
**Assembly tools for screws and nuts —
Technical specifications —**

Part 1:

Hand-operated wrenches and sockets

Outils de manœuvre pour vis et écrous — Spécifications techniques —

Partie 1: Clés de serrage et douilles à main

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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.

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

ISO 1711-1 was prepared by Technical Committee ISO/TC 29, *Small tools*, Subcommittee SC 10, *Assembly tools for screws and nuts, pliers and nippers*.

This second edition cancels and replaces the first edition (ISO 1711-1:1996), which has been technically revised.

ISO 1711 consists of the following parts, under the general title *Assembly tools for screws and nuts — Technical specifications*:

- *Part 1: Hand-operated wrenches and sockets*
- *Part 2: Machine-operated sockets ("impact")*

Assembly tools for screws and nuts — Technical specifications —

Part 1: Hand-operated wrenches and sockets

1 Scope

This part of ISO 1711 specifies minimum values for Rockwell hardness and torsional strength for hand-operated wrenches and sockets.

It covers the following three series of torsion torques.

— Series A: usual box wrenches and socket wrenches

EXAMPLE Reference nos. 1 1 02 01 0; 1 1 02 02 0 and 1 1 02 02 1; 1 1 02 03 0; 1 1 02 04 0; 1 1 02 05 0; 1 1 02 06 0; 1 1 02 09 0; 1 1 02 10 0; 1 1 02 11 0; 1 1 02 12 0; 1 1 02 13 0 and 1 1 02 13 1; 1 1 02 14 0; 1 1 02 15 0; 1 1 08 01 0; 1 1 08 02 0.

— Series C: open end wrenches

EXAMPLE Reference nos. 1 1 01 01 0; 1 1 01 01 1; 1 1 01 02 0; 1 1 01 03 0; 1 1 01 04 0.

— Series E: hand-operated square drive sockets

EXAMPLE Reference nos. 2 1 02 01 0 and 2 1 02 01 1.

NOTE The wrenches and sockets mentioned above are listed under their respective reference numbers in ISO 1703.

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 6508 (all parts), *Metallic materials — Rockwell hardness test*

3 Test torsion torques

The empiric formulae giving minimum test torsion torques, M , in newton metres, as a function of width across flats, s , in millimetres, are given for information in Table 1.

The minimum test torsion torques to be applied are given in Table 3.

Table 1 — Formulae giving minimum test torsion torques

Series				Minimum test torsion torque M N · m
A				$0,265 7 s^{2,34}$
C	Width across flats, s	mm	≤ 36	$0,039 2 s^{2,8}$
			> 36	$0,686 5 s^2$
E	Nominal dimension for driving square	mm	6,3	$0,980 7 s^{1,7}$
			10	$0,350 7 s^{2,34}$ ^a
			12,5	$1,471 s^2$
			20	$2,451 7 s^{1,7}$
			25	$46,581 6 s$
^a Test torque M applicable to Series A multiplied by the coefficient 1,32.				

4 Hardness testing

The hardness test shall be carried out in accordance with ISO 6508.

Minimum Rockwell hardness values are given in Table 2.

Table 2 — Minimum Rockwell hardness values for wrenches and sockets

Width across flats s mm	Minimum hardness	
	Alloy steel open end and double head wrenches ^a	All other wrenches or sockets
$s \leq 34$	42 HRC	39 HRC
$34 < s \leq 70$	39 HRC	35 HRC
^a For carbon steel open end wrenches, the hardness value shall be 36 HRC.		

5 Torque testing

5.1 General

For combined wrenches (for example, reference nos. 1 1 01 05 0 and 1 1 01 06 0), the box wrench side shall be tested in accordance with Table 3, Series A, and the open end wrench side shall to be tested in accordance with Table 3, Series C.

5.2 Method

The wrench or the socket shall be fully engaged in a hexagon test mandrel as shown in Figure 1. The height, h , and the width across corners, e_{\min} , of the mandrel are specified in Table 3.

Smoothly apply the load until the minimum testing torque as given in Table 3 is reached.

The nominal across-flats dimension of the test mandrel shall be equal to the nominal dimension, s , with a tolerance of $h8$. The mandrel shall be hardened to not less than hardness 55 HRC.

A device in which the mandrel can be rotated at a certain torque determined with an accuracy of $\pm 2,5\%$ may also be used for this test.

