INTERNATIONAL STANDARD

ISO 8764-1

Third edition
2004-04-01

Assembly tools for screws and nuts — Screwdrivers for cross-recessed head screws —

Part 1: Driver tips

Outils de manœuvre pour vis et écrous — Tournevis pour vis à empreinte cruciforme —

Partie 1: Extrémités de tournevis

Reference number
ISO 8764-1:2004(E)

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Contents

Page

Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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ISO 8764-1 was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 10, *Assembly tools for screws and nuts, pliers and nippers*.

This third edition cancels and replaces the second edition (ISO 8764-1:1999), which has been technically revised as follows:

— a designation has been added;

— in the English version, the term “point” becomes “tip” and “type” becomes “form”;

— in the French version, the term “type” becomes “forme”.

ISO 8764 consists of the following parts, under the general title *Assembly tools for screws and nuts — Screwdrivers for cross-recessed head screws*:

— *Part 1: Driver tips*

— *Part 2: General requirements, lengths of blades and marking of hand-operated screwdrivers*

Assembly tools for screws and nuts — Screwdrivers for cross-recessed head screws —

Part 1: Driver tips

1 Scope

This part of ISO 8764 specifies the shapes and dimensions, technical requirements and torque test methods for the tips of hand drivers and of machine-operated bits for cross-recessed head screws.

It specifies two forms of driver tips:

— form PH for form H recesses;

— form PZ for form Z recesses.

H and Z form recesses are specified in ISO 4757.

General requirements, lengths of blades and marking of hand-operated screwdrivers are given in ISO 8764-2.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4757, *Cross recesses for screws*

ISO 8764-2, *Assembly tools for screws and nuts — Screwdrivers for cross-recessed head screws — Part 2: General requirements, lengths of blades and marking of hand-operated screwdrivers*

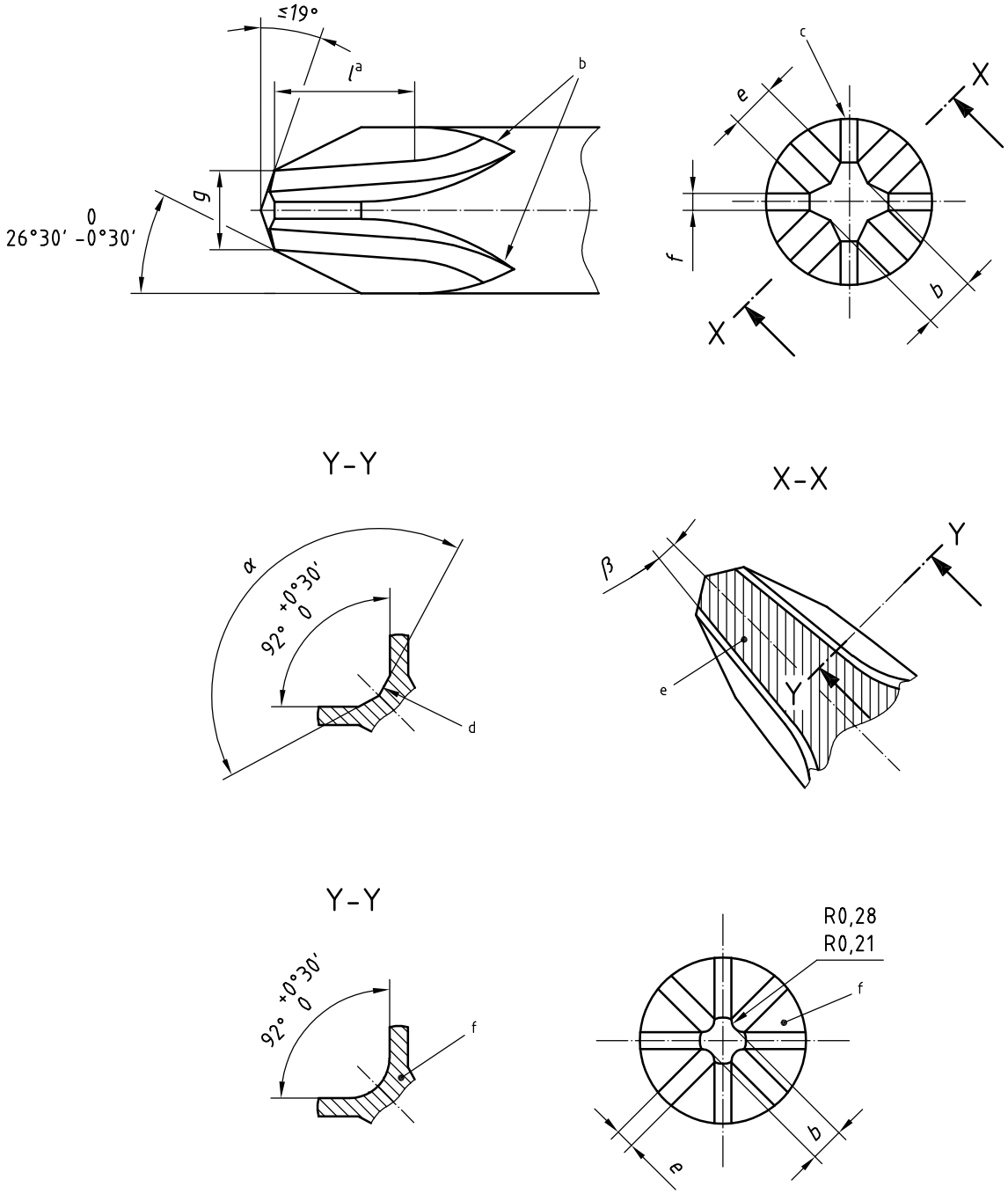
3 Shapes and dimensions

The shapes and dimensions of the tips shall be in accordance with Figure 1 and Table 1 for form PH, and with Figure 2 and Table 2 for form PZ.

The axis of the tip shall be concentric with the axis of the tool.

When a plated finish is used, the dimensions shall be met after plating.

Dimensions in millimetres



a Length of straight part.

b Blending of flutes dependent on method of manufacture.

