



# SLOVENSKI STANDARD

## SIST EN 14831:2005

01-julij-2005

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### Vezni elementi – Karakteristika privijanja - Poenostavljen preskus navora/zasuka

Fasteners - Tightening performance - Torque/Angle simplified test method

Verbindungselemente - Anziehverhalten - Vereinfachtes Drehmoment/Drehwinkel-Verfahren

Eléments de fixation - Aptitude au serrage - Méthode d'essai simplifiée Couple/Angle

**Ta slovenski standard je istoveten z: EN 14831:2005**

#### **ICS:**

21.060.01      Vezni elementi na splošno      Fasteners in general

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 14831**

April 2005

ICS 21.060.10; 21.060.20

English version

**Fasteners - Tightening performance - Torque/Angle simplified  
test method**

Eléments de fixation - Aptitude au serrage - Méthode  
d'essai simplifiée Couple/Angle

Verbindungselemente - Anziehverhalten - Vereinfachtes  
Drehmoment/Drehwinkel-Verfahren

This European Standard was approved by CEN on 3 March 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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## Foreword

This document (EN 14831:2005) has been prepared by Technical Committee CEN/TC 185, "Threaded and non-threaded mechanical fasteners and accessories", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2005, and conflicting national standards shall be withdrawn at the latest by October 2005.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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## 1 Scope

This document specifies a test method for fasteners with ISO metric thread from M6 to M16 and with property classes 8.8 to 12.9 for bolts and screws and with property classes 8 to 12 for nuts, to check their tightening performance in the elastic range.

It applies to steel fasteners with an ISO metric thread according to ISO 68-1.

It applies to fasteners having a friction coefficient from 0,06 up to and including 0,18. For higher values of friction coefficients, the dispersion of test results increases and the test method should not be applied. For lower values friction of coefficients, which are for very specific applications and require special lubrication, this document does not apply.

This comparative test method can be used to monitor stability of a production process (such as coating, lubrication, shot-blasting) or to compare various production manufacturing lots. It can also be used to detect fasteners, which are out of specification.

NOTE This simplified test method has been developed to avoid systematic use of more complex procedures.

In case of dispute the torque/tension test method according to EN ISO 16047 is the referee test.

This document does not apply for assessment of fasteners in actual assembly conditions; it does not allow the measurement of operating friction coefficients.

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## 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.

EN 20898-2, *Mechanical properties of fasteners — Part 2: Nuts with specified proof load values — Coarse thread (ISO 898-2:1992).*

EN ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs (ISO 898-1:1999).*

EN ISO 4759-3, *Tolerances for fasteners — Part 3: Plain washers for bolts, screws and nuts — Product grades A and C (ISO 4759-3:2000).*

EN ISO 7093-1, *Plain washers — Large series — Part 1: Product grade A (ISO 7093-1:2000).*

EN ISO 16047, *Fasteners — Torque/clamp force testing (ISO 16047:2005).*

ISO 965-2, *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose external and internal screw threads — Medium quality.*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

#### manufacturing lot

quantity of fasteners of a single designation including product grade, property class and size, manufactured from bar, wire, rod or flat product from a single cast, processed through the same or similar steps at the same time or over a continuous time period through the same heat treatment and/or coating process, if any

NOTE 1 Same heat treatment or coating process means:

- for a continuous process, the same treatment cycle without any setting modification;
- for a discontinuous process, the same treatment cycle for identical consecutive loads (batches).

NOTE 2 The manufacturing lot may be split into a number of manufacturing batches for processing purposes and then reassembled into the same manufacturing lot.

