भारतीय मानक
Indian Standard

IS 7422 (Part 3) : 2024

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

भाग 3 अवसादी चट्टानें

(पहला पुनरीक्षण)

Symbols and Abbreviations use in Geologlcal Maps, Sections and Subsurface Exploratory Logs

Part 3 Sedimentary Rocks

(First Revision)

ICS 07.060

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Geological Investigations and Subsurface Exploration Sectional Committee, WRD 05

FOREWORD

This Indian Standard (Part 3) (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 the geological formations constituting the foundations are indispensable. Often, these 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 therefore 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 to 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 3) deals with sedimentary rocks while other parts are as follows:

Part 1	Abbreviations
Part 2	Igneous rocks
Part 4	Metamorphic rocks
Part 5	Line symbols for formation contacts and structural features

The symbolization of rock types is based on the principles laid down by the International Organization for Standardization. For the rock types to be covered for symbolization, classification, of sedimentary rocks as adopted by United States Bureau of Reclamation for engineering purposes has been used.

The standard was first published in 1974. This revision has been brought out to bring the standard in latest style and update with respect to the latest field practices. In revision of this standard, 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 first revision of standard, 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 3 SEDIMENTARY ROCKS

(First Revision)

1 SCOPE

This standard (Part 3) covers symbols for sedimentary rocks for use in geological, maps, sections and logs of bore holes, test pits, exploratory drifts and shafts for river valley projects. Rock types covered in this standard are restricted to those commonly met with in engineering practice.

2 BASIC PRINCIPLES OF SYMBOLIZATION

2.1 In order to represent a type of rock on a map or on a plan, the corresponding surface should be covered by the symbols representing the rock in question. The surfaces occupied by rocks of different types should be separated by a continuous thin line if there is a clear demarcation among the different types in nature.

2.2 The graphic symbols should be used in black and white for the representation of rocks and minerals. Additional letter symbols may be used to designate other characteristics, such as age.

2.3 There is a great variety of rocks and it is impossible to have an individual symbol for each of the rock types that are found in nature. For this reason, the symbols are developed for the most important and frequently occurring rock types. For listing the rock types, one of the simpler systems used for classification of rocks has been followed; however, the tables of symbols for rock types are not meant to provide a standard system of classification. The symbolization is based on the following principles:

a) In order to characterize the properties of rocks, elementary symbols are chosen, which should be:
   1) as simple as possible and therefore easily traceable,
   2) express the nature of the rock, and
   3) such dimensions that several elementary symbols can be placed next to each other.

b) Principal rock types are represented by the juxtaposition of several identical elementary symbols; the variations of the above are shown by the addition of the elementary symbols which characterize the principal constituents;

c) In order to characterize the loose form of rock, symbols should be arranged with no determined order; a systematic staggered arrangement should represent the consolidated form of a rock; and

d) The individual elements or the rows of symbols should be arranged either parallel to the stratification or foliation where applicable or parallel to the margin of the map or the geological formation under portrayal, as found convenient. The procedure adopted should be indicated on the plan.

The basic symbols given in this standard should not be used for representations other than specified. Within the framework of these principles, symbols for other rocks not covered in this standard may be developed and intimated to the Indian Standards Institution. Similarly, for any characteristic not represented by a symbol, a new symbol may be chosen.

3 GRAPHIC SYMBOLS FOR SEDIMENTARY ROCKS

3.1 Elementary and Basic Symbols

The elementary symbols relating to sedimentary rocks and the basic symbols for the principal rock types are given in Table 1 and Table 2 respectively.

3.2 Mixed Symbols for Rocks

3.2.1 For developing mixed symbols for sedimentary rocks of a mixed character, the following points should be kept in view:

a) Irregular arrangement of the basic symbols characterizes loose rocks and a systematic staggered arrangement represents consolidated rocks; and

b) The symbols for mixed types of rocks are derived by combining suitably elementary symbols (*see* Table 1) and the basic symbols (*see* Table 2).

3.2.2 The symbols for different rock types commonly met with in engineering practice are given in Table 3. Symbols for rock types not given in this table may be developed on the basis of the principles laid down in **2.3** and **3.2.1**.

3.2.3 Where features are too small for graphical representation either an asterisk may be given against the feature and explained in the legend or the name of the rock written out.