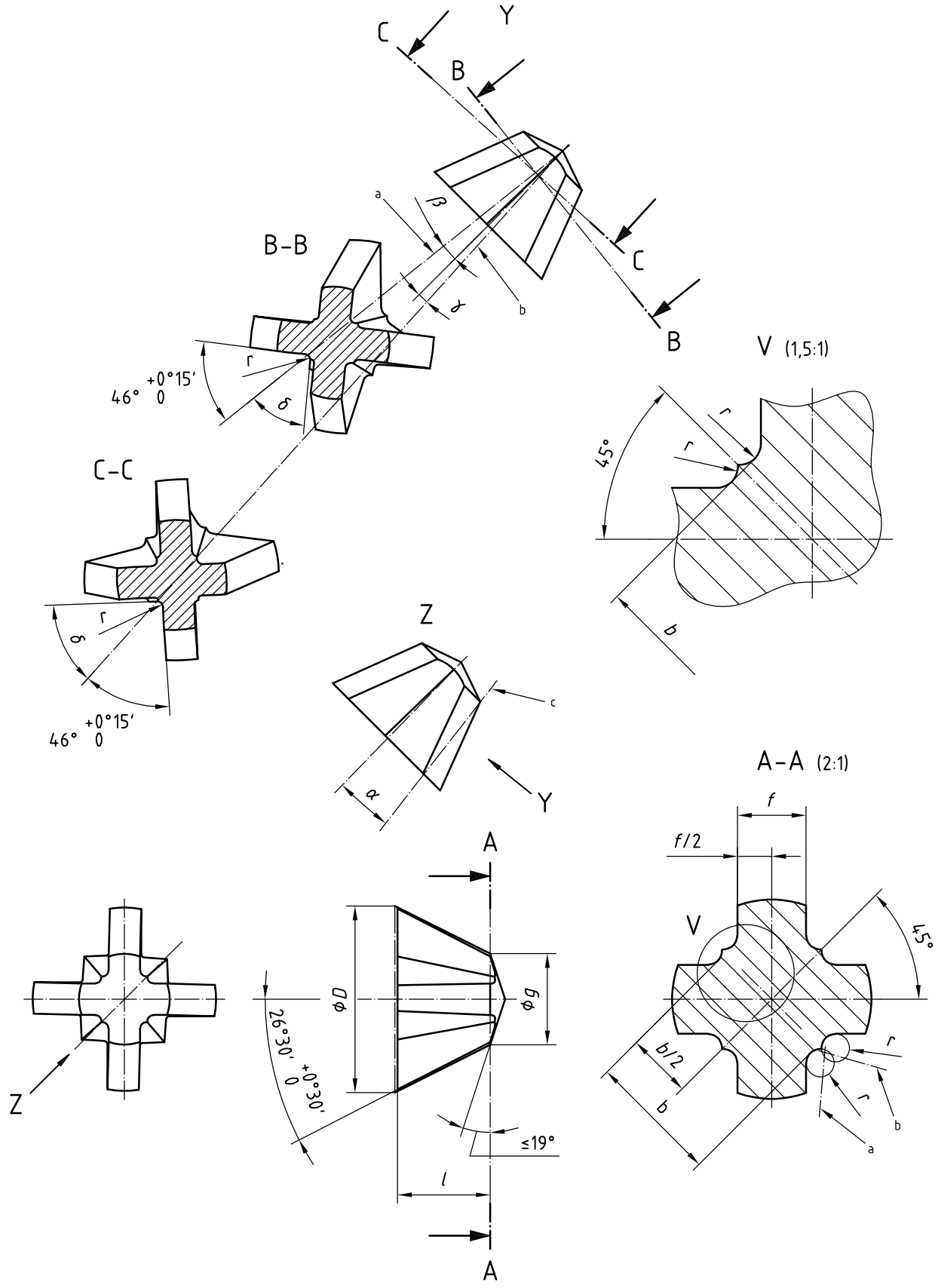
c Flutes equally spaced at 90°.

d For tip No. 0, see detail below (f).

e Section Y-Y: true flute angle measured at right angles to straight part of length *l*.

f Tip No. 0.

Figure 1 — Form PH tips



a Axis b.

b Axis g.

c Axes b and g.

Figure 2 — Form PZ tips

Table 1 — Dimensions of form PH tips

Tip	Nominal blade diameter mm	b mm	e mm	f mm	g mm	l min. mm	α	β
0	3	0,61 0,56	0,38 0,29	0,31 0,26	0,84 0,79	2,78	See Figure 1	7° 00' 6° 30'
1	4,5	1,03 0,98	0,54 0,49	0,53 0,48	1,30 1,25	2,78	138° 30' 138° 00'	7° 00' 6° 30'
2	6	1,56 1,51	1,13 1,08	0,64 0,59	2,31 2,26	4,37	140° 30' 140° 00'	5° 45' 5° 15'
3	8	2,52 2,47	2,12 2,07	0,81 0,73	3,84 3,79	6,74	146° 30' 146° 00'	5° 45' 5° 15'
4	10	3,60 3,55	2,76 2,71	1,12 1,04	5,11 5,06	8,34	153° 30' 153° 00'	7° 00' 6° 30'

Table 2 — Dimensions of form PZ tips

Tip	Nominal blade diameter mm	b mm	f mm	g mm	l min. mm	r mm	α	β	γ	δ
0	3	0,78 0,70	0,45 0,42	0,92 0,89	1,54	0,10 0,07	7° 00' 6° 30'	8° 15' 7° 45'	4° 53' 4° 23'	46° 15' 46° 00'
1	4,5	1,19 1,11	0,71 0,68	1,40 1,37	2,02	0,13 0,10				
2	6	1,78 1,70	1,00 0,95	2,44 2,39	3,17	0,30 0,15	5° 45' 5° 15'	6° 50' 6° 20'	3° 30' 3° 00'	
3	8	2,65 2,55	1,38 1,33	3,96 3,91	4	0,36 0,20				56° 30' 56° 15'
4	10	4,02 3,92	2,10 2,05	5,18 5,13	5,4	0,51 0,36	7° 00' 6° 30'	8° 15' 7° 45'	4° 53' 4° 23'	

4 Technical requirements

4.1 Material

Components shall be manufactured from steel which, when suitably heat-treated, satisfies the mechanical requirements and torque tests specified in 4.2 and Clause 6 respectively.

4.2 Heat treatment and hardness

The screwdriver tips shall have a minimum hardness of

— 54 HRC for hand-operated screwdrivers,

— 58 HRC for machine-operated screwdrivers,

for a minimum length of three times the nominal blade diameter measured from the driving end.

The remainder of the tool shall be hardened and tempered to a minimum of 50 HRC.

All hardness measurements shall be taken on ground flats, parallel with the axis and of sufficient area to give an accurate reading.

4.3 Finish

Components shall be free from cracks, blemishes and other deleterious defects.

5 Inspection of dimensions

5.1 General

Conformance with the dimensions as specified in Clause 3 shall be determined either by direct measurement or by the use of suitable inspection gauges as defined in 5.2 and 5.3.

