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

व्यापक परिचालन मसौदा

हमारा संदर्भः सीईडी 04/टी-47 **04 दिसंबर 2024**

तकनीकी समिति: इमारती चूना और जिप्सम उत्पाद विषय समिति, सीईडी 04

प्राप्तकर्ता :

क) सिविल इंजीनियरी विभाग परिषद्, सीईडीसी के सभी सदस्य
ख) सीईडी 04 के सभी सदस्य
ग) रूचि रखने वाले अन्य निकाय

प्रिय महोदय/महोदया,

निम्नलिखित भारतीय मानक का मसौदा संलग्न हैं:

प्रलेख संख्या	शीर्षक
सीईडी 04 (27007)WC	**बिल्डिंग लाइम्स के लिए परीक्षण के तरीके भाग 2 कार्बन डाइऑक्साइड सामग्री का निर्धारण का भारतीय मानक मसौदा** [IS 6932 (भाग 2) **का *पहला पुनरीक्षण***] ICS 91.100.10

कृपया इस मानक के मसौदे का अवलोकन करें और अपनी सम्मतियॉ यह बताते हुए भेजे कि यदि यह मानक के रूप में प्रकाशित हो तो इस पर अमल करने में आपके व्यवसाय अथवा कारोबार में क्या कठिनाइयाँ आ सकती हैं ।

सम्मतियाँ भेजने की अंतिम तिथि : **04 जनवरी 2025**

सम्मति यदि कोई हो तो कृपया अधोहस्ताक्षरी को उपरिलिखित पते पर संलग्न फोर्मेट में भेजें या manoj@bis.gov.in पर ईमेल कर दें ।

यदि कोई सम्मति प्राप्त नही होती है अथवा सम्मति में केवल भाषा सम्बन्धी त्रुटि हुई तो उपरोक्त प्रलेख को यथावत अंतिम रूप दिया जाएगा। यदि सम्मित तकनीकी प्रकृति की हुई विषय समिति के अध्यक्ष के परामर्श से अथवा उनकी इच्छा पर आगे की कार्यवाही के लिए विषय समिति को भेजे जाने के बाद प्रलेख को अंतिम रूप दे दिया जाएगा ।

यह प्रलेख भारतीय मानक ब्यूरो की वैबसाइट www.bis.gov.in पर भी उपलब्ध हैं।

धन्यवाद ।

भवदीय,

(द्वैपायन भद्र)
प्रमुख (सिविल इंजीनियरी)

संलग्नक : उपरिलिखित

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

DRAFT IN WIDE CIRCULATION

Our Ref: CED 04/T-47 **04 December 2024**

TECHNICAL COMMITTEE: Building Limes and Gypsum Products Sectional Committee. CED 04

ADDRESSED TO:

a) All Members of Civil Engineering Division Council, CEDC
b) All Members of CED 04
c) All others interests.

Dear Sir/Madam,

Please find enclosed the following document:

Doc No.	Title
CED 04 (27007)WC	**Draft Indian Standard** **Methods of Tests for Building Limes** **Part 2 Determination of Carbon Dioxide Content** [*First Revision* of IS 6932 (Part 2)] ICS 91.100.10

Kindly examine the draft standard and forward your views stating any difficulties which you are likely to experience in your business or profession if this is finally adopted as National Standard.

Last Date for Comments: **04 January 2025**

Comments if any, may please be made in the attached format and mailed to the undersigned at the above address or preferably through e-mail to manoj@bis.gov.in.

In case no comments are received or comment received are of editorial nature, you may kindly permit us to presume your approval for the above document as finalized. However, in case of comments of technical in nature are received then it may be finalized either in consultation with the Chairman, Sectional Committee or referred to the Sectional Committee for further necessary action if so desired by the Chairman, Sectional Committee.

The document is also hosted on BIS website www.bis.gov.in**.**

Thanking you,

Yours faithfully,

(**Dwaipayan Bhadra**)
Head (Civil Engineering)

Encl: As above

FORMAT FOR SENDING COMMENTS ON BIS DOCUMENTS

(Please use A-4 size sheet of paper only and type within fields indicated. Comments on each clause/sub-clause/table/fig etc. be started on a fresh box. Information in column 3 should include reasons for the comments and suggestions for modified working of the clauses when the existing text is found not acceptable. Adherence to this format facilitates Secretariat's work) (Please e-mail your comments to manoj@bis.gov.in)

Doc. No.: **CED 04 (27007)WC**

Title: **Draft Indian Standard Methods of Tests for Building Limes**
Part 2 Determination of Carbon Dioxide Content
[*First Revision* of IS 6932 (Part 2)] ICS 91.100.10

LAST DATE OF COMMENT: **04/01/2025**

NAME OF THE COMMENTATOR/ORGANIZATION: _____

Sl. No.	Clause/Para/Table/ Figure No. Commented	Comments/Modified Wordings	Justification of the Proposed Change

BUREAU OF INDIAN STANDARDS

DRAFT FOR COMMENTS ONLY
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Draft Indian Standard

METHODS OF TESTS FOR BUILDING LIMES PART 2 DETERMINATION OF CARBON DIOXIDE CONTENT

[*First Revision* of IS 6932 (Part 2)]
ICS 91.100.10

Building Lime and Gypsum Products Sectional Committee, CED 04	Last date of Comments: **04 January 2025**

FOREWORD

(*Formal clauses will be added later*)

The role of building limes in construction has been recognized and valued for centuries, from the ancient structures to modern structures. The use of lime as building materials is not only a testament to its versatility and durability but also to its sustainability and environmental benefits. As we continue to seek eco-friendly alternatives in construction, the relevance of lime-based products has become increasingly significant.