Table 1 Elementary Symbols Relating to Sedimentary Rocks

[*Clauses* 3.1 *and* 3.2.1 (b)]

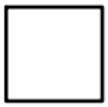
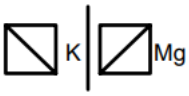
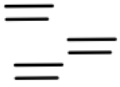
Sl No.	Mineral	Symbol	Mineral	Symbol
(1)	(2)	(3)	(4)	(5)
i)	Detritus		Anhydrite	
ii)	Gritty pebbly		Sodium salt	
iii)	Sandy		Potassium magnesium salt	
iv)	Silty			
v)	Argillaceous		Ferruginous	
vi)	Calcareous		Siliceous	
vii)	Dolomitic		Carbonaceous	
viii)	Gypsiferous		Bituminous	
ix)	Concretion		Humous	

Table 1 (*Concluded*)

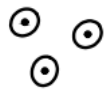
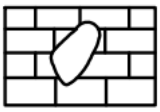
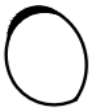
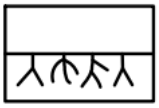
Sl No.	Mineral	Symbol	Mineral	Symbol
(1)	(2)	(3)	(4)	(5)
x)	Qoides		Fossiliferous (in general)	
xi)	Incrustations for example ferruginous		Vertebrates	
xii)			Invertebrates (marine)	
xiii)	Cavern for example In limestone		Invertebrates (non-marine)	
xiv)			Microfauna	
xv)	Volcanogenetic Admixtures		Flora	
xvi)			Microflora	
xvii)	Stigmarion bed		Shelly layer	

Table 2 Basic Symbols for Principal Types of Sedimentary Rocks

[*Clauses* 3.1 *and* 3.2.1 (b)]

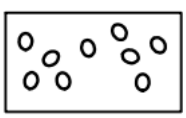
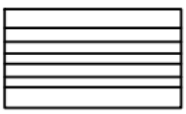
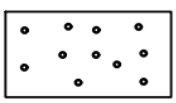
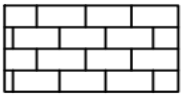
Sl No.	Mineral	Symbol	Mineral	Symbol
(1)	(2)	(3)	(4)	(5)
i)	Gravel		Shale	
ii)	Sand		Limestone	

Table 2 (*Concluded*)

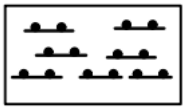
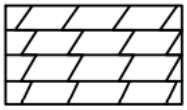
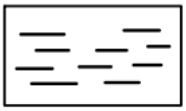
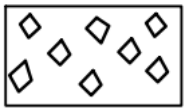
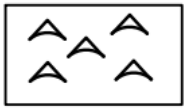
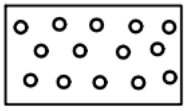
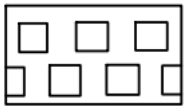
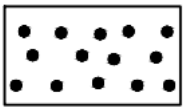
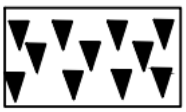
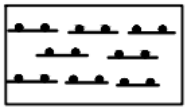
iii)	Silt		Dolomite	
iv)	Clay		Gypsum	
v)	Breccia		Anhydrite	
vi)	Conglomerate		Sodium salt	
vii)	Sandstone		Siliceous rocks	
viii)	Siltstone		Peat	

Table 3 Derived Symbols for Sedimentary Rock Type

(*Clause* 3.2.2)

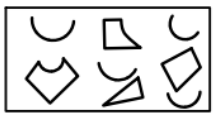
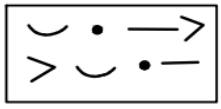
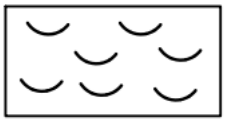
Sl No.	Texture	Essential Constituent	Definitive Characteristic	Petrographic Type	Symbol
(1)	(2)	(3)	(4)	(5)	(6)
i)	Clastic (composed predominantly of rock and mineral grains derived by weathering and erosion, and deposited by water, wind, ice or gravity; showing varying degrees of cementation or consolidation)	Volcanicejecta	Fragments > 32 mm	Agglomerate or breccia	
			Particles > 4 mm < 32 mm	Lapilli tuff	
			Particles < 4 mm	Tuff	

Table 3 (*Continued*)