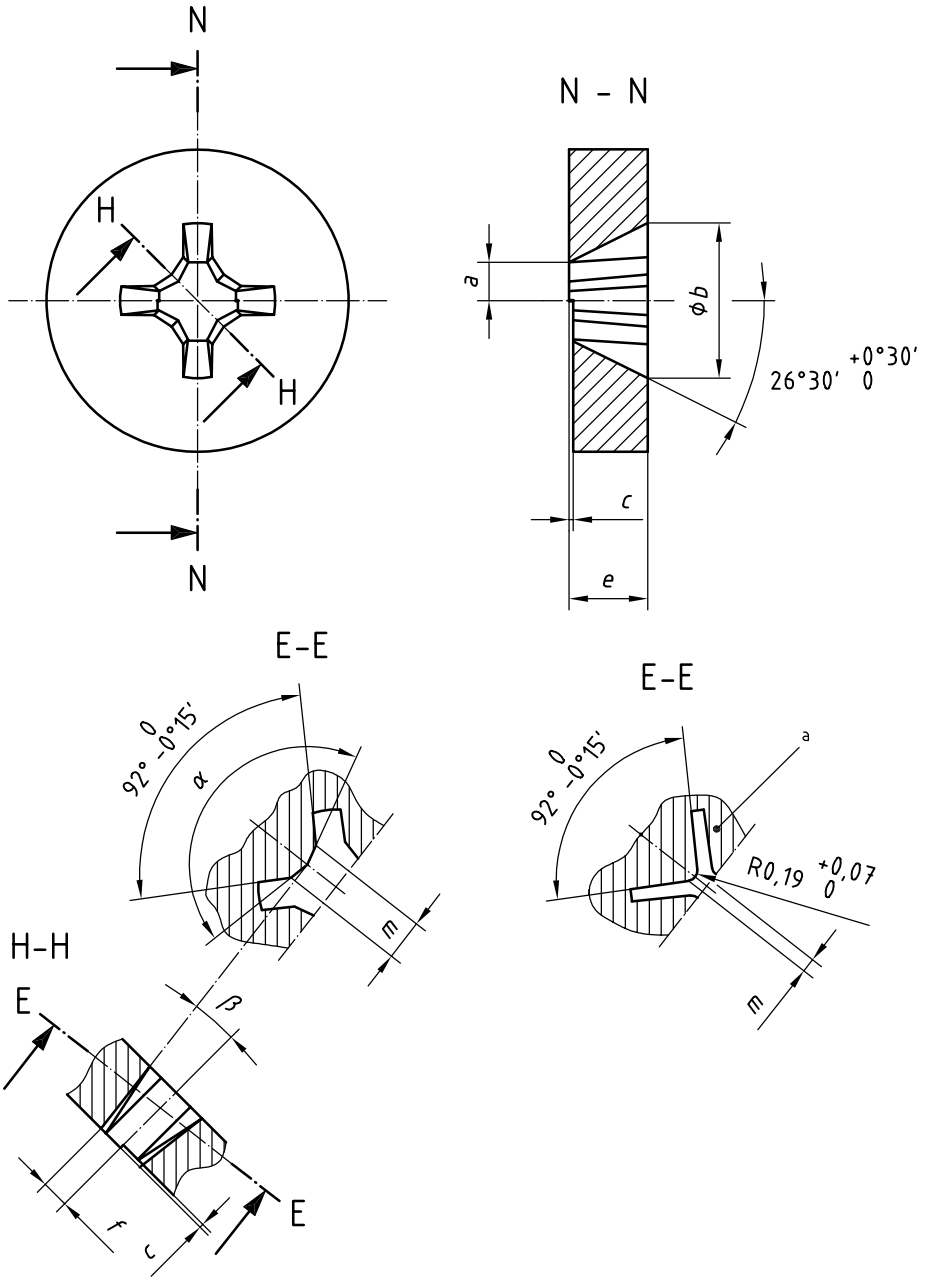
5.2 Inspection gauges for form PH tips

The dimensions of the tips are in accordance with this part of ISO 8764 when they fit properly into the gauge and when the edges of the tips at which the two cones of 53° and 142° meet and lie within step c of the gauge (see Figure 3 and Table 3). See Annex A for an explanation of the choice of dimensions.

5.3 Inspection gauges for form PZ tips

See Table 4 and Figure 4.

Dimensions in millimetres



a Size No. 0.

Figure 3 — Inspection gauge for form PH tips

Table 3 — Dimensions of inspection gauge for form PH tips

Tip	a ± 0,005 mm	b min. mm	c ± 0,025 mm	e max. mm	f ± 0,005 mm	m $^{0}_{-0,02}$ mm	α $^{0}_{-0°\ 15'}$	β $^{+0°\ 15'}_{0}$
0	0,419	3	0,254	2,38	0,284	0,29	—	7°
1	0,648	4,5		2,38	0,493	0,49	138°	
2	1,156	6		3,97	0,769	1,08	140°	5° 45'
3	1,918	8		6,34	1,257	2,07	146°	
4	2,553	10		7,94	1,804	2,71	153°	7°

Table 4 — Dimensions of inspection gauge for form PZ tips

Tip	b mm	f_1 mm	f_2 mm	a mm	i mm	k mm	g mm	t mm	r_a max. mm	r $^{+0,05}_{0}$ mm	α	β	γ	δ
0	1,635	0,48 0,47	0,485	2,5	1,55 1,54	1,30 1,29	0,93 0,92	0,83 0,82	0,07	0,1	7° 10'	7° 45'	4° 23'	
1	2,215	0,75 0,74	0,775	3,47	2,03 2,02	1,78 1,77	1,41 1,40	1,24 1,23	0,1	0,12	7° 00'	7° 35'	4° 13'	46° 05' 45° 55'
2	3,135	1,04 1,03	1,080	5,64	3,16 3,15	2,91 2,90	2,43 2,42	1,85 1,84			5° 55'	6° 20'	3° 00'	
3	4,255	1,42 1,41	1,49	8,02	4,01 4,00	3,76 3,75	3,95 3,94	2,68 2,67	0,15	0,15	5° 45'	6° 10'	2° 50'	56° 20'
4	6,565	2,14 2,13	2,195	10,67	5,41 5,40	5,16 5,15	5,17 5,16	4,05 4,04			7° 10' 7° 00'	7° 45' 7° 35'	4° 23' 4° 13'	56° 10'

NOTE 1 The inspection gauge can only be used for checking the penetration depth of tool profiles. Through this the fitting precision of the tool profiles in the referring screw heads is guaranteed. The bases of this test are given in ISO 4757 (for screws) and this part of ISO 8764 (for tools).

NOTE 2 In order to make a visual test of penetration depth possible, the difference of the inspection gauge surface i and k is stated bigger than the theoretical determination of the tolerance g_{min} and g_{max}.

