BUREAU OF INDIAN STANDARDS

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भारतीय मानक **मसौदा**

वायरलाईन हीरक क्रोड वेधन उपस्कर — पद्धति ए

भाग 1 मिटरी इकाइयाँ

(*पहला पुनरीक्षण*)

DRAFT *Indian Standard*

Wireline Diamond Core Drilling Equipment — System A Part 1 Metric Units

[*First Revision* of IS 15481 (Part 1)/ ISO 10097-1]

ICS 73.100.30

Diamond Core and Water Well Drilling **Sectional Committee, MED 21**	**Last date for receipt of comments is 21 May 2022**

FOREWORD

(*Adoption clauses to be added later*)

This standard was first published in 2004. This standard supersedes IS 15481 (Part 1): 2004/ ISO 10097-1: 1999 Wireline diamond core drilling equipment — System A—1: Metric units.

Major changes in this revision are as follows:

a) Mechanical properties have been revised;
b) Eccentricity has been revised; and
c) Straightness have been modified.

In the preparation of this standard considerable assistant has been derived from the following standards:

ISO 10097-1:1999 Wireline diamond core drilling equipment — System A — Part 1: Metric units.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2:2022 'Rules for 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.

DRAFT *Indian Standard*

WIRELINE DIAMOND CORE DRILLING EQUIPMENT — SYSTEM A

PART 1 METRIC UNITS

(*First Revision*)

1 SCOPE

This standard covers the nomenclature and the leading dimensions necessary for the interchangeability of the following wireline drilling equipment for drilling holes 48 mm to 96 mm in diameter, yielding cores of 27 mm to 63 mm in diameter.

The equipment is illustrated in Fig. 1 and comprises the following:

a) core bit;
b) reaming shell;
c) core lifter;
d) core lifter case;
e) outer tube;
f) inner tube; and
g) drill rod (smooth pipe only).

2 REFERENCES

The standards listed below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below.

IS/ISO No.	*Title*
ISO 3551-1:1992	Rotary core diamond drilling equipment — System A — Part 1: Metric units
IS 9439:2022	Glossary of terms used in water well drilling technology (*first revision*)
IS/ISO 18758-1: 2018	Mining and earth-moving machinery — Rock drill rigs and rock reinforcement rigs

3 TERMINOLOGY

For the purpose of this standard the terminologies given in IS 9439 and IS/ISO 18758-1 shall apply.

4 DESIGNATION

Items made in accordance with this part shall be designated by the identification letters WL and hole dimensions *A, B, N,* and *H.*

Example:

Core bit for wireline drilling hole *B* dimensions: WLB core bit.

5 MATERIALS

Materials used in the manufacture of the wireline drilling equipment specified in this standard shall have the minimum mechanical properties as specified in Table 1.

Table 1 Mechanical Properties

(*Clause* 5)

Sl No.	Component	Minimum Tensile Strength, y N/mm^2 (MPa)	Minimum Yield Stress, Re, N/mm^2 (MPa)	Minimum Brinell Hardness	Minimum Elongation After Fracture, A %	Condition
(1)	(2)	(3)	(4)		(5)	(6)
i)	Drill rods	690	550	200	15	Induction hardened
ii)	Core tubes	780	680	229	15	Tempered/stress relieved
iii)	Other items			Not specified		

6 DIMENSIONS AND TOLERANCES

6.1 General

All dimensions and tolerances are in millimetres unless otherwise stated and shall be in accordance with Tables 3 to 9 inclusive.

6.2 Conformity

In those industries where drilling depths are measured in metres, the rod lengths shall be 3 m, 1.5 m, or 0.75 m.

6.3 Eccentricity

The eccentricity is defined as the distance between the centres of the outer and inner diameters and may not exceed 5 percent of nominal wall thickness Q.

The eccentricity is calculated according to the formula:

$$\frac{Q_{\max} - Q_{\min}}{2Q_{\text{nom}}} \times 100$$

where

$Q_{\max}$ and $Q_{\min}$ are measured values in the same section.

6.4 Straightness

When measured over the whole length of the tube by rolling against a straightedge, the maximum deviation shall not be greater than following:

a) for drill rods 1 in 2 000; and
b) for core tubes 1 in 2 000.

