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METHOD OF
MEASUREMENT OF BUILDING AND
CIVIL ENGINEERING WORK

PART 17 ROAD WORK INCLUDING AIRFIELD PAVEMENTS

(Third Revision)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG

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Indian Standard

METHOD OF
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CIVIL ENGINEERING WORK

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(Third Revision)

Method of Measurement of Works of Civil Engineering (Excluding
River Valley Projects), BDC 44

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Indian Standard

METHOD OF MEASUREMENT OF BUILDING AND CIVIL ENGINEERING WORK

PART 17 ROAD WORK INCLUDING AIRFIELD PAVEMENTS

(Third Revision)

0. FOREWORD

0.1 This Indian Standard (Part 17) (Third Revision) was adopted by the Indian Standards Institution on 4 October 1985, after the draft finalized by the Method of Measurement of Works of Civil Engineering (Excluding River Valley Projects) Sectional Committee had been approved by the Civil Engineering Division Council.

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

0.3 Among the various civil engineering items, measurement of building was first to be taken up for standardization and this standard having provisions relation to all building works, was first published in 1958 and was revised in 1964 and 1970.

0.4 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 Sectional Committee decided that its scope, besides being applicable to buildings should be expanded so as to cover civil engineering works like industrial and river valley project works.

0.5 Since various trades are not related to one another, the Sectional Committee decided that method of measurement for each trade as given in IS : 1200-1964* be issued separately as a different part, which will be helpful to specific users in various trades. This part covering method of measurement of road work including airfield pavements to building as well as civil engineering works was, therefore, issued as a second revision in 1969.

0.6 In the course of use of this standard in the past 16 years and based on suggestions received, so as to bring in line with IRC codes this third revision has been prepared. The major modifications are in respect of earthwork, and cement concrete pavements.

0.7 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 : 2-1960†. 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 (Part 17) covers the method of measurement of road work including airfield pavements.

2. GENERAL

2.1 Clubbing of Items — Items may be clubbed together provided these are on the basis of detailed dimensions of items as stated in the 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 the decimal system, fixed in its place, subject to the following limits, unless otherwise stated:

- a) Length and width shall be measured to the nearest 0.01 m the thickness shall be measured to nearest 0.005 m or nearest to specified tolerance whichever is less;
- b) Areas shall be worked out to the nearest 0.01 m²; and
- c) Cubic contents shall be worked out to the nearest 0.01 m³.

*Method of measurement of building works (*first revision*).

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

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

2.5 The finished thickness of sub-base, base and bituminous courses shall be computed as in **2.5.1**.

2.5.1 The levels shall be taken before and after construction, at a grid of points 5 m centre to centre longitudinally in straight reaches and at 2.5 m on curves. On 2 lane roads, the levels shall be taken at four positions from transversely at 0.75 m and 2.75 m from either edge of the carriage way, and single lane roads at two positions transversely at 1.25 m from either edge of the carriage way, and also at the crown and edges. The reference for the transverse grid line shall be left in the form of embedded reference points on either ends so as to locate the grid points for level measurement after each successive course is laid. However for payment courses laid on widening portions at least one line of level shall be taken on each strip of the widening. The thickness of the payment at these points shall be the difference of levels before and after construction falling in that area.

2.6 All work shall be measured in square metres, except where otherwise stated. The length shall be measured between the end of the payment and the central line of the expansion joint or between the central line of consecutive expansion joint; the width shall be between the edge of a payment and the central line of the construction joint or between the central line of construction and expansion joint or between the central line of consecutive construction joints.

2.7 Excavation and earthwork necessary to bring the road alignment to proper levels making embankment, drains and site clearance shall be measured in accordance with the provisions given in IS : 1200 (Part 1)-1974*.

2.7.1 Rolling and watering formations, when required, may be either included with the item or measured separately in square metres.

2.8 The dismantling of roadwork shall be measured as given in IS : 1200 (Part 18)-1974†

2.9 The method of measurement for the materials for the roadwork shall be as given in IS : 1200 (Part 22)-1982‡.

*Method of measurement of building and civil engineering works: Part 1 Earthwork (*third revision*).

†Method of measurement of building and civil engineering works: Part 18 Demolition and dismantling (*third revision*).

‡Method of measurement of building and civil engineering works: Part 22 Materials.

