

भूवैज्ञानिक मानचित्र, खंड और उपसतही  
अन्वेषी लॉग में प्रयुक्त चिह्न और संक्षिप्त रूप  
भाग 5 रचना, सम्पर्क तथा संरचनात्मक आकृतियों  
के लिए रेखिक चिह्न  
( पहला पुनरीक्षण )

**Symbols and Abbreviations for Use  
in Geological Maps, Sections and  
Subsurface Exploratory Logs  
Part 5 Line Symbols for Formation  
Contacts and Structural Features  
( First Revision )**

ICS 07.060; 01.080.30

© BIS 2024



भारतीय मानक ब्यूरो  
BUREAU OF INDIAN STANDARDS  
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI - 110002  
[www.bis.gov.in](http://www.bis.gov.in) [www.standardsbis.in](http://www.standardsbis.in)

## FOREWORD

This Indian Standard (Part 5) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Geological Investigation and Subsurface Exploration Sectional Committee had been approved by the Water Resources Division Council.

In all spheres of engineering construction, data on the nature of geological formation, constituting the foundations is indispensable. Often, the data are given on maps or in geological sections using symbols and abbreviations. Geological maps and sections are also required for other activities such as mining and mineral prospecting. Such maps and sections are being prepared by various agencies in the country. In the absence of any standard for the guidance of the engineering geologist or engineer different symbols and abbreviations are being used by different agencies, resulting in entirely different representations of the same geological data. The data collected and presented by one agency for a particular purpose is often useful for other agencies investigating for a different job. It, therefore, becomes essential for all agencies to follow the same practice. This standard has been prepared to fulfil this need.

This standard (Part 5) deals with line symbols for formation contacts and structural features while other parts deal with the following:

- Part 1 Abbreviations
- Part 2 Igneous rocks
- Part 3 Sedimentary rocks
- Part 4 Metamorphic rocks

The standard was first published in 1992. This revision has been brought out to bring the standard in latest style and update with respect to the latest field practices. In this revision, due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country. In this revision, assistance have been derived from ISO 710 'Graphical symbol for use on detailed maps, plans and geological cross section'.

The composition of the Committee responsible for the 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, shall be rounded off in accordance with IS 2 : 2022 '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.

*Indian Standard***SYMBOLS AND ABBREVIATIONS FOR USE IN GEOLOGICAL MAPS, SECTIONS AND SUBSURFACE EXPLORATORY LOGS****PART 5 LINE SYMBOLS FOR FORMATION CONTACTS AND STRUCTURAL FEATURES***( First Revision )***1 SCOPE**

The symbols covered in this standard (Part 5) are:

- a) Line symbols for formation contacts and other structural features;
- b) Symbols for surface openings and exploration;
- c) Symbols for underground working and exploration, and
- d) Other miscellaneous symbols.

**2 BASIC PRINCIPLES OF REPRESENTATION**

**2.1** The symbols used are intended to characterize the existing state as found in nature and shall not be used to represent genetic processes and their connections.

**2.2** The tectonic elements can be regarded as surfaces or lineations characterized by their situations in space.

**2.2.1 Planes**

Tectonic planes are represented by their traces in the reference plane. The basic symbols for traces is a continuous line to which additional symbols characterizing the nature of the surface are added.

**2.2.2 Lineation**

Lineations are represented by their projection on the reference plane. The basic symbols for the projection of lineations is a compound line of alternate dots and dashes to which additional symbols characterizing the nature of the lineations in question are added.

**2.2.3 Indication of Position**

The position of the planes and lineations are given by the oriented representation of their traces and projections on the map or plan.

**3 LINE SYMBOLS FOR FORMATION, CONTACTS AND STRUCTURAL FEATURES**

**3.1** The line symbols representing formation contacts and various structural features are given in tabular form as listed below:

Contacts	<a href="#">Table 1</a>
Faults	<a href="#">Table 2</a>
Folds	<a href="#">Table 3</a>
Planar features	<a href="#">Table 4</a>
Line features	<a href="#">Table 5</a>
Slip plane and minor shear seams	<a href="#">Table 6</a>
Contours and isopleths	<a href="#">Table 7</a>

NOTE — For representing the fault, letter 'F' may be indicate at both the ends of the symbol. Similarly, for lineament, letter 'L' may be used at both the ends of the symbol.

