भूवैज्ञानिक मानचित्र, खंड और उपसतही अन्वेषी लॉग में प्रयुक्त चिह्न और संक्षिप्त रूप भाग 5 रचना, सम्पर्क तथा संरचनात्मक आकृतियों के लिए रैखिक चिह्न

IS 7422 (Part 5): 2024

(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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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 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	Table 1
Faults	Table 2
Folds	Table 3
Planar features	Table 4
Line features	Table 5
Slip plane and minor shear	Table 6
seams	

seams

Contours and isopleths <u>Table 7</u>

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 <u>Table 8</u>

scale maps

Symbols for use in small <u>Table 9</u>

scale maps

5 SYMBOLS FOR UNDERGROUND WORKING AND EXPLORATION

The symbols representing underground workings and such exploration are given in <u>Table 10</u>.

6 OTHER MISCELLANEOUS SYMBOLS

Symbols for sections, water wells and springs and other miscellaneous items are given in <u>Table 11</u>.

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	45 90
iii)	Overturned contact, showing dip	√ 65
iv)	Approximate contact	
v)	Possible contact	
vi)	Concealed contact	

Table 2 Line Symbol for Faults

	No.	Description	Symbol
	1)	(2) Fault	(3)
1	1)	rauit	
į	ii)	Fault, showing dip	60 90
i	iii)	Fault, approximately located	
i	iv)	Fault, inferred or doubtful	
,	v)	Concealed fault	
,	vi)	Lineament	
,	vii)	Fault (showing bearing and plunge of grooves, striation or slickensides)	65

 Table 2 (Concluded)

Table 2 (Concluded)		
Sl No. (1)	Description (2)	Symbol (3)
viii)	Fault, showing dip (Uupthrown side D- downthrown side)	U D 65
ix)	Fault (bar and ball on downthrown side)	
x)	Fault showing relative horizontal movement	
xi)	Fault (showing bearing and plunge of apparently downthrown block)	D 65 D 43 NORMAL REVERSE
xii)	Normal fault (hachures on downthrown side)	
xiii)	Reverse fault (R, upthrown side)	<u> </u>
xiv)	Thrust fault (T, upper plate)	50
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	$\triangle \triangleright \triangle \triangle \triangle \triangle \\ \triangle \nabla \triangle \nabla \triangleright$
xix)	Fault, intruded by dyke	-×××××
xx)	Termination of fault	

Table 3 Line Symbols for Folds

Sl No.	Description	Symbol
(1)	(2)	(3)
i)	Anticline, showing crestline	
ii)	Anticline showing crestline and direction of plunge	
iii)	Anticline showing crestline and plunge	20
iv)	Asymmetric anticline showing crestline and plunge, shorter arrow indicates steeper limb	15
v)	Asymmetric anticline showing dip of limbs and plunge	$\frac{20}{20}$ $\frac{50}{20}$
vi)	Overturned anticline showing direction of dip of limbs and plunge	10
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	15
xiii)	Asymmetric syncline showing trough line and plunge. Short arrow indicates steeper limb	
xiv)	Asymmetric syncline showing dip of limbs and plunge	15
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	- A
xxi)	Synclinal bend showing trace and plunge of axis. Dashed where approximately located	s
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	FA 15
xxv)	Minor fold axis, horizontal	FA
xxvi)	Minor folds showing plunge of axes	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Table 4 Planar Features

(<u>Clause 3.1</u>)

Sl No. (1)	Description (2)	Symbol (3)
i)	Strike and dip of beds	50
ii)	Strike and dip of beds (top beds known from sedimentary features, used only in areas of complex structure where overturning is also recognized)	50
iii)	Strike and dip of overturned beds	65
iv)	Strike and dip of overturned beds (top of beds known)	65
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	\bigoplus
ix)	Strike and dip of beds and plunge of slicken-sides	25

 Table 4 (Continued)

