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

Indian Standard

भूवैज्ञानिक मानचित्र, खंड और उपसतही अन्वेषी लॉग में प्रयुक्त चिन्ह और संक्षिप्त रूप

भाग 5 रचना, सम्पर्क तथा संरचनात्मक आकृतियों के लिए रैखिक चिन्ह

(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

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Geological Investigations and Subsurface Exploration Sectional Committee, WRD 05

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 Iineations 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	Table 1
Faults	Table 2
Folds	Table 3
Planar features	Table 4
Line features	Table 5
Slip plane and minor shear seams	Table 6
Contours and isopleths	Table 7

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	Table 8
Symbols for use in small scale maps	Table 9

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)

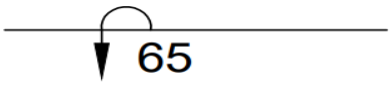
Sl No. (1)	Description (2)	Symbol (3)
i)	Contact	
ii)	Contact showing dip, vertical contact with topside known	
iii)	Overturned contact, showing dip	
iv)	Approximate contact	
v)	Possible contact	
vi)	Concealed contact	

Table 2 Line Symbol for Faults

(*Clause* 3.1)

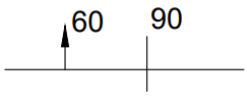
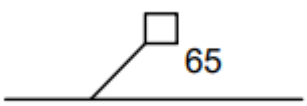
Sl No. (1)	Description (2)	Symbol (3)
i)	Fault	
ii)	Fault, showing dip	
iii)	Fault, approximately located	
iv)	Fault, inferred or doubtful	
v)	Concealed fault	
vi)	Lineament	
vii)	Fault (showing bearing and plunge of grooves, striation or slickensides)	

Table 2 (*Concluded*)

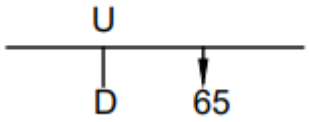
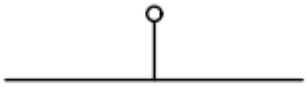
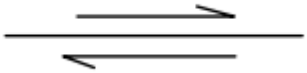
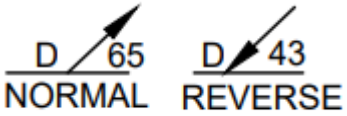
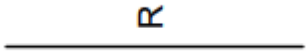
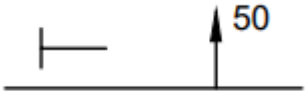
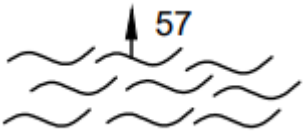
Sl No. (1)	Description (2)	Symbol (3)
viii)	Fault, showing dip (U-upthrown side, D-downthrown side)	
ix)	Fault (bar and ball on downthrown side)	
x)	Fault showing relative horizontal movement	
xi)	Fault (showing bearing and plunge of apparently downthrown block)	
xii)	Normal fault (hachures on downthrown 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)

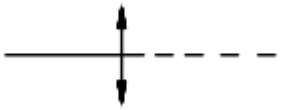
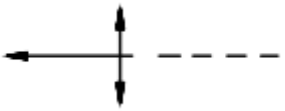
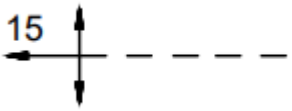
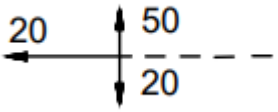
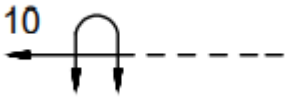
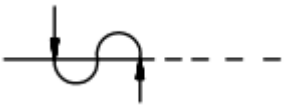
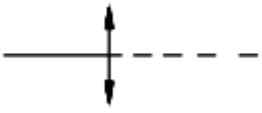
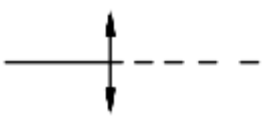
Sl No. (1)	Description (2)	Symbol (3)
i)	Anticline, showing crestline	
ii)	Anticline showing crestline and direction of plunge	
iii)	Anticline showing crestline and plunge	
iv)	Asymmetric anticline showing crestline and plunge, shorter arrow indicates steeper limb	
v)	Asymmetric anticline showing dip of limbs and plunge	
vi)	Overturned 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*)

