IS 12894 : 1990
(Reaffirmed 1995)

Indian Standard

FLY ASH-LIME BRICKS — SPECIFICATION

भारतीय मानक

पलाई ऐश-चूना ईंटें — विशिष्टि

UDC 691·421·2 : [666·924 + 662·613·13]

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

July 1990

Price Group 1

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on 7 May 1990, after the draft finalized by the Building Lime and Lime Products Sectional Committee had been approved by the Civil Engineering Division Council.

Fly Ash is a useful by-product from thermal power stations using pulverized coal as fuel and has considerable pozzolanic activity. This national resource can be gainfully utilized for manufacture of fly ash-lime bricks as a supplement to common burnt clay building bricks leading to conservation of natural resources and improvement in environmental quality. Fly ash-lime bricks are obtained from materials consisting of fly ash in major quantity, lime and an accelerator acting as a catalyst. Fly ash-lime bricks are generally manufactured by intergrinding or blending various raw materials which are then moulded into bricks and subjected to curing cycles at different temperatures and pressures. On occasions, as and when required, crushed bottom ash or sand is also used in the composition of the raw material. Crushed bottom ash or sand is used in the composition as a coarser material to control water absorption in the final product. Fly ash reacts with lime in presence of moisture to form a calcium silicate hydrate which is the binder material. Thus fly ash-lime brick is a chemically bonded brick.

These bricks are suitable for use in masonry construction just like common burnt clay bricks. Production of fly ash-lime building bricks has already started in the country and it is expected that this standard would encourage its production and use on mass scale. This standard lays down the essential requirements of fly ash-lime bricks so as to achieve uniformity in the manufacture of such bricks.

This standard is based on the results of investigation carried out by the various research organizations in the country.

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

FLY ASH-LIME BRICKS — SPECIFICATION

1 SCOPE

1.1 This standard lays down the requirements for classification, general quality, dimensions and physical requirements of fly ash-lime bricks used in buildings.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
712 : 1984	Specification for building limes (*third revision*)
1727 : 1967	Methods of test for pozzolanic materials (*first revision*)
3812 : 1981	Specification for fly ash for use as pozzolana and admixture (*first revision*)
3495 (Part 1) : 1976	Methods of tests of burnt clay building bricks : Part 1 Determination of compressive strength (*second revision*)
3495 (Part 2) : 1976	Methods of tests of burnt clay building bricks : Part 2 Determination of water absorption (*second revision*)
3495 (Part 3) : 1976	Methods of tests of burnt clay building bricks : Part 3 Determination of efflorescence (*second revision*)
4139 : 1989	Specification for calcium silicate bricks (*second revision*)
5454 : 1976	Methods for sampling of clay burnt building bricks (*first revision*)

3 GENERAL REQUIREMENTS

3.1 Visually the bricks shall be sound, compact and uniform in shape. The bricks shall be free from visible cracks, warpage and organic matter.

3.2 The bricks shall be solid and with or without frog 10 to 20 mm deep on one of its flat side. The shape and size of the frog shall conform to either Fig. 1A or Fig. 1B. The bricks shall have smooth rectangular faces with sharp and square corners.

4 DIMENSION AND TOLERANCES

4.1 The size of the fly ash-lime bricks shall be 190 mm × 90 mm × 90 mm. The tolerance on length shall be ±3 mm and that on breadth and height shall be ±2 mm.

NOTE — By agreement between the purchaser and the manufacturer, fly ash-lime bricks may be manufactured in other sizes also. The tolerance requirements on length, breadth and height shall remain the same as given above.

5 MATERIALS

5.1 Fly Ash

Fly ash shall conform to Grade 1 or Grade 2 of IS 3812 : 1981.

5.2 Bottom Ash

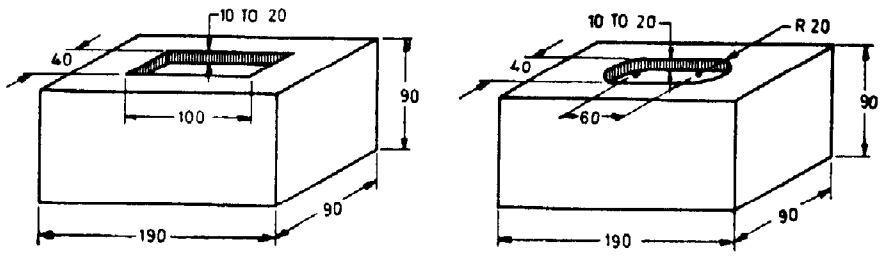
Bottom ash used as replacement of sand shall not have more than 12 percent loss on ignition when tested according to IS 1727 : 1967.

5.3 Sand

Deleterious materials, such as clay and silt in sand, shall preferably be less than 5 percent.

5.4 Lime

Lime shall conform to Class C hydrated lime of IS 712 : 1984.



1A 1B

All dimensions in millimetres.

FIG. 1 SHAPE AND SIZE OF FROGS IN BRICKS

5.5 Additives

Any suitable additive considered not detrimental to the durability of the bricks may be used.

6 CLASSIFICATION

6.1 The fly ash-lime bricks shall be of the following four classes depending upon their average compressive strength :

Class	*Average Compressive Strength N/mm²*	
	Not Less Than	*Less Than*
7.5	7·5	10·0
10	10·0	15·0
15	15·0	20·0
20	20·0	—

7.7 PHYSICAL CHARACTERISTICS

7.1 Compressive Strength

The minimum average compressive strength of fly ash-lime bricks shall not be less than the one specified for each class in **6.1** when tested as described in IS 3495 (Part 1) : 1976. The compressive strength of any individual brick shall not fall below the minimum average compressive strength specified for the corresponding class of bricks by more than 20 percent.

NOTE — In case any of the test results of compressive strength exceed the upper limit for the class, the same shall be limited to the upper limit of the class for the purpose of averaging.

7.2 Drying Shrinkage

The average drying shrinkage of the bricks when tested by the method described in IS 4139 : 1989, being the average of three units, shall not exceed 0·15 percent.

7.3 Efflorescence Test

The bricks when tested in accordance with the procedure laid down in IS 3495 (Part 3) : 1976, shall have the rating of efflorescence not more than 'moderate' up to Class 10 and 'slight' for higher classes.

7.4 Water Absorption

The bricks, when tested in accordance with the procedure laid down in IS 3495 (Part 2) : 1976, after immersion in cold water for 24 hours, shall have average water absorption not more than 20 percent by mass up to class 10 and 15 percent by mass for higher classes.

8 SAMPLING AND CRITERIA FOR CONFORMITY

8.1 Sampling and criteria for conformity of the bricks shall be as given in IS 5454 : 1976.

9 MARKING

9.1 Each brick shall be marked in a suitable manner with the manufacturer's identification mark or initials.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

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Doc : No CED 4 (4564)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Printed at Printwell Printers, Delhi, India