Sl No. (1)	Description (2)	Symbol (3)
x)	Strike and dip of foliation	
xi)	Strike of vertical foliation (relation- ship of foliation or shistosity, to bedding not shown in outcrop)	_
xii)	Horizontal foliation	+
xiii)	Crumpled, plicated, crenulated, or undulatory beds and average dip	55
xiv)	Strike and dip of foliation and parallel bedding	10
xv)	Strike of vertical foliation and parallel bedding	
xvi)	Strike and dip of foliation and parallel bedding	22
xvii)	Horizontal foliation and bedding	
xviii)	Strike and dip of cleavage	16
xix)	Strike of vertical cleavage	\vdash
xx)	Horizontal cleavage	\vdash

Table 4 (Concluded)

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

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	38 75

 Table 5 (Continued)

Sl No.	Description Description	Symbol
(1)	(2)	(3)
viii)	Vertical foliation showing horizontal lineation	
ix)	Strike and dip of foliation showing horizontal lineation	50
x)	Strike and dip of beds and plunge of lineation	14 / 25
xi)	Vertical foliation and vertical lineation	\longrightarrow
xii)	Strike of vertical foliation showing plunge of lineation	82
xiii)	Approximate strike of folded beds showing plunge of fold axes	× 80
xiv)	Attitude of overturned beds and parallel foliation	15
xv)	Attitude of foliation and overturned beds, strikes parallel but dips differ	50 30
xvi)	Double lineation	38 35
xvii)	Strike and dip of beds and intersecting slip cleavage (symbols joined at points of observation)	30
xviii)	Strike and dip of beds and intersecting slip cleavage	70 20
xix)	Strike and dip of joints	10
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	50 60

Table 6 Line Symbols for Slip Planes and Minor Shkar Seams

Sl No. (1)	Description (2)	Symbol (3)
i)	Joint plane	JP
ii)	Slip plane	SP
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

Sl No.	Description	Symbol
(1)	(2)	(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).	150
ii)	Outcrop point used for structural control	
iii)	Isopachs	
iv)	Isograds (add key mineral names to map and describe in explanation)	SILLIMANITE
		STAUROLITE

Table 8 Symbols for Surface Openings and Exploration for Use in Large Scale Maps $(\underline{\it Clause~4})$

	(<u>Cu</u>	ause 4)
Sl No.	Description	Symbol
(1) i)	(2) 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	0C-1 0C-1
vii)	Drill hole (up to and including 150 mm)	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)

Sl No. (1)	Description (2)	Symbol (3)
x)	Auger hole (up to and including 150 mm)	AH-1 AH-1
xi)	Auger hole, large diameter (above 150 mm)	AH-1 AH-1
xii)	Drill hole, inclined (showing bearing and inclination for surface)	50°/S 30° W
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	S-1 S-1
ii)	Inclined shaft	
iii)	Portal of tunnel, adit or slope	<u> </u>

Table 9 (Concluded)

Sl No.	Description	Symbol
(1) iv)	(2)	(3)
iv)	Inaccessible tunnel, adit or slope	<u>}</u>
v)	Trench	
vi)	Prospect pit	
vii)	Sand, gravel, clay or placer pit	\times
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

(<u>Clause 5</u>)

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)	
		Kd 450

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

(<u>Clause 6</u>)

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)	-320 TD 300
iv)	Drill hole or well on section (showing surface altitude and depth in m) (angle of deviation from vertical plotted)	TA
v)	Drill hole or wall projected to section (showing surface altitude and total depth in m)	350 TD 310
vi)	Nonflowing well	loop
vii)	Flowing well	

Table 8 (Continued)

Sl No.	Description	Symbol
(1)	(2)	(3)
(1) 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]	\bigcirc
x)	Flowing well with pumping plant	
xi)	Spring	
xii)	Thermal spring	■ T
		т
xiii)	Mineral spring	M
		M
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)	A A

ANNEX A

(<u>Foreword</u>)

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 (<i>Chairperson</i>)
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