INTERNATIONAL STANDARD

ISO 10098

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Wireline diamond core drilling equipment — System CSSK

Équipement de forage au diamant à ligne à câble avec carrotage — Système CSSK

Reference number
ISO 10098:1992(E)

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10098 was prepared by Technical Committee ISO/TC 82, *Mining*, Sub-Committee SC 6, *Diamond core drilling equipment*.

Annex A forms an integral part of this International Standard. Annexes B and C are for information only.

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Introduction

Wireline diamond core drilling equipment (CSSK system) is intended for independent use as well as for use in combination with system C equipment (see ISO 8866), designed for conventional diamond drilling.

Section 1 covers material and dimensions of wireline drilling equipment. Section 2 covers types and dimensions of gauges intended to check wireline drill rod threads.

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Wireline diamond core drilling equipment — System CSSK

Section 1: General

1.1 Scope

Section 1 of this International Standard specifies the material for and dimensions of equipment for wireline diamond core drilling in solid or weakly fissured medium hard or hard formations to depths of 1 200 m to 1 500 m.

NOTE 1 Cutting materials other than diamond may be used.

It applies to equipment with outer bit diameters of 46 mm, 59 mm, 76 mm and 93 mm with corresponding core diameters from 24 mm to 59 mm.

Section 1 of this International Standard specifies the main dimensions of the following equipment:

a) drill rods,

b) diamond bits,

c) reaming shells,

d) core-lifter cases,

e) core lifters,

f) outer core tubes,

g) retractable (inner) core tubes.

NOTE 2 Holes drilled by CSSK equipment are cased by System C casings (see ISO 8866[1]).

1.2 Designation

The designation of items complying with this International Standard comprises the name of the item, the letters CSSK and the corresponding core bit diameter value.

EXAMPLE

Core bit CSSK59

1.3 Materials

CSSK equipment shall be manufactured from materials which in the manufactured items provide mechanical properties not less than those given in table 1.

Table 1 — Minimum mechanical properties of the materials

Item	Tensile strength R_m N/mm² (MPa)	Yield stress R_e N/mm² (MPa)	Percentage elongation after fracture A %
Drill rods	735	540	12
Tubes of core barrels	690	490	12
Other items	Not specified		

1.4 Dimensions and tolerances

The main dimensions of system CSSK equipment are given in table 2. Symbols for the dimensions are given in table 3. Other dimensions and tolerances

1) ISO 8866:1991, *Rotary core diamond drilling equipment — System C.*

are shown in figures 3 to 11 and given in tables 4 to 12.

All dimensions are given in millimetres.

Tube ovality should be kept within outer diameter tolerances.

Drill rod threads shall be checked by gauges described in section 2 of this International Standard.

Threads of other equipment items shall be checked by gauges manufactured according to national standards.

The maximum deviation in wall thickness shall be kept within the wall thickness tolerances.

Tube curvature for drill rods shall not exceed

$\frac{1}{2\,500}$ of the rod length for CSSK46 and CSSK59;

$\frac{1}{2\,000}$ of the rod length for CSSK76 and CSSK93.

Tube curvature for outer and inner (retractable) core tubes shall not exceed

$\frac{1}{1\,500}$ of the tube length for CSSK46 and CSSK59;

$\frac{1}{1\,200}$ of the tube length for CSSK76 and CSSK93.

The curvature over 250 mm of each rod end, measured according to figure 1, shall not exceed

0,4 mm for CSSK46 and CSSK59 rods;

0,6 mm for CSSK76 and CSSK93 rods.

1.5 Technical requirements

Tubes shall be made seamless. The choice of tube rolling technique and machining operations is left to the manufacturer.

Tube curvatures shall be checked by rolling the tube on a horizontal or slightly inclined flat surface. When rolling, no clearances shall be seen between the rod (tube) ends and the surface nor between the centre of the rod (tube) and the surface. If any clearance is noticed between the rod (tube) and the surface, additional checking shall be carried out.

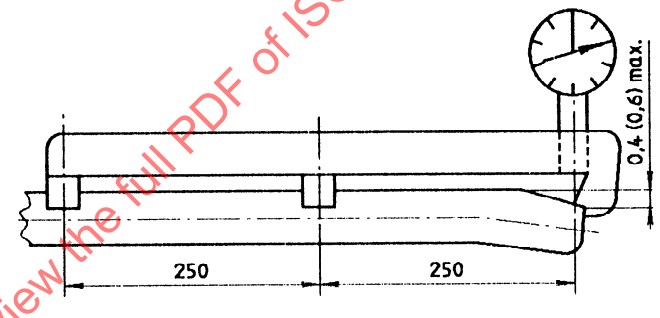


Figure 1 — Measuring rod end curvature

Table 2 — Main dimensions of system CSSK equipment

Designation	Reaming shell (outer diameter)	Core bit (outer and inner diameter)	Outer core tube (outer diameter and wall thickness)	Rectractable core tube (outer diameter and wall thickness)	Drill rod (outer diameter and wall thickness)
CSSK46	46,4	46 × 24	44 × 5	30 × 2,2	43 × 4,8
CSSK59	59,4	59 × 35,4	57 × 6	42 × 2,5	55 × 4,8
CSSK76	76,4	76 × 48	73 × 6,5	56 × 2,8	70 × 4,8
CSSK93	93,4	93 × 59	89 × 7	68 × 3	85 × 5,5

Table 3 — Symbols for dimensions

Symbol	Dimension
D_x	Core bit outer diameter (including diamonds)
D_y	Core bit inner diameter (including diamonds)
D_0	Outer diameter of a tube (not machined)
D	Outer diameter of a tube, machined (D_1 = maximum; D_2 = progressively decreasing)
d_0	Inner diameter of a tube, not machined
d	Inner diameter of a tube, machined (d_1 = maximum; d_2 = progressively decreasing)
L (l) [1]	Maximum length of the outer (inner) part
t	Maximum wall thickness
A (a) [2]	Major diameter of the box (pin) thread at the gauge plane location
B (b) [2]	Minor diameter of the box (pin) thread at the gauge plane location
P	Thread pitch
M (m) [2]	Depression width of the box (pin) thread
N (n) [2]	Protrusion width measured at the top of the box (pin) thread
R	Rounding radius
S	Distance between two parallel planes
Q (q) [2]	Protrusion height of the box (pin) thread

1) The symbol in parentheses refers to the inner part.
2) The symbols in parentheses refer to the pin thread.