**4 SYMBOLS FOR SURFACE OPENINGS AND EXPLORATION**

The symbols representing surface openings and exploration are given in tabular form as listed below:

Symbols for use in large scale maps	<a href="#">Table 8</a>
Symbols for use in small scale maps	<a href="#">Table 9</a>

**5 SYMBOLS FOR UNDERGROUND WORKING AND EXPLORATION**



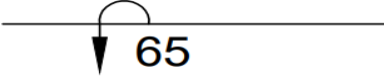

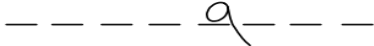

The symbols representing underground workings and such exploration are given in [Table 10](#).

**6 OTHER MISCELLANEOUS SYMBOLS**

Symbols for sections, water wells and springs and other miscellaneous items are given in [Table 11](#).

**Table 1 Line Symbols for Contacts**

([Clauses 3.1](#))

SI No. (1)	Description (2)	Symbol (3)
i)	Contact	
ii)	Contact showing dip, vertical contact with topside known	
iii)	Overturned contact, showing dip	
iv)	Approximate contact	
v)	Possible contact	
vi)	Concealed contact	

**Table 2 Line Symbol for Faults**

([Clause 3.1](#))


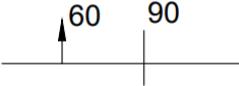

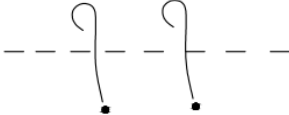


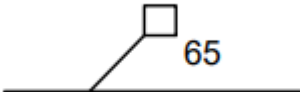
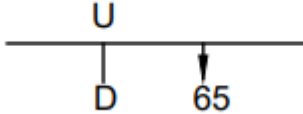
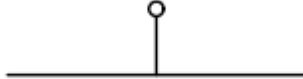
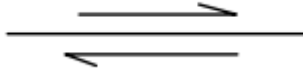
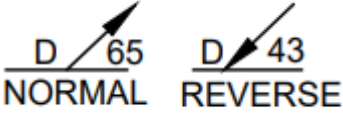

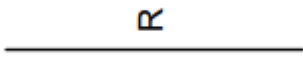



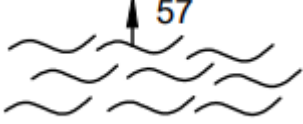



SI No. (1)	Description (2)	Symbol (3)
i)	Fault	
ii)	Fault, showing dip	
iii)	Fault, approximately located	
iv)	Fault, inferred or doubtful	
v)	Concealed fault	
vi)	Lineament	
vii)	Fault (showing bearing and plunge of grooves, striation or slickensides)	

Table 2 (Concluded)

Sl No. (1)	Description (2)	Symbol (3)
viii)	Fault, showing dip (U-upthrown side, D-downthrown side)	
ix)	Fault (bar and ball on downthrown side)	
x)	Fault showing relative horizontal movement	
xi)	Fault (showing bearing and plunge of apparently downthrown block)	
xii)	Normal fault (hachures on downthrown side)	
xiii)	Reverse fault (R, upthrown side)	
xiv)	Thrust fault (T, upper plate)	
xv)	Thrust fault (sawteeth on upper plate, major thrust fault)	
xvi)	Overturned thrust fault, sawteeth in dip direction, bar on side of tectonically higher plate	
xvii)	Fault (shear or mylonite) zone showing dip	
xviii)	Fault breccia	
xix)	Fault, intruded by dyke	
xx)	Termination of fault	

**Table 3 Line Symbols for Folds**


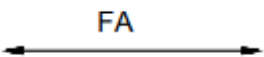
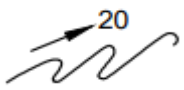
([Clause 3.1](#))

SI No. (1)	Description (2)	Symbol (3)
i)	Anticline, showing crestline	
ii)	Anticline showing crestline and direction of plunge	
iii)	Anticline showing crestline and plunge	
iv)	Asymmetric anticline showing crestline and plunge, shorter arrow indicates steeper limb	
v)	Asymmetric anticline showing dip of limbs and plunge	
vi)	Overtured anticline showing direction of dip of limbs and plunge	
vii)	Inverted anticline, arrows show direction of dip of limbs	
viii)	Dome	
ix)	Antiform	
x)	Syncline showing troughline	

Table 3 (Continued)