6.5 Technical conditions

Tubes should be made seamless. Tube rolling technique and machining operations are optional.

Tube straightness is checked by rolling the tube on a horizontal or slightly inclined flat surface. When rolling, no clearances shall be seen between the rod ends and the surface, nor between the middle of the rod (tube) and the surface.

Hole drilling by wireline system A equipment shall be cased by system A casing as specified in ISO 3551-1.

Table 2 System of Dimensional Identification Letters

(*Clause* 6.5)

Sl No.	Identification Letters	Meanings of Identification Letters
(1)	(2)	(3)
i)	*A*, A_1, etc.	Outside diameters; *A* being largest; A_1, A_2. etc. progressively smaller
ii)	*B*, B_1, etc.	Inside diameters; *B* being smallest; B_1, B_2, etc. progressively larger
iii)	*C*, C_1, etc.	External lengths; *C* being longest; C_1, C_2, etc. progressively shorter
iv)	*D*, D_1. etc.	Internal lengths; *D* being longest; D_1, D_2, etc. progressively shorter

v)	*E*, E_1, etc.	Major diameter of pin threads; *E* being largest; E_1, E_2, etc. smaller
vi)	*F*, F_1, etc.	Minor diameter of pin threads; *F* being largest; F_1, F_2, etc. smaller
vii)	Thread pitch (threads per inch)	Pin threads
viii)	*G*, G_1, etc.	Width at root of pin thread
ix)	*H*, H_1, etc.	Length of o.d. machined for external threading
x)	*J*, J_1, etc.	Minimum length for full depth of pin threads
xi)	*K*, K_1 etc.	Length of relief at the starting point of pin threads
xii)	*L*, L_1, etc.	Angle of bevel for pin thread shoulder
xiii)	*M*, M_1, etc.	Major diameter of box threads; *M* being largest; M_1, M_2, etc. smaller
xiv)	*N*, N_1, etc.	Minor diameter of box; *N* being largest; N_1, N_2, etc. smaller
xv)	Thread pitch (threads per inch)	Box threads
xvi)	*P*, P_1, etc.	Width at root of box threads
xvii)	*Q*, Q_1, etc.	Length of i.d. machined for internal threading
xviii)	*R*, R_1, etc.	Minimum length for full depth of box threads
xix)	*S*, S_1, etc.	Length of counter bore at the starting of box threads
xx)	*T*, T_1, etc.	Angle of bevel for thread shoulder
xxi)	*U*, U_1, etc.	Included angles: Internal and external
xxii)	*V*, V_1, etc.	Internal angles, not pertaining to threaded connections
xxiii)	*W*, W_1, etc.	External angles, not pertaining to threaded connections
xxiv)	*X*	Diamond set dimensions: External (o.d.)
xxv)	*Y*	Diamond set dimensions: Internal (i.d.)

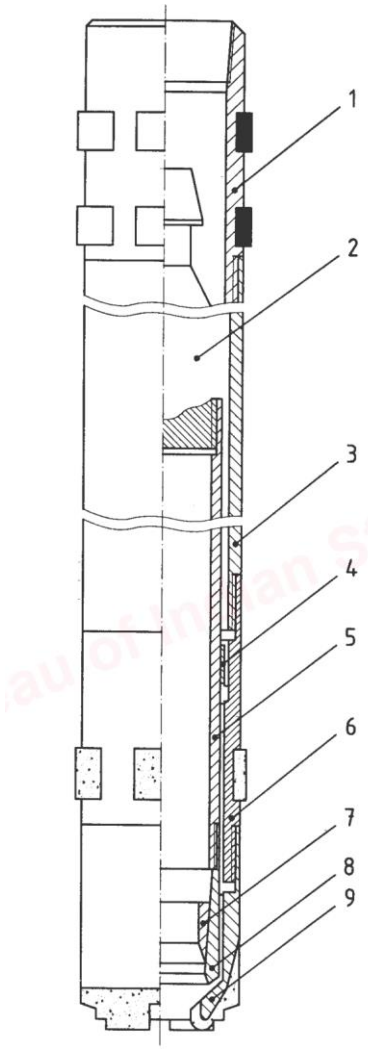
NOTES

1 All decimal dimensions indicate allowable tolerances.

2 The following common abbreviations have sometimes been used in tables in the English version for the sake of simplicity:

