

INTERNATIONAL  
STANDARD

**ISO**  
**1711-1**

First edition  
1996-12-01

---

---

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

**Part 1:** **STANDARD PREVIEW**

**(standards.iteh.ai)** Hand-operated wrenches and sockets

ISO 1711-1:1996

<https://standards.iteh.ai/catalog/standards/sist/8d9bd712-ed81-4ca9-ab16-6e476cf5a4b3/iso-1711-1-1996>  
*Outils de manœuvre pour vis et écrous — Spécifications techniques —  
Partie 1: Clés de serrage et douilles à main*



Reference number  
ISO 1711-1:1996(E)

## 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 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 first edition of ISO 1711-1 cancels and replaces ISO 1711:1975, which has been technically revised.

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

— *Part 1: Hand-operated wrenches and sockets*

“*Machine-operated sockets*” will be covered in a future part 2.

Annex A of this part of ISO 1711 is for information only.

© ISO 1996

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization

Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

# 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 which should be satisfied by hand operated wrenches and sockets.

It covers three series of torsion torques, namely:

- series A: usual ring wrenches and socket wrenches (examples: wrenches Nos. 5 – 6 – 8 – 9 – 10 – 11 – 15 – 16 – 17 – 18 – 19 – 20 – 21 – 26 – 27);
- series C: alloy steel open jaw wrenches (examples: wrenches Nos. 1 – 4);
- series E: hand-operated square drive sockets (example: socket No. 24).

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

### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 1711. 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 1711 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 1174-1:1996, *Assembly tools for screws and nuts — Driving squares — Part 1: Driving squares for hand socket tools*.

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

### 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<br>$M$<br>N·m |                      |
|---|--|----|---|----------------------|
| A   |  |    | $0,265 7 s^{2,34}$                        |                      |
| C   | Widths across flats<br>$s$                 | mm | $\leq 36$                                 | $0,039 2 s^{2,8}$    |
|   |  |    | $> 36$                                    | $0,686 5 s^2$        |
| E   | Nominal<br>dimension<br>for driving square | mm | 6,3                                       | $0,980 7 s^{1,7}$    |
|   |  |    | 10  | $0,350 7 s^{2,34} *$ |
|   |  |    | 12,5                                      | $1,471 s^2$          |
|   |  |    | 20  | $2,451 7 s^{1,7}$    |
|   |  |    | 25  | $46,581 6 s$         |
| *) 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<br>$s$<br>mm   | Minimum hardness<br>for alloy steel open jaw and<br>double head wrenches <sup>1)</sup> |        | for all other wrenches<br>or sockets |
|---|--|--------|--------------------------------------|
|   | $s \leq 32$  | 42 HRC |                                      |
| $32 < s \leq 60$  | 39 HRC   |        | 35 HRC                               |
| 1) For carbon steel open jaw wrenches the hardness value shall be 36 HRC. |  |        |                                      |

#### 5 Torque testing

##### 5.1 Method

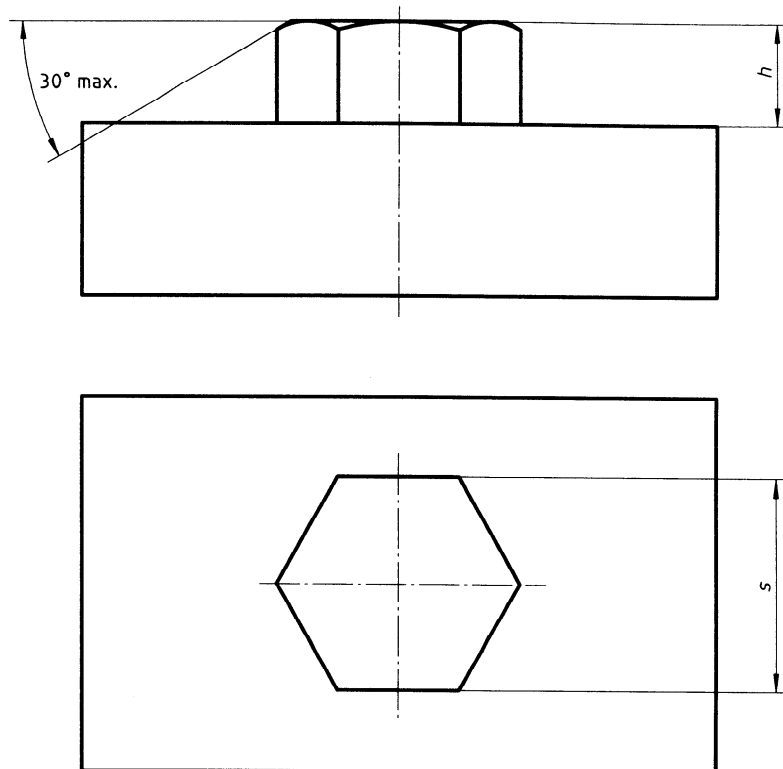
The wrench or the socket shall be fully engaged in a hexagon test mandrel as shown in figure 1. The height  $h$  of the mandrel is specified in table 3.

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  $h/8$ . 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 and width across flats**  
 (standards.iteh.ai)

ISO 1711-1:1996

## 5.2 Test of hexagonal 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 hexagon wrenches, the axis of the head shall remain perpendicular to the mandrel axis during the test.

