

INTERNATIONAL STANDARD

ISO
9173-1

First edition
1991-07-01

Dental extraction forceps

Part 1: Screw and pin joint types

Daviers à usage dentaire

Partie 1: Types d'articulations à vis ou à tourillon



Reference number
ISO 9173-1 : 1991 (E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 9173-1 was prepared by Technical Committee ISO/TC 106, *Dentistry*, Sub-Committee SC 4, *Dental instruments*.

ISO 9173 consists of the following parts, under the general title, *Dental extraction forceps*:

- *Part 1: Screw and pin joint types*
- *Part 2: Box joint types*
- *Part 3: ...*

Annexes A and B are for information only.

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Introduction

For many decades, "English" pattern forceps have been widely used by the world-wide dental community. The popularity of these forceps has been such that a number of manufacturers, from various countries, have produced their own versions. Quite naturally, each manufacturer attempted to introduce an element of individuality into the design; but as a consequence subtle dimensional changes occurred between forcep patterns produced by different manufacturers.

This part of ISO 9173 is based on commercial specifications and illustrates the popular patterns of forceps currently used in dental practice; it is by no means comprehensive and details of additional patterns may form the basis for future parts in this series.

The patterns described are not intended to specify a definitive design or formula but rather to reflect the range of dimensions currently used by manufacturers. For this reason some tolerances are rather generous and manufacturers are requested to work to closer tolerances on individual dimensions.

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Dental extraction forceps —

Part 1: Screw and pin joint types

1 Scope

This part of ISO 9173 specifies the dimensions and performance requirements for dental extraction forceps with screw or pin joints, commonly known as English pattern forceps.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9173. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9173 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 6508 : 1986, *Metallic materials — Hardness test — Rockwell test (scales A - B - C - D - E - F - G - H - K)*.

ISO 7153-1 : 1983, *Instruments for surgery — Metallic materials — Part 1: Stainless steel*.

3 Construction materials

3.1 Component parts

With the exception of the pins and screws (see 3.2), the component parts shall be made of stainless steel of grade B or C of ISO 7153-1.

3.2 Pins and screws

The pins and screws shall be made of stainless steel chosen, at the discretion of the manufacturer, from the grades specified in ISO 7153-1.

4 Requirements for physical properties

4.1 Heat treatment and hardness

4.1.1 The component parts of the instruments, with the exception of the pins and screws, shall be heat-treated to attain a Rockwell hardness value of 42 HRC to 50 HRC when tested in accordance with ISO 6508.

4.1.2 Mating surfaces on the same instrument, such as those on opposite beaks, shall not vary in hardness by more than 3 units on the Rockwell hardness scale C.

4.2 Mechanical strength

When tested in accordance with 7.1, neither the forcep or any part thereof shall fracture, or show any sign of cracks or acquire a permanent set of dimension b_3 greater than 0,2 mm.

4.3 Resistance to corrosion by boiling water, autoclaving and dry heat

4.3.1 When subjected to the procedure described in 7.3, the instrument shall show no change in hardness or mechanical strength in any part or acquire a permanent set of dimension b_3 greater than 0,2 mm.

4.3.2 After being subjected to the procedure described in 7.2 and 7.3, the instrument shall show no evidence of corrosion (i.e. neither general or localized rust formation on the surface nor pitting).

NOTE — Discoloration due to water marking does not constitute evidence of corrosion.

4.4 Requirements for joint

4.4.1 The forcep joint shall be so constructed so that the instrument opens smoothly, without jerking, when gripped in one hand and levered open and closed with the index finger.

4.4.2 When tested in accordance with 7.4, the opening and closing moment of force shall be between 0,20 N·m and 0,68 N·m.

4.4.3 When the extremity of each handle is gripped between the index finger and thumb of each hand, there shall be no perceptible lateral movement of the handles in any position between fully open and fully closed.

4.5 Finish

4.5.1 General

All surfaces shall be free from pores, cracks, grinding marks, residual scale and inclusions and shall also be free from any

non-functional sharp edges when inspected using normal vision (corrected if necessary) without magnification.

4.5.2 Beaks

When the inner or crown space of the forceps is serrated or textured, the serrations or texture shall be uniform in depth throughout their length and consistent within any one pattern of forceps when examined using normal vision (corrected if necessary) without magnification.

