

Indian Standard

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

PART 8 INSTRUMENTATION

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INDIAN STANDARDS INSTITUTION
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NEW DELHI 110002

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

PART 8 INSTRUMENTATION

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

PART 8 INSTRUMENTATION

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 25 November 1985 after the draft finalized by the Measurement of Works of River Valley Projects Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 In measurement of quantities in construction of river valley projects a large diversity of methods exist at present according to local practices. This lack of uniformity creates complication regarding measurements and payments. This standard is intended to provide guidance regarding a uniform basis for measurement of instrumentation items in river valley projects.

0.3 In reporting the results of measurement 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 covers the method of measurement of work related to instrumentation items in river valley projects.

2. GENERAL RULES

2.1 Clubbing of Item — Items may be clubbed together and that the break up of the clubbed items are 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.

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

2.3 Description of Items — The description of each item shall unless and otherwise stated, be held to include where necessary, conveyance and delivery handling, unloading, storing, fabrication, hoisting all labour for finishing to required shape and size setting, fitting and fixing in position, straight cutting and waste return or packings, etc.

2.4 Measurement — All works shall be measured net in decimal system as fixed in its place subject to the limitation: Linear dimensions shall be measured to the nearest of 0.01 metre.

3. PIEZOMETERS

3.1 Porus tube piezometers (aluminum pipe), thin tube hydraulic foundations type piezometers and embankment piezometers shall be measured in units of numbers and shall be designated in terms of R.D. (reduced distance), station number and elevation; and shall include the following:

- a) All connected works pertaining to making of main trenches/offset trenches in the compacted material of embankment (in case of embankment tips) and backfilling and compacting the material in specified layers after laying the tubing for tips, riser vertical steel pipes for avoiding reverse slopes, steel housing for temporary housing of the reels of the said tips.
- b) The quantity of bentonite, mud/cement gravel, etc, if required;
- c) The bore holes required to be made for foundation tips;
- d) The installation and removal of casing pipe to maintain the holes during installation of tip assembly;
- e) Goresole solution or wetting agent for circulation of water in tips, boiling of tips and boiling of water for filling pipes for taking pore pressure measurement;
- f) Epoxy rubber sheath wooden block and other petty items like black conduit, tapes and plump bob item; and
- g) Any wooden racks for facilitating the proper laying of twin tubes in trench.

3.2 The PVC twin tube from the pipe to instrumentation house/well shall be measured in running metres.

3.3 The pipes in case of porous tube piezometres shall be measured in running metres stating diameter and the type of the pipe.

3.4 Typical Terminal well constructed in RCC or in some special cases fabricated out of GI pipe shall be enumerated and shall include the following:

- a) Suitable measure like water proofing and painting of terminal well.
- b) Ventilation system being provided in terminal wells.

3.5 The valves, gauges, panels, water tanks, pumps, plumbings and other allied fittings required to furnish the instrumentation house/well shall be enumerated.

4. CROSS ARMS

4.1 The cross arm assembly which includes pipes, tee, spacers and counter weights along with its installation shall be measured in numbers.

5. MISCELLANEOUS INSTRUMENTS

5.1 Strain transducers, stress strain meters, reinforced bar stress transducer, base load transducer, pore pressure transducer, uplift pressure transducer, soil pressure transducer, dam level transducer (insertion type), displacement transducer, inclination transducer, temperature transducer, joint meter, slope indicators, bore hole extensometer, hollow load cells, tiltmeters/ground displacement transducers (electronic type), differential type transducers along with accessories shall be measured in numbers.

5.2 Lead wire shall be measured in metres from installation of instrument to the panel board in the control room.

5.3 Wherever bore hole is required to be done in vertical, horizontal or at any inclination, it shall be measured in linear metre.

5.4 Wherever mounting angles or spiders for arresting the transducers are required, these shall be enumerated.

5.5 Wherever junction boxes are required these shall be enumerated.

5.6 Wherever pipes and sleeves are installed these shall be measured in metres and diameter and class/type of pipe shall be designated.

5.7 Wherever grouting of anchor pipes are needed it shall be measured separately [see IS:9401 (Part 3)-1980 *].

6. MISCELLANEOUS

6.1 Any dewatering in the area for installation of instrumentation shall be measured separately [see IS:9401 (Part 2)-1980 †].

6.2 If monitoring is required after installation of instrument, it shall be measured as a lump sum item indicating the period, numbers and type of instruments.

*Method of measurement of works in river valley projects (dams and appurtenant structures): Part 3 Grouting.

†Method for measurement of works in river valley projects (dams and appurtenant): Part 2 Dewatering.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
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

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>	<i>Definition</i>
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

AMENDMENT NO. 1 APRIL 1996
TO
IS 9401 (Part 8) : 1985 METHOD OF
MEASUREMENT OF WORKS IN RIVER VALLEY
PROJECTS (DAMS AND APPURTENANT
STRUCTURES)

PART 8 INSTRUMENTATION

(*Page 5, clause 5.7*) — Substitute 'IS 9401 (Part 3) : 1994' for 'IS : 9401 (Part 3) - 1980'.

(*Page 5, clause 6.1*) — Substitute 'IS 9401 (Part 2) : 1982' for 'IS : 9401 (Part 2) - 1980'.

(*Page 5, first foot-note*) — Substitute 'Method of measurement of works in river valley projects (dams and appurtenant structures) : Part 3 Grouting (*first revision*)' for the existing foot-note.

(*Page 5, second foot-note*) — Substitute 'Method of measurement of works in river valley projects (dams and appurtenant structures) : Part 2 Dewatering' for the existing foot-note.