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**Assembly tools for screws and nuts —  
Hexagon socket screw keys**

*Outils de manœuvre pour vis et écrous — Clés mâles coudées pour vis à six plans creux*

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 2936 was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 10, *Assembly tools for screws and nuts, pliers and nippers*.

This fifth edition cancels and replaces the fourth edition (ISO 2936:1995), which has been technically revised. In particular:

- Figure 1 has been technically modified;
- three lengths (standard, long and extra-long) for  $l_1$  have been introduced as well as some new dimensions  $s$ ;
- the test method has been revised for which a new Figure 2 and a new Table 2 have been added;
- clause 5 "Designations" has been extended in accordance with the modifications.

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# Assembly tools for screws and nuts — Hexagon socket screw keys

## 1 Scope

This International Standard specifies the dimensions, method of test, designation and marking of hexagon socket screw keys. It also specifies the minimum values of Rockwell hardness that shall be met.

The specifications of this International Standard apply for tightening of hexagon socket screws for property class less than or equal to 12.9 as defined in ISO 898-1 and for tightening of socket set screws as defined in ISO 898-5.

NOTE Hexagon socket screw keys are listed under number 112 in ISO 1703:1983, *Assembly tools for screws and nuts — Nomenclature*.

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## 2 Normative references

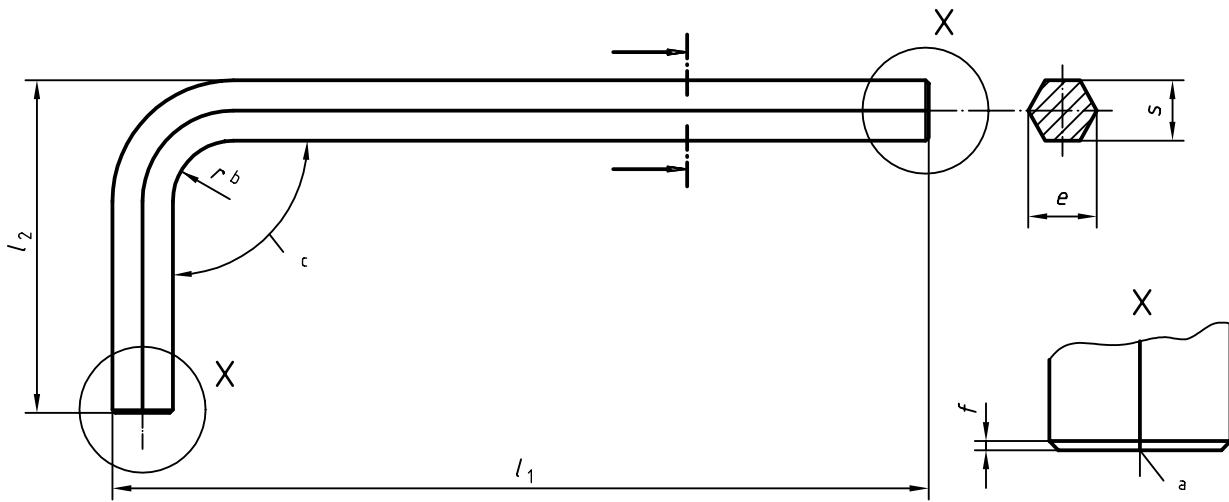
The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs*.

ISO 898-5, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 5: Set screws and similar threaded fasteners not under tensile stresses*.

3 Dimensions

See Figure 1 and Table 1.



a The corners may be sharp, rounded or chamfered and the radius of curvature or the chamfer  $f$  respectively shall not be greater than half the difference between width across corners  $e$  and width across flats  $s$

$$f_{\max} = \frac{e_{\max} - s_{\min}}{2}$$

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Each end shall be square with the axis of each arm within  $\pm 1^\circ$ .

b  $r$  shall not be smaller than 1,5 mm,  $r \geq s$

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c  $90^\circ \begin{smallmatrix} +2^\circ \\ -1^\circ \end{smallmatrix}$  for width across flats  $\leq 17$  mm

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$90^\circ \begin{smallmatrix} +3^\circ \\ -1^\circ \end{smallmatrix}$  for width across flats  $> 17$  mm