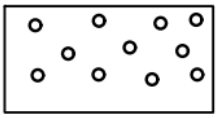
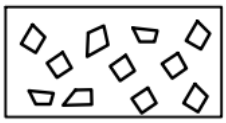
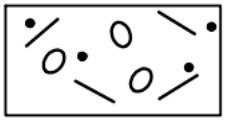
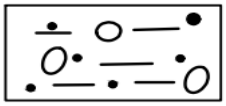
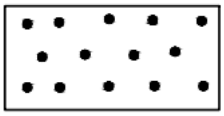
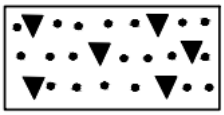
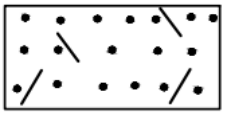
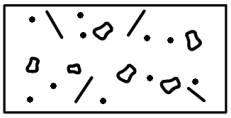
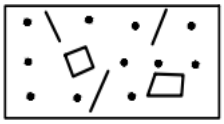
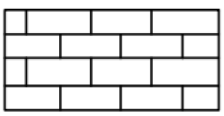
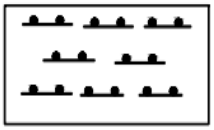
Sl No.	Texture	Essential Constituent	Definitive Characteristic	Petrographic Type	Symbol
(1)	(2)	(3)	(4)	(5)	(6)
		Gravel	Abraded particles > 4 mm over 50 % clay < 25 %	Conglomerate	
		Rock and mineral fragments	Angular particles > 4 mm over 50 % clay < 25 %	Breccia	
		Rock fragments and clay	Fragments greatly varied, occasionally exhibit faceting, high range of sizes usually unsorted; matrix usually clay, sometimes sand, usually greatly in excess of fragments	Loose Till	
				Compact Tillite	
				Sandstone	
				Quartzite	
ii)	Clastic (composed predominantly of rock and mineral grains derived by weathering and erosion, and deposited by water, wind, ice or gravity; showing varying degrees of cementation or consolidation)	Sand	Particles < 4 mm > 1/16 mm over 50 % clay < 25 %	Arkose	
				Graywacke	
				Subgraywacke	
		Detrital grains of calcite	Calcite > 50 % clay < 25 %	Limestone	
		Silt	Particles < 1/16 mm over 50 % clay < 25 %; massive to stratified	Siltstone	

Table 3 (*Continued*)

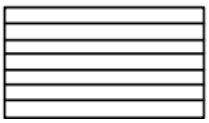
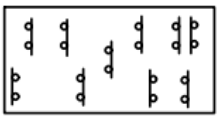
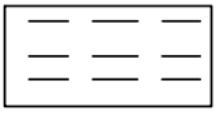
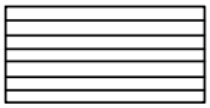
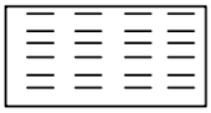
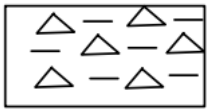
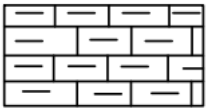
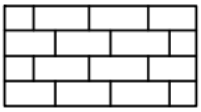
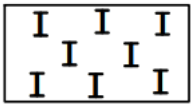
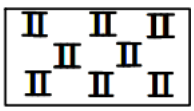
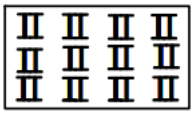
Sl No.	Texture	Essential Constituent	Definitive Characteristic	Petrographic Type	Symbol
(1)	(2)	(3)	(4)	(5)	(6)
			Predominant particles < 1/16 mm, fissile	Shale	
			Predominant particles < 1/16 mm, open structure	Loess	
		Clay minerals	Clay > 25 % massive to stratified	Claystone	
			Predominantly clay or silt, fissile	Shale	
			Predominantly clays and sericite, incipient recrystallization	Argillite (mudstone)	
			Montmorillonite clays > 75 %	Bentonite	
			Kaolinite clays > 75 %	Kaolin	
		Clay and calcite	Very fine grained; carbonates 25 % to 75 %	Marl, marlstone	
iii)	Calcite	Carbonate > 50 % of which calcite > 50 %	Coarse to microcrystalline, compact	Limestone	
			Fine to microcrystalline, porous, firm to friable	Chalk	
			Spongy, porous, firm to friable, fine to microcrystalline	Tufa	
			Compact to porous, banded, fine to microcrystalline	Travertine	