o.d = outside diameter

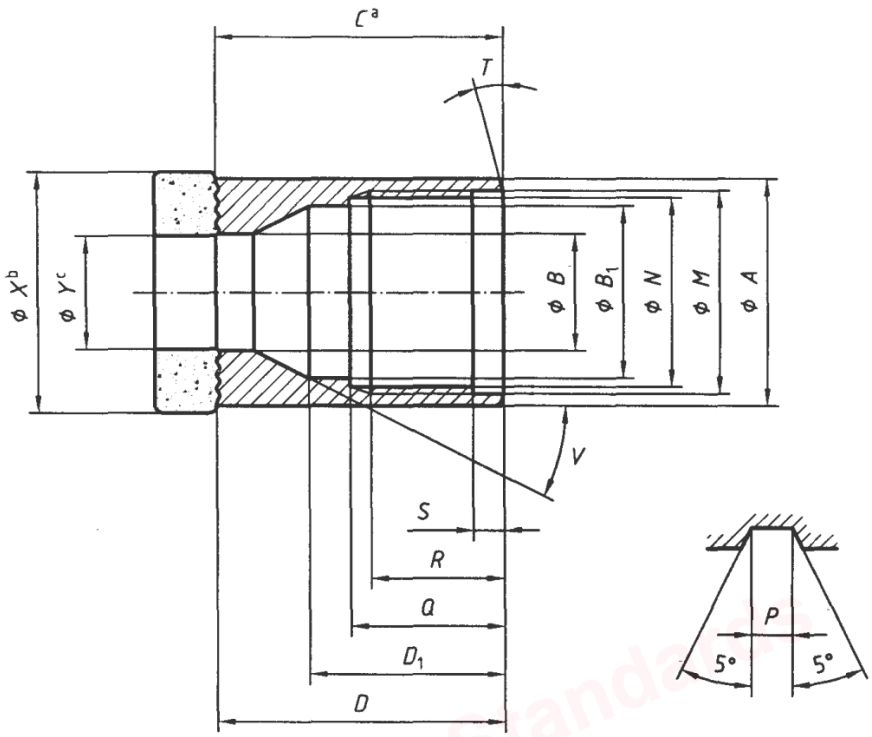
i.d. = inside diameter.



Key

1	Head (not standardized)	6	Reaming shell
2	Bearing unit (not standardized)	7	Core lifter
3	Outer core barrel	8	Core lifter case
4	Stabilizer (not standardized)	9	Bit
5	Retractable core barrel		

FIG.1 WIRELINE CORE BARREL ASSEMBLY



where

a clear of diamond
b set o.d.
c set i.d.

NOTE — For dimensions refer Table 3.

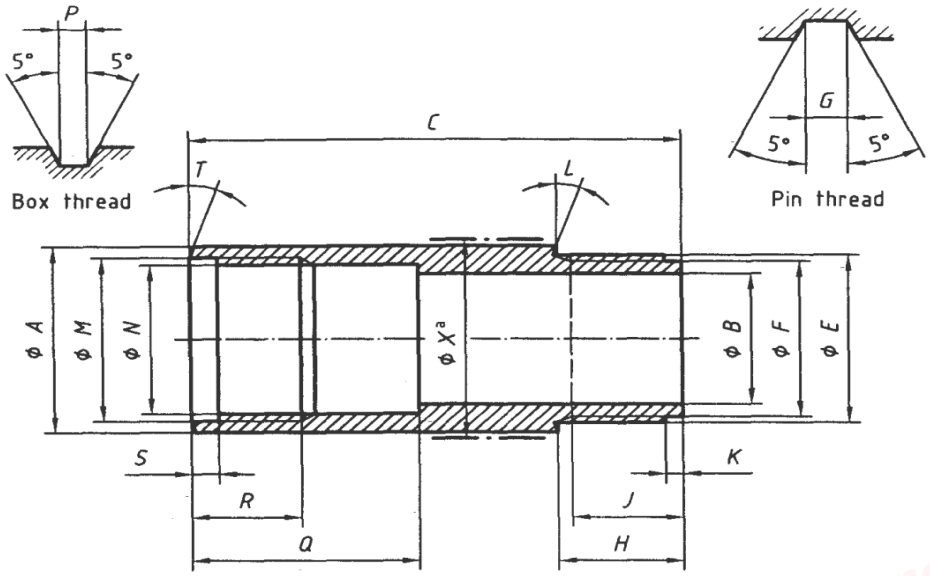
FIG.2 WIRELINE CORE BIT

Table 3 Wireline Core Bit

(*See* Fig. 2)

