

**BUREAU OF INDIAN STANDARDS**  
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**भारतीय मानक मसौदा**  
**नदी घाटी परियोजनाओं में कार्य मापन की पद्धति**  
**(बाँध और संबंधित संरचनाएं)**  
**भाग 11 डायाफ्राम दीवारें**  
(IS 9401 भाग 11 का दूसरा पुनरीक्षण)

**Draft Indian Standard**

**METHODS OF MEASUREMENT OF WORK IN RIVER VALLEY PROJECTS**  
**(DAMS AND APPURTENANT STRUCTURES)**

**PART 11 DIAPHRAGM WALLS**

[Second Revision of IS 9401 (Part 11)]

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Measurement and Cost Analysis of Works for River  
Valley Projects Sectional Committee, WRD 23

Last date for Comments:  
**03 April 2025**

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**FOREWORD**

(Formal clauses of the foreword will be added later)

In measurement of works relating to river valley projects a large diversity of methods exist according to local practices. The lack of uniformity creates complications regarding measurements and payments. This standard is, therefore, being formulated in different parts, covering each type of works separately. This part is intended to provide a uniform basis for measuring the work done in respect of diaphragm walls in river valley projects.

This standard was first published in 1990. With the experience gained by its usage and by the revision and updation of related standards, it was necessary to revise the standard so as to bring it in line with current field practice.

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 : 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.

**Draft Indian Standard****METHODS OF MEASUREMENT OF WORK IN RIVER VALLEY PROJECTS  
(DAMS AND APPURTENANT STRUCTURES)****PART 11 DIAPHRAGM WALLS**

[Second Revision of IS 9401 (Part 11)]

Measurement and Cost Analysis of Works for River  
Valley Projects Sectional Committee, WRD 23Last date for Comments:  
**03 April 2025****1 SCOPE**

This standard (Part 11) covers the method of measurement of diaphragm wall/works in river valley project works.

**2 REFERENCES**

The standards given 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:

<i>IS No.</i>	<i>Title</i>
IS 1200 (Part 8) : 1993	Methods of measurement of building and civil engineering works: Part 8 steelwork and ironwork ( <i>fourth revision</i> )
IS 9401 (Part 2) : 2003	Method of measurement of works in river valley projects (dams and appurtenant structures): Part 2 dewatering ( <i>first revision</i> )
IS 9401 (Part 3) : 2003	Method of measurement of works in river valley projects (dams and appurtenant structures): Part 3 grouting ( <i>second revision</i> )

**3 GENERAL****3.1 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.

**3.2 Description of Items**

The description of each item shall, unless otherwise stated, be held to include, where necessary, conveyance and delivery, handling (including loading and unloading), storing, fabrication, hoisting, all framework and scaffolding, all labour for finishing to required shape and size, setting, fitting and fixing in position, straight cutting and return of waste packings; dismantling of the equipment and taking it back, etc.

### **3.3 Unit of Measurements**

All work shall be measured net in decimal system as fixed in its place subject to the following limitations, unless otherwise stated:

- a) Linear dimensions shall be measured to the nearest 0.01 m;
- b) Areas shall be worked out to the nearest 0.01 m<sup>2</sup>; and
- c) Cubic contents shall be worked out to the nearest 0.01 m<sup>3</sup>.

### **3.4 Work to be Measured Separately**

**3.4.1** Work executed in the following conditions shall be measured separately:

- a) Work in or under water;
- b) Work in liquid mud/marshy land; and
- c) Work under tides.

**3.4.2** The levels and the timings of high and low water tides, where occurring, shall be stated.

**3.4.3** Wherever springs or special situations are encountered and dewatering is resorted to, it shall be measured in accordance with IS 9401 (Part 2).

## **4 BILL OF QUANTITIES**

**4.1** The bill of quantities shall fully describe the materials and workmanship and accurately represent the work to be executed.

**4.2** A general description of the nature of the site shall be stated. For walls near river banks, reservoirs or sea front, the maximum and minimum water levels shall be stated.

**4.3** Water logging, whether due to nature of the soil or due to any underground unknown obstruction as anticipated, shall be stated. Ground water level during rainy seasons and dry spells shall be specified.

**4.4** The available information as to the strata through which excavation is to be carried out shall be stated or reference records of bores be given.

**4.5** The cut-off level of the top of the diaphragm wall shall be clearly specified. Also, the level and location of the reference bench mark shall be provided.

**4.6** The item shall include any extra excavation, filling and ramming required at the time of actual construction for the movement of the cranes and other walling equipment about the site.

**4.7** Bringing plant to the site, erecting it, dismantling and taking it back shall be measured separately as lumpsum items.

## **5 METHOD OF MEASUREMENT OF DIAPHRAGM WALLS**

**5.1** The diaphragm wall shall be described according to type and width/thickness.

**5.2** Guide wall shall be measured in linear metres.

**5.3** Empty and blind boring shall be measured in cubic metres arrived at by multiplying depth (measured from top of the guide wall to the cut-off level of the diaphragm wall) by the cross-sectional area of the panel.

**5.4** Trenching in overburden shall be measured in cubic metres as cross-sectional area of panel multiplied by depth of excavation in overburden.

**5.5** Trenching/chiselling in all types of rocks and boulders shall be measured in hours per chiselling rig, or other contrivance employed thereof. Time for removing broken rock fragments or for otherwise cleaning panel bottom of chiselling material shall be added to the chiselling time. Alternatively, chiselling shall be measured in cubic metres arrived at from the cross-sectional area of the panel adopted and the height. The height shall be the difference of elevations between average of top of rock encountered and the average of final chiselled rock surface.

**5.6** Steel reinforcement shall be measured separately in accordance with IS 1200 (Part 8).

**5.7** Embedded fixtures in steel reinforcement cage like bearing plates and pipes for anchoring and grouting or other such fixtures shall be measured in kilograms calculated from their dimensions and unit weights.

**5.8** Spacers, tie rods and anchors used to secure the panels shall be measured separately for each panel in numbers, specifying their length, diameter, size, etc.

**5.9** Plastic/RCC/concrete/cement-bentonite slurry shall be measured in cubic metres arrived at from the cross-sectional area of the type adopted and the average depth.

**5.10** Panel joints (whether concave or convex) other than straight joints formed by means of stop end pipes in successive panel method of construction, shall be measured in running metres separately.

**5.11** Deadman shall be measured in cubic metres as in **5.9**.

**5.12** Top edge finishing with RCC beams, etc, shall be measured in cubic metres.

**5.13** Grouting by approved means underneath the diaphragm panel shall be measured in accordance with IS 9401 (Part 3).

**5.14** Admixture used in cement concrete for diaphragm panel shall be measured in kilograms.