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5 Key to dimensions and illustrations for all forceps

Table 1 — Key to figures 1 to 13

Dimension		Measurement point	Figures
a	Joint thickness	At maximum width excluding protruding pins, screws and rivets	2, 7, 9
$b_1^{1)}$	Beak thickness	As illustrated	2, 3, 4, 9
$b_2^{1)}$	Crown space width	At maximum width with forceps closed	1
$b_3^{1)}$	Beak separation	At minimum gap with forceps closed	1
b_4	Forcep width	At maximum distance across handles with forceps closed	1
b_5	Handle width	At base of handle where radius blends and maximum width occurs	2
b_6	Beak width (combined)	At maximum distance across both beaks when forceps closed.	1
b_7	Joint width	At maximum width for half- and pin joint forceps	6, 8
d_1	Joint diameter for forceps with circular joints	As illustrated	1
$h_1^{1)}$	Beak offset 1	If $h_2 = 0$, from furthest point of beak tip to forcep centreline If $h_2 \neq 0$, from furthest point of beak tip to measurement point of h_2 (i.e. on first bend in beak)	3, 4
$h_2^{1)}$	Beak offset 2	From furthest point on first bend to centreline of forcep	4
h_3	Handle offset	From furthest point on handle to centreline of forcep	11, 12
		As illustrated	13
l_1	Overall length	As shown in plan view illustrated	1, 3, 5, 6, 8
$l_2^{1)}$	Overall beak length	From beak tip to pivot centre	1, 3, 5, 6, 8
$l_3^{1)}$	Working length of beak	From beak tip to outside diameter of the joint	2, 3, 5, 6
$l_4^{1)}$	Thickness of ramp/height of step	Centreline between outside diameter of joint and crown space	2, 3
l_5	Scoping length	From beak tip to limit of depression	2
l_6	Length of serrations	From beak tip to limit of serrations within scoping	2
$r^{1)}$	Depth of scoping	From edge of beak to lowest point in scoped section	2

1) The tolerance on this dimension is critical and will have a direct effect on the performance.

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5.1 Forceps with circular joint

