



SLOVENSKI STANDARD
oSIST prEN 17490:2020
01-maj-2020

Ugotavljanje izvlečne sile vijakov iz kanalov z navoji

Determination of screw pull out forces from screw thread channels

Bestimmung der Schraubenausziehkräfte von Schraubgewindekanälen

Détermination de la résistance à l'arrachement des vis dans les canaux de vissage

Ta slovenski standard je istoveten z: prEN 17490

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ICS:

21.060.99	Drugi vezni elementi	Other fasteners
91.190	Stavbna oprema	Building accessories

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EUROPEAN STANDARD
NORME EUROPÉENNE
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DRAFT
prEN 17490

March 2020

ICS 21.060.99

English Version

Determination of screw pull out forces from screw thread channels

Détermination de la résistance à l'arrachement des vis
dans les canaux de vissage

Bestimmung der Schraubenausziehungskräfte von
Schraubgewindekanälen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 33.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 17490:2020) has been prepared by Technical Committee CEN/TC 33 “Doors, windows, shutters, building hardware and curtain walling”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

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Introduction

This document provides a test method for assessing the screw pull out forces from screw thread channels used frequently in the fenestration (doors, windows and curtain walling) market.

Using the results from this test method, a manufacturer has the ability to estimate the number of screws to be applied to make sure that a given connection is able to withstand a particular loading scenario.

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1 Scope

This document provides a test method for determining the bearing capacity (pull out force) of a connection consisting of a screw in a screw thread channel, which cannot be calculated in accordance with current codes or conventional calculations. This document can be applied to several products, including doors, windows and curtain walling.

This document applies to screw thread channels made out of metal as well as metal screws.

The pull out forces of such connections can already be assessed indirectly with another test method e.g. wind load resistance for doors/windows according to EN 12211 or curtain walling kits according to EN 12179. Additional information with respect to the mechanical performance of connections and direct applications can be determined with the test method described in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 ISO 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines – Part 1: Tension/compression testing machines - Calibration and verification of the force-measuring system (ISO 7500-1)*

3 Terms and definitions

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

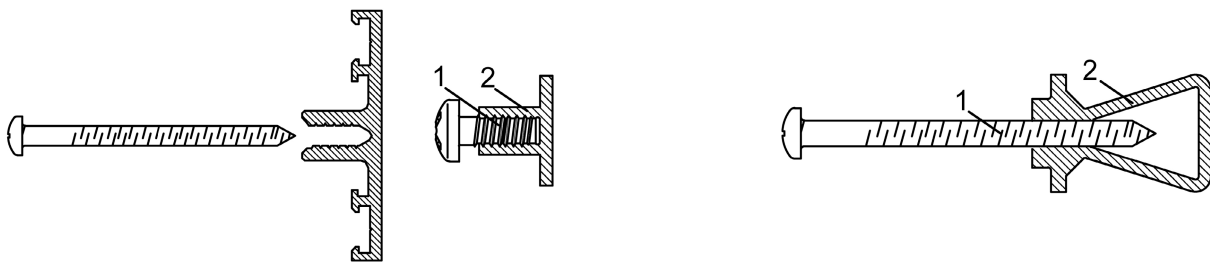
ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 connection

set of components consisting of a screw and a screw thread channel designed to transfer loads between different framing members (see Figure 1)

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a) Typical connection made out of aluminium extruded profile

b) Typical connection made out of formed steel sheet

Key

- 1 screw
2 screw thread channel

Note 1 to entry: there may be other components such as plastics in the area of the screw thread channel that are not contributing to the load-bearing capacity of the connection (e.g. the thermal break in stick construction curtain walling kits).

Figure 1 — Typical connections made out of a) aluminium extruded profile or b) formed steel sheet

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4 Symbols and abbreviations (standards.iteh.ai)

For the purposes of this document, the following symbols and abbreviations apply.

- F Applied proof load <https://standards.iteh.ai/catalog/standards/sist/15243060-0ac5-44b3-9485-0c88eb289808/osist-pren-17490-2020>
- D Distance between the line of action of load F and the inner edge of the screw thread channel clamp
- e $((\text{width of actuator clamp slot}) - (\text{diameter of screw head}))/2$

5 Definition of principle

A vertical upward load is applied to the screw head of a screw that is fastened in a screw thread channel. The load is increased until the prescribed 'proof load' is reached.

6 Requirements

6.1 Actuator

An actuator capable of applying an upward load of at least the proof load "F" to the screw head of the connection is used. A linkage shall be provided between the actuator and the connection which ensures that the vertical force is applied directly above the screw without applying unrepresentative flexural or torsional moments to any component.