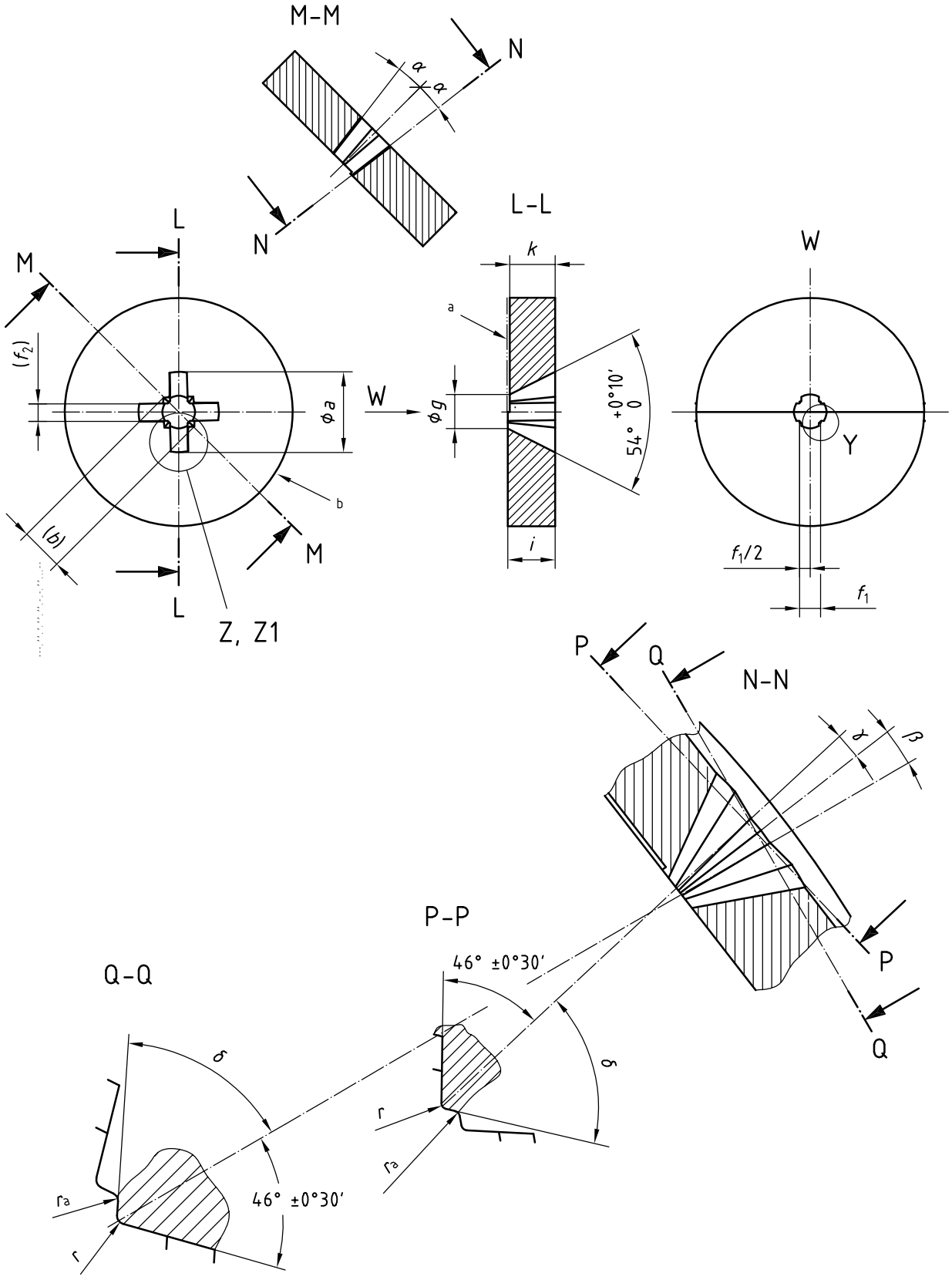
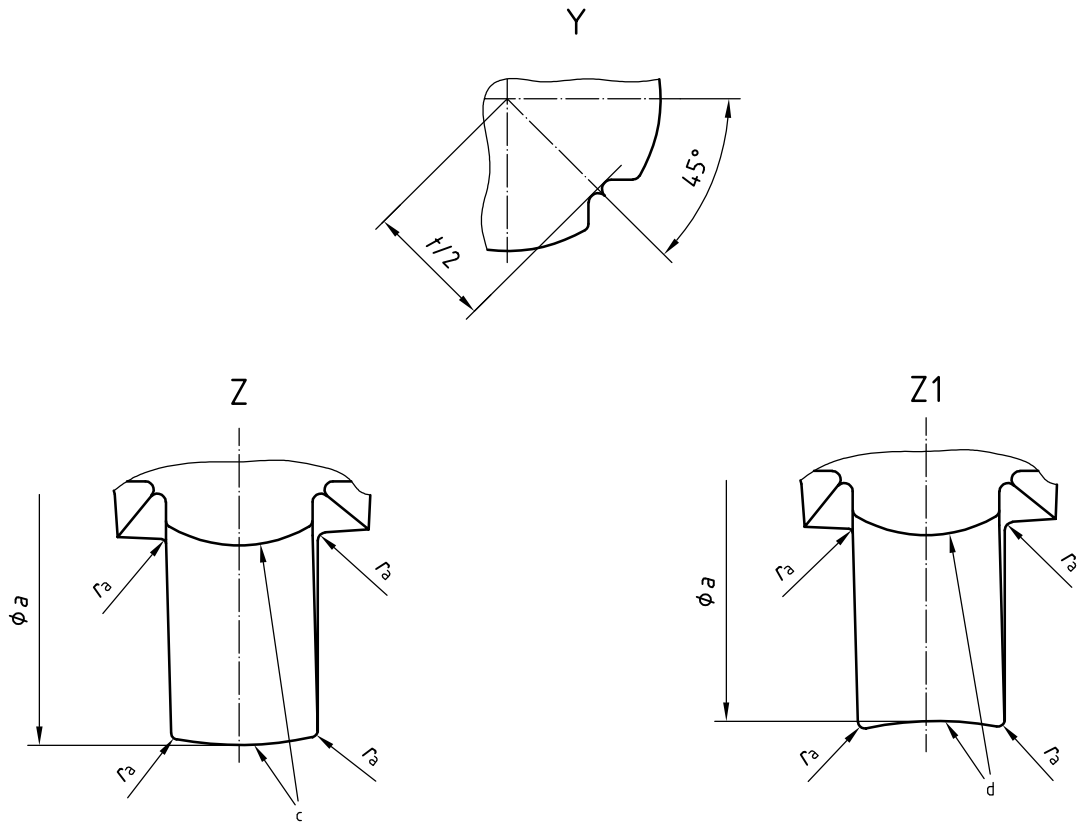


Figure 4 — Inspection gauge for form PZ tips



a For use, see Table 4.

b Periphery form at the manufacturer's discretion.

c Forms for tips Nos. 0 to 4.

d Forms by “e.d.m. manufacturing” method in sizes 0 and 1 permitted.

Figure 4 — Inspection gauge for form PZ tips (*continued*)

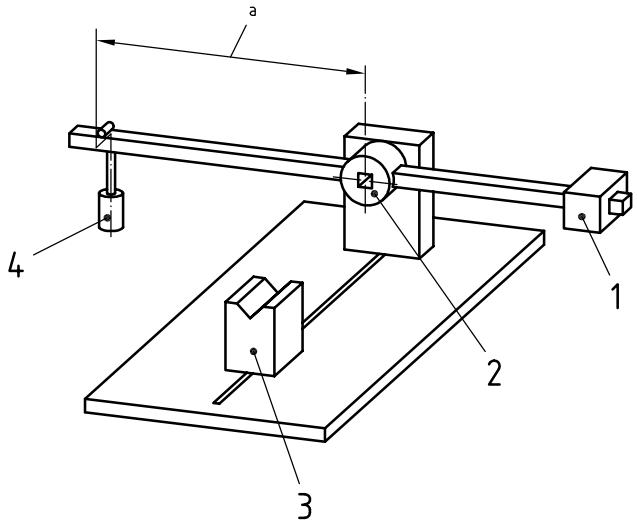
6 Torque test

The test specified in this clause applies to the driver tips only.

The test blade shall be gripped in the jaws of the mandrel of a torque testing device (see Figure 5). The testing device shall also be equipped with a test block of the appropriate form and driver tip size so as to comply with the requirements of Figure 6 and Table 5.

The minimum hardness of the test block shall be 62 HRC.

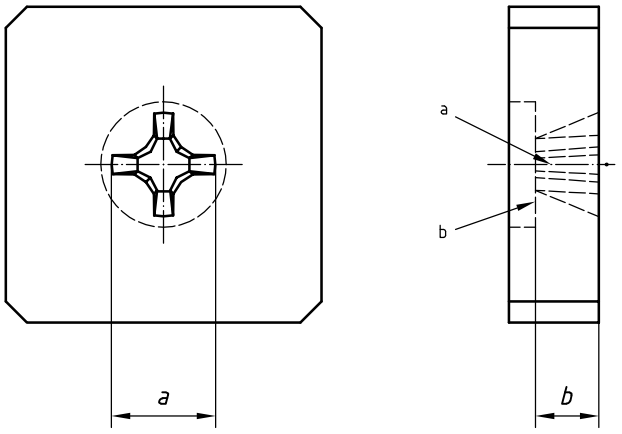
After application of the minimum torque specified in Table 6, the driver tips shall not exhibit any fracture or permanent distortion.



