भारतीय मानक

नदी घाटी परियोजनाओं में कार्यमापन की पद्धति (बाँध और सम्बद्ध संरचनाएँ)

भाग 17 जलयांत्रिक तथा सम्बन्धित धातु कार्य

Indian Standard

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

PART 17 HYDROMECHANICAL AND RELATED METAL WORKS

ICS 93.160

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

February 1999 **Price Group 2**

FOREWORD

This Indian Standard (Part 17) 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 measurement of works of river projects, a large diversity of methods exists at present according to local practices. Lack of uniformity creates complications regarding measurements and payments. This standard is being formulated in various parts, covering each type of work separately. Part 17 is intended to provide a uniform basis for measuring the work done in respect of hydromechanical and iron works for river valley projects.

In reporting the result 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 'Rules for rounding off numerical value (*revised*)'.

Indian Standard

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

PART 17 HYDROMECHANICAL AND RELATED METAL WORKS

1 SCOPE

This standard (Part 17) covers the method of measurement of hydromechanical and related metal works of river valley projects.

2 REFERENCE

The following standard contains provisions which through reference in this text, constitutes provision of this standard. At the time of publication, the edition indicated was 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 edition of the standard indicated below:

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

3 GENERAL

3.1 Hydromechanical works are not amenable to simple measurement techniques for the purpose of payment. The bill of quantities is framed in such a way that measurement for the purpose of payment can be done on the basis of completion of various stages of work carried out in accordance with specifications and approved drawings. As such the bill of quantities and detailed scope of work is generally brought out in terms of sets, or numbers, of equipment.

3.2 Clubbing of Items

Items may be clubbed together provided that break-up of clubbed items is agreed to be on basis of detailed description of items, stated in this standard.

3.3 Booking of Dimensions

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

3.4 Dimensions

Unless otherwise stated all work shall be measured net in decimal system, as fixed in its place, as given in **3.4.1** to **3.4.3.**

3.4.1 Linear dimensions including diameter shall be measured to the nearest 0.001 m.

3.4.2 Areas shall be worked out to nearest 0.001 m^2.

3.4.3 Weights shall be worked out to nearest 0.5 kg.

3.5 Description of Items

The description of each item shall include conveyance and delivery, handling, loading, unloading, storing, rehandling, installation/erection testing and commissioning including all inputs for finishing to required shape and size.

3.6 Work to be Measured Separately

Wherever dewatering is resorted to it shall be measured in accordance with Part 2 of this standard.

3.7 Mill Tolerance

Mill tolerances/rolling margins shall not be considered if the weight is determined by standard weight basis. In case where details of actual weights are available the same should be adopted.

4 BILL OF QUANTITIES

Items of work shall fully describe the materials and truly represent the work to be executed. For the purpose of this standard the works shall be categorised into the stages/activities given in **4.1**. The stages are applicable to all components of hydromechanical works including first and second stage embedded parts, gate structures, stoplogs, bulkhead gates, lifting beams and trash racks, hoists and appurtenances, penstocks and pressure shaft liners, etc.

4.1 Stages/Activities

4.1.1 Design, fabrication, manufacture, shop assembly, painting and supply at designated locations.

4.1.2 Handling, site assembly, erection/installation, field painting, testing and commissioning.

5 MEASUREMENTS

5.1 Various items of steel work for hydromechanical

equipment shall be classified and measured separately as given in **5.6** to **5.12.5**.

5.2 The dimensional measurement at works and at site is carried out during inspections to ensure manufacturing and operational accuracy and completeness of items in accordance with the approved drawings. The approved drawings shall incorporate Bill of Materials indicating various components with their description, size, quantity, material, specifications, and theoretical weights in case of fabricated components. The bill of materials shall form the basis for ensuring completeness to enable acceptance of sets of different items of works.

5.3 Unless otherwise specified, an additional allowance of 2.5 percent of the weight of the structure shall be made for shop and site rivet heads in riveted steel structures.

5.4 Unless otherwise specified, in the case of welded steel structures 1.5 percent of the weight of structure shall be added to the weight.

5.5 The theoretical weight of components in the bill of materials incorporated in the approved drawings shall be based on unit weight given in relevant Indian Standards. No deduction shall be made for holes of area less than 0.01 m^2.