Sl No.	Dimension		WLA	WLB	WLN	WLH
(1)	(2)		(3)	(4)	(5)	(6)
i)	*A*	*Max.*	46.66	57.96	73.91	94.31
		Min.	46.56	57.86	73.81	94.21
ii)	*B*	*Max.*	27.89	37.70	48.82	64.69
		Min.	27.76	36.91	48.02	63.90
iii)	B_1	*Max.*	36.91	46.43	60.72	78.18
		Min.	36.12	45.64	59.93	77.39
iv)	*C*	*Min.*	57.91	66.04	65.41	96.22
v)	*D*	*Max.*	58.71	66.83	66.20	97.01

		Min.	57.91	66.04	65.41	96.22
vi)	D_1	*Max.*	49.61	57.55	54.37	83.74
		Min.	48.82	56.75	53.58	82.95
vii)	*M*	*Max.*	42.09	52.43	67.51	85.78
		Min.	42.04	52.37	67.46	85.70
viii)	*N*	*Max.*	40.59	50.85	65.99	84.20
		Min.	40.51	50.80	65.94	84.12
ix)	Thread pitch		6.35	6.35	6.35	6.35
x)	*P*	*Max.*	3.20	3.20	3.20	3.20
		Min.	3.12	3.12	3.12	3.12
xi)	*Q*	*Max.*	42.29	42.52	42.55	42.75
		Min.	42.16	42.39	42.42	42.62
xii)	*R*	*Min.*	38.89	38.89	38.89	38.89
xiii)	*S*	*Max.*	7.4	7.4	7.4	7.14
		Min.	6.35	6.35	6.35	6.35
xiv)	*T*		15°	15°	15°	15°
xv)	*V*		30°	30°	30°	30°
xvi)	*X*	*Max.*	47.75	59.69	75.44	95.76
		Min.	47.50	59.44	75.18	95.38
xvii)	*Y*	*Max.*	27.10	36.53	47.75	63.63
		Min.	26.85	36.27	47.50	63.37



[a] Set o.d.

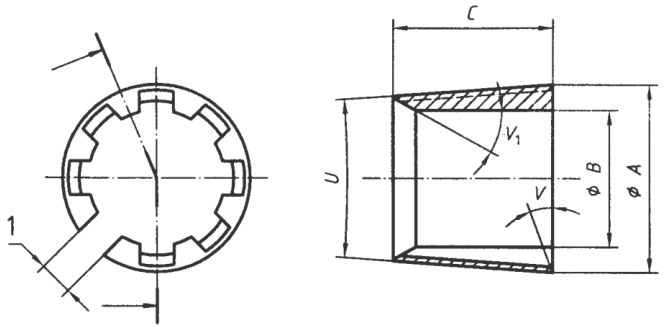
NOTE — For dimensions refer Table 4.

FIG. 3 WIRELINE REAMING SHELL

Table 4 Wireline Reaming Shell

(*see* Fig. 3)