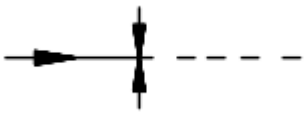
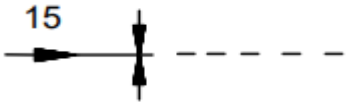
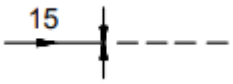
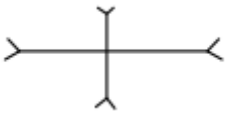
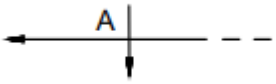
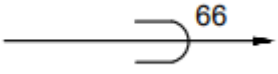
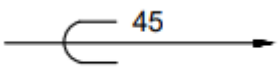
Sl No. (1)	Description (2)	Symbol (3)
xi)	Syncline showing troughline and direction of plunge	
xii)	Syncline showing troughline and plunge	
xiii)	Asymmetric syncline showing trough line and plunge. Short arrow indicates steeper limb	
xiv)	Asymmetric syncline showing dip of limbs and plunge	
xv)	Overturned 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 foilation, 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*)

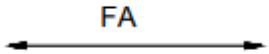
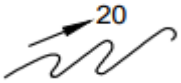
Sl No. (1)	Description (2)	Symbol (3)
xxiv)	Minor fold axis, showing plunge	
xxv)	Minor fold axis, horizontal	
xxvi)	Minor folds showing plunge of axes	

Table 4 Planar Features

(*Clause* 3.1)

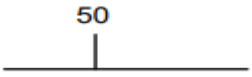
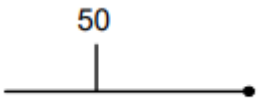
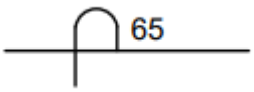
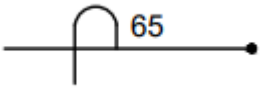
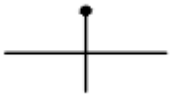
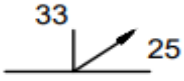
Sl No. (1)	Description (2)	Symbol (3)
i)	Strike and dip of beds	
ii)	Strike and dip of beds (top beds known from sedimentary features, used only in areas of complex structure where overturning is also recognized)	
iii)	Strike and dip of overturned beds	
iv)	Strike and dip of overturned beds (top of beds 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*)

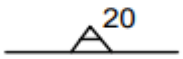
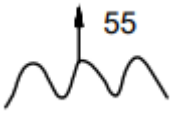
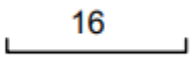
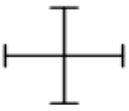
Sl No. (1)	Description (2)	Symbol (3)
x)	Strike and dip of foliation	
xi)	Strike of vertical foliation (relationship of foliation or shistosity, to bedding not shown in outcrop)	
xii)	Horizontal foliation	
xiii)	Crumpled, plicated, crenulated, or undulatory beds and average dip	
xiv)	Strike and dip of 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*)

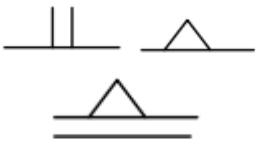
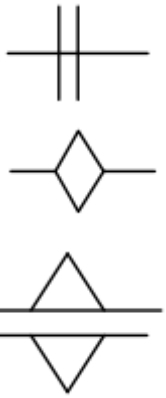
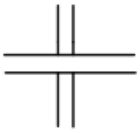
Sl No. (1)	Description (2)	Symbol (3)
xxi)	Inclined vertical	
xxii)	Vertical	
xxiii)	Horizontal	
Contrasting symbols can be used to distinguish between different kinds of planar structures : Type of planar structure should be specified in explanation.		

