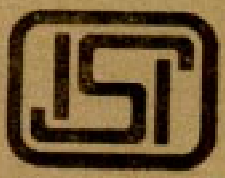
IS : 9401 (Part V) - 1980
(Reaffirmed 1997)

Indian Standard

METHOD OF MEASUREMENT OF WORKS IN RIVER VALLEY PROJECTS (DAMS AND APPURTENANT STRUCTURES)

PART V MASONRY

UDC 69·003·12 : 693 : 627·8



INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Price Rs 5·00

September 1980

Indian Standard

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PART V MASONRY

Method of Measurement of Works of River Valley Projects, BDC 69

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Indian Standard

METHOD OF MEASUREMENT OF WORKS IN RIVER VALLEY PROJECTS (DAMS AND APPURTENANT STRUCTURES)

PART V MASONRY

0. FOREWORD

0.1 This Indian Standard (Part V) was adopted by the Indian Standards Institution on 29 January 1980, after the draft finalized by the Method of Measurement of Works of River Valley Projects Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 In measurements of quantities in construction of river valley projects a large diversity of methods exists at present according to local practices. This lack of uniformity creates complication regarding measurements and payments. The estimator is also left in doubt as to the true meaning and intention of items in the schedule of work. This standard is intended to provide a uniform basis for measuring masonry works in the construction of river valley projects.

0.2.1 The provisions contained in this standard will generally have precedence over the provisions in IS : 1200 (Part III)-1976* and IS : 1200 (Part IV)-1976†. However, the provisions of both these standards and this standard be considered complimentary and supplementary to each other.

0.3 In reporting the result of measurements made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960‡.

1. SCOPE

1.1 This standard (Part V) covers the method of measurement of masonry works in river valley projects (dams and appurtenant structures).

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

†Method of measurement of building and civil engineering works: Part IV Stone masonry (*third revision*).

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

2. GENERAL

2.1 The purpose of measurement of proposed work is preparation of bill of quantities for estimating and tendering. The purpose of measurement of executed work is assessment of value of work for payment. In either case the method of measurements should be such that it is fairly quick, reasonably accurate and amenable to check at any time.

2.2 In case of measurement of proposed work, the dimensions are scaled or read from drawings and then worked up that is reduced to length, area, or volume in recognized units of measurements for the particular item. In case of assessment of executed work, the dimensions are measured in the field. Calculations of length, area, volume, weight, etc, are made on the basis of these dimensions and payments are made accordingly. Where measurement of a number of units are the same it is the usual practice to take measurements of one unit and multiply the calculated length, area or volume by the number of units.

2.3 Measurements shall be taken to nearest centimetre including of levels. Fractions less than half shall be disregarded and fractions half and above are to be regarded as unity. Areas shall be worked out to be nearest 0·01 m^2 and cubic contents shall be worked out to nearest 0·01 m^3. However, in measurement of repetitive nature, this practice shall be applied to the total of the item and not to individual unit. It is essential that measurements shall be as accurate as possible.

2.4 Measurements are closely linked with detailed drawings, description of items and specifications of the work. These should, therefore, be very clear and properly worded and the order of precedence shall be sanctioned drawings, approved specifications and specified description of items.

3. MEASUREMENT OF IRREGULAR AREAS AND VOLUMES

3.1 The irregular area shall be divided into a number of figures of known area, say, triangles, rectangles, etc. The remaining part (which cannot be formed into a triangle or a regular figure) may be evaluated by taking out average height drawn on a common base by *Simpsons Rule.*

3.2 In case of an irregular volume, the volume shall be determined by the *Prismoidal formula.*

4. MEASUREMENT OF MASONRY WORKS

4.1 General

4.1.1 Masonry work differing in characteristic and specification shall be given and measured under separate headings.

4.1.2 The work executed shall be specified clearly that is stone, mortar (ratio, percentage with respect to volume of work, water: cement ratio), and labour. It shall be stated if the stone is to be set on its natural bed or otherwise.

4.1.3 No deduction shall be made for the following:

a) Any opening of embedded material up to 0·05 m^2 in area;

b) Plates or the like where thickness does not exceed 100 mm and bearing does not extend over the entire area;

c) Blocks for hold fasts, holding down bolts and the like; and

d) For chamfers provided, if any, less than 50 × 50 mm.