Sl No.	Dimension		WLA	WLB	WLN	WLH
(1)	(2)		(3)	(4)	(5)	(6)
i)	*A*	*Max.*	46.66	57.96	73.91	94.31
		Min.	46.56	57.86	73.81	94.21
ii)	*B*	*Max.*	36.51	46.04	60.33	77.79
		Min.	36.36	45.86	60.12	77.53
iii)	*C*	*Max.*	162.32	159.15	171.85	182.96
		Min.	161.53	158.35	171.05	182.17
iv)	*E*	*Max.*	41.96	52.30	67.39	85.62
		Min.	41.91	52.25	67.34	85.55
v)	*F*	*Max.*	40.44	50.72	65.86	84.05
		Min.	40.39	50.67	65.81	83.97
vi)	Thread pitch		6.35	6.35	6.35	6.35
vii)	*G*	*Max.*	3.20	3.20	3.20	3.20
		Min.	3.12	3.12	3.12	3.12
viii)	*H*	*Max.*	41.28	41.38	41.28	41.20
		Min.	41.15	41.25	41.15	41.07
ix)	*J*	*Min.*	38.89	38.89	38.89	38.89
x)	*K*	*Max.*	7.14	7.14	7.14	7.14
		Min.	6.35	6.35	6.35	6.35
xi)	*L*		15°	15°	15°	15°
xii)	*M*	*Max.*	42.09	52.43	67.51	85.78
		Min.	42.04	52.37	67.46	85.70
xiii)	*N*	*Max.*	40.59	50.85	65.99	84.20
		Min.	40.51	50.80	65.94	84.12
xiv)	Thread pitch		6.35	6.35	6.35	6.35
xv)	*P*	*Max.*	3.20	3.20	3.20	3.20
		Min.	3.12	3.12	3.12	3.12
xvi)	*Q*	*Max.*	61.01	61.32	67.69	74.04
		Min.	60.88	61.19	67.56	73.91
xvii)	*R*	*Min.*	38.89	38.89	38.89	38.89
xviii)	*S*	*Max.*	7.14	7.14	7.14	7.14
		Min.	6.35	6.35	6.35	6.35
xix)	*T*		15°	15°	15°	15°
xx)	*X*	*Max.*	48.13	60.07	75.82	96.27
		Min.	47.88	59.82	75.57	95.89



Key

1 Gap

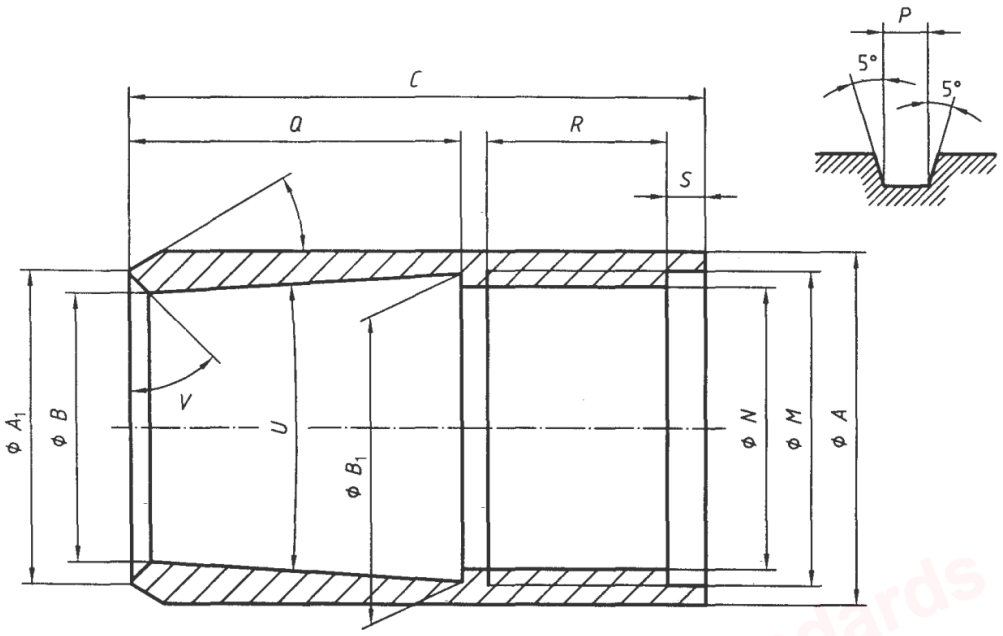
NOTE — For dimensions refer Table 5.