Table 5 Line Symbols for Liner Features

(*Clause* 3.1)

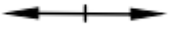
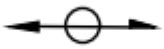
Sl No. (1)	Description (2)	Symbol (3)
i)	Bearing and plunge of lineation	
ii)	Vertical lineation (use open symbol in combination with line symbols)	
iii)	Vertical beds, showing horizontal lineation	
iv)	Horizontal beds showing trend of horizontal lineation	
v)	Vertical beds showing plunge of lineation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

Table 5 (*Continued*)

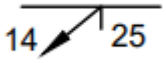
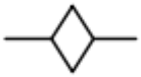
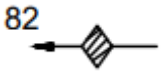
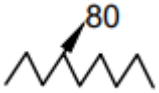
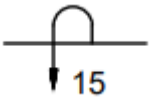
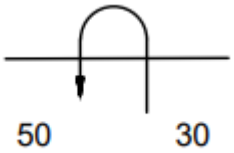
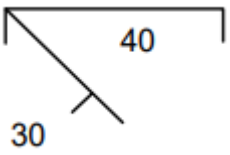
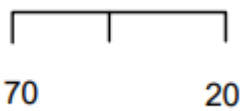
Sl No. (1)	Description (2)	Symbol (3)
viii)	Vertical foliation showing horizontal lineation	
ix)	Strike and dip of foliation showing horizontal lineation	
x)	Strike and dip of beds and plunge of lineation	
xi)	Vertical foliation and vertical lineation	
xii)	Strike of vertical foliation showing plunge 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*)

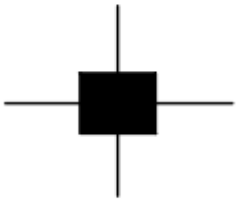
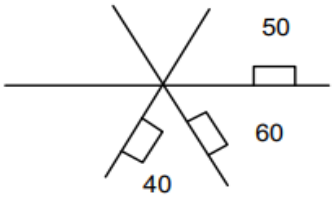
Sl No. (1)	Description (2)	Symbol (3)
xxi)	Horizontal joints	
xxii)	Strike and dips of multiple joints	

Table 6 Line Symbols for Slip Planes and Minor Shkar Seams

(*Clause* 3.1)

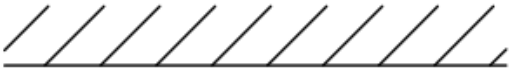
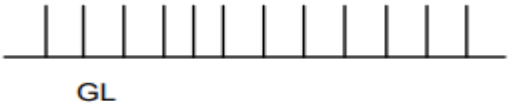
Sl No. (1)	Description (2)	Symbol (3)
i)	Joint plane	
ii)	Slip plane	
iii)	Shear zone – 1 cm to 5 cm (thick crushed rock)	
iv)	Shear zone – 5 cm to 15 cm (thick crushed rock)	
v)	Shear zone – thickness of zone defined by border lines	
vi)	Glide crack	

Table 7 Lines Symbols for Contours and Isopleths

(*Clause* 3.1)

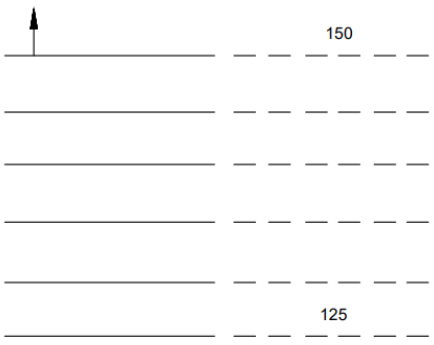
Sl No. (1)	Description (2)	Symbol (3)
i)	Structure contours drawn on top (or base) of given geological horizon, long-dashed where control less accurate, short dashed where datum is above land surface, contour interval 5 m, arrow indicates direction of dip (structure contours generally not shown as concealed; may be omitted in areas of no information. Arrows used only where index contours fail to show dip).	
ii)	Outcrop point used for structural control	
iii)	Isopachs	
iv)	Isograds (add key mineral names to map and describe in explanation)	

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

(*Clause* 4)

