भारतीय मानक

नदी घाटी परियोजनाओं मे कार्य मापन की पद्धति (बाँध और सम्बद्ध ढाँचे)

भाग 3 घोल अभिपूरण

(दूसरा पुनरीक्षण)

Indian Standard

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

PART 3 GROUTING

(Second Revision)

ICS 93.160

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

February 2003

Price Group 2

FOREWORD

This Indian Standard (Part 3) (Second Revision) 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 Water Resources Division Council.

In measurement of works of river projects a large diversity of methods exist at present according to local practices. The lack of uniformity creates complications regarding measurements and payments. This standard has been formulated in various parts, covering each type of work separately. This part is intended to provide a uniform basis for measuring the work done in respect of grouting for river valley projects. Due care has been taken to ensure conformity with IS 13418 : 1992 'Proforma for analysis of unit rate of grouting used in river valley projects'.

This standard was first published in 1980 and revised in 1994. With the experience gained by its usage and by the revision and updation of related standards, it was necessary to revise the standard second time so as to bring it in line with the current field practice.

There is no ISO standard on the subject. This standard has been prepared based on indigenous manufacturers' data/practices prevalent in the field in India.

The composition of the Committee responsible for formulation of this standard is given in Annex A.

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 3 GROUTING

(Second Revision)

1 SCOPE

This standard (Part 3) covers the method of measurement of grouting in river valley project works (dams and appurtenant structures).

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 standrd are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
6066 : 1994	Recommendations for pressure grouting of rock foundations in river valley projects (*third revision*)
9401 (Part 2) : 2002	Method of measurement of work in river valley projects (dams and appurtenant structures) : Part 2 Dewatering (*first revision*)

3 GENERAL

3.1 Clubbing of Items

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

3.2 Recording of Dimensions

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

3.3 Description of Items

The description of each item shall, unless otherwise stated, be held to include where necessary, conveyance and delivery, handling, unloading, storing, fabrication, hoisting, all formwork 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.

3.3.1 Reaming of drilled holes shall not be measured separately.

3.4 Units of Measurement

All works 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^2; and

c) Cubic contents shall be worked out to the nearest 0.01 m^3.

3.5 Work to be Measured Separately

Work executed in the following conditions shall be measured separately:

a) Work in or under water,

b) Work in liquid mud/marsh land, and

c) Work under tides.

3.5.1 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 The available information, as to the strata conditions through which grouting is to be done, shall be stated or reference showing records of bores be given.

4.3 If pressure testing is to be done, the provision for such test shall be specified and measured separately.

4.4 Diameters and length of holes shall be stated in item descriptions for drilling for grouting along with the method of drilling.

4.5 Components of grout mixtures and their proportions by volume shall be stated in item descriptions for grout materials and injections.

4.6 Thickness of plate steel liners and concrete behind liner/concrete lining thickness through which grout holes may have to be drilled shall be stated.

4.7 Pipes, specials and fittings shall be measured separately.

5 MEASUREMENT OF GROUT PIPES, SPECIALS AND FITTINGS

5.1 Pipes and Specials

The grout pipes, fittings and specials provided for drilling and grouting shall be designated according to the class of pipes and specials in accordance with the relevant Indian Standards. The measurements shall be done on the basis of weight. The weights shall be calculated on the basis of relevant Indian Standards, where applicable. No measurement shall be made for pipes, fittings and specials which are removable and are above the surface from where the grouting starts.

6 MEASUREMENT OF DRILLING OF HOLE FOR GROUTING

6.1 Precise location of the hole with respect to co-ordinate, group and number of the hole, shall be fixed and recorded.

6.2 The drilling of the hole shall be measured separately in running metres of the hole drilled. It shall be classified as follows:

a) Drilling through material other than rock or artificial hard material;
b) Drilling through rock or artificial hard material; and
c) Method of drilling, such as percussion, rotary, diamond, etc, shall be stated.

6.2.1 In addition, these holes shall be classified depending on their angle as follows:

a) 0° to 45° vertically downwards,
b) 0° to 45° vertically upwards, and
c) Up to but not including 45° to the horizontal.

6.3 The length of holes drilled and grouted shall be grouped in stages of approximately 5 m as up to 5 m, exceeding 5 m and up to 10 m, exceeding 10 m and up to 15 m, etc. Length drilled through previously grouted holes shall be measured separately. The above stages shall be grouped and measured from the top of the hole or from the top of the casing pipe whichever is higher.

