भारतीय मानक
Indian Standard
IS 9394 : 2024

पत्थर का लिंटल — विशिष्टि

(पहला पुनरीक्षण)

Stone Lintels — Specification

(First Revision)

ICS 91.060.10

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June 2024 Price Group 5

Stones Sectional Committee, CED 06

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Stone Sectional Committee had been approved by the Civil Engineering Division Council.

Lintels are an 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. This standard was first published in 1979.

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

The significant modifications in this revision are:

a) The provisions for throating has been explained;

b) The figure for throating has been modified to make it more clear; and

c) The conformity assessment marking clause have been included.

This standard contributes to the United Nations Sustainable Development Goal 11 ‘Sustainable cities and communities’ towards strengthening the efforts to protect and safeguard the world’s cultural and natural heritage.

The composition of the Committee responsible for formulation of this standard is given in Annex A.

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 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. 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

STONE LINTELS — SPECIFICATION

(First Revision)

1 SCOPE

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

2 REFERENCES

The standards given below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards:

IS No.	*Title*
IS 1121 (Part 2) : 2023	Determination of strength properties of natural building stones — Methods of test: Part 2 Transverse strength (*third revision*)
IS 1124 : 1974	Method of test for determination of water absorption apparent specific gravity and porosity of natural building stones (*first revision*)
IS 1126 : 2013	Determination of durability of natural building stones — method of test (*second revision*)
IS 1129 : 1972	Recommendation of dressing of natural building stones (*first revision*)
IS 4905 : 2015	Random sampling and randomization procedures (*first revision*)

3 GENERAL REQUIREMENTS

3.1 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.

3.2 The stone shall be without any cracks, vents, fissures, clay holes or other similar source of weakness.

3.3 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.

3.4 The stone damaged by blasting, driving edges, heating, etc shall not be considered for testing.

4 PHYSICAL PROPERTIES

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).

5 DIMENSION AND TOLERANCE

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

5.2 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.

5.3 A tolerance of ± 1.5 mm shall be allowed on all dimensions of 1.2 m or less and ± 3 mm on all dimensions more than 1.2 m.

5.4 Throating

The lintels on outer walls, above windows, shall have a projection on the outer side; to protect them against raindrops, throating of 16 mm × 8 mm shall be provided as shown in Fig. 1.

5.5 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 the width of the supporting masonry whichever is more, subject to a minimum of 200 mm. The bearing length shall be increased for exceptionally heavy loads and for long spans. Bed blocks shall be provided if the clear span exceeds 2 m.

6 DESIGN

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

6.2 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 equilateral 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 equilateral 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; and

d) When a concentrated load comes over the equilateral 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.

7 WORKMANSHIP

7.1 The edges of the stone lintels shall be dressed as per IS 1129.

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

8 MARKING

8.1 Each stone lintel shall be legibly and indelibly marked with the following:

a) Manufacturer's name and his registered trade-mark, if any; and

b) The words 'STONE LINTEL';

8.2 Similar information shall be provided in the delivery advices accompanying the shipment of packed.

8.3 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

9 SAMPLING

9.1 Lot

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

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

9.2 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 (2) and col (3) of Table 2.

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

9.3 All the lintels, selected as per col (3) of Table 2 shall be examined for general requirements (*see* 3), physical properties (*see* 4), dimensions (*see* 5) and, workmanship (*see* 7). Any lintels 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 lintels are less than the permissible number as given in col (4) of Table 2.

9.4 The lot having been found satisfactory with respect to dimensions, workmanship, general requirements, and having transverse strength shall be tested for the remaining physical properties. For this purpose a sub-sample of size given in col (5) 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 the requirements fail in any of these tests.

Table 1 Physical Properties of the Stone Used for Lintels

(*Clause 4*)

Sl No.	Characteristic	Requirement	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Specific gravity, *Min*	2.6	IS 1124
ii)	Water absorption, percent, *Max*	1.0	IS 1124
iii)	Transverse strength, N/mm^2, *Min*	11.0	IS 1121 (Part 2)
iv)	Durability	Shall not develop spalling or cracks	IS 1126