FIG. 4 WIRELINE CORE LIFTER

Table 5 Wireline Core Lifter

(*See* Fig. 4)

Sl No.	**Dimension**		**WLA**	**WLB**	**WLN**	**WLH**
(1)	(2)		(3)	(4)	(5)	(6)
i)	*A*	*Max.*	30.23	40.23	52.04	68.94
		Min.	30.18	40.18	51.99	68.88
ii)	*B*	*Max.*	26.59	36.02	47.12	62.87
		Min.	26.54	35.97	47.07	62.81
iii)	*C*	*Max.*	22.62	25.80	28.97	38.50
		Min.	21.83	25.00	28.18	37.70
iv)	*U*	*Max.*	5° to 15’	5° to 15’	5° to 15’	5° to 15’
		Min.	4° to 45’	4° to 45’	4° to 45’	4° to 45’
v)	*V*		0°	0°	0°	0°
vi)	V_1		30°	30°	30°	30°



NOTE — For dimensions refer Table 6.

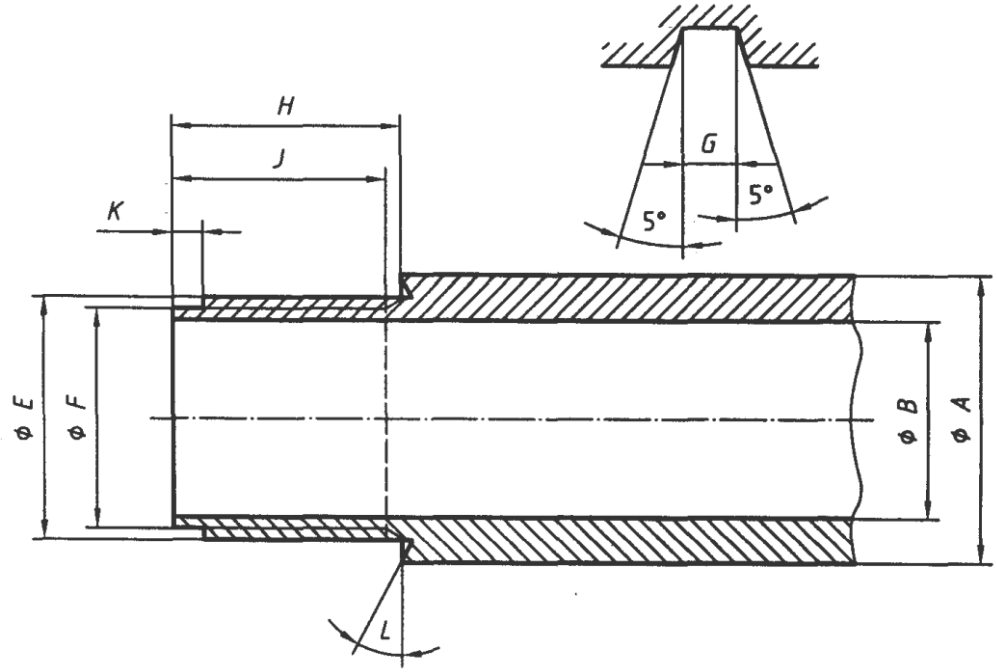
FIG. 5 WIRELINE CORE LIFTER CASE

Table 6 Wireline Core Lifter Case

(*see* Fig. 5)

Sl No.	Dimension		WLA	WLB	WLN	WLH
(1)	(2)		(3)	(4)	(5)	(6)
i)	*A*	*Max.*	32.94	43.00	55.93	73.23
		Min.	32.89	42.95	55.88	73.18
ii)	A_1	*Max.*	30.68	40.41	52.73	67.99
		Min.	30.63	40.35	52.68	67.94
iii)	*B*	*Max.*	28.30	38.02	49.56	65.61
		Min.	28.24	37.97	49.50	65.56
iv)	B_1	*Max.*	31.09	41.43	53.21	70.38
		Min.	31.01	41.33	53.14	70.31
v)	*C*	*Max.*	63.90	70.25	75.01	89.30
		Min.	63.10	69.45	74.22	88.50
vi)	*M*	*Max.*	31.32	41.10	53.47	70.69
		Min.	31.27	41.05	53.42	70.64
vii)	*N*	*Max.*	30.18	39.93	52.20	69.29
		Min.	30.12	39.88	52.15	69.24
viii)	Thread pitch		3.175	3.175	3.175	3.175
ix)	*P*	*Max.*	1.63	1.63	1.63	1.63
		Min.	1.55	1.55	1.55	1.55

x)	*Q*	*Max.*	40.08	44.85	51.59	67.07
		Min.	39.29	44.05	50.80	66.28
xi)	*R*	*Min.*	20.64	20.64	20.64	20.64
xii)	*S*	*Max.*	3.97	3.97	3.97	3.97
		Min.	3.18	3.18	3.18	3. 18
xiii)	*T*		30°	30°	30°	30°
xiv)	*U*	*Max.*	5° to 15’	5° to 15’	5° to 15’	5° to 15’
		Min.	4° to 45’	4° to 45’	4° to 45’	4° to 45’
xv)	*V*		45°	45°	45°	45°



NOTE — For dimensions refer Table 7.