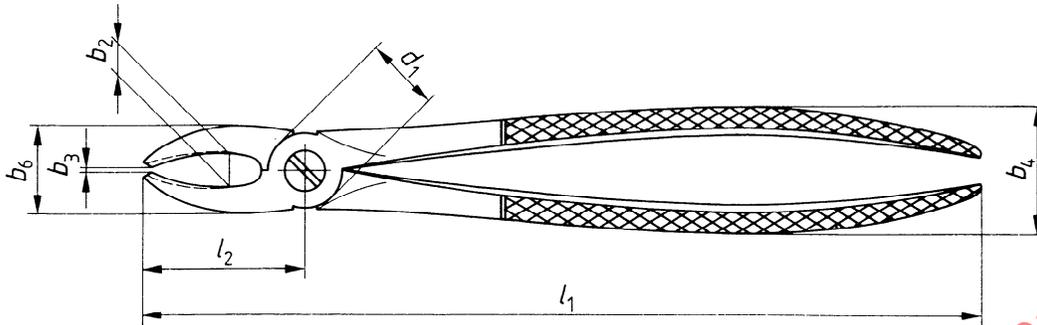


Figure 1

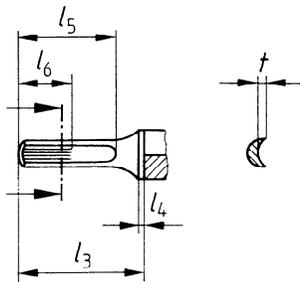


Figure 2

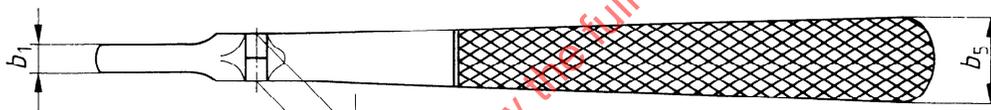


Figure 3

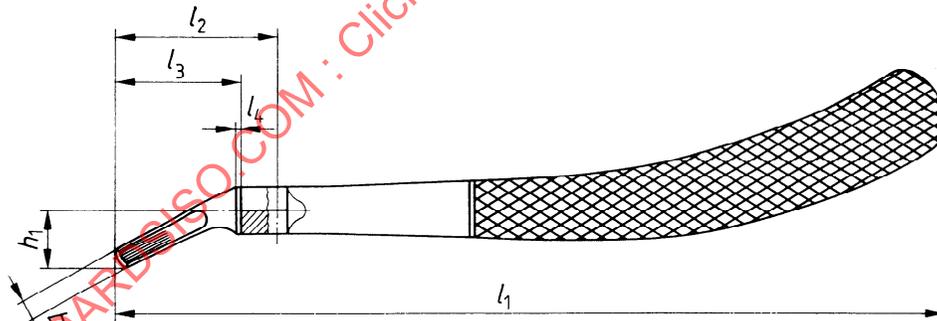


Figure 4

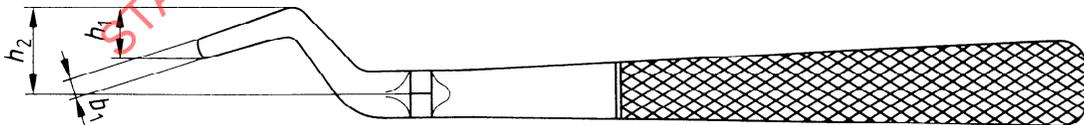


Figure 5

5.2 Forceps with pin joint

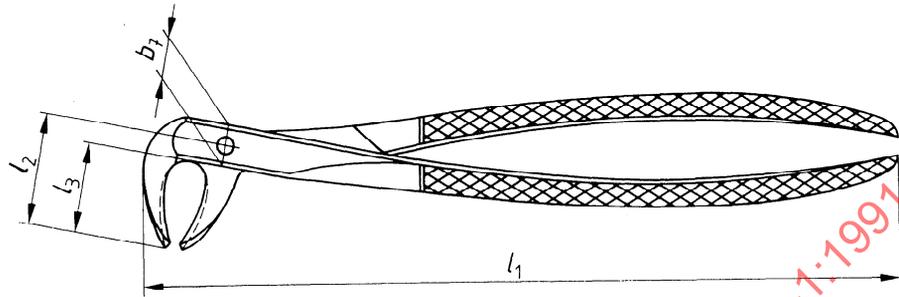


Figure 6

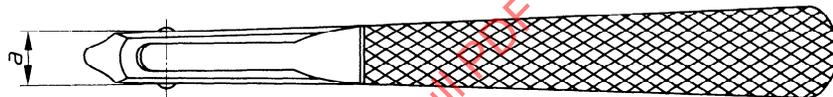


Figure 7

5.3 Forceps with half-joint

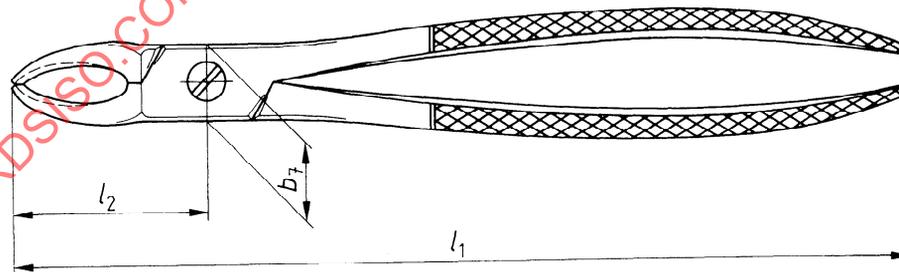


Figure 8

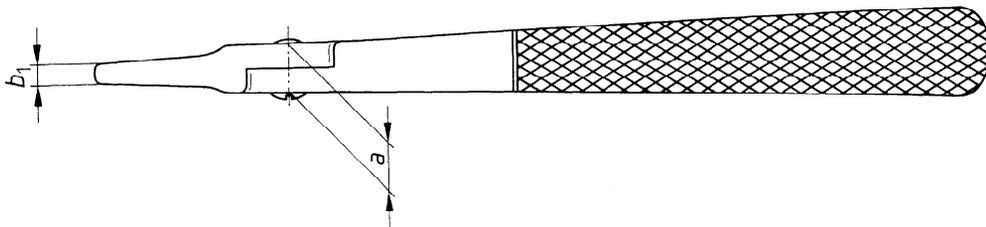


Figure 9

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5.4 Handle shapes

5.4.1 Straight handle (see figure 10)

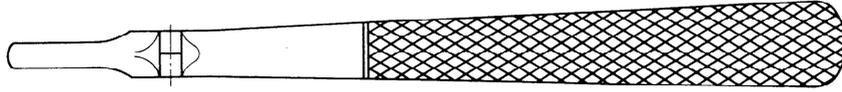


Figure 10

5.4.2 Curved handle: type 1 (see figure 11)

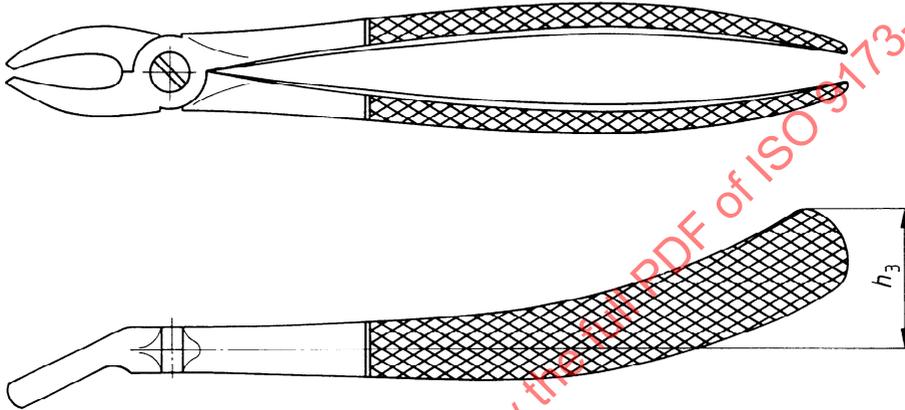


Figure 11

5.4.3 Curved handle: type 2 (see figure 12)

NOTE — This type is also known as Read pattern handles.

