IS 9401 (Part 14) : 1992
(Reaffirmed 1997)

भारतीय मानक

नदी घाटी परियोजनाओं में कार्य मापन की पद्धतियां (बांध और समबद्ध संरचनाएं)

भाग 14 नहर कार्य

Indian Standard

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

PART 14 CANAL WORKS

UDC 627·8 : 626·1 : 69·003·12

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

December 1992 Price Group 2

FOREWORD

This Indian Standard (Part 14) was adopted by the Bureau of Indian Standards, after the draft finalized by the Measurement of Works of River Valley Projects Sectional Committee had been approved by the River Valley Division Council.

In the measurement of works of river projects a large diversity of methods exist at present according to local practices. This lack of uniformity creates complications regarding measurements and payments. Keeping in view the large amount of financial outlay involved in river valley projects and also the fact that the authorities responsible for completing these projects, are of the state level or national level, it is felt that a suitable methodology is needed for adopting uniform practices towards the measurement of works so that the scope of complications and misinterpretation of items of work is reduced, as far as possible. This standard is being formulated in various parts so as to cover each type of work separately. This part is intended to provide a uniform basis for measuring the work done in respect of canal works.

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

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

PART 14 CANAL WORKS

1 SCOPE

1.1 This standard covers the methods of measurement of canal works in river valley projects.

2 REFERENCES

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

IS No.	*Title*
9401 (Part 2) : 1982	Method of measurement of works in river valley projects (dams and appurtenant structures) : Part 2 Dewatering
9401 (Part 7) : 1984	Method of measurement of works in river valley projects (dams and appurtenant structures) : Part 7 Joints
9401 (Part 9) : 1987	Method of measurement of works in river valley projects (dams and appurtenant structures) : Part 9 Lining

3 GENERAL

3.1 Items may be clubbed together provided these are on the basis of the detailed description of items stated in the standard.

3.2 In booking dimensions the order shall be consistent and generally in sequence of length or breadth or width and height or depth or thickness.

3.3 All work shall be measured net in the decimal system. Dimensions shall be measured to the nearest 0·01 m, areas shall be worked out to the nearest 0·01 m^2 and cubic contents shall be worked out to the nearest 0·01 m^3.

3.4 Work executed in the following conditions shall be measured separately:

a) Work in or under water,

b) Work in or under foul conditions,

c) Work under tides.

3.4.1 The levels of high and low tides where occurring shall be stated.

3.4.2 The items of work shall fully describe the material and workmanship and accurately represent the work to be executed.

3.5 The following shall not be measured separately and allowance for the same shall be deemed to have been made in the description of the main item:

a) Marking of chainage;

b) Setting out of work, profiles etc;

c) Site clearance such as cleaning grass and vegetation;

d) Unauthorised battering or benching of excavation;

e) Forming (or leaving) deadmen or tell-tales in canals or borrow pits and their removal after measurement;

f) Forming (or leaving) steps inside deep excavations and their removal after measurement;

g) Bailing out or pumping out of water, in excavation, due to rain, if not measured separately.

NOTE — Dewatering, if measured separately, shall be measured according to Part 2 of this standard (*see* **2.1**).

4 CLASSIFICATION

4.1 The material to be excavated shall be broadly classified into three categories as follows:

a) Soil,

b) Rock not requiring blasting, and

c) Hard rock requiring blasting.

NOTE — Where required, separate provision shall be made for controlled blasting.

5 METHOD OF MEASUREMENT

5.1 The measurement of earthwork shall be done in cubic metres and the measurement taken, shall be of authorised dimensions. Irregular areas shall be divided into a number of figures of known area say, triangles, rectangles etc. The remaining part which cannot be formed into regular figures may be evaluated by taking out average height drawn on a common base, by Simpson's rule. In the case of irregular volume, the same shall be determined by prismodial formulae.

6 MEASUREMENT OF VARIOUS TYPES OF EXCAVATION

6.1 The description of item shall include forming of slopes and levels, using shoring where required, depositing as fill in embankment or otherwise after making outlines, putting profiles etc.

6.2 Where the excavation is from borrow pits in fairly uniform ground, the measurement of cutting in borrow pits shall be made by taking off dimensions from the pits excavated, based on the telltales left at suitable intervals, so as to determine the average depth of excavation.