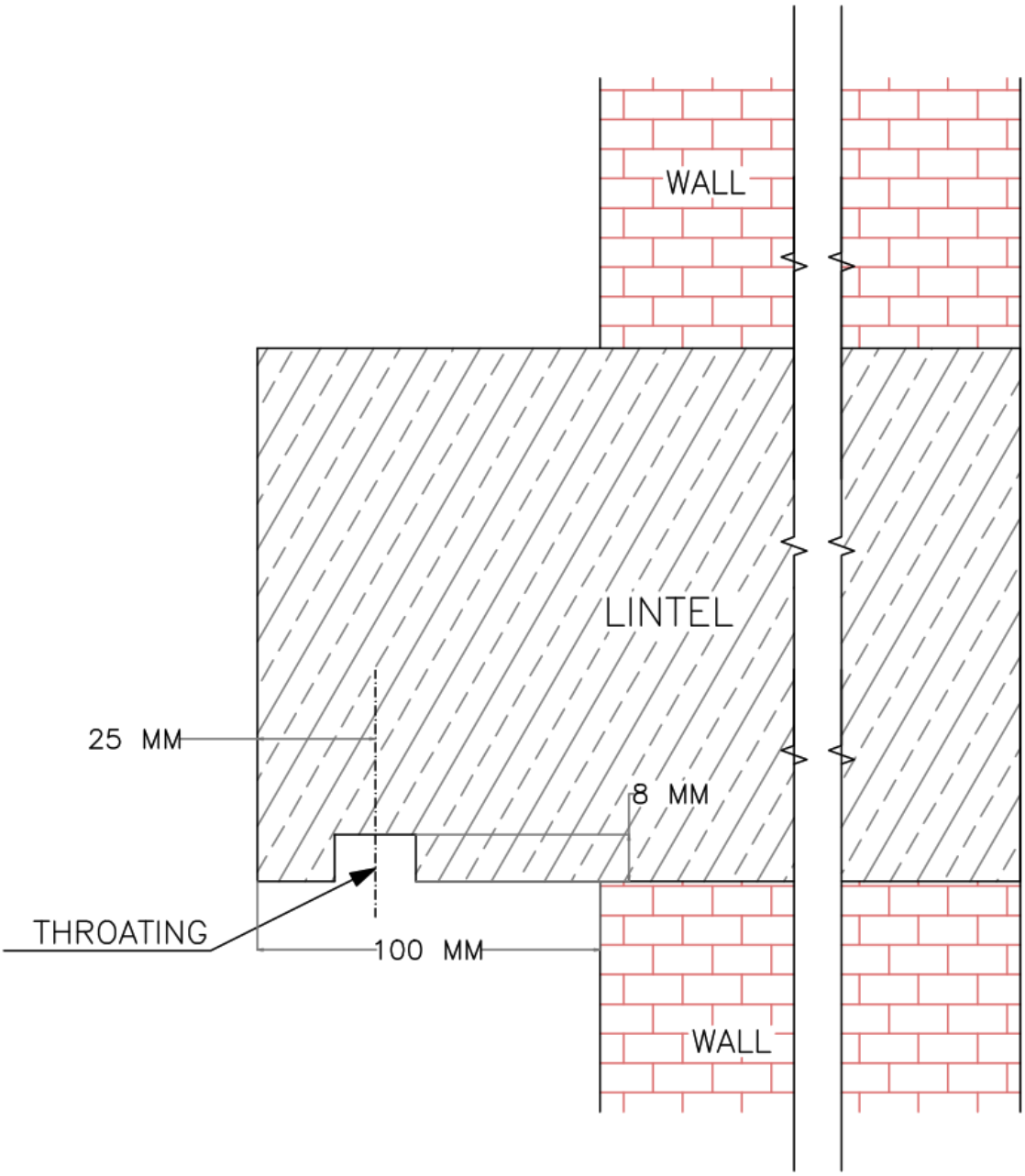
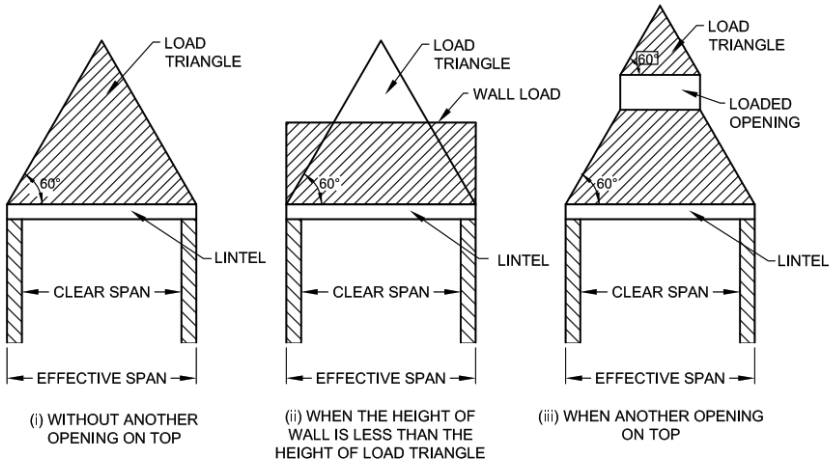
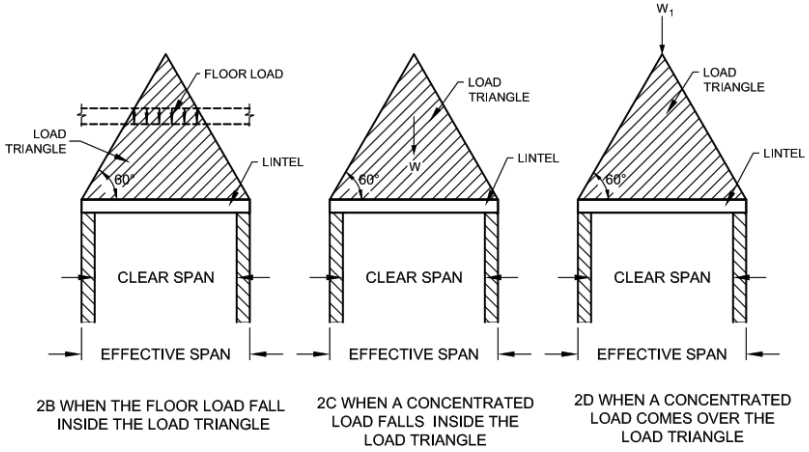


FIG. 1 POSITION AND SIZE OF THROATING



2A WHEN THE FLOOR LOAD FALL OUTSIDE THE LOAD TRIANGLE



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

where

W = concentrated load;
W_1 = weight due to load triangle; and
L = effective span.

FIG. 2 LOADING ON LINTELS

Table 2 Sample Size and Criteria for Conformity

(*Clause* 9.2, 9.3 *and* 9.4)

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

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Stone Construction Sectional Committee, CED 06

Organization	*Representative(s)*
Indian Institute of Technology Delhi, New Delhi	DR SHASHANK BISHNOI **(*Chairperson*)**
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SHRIMATI DIVYA S.
SCIENTIST 'D'/JOINT DIRECTOR
(CIVIL ENGINEERING), BIS

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This Indian Standard has been developed from Doc No.: CED 06 (24694).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Published by BIS, New Delhi