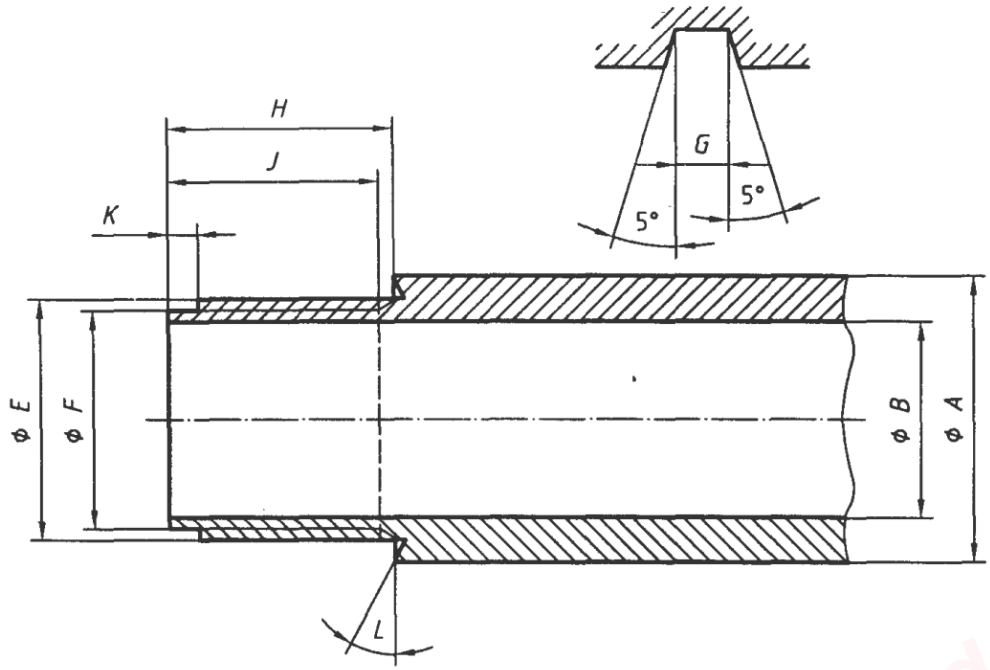
FIG. 6 WIRELINE CORE BARREL OUTER TUBE (LOWER END)

Table 7 Wireline Outer Tube (Lower End)

(*see* Fig. 6)

Sl No.	Dimension		WLA	WLB	WLN	WLH
(1)	(2)		(3)	(4)	(5)	(6)
i)	*A*	*Max.*	46.19	57.33	73.23	92.33
		Min.	46.04	57.15	73.03	92.08
ii)	*B*	*Max.*	36.51	46.04	60.53	77.79
		Min.	36.36	45.86	60.33	77.53
iii)	*E*	*Max.*	41.96	52.30	67.39	05.62

		Min.	41.91	52.25	67.34	85.55
iv)	*F*	*Max.*	40.44	50.72	65.86	84.05
		Min.	40.39	50.67	65.81	83.97
v)	Thread pitch		6.35	6.35	6.35	6.35
vi)	*G*	*Max.*	3.20	3.20	3.20	3.20
		Min.	3.12	3.12	3.12	3.12
vii)	*H*	*Max.*	41.28	41.48	41.38	41.28
		Min.	41.15	4135	41.25	41.15
viii)	*J*	*Min.*	38.89	38.89	38.89	38.89
ix)	*K*	*Max.*	7.14	7.14	7.14	7.14
		Min.	6.35	6.35	6.35	6.35
x)	*L*	*Min.*	15°	15°	15°	15°



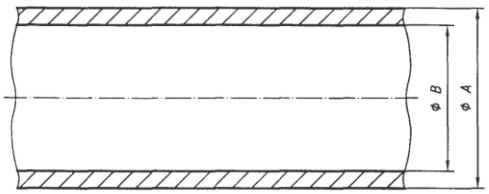
NOTE — For dimensions refer Table 8.