[Adapted from EN ISO 15330:1999]

### 3.2

#### coating process cycle

a sequence of surface preparation and/or coating application during a period of time where operating parameters including temperature, concentration, surface area, current density, or any other parameter which may affect the mechanical and/or performance properties of the fasteners are set and maintained

### 3.3

#### heat treatment cycle

a sequence of heat treatment over a defined period of time where operating parameters such as temperature, atmosphere, pressure, retention time, or any other parameter which may affect the mechanical or performance properties of the fasteners are set and maintained

## 4 Symbols and units

$d$	Nominal diameter of the bolt, screw or nut, mm
$d_e$	External diameter of the bearing part, mm
$d_h$	Diameter of the clearance hole (block or bearing part/washer, mm)
$d_w$	Outside diameter of the bearing face of the bolt, screw or nut, mm
$D_b$	Diameter of bearing surface under nut or bolt head for friction (see EN ISO 16047)
$d_2$	Basic pitch diameter, mm
$F$	Force
$F_{p, \max}$	Clamping force corresponding to $T_p$ in correlation with $\mu_{\min}$ , N
$F_{p, \min}$	Clamping force corresponding to $T_p$ in correlation with $\mu_{\max}$ , N
$F_p$	Clamping force corresponding to $T_p$ , N
$F_{\text{test}, \max}$	Maximum clamping force, N
$F_{\text{test}, \min}$	Minimum clamping force, N
$F_{\text{test}}$	Nominal clamping force, N
$H$	Height of the tightening block, mm
$h$	Thickness of the bearing part, mm
$L$	Side dimension of the tightening block, mm
$L_c$	Clamping length, mm
$n$	Number of tested bolts, screws or nuts.
$P$	Pitch of the thread, mm
$r_m$	Mean effective radius of the bearing face, mm
$T$	Torque
$\bar{T}$	Mean torque for calibration, Nm
$T_{\max}$	Maximum torque value, Nm

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$T_{\min}$	Minimum torque value, Nm
$T_p$	Pretorque, Nm
$T_{\text{test}}$	Torque corresponding to $F_{\text{test}}$ , Nm
$\theta$	Angle of rotation
$\theta_{\text{test}}$	Angle value measured between $T_p$ and $T_{\text{test}}$ in degrees
$\mu_{\max}$	Upper limit of the specified range of friction coefficient
$\mu_{\min}$	Lower limit of the specified range of friction coefficient

**5 Test principle**

The principle of this test is to apply a specified clamping force to the bolt/screw by rotating the fastener (bolt/screw or nut) to be tested under reference conditions.

After applying a pretorque the fastener to be tested is tightened to a specified test angle.

The final torque is monitored and compared to a specified torque range.

**6 Apparatus****6.1 Test device**

The torque wrench shall be able to apply a tightening torque within the uncertainty of  $\pm 2\%$  of the value to be measured. The uncertainty of angle measurement shall be  $\pm 2^\circ$  or  $\pm 2\%$  of the measured value, whichever is greater.

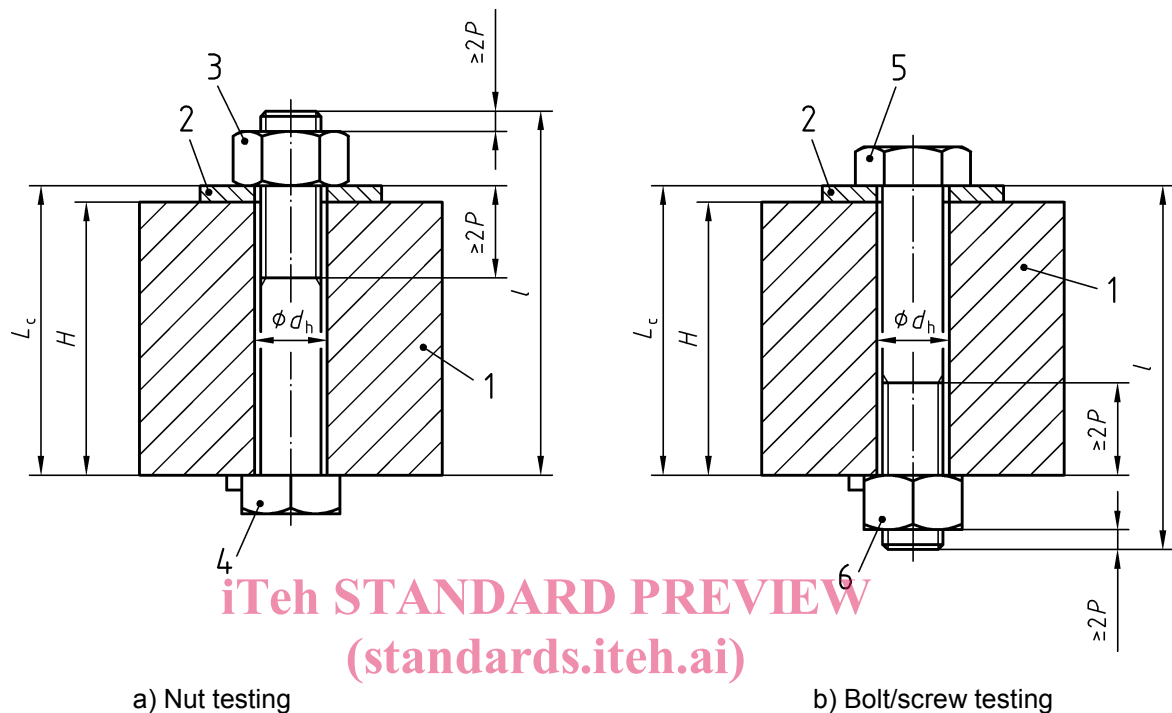
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## 6.2 Test fixture