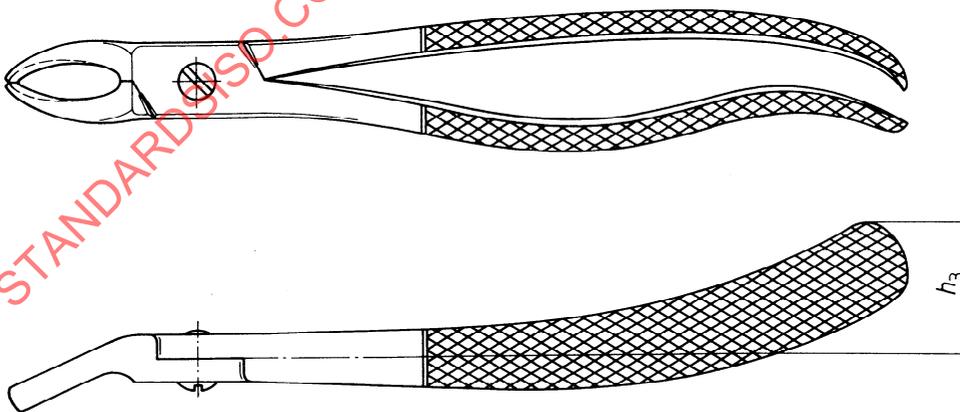


Figure 12

5.4.4 Curved handle: type 3 (see figure 13)

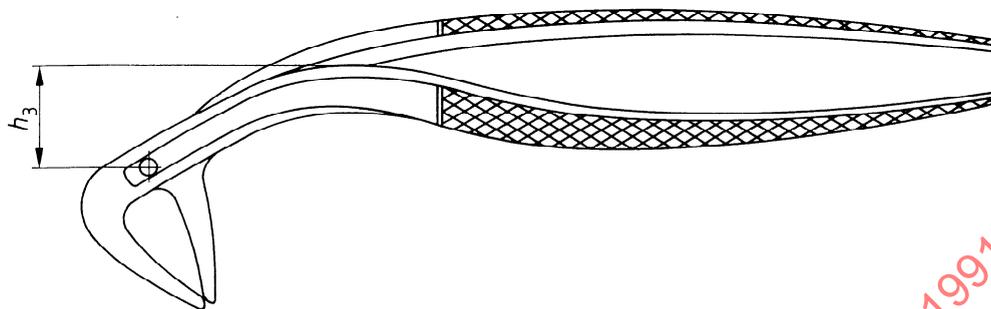


Figure 13

6 Designs and dimensions

6.1 Handles

The handles shall be as illustrated in figures 1 to 13 and shall have the dimensions given in tables 2 to 6.

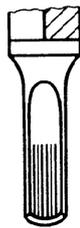
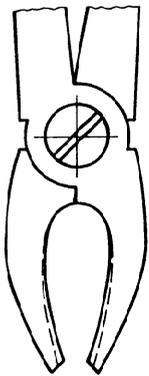
6.2 Beaks

For the various pattern numbers, the beaks shall have the designs shown in the following drawings (see 6.3 to 6.7) and shall have the dimensions given in tables 2 to 6.

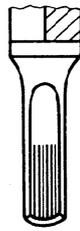
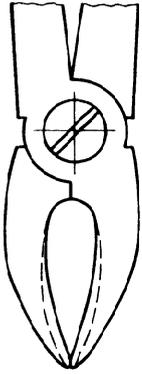
NOTE — The pattern numbers shown against the following drawings relate to English forceps pattern numbers which have been in common use for several decades. As will be seen, the numbers do not run consecutively throughout the drawings: this is because this part of ISO 9173 covers only the most popular patterns.