SI No. (1)	Description (2)	Symbol (3)
xi)	Syncline showing troughline and direction of plunge	
xii)	Syncline showing troughline and plunge	
xiii)	Asymmetric syncline showing trough line and plunge. Short arrow indicates steeper limb	
xiv)	Asymmetric syncline showing dip of limbs and plunge	
xv)	Overtuned syncline showing direction of dip of limbs and plunge	
xvi)	Basin	
xvii)	Inverted syncline, arrows show direction of dip of limbs	
xviii)	Synform, drawn on foliation, cleavage or bedding	
xix)	Monocline showing trace and plunge of axes, dashed where approximately located	
xx)	Anticlinal bend showing trace and plunge of axis. Dashed where approximately located	
xxi)	Synclinal bend showing trace and plunge of axis. Dashed where approximately located	
xxii)	Minor anticline, showing plunge	
xxiii)	Minor syncline, showing plunge	

**Table 3 (Concluded)**

SI No. (1)	Description (2)	Symbol (3)
xxiv)	Minor fold axis, showing plunge	
xxv)	Minor fold axis, horizontal	
xxvi)	Minor folds showing plunge of axes	

**Table 4 Planar Features**

([Clause 3.1](#))

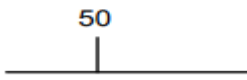
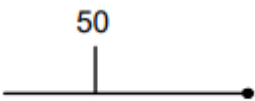
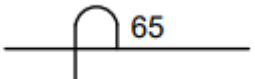
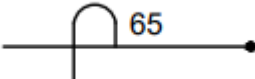
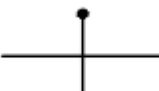



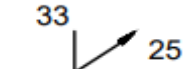
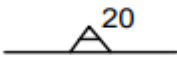


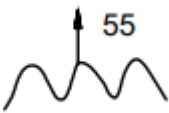
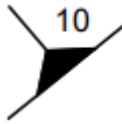



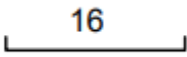


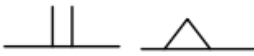
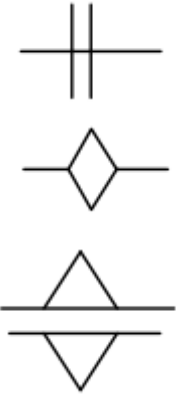
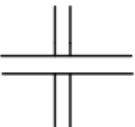
SI No. (1)	Description (2)	Symbol (3)
i)	Strike and dip of beds	
ii)	Strike and dip of beds (top beds known from sedimentary features, used only in areas of complex structure where overturning is also recognized)	
iii)	Strike and dip of overturned beds	
iv)	Strike and dip of overturned beds (top of beds known)	
v)	Strike of vertical beds (top of beds known)	
vi)	Strike of vertical beds	
vii)	Component of dip (dot marks point of observation)	
viii)	Horizontal beds	
ix)	Strike and dip of beds and plunge of slicken-sides	



Table 4 (Continued)

SI No. (1)	Description (2)	Symbol (3)
x)	Strike and dip of foliation	
xi)	Strike of vertical foliation (relationship of foliation or shistosity, to bedding not shown in outcrop)	
xii)	Horizontal foliation	
xiii)	Crumpled, plicated, crenulated, or undulatory beds and average dip	
xiv)	Strike and dip of foliation and parallel bedding	
xv)	Strike of vertical foliation and parallel bedding	
xvi)	Strike and dip of foliation and parallel bedding	
xvii)	Horizontal foliation and bedding	
xviii)	Strike and dip of cleavage	
xix)	Strike of vertical cleavage	
xx)	Horizontal cleavage	

**Table 4 (Concluded)**

SI No. (1)	Description (2)	Symbol (3)
xxi)	Inclined vertical	
xxii)	Vertical	
xxiii)	Horizontal	

Contrasting symbols can be used to distinguish between different kinds of planar structures :  
Type of planar structure should be specified in explanation.