Key

1 adjustable counterbalance
2 test block pivoting support
3 sliding test piece support
4 appropriate mass
a Distance from the fulcrum to the centre of the mass.

Figure 5 — Schematic representation of a torque testing device



a Form shall be recessed with a punch corresponding to the driver tip dimensions.
b Appropriate counterbore.

Figure 6 — Torque test block

Table 5 — Torque test block dimensions

Dimensions in millimetres

Tip	Driver tips, hand- and machine-operated			
	form PH		form PZ	
	a	*b*	*a*	*b*
0	2,34 2,24	1,47	2,20 2,05	1,25 1,10
1	3,66 3,56	2,34	3,70 3,55	2,25 2,10
2	5,97 5,87	3,63	5,50 5,35	3,00 2,85
3	9,85 9,75	5,99	7,70 7,55	3,70 3,55
4	12,39 12,29	7,26	9,85 9,70	4,65 4,50

Table 6 — Test torques for forms PH and PZ

Tip	Test torque N · m	
	M_{hand} [a]	M_{machine} [b]
0	1	1
1	3,5	3,9
2	8,2	10,3
3	19,5	32
4	38	88,7

a $M_{\text{hand}} = 0{,}038\ d^3$
where d is the nominal blade diameter, expressed in millimetres.

b $M_{\text{machine}} = M_{\text{hand}} \left(1 + \frac{M_{\text{hand}}}{50}\right)^{1,5}$

7 Designation

EXAMPLE 1 Designation of a screwdriver tip, form PH, size 2:

(Screwdriver) Tip ISO 8764-1 — PH2

EXAMPLE 2 Designation of a screwdriver tip, form PZ, size 2:

(Screwdriver) Tip ISO 8764-1 — PZ2

EXAMPLE 3 Designation of a gauge for a screwdriver tip, form PH, size 2:

Gauge ISO 8764-1 — PH2

EXAMPLE 4 Designation of a gauge for a screwdriver tip, form PZ, size 2:

Gauge ISO 8764-1 — PZ2

Annex A
(informative)

Explanation of choice of gauge dimensions for form PH tips

The gauge dimensions for form PH tips were chosen on the basis of the following criteria:

a) $2 \times a = g_{max}$ of the driver tip so that the driver does not sit on the cone 2 × 26° 30' (see Figure A.1);

b) $2 \times f = f'_{min}$ of the driver tip to ensure that the driver fits to the flanks of the cone $2 \times \beta$ during testing (see Figure A.2), where

$$f' = b + [\tan(19°) \times \tan\beta\,(g - b)]$$

where f', b, g and β are dimensions of the driver tip;

c) dimension b of the gauge shall not be less than the blade diameter of the driver so that the total effective range is tested;

d) dimension e of the gauge shall not exceed the length l of the driver because the angle β of the driver need only be respected over the length l;

e) M is theoretically a function of the quantities a, f, β and α. In the present case, M of the gauge is set equal to dimension e_{min} of the driver tip;

f) $$c = \frac{0{,}5\,(f_{max} - f_{min})}{\tan\beta} \approx \frac{0{,}025\,4}{0{,}1} = 0{,}254 \text{ mm}.$$

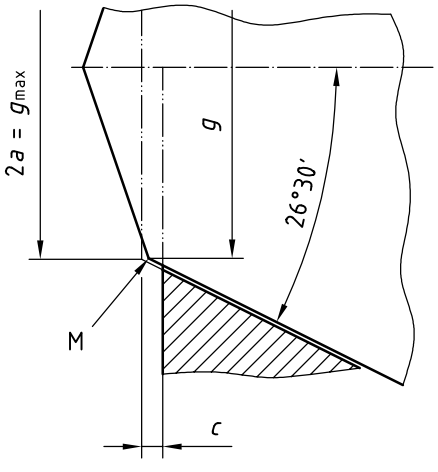


Figure A.1 — Detail of section N-N of Figure 3
(with tip mounted)

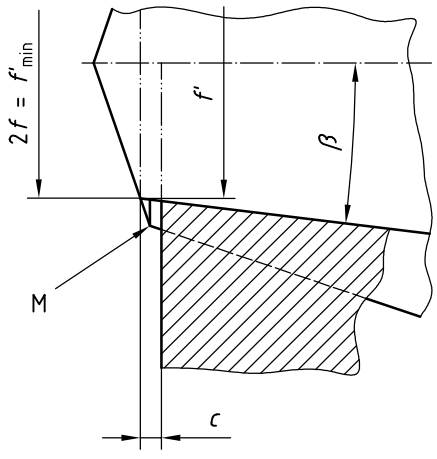


Figure A.2 — Detail of section H-H of Figure 3
(with tip mounted)

Annex B
(informative)

Guide for inspection gauges for form PZ tips

B.1 Scope

This annex describes a “reading guide” for inspection gauges for form PZ tips in accordance with this part of ISO 8764.

B.2 Reading guide of Figure 4

See Figures B.1 to B.17.