Table 3 (*Continued*)

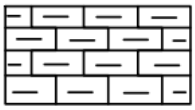
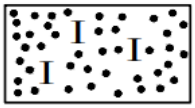
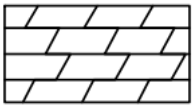
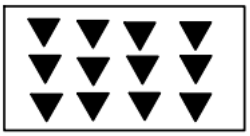
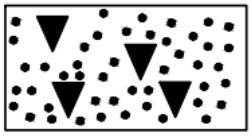
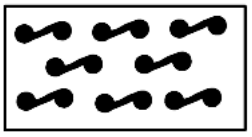
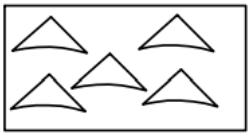
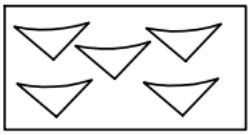
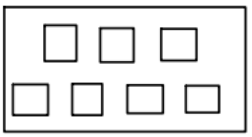
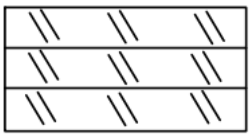
Sl No.	Texture	Essential Constituent	Definitive Characteristic	Petrographic Type	Symbol
(1)	(2)	(3)	(4)	(5)	(6)
		Calcite and clay	Very fine-grained; calcite 25 % to 75 %	Marl, marlstone	
iv)	Crystalline (composed predominantly of coarse to fine of microcrystalline to cryptocrystalline aggregates of crystals precipitated chemically or biochemically from surface or subsurface waters)	Carbonates	Carbonates > 25 % compact to earthy; deposited by ground water	Caliche	
		Dolomite	Carbonate > 50 % of which dolomite > 50 % coarse to fine, compact	Dolomite	
		Chalcedony	Chalcedony > 25 % microcrystalline to cryptocrystalline, conchoidal fracture, compact	Chalcedonic chert	
		Cryptocrystall-ine quartz	Cryptocrystalline quartz, > 50 %	Novaculite	
		Chalcedony	Chalcedony > 25% friable to firm; earthy to porous	Tripoli	
		Crystalline phosphates	Crystalline phosphates > 50 %	Phosphorite	
		Anhydrite	Anhydrite > 50 %	Rock anhydrite	
		Gypsum	Gypsum > 50 %	Rock gypsum	
v)	Amorphous (composed predominantly of noncrystalline substances precipitated or produced by chemical or biochemical action in surface or ground water or within sediments by geologic processes)	Halite	Halite > 50 %	Rock salt	
		Haematite	Haematite > 50 %	Haematite rock	

Table 3 (*Continued*)

