IS 1849 (Part 1/Sec 1) : 1990
(Reaffirmed 1995)

भारतीय मानक

उर्ध्व मिश्रित भरण चूना भट्टी का डिजाइन और संस्थापन — मार्गदर्शिका

भाग 1 चूनापत्थर के लिये

अनुभाग 1 चिनाई प्रकार शैफ्ट

(दूसरा पुनरीक्षण)

Indian Standard

DESIGN AND INSTALLATION OF VERTICAL MIXED FEED LIME KILN — GUIDE

PART 1 FOR LIMESTONE

Section 1 Masonry Type Shaft

(Second Revision)

UDC 666·92·041·53

BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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FOREWORD

This Indian Standard (Part 1/Sec 1) (Second Revision) was adopted by the Bureau of Indian Standards on 23 May 1990, after the draft finalized by the Building Lime and Lime Products Sectional Committee had been approved by the Civil Engineering Division Council.

For refinement and standardization of the technique of manufacture of building limes, which are mostly produced in small scale industries, it was felt that guidelines for the design of lime kiln based on studies carried out by the Central Building Research Institute, Roorkee, Khadi and Village Industries Commission and Gujarat Engineering Research Institute, Vadodara could be formulated so that it will be helpful in setting up kilns for the manufacture of building lime in the villages and small-scale industries. For efficient design of kiln a number of factors, such as chemical composition of limestone, type of the fuel and output required are to be considered. This standard give general guidance for the design and installation of lime kiln in which the charge is fed from top and lime is drawn from the bottom of the shaft through discharge opening.

This standard was first published in 1967 and subsequently revised in 1976 based on studies conducted by Khadi and Village Industries Commission. This revision has been taken up based on experience gained with the use of this standard. In this revision the requirements regarding discharge door and charging device have been simplified in addition to some other minor modifications.

This standard has been prepared in two parts. Part 2 covers design and installation of kiln for manufacture of lime from limeshell. Part 1 of this standard has been split into two sections, Section 1 covering the masonry type shaft and Section 2 covering the reinforced cement concrete type shaft.

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

DESIGN AND INSTALLATION OF VERTICAL MIXED FEED LIME KILN—GUIDE

PART 1 FOR LIMESTONE

Section 1 Masonry Type Shaft

(Second Revision)

1 SCOPE

1.1 This standard (Part 1/Sec 1) (*second revision*) covers details for the design and installation of vertical mixed feed masonry shaft type kilns for manufacture of lime from limestone* by natural draft up to the capacity of 5 tonnes per day.

2 REFERENCES

2.1 The Indian Standards given below are necessary adjuncts to this standard:

IS No.	*Title*
6 : 1983	Moderate heat duty fireclay refractories, Group 'A' (*fourth revision*)
195 : 1963	Fireclay mortar for laying fireclay refractory bricks (*second revision*)
2053 : 1974	Thermocouple pyrometers (*first revision*)
6508 : 1988	Glossary of terms relating to building lime (*first revision*)

3 TERMINOLOGY

3.1 For the purpose of this standard, definitions given in IS 6508 : 1988 shall apply.

4 SIZE OF KILN

4.0 The factors given in **4.1** and **4.2** should be considered for the efficient designing of lime kilns. The broad details and dimensions for commonly used three sizes of kiln using steam coal as fuel are given in Fig. 1.

4.1 Output

The size of the kiln should be mainly decided by the output required from it which in turn depends upon the type of fuel and chemical composition of limestone.

*The use of crystalline limestone is not recommended.

4.2 Height of the Kiln

For efficient performance and low fuel consumption the height should vary 3 to 4 times the internal diameter.

5 INSTALLATION

5.0 A vertical mixed-feed masonry shaft kiln should consist of the following:

a) Foundations;

b) Base;

c) The superstructure:

i) Discharge place, and

ii) The shaft of the kiln:

d) Platforms;

e) Stairways; and

f) Charging device.

5.1 Foundation of the Kiln

A suitable foundation shall be provided depending on the nature of the soil and expected loads.

5.2 Base of the Kiln

The base of the kiln should be platform type (*see* Fig. 2).