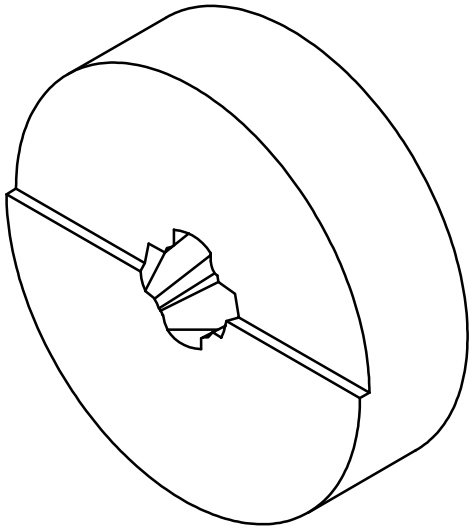


Figure B.1 — Inspection gauge for form PZ tips, perspective view

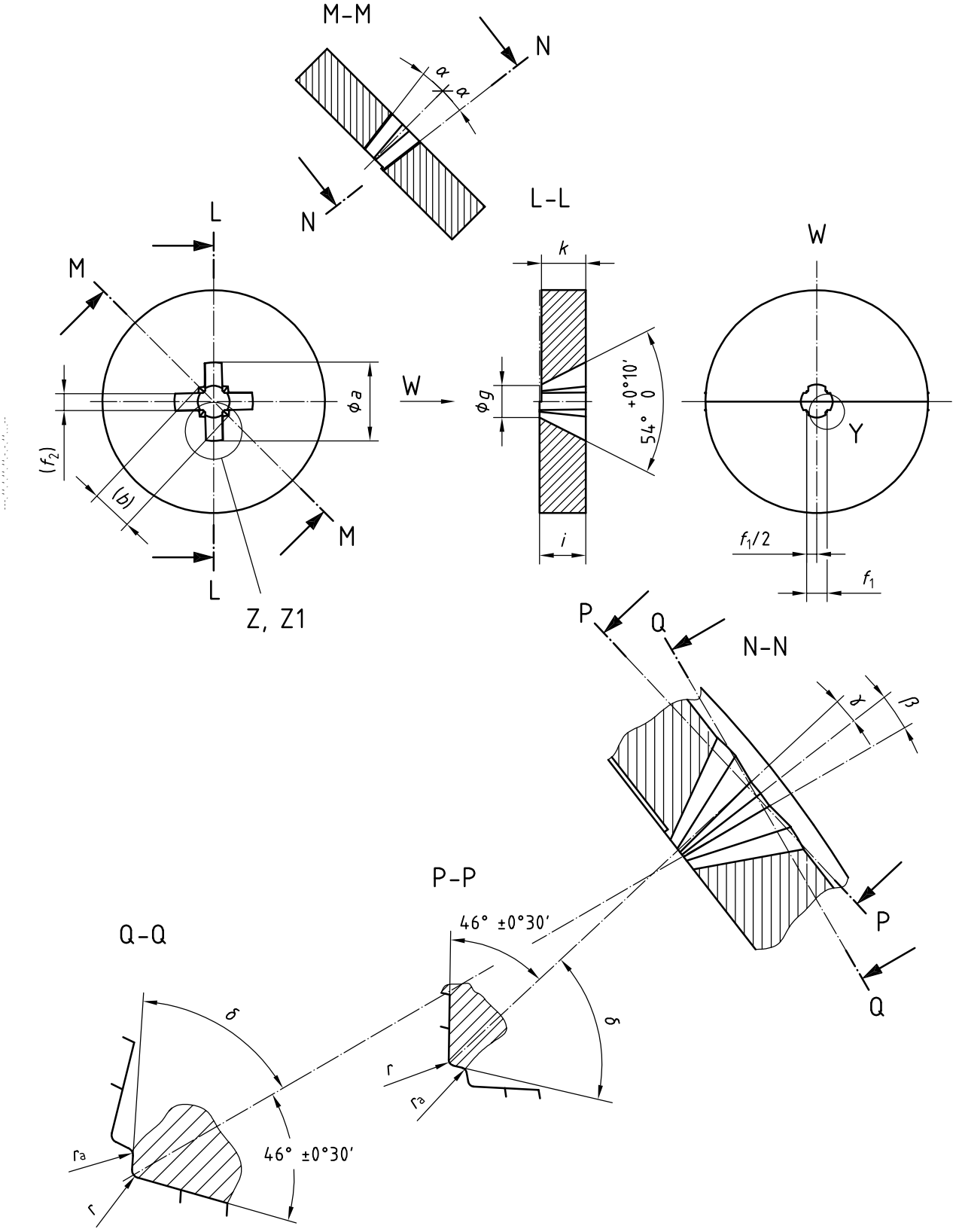


Figure B.2 — Inspection gauge for form PZ tips

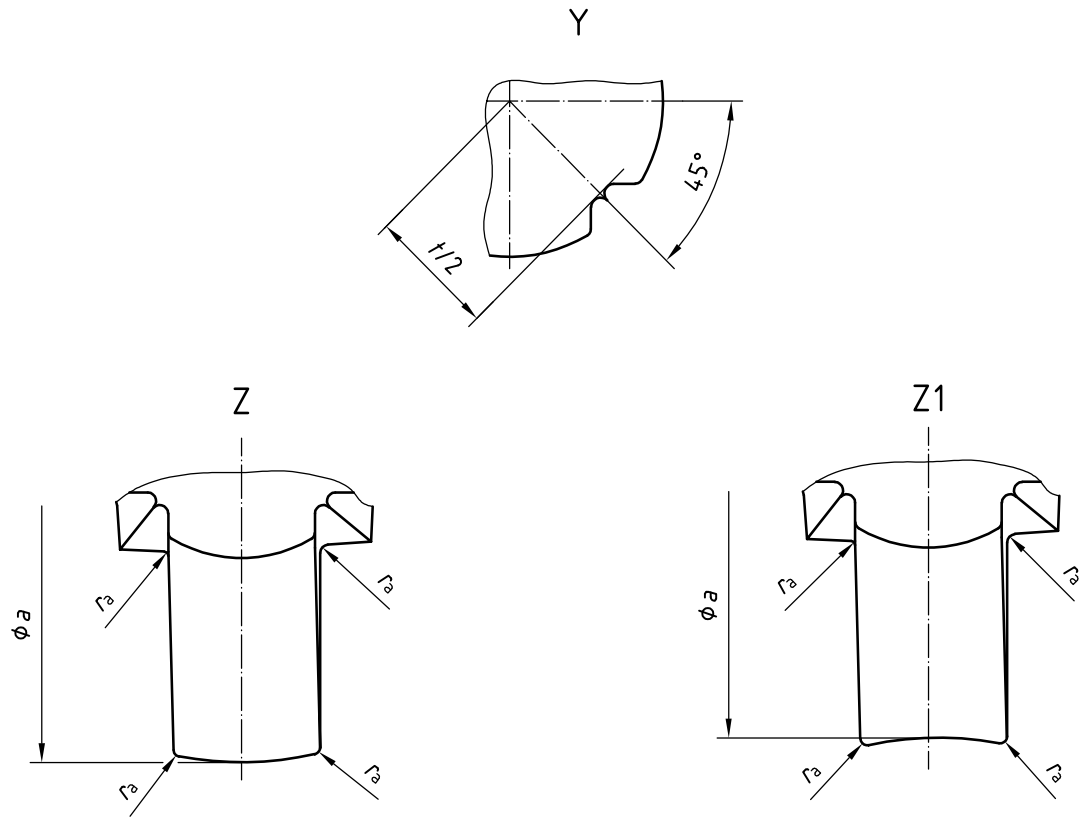
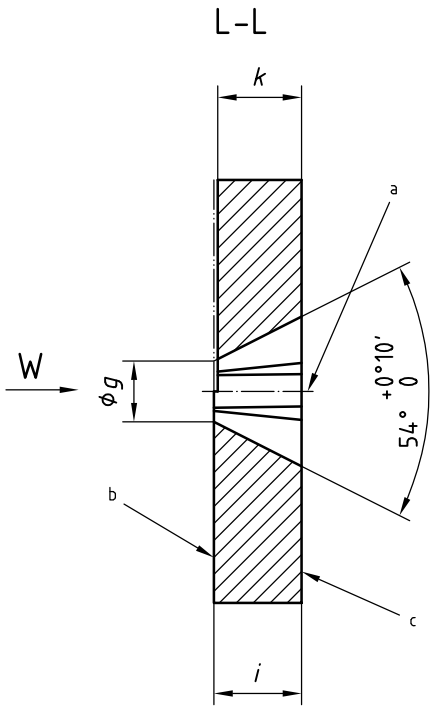


Figure B.2 — Inspection gauge for form PZ tips (*continued*)



a AXEDIAMG.

b FACEPLANG.

c FACEPLANA.

Figure B.3 — View L-L

The gauge consists of a metal sheet, growing narrower over half of its front surface.

The thickness of the flange is i on the thickest half, and k on the thinnest (L-L view).

External and internal face are parallel one with the other, without specific precision definition.

Let FACEPLANG be the plane where diameter g is defined (L-L view), and FACEPLANA the plane where diameter a is defined (front view).

The theoretical penetration axis of the screwdriver is perpendicular to these planes. Let us call this axis AXEDIAMG.

From front view, the gauge recess consists of a repetitious motive.