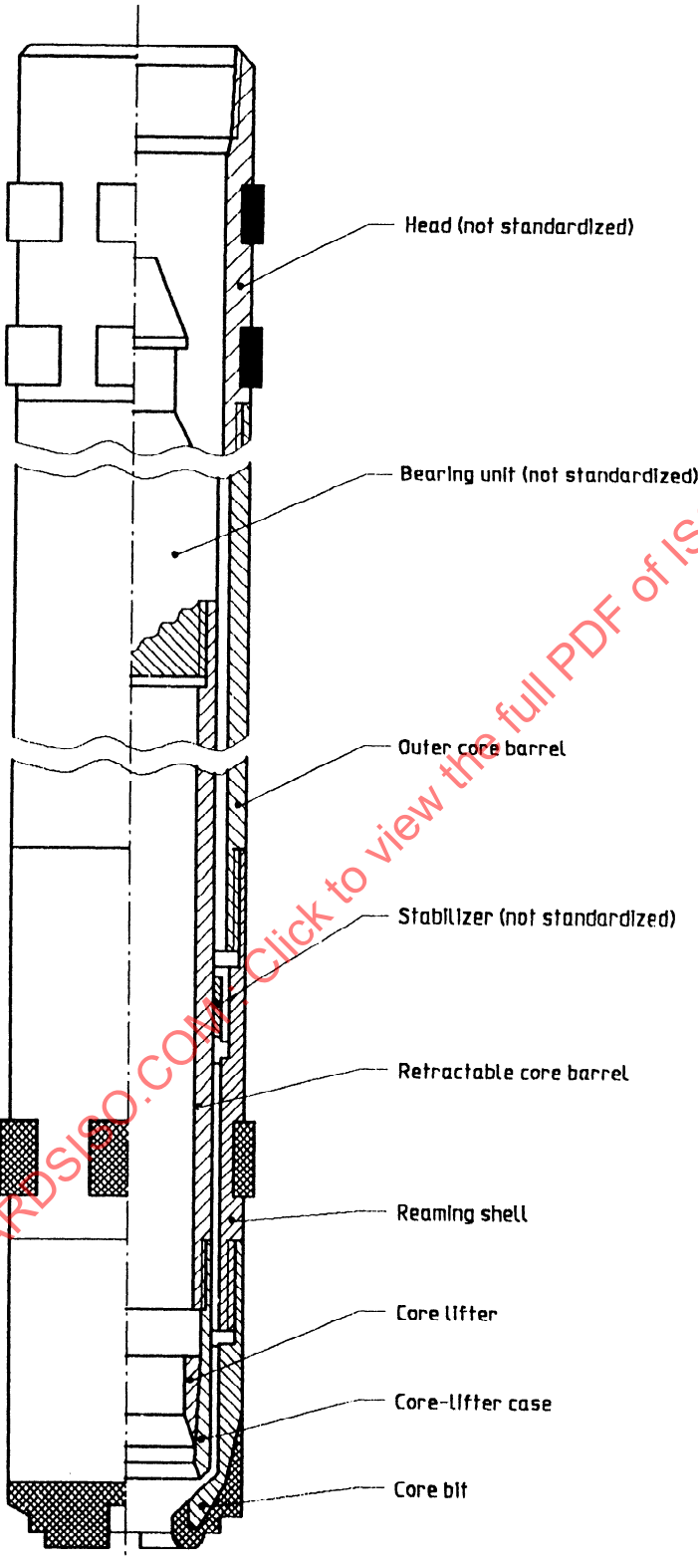


Figure 2 — Wireline core barrel assembly

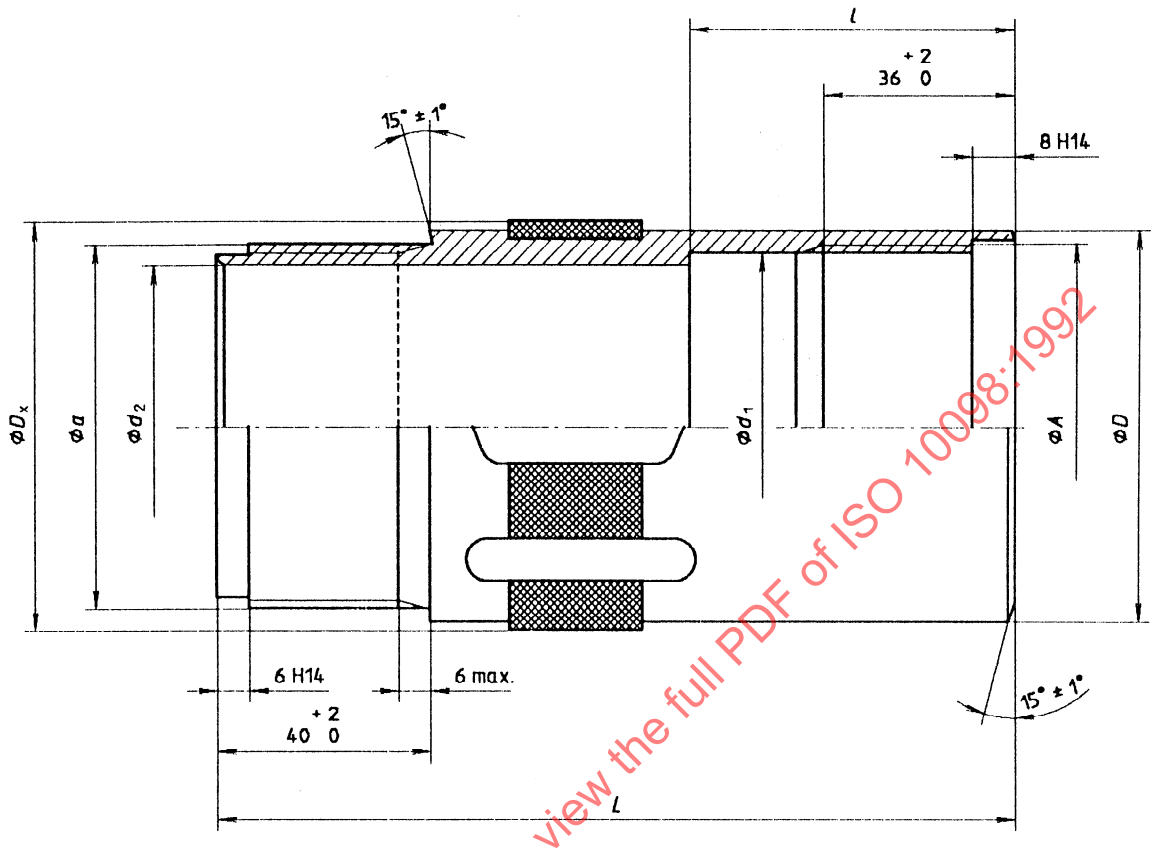


Figure 3 — Reaming shell

Table 4 — Dimensions of reaming shells

Dimension	CSSK46	CSSK59	CSSK76	CSSK93
D_x $^{+0,2}_{0,1}$	46,4	59,4	76,4	93,4
D h12	45	57	73	89
d_1 H10	38,5	50,5	66,5	82,5
d_2 H12	33,5	45	60	75
L h14	150	150	150	180
$l \pm 0,6$	61	61	61	74
Thread ($A \times P$ and $a \times P$)	40 × 4	52 × 4	68 × 4	84 × 4

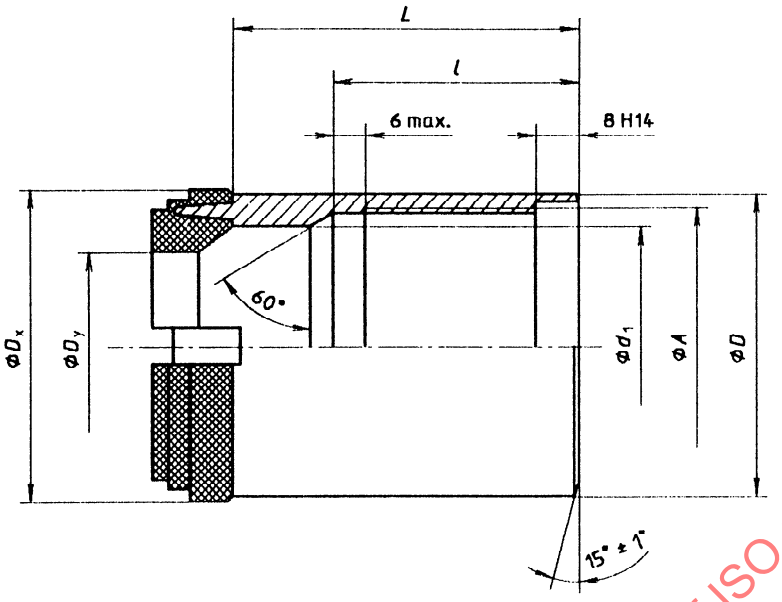
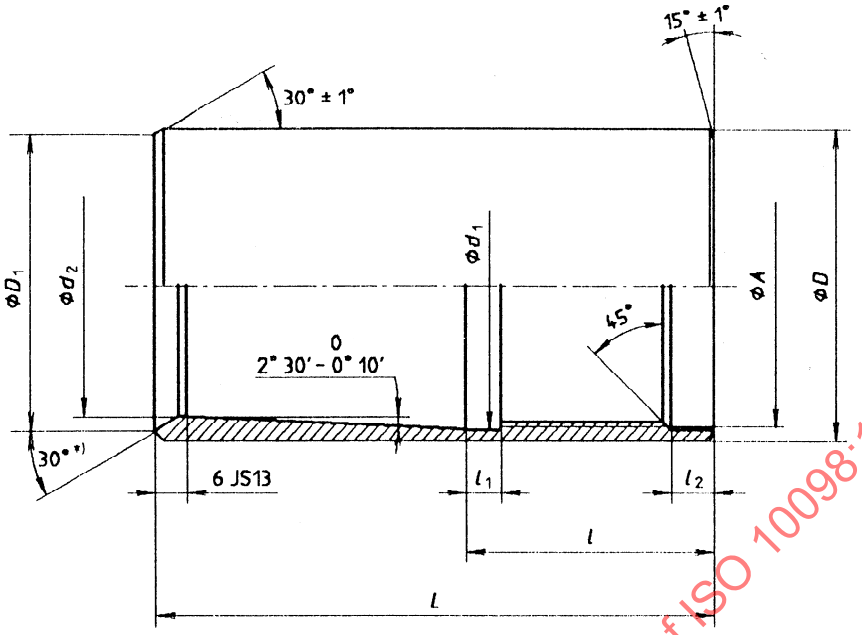