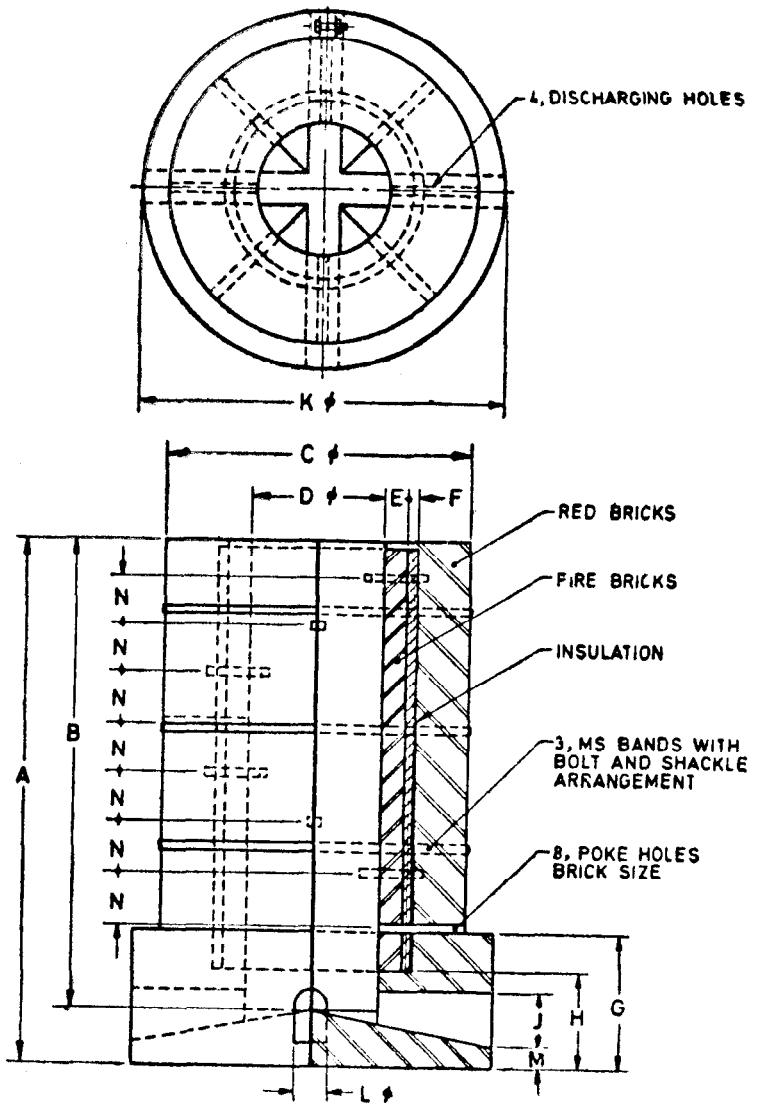
5.3 The Super structure

5.3.1 *Discharge Place*

The discharge doors should be of convenient size and fitted with a damper. The floor of the discharge place should be hard and smooth finished and sufficiently sloping for easy removal of lime.

5.3.2 *Shaft of the Kiln*

The shaft may be cylindrical with constant internal diameter but the outer diameter may



	Capacity	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*J*	*K*	*L*	*M*	*N*
1	tonne/day	4 600	4 100	2 750	1 200	230	85	1 250	1 400	500	3 000	300	200	400
3	tonnes/day	4 800	4 300	2 800	1 200	230	90	1 250	900	500	3 200	300	200	360
5	tonnes/day	6 000	5 400	3 500	1 500	230	70	1 500	380	700	3 900	600	200	540

All dimensions in millimetres.

FIG. 1 DIMENSIONS OF LIME KILNS

vary from top to bottom. The shaft of the kiln should consist of:

a) lining,

b) insulation,

c) outer wall or the shell, and

d) metal bands.

5.3.2.1 The lining of the kiln should be made of refractory bricks (*see* IS 6 : 1983). The bricks should preferably be tapered to suit the shaft diameter.

5.3.2.2 The laying of the refractory bricks should be done with thin joints and fireclay mortar (*see* IS 195 : 1963).

5.3.2.3 To reduce the loss of heat by radiation, the kiln should be insulated between the lining and outer wall. The insulation should be done by providing a gap of 100 mm and filling by brickbats in a dry state or thick burnt paddy husk.

5.3.2.4 Outer wall or the shell should be constructed with brick or stone masonry.

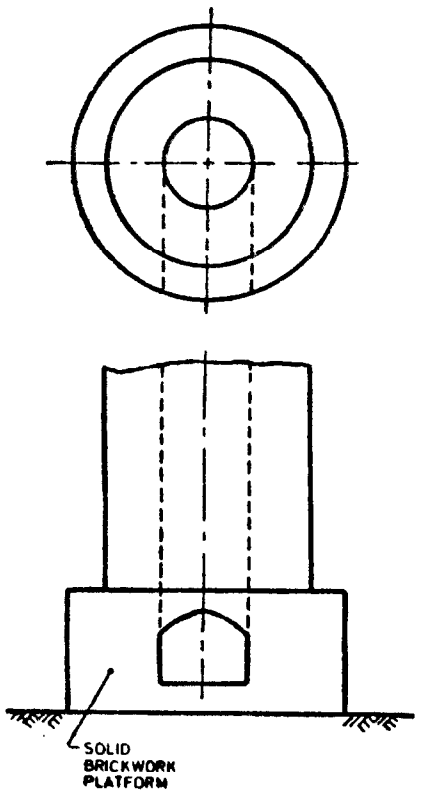


FIG. 2 BASE OF KILN — PLATFORM TYPE

5.3.2.5 Suitable metal bands should be used around the periphery of the kiln to strengthen the shaft and to reduce the tendency to crack.

5.3.2.6 Poke holes should be provided around the periphery of the kiln starting from floor in the calcination zone. The poke holes should be spaced at every half metre to one metre and spread around the circumference of the kiln. The size of the poke hole should be 120 mm × 80 mm and the length shall correspond to the thickness of the kiln wall including the lining.

5.4 A platform of suitable size should be provided at the top for facilitating feeding of raw materials.

5.5 Stairways

Suitable stairways should be provided to reach the top of the platform.

5.6 Charging

Any convenient loading device may be adopted.

5.7 For recording of temperature in the various zones of the kiln, thermocouples fitted with pyrometer (*see* IS 2053 : 1974) should be inserted in the wall of the kiln through poke holes.

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