IS 13757 : 1993
( Reaffirmed 1998 )

भारतीय मानक

# पकी मिट्टी उडनराख भवन निर्माण ईंटों की विशिष्टि

*Indian Standard*

# BURNT CLAY FLY ASH BUILDING BRICKS — SPECIFICATION

UDC 691·421·431



BUREAU OF INDIAN STANDARDS
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Price Group 2

## FOREWORD

Increasing number of thermal power plants have been coming up in the country and bringing with them an acute environmental problem in the form of flyash. Dumping of dry flyash on land devours large areas of fertile land and also flies off in the air to places near the dumping around making the atmosphere dusty and unhealthy. Wet dumping with water creates problems like polluting the ground water in addition to devouring the land where this flyash slurry is disposed off in ponds.

To overcome these problem, many new uses for flyash have been found out through research. One such use is the use of flyash for making building bricks in conjunction with clay. This use of flyash has the added advantage of conserving the fertile top soil in brick manufacturing areas. Further, addition of flyash even improves the brick making qualities of certain types of soils.

The standard has been prepared on similar lines to the Indian Standard IS 1077 : 1992, Specification for common burnt clay building bricks ( *fifth revision* ), keeping in view the same end use to which these two type of bricks are put.

Keeping in view the advantages of modular co-ordination, Indian standards specify the dimensions of standards bricks in 100 mm module as the basis of all dimensional standardization in regard to building components. This is also in confirmity with the decision of Government of India to adopt metric system in the country. Considering the various issues regarding the manufacturing and other practices followed in the country, the Sectional Committee responsible for the preparation of this standard had specified modular size of the brick. Advantages that a modular brick has over traditional brick are many, such as:

a) requires less drying area;

b) saving in space of floor area;

c) economy in cost of brick masonry;

d) saving in labour cost;

e) less losses during handling etc; and

f) less consumption of mortar.

However, it was brought to the notice of committee that there was sufficient demand for sizes other than modular sizes and that the manufacturers were meeting such demands at present. this had led to a situation where bricks satisfying other reguirments of the standard, but not the requirements regarding dimensions were classified as not satisfying the requirements of the standard. Therefore, the Committee has decided to include the non-modular size of the brick in addition to the modular size. This relaxation will be for a period of four years from the publication of this standard and it is intended that the manufacturers and consumer organization can gradually switch over within this period to the modular sizes, which are the preferred sizes.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values ( *revised* )'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# *Indian Standard*

# BURNT CLAY FLY ASH BUILDING BRICKS — SPECIFICATION

## 1 SCOPE

**1.1** This standard lays down requirements for classification, general quality, dimensions and physical requirements of common burnt clay building bricks used in buildings.

NOTE — Burnt clay flyash bricks having compressive strength less than 30 N/mm² approximately 300 kgf/cm² are covered in this standard and for higher strength, see IS 2180 : 1988 and IS 1077 : 1992.

## 2 REFERENCES

**2.1** The Indian Standards listed in Annex A are necessary adjuncts to this standard.

## 3 TERMINOLOGY

**3.1** For the purpose of this standard, the definitions given in IS 2248 : 1981 (*under revision*) shall apply.

## 4 CLASSIFICATION

**4.1** Burnt clay fly ash bricks shall be classified on the basis of average compressive strength as given in Table 1.

**Table 1 Classes of Burnt Clay-Fly Ash Bricks**

(*Clause* 4.1)

| Class Designation | Average Compressive Strength Not Less than | |
|---|---|---|
| | N/mm² | kgf/cm² (Appox) |
| 30 | 30.0 | (300) |
| 25 | 25·0 | (250) |
| 20 | 20·0 | (200) |
| 17·5 | 17·5 | (175) |
| 15 | 15·0 | (150) |
| 12·5 | 12·5 | (125) |
| 10 | 10·0 | (100) |
| 7·5 | 7·5 | (75) |
| 5 | 5·0 | (50) |
| 3·5 | 3·5 | (35) |

## 5 GENERAL QUALITY

**5.1** Clay flyash bricks shall be hand or machine moulded and shall be made from the admixture of suitable soils and flyash in optimum soils and flyash in optimum proportions, *see* IS 2117 : 1991 The flyash used for manufacture of bricks shall conform to grade 1 or grade 2 as per IS 3812 : 1981. The bricks shall be uniformly burnt, free from cracks and flaws as black coring, nodules of stone and/or free lime and organic matter. In case of non-modular size of bricks, frog dimensions shall be the same as for modular size bricks.