5.6 The following items shall be measured as number of sets supplied as per approved specifications and drawings.

5.6.1 *Embedded Parts*

a) First stage embedded parts consisting of anchor bolts, corner angles, holding down bolts including all fittings, etc.

b) Second stage embedded parts comprising track assembly, seal seats and bases, sill beam, liners, bonnet and bonnet covers, side guides, trunnion brackets, rest beam, anchor girders, dogging devices, anchor bolts and holding down bolts etc.

5.6.2 *Gates, Bulkhead Gates and Stoplogs*

Gates, bulkhead gates and stoplogs comprising gate leaf/skin plate, horizontal girders, vertical girders/end vertical boxes, vertical stiffeners, arms, bracings, roller assemblies, guide assemblies, seal assemblies, lifting arrangements, flow breakers, shields, trunnion girders, trunnion hubs, dogging devices, filling in valve, splice plates etc.

5.6.2.1 The theoretical weights of components in the bill of materials incorporated in the approved drawings shall be based on the details given below:

a) The weight of steel sheet, plate and strip shall be taken from relevant Indian Standards on standard weight basis for every millimeter of sheet thickness. For rolled sections like girders, channels, angles, rounds, steel strips etc, weights given in relevant Indian Standard shall be used.

b) Unless otherwise specified, weights of cleats, brackets, stiffeners, distance pieces, separators, diaphragms, gussets (taking overall rectangular dimension), base plates, packing pieces shall be added to the weight of respective items.

c) For forged steel/steel castings weight shall be calculated on the basis of relevant Indian Standards.

5.6.3 *Hoists*

Hoists comprising hoisting ropes and attachments, rope drums, gears, shafts, couplings/bearings, pedestals, electric motor, worm reducers, electro-mechanical/thrustor brakes, hand operation arrangements, gate position indicators, dial and dial assembly, limit switches, cables, cable reeling drums, control panels, remote control switches, and covers for drive unit and gear boxes, etc.

5.6.4 *Hoist Supporting Structures*

Hoist bridge, columns, cross girders, platform assembly, ladders, staircases including treads and landings, hand rails, chequered plates/gratings and fasteners.

5.6.5 *Lifting Beam*

Includes engaging and disengaging hooks, lifting lugs, side guide shoes, links etc.

5.6.6 Under slung hoist/gantry cranes, EOT-Cranes, trash rack cleaning machine, including gantry girders, embedments, crane runway rails including fasteners and fixtures.

5.6.7 Hydraulic hoists, power packs and other electrical equipment.

5.6.8 Screw hoists (manually/electrically operated) and associated pedestal, stem, gearing, etc.

5.7 Trash racks, cast iron gates and frames shall be measured by weight or sets.

5.8 Cables and guy wires shall be described and measured in running metres stating the diameter.

5.9 The stanchions and columns shall be described and measured in numbers specifying weight.

5.10 Grid flooring and grills shall be described by size

and measured in square metres on the basis of overall area, or by weight.

5.11 Air vent pipes and bypass pipes shall be measured in running metres. Poles shall be measured in running metres considering the diameter and type based on the relevant Indian Standards.

5.12 Penstocks/Pressure Shaft Liners

The measurement of this item shall be made either by weight or by sets (length and numbers) as given in **5.12.1** to **5.12.5**.

5.12.1 For liner measurement of length, the pipes including welds shall be considered as continuous pipes. The weight shall be calculated on standard weight basis.

5.12.2 For straight portions of liner, finished lengths as laid in position shall be measured and weight calculated on the basis of measurement of each section.

5.12.3 For the bend, the length along each axis of the curve shall be measured and weights calculated accordingly.

5.12.4 For stiffener rings, anchor and sealing rings, the thickness, inner and outer diameter of the ring shall be measured. The outer diameter of penstock/pressure shaft liner at a particular point shall be the inner diameter of the rings and the outer diameter of rings shall be equal to the inner diameter plus twice the height of stiffener.

5.12.5 The piezometer plugs and structural steel supports for penstocks shall not be measured separately. However, no deduction shall be made for the plug holes, while calculating the weight of the penstock liners.

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 323 01 31, 323 94 02, 323 33 75

Telegrams: Manaksanstha
(Common to all offices)

Regional Offices: Telephone

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002 — 323 76 17, 323 38 41

Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola, CALCUTTA 700054 — 337 84 99, 337 85 61, 337 86 26, 337 86 62

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022 — 60 38 43, 60 20 25

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

Western : Manakalaya, E9 MIDC, Marol, Andheri (East), MUMBAI 400093 — 832 92 95, 832 78 58, 832 78 91, 832 78 92

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