FIG. 7 WIRELINE CORE BARREL INNER TUBE (LOWER END)

Table 8 Wireline Core Barrel Inner Tube (Lower End)
(*See* Fig. 7)

Sl No.	**Dimension**		**WLA**	**WLB**	**WLN**	**WLH**
(1)	(2)		(3)	(4)	(5)	(6)
i)	*A*	*Max.*	32.67	42.99	55.74	73.23
		Min.	32.54	42.86	55.56	73.03
ii)	*B*	*Max.*	28.58	38.10	50.01	66.93

		Min.	28.45	37.97	49.83	66.73
iii)	*E*	*Max.*	31.24	40.97	53.34	70.56
		Min.	31.19	40.92	53.29	70.51
iv)	*F*	*Max.*	30.07	39.80	52.07	69.16
		Min.	30.02	39.75	52.02	69.11
v)	Thread pitch		3.175	3.175	3.175	3.175
vi)	*G*	*Max*	1.63	1.63	1.63	1.63
		Min.	1.55	1.55	1.55	1.55
vii)	*H*	*Max.*	22.10	22.10	22.10	22.10
		Min.	21.97	21.97	21.97	21.97
viii)	*J*	*Min.*	20.64	20.64	20.64	20.64
ix)	*K*	*Max.*	3.97	3.97	3.97	3.97
		Min.	3.18	3.18	3.18	3.18
x)	*L*	*Min.*	0°	0°	0°	0°



NOTE — For dimensions refer Table 9.

FIG. 8 DRILL ROD (SMOOTH PIPE)

Table 9 Drill Rod, Smooth Pipe

(*See* Fig.8)

Sl No.	**Dimension**		**WLA**	**WLB**	**WLN**	**WLH**
(1)	(2)		(3)	(4)	(5)	(6)
i)	*A*	*Max.*	44.60	55.75	70.05	89.15
		Min.	44.45	55.58	69.85	88.90
ii)	*B*	*Max.*	35.08	46.20	60.33	78.00
		Min.	34.93	46.02	60.12	77.77

NOTE — Further details are given in Annex A.

ANNEX A

(*Informative*)

PRINCIPAL DIMENSIONS OF DRILL ROD THREADS

Sl No.	Dimensions	WLA	WLB	WLN	WLH
(1)	(2)	(3)	(4)	(5)	(6)
i)	Thread tapering	1:28.64	1:28.64	1:28.64	2:28.64
ii)	Angle of thread arrival	1°	1°	1°	1°
iii)	Angle of thread profile	29°	29°	29°	29°
iv)	Thread pitch	6.350	8.466	8.466	8.466
v)	Maximum outside diameter of box thread in stop batt axis	41.325	52.125	66.425	84.655
vi)	Maximum outside diameter of box thread in stop shoulder axis	39.805	50.595	64.895	83.135
vii)	Mean spire depth of box thread	0.752	0.785	0.785	0.785
viii)	Width at root of box thread	3.00	4.06	4.06	4.06
ix)	Mean length of box thread from stop batt to internal angle of stop shoulder	41.8	44.9	44.9	45.0
x)	Minimum length for full depth of box thread	39.7	43.3	43.3	43.3
xi)	Minimum inside diameter of pin thread in stop batt axis	38.18	48.84	63.12	81.38
xii)	Minimum inside diameter of pin thread in shoulder axis	39.80	50.47	64.74	83.01
xiii)	Mean spire depth of pin thread	0.740	0.800	0.800	0.800
xiv)	Width at root of pin thread	3.00	4.06	4.06	4.06
xv)	Mean length of pin thread from stop batt to external angle of stop shoulder	41.3	44.4	44.4	44.4
xvi)	Minimum length for full depth of pin thread	39.7	43.7	43.7	43.7
xvii)	Angles of bevel for thread stop battes and stop shoulders	15°	15°	15°	15°

NOTE — Many dimensions are approximate.