

**भारतीय मानक ब्यूरो**

(उपभोक्ता मामले, खाद्य एवं सार्वजनिक वितरण मंत्रालय, भारत सरकार)

BUREAU OF INDIAN STANDARDS

(Ministry of Consumer Affairs, Food & Public Distribution, Govt. of India)

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Website: www.bis.org.in, www.bis.gov.in**प्रारंभिक मसौदा****हमारा संदर्भ: सीईडी 44/टी-25****29 अक्टूबर 2024****तकनीकी समिति:** सिविल इंजीनियरिंग के कार्यों के मापन की पद्धतियाँ

(जल संसाधन विकास को छोड़कर) विषय समिति, सीईडी - 44

प्राप्तकर्ता:

- क) सिविल इंजीनियरी विभाग परिषद्, सीईडीसी के सभी सदस्य
ख) सीईडी 44 के सभी सदस्य
ग) रूचि रखने वाले अन्य निकाय

प्रिय महोदय/महोदया,

निम्नलिखित भारतीय मानक का मसौदा संलग्न है:

प्रलेख संख्या	शीर्षक
सीईडी 44 (26855)P	भवन की माप की विधि एवं सिविल इंजीनियरिंग कार्य भाग 25 सुरंग-निर्माण [IS 1200 (भाग 25) का पहला पुनरीक्षण] ICS 17.020; 91.040.01; 93.010

कृपया इस मसौदे की जाँच करें और इसमें और सुधार के संबंध में अपनी सम्मतियाँ साझा करें।

सम्मतियाँ भेजने की अंतिम तिथि: 19/11/2024टिप्पणियाँ, यदि कोई हों, बीआईएस ई-गवर्नेंस पोर्टल https://www.services.bis.gov.in/php/BIS_2.0/WCDraft/comment_pdraft.php के माध्यम से ऑनलाइन भेजी जा सकती हैं।वैकल्पिक रूप से, टिप्पणियाँ संलग्न प्रारूप में भी दर्ज की जा सकती हैं और ced44@bis.gov.in या divya.s@bis.gov.in पर ईमेल की जा सकती हैं।**आपको अपनी टिप्पणियाँ सबमिट करने के लिए लॉग इन करने की आवश्यकता हो सकती है, कृपया लॉग इन करने के लिए अपने मोबाइल नंबर (बीआईएस को प्रदान किया गया) और ओटीपी प्रावधान का उपयोग करें।**

यदि कोई सम्मति प्राप्त नहीं होती है अथवा सम्मति में केवल भाषा संबंधी त्रुटि हुई तो हम मान लेंगे कि प्रारंभिक मसौदे के लिए आपका अनुमोदन प्राप्त हुआ है। यदि सम्मति तकनीकी प्रकृति की हुई तो उसे विषय समिति के अध्यक्ष के परामर्श से आवश्यक कार्रवाई के लिए विषय समिति के सामने रखा जाएगा।

धन्यवाद।

भवदीय

ह/-

(दिव्या एस.)

सदस्य सचिव सीईडी 44

वैज्ञानिक 'डी'(सिविल इंजीनियरिंग)

ई-मेल: divya.s@bis.gov.in

संलग्न: उपरलिखित

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Website: www.bis.org.in, www.bis.gov.in**PRELIMINARY DRAFT**

Our Reference: CED 44/T-25

29 October 2024

**Technical Committee: Method of Measurement of Works of Civil Engineering
(Excluding Water Resources Development) Sectional Committee, CED 44,****Addressed To:**

- All Members of Civil Engineering Division Council, CEDC
- All Members of CED 44
- All others interested

Dear Sir/Madam,

Please find enclosed the following document:

Doc No.	Title
CED 44 (26855)P	Method of Measurement of Building and Civil Engineering Works Part 25 Tunnelling [(Third Revision) of IS 1200 (Part 25)] ICS 17.020; 91.040.01; 93.010

Kindly examine the attached draft and forward your comments for further improvement.

Last Date for comments: 19 November 2024Comments if any, may be sent online through the BIS e-governance portal at https://www.services.bis.gov.in/php/BIS_2.0/WCDraft/comment_pdraft.php.Alternatively, comments may also be recorded in the enclosed format and emailed at ced44@bis.gov.in or at divya.s@bis.gov.in.***You may be required to login to submit your comments, kindly use your mobile number (provided to BIS) and the otp provision to login.***

In case no comments are received, or comments received are of editorial nature, kindly permit us to presume your approval for the above document. However, in case comments of technical nature are received, then in consultation with the Chairperson, CED 44 the comments may be put up to the Sectional Committee for necessary action.