Figure 4 — Core bit

Table 5 — Dimensions of core bits

Dimension	CSSK46	CSSK59	CSSK76	CSSK93
D_x	$46\ ^{+0,2}_{0,1}$	$59\ ^{+0,3}_{0,2}$	$76\ ^{+0,3}_{0,2}$	$93\ ^{+0,3}_{0,2}$
D_y	$24\ ^{+0,2}_{0,1}$	$35,4\ ^{+0,3}_{0,2}$	$48\ ^{+0,3}_{0,2}$	$59\ ^{+0,3}_{0,2}$
D h12	45	57	73	89
d_1 H12	33,5	45	60	75
L [1] $\pm$ 1	65	65	65	83,3
$l\ ^{+2}_{0}$	46	46	46	46
Thread ($A \times P$)	40 × 4	52 × 4	68 × 4	84 × 4

1) Depending upon the bit design, this size may be changed.



*) Dimension for reference only.

Figure 5 — Core-lifter case

Table 6 — Dimensions of core-lifter cases

Dimension	CSSK46	CSSK59	CSSK76	CSSK93
D h10	30,3	42	56	68
D_1 JS14	27	39	52	63
d_1 H12	28,7	40,2	54,2	66
d_2 min.	26	36,5	49,5	60
L h12	72	78	105	88,5
l H12	26	28	46,5	28,5
l_1 H12	3	4	6,5	6,5
l_2 H14	4	4	8	4
Thread ($A \times P$)	28,5 × 3,175	40 × 3,175	54 × 4	66 × 4

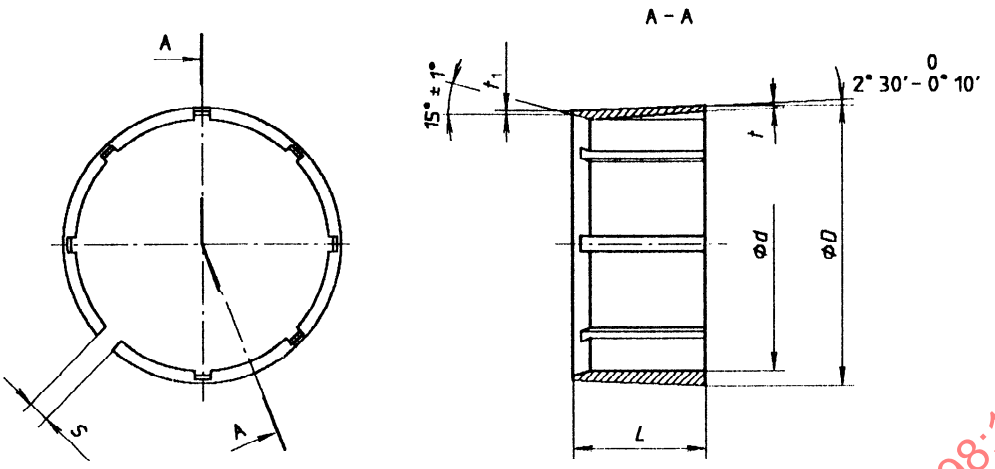
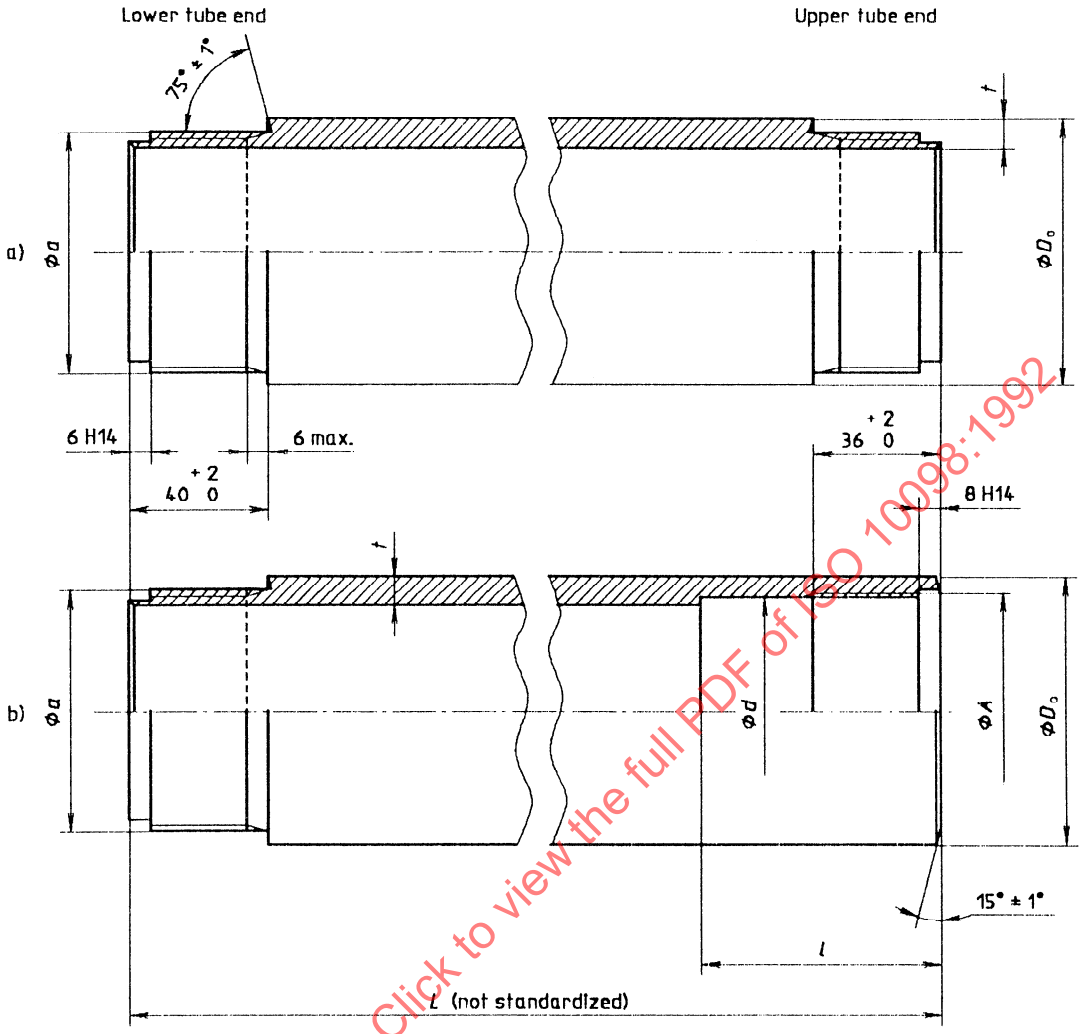