**Table 5 Line Symbols for Liner Features**

*(Clause 3.1)*



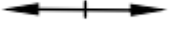






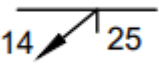

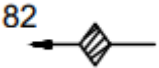
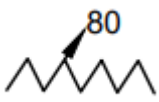
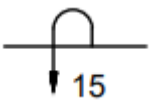
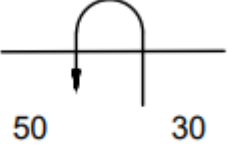

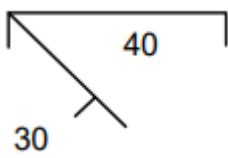
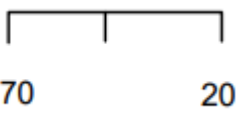


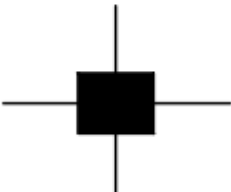
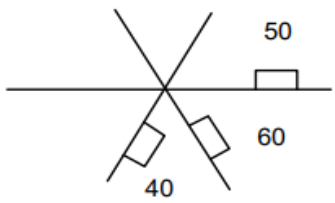
SI No. (1)	Description (2)	Symbol (3)
i)	Bearing and plunge of lineation	
ii)	Vertical lineation (use open symbol in combination with line symbols)	
iii)	Vertical beds, showing horizontal lineation	
iv)	Horizontal beds showing trend of horizontal lineation	
v)	Vertical beds showing plunge of lineation	
vi)	Horizontal lineation	
vii)	Strike and dip of foliation and plunge of lineation	

Table 5 (Continued)







Sl No. (1)	Description (2)	Symbol (3)
viii)	Vertical foliation showing horizontal lineation	
ix)	Strike and dip of foliation showing horizontal lineation	
x)	Strike and dip of beds and plunge of lineation	
xi)	Vertical foliation and vertical lineation	
xii)	Strike of vertical foliation showing plunge of lineation	
xiii)	Approximate strike of folded beds showing plunge of fold axes	
xiv)	Attitude of overturned beds and parallel foliation	
xv)	Attitude of foliation and overturned beds, strikes parallel but dips differ	
xvi)	Double lineation	
xvii)	Strike and dip of beds and intersecting slip cleavage (symbols joined at points of observation)	
xviii)	Strike and dip of beds and intersecting slip cleavage	
xix)	Strike and dip of joints	
xx)	Strike of vertical joints	

**Table 5 (Concluded)**

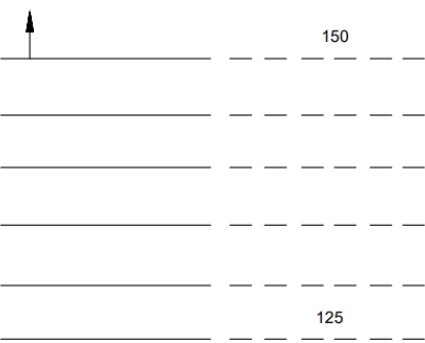



SI No. (1)	Description (2)	Symbol (3)
xxi)	Horizontal joints	
xxii)	Strike and dips of multiple joints	

**Table 6 Line Symbols for Slip Planes and Minor Shkar Seams**

*(Clause 3.1)*



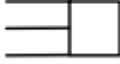



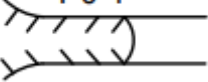
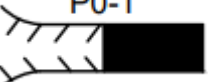
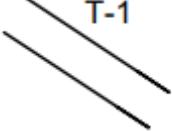
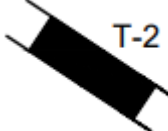



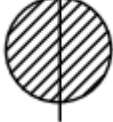
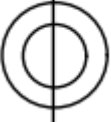


SI No. (1)	Description (2)	Symbol (3)
i)	Joint plane	
ii)	Slip plane	
iii)	Shear zone – 1 cm to 5 cm (thick crushed rock)	
iv)	Shear zone – 5 cm to 15 cm (thick crushed rock)	
v)	Shear zone – thickness of zone defined by border lines	
vi)	Glide crack	 GL

**Table 7 Lines Symbols for Contours and Isopleths***(Clause 3.1)*

SI No. (1)	Description (2)	Symbol (3)
i)	Structure contours drawn on top (or base) of given geological horizon, long-dashed where control less accurate, short dashed where datum is above land surface, contour interval 5 m, arrow indicates direction of dip (structure contours generally not shown as concealed; may be omitted in areas of no information. Arrows used only where index contours fail to show dip).	 <p>The symbol shows a solid horizontal line with a dashed horizontal line below it. An arrow points upwards from the solid line. The number '150' is positioned to the right of the dashed line. Below this, there is another set of solid and dashed lines, with the number '125' to the right of the dashed line.</p>
ii)	Outcrop point used for structural control	 <p>The symbol is a large 'X' shape formed by two intersecting diagonal lines.</p>
iii)	Isopachs	 <p>The symbol consists of a solid horizontal line with a dashed horizontal line below it.</p>
iv)	Isograds (add key mineral names to map and describe in explanation)	 <p>The symbol consists of the text 'SILLIMANITE' on the top line and 'STAUROLITE' on the bottom line, separated by a horizontal line.</p>

