International Standard 6789

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Assembly tools for screws and nuts — Torque wrenches — Torque ranges and tolerances

Outils de manœuvre pour vis et écrous — Clés dynamométriques — Gammes de couples et tolérances

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6789 was developed by Technical Committee ISO/TC 29, *Small tools,* and was circulated to the member bodies in May 1980.

It has been approved by the member bodies of the following countries:

Belgium	Israel	South Africa, Rep. of
China	Italy	Spain
France	Korea, Rep. of	Sweden
Germany, F.R.	Netherlands	United Kingdom
Hungary	Poland	USSR
India	Romania	

The member bodies of the following countries expressed disapproval of the document on technical grounds:

Australia
Japan
USA

Printed in Switzerland

Assembly tools for screws and nuts — Torque wrenches — Torque ranges and tolerances

1 Scope and field of application

This International Standard specifies torque range as a function of the driving squares and the corresponding torque range tolerances for torque wrenches of the deflecting beam type and torque setting type, listed numbers 258 and 259 in ISO 1703.

Driving squares are in accordance with ISO 1174.

2 References

ISO 1174, *Assembly tools for bolts and screws — Driving squares for power socket wrenches and hand socket wrenches.*

ISO 1703, *Assembly tools for screws and nuts — Nomenclature.*

3 Torque loads applicable to each square drive size

Individual torque wrenches, up to the maximum value for each square drive size, can have their own specific range. It is recommended that the minimum tightening torque value for a wrench should not be less than 20 % of its maximum capacity.

Square drive nominal size mm	**Maximum value of torque load** N·m
6,3	25
10	100
12,5	315
20	1 000
25	2 500

4 Tolerances for the torques of wrenches

The tolerances $\pm\ Y$ are fixed as a function of the chosen set value.

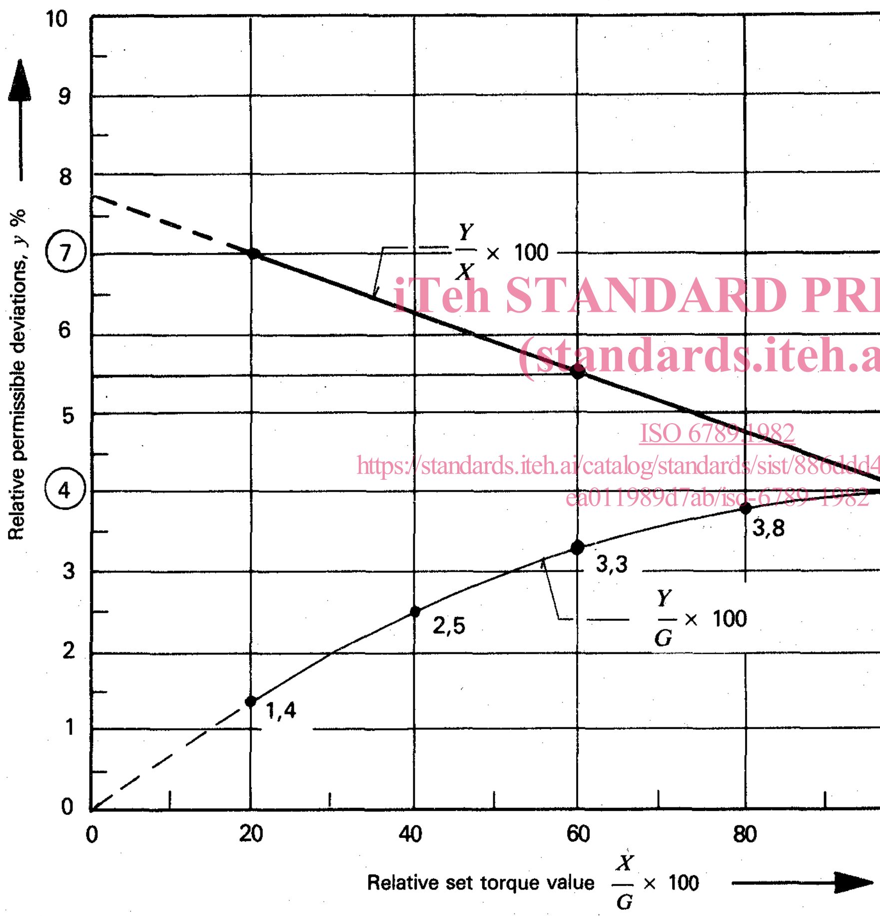
Each torque setting of the wrenches shall have a tolerance in accordance with the following values.

For the maximum torque value of the wrench the tolerance shall be ± 4 %.

For the torque value of 20 % of maximum capacity of the wrench, the tolerance shall be ± 7 %.

Torque values between the minimum and maximum shall have tolerances in accordance with the values given in the figure.

NOTE — The tolerance ± 7 % of the set torque value on the recommended minimum 20 % capacity torque corresponds to ± 1,4 % of the wrench maximum capacity.



NOTE — Formulae for the curves in the figure :

$$\frac{Y}{X} \times 100 = 7{,}75 - \frac{3{,}75}{10^2} \times \left(\frac{X}{G} \times 100\right)$$

$$\frac{Y}{G} \times 100 = \frac{7{,}75}{10^2} \times \left(\frac{X}{G} \times 100\right) - \frac{3{,}75}{10^4}\left(\frac{X}{G} \times 100\right)^2$$

Y = Permitted deviation of the respective set value X in newtons metres;

X = Set torque value (measured torque) in newtons metres;

G = Maximum capacity of the torque wrench, in newtons metres;

$y\ \% = \frac{Y}{X} \times 100$ = Relative permissible deviations (with respect to measurement)

Basic formula for calculating the relative permissible deviations :

$$y\ \% = 7{,}75 - \left(3{,}75 \times \frac{X}{G}\right)$$

Figure — Relative permissible deviations of the respective values of torque load

Example :

For a torque wrench with a maximum capacity $G = 200$ N·m :

a) the maximum value of X is 200 N·m, hence

$y = \pm 4$ % and

$$Y = \pm \frac{4}{100} \times 200 = \pm 8 \text{ N·m}$$

b) the minimum value of X is $\frac{20}{100} G = 40$ N·m, hence

$y = \pm 7$ % and

$$Y = \pm \frac{7}{100} \times 40 = \pm 2{,}8 \text{ N·m (which is } \pm 1{,}4 \text{ \% of } G)$$

c) a value of 120 N·m for X

— by application of the figure (with a relative torque value $\frac{120}{200} \times 100 = 60$ %) gives

$y = \pm 5{,}5$ % and

$$Y = \pm \frac{5{,}5}{100} \times 120 = \pm 6{,}6 \text{ N·m (which is } \pm 3{,}3 \text{ \% of } G)$$

— by application of the formula gives

$$y = \pm \left[7{,}75 - \left(3{,}75 \times \frac{120}{200} \right) \right] = \pm 5{,}5 \text{ \% and}$$

$$Y = \pm \frac{5{,}5}{100} \times 120 = \pm 6{,}6 \text{ N·m}$$