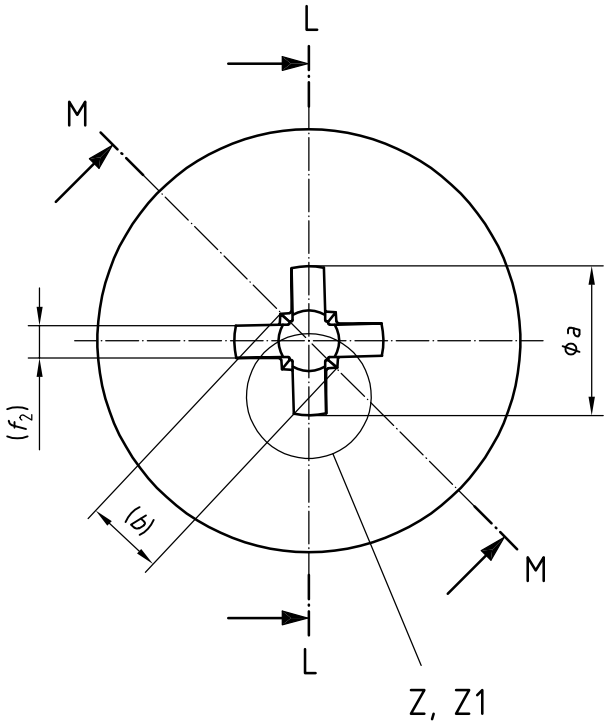


Figure B.4 — Front view

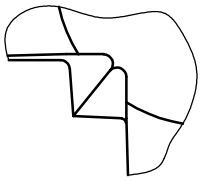


Figure B.5 — Detail of repeated shape

The basic form is defined over a 90° sector, and reproduced three times around the AXEDIAMG axis.

We can design the shape of the hole, to be subtracted from the metal sheet.

The subtracted shape can be described from a cone defined over diameter a and diameter g circles (front and L-L views).

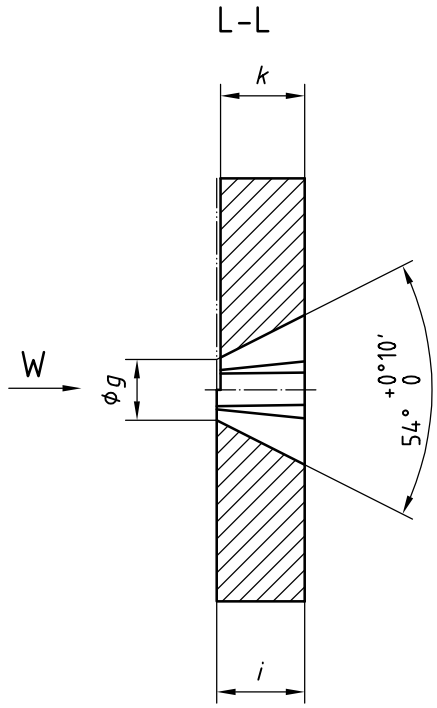


Figure B.6 — View L-L

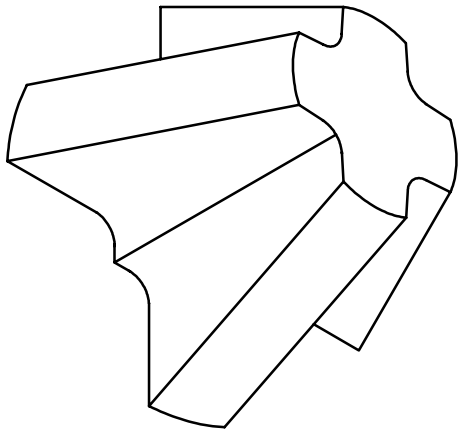


Figure B.7 — Shape to be subtracted

The basic motive could be described with a machining approach: it comes from the subtraction of two prisms from the previously defined cone. Let us describe each prism.

A prism is defined by a section, placed in space, a vector defining the direction and length of the section displacement.

As we deal with material subtraction, we describe here the shape to be subtracted from the initial cone. The prism has to span over upper and lower sides of the metal sheet to avoid every undesirable effect of partial intersection.

The axis of prism sections is described by a double tilting.

Let us start from front view, where we proceed to section M-M.

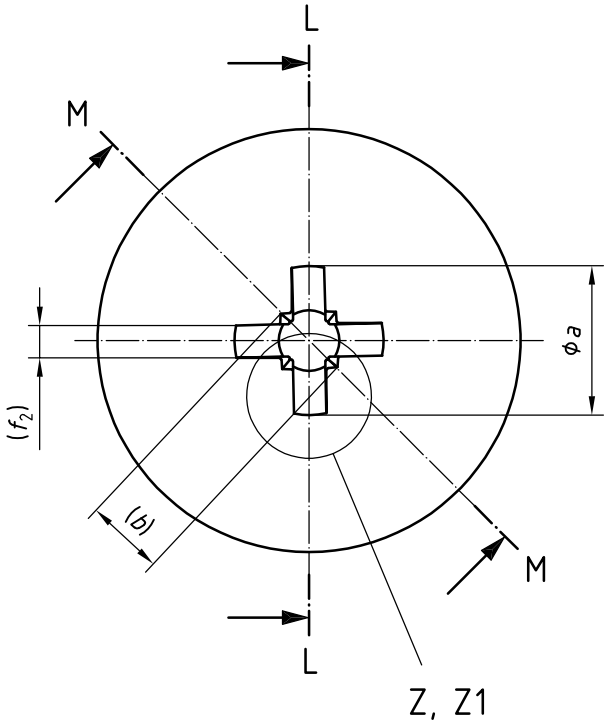


Figure B.8 — Front view

In M-M view, we define a second section plane, at an angle, α, with AXEDIAMG; this second plane is N-N plan.

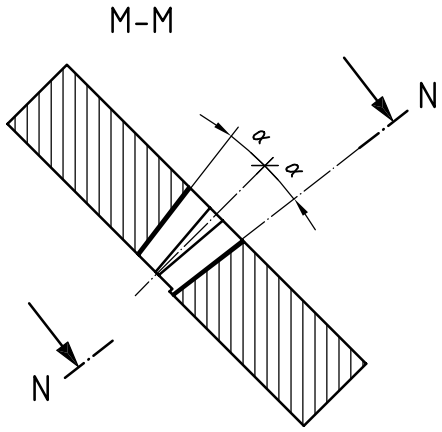


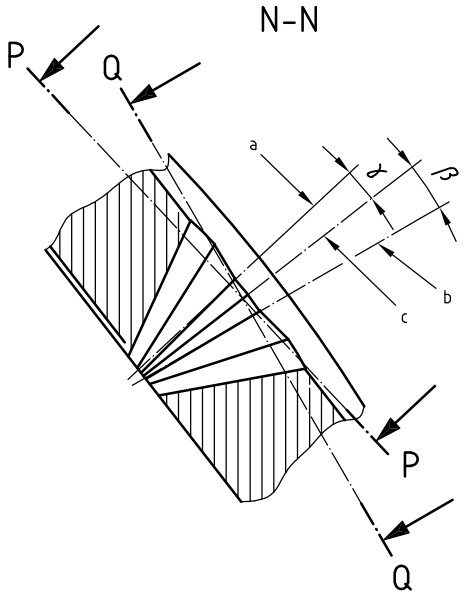
Figure B.9 — View M-M

In the N-N plane section, let us define two lines at angles β and γ with the projection of AXEDIAMG over N-N plane.

We call AXEDIAMPROJNN the projection of AXEDIAMG over N-N;

AXEBETA, the line making an angle of β with AXEDIAMGPROJNN;

AXEGAMMA, the line making an angle of γ with AXEDIAMGPROJNN.