Figure 6 — Core lifter

Table 7 — Dimensions of core lifters

Dimension	CSSK46	CSSK59	CSSK76	CSSK93
D h10	27	39,2	52	64
d H11	23,2	34,6	47,4	58,4
t [1] h12	0,6	0,6	0,7	0,7
t_1 js13	0,3	0,3	0,3	0,4
L h14	20	25	25	35
S H14	3	4	4	4
NOTE — Number of recesses is not standardized.				
1) Dimension for reference only.				



a) For CSSK46 and CSSK59 tubes
b) For CSSK76 and CSSK93 tubes

Figure 7 — Outer core tubes

Table 8 — Dimensions of outer core tubes

Dimension	CSSK46	CSSK59	CSSK76	CSSK93
D_0	45 ± 0,36	57 ± 0,46	73 ± 0,58	89 ± 0,15
t	5 ± 0,4	6 ± 0,4	6,5 ± 0,52	7 ± 0,5
d H10	—	—	66,5	82
i H14	—	—	68	74
Pin thread ($a \times P$)	40 × 4	52 × 4	68 × 4	84 × 4
Box thread ($A \times P$)	—	—	68 × 4	84 × 4

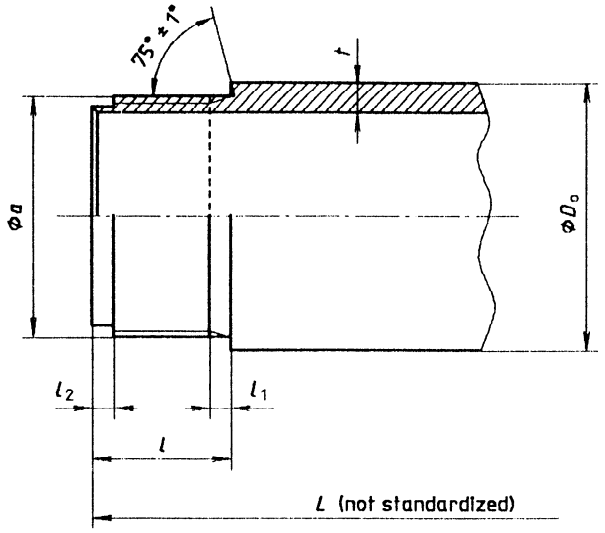


Figure 8 — Retractable core tube

Table 9 — Dimensions of retractable core tubes (lower end)

Dimension	CSSK46	CSSK59	CSSK76	CSSK93
D_0	30 ± 0,1	42 ± 0,2	56 ± 0,48	68 ± 0,1
t	2,2 ± 0,17	2,5 ± 0,2	2,8 ± 0,3	3 ± 0,2
l H12	22	24	40	22
l_1 max.	3	3	6	3
l_2 H14	3	3	6	3
Thread ($a \times P$)	28,5 × 3,175	40 × 3,175	54 × 4	66 × 4

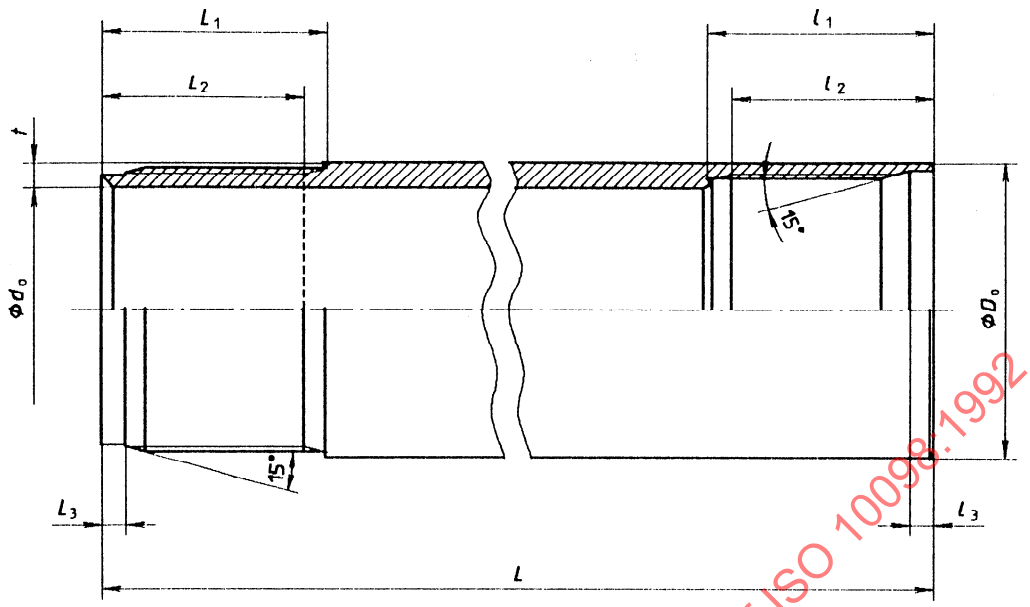
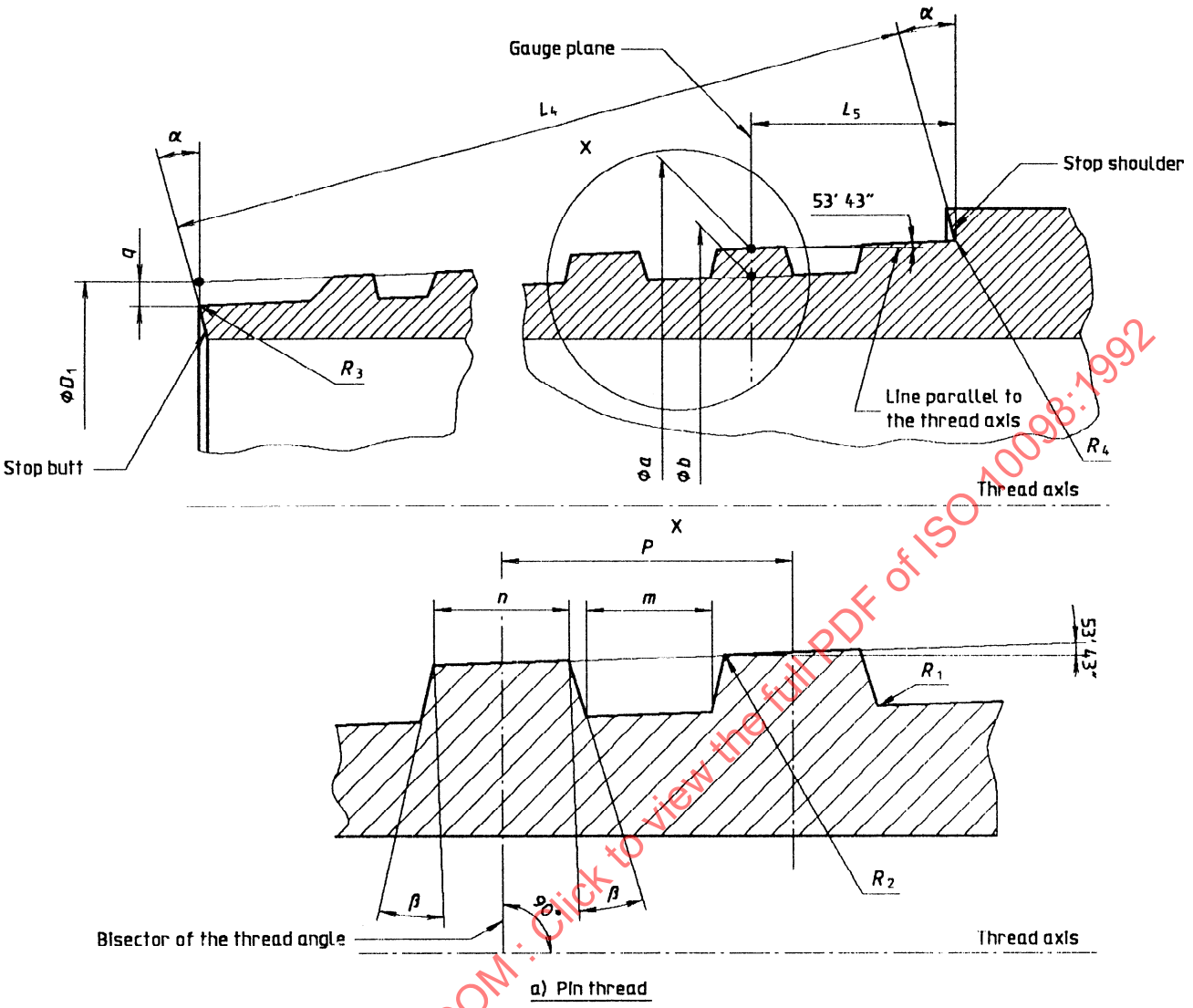