**5.2** Hand-moulded bricks of 90 mm or 70 mm height shall be moulded with a frog 10 to 20 mm deep on one of its flat sides; the shape and size of the frog shall conform to either Fig. 1A or Fig. 1B (Refer **6.1.1** for *L*, *W* and *H*). Bricks of 40 or 30 mm height as well as those made by extrusion process may not be provided with frogs.

**5.3** The bricks shall have smooth rectangular faces with sharp corners and shall be uniform in shape and colour.

## 6 DIMENSIONS AND TOLERANCES

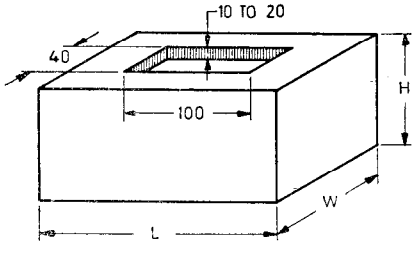
### 6.1 Dimensions

**6.1.1** The standard modular sizes of clay building fly ash bricks shall be as follows (Fig. 1A and 1B):

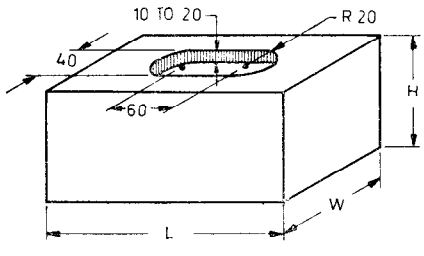
| *Length* (*L*) | *Width* (*W*) | *Height* (*H*) |
|---|---|---|
| mm | mm | mm |
| 190 | 90 | 90 |
| 190 | 90 | 40 |

**6.1.2** The following non-modular sizes of the bricks may also be used (Fig. 1A and Fig. 1B):

| | | |
|---|---|---|
| 230 | 110 | 70 |
| 230 | 110 | 30 |




1A




1B

All dimensions in millimetres.

FIG. 1 SHAPE AND SIZE OF FROGS IN BRICKS

**6.1.2.1** For obtaining proper bond arrangement and modular dimensions for the brickwork, with the non-modular sizes, the following sizes of the bricks may also be used:

| | | | |
|---|---|---|---|
| 70 | 110 | 70 | 1/3 length brick |
| 230 | 50 | 70 | 1/2 width brick |

### 6.2 Tolerances

The dimensions of bricks when tested in accordance with **6.2.1** shall be within the following limits per 20 bricks:

a) For modular size

Length 3 720 to 3 880 mm ( 3 800 ± 80 mm )

Width 1 760 to 1 840 mm ( 1 800 ± 40 mm )

Height 1 760 to 1 840 mm ( 1 800 ± 40 mm )
( For 90 mm high bricks )

760 to 840 mm ( 800 ± 40 mm )
( For 40 mm high bricks )

b) For non-modular size

Length 4 520 to 4 680 mm ( 4 600 ± 80 mm )

Width 2240 to 2160 mm ( 2 200 ± 40 mm )

Height 1 440 to 1 360 mm ( 1 400 ± 40 mm )
( For 70 mm high bricks )

640 to 560 mm ( 600 ± 40 mm )
( For 30 mm high bricks )

**6.2.1** Twenty ( or more according to the size of stack ) whole bricks shall be selected at random from the sample selected under **8**. All blisters, loose particles of clay and small projections shall be removed. They shall then be arranged upon a level surface successively as indicated in Fig. 2A, 2B and 2C in contact with each other and in a straight line. The overall length of the assembled bricks shall be measured with a steel tape or other suitable inextensible measure sufficiently long to measure the whole row at one stretch. Measurement by repeated application of short rule or measure shall not be permitted. If, for any reason it is found impracticable to measure bricks in one row, the sample may be divided into rows of 10 bricks each which shall be measured separately to the nearest millimetre. All these dimensions shall be added together.