## 5.3 Test of socket 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.

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

## 5.4 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.

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

| Width<br>across<br>flats<br><i>s</i><br><br>mm | Minimum test torsion torque<br><i>M</i><br>N·m |       |  |                   |                   |                     |       | Test<br>mandrel<br>height<br><i>h</i><br><br>mm<br>h13 |
|--|--|-------|--|-------------------|-------------------|---------------------|-------|--|
|  | Series   |       |  |                   |                   |                     |       |  |
|  | A  | C     | E  |                   |                   |                     |       |  |
|  |  |       | Nominal dimensions of the driving square <sup>1)</sup><br>mm |                   |                   |                     |       |  |
|  |  | 6,3   | 10   | 12,5              | 20                | 25                  |       |  |
| 3,2  | 4,04   | 1,02  | 7,08   | —                 | —                 | —                   | —     | 1,3  |
| 4  | 6,81   | 1,9   | 10,4   | —                 | —                 | —                   | —     | 1,6  |
| 5  | 11,5   | 3,55  | 15,1   | —                 | —                 | —                   | —     | 2  |
| 5,5  | 14,4   | 4,64  | 17,8   | —                 | —                 | —                   | —     | 2,4  |
| 6  | 17,6   | 5,92  | 20,6   | —                 | —                 | —                   | —     | 2,8  |
| 7  | 25,2   | 9,12  | 26,8   | 33,2              | —                 | —                   | —     | 3,2  |
| 8  | 34,5   | 13,3  | 33,6   | 45,5              | —                 | —                   | —     | 4  |
| 9  | 45,4   | 18,4  | 41,1   | 59,9              | —                 | —                   | —     | 4,4  |
| 10   | 58,1   | 24,8  | 49,1   | 76,7              | 147               | —                   | —     | 4,8  |
| 11   | 72,7   | 32,3  | 57,8   | 96                | 178               | —                   | —     | 5,6  |
| 12   | 89,1   | 41,2  | 67   | 118               | 212               | —                   | —     | 6  |
| 13   | 107  | 51,6  | 68,6 <sup>2)</sup>   | 141               | 249               | —                   | —     | 6,4  |
| 14   | 128  | 63,5  | 68,6 <sup>2)</sup>   | 169               | 288               | —                   | —     | 7  |
| 15   | 150  | 77    | —  | 198               | 331               | —                   | —     | 7,4  |
| 16   | 175  | 92,3  | —  | 225 <sup>2)</sup> | 377               | —                   | —     | 8  |
| 17   | 201  | 107   | —  | 225 <sup>2)</sup> | 425               | —                   | —     | 8,8  |
| 18   | 230  | 128   | —  | 225 <sup>2)</sup> | 477               | —                   | —     | 9,6  |
| 19   | 261  | 149   | —  | 225 <sup>2)</sup> | 531               | —                   | —     | 10,2   |
| 21   | 330  | 198   | —  | 225 <sup>2)</sup> | 569               | —                   | —     | 11,2   |
| 22   | 368  | 225   | —  | 225 <sup>2)</sup> | 569 <sup>2)</sup> | 569 <sup>3)</sup>   | —     | 11,8   |
| 24   | 451  | 287   | —  | —                 | 569 <sup>2)</sup> | 569 <sup>3)</sup>   | —     | 12,8   |
| 27   | 594  | 399   | —  | —                 | 569 <sup>2)</sup> | 665                 | —     | 14,4   |
| 30   | 760  | 536   | —  | —                 | 569 <sup>2)</sup> | 795                 | —     | 16   |
| 32   | 884  | 643   | —  | —                 | 569 <sup>2)</sup> | 888                 | —     | 16,8   |
| 34   | 1 019  | 761   | —  | —                 | 569 <sup>2)</sup> | 984                 | —     | 17,6   |
| 36   | 1 165  | 894   | —  | —                 | —                 | 1 084               | —     | 19,2   |
| 41   | 1 579  | 1 154 | —  | —                 | —                 | 1 353               | —     | 21,6   |
| 46   | 2 067  | 1 453 | —  | —                 | —                 | 1 569 <sup>2)</sup> | 2 143 | 24   |
| 50   | 2 512  | 1 716 | —  | —                 | —                 | 1 569 <sup>2)</sup> | 2 329 | 26,4   |
| 55   | 3 140  | 2 077 | —  | —                 | —                 | —                   | 2 562 | 28,8   |
| 60   | 3 849  | 2 471 | —  | —                 | —                 | —                   | 2 795 | 31,2   |

1) For dimensions of driving squares, see ISO 1174-1.  
 2) The value of the test torque has been voluntarily limited. Driving squares have lower strengths than the sockets for the same steel grade.  
 3) This value is greater than that which might have been obtained by computation. They were 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.

**Annex A**  
(informative)

**Bibliography**

- [1] ISO 1703:1983, *Assembly tools for screws and nuts — Nomenclature*.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

ISO 1711-1:1996

<https://standards.iteh.ai/catalog/standards/sist/8dbbd712-ed81-4ca9-ab16-6e476cf5a4b3/iso-1711-1-1996>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

ISO 1711-1:1996

<https://standards.iteh.ai/catalog/standards/sist/8dbbd712-ed81-4ca9-ab16-6e476cf5a4b3/iso-1711-1-1996>

---

---

**ICS 25.140.30**

**Descriptors:** tools, hand-operated devices, assembly tools, wrenches, socket wrenches, specifications, dimensions, tests, hardness tests, torsion tests, determination, mechanical strength.

Price based on 5 pages

---

---