4.1.4 Works shall be measured under different categories in stages of 3 m stating the height above ground level or depth below ground level as the case may be indicating the ground level.

4.2 Masonry Work

4.2.1 Masonry work shall be measured in cubic metres including finishing of face which should be clearly stated and including all labour (except as stated otherwise), necessary staging, shoring, hoisting, etc, setting, jointing, pointing and for preparing of slurry, cleaning off and rubbing down on completion, if required.

4.2.2 The measurement shall be made to the neat lines of structure as shown in the drawing or actually executed whichever is less.

4.2.3 In case of structures having base area 500 m^2 and above, the measurement shall be made according to pre-work and post-work levels dividing the area into small grids of 3 metre square.

4.2.4 In measurement volume of embedded pipes, recesses, passages, chambers, openings, cavities, depressions, drains and niches and other metal works excluding reinforcement, bolts and HT cables, etc, having a cross-sectional area more than 0·05 m^2 shall be deducted.

4.2.5 For slurry or cement mortar required in construction joints, no separate measurement for its use shall be made as these form part of masonry.

4.3 Extra Lift

4.3.1 An item of extra lift measured in cubic metres shall be given for all masonry works above 3 metres from the ground level in stages of 3 metre each inclusive of necessary staging, shoring, hoisting, etc.

4.3.2 Similarly an item of extra descending measured in cubic metres shall be given for all masonry works more than 3 metres from the ground

level and in stages of 3 metres each including necessary staging, shoring, etc.

4.4 Piers, Pillars/Columns, etc

4.4.1 Masonry work in piers, pillars/columns, etc, shall be fully described and measured in cubic metres according to following categories:

a) Rectangular or polygonal on plan,

b) Curved on plan to any radius, or

c) Any other type.

4.5 Masonry in Arches

4.5.1 Masonry work in arches shall be described and measured separately in cubic metres including centering for spans up to 2 metres.

4.5.2 For spans exceeding 2 m centering shall be measured separately.

4.5.3 Facing to arches shall be measured separately.

4.6 Facing and Hearting Work

4.6.1 If the facing work is of different specification than hearting, facing work shall be measured separately on the basis of exposed surface multiplied by depth of facing as specified or actual whichever is less, in cubic metres.

4.6.2 The measurement of hearting shall be in cubic metres worked out on the basis of total volume of masonry minus the volume of facing work worked out as in **4.6.1.**

4.7 Masonry Work Built Entirely of Facing Block — Parapet or boundary walls, which are built fair face both sides or entirely of facing blocks shall be measured on its central line as a single item in square metres.

4.8 Special Work

4.8.1 Any special stone work less than 25 cm in thickness shall be measured in square metres, stating the thickness, describing the face work and other connected works to be done.

4.8.2 Any special pointing work required to be done shall be measured in square metres describing the nature of work including materials to be used.

4.9 Band — Masonry work in bands shall be measured in running metres stating the thickness, if the width is less than 25 cm otherwise in square metres.

4.10 Projections — Projections to masonry, such as footing, attached piers, etc, shall be measured in cubic metres.

4.11 Cornices, Copings, Strings, etc — Masonry work in cornices, string course, plinth courses, sills, coping, etc, shall be described and measured in running metres.

4.12 Ornamental Works — Masonry work in ornamental works such as bead, dart and similar items shall be described and measured separately in running metres.

4.13 Block-Outs

4.13.1 Block-outs in masonry work shall be measured in running metres specifying the shape of the block-outs including dimensions.

4.13.2 Filling work required to be done in block-outs shall be described in detail and measured in running metres.

4.14 Cutting Grooves — Cutting grooves shall be measured in running metres specifying the shape and size of cutting.

4.15 Cutting of Openings — Cutting of openings shall be measured in cubic metre and item shall include provision for fixing and removal of existing support and temporary support.

4.16 Levelling-Up — When levelling-up of uncoursed or random work is required, it shall be measured separately in square metres and the material, such as concrete or mortar to be used in levelling-up shall be described.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2