2.10 Works involved in the preparation of cut formation shall be measured in units indicated below:

- | | |
|--|--------------|
| i) Loosening and recompacting of subgrade level | square metre |
| ii) Removal of unsuitable material | cubic metre |
| iii) Replacement with suitable material in lieu of unsuitable material removed | cubic metre |
| iv) Preparing rocky subgrade | square metre |

2.11 Stripping including storing and re-application of top soil shall be measured in cubic metres.

3. ROADWORK GENERALLY

3.1 Soling and sub-bases shall be described stating the thickness.

3.2 Levelling course shall be measured as volume compacted in position in cubic metres. The volume shall be worked out as product of surface area and average thickness (*see 2.5.1*) using prismoidal formulae.

3.3 Stripping including storing and re-application of top soil shall be measured as volume in cubic metres.

3.4 Works involving loosening and recompacting of original ground shall be measured in square metres.

3.5 Removal of unsuitable material at embankment foundation and replacement with suitable material shall be measured as in cubic metres.

4. TAR AND BITUMEN ROADS

4.1 Binder — Tar or bitumen, hereinafter referred to as 'binder' shall be described stating type, grade and penetration value.

4.1.1 Work carried out with different types of binders, shall be measured separately.

4.2 Priming — Priming surfaces of water-bound macadam prior to surface dressing shall be measured separately stating the type and quantity of primer per square metre.

4.3 Edging — Edging shall be measured in running metres describing the material and method of placing.

4.3.1 The excavation required to be done shall be included in the description of item and shall not be measured separately.

4.4 Tack Coat — Tack coat shall be measured in terms of surface area of application in square metres depending upon the rate of spread specified.

4.5 Bituminous Macadam Base in Binder Course — Bituminous macadam with binder course shall be measured as finished work in cubic metres.

4.5.1 The work of filing potholes not exceeding 0.005 m³ shall be included in the description of item and shall not be measured separately.

4.6 Bituminous Penetration Macadam Base in Binder Course — Penetration macadam base with binder course shall be measured as finished work in square metres.

4.7 Built Up Spray Court Base Course — Built up spray grout shall be measured as finished work in square metres.

4.8 Surface Dressing — Each coat of surface dressing shall be measured as finished work in square metres.

4.9 Open Graded Premix Carpet — Open-graded premix carpet shall be measured as finished work in square metres.

4.10 Mix Seal Surfacing — Mix seal surfacing shall be measured as finished work in square metres.

4.11 Semi Dense Carpet — The semi-dense carpet shall be measured as finished work in cubic metres.

4.12 Asphaltic Concrete — Asphaltic concrete shall be measured as finished work in cubic metres.

4.13 Seal Coat — Seal coat shall be measured as finished work in square metres.

4.14 Pre-Fabricated Bitumenized Surfacing — The work shall be described and work in single layer and double layer shall each be measured separately in square metres.

5. MISCELLANEOUS

5.1 Screening — Total quantity of rod metal, stone chips, etc, required to be screened shall be measured in cubic metres.

5.2 Breaking — Breaking stone, brick or other road materials into required sizes shall be measured in cubic metres of stacked materials after breaking, stating the size before and after breaking, and shall include tracking.

5.3 Scarifying — Scarifying shall be measured in square metres stating the depth scarified and the type of surface.

5.3.1 Hand and machine scarifying shall each be measured separately.

5.4 Berms — Preparation of berms shall be measured in running metres stating the average filling and width.

5.5 Sub-bases, Bases, and Shoulders — Granular sub-base shall be measured as finished work in position in cubic metres.

5.5.1 Stabilized soil sub-base shall be measured as finished work in position in cubic metres.

5.5.2 Water bound macadam base and sub-base course shall be measured as finished work in position in cubic metres.

5.6 Potholes — Potholes exceeding 0.05 m^3 shall be measured in cubic metres.

5.7 Shoulder — Shoulder construction shall be measured as finished work in position in cubic metres.

5.8 Pre-splitting Rock Excavation Slopes — The area of pre-splitting shall be measured as square metres of specified presplit slope surface.

5.9 Turfing with Sods — Turfing with sods shall be measured as finished work in square metres.

5.10 Seeding and Mulching — Seeding and mulching shall be measured as finished work in square metres.

5.11 Drain — Pipe for sub-surface drain shall be measured in linear metres between extreme ends of the installation is complete. Jointing of pipes including the provision of hessian wrappings at open joints, plugging the upgrade end of pipe, providing grating/screen at the outlet end and providing impervious clay covering where required shall be included in the description and shall not be measured separately,

5.11.1 Backfill material and aggregates for aggregate drains shall be measured as laid in position in cubic metres.

5.11.2 Removal of unsuitable material and its replacement with suitable material in the trench bed shall be measured in volume of suitable material laid in position in cubic metres.