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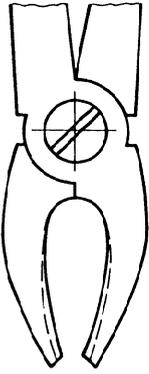
∞ 6.3 Upper forceps with circular joint: adult



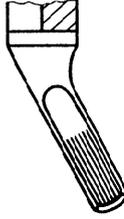
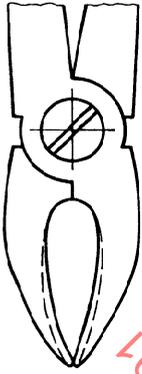
Pattern numbers 1, 2, 107



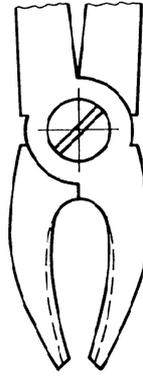
Pattern number 29



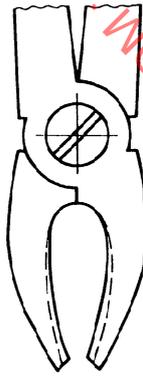
Pattern number 7
Curved handle: type 1



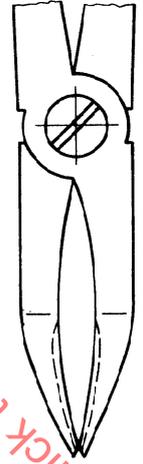
Pattern numbers 136, 147
Curved handle: type 1



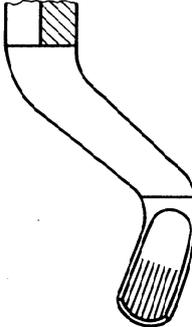
Pattern number 17 — Curved handle: type 1
Pattern number 94 — Curved handle: type 2



Pattern number 18 — Curved handle: type 1
Pattern number 95 — Curved handle: type 2



Pattern numbers 51, 51A, 52



Pattern number 67

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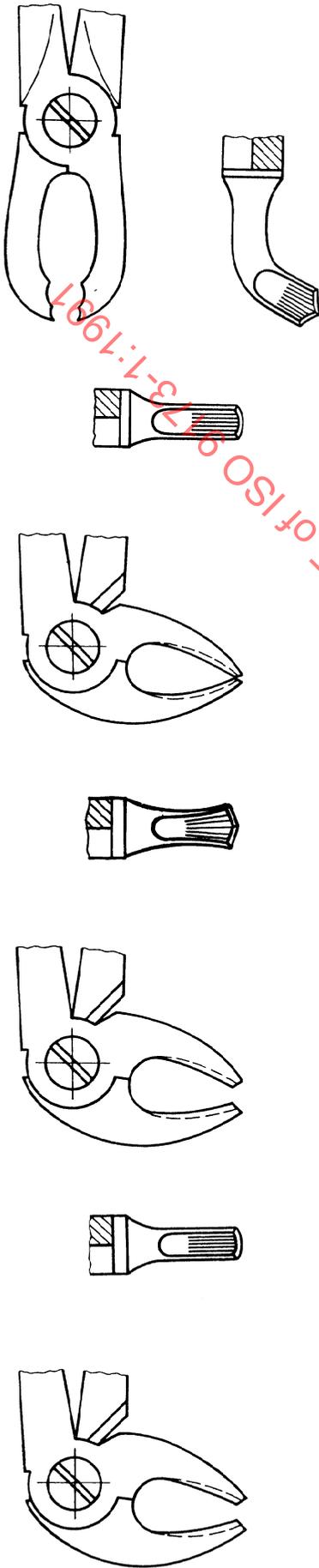
Table 2 — Dimensions for upper forceps with circular joint: adult

Dimensions in millimetres

Pattern number	a $\pm 0,5$	b_1 $\pm 0,3$	b_2 $\pm 0,5$	b_3	b_4 ± 2	b_5 $+1$ $-1,5$	b_6 ± 1	d_1 $+1$ 0	h_1 ± 1	h_2 $\pm 1,5$	h_3 ± 3	l_1 ± 3	l_2 ± 1	l_3 $\pm 0,5$	l_4	l_5 $+2$ -1	l_6 min.	l \approx	Mass g max.
1	8,5	5,5	6,7	$1,5 \pm 0,5$	27	17	17,5	14	—	—	—	160	30,5	23,25	1,75	17,5	8	1	165
2	8,5	4,8	6,7	$1,5$ max.	27	17	17,5	14	—	—	—	160	30,5	23,25	1,75	17,5	8	1	165
7	8,5	5	6,8	$1,5 \pm 0,5$	27	17	17,5	14	9,2	—	28	162	30,5	23,25	$1,75 \pm 0,25$	17,5	8	1	170
17/18	8,5	7	9,5	$3,5 \pm 1,5$	27	17	18	14	9,2	—	28	160	28,5	21,25	1,75	15	6	1	170
29	8,5	4,2	5,8	—	27	17	17,5	14	—	—	—	162	32	24,75	1,5	18	7	0,8	165
51	8,5	3,6	5,6	—	27	17	17	14	8,5	18	—	175	44	37	1 max.	18	8	1	170
51A	8,5	2,5	5	—	27	17	15	14	8	16	—	175	44	37	—	18	10	0,7	170
52	8,5	4,6	5,7	—	27	17	17,5	14	9	18,5	—	175	44	37	1 max.	18	8	1	170
67 ¹⁾	8,5	6,6	6,5	2 ± 1	27	17	14	14 ¹⁾	10	18,5	—	174	44 ¹⁾	37	—	12	5	1,2	165
94/95	8,5	$b_{1a} : 6,6$ $b_{1b} : 7,4$	8,5	$3,5 \pm 0,5$	27	17	19	14	11,5	—	28	162	28	21	1,5	16	10	1	165
107	8,5	$b_{1a} : 4,7$ $b_{1b} : 5,6$	5,5	2 max.	27	17	16,5	14	—	—	—	153	23	16,25	$1,5 \pm 0,25$	9	5	0,8	150
136	8,5	4,5	6,3	—	27	17	17,5	14	10	—	28	162	30,5	23,25	1,75	17	8	0,8	170
147	8,5	3	6	—	28	17	18	14	7	—	28	162	31,5	24,25	1,5	17	6	0,5	155