**Table 8 Symbols for Surface Openings and Exploration for Use in Large Scale Maps**

(Clause 4)

Sl No. (1)	Description (2)	Symbol (3)	
i)	Vertical shaft	S-1 	S-1 
ii)	Inclined shaft	IS-1 	IS-1 
iii)	Portal or slit	P-1 	P-1 
iv)	Portal or open cut	P0-1 	P0-1 
v)	Trench	T-1 	T-2 
vi)	Prospect pit or open cut	OC-1 	OC-1 
vii)	Drill hole (up to and including 150 mm)	DH-1 	DH-1 
viii)	Drill hole, large diameter (more than 150 mm)	DH-1 	DH-1 
ix)	Drill hole (no geological data available)	HD 	

**Table 8 (Concluded)**

SI No. (1)	Description (2)	Symbol (3)
x)	Auger hole (up to and including 150 mm)	
xi)	Auger hole, large diameter (above 150 mm)	
xii)	Drill hole, inclined (showing bearing and inclination for surface)	
xiii)	Mine dump	


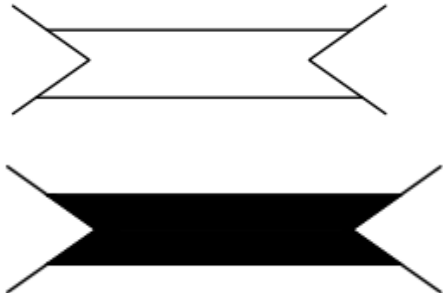
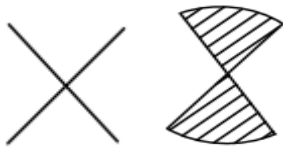
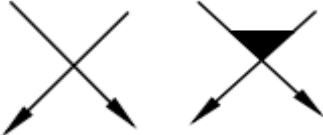

NOTE — Wherever two symbol. are given, the left hand figure denotes the proposed and the right hand figure, the completed working.

**Table 9 Symbols for Surface Openings and Exploration for Use in Small Scale Maps**

([Clause 4.1](#))

SI No. (1)	Description (2)	Symbol (3)
i)	Vertical shaft	
ii)	Inclined shaft	
iii)	Portal of tunnel, adit or slope	

Table 9 (Concluded)

SI No.	Description	Symbol
(1)	(2)	(3)
iv)	Inaccessible tunnel, adit or slope	
v)	Trench	
vi)	Prospect pit	
vii)	Sand, gravel, clay or placer pit	
viii)	Mine, quarry, glory hole or open pit	

NOTE — The left hand figure denotes the proposed, and the right hand figure, the completed working.

Table 10 Symbols for Under Ground Working and Exploration

(Clause 5)



SI No.	Description	Symbol
(1)	(2)	(3)
i)	Shaft at surface	
ii)	Shaft, above and below level	



Table 10 (Concluded)

SI No.	Description	Symbol
(1)	(2)	(3)
iii)	Bottom of shaft (show bottom of pump by note on map of lower level)	
iv)	Winze or head or raise	
v)	Raise or winze extending through level	
vi)	Raise or foot of winze	
vii)	Stopes (can also be explained by note stoped above or stoped below)	
viii)	Oil well	
ix)	Shaft or dig	
x)	Dry hole (Showing formation and altitude at surface, formation at bottom of hole and total depth)	

Km 350  
 Kd 450

**Table 11 Symbols for Sections, Water Wells and Springs and Other Miscellaneous Items**

(Clause 6)



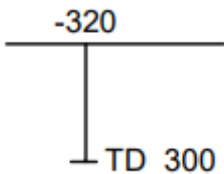
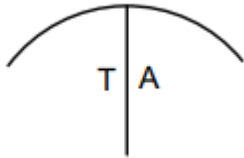
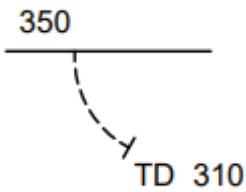