6.4 Grout holes drilled through plate steel liners shall however, be measured in numbers separately, mentioning the thickness of liners.

7 WATER PRESSURE TESTING BEFORE AND AFTER GROUTING

7.1 Measurement of water pressure testing by open end washing or pressure washing wherever necessary shall be made separately for each hole as follows:

a) Open end washing of the holes shall be measured in linear metres of the hole drilled irrespective of the stage of the hole;
b) Pressure washing or jetting of holes shall be measured in terms of hour of pumping done;
c) Percolation test shall be measured in terms of hour for the duration of pumping; and
d) The water loss shall be measured in lugeons.

8 GROUTING

8.1 The measurement for all types of grouting (*see* IS 6066) shall be made on the basis of the weight of cement in the grout actually forced into the holes. Sand, clay and liquid admixtures shall be measured by weight. Bentonite, pulverized fuel ash, silicate and/or other admixtures, if used, shall be measured separately in the loose dry state before mixing and shall be measured by weight.

8.2 The measurement shall not include the quantity of water added.

9 INSTRUMENTATION REQUIRED FOR GROUTING

The instruments needed for the grouting operation shall be described clearly giving detailed specification of the instruments like upheaval gauges, deflection gauges, stress-strain meters, etc, indicating their location and shall be measured in numbers.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Measurement of Works of River Valley Projects Sectional Committee, WRD 23

Organization	*Representative(s)*
Tehri Hydro Development Corporation, Noida	SHRI KULTAR SHARMA (***Chairman***)
Bhakra Beas Management Board, Chandigarh	SUPERINTENDING ENGINEER SUPERINTENDING ENGINEER (TALWARA CIRCLE) (*Alternate*)
Central Water Commission, New Delhi	DIRECTOR COST APPRAISAL (HW) DIRECTOR COST APPRAISAL (IRRIGATION) (*Alternate*)
Continental Construction (P) Ltd, New Delhi	SHRI T. B. S. RAO SHRI P. A. KAPUR (*Alternate*)
Ferro Concrete Corporation (I) Pvt Ltd, Indore	SHRI MAHAVIR BIDASIARIA SHRI ASHOK BIDASARIA (*Alternate*)
Gammon India Ltd, Mumbai	SHRI R. D. VARANGAONKAR SHRI V. M. DHARAP (*Alternate*)
Indian Institute of Technology, New Delhi	HEAD (CIVIL ENGG)
Irrigation and Waterways Directorate, Government of West Bengal, Kolkata	SHRI H. P. CHAKRABARTI SHRI KAUSHIK CHTTERJEE (*Alternate*)
Irrigation Department, Government of Kerala, Thiruvananthapuram	CHIEF ENGINEER (PROJECT II) DEPUTY CHIEF ENGINEER (IRRIGATON) (*Alternate*)
Irrigation Department, Government of Andhra Pradesh, Hyderabad	CHIEF ENGINEER
Irrigation Department, Government of Karnataka, Bangalore	CHIEF ENGINEER (CIVIL)
Irrigation Department, Government of Maharashtra, Nagpur	SUPERINTENDING ENGINEER
Irrigation Department, Government of Rajasthan, Jaipur	SHRI D. C. KOTHARI
Irrigation Department, Government of Uttranchal, Dehra Dun	CHIEF ENGINEER (YAMUNA VALLEY) SUPERINTENDING ENGINEER (*Alternate*)
Jaiprakash Associates Private Ltd, New Delhi	SHRI D. G. KADKADE
Karnataka Power Corporation Limited, Bangalore	CHIEF ENGINEER (CIVIL DESIGN)
Narmada and Water Resources Department, Government of Gujarat, Gujarat	SUPERINTENDING ENGINEER
Nathpa Jakhri Power Corporation, Distt Kinnaur	SHRI M. P. GARG
National Hydroelectric Power Corporation Ltd, Faridabad	SHRI Y. R. PAHUJA SHRI V. K. SAINI (*Alternate*)
Skanska Cementation India Limited, Mumbai	SHRI P. C. THOMAS SHRI S. N. PATIL (*Alternate*)
Trafalgar House Construction India Ltd, Mumbai	SHRI V. V. NAYAK SHRI A. K. MUKHERJEE (*Alternate*)
BIS Directorate General	SHRI S. S. SETHI, Director & Head (WRD) [Representing Director General (*Ex-officio Member*)]

Member Secretary
SHRI R. S. JUNEJA
Joint Director (WRD), BIS

Bureau of Indian Standards

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