Thanking you,

Sd/-

(Divya S.)Member Secretary CED 44
Scientist 'D' (Civil Engineering)
E-mail: divya.s@bis.gov.in**Encl: As above**

FORMAT FOR SENDING COMMENTS ON THE DOCUMENT

[Please use A4 size sheet of paper only and type within fields indicated. Comments on each clause/sub-clause/table/figure, etc, be stated on a fresh row. Information/comments should include reasons for comments, technical references and suggestions for modified wordings of the clause. **Comments through https://www.services.bis.gov.in/php/BIS_2.0/WCDraft/comment_pdraft.php shall be appreciated.**]

Doc. No.: CED 44(26855)P**BIS Letter Ref:** CED 44/T-25**Title:** Preliminary Draft of Method of Measurement of Building and Civil Engineering Works Part 25 Tunnelling [(Third Revision) of IS 1200 (Part 25)]Last date of comments: **19 Novembers 2024****Name of the Commentator/ Organization:** _____

Sl No.	Clause/ Para/ Table/ Figure No. commented	Comments/ Modified Wordings	Justification of Proposed Change
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NOTE- Kindly insert more rows as necessary for each clause/table, etc

BUREAU OF INDIAN STANDARDS

Preliminary Draft Indian Standard

**METHOD OF MEASUREMENT OF BUILDING
AND CIVIL ENGINEERING WORKS
PART 25 TUNNELING**

(Third Revision of IS 1200 Part 25)

FOREWORD

formal clauses will be added later.

Measurement occupies a very important place in the planning and execution of any civil engineering work from the time of first estimates to the final completion and settlement of payments for a project. Methods followed for measurement are not uniform and considerable differences exist between practices followed by different construction agencies and also between various Central and State Government Departments, While it is recognized that each system of measurement has to be specifically related to administrative and financial organizations within a department responsible for the work, a unification of various systems at technical level has been accepted as very desirable specially as it permits a wider range of operation for civil engineering contractors and eliminates ambiguities and misunderstandings of various systems followed.

Among various civil engineering items, measurement of buildings was the first to be taken up for standardization and this standard having provisions relating to building work was first published in 1958 and was revised in 1964.

In the course of usage of this standard by various construction agencies in the country, several clarifications and suggestions for modifications were received and as a result of study, the technical committee responsible for this standard decided that its scope beside! being applicable to buildings should be expanded to cover method of measurement for civil engineering works like industrial and river valley projects.

Wherever necessary, more information than is demanded by adherence to this standard may be given, provided the principles of measurements laid down in this standard are observed and it is in the interest of accuracy and practical estimating to do so.

This revision has been brought out to incorporate the changes found necessary in light of usage of this standard and suggestions made by various implementing bodies. The significant modifications in this revision are:

- a) It has been specified that the measurement of work of highway and railway tunnels, as well as work done using tunnel boring machines shall be measured separately.
- b) Further guidance regarding the measurement while using tunnel boring machines have been provided.

Further modifications will be added after the circulation of P draft.

This standard contributes to the Sustainable Development Goal 9 'Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation'.

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 measurement 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.

*Preliminary Draft Indian Standard***METHOD OF MEASUREMENT OF BUILDING AND CIVIL ENGINEERING WORKS
PART 25 TUNNELING***(Third Revision of IS 1200 Part 25)***1 SCOPE**

This standard (Part 25) covers the method of measurement of tunnelling.

2 REFERENCE

The standards listed 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 editions of the standards indicated below:

IS No.	Title
IS 1200	Methods of measurement of building and civil engineering works:
Part 1 : 1992	Part 1 earthwork
Part 2 : 1974	Part 2 concrete works
Part 11 : 2024	Part 11 paving, floor finishes, dado and skirting (<i>Fifth Revision</i>) (<i>Under Publication</i>)
IS 4880 (Part 2) : 1976	Code of practice for design of tunnels conveying water: Part 2 geometric design (<i>First Revision</i>)

2 GENERAL RULES

2.1 Clubbing of Items – Items may be clubbed together and that the break-up of the clubbed items is agreed to be on the basis of the detailed description of the items stated in this standard.

2.2 Booking of Dimensions – In booking dimensions, the order shall be consistent and generally in the sequence of length, width and height or depth or thickness.

2.3 Measurements – All work shall be measured net in decimal system as fixed in its place as given below

- Linear dimensions shall be measured to the nearest 0.01 metre,
- Areas shall be worked out to the nearest 0.01 square metre,
- Cubic contents shall be worked to the nearest 0.01 cubic metre, and

- d) The weight shall be measured to the nearest 0.1 kilogram.

2.4 Work to be Measured Separately – Work executed in the following conditions shall be measured separately:

- a) Work in or under water, and
- b) Work in compressed air.
- c) Work inside Highway / Railway Tunnels.
- d) Work done using Tunnel Boring Machines.

2.4.1 Where springs are likely to be encountered the work shall be measured against a separate specific provision made for the purpose (see **2.5**).

2.5 Pumping where resorted to including bore well/well point dewatering shall each be measured separately for all stages of pumping, including intermediate stages unless otherwise stated, in kW hours or hp hours. Whenever pneumatic pumping is resorted to, it shall be measured in rated capacity of the compressor, in cubic metre of air delivered per hour.