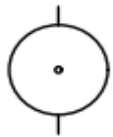




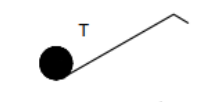
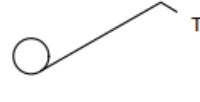
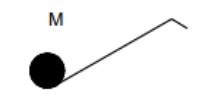
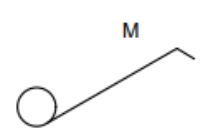


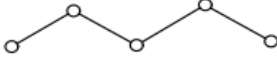

SI No.	Description	Symbol
(1)	(2)	(3)
i)	Thrust (arrow shows relative direction of movement)	
ii)	Fault (arrow shows relative direction of movement)	
iii)	Fault, showing lateral movement (T towards observer; A away from observer, may be combined with arrows to show strike slip and dip slip movement)	
iv)	Drill hole or well on section (showing surface altitude and depth in m) (angle of deviation from vertical plotted)	
v)	Drill hole or wall projected to section (showing surface altitude and total depth in m)	
vi)	Nonflowing well	
vii)	Flowing well	

Table 8 (Continued)

SI No.	Description	Symbol
(1)	(2)	(3)
viii)	Test hole, abandoned or not in use	
ix)	Nonflowing well with pumping plant [generally shown on blue (drainage) base plate in ground-water and surface-water reports]	
x)	Flowing well with pumping plant	
xi)	Spring	
		
xii)	Thermal spring	
		
xiii)	Mineral spring	
		
xiv)	Glacial striae	
		

**Table 8 (Concluded)**

SI No.	Description	Symbol
(1)	(2)	(3)
xv)	Line of stratigraphic section	
xvi)	Line of section (generally omitted from explanation, used only to avoid confusion with other line)	

## ANNEX A

(Foreword)

## COMMITTEE COMPOSITION

Geological Investigations and Subsurface Exploration Sectional Committee, WRD 05

<i>Organization</i>	<i>Representative(s)</i>
In Personal Capacity Gurugram (G-202, JMD Garden Sohna Road, Sector 33 Gurugram - 122018)	DR P. C. NAWANI ( <b>Chairperson</b> )
Aecs Engineering and Geotechnical Services Pvt Limited, Noida	DR TANU RAGHUVANSHI SHRI SANJEEV TREHAN ( <i>Alternate</i> )
Afcons Infrastructure Limited, Mumbai	DR SUNIL BASARKAR DR LAKSHMANA RAO MANTRI ( <i>Alternate</i> )
Aimil Limited, New Delhi	SHRI LAXMIDHAR MOHAPATRA SHRI HEMAN MANCHANDA ( <i>Alternate</i> )
Central Soil and Material Research Station, New Delhi	SHRI N. P. HONKANDAVAR SHRI HARI DEV ( <i>Alternate</i> )
Central Water and Power Research Station, Pune	DR G. DHANUNJAYA SHRI V. CHANDRA SHEKAR ( <i>Alternate I</i> ) SHRI B. SURESH KUMAR ( <i>Alternate II</i> )
Central Water Commission, New Delhi	SHRI SAMIR KUMAR SHUKLA SHRI K. REKHA RANI ( <i>Alternate</i> )
CSIR - Central Building Research Institute, Roorkee	SHRI KOUSHIK PANDIT DR P. K. S. CHAUHAN ( <i>Alternate</i> )
CSIR - Central Institute for Mining and Fuel Research, Dhanbad	DR J. K. MOHNOT DR ASHOK KUMAR SINGH ( <i>Alternate</i> )
Ferro Concrete Construction Pvt Ltd, Indore	DR MAHAVIR BIDASARIA
Geological Survey of India, New Delhi	SHRI P. K. GAJBHIYE SHRI IMTIKUMZUK ( <i>Alternate</i> )
Gujarat Engineering Research Institute, Vadodara	SHRI N. R. MAKWANA SHRI R. K. CHAUHAN ( <i>Alternate</i> )
Himachal Pradesh Power Corporation Limited, Shimla	SHRI ER R. K. KAUNDAL SHRI SANJAY RANA ( <i>Alternate</i> )
Indian Institute of Remote Sensing, Dehradun	DR R. S. CHATTERJEE
Indian Institute of Technology, Dhanbad	SHRI LOHIT KUMAR NAINEGALI DR AVINASH KUMAR SINGH ( <i>Alternate</i> )
Indian Institute of Technology, Indore	SHRI MANISH KUMAR GOYAL
Jammu and Kashmir State Power Development Corporation, Srinagar	SHRI RAVI PANDITA
M/S Parsons Overseas Ltd, New Delhi	SHRI SANJAY RANA SHRI ASHUTOSH KAUSHIK ( <i>Alternate</i> )