Figure 1 — Hexagon socket screw key

Table 1 — Dimensions

Dimensions in millimetres

Width across flats			Width across corners						
$s$			$e^a$		$l_1$			$l_2$	
nom.	max.	min.	max.	min.	Standard	Long	Extra-long	Limit deviations	Limit deviations
0,7	0,71	0,70	0,79	0,76	33	—	—	0 -2	7
0,9	0,89	0,88	0,99	0,96	33	—	—		11
1,3	1,27	1,24	1,42	1,37	41	63,5	81		13
1,5	1,50	1,48	1,68	1,63 <sup>b</sup>	46,5	63,5	91,5		15,5
2	2,00	1,96	2,25	2,18 <sup>c</sup>	52	77	102		18
2,5	2,50	2,46	2,82	2,75 <sup>c</sup>	58,5	87,5	114,5	0 -4	20,5
3	3,00	2,96	3,39	3,31 <sup>c</sup>	66	93	129		23
3,5	3,50	3,45	3,96	3,91	69,5	98,5	140		25,5
4	4,00	3,95	4,53	4,44 <sup>c</sup>	74	104	144		29
4,5	4,50	4,45	5,10	5,04	80	114,5	156		30,5
5	5,00	4,95	5,67 <sup>d</sup>	5,58 <sup>d</sup>	85	120	165		33
6	6,00	5,95	6,81	6,71 <sup>d</sup>	96	141	186		38
7	7,00	6,94	7,94	7,85	102	147	197		41
8	8,00	7,94	9,09	8,97	108	158	208		44
9	9,00	8,94	10,23	10,10	114	169	219		47
10	10,00	9,94	11,37	11,23	122	180	234	50	
11	11,00	10,89	12,51	12,31	129	191	247	53	
12	12,00	11,89	13,65	13,44	137	202	262	57	
13	13,00	12,89	14,79	14,56	145	213	277	0 -6	63
14	14,00	13,89	15,93	15,70	154	229	294		70
15	15,00	14,89	17,07	16,83	161	240	307		73
16	16,00	15,89	18,21	17,97	168	240	307		76
17	17,00	16,89	19,35	19,09	177	262	337		80
18	18,00	17,89	20,49	20,21	188	262	358		84
19	19,00	18,87	21,63	21,32	199	—	—		89
21	21,00	20,87	23,91	23,58	211	—	—	96	
22	22,00	21,87	25,05	24,71	222	—	—	102	
23	23,00	22,87	26,16	25,86	233	—	—	108	
24	24,00	23,87	27,33	26,97	248	—	—	114	
27	27,00	26,87	30,75	30,36	277	—	—	127	
29	29,00	28,87	33,03	32,59	311	—	—	141	

Table 1 (continued)

Width across flats <i>s</i>			Width across corners <i>e<sup>a</sup></i>		<i>l<sub>1</sub></i>			Limit deviations	<i>l<sub>2</sub></i>	
nom.	max.	min.	max.	min.	Standard	Long	Extra-long		Limit deviations	
30	30,00	29,87	34,17	33,75	315	—	—	0 -12		142
32	32,00	31,84	36,45	35,98	347	—	—		157	
36	36,00	35,84	41,01	40,50	391	—	—		176	
<p>a <math>e_{\max} = 1,14 s_{\max} - 0,03</math> (from <math>1,5 \leq s \leq 36</math>)  <math>e_{\max} = 1,13 s_{\max}</math> (from <math>8 \leq s \leq 36</math>)</p> <p>b <math>e_{\max} = 1,13 s_{\min} - 0,04</math></p> <p>c <math>e_{\min} = 1,13 s_{\min} - 0,03</math></p> <p>d <math>e_{\min} = 1,13 s_{\min} - 0,02</math></p>										