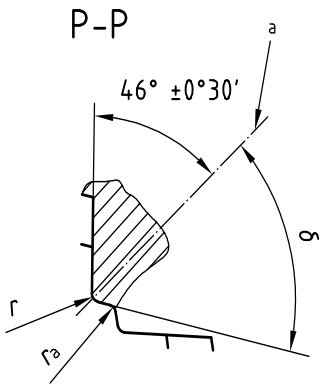


a AXEGAMMA.
b AXEBETA.
c AXEDIAMGPROJNN.

Figure B.10 — View N-N

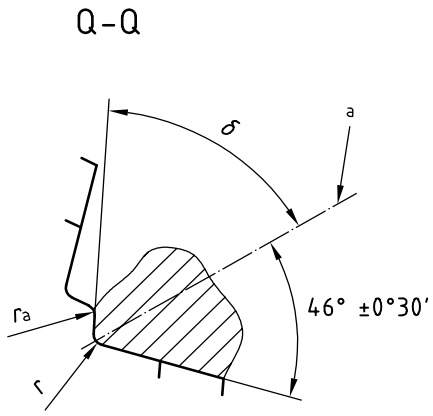
These two lines are the directions of the two prisms. Let P-P be a perpendicular plane to AXEBETA and Q-Q a perpendicular plane to AXEGAMMA.

The section of each prism is defined in planes P-P and Q-Q, respectively (see views from P-P and Q-Q).



a AXEDIAMPRO.

Figure B.11 — View P-P



a AXEDIAMPROJQQ.

Figure B.12 — View Q-Q

(Modification of view P-P: angle 46°)

Let us call PRISMEP the prism constructed over P-P view, and PRISMEQ the prism over Q-Q view. Let us consider the definition of P prism section.

The section basic shape consists of two lines connected by an arc of radius r. Each line has to be sufficiently long to ensure a complete intersection with the cone; the shape out of the cone is of no importance.

The two lines are defined in direction by angles δ and 46° with line AXEDIAMGROJPP (projection of AXEDIAMG on plane P-P).

The intersection of PRISMEP with face FACEAXEG is a tangent to a straight line inclined at 45°, at a distance of t/2 from axis G. This is specified in view Y.

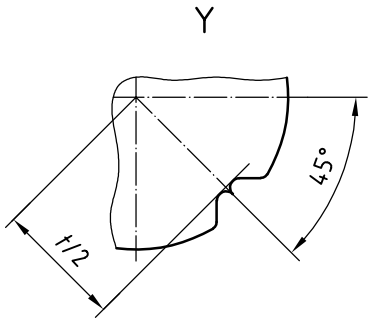


Figure B.13 — View Y

(Modification: the character symmetrical to t is expressed on the plane)

We still need to place the section such that, in view W, the intersection of diameter g circle (defined in view L-L) with the projection of the section over the plane of face FACEPLANG, is at a distance of f_1/2.

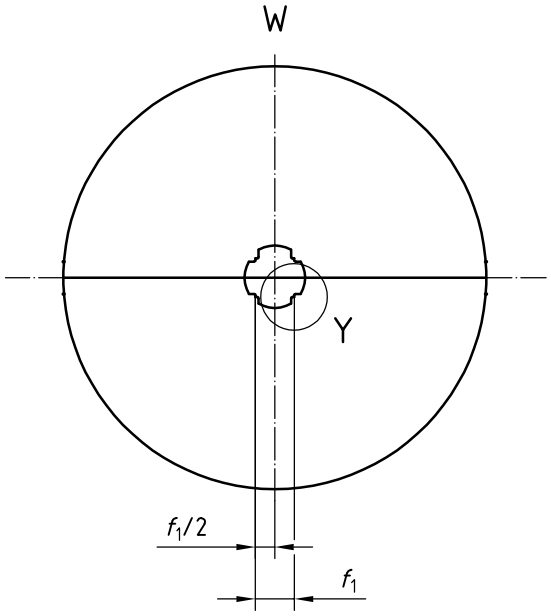


Figure B.14 — View W

(Modification: the character symmetrical to f_1 around the axis is not indicated in the initial document)

The solution has to be found in an iterative approach, by successive positioning.

The same approach is to be applied to the other prism.

The common edge is to be rounded with a radius r_a max. (views P-P and Q-Q).

The view Z specifies some edge rounding. The differences of shapes between views Y and Z are to be noted: arcs of diameters g and a are replaced by straight lines.

(Consequently, shall view Y be modified?)

Sections being defined and in place, we just need to sweep the sections along their respective direction, such that they span over the cone and such that the intersection behaves as if the prism were of infinite length.

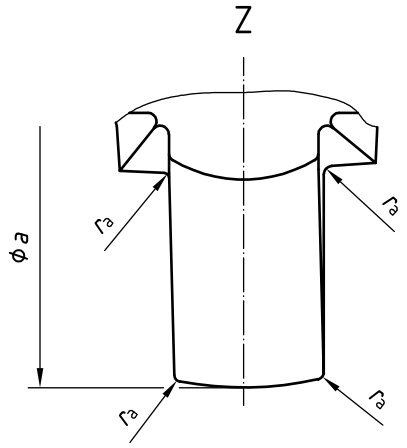


Figure B.15 — View Z

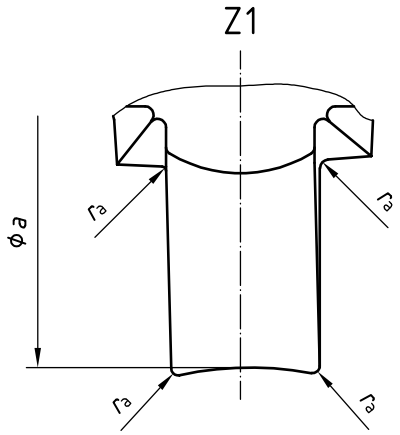


Figure B.16 — View Z1

Remarks:

View Z1 gives a latitude of shape, related to the manufacturing process, permitted for gauges of sizes 1 and 2.

Dimensions b, f_2 and a (front view) are deduced by construction; they may be used to verify a partial conformity of the gauge.

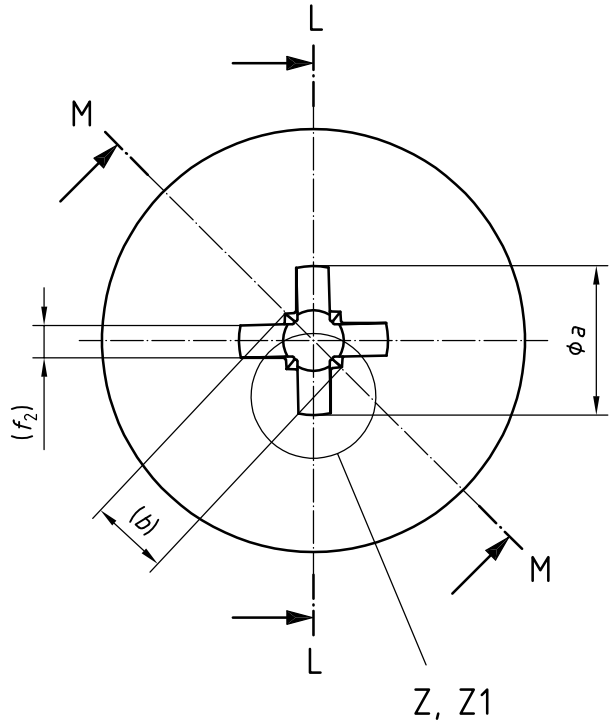


Figure B.17 — Front view

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