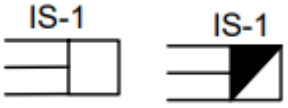
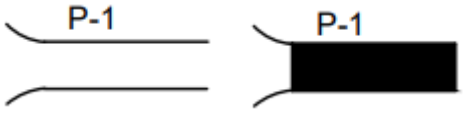
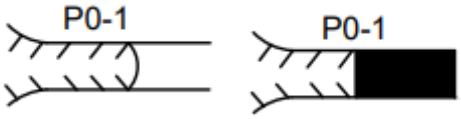
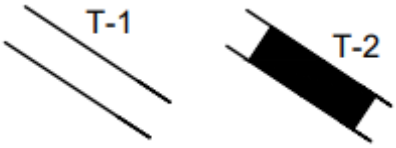
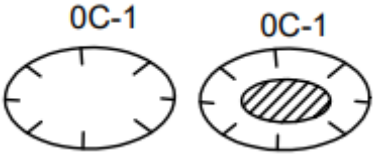
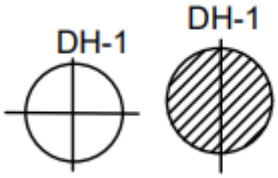
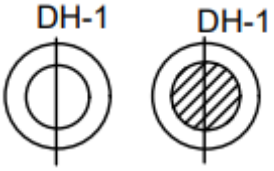
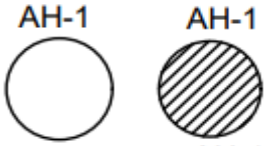
Sl No. (1)	Description (2)	Symbol (3)
i)	Vertical shaft	
ii)	Inclined shaft	
iii)	Portal or slit	
iv)	Portal or open cut	
v)	Trench	
vi)	Prospect pit or open cut	
vii)	Drill hole (up to and including 150 mm)	
viii)	Drill hole, large diameter (more than 150 mm)	
ix)	Drill hole (no geological data available)	

Table 8 (*Concluded*)

Sl No.	Description	Symbol
(1)	(2)	(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)

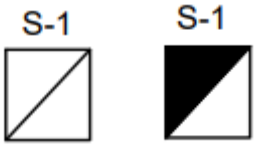
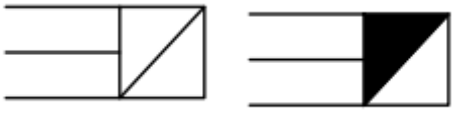
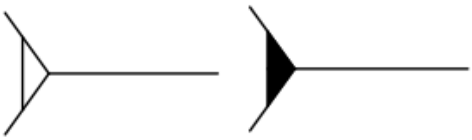
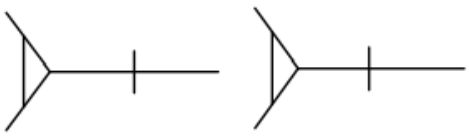
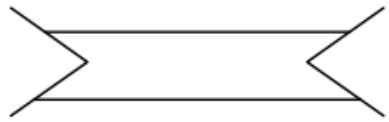
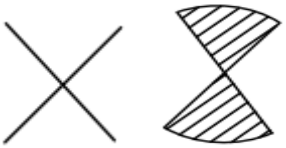
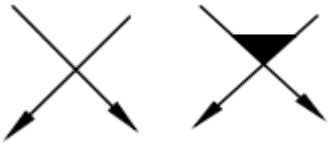
Sl No.	Description	Symbol
(1)	(2)	(3)
i)	Vertical shaft	
ii)	Inclined shaft	
iii)	Portal of tunnel, adit or slope	

Table 9 (*Concluded*)

Sl 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*)

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

Table 10 (*Concluded*)

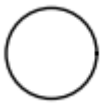
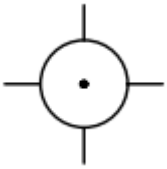
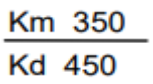
Sl No.	Description	Symbol
(1)	(2)	(3)
iii)	Bottom of shaft (show bottom of pump by note on map of lower level)	
iv)	Winze or head or raise	
v)	Raise or winze extending through level	
vi)	Raise or foot of winze	
vii)	Stopes (can also be explained by note stoped above or stoped below)	 
viii)	Oil well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