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

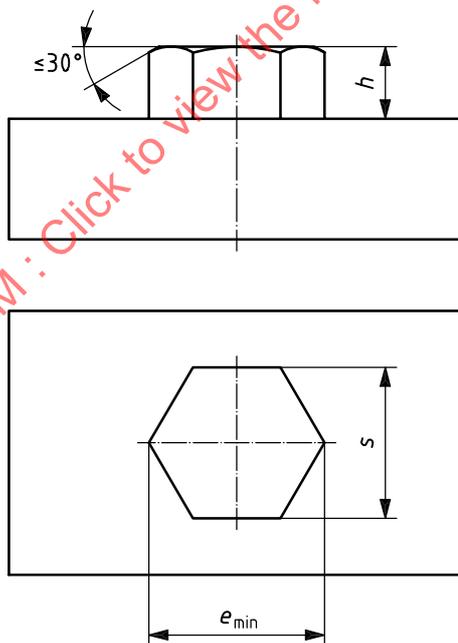


Figure 1 — Test mandrel height, width across flats and width across corners

5.3 Test of box wrenches or open jaw wrenches

Apply the load as far along the shaft of the wrench as possible, perpendicular to its longitudinal axis. Use an extension tube when testing large wrenches.

Load the wrench once in each direction during the test.

For open jaw wrenches, the head shall remain perpendicular to the mandrel axis during the test. For box wrenches, the axis of the head shall remain perpendicular to the mandrel axis during the test.

5.4 Test of socket wrenches

Apply the load as far along the shaft of the wrench as possible, perpendicular to its longitudinal axis. Use an appropriate test device that will safely test large wrenches.

The axis of the socket wrenches and the axis of the mandrel shall remain coaxial during the test.

5.5 Test of hand-operated square drive sockets

A square mandrel of hardness not less than 55 HRC shall be used for driving the socket. The nominal across-flats dimension of this mandrel shall be equal to the maximum dimension, with a tolerance of h8, of the corresponding driving square.

The axes of the two mandrels and the axis of the socket shall remain coaxial during the test.

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Table 3 — Minimum test torsion torques and test mandrel height as function of width across flats

Nominal width across flats ^a <i>s</i> mm	Minimum test torsion torque, <i>M</i> N · m							Test mandrel	
	Series							Height <i>h</i> h13 mm	Width across corners ^e <i>e</i> _{min.} mm
	A	C	E						
			Driving square nominal dimension ^b mm						
			6,3	10	12,5	20	25		
3,2	4,04	1,02	7,08	—	—	—	—	1,3	3,62
4	6,81	1,9	10,4	—	—	—	—	1,6	4,52
5	11,5	3,55	15,1	—	—	—	—	2	5,65
5,5	14,4	4,64	17,8	—	—	—	—	2,4	6,22
7	25,2	9,12	26,8	33,2	—	—	—	3,2	7,91
8	34,5	13,3	33,6	45,5	94	—	—	4	9,04
10	58,1	24,8	49,1	76,7	147	—	—	4,8	11,30
11	72,7	32,3	57,8	96	178	—	—	5,6	12,43
13	107	51,6	68,6 ^c	141	249	—	—	6,4	14,69
15	150	77	68,6 ^c	198	331	—	—	7,4	16,95
16	175	92,3	68,6 ^c	225 ^c	377	—	—	8	18,08
18	230	128	—	225 ^c	477	—	—	9,6	20,34
21	330	198	—	225 ^c	569	569 ^d	—	11,2	23,73
24	451	287	—	225 ^c	569 ^c	569 ^d	—	12,8	27,12
27	594	399	—	—	569 ^c	665	—	14,4	30,51
30	760	536	—	—	569 ^c	795	—	16	33,90
34	1 019	761	—	—	569 ^c	984	—	17,6	38,42
36	1 165	894	—	—	—	1 084	—	19,2	40,68
41	1 579	1 154	—	—	—	1 353	1 910	21,6	46,33
46	2 067	1 453	—	—	—	1 569 ^c	2 143	24	51,98
50	2 512	1 716	—	—	—	1 569 ^c	2 329	26,4	56,50
55	3 140	2 077	—	—	—	1 569 ^c	2 562	28,8	62,15
60	3 849	2 471	—	—	—	1 569 ^c	2 795 ^c	31,2	67,80
65	4 021	2 900	—	—	—	—	2 795 ^c	33,5	73,45
70	4 658	3 364	—	—	—	—	2 795 ^c	36	79,10

^a According to ISO 272.

^b For dimensions of driving squares, see ISO 1174-1.

^c Value of test torque voluntarily limited. Driving squares have lower strengths than sockets of the same steel grade.

^d Value greater than that which might have been obtained by computation, nevertheless adopted as it would be abnormal for the strength of sockets with driving squares of 20 mm to be lower than the strength of sockets with driving squares of 12,5 mm.

^e $e_{\text{min.}} = s_{\text{nom}} \times 1,13$.