IS 9394 (1979): stone lintels [CED 6: Stones]

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Indian Standard

SPECIFICATION FOR STONE LINTELS

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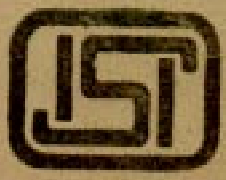

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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SPECIFICATION FOR STONE LINTELS

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SPECIFICATION FOR STONE LINTELS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 20 December 1979, after the draft finalized by the Stones Sectional Committee, had been approved by the Civil Engineering Division Council.

0.2 Lintels are important structural part of a building. Stratified limestones and sandstones which are available more or less in every part of our country, are extensively used for making lintels. The strength of the stone used for lintels, is of considerable importance, and, therefore, due care should be taken while making their selection. This standard has, therefore, been formulated to provide guidance for the selection of suitable stones for the purpose.

0.3 The stone lintels described in this standard are primarily intended for use with doors, windows and ventilators in residential, office and industrial buildings. But their use is not thus restricted.

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 or analysis, 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.

1. SCOPE

1.1 This standard lays down the requirement for dimensions, physical properties, and workmanship of lintels made out of natural stone.

2. GENERAL REQUIREMENTS

2.1 The stone for the lintels shall be reasonably fine grained, hard and shall have a uniform texture and colour. They shall be free from weathering and decay.

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

2.2 The stone shall be without any cracks, vents, fissures, clayholes or other similar source of weakness.

2.3 The lintel shall be so cut that when set in the building, the stone is laid on its natural bed or with the bed in the same direction as it was when the test for transverse strength was carried out.

2.4 The stone damaged by blasting, driving edges, heating, etc, shall not be considered as a source of rejection.

3. PHYSICAL PROPERTIES

3.1 The physical properties of the stones used for lintels shall conform to the requirements given in col 3 of Table 1, when tested in accordance with the provisions of Indian Standards given in col 4.

TABLE 1 PHYSICAL PROPERTIES OF THE STONE USED FOR LINTELS

SL No.	Characteristics	Requirements	Method of Test (Ref to IS)
(1)	(2)	(3)	(4)
i)	Specific gravity	2·6 *Min*	IS : 1124-1974*
ii)	Water absorption, percent	1·0 *Max*	IS : 1124-1974*
iii)	Transverse strength, N/mm²	11·0 *Min*	IS : 1121 (Part II)-1974†
iv)	Durability	Shall not develop spalling or cracks	IS : 1126-1974‡

*Method of test for determination of water absorption apparent specific gravity and porosity of natural building stones (*first revision*).

†Method of test for determination of strength properties of natural building stones: Part II Transverse strength.

‡Method of test for determination of durability of natural building stones (*first revision*).

4. DIMENSION AND TOLERANCE

4.1 The stone lintels shall be of rectangular cross-section.

4.2 The width shall be equal to the thickness of the wall and the depth shall not be less than 100 mm. The length shall be limited to a maximum clear span of 2·65 metres.

4.3 A tolerance of $\pm$ 1·5 mm shall be allowed on all dimensions of 1·2 m or less and $\pm$ 3 mm on all dimensions more than 1·2 m.

4.4 Throating — A 16 $\times$ 8 mm throating shall be provided to the soffit of the external lintel as shown in Fig. 1.

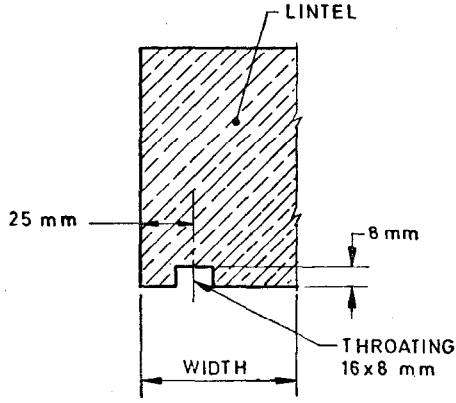


FIG. 1 POSITION AND SIZE OF THROATING

4.5 Lintel Bearing — Stone lintels shall be well bonded into the masonry on either side of the opening. The bearing length on either side shall not be less than the depth of the lintel or half the width of the supporting masonry whichever is more. The bearing length shall be increased for exceptionally heavy loads and for long spans. Bed blocks shall be provided if the clear span exceeds 2m.

5. DESIGN

5.1 The stone lintel shall be designed as freely supported at the ends.

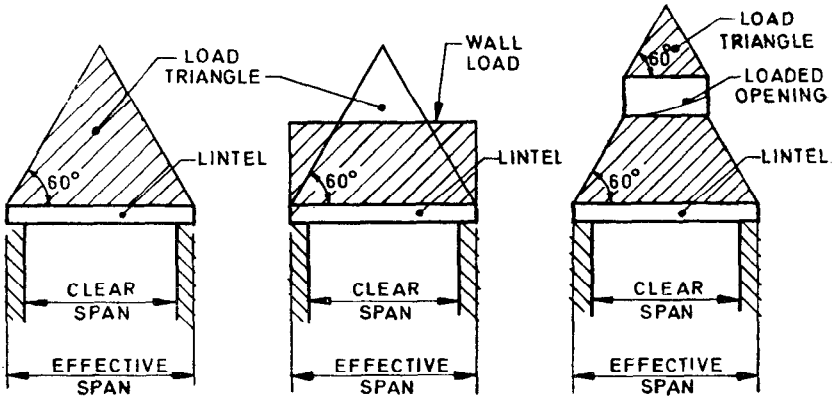
5.2 In calculating the required depth of lintels the loading shall be assumed as follows:

a) The load of masonry contained in a 60° triangle with the base equal to the effective span as shown in Fig. 2A.