1) This pattern is also manufactured in half-joint. In this case, these dimensions are not applicable.

6.4 Lower forceps with circular joint: adult



Pattern number 13

Pattern number 22

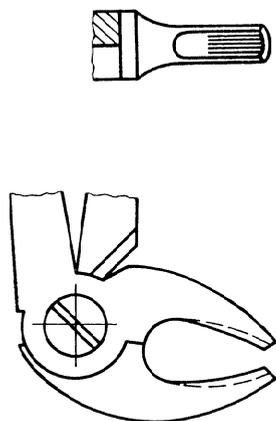
Pattern numbers 33, 33A

Pattern number 79

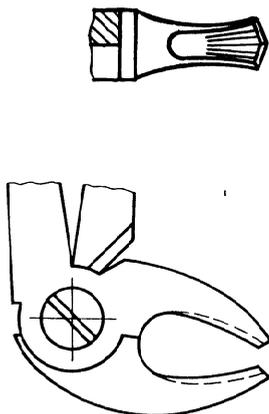
Table 3 — Dimensions for lower forceps with circular joint: adult

Pattern number	Dimensions in millimetres																		
	a $\pm 0,5$	h_1 $\pm 0,3$	h_2 $\pm 0,5$	h_3	h_4 ± 2	h_5 $+1$ $-1,5$	h_6 ± 1	h_1 $+1$ 0	h_1 ± 1	h_2	h_3	l_1 ± 3	l_2 ± 1	l_3 $\pm 0,5$	l_4 $\pm 0,25$	l_5 $+2$ -1	l_6 min.	r \approx	Mass g max.
13	8,5	4,7	6,7	2 max.	27	17	17,5	14	—	—	—	144	24	16,75	1,5	11	6	0,8	160
22	8,5	7	8,8	3,5 \pm 0,5	27	17	19	14	—	—	—	145	24	16,75	1,5	11	6	1	175
33	8,5	3,9	6,5	—	27	17	17,5	14	—	—	—	144	25	17,75	1,5	11	6	0,8	150
33A	8,5	3	6	—	27	17	17,5	14	—	—	—	144	26	18,75	1,5	12	6	0,6	150
79	8,5	6,7	8,6	2,5 \pm 0,5	27	17	17,5	14	13	—	—	162	31,5	24,25	1,75	12	6	1	160

