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# BRICK

**BRICK,** blocks of tempered mud, either sun-dried (*ḵešt*) or baked in a kiln (*ājor*), the traditional building material in most of Iran. It has customarily been made from a mixture of water-soaked earth (*gel-čāl*), straw, and chaff (*kāh*) and formed in wooden molds, which in the 20th century are standardized at about 20 x 20 x 4.5 cm (Wulff, *Crafts*, pp. 109-10). The earliest recorded use of sun-dried bricks (*ḵešt*) in Iran was at Ganj Dareh (Ganj-Dara) near Kermānšāh, where walls in level E, possibly of the late 9th or early 8th millennium b.c., were constructed of plano-convex and cigar-shaped bricks (Smith, pp. 178-80; see also Schmandt-Besserat, pp. 13-14).

The relatively durable baked brick (*ājor*), fired to hardness in a kiln, though familiar in Mesopotamian architecture from the Early Dynastic period (ca. 3000-2300 b.c.; Delougaz; Eaton-Francis, p. 5), came into use in monumental structures in Iran only in the 2nd millennium b.c. In Mesopotamia and Elam the standard brick size dictated basic architectural proportions, as can be seen in the molded relief panels on the facade of the Kassite temple of Innin (Innana) at Uruk (Warka), dated ca. 1413 b.c., and the Middle Elamite temple of Inshushinak at Susa, of the 12th century b.c. (Orthmann, fig. 169 and p. 295; Amiet, 1966, fig. 299).

A considerable advance in brick technology occurred in Elam in about the 13th century b.c., when blocks intended for decorative purposes were molded from siliceous earth mixed with lime and fired (Amiet, 1976, p. 14; Carter and Stolper, pp. 157, 161; Porada, p. 53). These bricks were relatively lightweight, porous, and durable; they also could be enhanced by molded reliefs on their

outer surfaces and were coated with colored lead-based glazes (Amiet, 1976, p. 14). Glazed bricks of this kind continued in use through the neo-Elamite period (ca. 1000-600 b.c.) and were also frequently adopted for wall decoration in Achaemenid architecture (559-330 b.c.), for example, the Archer Frieze from the *apadāna* (great hall) at Susa, now in the Louvre Museum, Paris (Dieulafoy, pp. 253f.; Mecquenem et al., passim; Azarpay, pp. 192-96). The fundamental relationship between brick size and architectural proportion apparently also persisted into the Achaemenid period, when the standard brick size was 33-35 x 33-35 x 8-9 cm (Hesse, pp. 219-41; Perrot and Ladiray, pp. 44, 48; Azarpay, loc. cit,),

In the Parthian (247 b.c.-a.d. 224) and Sasanian (224-651) periods mortared rubble was preferred for monumental architecture (Keall, 1967, pp. 101-02; idem, 1977, pp. 1-9), though bricks continued to be used. They were flat and squared and made in standard sizes: The Parthian bricks were similar to those of the Achaemenid period (30-40 x 30-40 x 10-13 cm) and generally smaller than those of contemporary Bactria and Transoxiana under the Kushans (Colledge, p. 25; Francfort, p. 58). In the Sasanian period the same type continued, though sizes varied considerably (Bier, p. 53 and n. 158). Exploitation of gypsum mortar (*gač*) as a bonding agent permitted construction of barrel-vaulted *ayvān*s and the dome on squinches (See čaharṭāq), introduced in the Parthian and Sasanian periods respectively. The Mesopotamian technique of covering the bare brick or rubble surfaces of a building with gypsum plaster, to protect against moisture, to mask unevenness in the wall surface, and sometimes to serve as a base for carved or painted decoration (Place, pp. 272-73; Haller, pp. 107, 116-17, 167), may have been introduced into Iran under the Parthians (Keall, 1977, pp. 104, 109); it was widely used in the Sasanian period. Sasanian architects also occasionally used bricks ornamentally, anticipating the decorative use of brick bonding in Iranian architecture of the Islamic Middle Ages (Deshayes, p, 146; Boucharlat, p, 334; Bier, pp. 43-45).

In Islamic Iran the dimensions of bricks have varied considerably. In the Mongol period (654-736/1256-1336) the most common brick ranged between 18 and 31 cm square and between 4 and 7 cm thick (Wilber, 1955, p. 48 n. 10). Until the 4th/10th century building exteriors were characterized by simple surface patterns created by the structural bonding of bricks with mortar. Under the Samanids (204-395/819-1005) core structures were sometimes masked with brick “skins,” which provided an opportunity for more complex

bonding patterns and cut-brick decoration. This technique, which may have originated in Central Asia, quickly spread throughout Iran and was considerably elaborated. In addition, bricks were frequently set in different planes in order to add contrast between light and shadow to the decorative range. Although devoid of any relation to the architectural matrix, these patterns thus served to enliven otherwise dull, dun-colored surfaces (*Survey of Persian Art* III, pp. 1267-93; Wilber, 1939, p. 17). This type of exterior ornamentation was further elaborated from the 5th/11th century with the introduction of brightly colored glazed bricks or tiles. At first used sparingly as accents in the brickwork, these materials were eventually combined to face entire expanses of brick, thus imbuing exterior walls and domes with color and glitter. Probably in the late 6th/12th century interior walls also came to be faced with luster-painted and polychrome glazed tiles (*kāšī*), produced mainly in the celebrated ceramic center of Kāšān (see also ceramics).

In a parallel line of development brick-built *ayvān*s and domes grew progressively larger and more elaborate, owing to the strength of gypsum mortar, which permitted daring solutions that seemed to defy gravity. In the 17th-century mosques of Isfahan, for example, vaults up to 30 m wide and colossal thin-shelled domes on complex squinches “achieved a lightness and elasticity rivalled only by the Gothic stone architecture of northern Europe, and a beauty qualifying it for the circle of the greatest arts where no rivalry can be supposed” (*Survey of Persian Art* III, p. 901; cf. pp. 1165-1215).

Since World War II the industrial production of baked bricks and cement has been rapidly displacing the manufacture of traditional materials, sharply altering the organization of the building trades so that the old techniques of brick construction are gradually being lost (Bromberger, pp. 710-11).

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