Figure 9 — Drill rod

Table 10 — Dimensions of drill rods

Dimension	CSSK46		CSSK59		CSSK76		CSSK93	
	nom.	tol.	nom.	tol.	nom.	tol.	nom.	tol.
D_0 [1]	43	—	55	—	70	—	85	—
d_0	33,4	± 0,2	45,4	± 0,2	60,4	± 0,2	74	± 0,4
t	4,8	± 0,2	4,8	± 0,2	4,8	± 0,2	5,5	± 0,45
L	1 500 3 000	+ 50 − 100	1 500 3 000 4 500	+ 50 − 100	1 500 3 000 4 500	+ 50 − 100	1 500 3 000 4 500	+ 50 − 100
L_1 [1]	32	—	42	—	42	—	45	—
L_2	28	min.	38	min.	38	min.	39,2	min.
L_3	4,5	± 0,6	4,5	± 0,6	4,5	± 0,6	6	± 0,6
l_1 [1]	32	—	42	—	42	—	45	—
l_2	28	min.	38	min.	38	min.	39,4	min.
l_3	4,5	± 0,6	4,5	± 0,6	4,5	± 0,6	6	± 0,6

1) Dimensions for reference only.



a) Pin thread

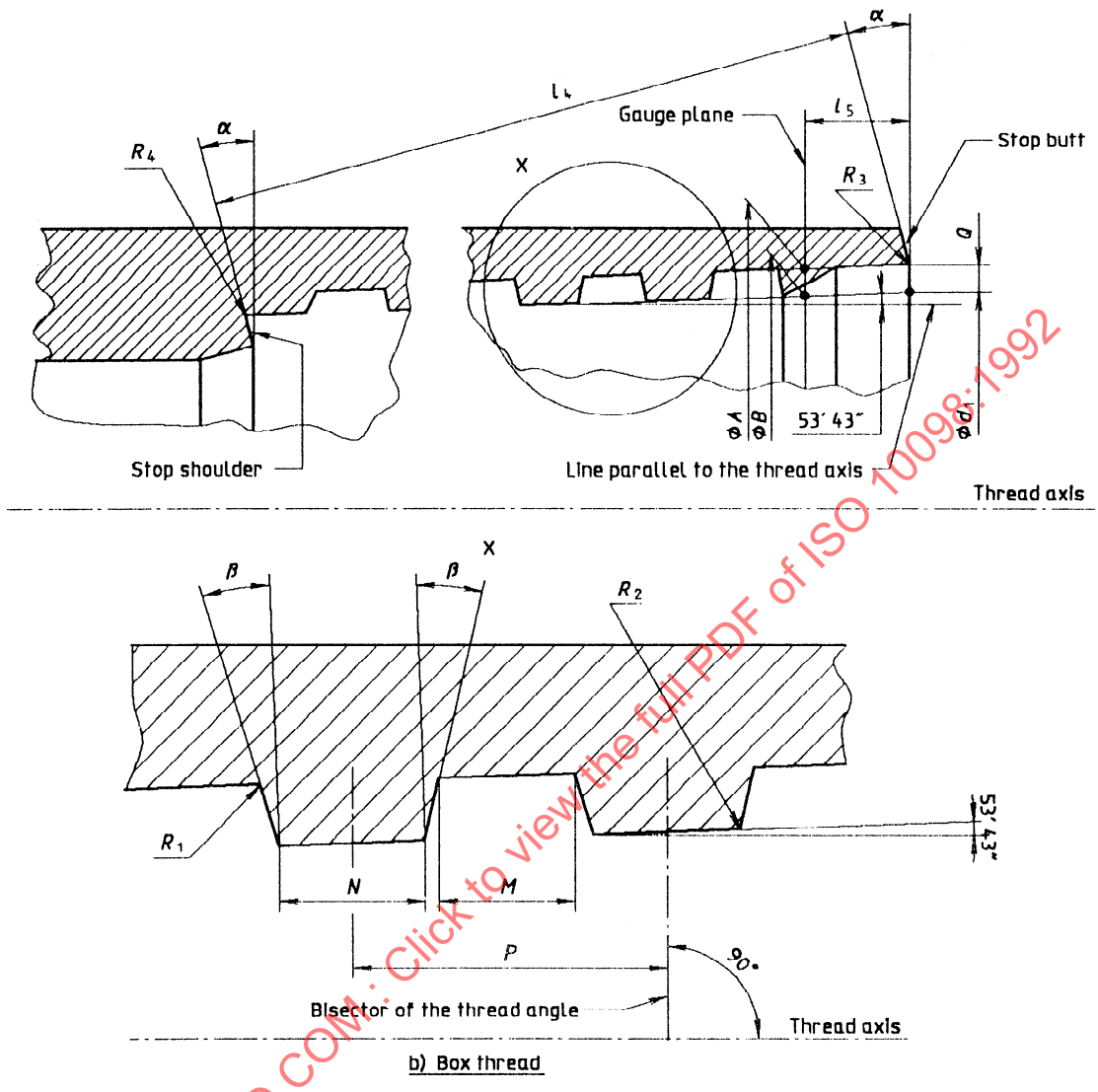


Figure 10 — Drill rod pin end (see table 11)

Table 11 — Dimensions of drill rod threads (see figure 10)

Dimension	CSSK46		CSSK59		CSSK76		CSSK93	
	nom.	tol.	nom.	tol.	nom.	tol.	nom.	tol.
A [1]	38,862	$^{+0,05}_{0}$	51,043	$^{+0,05}_{0}$	66,043	$^{+0,05}_{0}$	80,688	$^{+0,03}_{0}$
a [1]	38,862	$^{0}_{-0,03}$	51,043	$^{0}_{-0,03}$	66,043	$^{0}_{0,03}$	80,688	$^{0}_{-0,02}$
B [1]	37,462	$^{+0,06}_{0}$	49,343	$^{+0,06}_{0}$	64,343	$^{+0,06}_{0}$	79,148	$^{+0,05}_{0}$
b [1]	37,362	$^{0}_{0,06}$	49,243	$^{0}_{0,06}$	64,243	$^{0}_{0,06}$	79,02	$^{0}_{0,056}$
D_1 [2]	38,1	—	50	—	65	—	79,594	—
d_1 [2]	37,637	—	49,55	—	64,55	—	79,4	—
L_4	31,183	$^{+0,1}_{0}$	40,922	$^{+0,1}_{0}$	40,922	$^{+0,1}_{0}$	39,737	$^{+0,1}_{0}$
l_4	31,283	$^{0}_{0,1}$	41,022	$^{0}_{0,1}$	41,022	$^{0}_{0,1}$	39,737	$^{0}_{0,1}$
l_5 [2]	7,604	—	8,626	—	8,626	—	10	—
l_5 [2]	5,604	—	6,626	—	6,626	—	8,128	—
M	2,9	$^{+0,1}_{0}$	3,9	$^{+0,12}_{0}$	3,9	$^{+0,12}_{0}$	4,035	$^{+0,12}_{0}$
m	2,9	$^{+0,1}_{0}$	3,9	$^{+0,12}_{0}$	3,9	$^{+0,12}_{0}$	4,025	$^{+0,12}_{0}$
N [2]	2,725	—	3,645	—	3,645	—	3,83	—
n [2]	2,698	—	3,618	—	3,618	—	3,83	—
P	6	± 0,03	8	± 0,03	8	± 0,03	8	± 0,03
Q	0,7	± 0,03	0,85	± 0,03	0,85	± 0,03	0,77	$^{+0,04}_{0}$
q	0,75	± 0,03	0,9	± 0,03	0,9	± 0,03	0,83	$^{+0,04}_{0}$