Building lime is used in construction for a variety of purposes such as lime washing, lime mortar, lime Plastering, lime Concrete, Rendering and Pointing, soil Stabilization, Restoration of Historic Buildings, Waterproofing and Decoration. Each of these forms of lime serves specific purposes in construction, from creating strong, durable mortar joints to providing breathable, flexible finishes that protect and preserve structures.

A number of Indian Standards on lime building materials covering specifications, code of practices, etc. have been prepared with a view to assisting the lime industry in its development. In line with that, methods of test for building lime, IS 6932 was prepared in eleven parts in the year 1973. In this revision it was decided to review and update the various existing test methods of building lime, taking into consideration the latest international practices and developments in this field and the current practices in the country. In this revision all the amendments are incorporated and reference of all Indian standards has been updated. Ambiguity in the procedure or reporting has been also removed.

This standard (Part 2) covers the method of test for building lime for determination of carbon dioxide content. The others standards in the series are:

Part 1	Determination of insoluble residue in dilute acid and alkali, loss on ignition, insoluble residue in hydrochloric acid, silicon dioxide, ferric and aluminium oxide, calcium oxide and magnesium oxide
Part 3	Determination of residue on slaking of quicklime
Part 4	Determination of fineness of hydrated lime
Part 5	Determination of unhydrated oxide
Part 6	Determination of volume yield of quicklime
Part 7	Determination of compressive and transverse strengths
Part 8	Determination of workability

Part 9 Determination of soundness
Part 10 Determination of popping and pitting of hydrated lime
Part 11 Determination of setting time of hydrated lime

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.

Draft Indian Standard

METHODS OF TESTS FOR BUILDING LIMES
PART 2 DETERMINATION OF CARBON DIOXIDE CONTENT

(First Revision)

1 SCOPE

This standard (Part 2) covers method of test for determination of carbon dioxide content of building lime.

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 agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standard indicated below:

IS No.	*Title*
IS 265 : 2021	Hydrochloric acid – Specification (*fifth revision*)
IS 460 (Part 1) : 2020	Test sieves — Specification: Part 1 Wire cloth test sieves (*fourth revision*)
IS 712 : 1984	Specification for building limes (*third revision*)
IS 1070 : 2023	Reagent grade water – Specification (*fourth revision*)

3 OBJECTIVE

The objective of determining the carbon dioxide (CO_2) content in lime is to accurately assess the proportion of CO_2 chemically bound within lime products, such as quicklime (CaO) and hydrated lime ($Ca(OH)_2$). By quantifying CO_2 content, manufacturers can optimize production processes, such as calcination and hydration, to achieve the desired product characteristics and maintain consistency across batches.

4 PRINCIPLE

The carbon dioxide content in lime is determined by measuring the volume of CO_2 gas released when a known mass of lime is reacted with hydrochloric acid (HCl) under controlled conditions.

5 APPARATUS AND REAGENTS

5.1 A suitable of apparatus is shown in Fig. 1. The system consists of a U-tube A with anhydrous granulated calcium chloride and another U-tube B with soda asbestos, funnel C with a glass stopcock S and a bent inlet glass tube (projecting below the acid level) is used to introduce hydrochloric acid into the generating flask D. Condenser E condenses most of the water and hydrochloric acid. The U-tube F contains zinc pallets to react with residual acid, if any acid to absorb moisture. Bubbler G contains concentrated sulphuric. The U-tube H_1 contains pumice stone, impregnated with anhydrous copper sulphate to remove traces of hydrogen sulphide. Pumice stone is prepared by crushing it to approximately 5 mm size, shifting it free from dust and then transferring 60 g of it to a casserole, it is then covered with a concentrated solution of 30 g to 35 g of copper sulphate and then heated for 3 h to 4 h at 150 °C to

160 °C, cooled in a desiccator and preserved in a glass-stoppered bottle. U-tube H contains anhydrous granulated calcium chloride in one limb and anhydrous magnesium perchlorate in the other to remove the last traces of moisture. U-tubes J_1 and J contain both soda asbestos and anhydrous magnesium perchlorate in each limb to absorb carbon dioxide. U-tube K contains anhydrous granulated calcium chloride and anhydrous magnesium perchlorate in each limb to protect the end of the train against moisture. U-tubes are suspended from a cross, bar N. Two retort stands L and M carry the cross bar N. All joints are made of stout-walled rubber tubing with the ends of the glass tubes touching each other. Means are provided to pass air through the system either under pressure or by suction.