## 7 PHYSICAL REQUIREMENTS

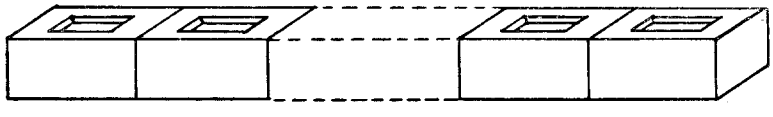
### 7.1 Compressive Strength

The bricks, when tested in accordance with the procedure laid down in IS 3495 ( Part 1 ) : 1992 shall have a minimum average compressive strength for various classes as given in **4.1**.

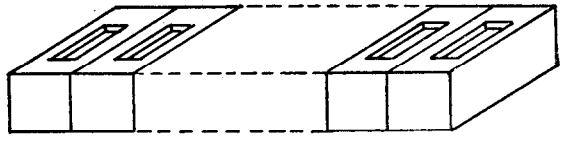
**7.1.1** The compressive strength of any individual brick tested shall not fall below the minimum compressive strength specified for the corresponding class of brick. The lot shall be then checked for next lower class of brick.

### 7.2 Water Absorption

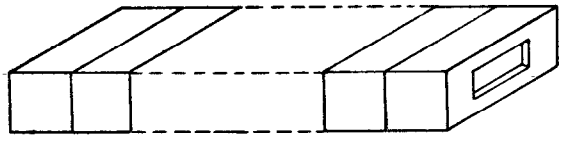
The bricks, when tested in accordance with the procedure laid down in IS 3495 ( Part 2 ) : 1992 after immersion in cold water for 24 hours, water absorption shall not be more than 20 per-



2A MEASUREMENT OF LENGTH



2B MEASUREMENT OF WIDTH



2C MEASUREMENT OF HEIGHT

FIG. 2 MEASUREMENT OF TOLERANCES OF COMMON BUILDING BRICKS

cent by weight up to class 12.5 and 15 percent by weight for higher classes.

**7.3 Efflorescence**

The bricks when tested in accordance with the procedure laid down in IS 3495 ( Part 3 ) : 1992 the rating of efflorescence shall not be more than 'moderate' up to class 12.5 and 'slight' for higher classes.

## 8 SAMPLING AND CRITERION FOR CONFORMITY

**8.1** Sampling of clay-flyash building bricks shall be done in accordance with the procedure laid down in IS 5454 : 1978. The criterion for conformity shall be as given in IS 5454 : 1978.

## 9 MARKING

**9.1** Each brick shall be marked ( in the frog where provided ) with the manufacturer's identification mark or initials.

**9.1.1** The manufacturer may also use the Standard mark.

# ANNEX A
( *Clause* 2.1 )

## LIST OF REFERRED INDIAN STANDARDS

| *IS No.* | *Title* |
|---|---|
| 1077 : 1992 | Specification for common burnt clay building bricks (*fifth revision* ) |
| 2117 : 1991 | Guide for manufacture of hand made common burnt clay building bricks ( *second revision* ) |
| 2180 : 1988 | Specification for heavy-duty burnt clay building bricks ( *second revision* ) |
| 2248 : 1981 | Glossary of terms relating to structural clay products for buildings (*first revision* ) |
| 3495 ( Part 1 ) : 1992 | Methods of tests of burnt clay building bricks : Part 1 Determination of compressive strength ( *second revision* ) |
| 3495 ( Part 2 ) : 1992 | Methods of tests of burnt clay building bricks : Part 2 Determination of water absorption ( *second revision* ) |
| 3495 ( Part 3 ) : 1992 | Methods of tests of burnt clay building bricks : Part 3 Determination of efflorescence ( *second revision* ) |
| 3812 : 1981 | Specification for fly ash for use as pozzolana and admixture ( *first revision* ) |
| 5454 : 1978 | Methods for sampling of clay building bricks (*first revision* ) |

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**Amendments Issued Since Publication**

| Amend No. | Date of Issue | Text Affected |
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