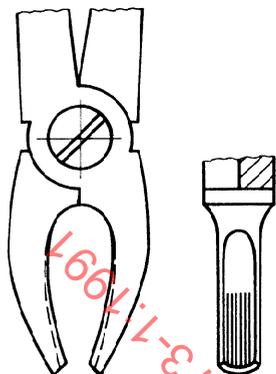
6.5 Children's pattern forceps



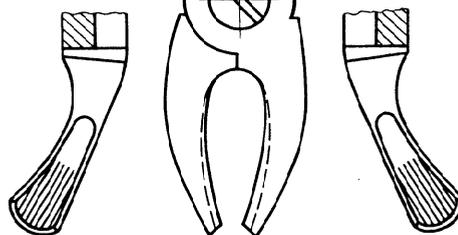
Pattern number 13S



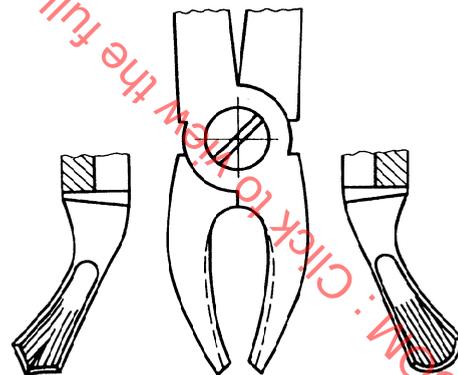
Pattern number 22S



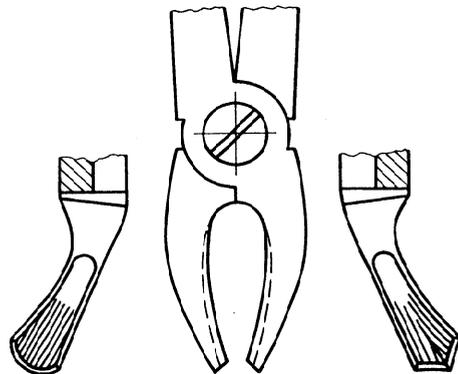
Pattern number 37



Pattern number 39 —
Curved handle: type 1



Pattern number 39L —
Curved handle: type 1

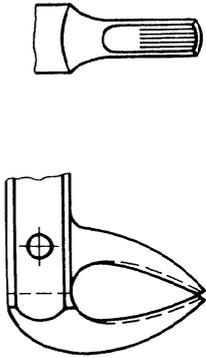


Pattern number 39R —
Curved handle: type 1

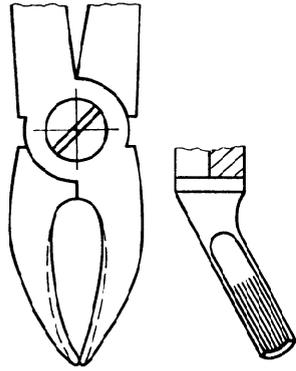
Table 4a) — Dimensions for children's pattern forceps

Pattern number	Dimensions in millimetres																			
	a	b_1	b_2	b_3	b_4	b_5	b_6	b_7	d_1	h_1	h_2	h_3	l_1	l_2	l_3	l_4	l_5	l_6	t	Mass g max.
13S	$\pm 0,5$	4	6,2	0,6 min.	25	16	16	—	13	—	—	—	130	23	16,25	1,25	10	8	\approx	130
22S	7,5	5,5	7,4	3,5 max.	25	16	16,5	—	13	—	—	—	130	21	14,25	1,25	10	8	1	130
37	7,5	3,9	5,3	1 max.	25	16	15	—	13	—	—	—	143	26	19,25	1,25	14	5	0,8	130
39/39L 39R	7,5	5,9	7,4	2,5 \pm 0,5	25	16	16,5	—	13	8	—	25	148	25	18,25	1,25	12	6	0,8	130

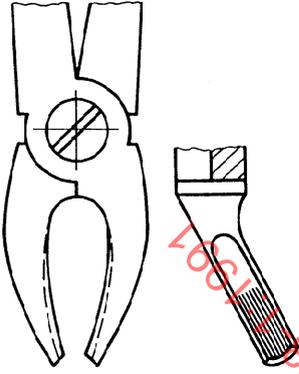
6.5 Children's pattern forceps (concluded)



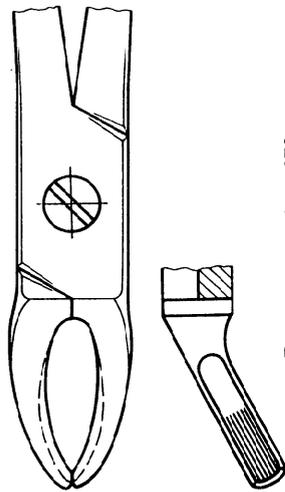
Pattern numbers 123, 162



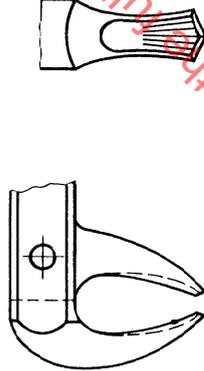
Pattern number 138
Curved handle: type 1



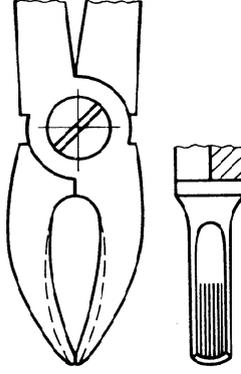
Pattern number 157
Curved handle: type 1