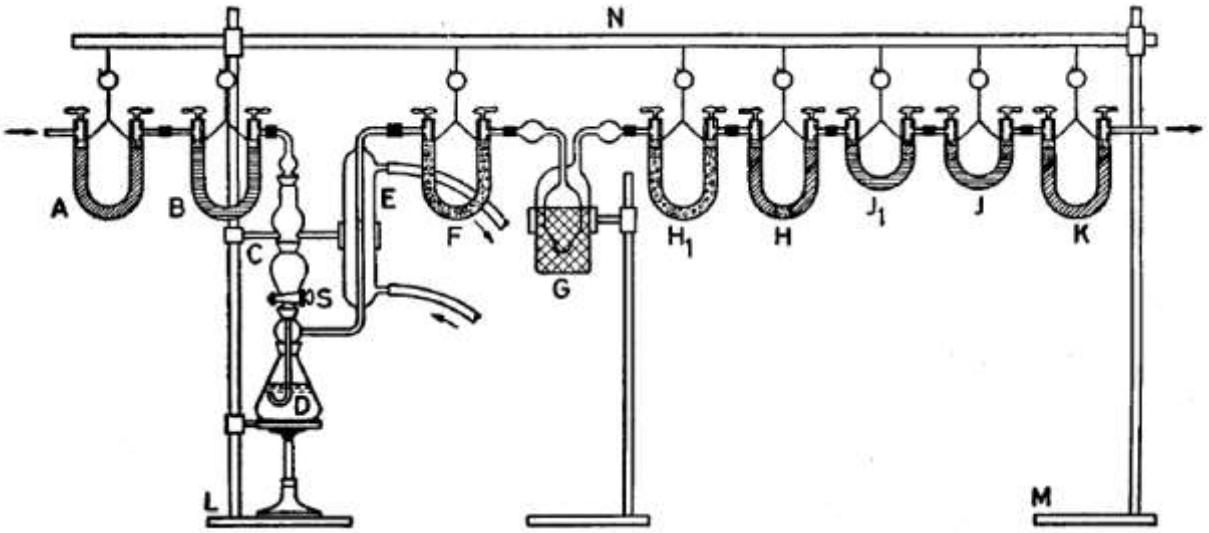

FIG. 1 ASSEMBLY OF APPARATUS FOR DETERMINATION OF CARBON DIOXIDE IN LINE

5.2 Dilute Hydrochloric Acid – 1:4 (v/v) – It shall be prepared by diluting hydrochloric acid (sp gr 1.16 and conforming to IS 265) four times its volume with water.

5.3 Analytical balance with an accuracy of 0.001 g.

6 SAMPLE PREPARATION

6.1 General

6.1.1 Sampling shall be carried out as quickly as possible so that the material does not deteriorate. The total time occupied in mixing and preparation of the sample for the test should not exceed two hours. The samples shall be placed immediately in clean, dry, air-tight containers. When testing is not to be carried out at once, the samples shall be kept in the air-tight containers. Tools such as Shovel, auger, metal or plastic containers shall be of material free from rust and shall be alkali resistant.

6.1.2 If the sample contains lumps, crush the lime using a mortar and pestle or mechanical grinder to achieve a fine powder. Sieving is used to achieve a uniform particle size for accurate test results. Pass the dried and pulverized lime through a 2.36 mm sieve [*see* IS 460 (Part 1)]. This is a standard procedure for many tests, although specific tests may require different sieve sizes (for example, 300-micron sieve). Use a precision balance to weigh the required quantity of lime for each test. The amount of lime needed will vary depending on the test being conducted. Typically, chemical tests may require 0.5 g to 5.0 g of sieved lime and physical test require 100 g to 5 000 g. Use distilled (*see* IS 1070) or deionized water to avoid contamination. Follow the specific water-to-lime ratio as required by the test method. The mixing

can be done manually using a spatula or mechanically using a mixer. Ensure that the mixture is homogeneous and free of lumps. For some tests, a paste like consistency may be required.

7 PROCEDURE

Accurately weight about 2.5 g of the sample, transfer it into the flask D and add 20 ml to 40 ml of distilled water. Insert the glass stopper carrying the funnel arrangement and condenser and make sure that the apparatus is air-tight. Pass air through the system until the carbon dioxide absorption tubes J_1 and J attain constant mass. Close the stopcock (S and reconnect in the system the weighed carbon dioxide absorption tubes J_1 and J. Introduce 40 m of hydrochloric acid into the flask D through funnel C and heat the flask carefully so that the gases pass through the sulphuric acid bubbler at a moderate rate. Allow the contents of the flask to boil after about 30 min to 40 min. After 2 min to 3 min of boiling, remove the flame and connect the flask to scrubbers A and B by means of stopcock S and pass air through the system for 20 min at a moderate rate. Keep the absorption tubes J_1 and J at room temperature for 30 min and then weigh. The increase in mass denotes the carbon dioxide content in the sample.

8 REPORT OF TEST RESULTS

The carbon dioxide content shall be reported as a percentage of mass of the sample taken.