Dimension	CSSK46		CSSK59		CSSK76		CSSK93	
	nom.	tol.	nom.	tol.	nom.	tol.	nom.	tol.
R_1	0,2	max.	0,2	max.	0,2	max.	0,1	max.
R_2	0,3	$^{0}_{-0,1}$	0,3	$^{0}_{-0,1}$	0,3	$^{0}_{0,1}$	0,15	$^{0}_{-0,5}$
R_3	0,3	$^{0}_{0,1}$	0,3	$^{0}_{0,1}$	0,3	$^{0}_{0,1}$	0,15	$^{0}_{-0.5}$
R_4	0,2	max.	0,2	max.	0,2	max.	0,1	max.
α	15°	± 0° 30′	15°	± 0° 30′	15°	± 0° 30′	30°	± 0° 30′
β	15°	± 0° 30′	15°	± 0° 30′	15°	± 0° 30′	5°	± 0° 15′

NOTES

1 The tolerance, AT_D, on the taper along the length of the thread, measured according to figure A.1, shall be:

-- for CSSK46 drill rod threads:

$^{+0,08}_{0}$ mm for pin threads, and

$^{0}_{-0,08}$ mm for box threads;

-- for CSSK59, CSSK76 and CSSK93 drill rod threads:

$^{+0,12}_{0}$ mm for pin threads, and

$^{0}_{-0,12}$ mm for box threads.

2 The concentricity tolerance of the thread axis relative to the outer rod axis, measured 250 mm from the stop shoulder (for pin ends) and from the stop butt (for box ends), shall not exceed:

Ø 0,4 mm for CSSK46 and CSSK59 rods;

Ø 0,6 mm for CSSK76 rods;

Ø 0,8 mm for CSSK93 rods.

(See figures B.1 and B.2 for a schematic representation of measuring devices.)

1) Sizes are checked by gauges.

2) Dimensions are for reference only.

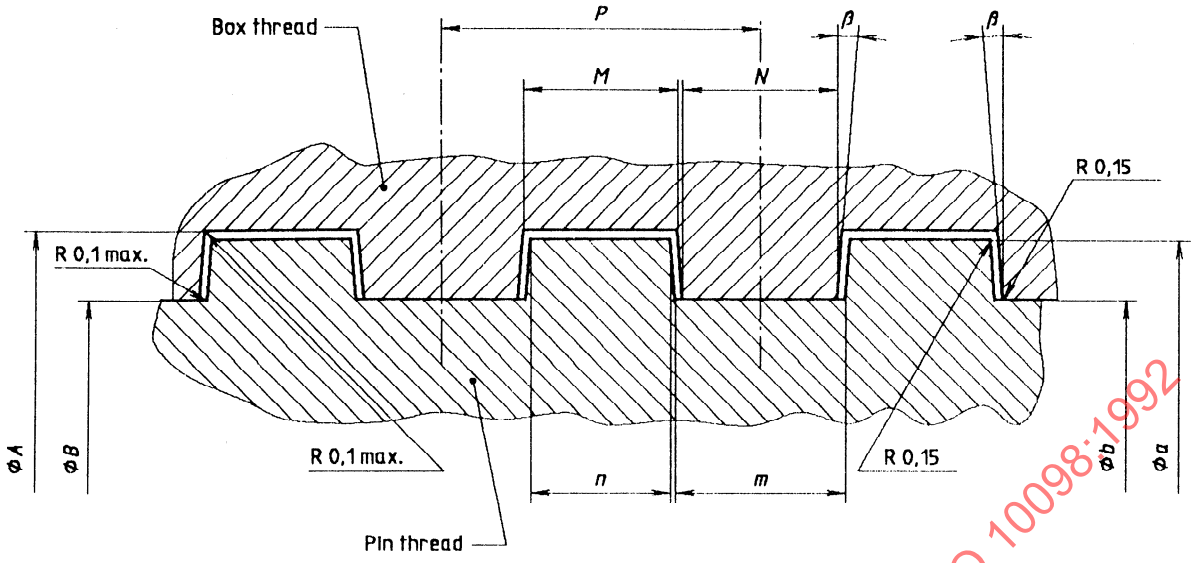


Figure 11 — Cylindrical thread

Table 12 — Dimensions of cylindrical threads

Thread designation	P	A H11 (H10)	B H10 (H9)	a h10 (h9)	b h11 (h10)	$M(m)$ H12	N h12	n h12	β ± 0° 30′
28,5 × 3,175	3,175	28,5	27,5	28,475	27,5	1,46	1,447	1,454	15°
40 × 3,175	3,175	40	39	39,96	39	1,46	1,448	1,459	15°
40 × 4	4	40,032	38,5	40	38,5	1,946	1,934	1,922	5°
52 × 4	4	52,04	50,5	52	50,5	1,946	1,934	1,922	5°
54 × 4	4	54,04	52,5	54	52,5	1,946	1,934	1,922	5°
68 × 4	4	68,04	66,5	68	66,5	1,946	1,934	1,922	5°
66 × 4	4	65,998	64,25	65,75	64,25	1,946	1,934	1,922	5°
84 × 4	4	83,748	82	83,5	82	1,946	1,934	1,922	5°

Section 2: Thread gauges for wireline drill rods

2.1 Scope

Section 2 of this International Standard covers a set of gauges intended to check drill rod threads of the series: CSSK46, CSSK59, CSSK76 and CSSK93.

Other gauge designs and other methods of measuring tolerances and negative allowances are permitted if set ratios of dimensions are observed.

Guidelines for the use of gauges are given in annex C.

This International Standard applies to the following types of gauge:

WS internal (plug) and external (ring) smooth (threadless) gauges, working type;

WT internal (plug) and external (ring) threaded gauges, working type;

WLim plane limit gauges, working type;

IS-WS internal (plug) smooth gauges for WS rings, inspection type;

IS-WS internal (plug) smooth gauges for WT rings, inspection type.

2.2 Designation

Gauges complying with this International Standard shall be designated by the name (plug, ring, plane limit), designation of the gauge type (WS, WT, IS-WS, etc.), system designation (CSSK) and size (core bit diameter).

EXAMPLE

Plug WS CSSK46

2.3 Materials

Gauges shall be manufactured from tool alloy chrome/manganese/tungsten steel with a hardness (after tempering) of not less than 62 HRC.

Gauges shall be subjected to ageing and demagnetization.

2.4 Dimensions and tolerances

The main dimensions and tolerances of the gauges are shown in figures 12 to 18 and given in tables 13 to 19.

Taper tolerances of plug gauges (WS and WT types) taken by major diameter at length l should not be more than the tolerances for the major diameters given in the corresponding tables.

2.5 Roughness of gauge surfaces

The arithmetical mean deviation (R_a) should not be greater than

0,32 µm for measuring surfaces of smooth gauges and threaded gauges (surfaces of projections);

1,25 µm for other surfaces neighbouring the measuring surface of the thread;

2,5 µm for the surface of the thread depressions.