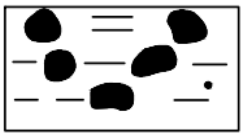
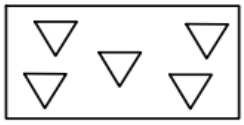
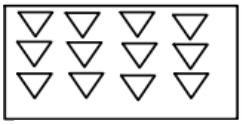
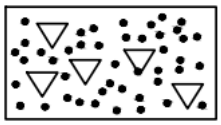
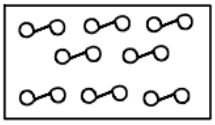
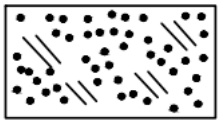
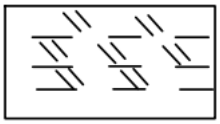
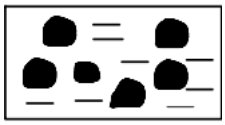
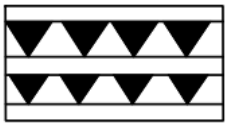
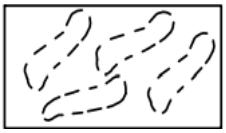
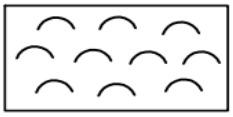
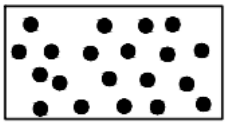
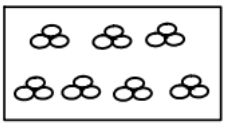
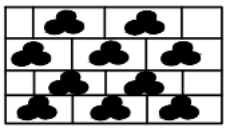
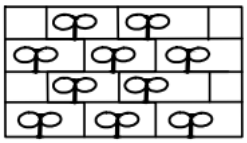
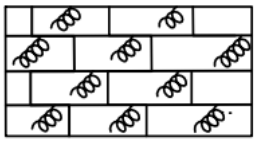
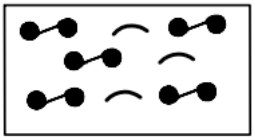
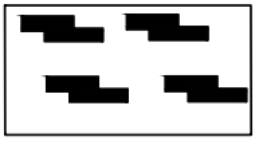
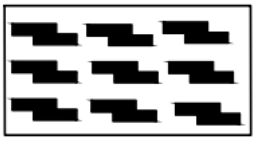
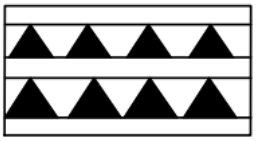
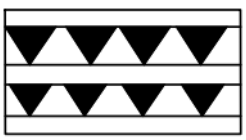
Sl No.	Texture	Essential Constituent	Definitive Characteristic	Petrographic Type	Symbol
(1)	(2)	(3)	(4)	(5)	(6)
		Crystalline hydrous aluminium oxide	Hydrous aluminium oxides > 50 % of which > 50 % are crystalline	Bauxite	
		Opal	Opal > 50 % massive to banded; compact	Opal opaline chert, porcelanite	
			Opal > 50 % porous, massive to laminated	Siliceous sinter	
			Deposited by geysers	Geyserite	
		Collophane	Accumulated bird excrement	Guano	
			Amorphous phosphates > 50 %	Phosphorite	
		Limonite	Limonite > 50 %	Limonite, bog iron ore	
		Amorphous hydrous aluminium oxides	Hydrous aluminium oxides > 50 % of which > 50 % are amorphous	Bauxite	
				Laterite	
		Hydrocarbons	Solid	Asphalt, mineral tar, gilsonite, grahamite	
		Amorphous carbon	Fibrous to spongy to compact; carbonized plant remains < 50 % black to brown	Coal	
		Oxygenated hydrocarbons	Resinous, various light colours	Amber	

Table 3 (*Concluded*)

Sl No.	Texture	Essential Constituent	Definitive Characteristic	Petrographic Type	Symbol
(1)	(2)	(3)	(4)	(5)	(6)
vi)	Bio fragmental (composed of whole or mental remains of plants or animals)	Calcareous shells and fragments	Whole or fragments shells > 50 %	Coquina	
		Diatom tests	Diatom tests > 50 %	Diatomite, diatomaceous earth	
		Radiolarian tests	Radiolarian tests > 50 %	Radiolarian, radiolarian earth	
		Foraminifera tests	Foraminifera tests > 50 %	Foraminiferal limestone	
		Algal structures	Algal structures > 50 %	Algal limestone	
		Coral structures	Coral structures > 50 %	Coral limestone	
		Phosphatic shells teeth, bones	Phosphatic fossils > 50 %	Phosphorite	
		Partially or completely carbonized plant, remains	Brown to black, spongy to compact, plant remains readily visible	Peat	
			Brown to black, fibrous to compact, slakes readily	Lignite	
			Black, massive to banded, compact, slakes slowly	Bituminous coal	
			Black, massive to banded, submetallic, conchoidal fracture	Anthracite coal	