Pattern number 159
Curved handle: type 1



Pattern numbers 160, 161



Pattern number 163

Table 4b) — Dimensions for children's pattern forceps

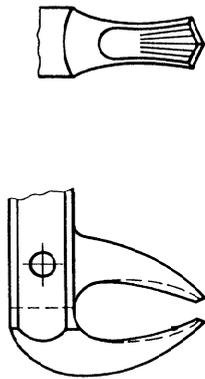
Pattern number	a		b ₁	b ₂	b ₃	b ₄	b ₅	b ₆	b ₇	d ₁	h ₁	h ₂	h ₃	l ₁	l ₂	l ₃	l ₄	l ₅	l ₆	l	Mass
	± 1		± 0,3	± 0,5	± 0,5	± 2	+1 -1,5	± 1	± 1	+1 0	± 1	—	± 3	± 3	± 1	± 0,5	± 0,25	+2 -1	min.	≈	g max.
123	11		3,5	6	—	20	16	15	7,5	PIN	—	—	—	137	19	15	—	9	5	0,5	140
138	7,5		3	5	—	27	16	14	—	13 ¹⁾	5	—	20	143	28	16	1,5	12	4	0,5	120
157	7,5	± 0,5	6	7,3	2	23	16	16,5	—	13	8	—	25	150	25	18,5	1,3	12	6	0,8	140
159	7,5		3,7	4,9	—	27	16	14	13	2)	6,1	—	20	143	28	16	1,5	12	5	0,5	120
160	11		5	8,3	3	20	16	16	7,5	PIN	—	—	—	137	17,5	13,5	—	9	4	0,8	140
161	11	± 1	4,5	7,3	3	20	16	16	7,5	PIN	—	—	—	136	16,5	12,5	—	9	4	0,5	140
162	11		3	6,5	—	20	16	16	7,5	PIN	—	—	—	137	19	15	—	9	4	0,5	140
163	7,5	± 0,5	3,5	5,3	—	23	16	15,5	—	13	—	—	—	142	26	19,5	1,3	14	5	0,8	120

Dimensions in millimetres

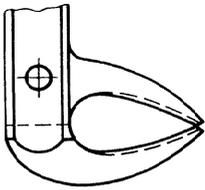
1) This pattern is also manufactured in half-joint. In this case, these dimensions are not applicable.

2) This pattern is manufactured in half-joint.

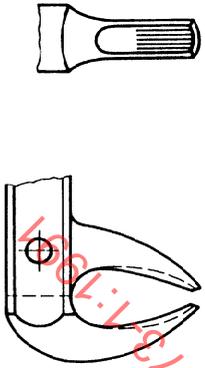
6.6 Forceps with pin joint



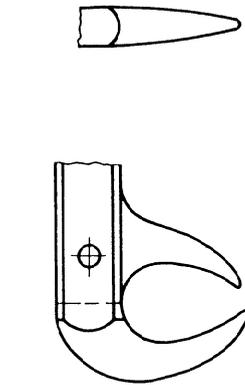
Pattern numbers 73, 73S



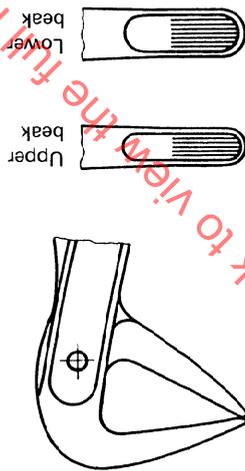
Pattern numbers 74, 74N



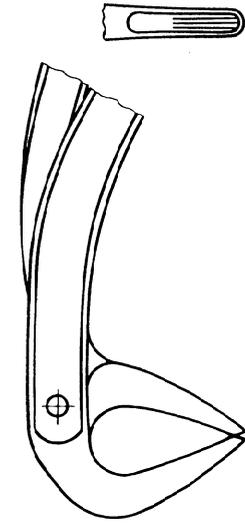
Pattern number 75



Pattern number 86



Pattern number 137



Pattern number 144 —
Curved handle: type 3

Table 5 — Dimensions for forceps with pin joint

Pattern number	a ±1	b ₁ ±0,3	b ₂ ±0,5	b ₃	b ₄ ±2	b ₅ ±1	b ₆ ±1	b ₇ ±1	d ₁	h ₁	h ₂	h ₃ ±3	l ₁ ±3	l ₂ ±1	l ₃ ±0,5	l ₄	l ₅ +2 -1	l ₆ min.	t ≈	Mass g max.
73	11	6,9	9,8	4	±1	26	17	19	8	Pin	—	—	147	21,5	17	—	10	5	0,8	160
73S	11	6	9	4	26	17	17	8	Pin	—	—	—	147	19	14,5	—	10	5	0,8	160
74	11	4,5	8	—	26	17	19	8	Pin	—	—	—	147	24	20	—	14	7	0,8	160
74N	11	2,6	7,3	—	26	17	19	8	Pin	—	—	—	147	24	20	—	13	6	0,5	160
75	11	4,5	7,6	1,5	±0,5	26	17	19	8	Pin	—	—	147	21	16,5	—	11	6	0,7	160
86	11	4	7,6	3,5	26	17	19	8	Pin	—	—	—	148	22,5	18	—	—	—	—	165
137	11	4,5/5	8,5	—	26	17	21	8	Pin	—	—	—	149	24,5	20	—	15	7	0,8	165
144	11	4	9	—	26	17	21	8	Pin	—	—	15	150	24,5	19,5	—	15	7	0,8	170

Dimensions in millimetres