5.12 Culverts — RCC pipe culverts shall be measured along their centre between the inlet and the outlet ends in running metres. The concrete bedding shall be measured as per IS : 1200 (Part 2)-1974*.

6. CEMENT CONCRETE PAVEMENTS

6.1 The strength of cement concrete to be used shall be described and the work shall be measured either in cubic metres or square metres.

*Method of measurement of building and civil engineering works: Part 2 Concrete works (*third revision*).

6.1.1 Concrete required to be spread and consolidated by mechanical spreaders and vibratory compacting equipment shall be measured separately and so described.

6.1.2 If concrete is reinforced with bars or fabric reinforcement, it shall be so stated and measured separately. Reinforcement shall be measured separately [*see* IS : 1200 (Part 8)-1974]*.

6.1.3 Formwork for pavings shall be measured separately [*see* IS : 1200 (Part 5)-1982†].

6.1.4 Special surface finishes shall be described and measured separately in square metres or alternatively included with the main item itself

6.1.5 Construction and dummy joints shall be described and measured separately if not included in the main item in running metres stating the thickness and depth of joint. The expansion joints shall be measured in running metres stating the thickness and depth of joint.

6.1.6 Steel dowel bars including ferrules shall be described stating the length and diameter or bars and enumerated.

6.1.7 Steel plate reinforcement to the joints shall be described as including the metal sheath stating the thickness and width of the plate and the gauge of the metal sheath and measured in running metres of the joint.

6.1.8 Forming tongued and grooved longitudinal butt-joints shall be measured in running metres.

*Method of measurement of building and civil engineering works: Part 8 Steel work and iron work (*third revision*).

†Method of measurement of building and civil engineering works: Part 5 Formwork (*third revision*).

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones: 323 0131, 323 3375, 323 9402

Fax : 91 11 3234062, 91 11 3239399, 91 11 3239382

Telegrams : Manaksanstha
(Common to all Offices)

Central Laboratory:

Plot No. 20/9, Site IV, Sahibabad Industrial Area, SAHIBABAD 201010

Telephone

8-77 00 32

Regional Offices:

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002 323 76 17

*Eastern : 1/14 CIT Scheme VII M, V.I.P. Road, Maniktola, CALCUTTA 700054 337 86 62

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022 60 38 43

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113 235 23 15

†Western : Manakalaya, E9 Behind Marol Telephone Exchange, Andheri (East),
MUMBAI 400093 832 92 95

Branch Offices:

'Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMEDABAD 380001 550 13 48

‡Peenya Industrial Area, 1st Stage, Bangalore - Tumkur Road,
BANGALORE 560058 839 49 55

Gangotri Complex, 5th Floor, Bhadbhada Road, T. T. Nagar, BHOPAL 462003 55 40 21

Plot No. 62-63, Unit VI, Ganga Nagar, BHUBANESHWAR 751001 40 36 27

Kalaikathir Buildings, 670 Avinashi Road, COIMBATORE 641037 21 01 41

Plot No. 43, Sector 16 A, Mathura Road, FARIDABAD 121001 8-28 88 01

Savitri Complex, 116 G. T. Road, GHAZIABAD 201001 8-71 19 96

53/5 Ward No. 29, R. G. Barua Road, 5th By-lane, GUWAHATI 781003 54 11 37

5-8-58C, L. N. Gupta Marg, Nampally Station Road, HYDERABAD 500001 20 10 83

E-52, Chitaranjan Marg, C-Scheme, JAIPUR 302001 37 29 25

117/418 B, Sarvodaya Nagar, KANPUR 208005 21 68 76

Seth Bhawan, 2nd Floor, Behind Leela Cinema, Naval Kishore Road,
LUCKNOW 226001 23 89 23

Patliputra Industrial Estate, PATNA 800013 26 23 05

T. C. No. 14/1421, University P. O. Palayam,
THIRUVANANTHAPURAM 695034 6 21 17

NIT Building, Second Floor, Gokulpat Market, NAGPUR 440010 52 51 71

Institution of Engineers (India) Building, 1332 Shivaji Nagar, PUNE 411005 32 36 35

*Sales Office is at 5 Chowringhee Approach, P. O. Princep Street,
CALCUTTA 700072 27 10 85

†Sales Office is at Novelty Chambers, Grant Road, MUMBAI 400007 309 65 28

‡Sales Office is at 'F' Block, Unity Building, Narashimaraja Square,
BANGALORE 560002 222 39 71