6.3 Where the ground is not uniform, excavation shall be measured by taking cross-sections at suitable intervals before starting the work and after its completion, and computing the quantity of excavation from these levels.

6.4 All excavation shall be measured in successive stages of 1·5 m starting at the commencing level. This shall not apply to cases where no lift is involved. Battering and benching shall be specified and measured along with the main item of excavation.

6.5 Each type of classification shall be measured separately.

7 MEASUREMENT OF FILL FOR MAKING EMBANKMENTS

7.1 Separate measurement for making embankments shall be taken only if earth from the excavation is not utilised.

7.2 The actual measurement of fill shall be calculated by taking levels at suitable intervals, of the original ground before start of the work after site clearance, and after compaction of the fill in suitable layers as specified. The quantity of the fill shall be computed from these levels. If filling materials are obtained from borrow pits, the same shall be measured from borrowpits as in **6** above.

7.3 The dimensions shall be taken from actual measurements in all cases to arrive at net measurements of filling, based on prespecified deductions (stated as percentage) for voids.

7.4 The measurement shall be taken in successive stages of 1·5 m.

7.5 If any tests are to be conducted in respect of degree of compaction, the same shall be specified and included in the item of work.

7.6 The distance for lead shall be over the shortest practicable, and not necessarily the route actually taken. Distances not exceeding 250 m, shall be measured in units of 50 m, distances exceeding 250 m and not exceeding 500 m shall be measured as a separate item. Lead beyond 500 m shall be measured in units of 500 m i.e, there will be one item on lead exceeding 500 m and not exceeding 1 000 m. Where the lead exceeds 5 km, it will be measured in units of 1 kilometre, half killometre and above being treated as one unit, less than half a kilometre being ignored. For the measurement of lead, the area excavated shall be divided into suitable blocks. In each block the distance shall be from the centre of the block to the centre of placed earth.

8 REMOVAL OF TREES AND HEDGES

8.1 Clearing areas of shrubs, brush-wood and small trees not exceeding 30 cm girth shall be measured in square metres and shall be deemed to include removal and disposal.

The cutting down of trees exceeding 30 cm girth and over upto 100 cm girth shall be enumerated as one item. The cutting down of trees exceeding 100 cm girth shall be enumerated separately stating the girth. The girth shall be measured one metre above ground level. The item shall include lopping of branches as well as removal and disposal.

Cutting down hedges and removal of fences shall be fully described and measured in running metres and shall be deemed to include removal and disposal.

Digging out of roots, including stacking, shall be measured separately and enumerated.

9 LINING

9.1 The measurement of lining shall be done according to Part 9 of this standard and shall include preparation of subgrade (*see* **2.1**).

10 JOINTS

The measurement of joints, if any, shall be done according to part 7 of this standard (*see* **2.1**).

11 TURFING

11.1 It shall be measured in square metres. The description of items shall include all operations including supply and transportation of materials, growing grass or vines after placing rich soil of specified thickness and, if required, watering after placing specified quantity of manure.

12 OTHER COMPONENTS OF CANALS

12.1 Silt vanes, sediment ejector, canal escapes, cross regulators, silt selectives head regulators, groyne walls, skimming platforms and canal outlets, shall be fully described with detailed drawings and measured as separate individual items.

13 MISCELLANEOUS ITEMS

13.1 Items like wheel guard, RD, and boundary stones shall be described and enumerated.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Revision of Indian Standards

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference:

Doc : No. RVD 23 (72)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices : Telephone

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002 — 331 01 31, 331 13 75

Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola, CALCUTTA 700054 — 37 84 99, 37 85 61, 37 86 26, 37 86 62

Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036 — 53 38 43, 53 16 40, 53 23 84

Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113 — 235 02 16, 235 04 42, 235 15 19, 235 23 15

Western : Manakalaya, E9 MIDC, Marol, Andheri (East), BOMBAY 400093 — 632 92 95, 632 78 58, 632 78 91, 632 78 92

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. PATNA. THIRUVANANTHAPURAM.

Printed at Printwell Printers, Aligarh, India