SLOVENSKI STANDARD
SIST EN 17490:2021

01-oktober-2021

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: **EN 17490:2021**

ICS:

21.060.99	Drugi vezni elementi	Other fasteners
91.190	Stavbna oprema	Building accessories

SIST EN 17490:2021 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 17490

August 2021

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 Schraubenausziehkräfte von Schraubgewindekanälen

This European Standard was approved by CEN on 4 July 2021.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 17490:2021 E

Contents

Page

European foreword

This document (EN 17490:2021) 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 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 February 2022, and conflicting national standards shall be withdrawn at the latest by February 2022.

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

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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

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 determine the number of screws to be applied to make sure that a given connection is able to withstand a particular loading scenario.

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 screw thread channels used in several products, including doors, windows and curtain walling.

This document is applicable 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.

The bearing capacity of non-metallic components under the combination of high temperature and load is not considered in the standard. Additional verifications are performed depending on the type of the non-metallic material used.

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:

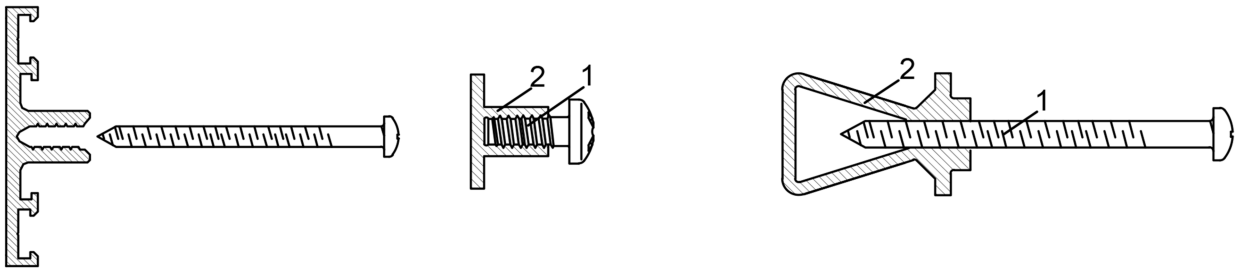
— ISO Online browsing platform: available at https://www.iso.org/obp

— 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

Note 1 to entry: See Figure 1.

Note 2 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).



a) Examples of typical connections made out of aluminium extruded profile

b) Example of typical connections made out of formed steel sheet

Key

1 screw

2 screw thread channel

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

3.2
proof load
force at break of the connection

3.3
pressure plate
length of profiled material attached to mullions and/or transoms around the perimeter of a pane of glass, insulating glass unit or infill panel to provide restraint and usually compress the glazing gasket

4 Symbols and abbreviations

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

F	Applied force
$F_{des,u}$	Design force at the ultimate limit state
$F_{max,i}$	Maximum force at ultimate limit state for the sample "i"
$F_{u,5}$	Characteristic force giving 75 % confidence that 95 % of the test results is be higher than this value
e	((width of actuator clamp slot) – (diameter of screw head))/2
n	Number of samples
s_{dev}	Standard deviation of the series under consideration
ULS	Ultimate Limit State
X	In-depth of the screw (mm)
Y	Width of the profile (mm)
γ_u	partial factor for the connection applicable to break
$\tau_{\alpha\beta}$	Statistical eccentricity of 5 % with 75 % confidence

5 Definition of principle

A vertical upward force is applied to the screw head of a screw that is fastened in a screw thread channel. The force is increased until the break of the connection is reached (proof load).

6 Requirements

6.1 Actuator

An actuator capable of applying an upward force up to the proof load 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

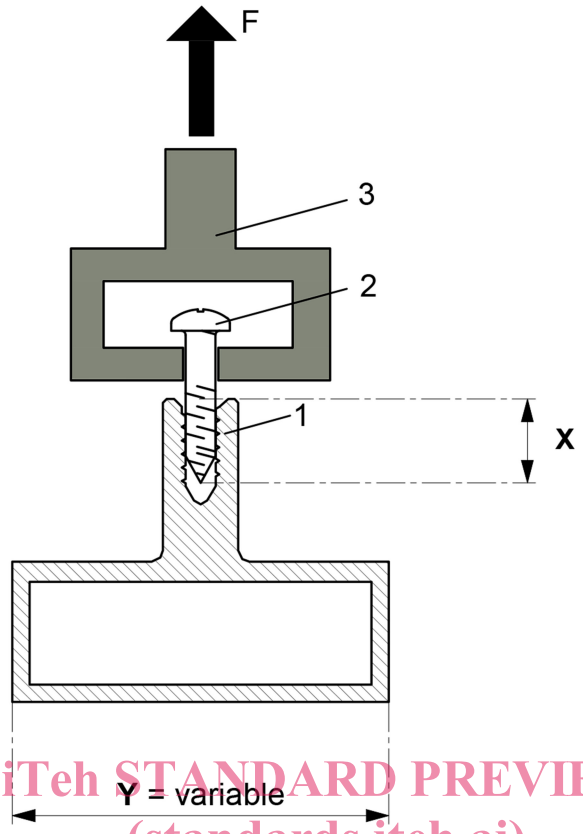
7.1 Screw thread channel

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 force 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 screwed into the thread channel in respect of the given screw in-depth penetration distance “X”.



Key

1 screw thread channel (part of the connection)
2 screw (part of the connection)
3 actuator (apparatus for applying the force “F”)

Figure 2 — Test arrangement

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, ensuring that only the screw under test is pulled out.

8.2 Loading and force measurement

The loading arrangement shown in Figure 2 shall be used. 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.

The force F shall be applied to the screw head as shown in Figure 2, until break.

The feed rate shall be in the range of 1 mm/min to 6 mm/min. In general, the force shall be applied in the axis of the screw thread channel.

The design load $F_{des,u}$ for the Ultimate Limit State is determined according to the procedure described in Annex A.