**IS 7422 (Part 5) : 2024**

<i>Organization</i>	<i>Representative(s)</i>
Narmada Control Authority, Indore	SHRI M. K. CHAUHAN
National Institute of Rock Mechanics, Bengaluru	DR AJAY KUMAR NAITHANI DR SANDEEP NELLIAT ( <i>Alternate</i> )
National Hydroelectric Power Corporation Ltd, Faridabad	SHRI AJAY SINGH SHRI MOHINDER PAL SINGH ( <i>Alternate</i> )
National Thermal Power Corporation Limited, Noida	SHRI NAVEEN KUMAR JAIN SHRI BHUVNESH KUMAR ( <i>Alternate</i> )
North Eastern Electric Power Corporation Ltd, Shillong	SHRI GIRISH KALITA
Satluj Jal Vidyut Nigam Limited, Shimla	SHRI AJAY KUMAR SHRI BRIJESH BADONI ( <i>Alternate</i> )
Tehri Hydro Development Corporation India Limited, Rishikesh	SHRI AJAY KUMAR
Uttarakhand Jal Vidyut Nigam Ltd, Dehradun	DR HARISH BAHUGUNA
In Personal Capacity ( <i>House No. 120, Jalshakti Vihar (NHPC Society) Sector PHI 1, Pocket 4 Greater Noida, Gautam Budhha Nagar - 201310</i> )	SHRI GOPAL DHAWAN
In Personal Capacity ( <i>Falt no. 4123, Ace Golfshire, Tower 4, Sector 150, Noida - 201310</i> )	SHRI R. K. GOEL
In Personal Capacity ( <i>68 Sadhbhawna Apartment, Plot no. 13 IP Extesnsion, Patparganj Delhi - 110092</i> )	SHRI SHYAM LAL KAPIL
In Personal Capacity ( <i>D 31, Jal Vidyut Apts. Sector 21 C. Part III, Faridabad - 121001</i> )	SHRI IMRAAN SYEED
BIS Directorate General	SHRI R. BHANU PRAKASH SCIENTIST 'E'/ DIRECTOR AND HEAD (WATER RESOURCES) [REPRESENTING DIRECTOR GENERAL ( <i>Ex-officio</i> )]

*Member Secretary*  
SHRI AJAY MEENA  
SCIENTIST 'B'/ASSISTANT DIRECTOR  
(WATER RESOURCES), BIS



## Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 2016* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

### Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Head (Publication & Sales), BIS.

### Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-[www.bis.gov.in](http://www.bis.gov.in) or [www.standardsbis.in](http://www.standardsbis.in).

This Indian Standard has been developed from Doc No.: WRD 05 (21370).

### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

## BUREAU OF INDIAN STANDARDS

### Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones: 2323 0131, 2323 3375, 2323 9402

Website: [www.bis.gov.in](http://www.bis.gov.in)

### Regional Offices:

Central : 601/A, Konnectus Tower -1, 6<sup>th</sup> Floor,  
DMRC Building, Bhavbhuti Marg, New  
Delhi 110002

Telephones

{ 2323 7617

Eastern : 8<sup>th</sup> Floor, Plot No 7/7 & 7/8, CP Block, Sector V,  
Salt Lake, Kolkata, West Bengal 700091

{ 2367 0012  
2320 9474

Northern : Plot No. 4-A, Sector 27-B, Madhya Marg,  
Chandigarh 160019

{ 265 9930

Southern : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113

{ 2254 1442  
2254 1216

Western : 5<sup>th</sup> Floor/MTNL CETTM, Technology Street, Hiranandani Gardens, Powai  
Mumbai 400076

{ 25700030  
25702715

**Branches :** AHMEDABAD, BENGALURU, BHOPAL, BHUBANESHWAR, CHANDIGARH, CHENNAI, COIMBATORE, DEHRADUN, DELHI, FARIDABAD, GHAZIABAD, GUWAHATI, HARYANA (CHANDIGARH), HUBLI, HYDERABAD, JAIPUR, JAMMU, JAMSHEDPUR, KOCHI, KOLKATA, LUCKNOW, MADURAI, MUMBAI, NAGPUR, NOIDA, PARWANOO, PATNA, PUNE, RAIPUR, RAJKOT, SURAT, VIJAYAWADA.