6.2 Force measuring instruments

The class of force measuring instruments shall conform to EN ISO 7500-1 over the required range of force.

7 Test specimens

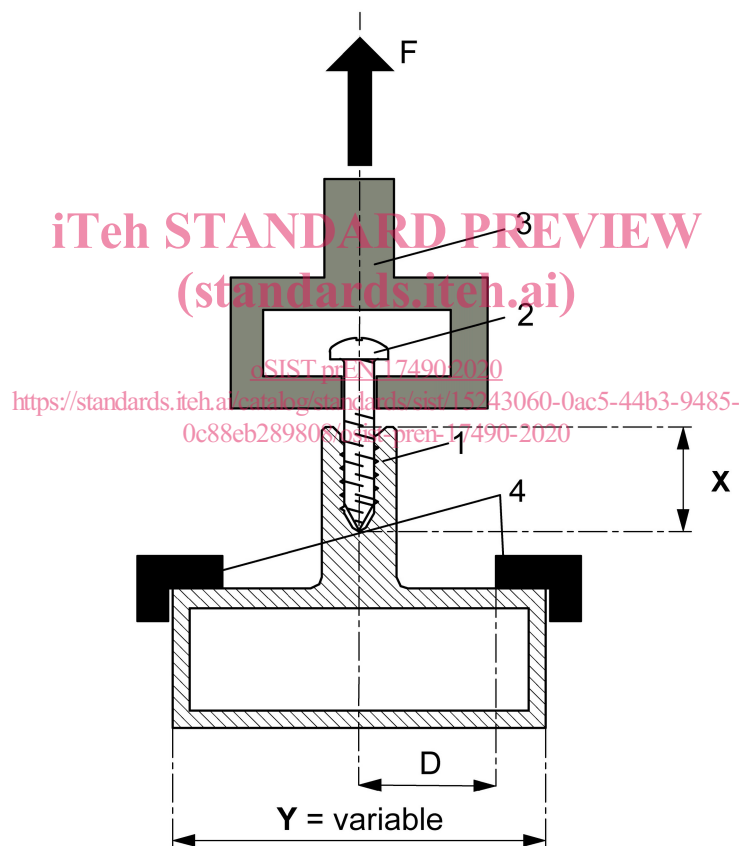
7.1 Screw thread channel

The shape of the screw thread channel may be different depending on the design of the connection. This technology is very frequently used for curtain walling kits with tubular profiles. The part of the connection that contains the screw thread channel shall be rigidly fixed during the test to avoid any deformation and movement that can influence the results.

7.2 Screw

The screw shall be connected to the actuator and the load will be applied axially to ensure that forces applied to the screw thread channel will not affect the geometry of the channel.

The screw shall be inserted into the screw thread channel using the torque as recommended by the manufacturer.



Key

- 1 screw thread channel (part of the connection)
- 2 screw (part of the connection)
- 3 actuator (apparatus for applying the pull out force)
- 4 clamp (fixing the element that contains the screw thread channel)

Figure 2 — Test arrangement

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8 Procedure

8.1 Preparation for test

It is essential to ensure that all parts of the connection as well as the apparatus is supported in a stiff frame.

8.2 Loading and force measurement

The loading arrangement shown in Figure 2 shall be used. The distance D between the line of action of the applied load F and the inner edge of the clamp needs to replicate the actual connection. When required, the part that contains the screw thread channel may be modified to be clamped in such a way to allow symmetrical load application without altering the mechanical resistance of the connection.

Further rules on how the distance D can be varied in practice from that tested are given in Clause 9.

The specified load shall be applied to the screw head as shown in Figure 2. The load shall be maintained for 3 min and shall be removed smoothly without producing any shock. The feed rate shall be in the range of 1 mm/min to 5 mm/min. In general, the load shall be applied perpendicular to the axis of the screw thread channel.

8.3 Inspection after the termination of the test

To determine whether there is no damage of the connection, after having the connection fully unloaded, it will be retested at a load which is 75 % of the specified proof load applied F and the connection shall perform no differently compared with the applied load F .

8.4 Number of test pieces

The test shall be repeated for at least 5 samples or within the same profile in a distance of 400 mm. The actual distance from screw to screw should be considered, otherwise the length of the samples should be at least 300 mm.

8.5 Evaluation of a metallic pressure plate and connection

After completing the above procedure, when the connection is to be combined with a metallic pressure plate, one more test (at least another 5 samples as in 8.4) will be performed as shown in Figure 3, to check whether a pressure plate which may be used (e.g. on stick curtain walling systems) is performing adequately and that either the head of the screw will not pass through the pressure plate or the head of the screw will not be cut off when the load is applied.