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भाग 2 चिनाई तथा कंक्रीट बांध

Indian Standard

**GUIDELINES FOR THE DESIGN OF GROUT
CURTAINS**

PART 2 MASONRY AND CONCRETE GRAVITY DAMS

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

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Price Group 1

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Foundation and Sub-structures Sectional Committee had been approved by the River Valley Division Council.

Grout curtains are established under the heel of concrete and masonry dams to prevent erosion and loss of water from the reservoir, and, in conjunction with the drainage, to reduce uplift pressure. This is created by drilling and grouting one, or more, lines of drill holes till a barrier or cut-off of desired impermeability is created.

Design requirements for grout curtains for earth and rockfill dams are covered in Part 1 of the Standard. This part covers the design requirements of grout curtains for Masonry and Concrete Gravity Dams.

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***GUIDELINES FOR THE DESIGN OF GROUT CURTAINS****PART 2 MASONRY AND CONCRETE GRAVITY DAMS****1 SCOPE**

This standard covers the guidelines for the design of grout curtains which are used as a principal measure of seepage control for masonry and concrete dams founded on rock mass.

2 REFERENCE

2.1 The following Indian Standard is a necessary adjunct to this standard:

IS 6066 : 1984 Recommendations for pressure grouting of rock foundations in river valley projects (*first revision*)

3 DESIGN CONSIDERATIONS**3.1 Geological Considerations**

The data already obtained from the exploration of the foundation should be analysed to assess the characteristics of foundation rocks and the location and orientation of faults, seams, cavities, joints and bedding planes and discontinuities. The permeability values of foundation strata at various depths should be used for the design since the stages and spacing of the holes for grouting should be based on this data.

3.2 Drilling of Grout Holes

Percussion drills can be used for drilling the grout holes, provided the foundation rock is of a type that will produce granular cuttings, rather than slimes. In case of rocks having weaknesses such as faults and seams it is recommended that at least one hole should be bored with suitable boring machines which are capable of recovery of rock cores and which will facilitate inspection of bore hole walls. Diamond core drilling permits the examination of cores and the location of seams by means of a TV borehole camera.

3.3 Inclination of Grout Holes

The holes may be either vertical or inclined. The orientation, plan and inclination of grout holes depends upon the type of joints and other discontinuities in the foundation rock. The

most common practice is to drill holes inclined towards upstream at 5 to 10 degrees with the vertical.

3.4 Spacing of Grout Holes

Single line grout curtains are generally used. The usual practice is to try a widely spaced system of primary holes at a spacing of 6 m to 8 m, followed by secondary and tertiary holes at a progressively smaller spacing till the desired results are obtained. However, hole spacing less than one meter should be avoided.

3.5 Depth of the Grout Curtain

The depth of the grout curtain depends upon the type and conditions of the rock mass with respect to its permeability. The following empirical criteria may be used as a guide which is based on going practice:

where

$$D = 2/3 H + 8$$

D = Depth of the grout curtain in m, and

H = Height of reservoir water in m.

4 GROUT PROCEDURE

4.1 The procedure for grouting as laid down in IS 6066 : 1984 should be followed.

4.2 Curtain grouting is normally done from the foundation cum drainage gallery after masonry/concrete is laid up to half of the design height or 20 m from the bottom of the gallery, whichever is earlier. However in special cases an additional grout curtain can also be provided at the heel of the dam.

4.3 Drainage holes should be drilled in the foundation gallery. Drainage holes should, however, not be drilled in the foundation gallery till curtain grouting is completed within 30 m from the location of the drainage holes.

4.4 Efficacy of Grout Curtain

This should be evaluated by results of permeability tests during drilling of secondary/tertiary holes as given in IS 6066 : 1984.

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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
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