface Features.”

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