b) Uniformly distributed floor loads above the equilatral triangle shall be disregarded. However, in case uniformly distributed floor load falls within the triangle, they shall be considered by taking into account only the length of the floor lying inside the triangle as shown in Fig. 2B.

c) When a concentrated load falls inside the equilatral triangle, the load to be considered is the weight of the triangle as given in (a) or (b) above, plus the concentrated load over the span as shown in Fig. 2C.

d) When a concentrated load comes over the equilatral triangle, the load to be carried is the weight of the triangle, as given in (a) or (b) above, plus the weight of the concentrated load both acting together as uniformly distributed load over the span as shown in Fig. 2D.

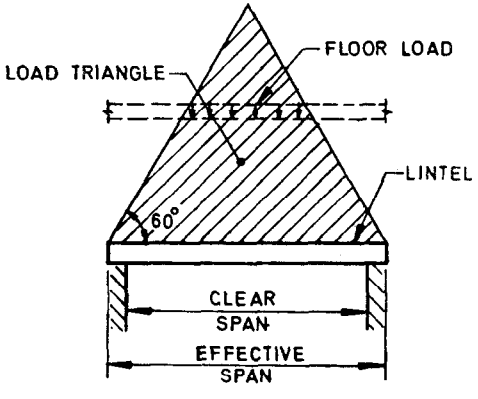


(i) Without another opening on top

(ii) When the height of wall is less than the height of load triangle

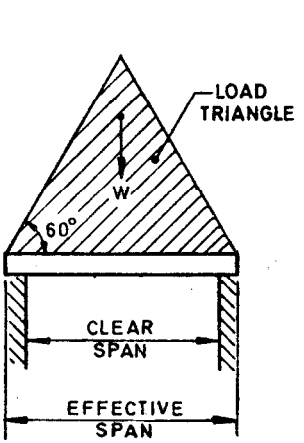
(iii) When another opening on top

2A When the Floor Load Fall outside the Load Triangle



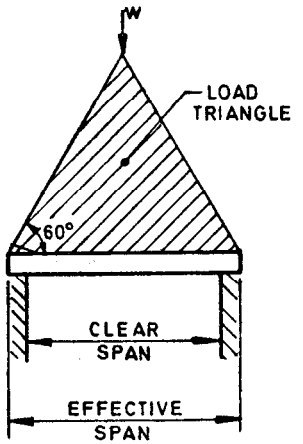
2B When the Floor Load Fall inside the Load Triangle

FIG. 2 LOADING ON LINTELS (*Continued*)



2C When a Concentrated Load Falls inside the Load Triangle

$$BM = \left(\frac{WL}{4} + \frac{W_1 L}{6} \right)$$



2D When a Concentrated Load comes over the Load Triangle

$$BM = \frac{(W + W_1) L}{6}$$

where

W = Concentrated load

W_1 = Weight due to load triangle

L = Effective span

FIG. 2 LOADING ON LINTELS

6. WORKMANSHIP

6.1 The edges of the stone lintels shall be dressed as per IS : 1129-1972*.

6.2 The exposed surface of the lintel shall be finished as specified.

7. MARKING

7.1 Each stone lintel may be marked in a suitable manner with the manufacturers' identification mark or initials.

8. SAMPLING

8.1 Lot — In any consignment, all the lintels of the same stone group, size and finish shall be grouped together to constitute a lot.

*Recommendation of dressing of natural building stones (*first revision*).

8.1.1 Samples shall be selected and tested separately for each lot for determining its conformity or otherwise to the requirements of the specification.

8.2 The number of stone lintels to be selected from a lot shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 2.

TABLE 2 SAMPLE SIZE AND CRITERIA FOR CONFORMITY

Lot Size	Sample Size	Permissible No. of Defectives	Sub-Sample Size
(1)	(2)	(3)	(4)
Up to 25	3	0	2
26 to 100	5	0	2
101 to 200	8	0	3
201 to 500	13	0	4
501 and above	20	1	5

8.2.1 The lintels in the sample shall be selected at random and in order to ensure the randomness of selection, random number tables may be used (*see* IS : 4905-1968*).

8.3 All the lintels, selected as per col 2 of Table 2 shall be examined for general requirements (*see* **2**), transverse strength (*see* **3**), dimensions and tolerances (*see* **4**), workmanship (*see* **6**). Any lintel failing in any one or more of the above requirements shall be considered as defective. A lot shall be conforming to these requirements, if the number of defective lintel obtained is not more than the permissible number of defectives given in col 3 of Table 2.

8.4 The lot having been found satisfactory with respect to dimensions, workmanship, general requirements, and transverse strength shall be tested for the remaining physical properties. For this purpose a sub-sample of size given in col 4 of Table 2 shall be selected at random. A lot shall be considered to have satisfied the requirements of the physical properties if none of the lintels tested for these requirements fail in any of these tests.

*Method for random sampling.