4 Method of test

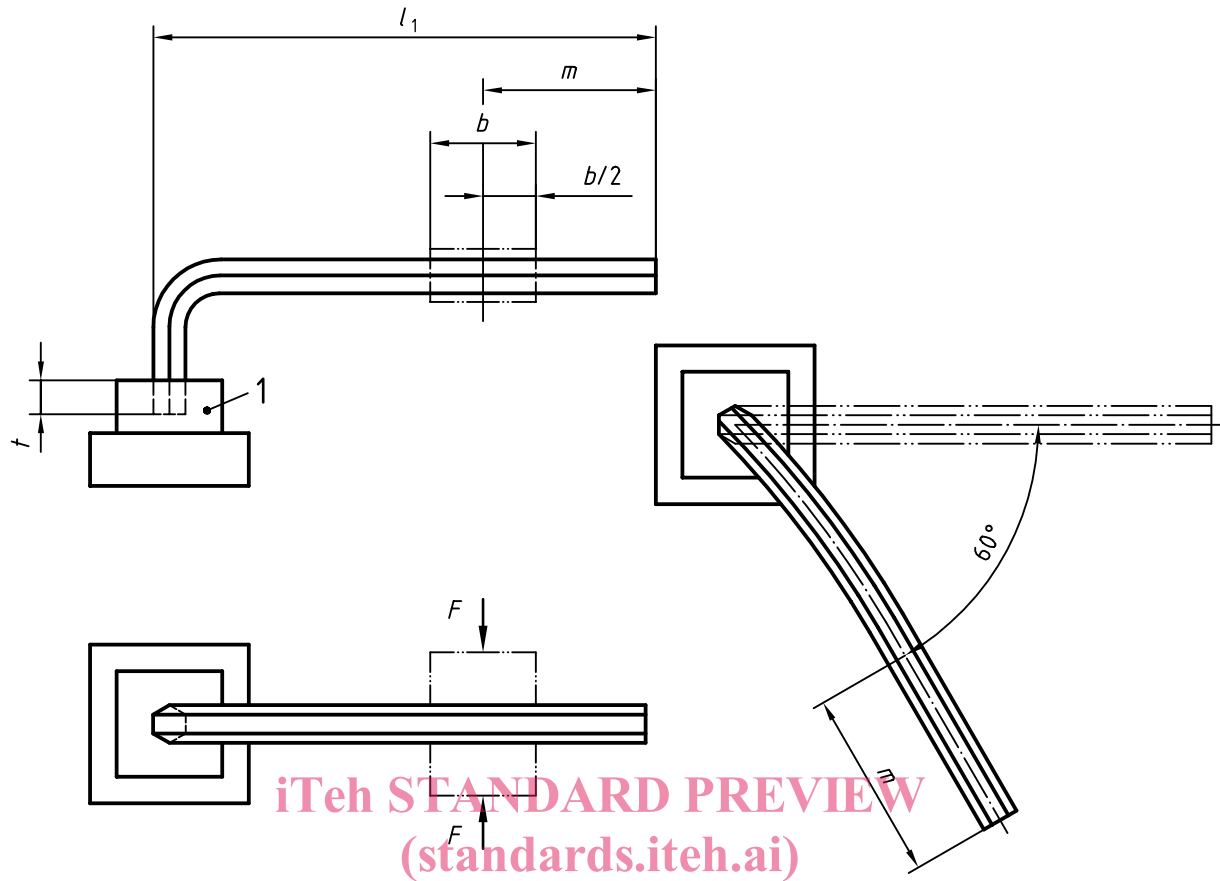
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Insert the short arm of the key into a female hexagon socket adapter having a Rockwell hardness as given in Table 3. Smoothly apply an increasing load at a distance *m* from the end of the long arm of the key (where  $m = l_1/3$ , with a tolerance of  $\pm 2$  mm) until the proof torque is reached. It shall be ensured throughout the whole test procedure that the friction lock contact with the tool surface is maintained over the total area of the force-initiating contact area *b* as given in Table 2. The load shall be applied perpendicular to the axis of the key and the torque is calculated as the product of the applied load and the distance between the point of application of the load and the axis of the adapter. Test values are given in Table 3.

Following the application of the minimum test torque, any possible damage or deformation shall not affect the usability of the key.

For a key with a width across the flats of up to and including 14 mm the hexagon socket screw key shall show a total deformation, to torsion fracture, of at least 60° under load and a permanent deformation before failure.





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**Key**

- 1 Female hexagon socket adapter

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**Figure 2 — Test configuration**

**Table 2 — Test dimensions for force-initiating contact area**

Dimensions in millimetres

Width across flats $s$ nom.	Force-initiating contact area $b$ $\pm 1$
$0,7 \leq s \leq 5$	10
$5 < s \leq 17$	20
$s > 17$	50