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

(*Clause* 6)

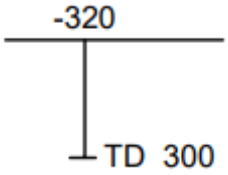
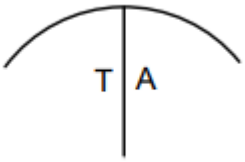
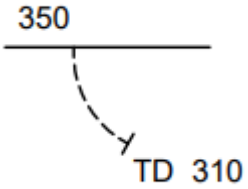
Sl No.	Description	Symbol
(1)	(2)	(3)
i)	Thrust (arrow shows relative direction of movement)	
ii)	Fault (arrow shows relative direction of movement)	
iii)	Fault, showing lateral movement (T towards observer; A away from observer, may be combined with arrows to show strike slip and dip slip movement)	
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*)

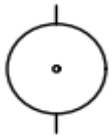
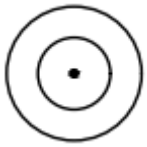
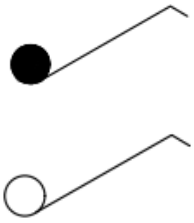
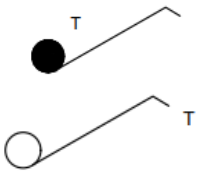
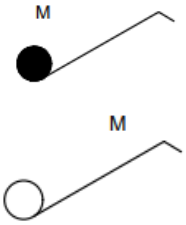
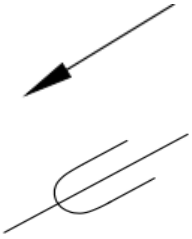
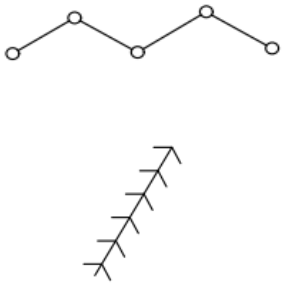
Sl No.	Description	Symbol
(1)	(2)	(3)
viii)	Test hole, abandoned or not in use	
ix)	Nonflowing well with pumping plant [generally shown on blue (drainage) base plate in ground-water and surface-water reports]	
x)	Flowing well with pumping plant	
xi)	Spring	
xii)	Thermal spring	
xiii)	Mineral spring	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

Table 8 (*Concluded*)

Sl 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

Organization	*Representative(s)*
In Personal Capacity (*G-202, JMD Garden Sohna Road, Sector 33 Gurugram - 122018*)	DR P. C. NAWANI **(*Chairperson*)**
Aecs Engineering and Geotechnical Services Pvt Limited, Noida	DR TANU RAGHUVANSHI SHRI SANJEEV TREHAN (*Alternate*)
Afcons Infrastructure Limited, Mumbai	DR SUNIL BASARKAR DR LAKSHMANA RAO MANTRI (*Alternate*)
Aimil Limited, New Delhi	SHRI LAXMIDHAR MOHAPATRA SHRI HEMAN MANCHANDA (*Alternate*)
Central Soil and Material Research Station, New Delhi	SHRI N. P. HONKANDAVAR SHRI HARI DEV (*Alternate*)
Central Water and Power Research Station, Pune	DR G. DHANUNJAYA SHRI V. CHANDRA SHEKAR (*Alternate* I) SHRI B. SURESH KUMAR (*Alternate* II)
Central Water Commission, New Delhi	SHRI SAMIR KUMAR SHUKLA SHRI K. REKHA RANI (*Alternate*)
CSIR - Central Building Research Institute, Roorkee	SHRI KOUSHIK PANDIT DR P. K. S. CHAUHAN (*Alternate*)
CSIR - Central Institute for Mining and Fuel Research, Dhanbad	DR J. K. MOHNOT DR ASHOK KUMAR SINGH (*Alternate*)
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