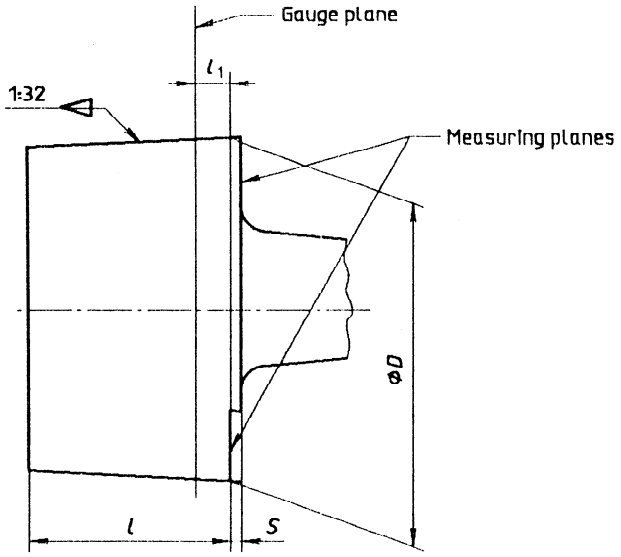


Figure 12 — Smooth plug gauges (WS type)

Table 13 — Main dimensions of smooth plug gauges (WS type)

Designation	D ± 0,01	l nom.	l tol.	l_1	S $^{0}_{0.014}$
CSSK46	37,462	28	± 0,42	5,604	2
CSSK59	49,343	38	± 0,5	6,626	2
CSSK76	64,343	38	± 0,5	6,626	2
CSSK93	79,148	40	± 0,5	8,128	1,6

NOTE — When there is a displacement of the gauge plane of 1,5 mm, checked by a microscope, the gauge shall be discarded.

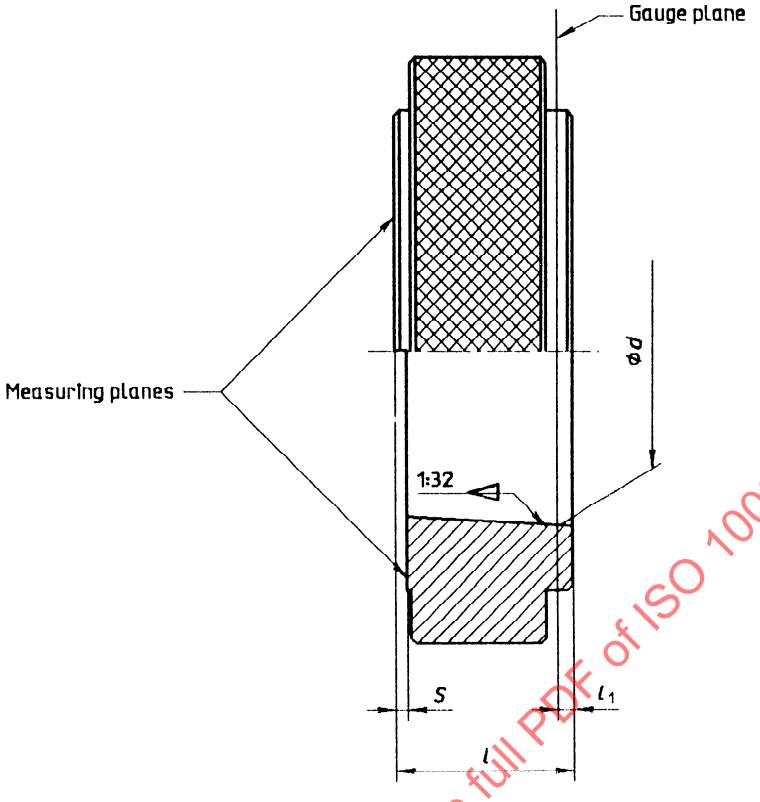


Figure 13 — Smooth ring gauges (WS type)

Table 14 — Main dimensions of smooth ring gauges (WS type)

Designation	d	l		l_1		S	
		nom.	tol.	nom.	tol.	nom.	tol.
CSSK46	38,862	24,396	$^{0}_{-0,033}$	0	—	1	$^{0}_{-0,014}$
CSSK59	51,043	38,374	$^{0}_{-0,039}$	0	—	1	$^{0}_{-0,014}$
CSSK76	66,043	33,374	$^{0}_{-0,039}$	0	—	1	$^{0}_{-0,014}$
CSSK93	80,688	39	$^{0}_{-0,039}$	4	$^{0}_{-0,014}$	0,65	$^{0}_{-0,014}$

NOTES

1 Rings shall be aligned diametrically with inspection plug gauges of IS-WS type so that the ring face coincides with the face of the inspection plug gauge. Displacement of the new ring face relative to the measuring plane in the direction of their common axes should not be greater than ± 0,1 mm.

2 When there is a displacement of the gauge plane of 0,5 mm, which is checked by an inspection-type plug gauge (IS-WS), the gauge shall be discarded.

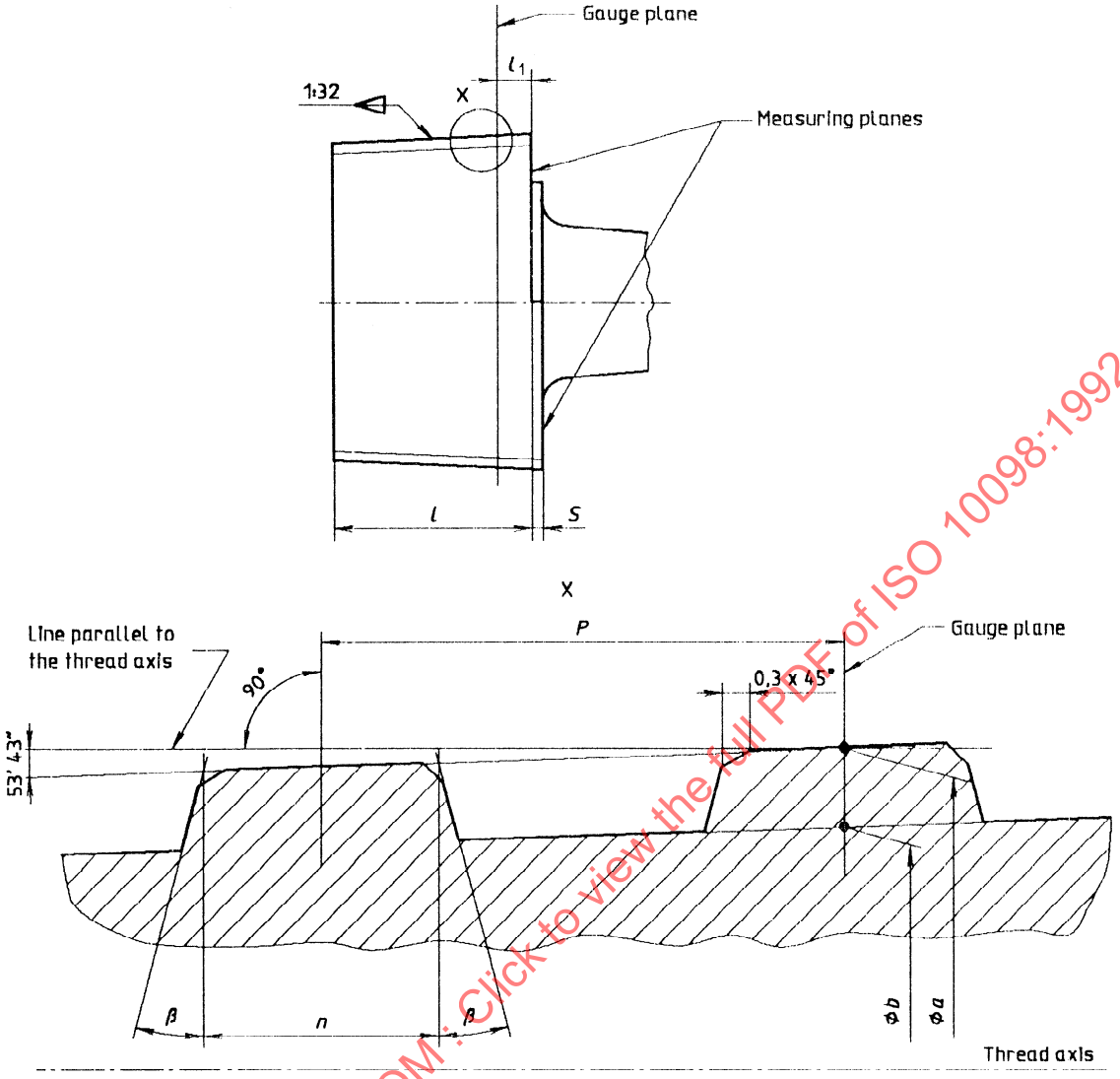


Figure 14 — Thread plug gauges (WT type) (see table 15)

Table 15 — Main dimensions of thread plug gauges (WT type) (see figure 14)

Dimension	CSSK46	CSSK59	CSSK76	CSSK93
l	25,5 ± 0,42	34,5 ± 0,5	34,5 ± 0,5	38 ± 0,5
l_1	4,604	5,626	5,626	8,128
$S\ ^{0}_{0,014}$	1,5	1,5	1,5	0,98
a ± 0,005	38,862	51,043	66,043	80,688
b max.	36,862	48,643	63,643	78
P ± 0,01	6	8	8	8
n	2,7 $^{0}_{0,25}$	3,75 $^{0}_{0,3}$	3,75 $^{0}_{0,3}$	3,8 $^{0}_{0,3}$
β ± 0° 20′	15°	15°	15°	5°

NOTE — When there is a displacement of the gauge plane of 0,5 mm, which is checked by a microscope, the gauge shall be discarded.