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 & Geotechnical Services Pvt Ltd, Noida	DR TANU RAGHUVANSHI (MANAGER LABORATORY) SHRI SANJEEV TREHAN DIRECTOR (*Alternate*)
Afcons Infrastructure Limited, Mumbai	DR SUNIL BASARKAR, GM (DESIGNS) DR LAKSHMANA RAO MANTRI, ASSISTANT GM (DESIGN) (*Alternate*)
Aimil Limited, New Delhi	SHRI LAXMIDHAR MOHAPATRA SHRI HEMAN MANCHANDA (*Alternate*)
CSIR — Central Building Research Institute, Roorkee	SHRI KOUSHIK PANDIT PRINCIPAL SCIENTIST DR P. K. S. CHAUHAN PRINCIPAL SCIENTIST (*Alternate*)
CSIR - Central Institute for Mining And Fuel Research, Dhanbad	DR J. K. MOHNOT, CHIEF SCIENTIST AND SCIENTIST-IN-CHARGE DR ANIL SWARUP (*Alternate*)
Central Soil & Material Research Station, New Delhi	SHRI N P HONKANDAVAR, SCIENTIST E SHRI HARI DEV, SCIENTIST E (*Alternate*)
Central Water Commission, New Delhi	SHRI SAMIR KUMAR SHUKLA DIRECTOR (FE AND SA) SHRI S. K. DAS, DIRECTOR CMDD (E AND NE) (*Alternate*)
Central Water & Power Research Station, Pune	DR G. DHANUNJAYA, SCIENTIST C SHRI V. CHANDRA SHEKAR, SCIENTIST C (*Alternate*) SHRI B. SURESH KUMAR SCIENTIST C (*Alternate*)
Ferro Concrete Construction Pvt Ltd, Indore	DR MAHAVIR BIDASARIA (*Alternate*)
Geological Survey of India, New Delhi	SHRI P. K. GAJBHIYE, DIRECTOR SHRI IMTIKUMZUK, DIRECTOR (*Alternate*)
Gujarat Engineering Research Institute, Vadodara	SHRI N. R. MAKWANA, JOINT DIRECTOR (IRRIGATION) SHRI R. K. CHAUHAN, SENIOR GEOLOGIST, ENGINEERING GEOLOGY DIVISION (*Alternate*)
Himachal Pradesh Power Corporation Limited, Shimla	SHRI ER. R. K. KAUNDAL, GENERAL MANAGER (DESIGNS) SHRI SANJAY RANA DY GM (*Alternate*)
Indian Institute of Remote Sensing, Dehradun	DR R. S. CHATTERJEE, SCIENTIST 'G' AND HEAD, GEOSCIENCES DEPARTMENT
J&K State Power Development Corporation Limited, Srinagar	SHRI RAVI PANDITA

Organization	*Representative*(*s*)
M/S Parsons Overseas Ltd, New Delhi	SHRI SANJAY RANA, MANAGING DIRECTOR SHRI ASHUTOSH KAUSHIK, CEO (*Alternate*)
Narmada Control Authority, Indore	SHRI M. K. CHAUHAN
National Hydroelectric Power Corporation Ltd, Faridabad	SHRI SHYAM LAL KAPIL, EXECUTIVE DIRECTOR SHRI AJAY SINGH, DEPUTY GMM SHRI MOHINDER PAL SINGH, SENIOR MANAGER (GEOPHYSICS) (*Alternate*)
National Institute of Rock Mechanics, Karnataka	DR AJAY KUMAR NAITHANI DR SANDEEP NELLIAT (*Alternate*)
National Thermal Power Corporation Limited, Noida	SHRI NAVEEN KUMAR JAIN SHRI BHUVNESH KUMAR (*Alternate*)
North Eastern Electric Power Corporation Ltd, Shillong	SHRI GIRISH KALITA, MANAGER (GEOLOGY)
Satluj Jal Vidyut Nigam Ltd Limited, Shimla	SH AJAY KUMAR, MANAGER SHRI BRIJESH BADONI, MANAGER (*Alternate*)
Tehri Hydro Development Corporation India Limited, Rishikesh	SHRI AJAY KUMAR SHRI KAILASAH CHANDRA UNIYAL (*Alternate*)
Uttarakhand Jal Vidyut Nigam Ltd, Dehradun	DIRECTOR (PROJECTS) DR HARISH BAHUGUNA (*Alternate*)
In Personal Capacity (*House No. 120, Jalshakti Vihar (NHPC Society) Sector PHI 1, Pocket 4 Greater Noida, Gautam Budhha Nagar-201310*)	SHRI GOPAL DHAWAN,
In Personal Capacity, (*Falt no. 4123, Ace Golfshire, Tower 4, Sector 150, Noida – 201310*)	SHRI R. K. GOEL
In Personal Capacity (*D 31, Jal Vidyut Apts. Sector 21 C. Part III, Faridabad- 121001*)	SHRI IMRAAN SYEED
BIS Directorate General	SHRI R. BHANU PRAKASH SCIENTIST 'E'/ DIRECTOR AND HEAD (WATER RESOURCES) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

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

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This Indian Standard has been developed from Doc No.: WRD 05 (21366).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
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