2.6 Bills of Quantities – The bills of quantities shall fully describe the materials and workmanship, and accurately represent the work to be executed.

3 METHOD OF MEASUREMENT OF EXCAVATION

3.1 The item of tunnel excavation may be classified as follows:

- a) Excavation in tunnel in hard rock not requiring supports.
- b) Excavation in tunnel in all classes of soil, soft and hard rock [see IS 1200 (Part 1)] requiring temporary or permanent supports during excavation.

NOTE - Supports shall be measured separately (see **4**).

3.2 The description of item shall unless otherwise stated to be held to include drilling, blasting, ventilation, lighting, scaling and hauling of excavated material and depositing in the area earmarked and finally clearing the surface.

3.3 The quantity of excavation shall be measured in -cubic metres and shall be the volume of the tunnel measured in solid contained within hypothetical line as decided by engineer-in-charge (also known as 'B' line or pay line) irrespective of whether or not the actual excavation falls within or beyond the said line, subject to excavation up to the minimum excavation line ('A' line), 'A' line and 'B' line shall be as defined in IS 4880 (Part 2).

3.3.1 In case as determined by the engineer-in-charge the minimum excavation line is increased necessitating enlargement of the already excavated tunnel, separate measurement of the quantity of the excavation shall be made. The measurement shall be between the original 'B' line and the revised 'B' line that is established.

3.4 The layers of soft or disintegrated rock bedded with hard rocks or seams or faults required to be excavated beyond the pay line being removed by hand or pneumatic or other implements without requiring continuous and systematic blasting, shall be measured separately.

3.5 Cement consumed at the point of mixing for guniting/shotcreting required for protection of weak rock shall be measured separately on weight basis.

3.6 While using Tunnel Boring Machines, length of the finished diameter of the tunnel inclusive of lining if specified is measured in metres.

4 METHOD OF MEASUREMENT OF SUPPORTS

4.1 Temporary Supports – The item of temporary supports, when erected, shall include furnishing, installing, maintenance and removing temporary supports including other connected materials, labour and equipment. The measurement of the temporary support shall be done on the basis of area supported by such support (peripheral length multiplied by linear dimension of tunnel).

4.2 Permanent Supports - The item of permanent supports shall consist of furnishing and installing the supports, complete with all bolts, nuts, butt plates, feather plates, dowels, wedges, tie rods, spikes, drift pins, temporary timber spreaders and concrete pedestals if any, logging, blocking and back packing with excavated material. All structural steel including riveted and welded, and nuts and bolts shall be measured in kilograms

4.3 Grouting behind the supports and concrete lining shall be measured separately in terms of weight of cement consumed stating the material used.

4.4 In case precast concrete blocks as lagging are provided, so as to form the part of concrete lining, the same shall be measured separately [see IS 1200 (Part 2)]. The volume of such blocks shall be deducted from the volume of the concrete lining if these are placed within the 'B' line.

4.5 Space between the 'B' line and precast concrete or structural steel lining filled by concrete shall be measured separately as below on the basis of weight of cement consumed:

- a) Cement concrete placed manually for ledge beams, curbs, etc.
- b) Cement concrete placed with mechanical aids such as pumps, placers, etc.

4.6 Rock bolt shall be measured on weight basis which shall be including wedges, nuts and butt plates.

4.7 Pipes provided for drainage purposes in lining shall be measured separately in running metres

5. CONCRETE LINING

5.1 Measurement for the concrete lining shall be made of the quantity of concrete placed between the formwork or the outside surface of the steel shell when used and the pay line, which shall be 'B' line or pay line adopted for excavation at the place. The item of concrete lining shall be inclusive of formwork. No deduction shall be made for the volume of the reinforcement, but the volume of permanent steel supports (see **4.2**) where provided shall be deducted from the total volume of concrete lining [see also IS 1200 (Part 11)].

5.1.1 The rate of tunnel lining in case of TBM is generally inclusive in the overall rate.

6. PRESSURE GROUTING OVER CONCRETE LINING

6.1 Grout Holes – The length of the grout holes drilled either for pack grouting or pressure grouting through concrete and also rock shall be measured in running metres. Grout holes drilled through plate steel liners shall, however, be measured in numbers separately.

6.2 Grout Pipe and Fittings – Grout pipes and fittings provided for grouting shall be measured in kilograms and the weight of all pipes and fittings shall be derived either by actual weighment or from known weights and lengths.

6.3 Water Pressure Testing – Measurement for water pressure testing shall, where necessary, be made separately for each hole and enumerated.

6.4 Grouting – Measurement for grouting shall be made on the basis of the weight of cement in the grout actually forced into the holes. Stone dust and/or other additions, if used, shall be measured separately in the loose dry state before mixing and shall be measured by boxes of approved size and design.