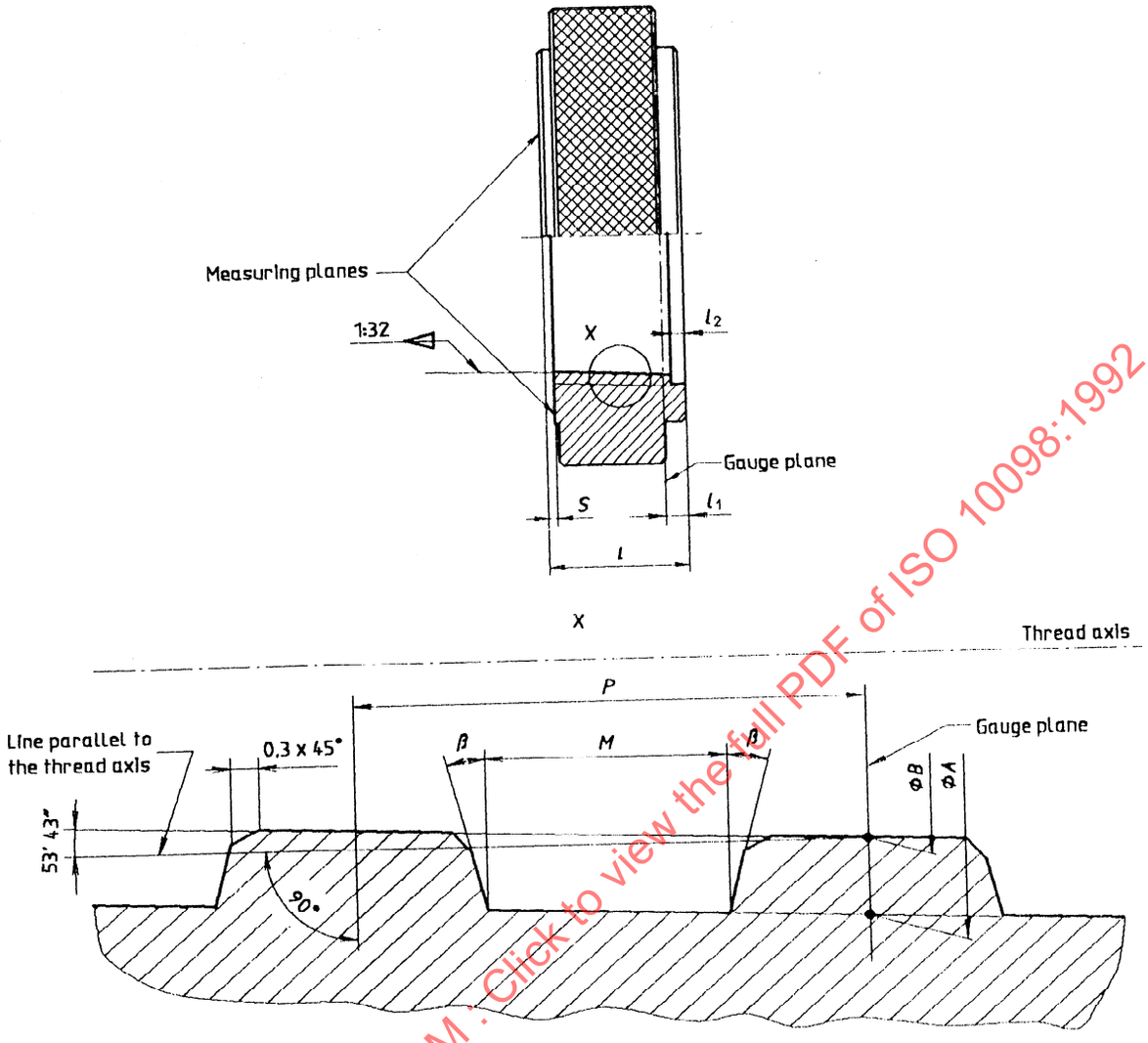


Figure 15 — Thread ring gauges (WT type) (see table 16)

Table 16 — Main dimensions of thread ring gauges (WT type) (see figure 15)

Dimension	CSSK46	CSSK59	CSSK76	CSSK93
$l\ {}^{0}_{-0,039}$	30,978	41,006	41,006	38,8
l_1	4,582	5,632	5,632	2
$l_2 \pm 0,375$	4	5	5	0
$S\ {}^{0}_{-0,014}$	2	2	2	1,8
A min.	39,362	51,643	66,643	81,5
B	37,362	49,243	64,643	$78,02\ {}^{+0,005}_{0}$
$P \pm 0,015$	6	8	8	8
M	$2,8\ {}^{+0,25}_{0}$	$3,75\ {}^{+0,30}_{0}$	$3,75\ {}^{+0,30}_{0}$	$4\ {}^{+0,30}_{0}$
$\beta \pm 0° 20'$	15°	15°	15°	5°

NOTES

1 Rings are diametrically (of diameter B) aligned with inspection plug gauges (IS-WT) so that the ring face coincides with the face of the inspection plug (measuring surface of the plug). Displacement of the new ring face relative to the measuring plane should not be greater than $\pm$ 0,1 mm.

2 When there is a displacement of the gauge plane of 1,5 mm, which is checked by an inspection-type plug gauge (IS-WT), the gauge shall be discarded.

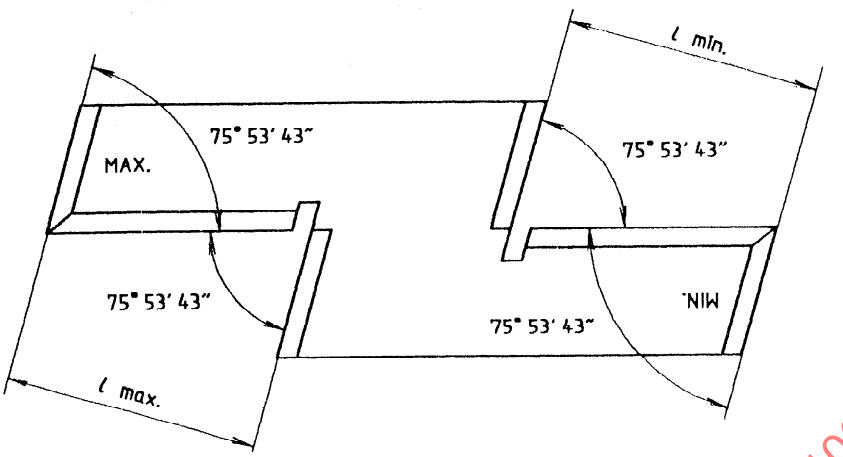


Figure 16 — Plane limit gauges (WLim type)

Table 17 — Main dimensions of place limit gauges (WLim type)

Designation	l_{max} $^{0}_{0,011}$	l_{min} $^{+0,011}_{0}$
CSSK46	31,283	31,183
CSSK59	41,022	40,922
CSSK76	41,022	40,922

NOTE — Maximum gauge wear is determined by the following tolerance increases:

up to − 0,028, for l_{max}

up to + 0,028, for l_{min}