### 6.2.1 General

The test fixture includes a tightening block and a bearing part, see Figure 1.



#### Key

- 1 Tightening block
- 2 Bearing part
- 3 Nut to be tested
- 4 Reference bolt/screw
- 5 Bolt/screw to be tested
- 6 Reference nut

**Figure 1 — Test fixture**

The reference fastener and the bearing part/washer shall not rotate during the test. Any device used to prevent rotation shall not intrude into the bearing face of the fastener to be tested.

### 6.2.2 Tightening block

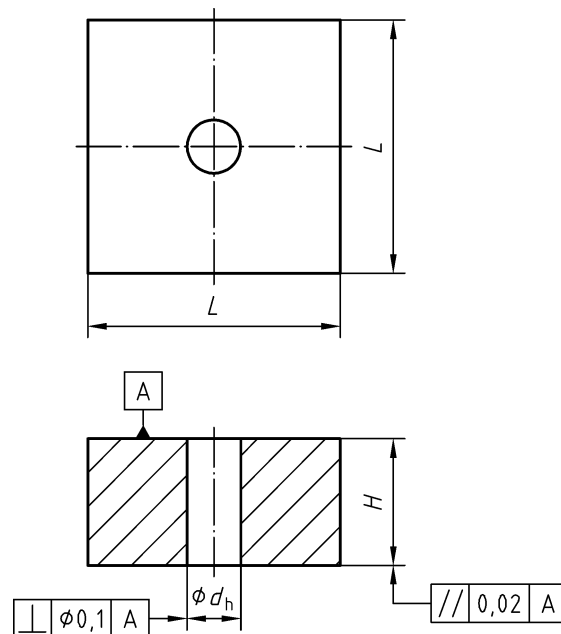
The tightening block shall be made of steel quenched and tempered to a hardness equal to or above 50 HRC. It shall be dry and clean.

The bearing surface shall be uncoated.

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Dimensions of the tightening block see Figure 2 and Table 1.

Dimensions in millimetres



**Figure 2 — Tightening block**  
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Table 1 — Dimensions of tightening block

Dimensions in millimetres

Thread of the fastener to be tested <i>d</i>	M6	M8	M10	M12	M14	M16	
<i>L</i>	50 ± 0,5						
<i>d<sub>h</sub></i> min.	6,40	8,40	10,50	13,00	15,00	17,00	
<i>d<sub>h</sub></i> max.	6,55	8,55	10,65	13,18	15,18	17,18	
<i>H<sub>nom</sub></i> for testing nuts	25	25	35	35	50	50	
<i>H<sub>nom</sub></i> for screws (fully threaded)	9,00	12,00	15,00	18,00	21,00	24,00	
<i>l</i>	<i>H<sub>nom</sub></i> for bolts (partially threaded)						
30	20						
35							
40	30	25					
45							
50	35	35	25				
55							
60	45	45	35				
65							
70			50	45	38	38	
80			60	60	50	50	
90			65	65	60	65	
100			78	78	78		
110						85	
120							
130					95		
140					110	100	
150							
160						120	