

**IS : 3068 - 1986**  
( Reaffirmed 1991 )

*Indian Standard*

**SPECIFICATION FOR  
BROKEN BRICK ( BURNT CLAY )  
COARSE AGGREGATE FOR USE IN  
LIME CONCRETE**

*( Second Revision )*

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

*Indian Standard*

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( *Continued on page 2* )

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IS : 3068 - 1986

( Continued from page 1 )

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SPECIFICATION FOR  
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LIME CONCRETE  
( *Second Revision* )

0. FOREWORD

**0.1** This Indian Standard ( Second Revision ) was adopted by the Indian Standards Institution on 30 June 1986, after the draft finalized by the Building Limes Sectional Committee had been approved by the Civil Engineering Division Council.

**0.2** Broken brick ( burnt clay ) is used as coarse aggregate in the preparation of lime concrete where aggregates derived from natural sources are not available in plenty or where its cost is prohibitive. It is a good alternative to broken stone where good well-burnt bricks are available in sufficient quantity. It can be used in foundations and other works requiring low strength and exposed to less severe conditions of service. Coarse aggregates prepared from bricks of varying strength and properties are used in different parts of the country. To give a rational approach for the use of this type of aggregate in structural concrete, this standard has been formulated.

**0.3** This standard was first published in 1965 and subsequently revised in 1975. The present revision has been prepared with a view to incorporating the modifications found necessary in the light of experience gained during the use of this standard. In this revision, the requirement of aggregate in respect of bulk density has been incorporated; and the nominal aperture size of the sieves for grading and water absorption value of the aggregates have been modified in addition to some other minor modifications.

**0.4** 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, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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\*Rules for rounding off numerical values ( revised ).

## 1. SCOPE

1.1 This standard covers the requirements for coarse aggregate prepared from broken bricks ( burnt clay ) for use in lime concrete.

## 2. GENERAL QUALITY

2.1 The broken brick coarse aggregate shall be prepared from the well/overburnt bricks conforming to class designation 50 and above of IS : 1077-1986\*. It shall be free from underburnt clay particles, soluble salt and adherent coating of soil or silt.

2.2 Brick aggregate should be handled least number of times before being used in concrete, as repeated handling could result in breaking up and production of finer material passing 4.75 mm IS Sieve. Allowable limit of such material passing 4.75 mm IS Sieve shall not be more than 5 percent.

## 3. PHYSICAL REQUIREMENTS

3.1 Grading — The coarse aggregate shall be of the grading specified in Table 1, when tested for sieve analysis according to IS : 2386 ( Part 1 )-1963‡.

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TABLE 1 REQUIREMENTS OF GRADING FOR BROKEN BRICK COARSE AGGREGATE

IS SIEVE DESIGNATION [ see IS : 460 ( PART 1 )- 1985* ]	PERCENT PASSING ( BY MASS )
75 mm	100
37.5 mm	95-100
19.0 mm	45-75
4.75 mm	0-5

\*Specification for test sieves: Part 1 Wire cloth test sieves ( *third revision* ).

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3.2 Broken brick coarse aggregate shall also conform to the requirements given in Table 2.

## 4. SAMPLING

4.1 The method of sampling shall be in accordance with IS : 2430-1969‡.

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\*Specification for common burnt clay building bricks ( *fourth revision* ).

‡Methods of test for aggregates for concrete: Part 1 Particle size and shape.

‡Methods for sampling of aggregates for concrete.

**TABLE 2 REQUIREMENTS OF BROKEN BRICK COARSE AGGREGATE**  
( Clause 3.2 )

Sl. No.	CHARACTERISTIC	REQUIREMENT	REFERENCE TO METHOD OF TEST
(1)	(2)	(3)	(4)
i)	Bulk density, kg/m <sup>3</sup>	1100-1350	IS : 2386 ( Part 3 )-1963*
ii)	Aggregate impact value, percent, <i>Max</i>	50	IS : 5640-1970†
iii)	Water absorption, percent, <i>Max</i>	20	Appendix A
iv)	Water soluble matter, percent, <i>Max</i>	1	Appendix B

\*Methods of test for aggregates for concrete: Part 3 Specific gravity, density, voids, absorption and bulking.

†Method of test for determining aggregates impact value of soft coarse aggregates.

## APPENDIX A

[ Clause 3.2; and Table 2, Item (iii) ]

### METHOD OF TEST FOR DETERMINATION OF WATER ABSORPTION OF AGGREGATE

#### A-1. APPARATUS

**A-1.1** The apparatus shall consist of a balance of capacity not less than 3 kg, readable and accurate to 0.5 g.

#### A-2. SAMPLE

**A-2.1** A sample of not less than 3 000 g of the aggregate shall be tested.

#### A-3. PROCEDURE

**A-3.1** The sample shall be screened on a 9.5 mm IS Sieve and washed to remove finer particles and dust. This sample shall be dried in a ventilated oven at a temperature between 100 to 110°C till a constant mass ( $W_1$ ), is obtained, and cooled approximately to room temperature. The dried and cooled sample shall then be placed in a suitable vessel and covered with distilled water conforming to IS : 1070-1977\* at a temperature between 22 and 32°C and shall remain immersed for 24 hours.

\*Specification for water for general laboratory use ( *second revision* ).

Any air entrapped in the aggregate or bubbles appearing on its surface shall be removed by a gentle agitation with a rod. The sample shall then be taken from the water and any water visible on the surface shall be rapidly removed by means of a damp cloth. The surface-dried sample shall then be immediately weighed ( $W_2$ ).

#### A-4. EVALUATION AND REPORT OF TEST RESULTS

A-4.1 The percentage of water absorption of the aggregate shall be calculated as follows:

$$\text{Water absorption, percent by mass, after 24-hour immersion in water} = \frac{W_2 - W_1}{W_1} \times 100$$

where

$W_2$  = mass in g of the sample after 24-hour immersion in water, and

$W_1$  = mass in g of the dry sample.

## APPENDIX B

[ Clause 3.2; and Table 2, Item (iv) ]

### METHOD OF TEST FOR DETERMINATION OF WATER SOLUBLE MATTER OF AGGREGATE

#### B-1. PREPARATION OF SAMPLE

B-1.1 About 100 g of the representative sample shall be air-dried and ground to pass 150-micron IS Sieve. The material shall be stored in an air-tight bottle.

#### B-2. PROCEDURE

B-2.1 25 g of the sample shall be weighed and transferred to a 500-ml breaker. 100 ml of distilled water conforming to IS : 1070-1977\* shall be added and the contents stirred frequently for three hours. It shall be decanted through a No. 42 Whatman filter paper or equivalent into a 500-ml graduated flask. The filtrate shall be refiltered, if necessary. The filter paper shall be returned to the beaker, 250 ml of distilled water shall be added and the extraction continued for another one and a half hour. The material on the filter paper shall be washed three times with distilled water and filtered. The filtrate and the washing shall be added to the first filtrate in the 500-ml flask and made up to

\*Specification for water for general laboratory use ( *second revision* ).

the mark using distilled water. The flask shall be shaken well and 200 ml shall be pipetted out to a weighed platinum dish ( or porcelain dish, glazed inside and outside ). The contents of the dish shall be evaporated to dryness, and heated to constant mass at 105 to 110°C.

### B-3. EVALUATION AND REPORT OF TEST RESULTS

B-3.1 The percentage mass of the soluble salt shall be calculated as follows:

Soluble salts, percent by mass =  $10 W$

where

$W$  = mass in g of the dried material on the dish.



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