SLOVENSKI STANDARD

SIST EN 17146:2019

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Ugotavljanje trdnosti podpore polnil - Preskusne metode in zahteve

Determination of the strength of infill supports - Test method and requirements

Bestimmung der Festigkeit von Auflagern für Ausfachungen - Prüfverfahren und Anforderungen

Détermination de la résistance des supports de vitrage (panneaux de remplissage) - Méthode d'essai et exigences

Ta slovenski standard je istoveten z: **EN 17146:2018**

ICS:

91.060.10	Stene. Predelne stene. Fasade	Walls. Partitions. Facades

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EN 17146

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Determination of the strength of infill supports - Test method and requirements

Détermination de la résistance des supports de vitrage (panneaux de remplissage) - Méthode d'essai et exigences

Bestimmung der Festigkeit von Auflagern für Ausfachungen - Prüfverfahren und Anforderungen

This European Standard was approved by CEN on 5 November 2018.

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

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European foreword

This document (EN 17146:2018) 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of an identical text or by endorsement, at the latest by June 2019, and conflicting national standards shall be withdrawn at the latest by June 2019.

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.

This standard has been developed by CEN/TC 33/WG 6 Curtain walling for the purpose of curtain walling systems, but can be used also for similar constructions and fenestration products.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies test methods for the determination of the bearing capacity (ultimate limit state and serviceability limit state) of infill support which cannot be calculated in accordance with current codes or conventional calculations based upon the strength of the materials or to compare the calculation when necessary.

Three different types of infill (glass) supports are dealt in this standard:

— The cantilever infill (glass) supports, see Figure 1 (a);

— The cruciform infill (glass) supports only fixed to the mullion, see Figure 1 (b);

— Corner infill (glass) supports only fixed to the mullion, see Figure 1 (c).

The test method is intended for the assessment of cantilever infill (glass) supports that have not been tested according to EN 16758 (see Figure 9). The results of the test method can only be interpreted when incorporated with the results from a test in accordance with EN 16758.

It is essential that cruciform and corner infill (glass) supports only fixed to the mullion are tested in accordance with this standard.

The infill (glass) supports connected to the mullion and the transom together are considered as a part of sheared connection and are covered by EN 16758.

Where the mechanical performances of the infill (glass) support is already assessed in accordance with the provisions described in EN 13830, additional information with respect to mechanical performance of the infill (glass) support and direct applications can be determined with this standard.

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 12519, *Windows and pedestrian doors — Terminology*

EN 13119, *Curtain walling — Terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12519 and EN 13119 and the following apply.

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

— IEC Electropedia: available at http://www.electropedia.org/

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

3.1
infill (glass) support
device designed to transfer the dead load of the infill to the framing members

4 Symbols

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

$\Delta_{v,c}$	Vertical deformation after creep test [mm]
$\Delta_{v,i}$	Initial vertical deformation [mm]
c_w:	Elasticity constant [N/mm^2]
d	thickness of the internal infill gasket
D	deformation [mm]
DT	transducer
e	the distance from the position of (α) the contact area of the internal infill gasket and the transom, and the vertical plane containing the centre of gravity of the infill the manufacturer is willing to use
F	force [N]
$F_{ave,ela}$	the maximum average elastic force corresponding to the maximum deformation of the elastic part of the graph (forces F, deformation ε)[N]
$f_{ave,ela}$	average of deflection infill support [mm]
$F_{des,l\ sx}$	left design force for symmetrical loading with a deformation limited to a “x” value
$F_{des,l\ ux}$	left design force for unsymmetrical loading with a deformation limited to a “x” value
$F_{des,r,sx}$	Right design force for symmetrical loading with a deformation limited to a “x” value
$F_{des,r,ux}$	Right design force for unsymmetrical loading with a deformation limited to a “x” value
$F_{des,s}$	Design force at the service limit state
$F_{des,ss}$	Design force in service limit state for symmetrical loading
$F_{des,su}$	Design force in service limit state for unsymmetrical loading
$F_{des,u}$	Ultimate limit state design force
$F_{max,s}$	The maximum average elastic force for series of test
$F_{max,u5}$	Characteristic force resulting from de recorded forces at break of a considered set of samples
$F_{s,ave}$	average forces from de recorded forces of a considered set of samples during a symmetric loading
F_{u5}	the characteristic force giving 75 % confidence that 95 % of the test results will be higher than this value [N]
F_v	Vertical force
$F_{v,des}$	design vertical long term load [N]
$F_{v,l}$	Vertical force applied at the left part of a cruciform infill support
$F_{v,l,s}$	Vertical force applied at the left part of a cruciform infill support corresponding to the elastic deformation limit of the infill support

$F_{v,l,u}$	Vertical force applied at the left part of a cruciform infill support during a unsymmetrical loading
$F_{v,r}$	Vertical force applied at the right part of a cruciform infill support
$F_{v,r,s}$	Vertical force applied at the right part of a cruciform infill support corresponding to the elastic deformation limit of the infill support
$F_{v,r,u}$	Vertical force applied at the right part of a cruciform infill support during a unsymmetrical loading
g	distance between the edge of the infill and edge of the setting block
HT	high temperature
h_t	total height of the cruciform infill support
i	distance between the longitudinal axis of the mullion and the setting block
k	length of the setting block for the cruciform infill support
L	length of the setting block for the cantilever infill support
l	length of the horizontal flange of the cruciform/corner infill support
l_l	length of the horizontal left flange of the cruciform/corner infill support
L_r	length of the horizontal right flange of the cruciform/corner infill support
o	thickness of the setting block
p	maximum thickness of the infill panel, also measurement reference point for the infill support deflection.
R	sample length of the cantilever infill support frame profile
R	linear regression coefficient
s	the standard deviation of the series under consideration
t	maximum thickness of the infill
TC	Temperature category
w	deflection glass support
α	the contact area of the internal infill gasket and the frame profile (mullion or transom)
γ_u	partial factor for the infill support applicable to rupture
$\varepsilon_{max,s}$	Maximum elastic deformation resulting from the analyse of the curves recorded during the symmetric loading
$\tau_{\alpha ß}$	statistical eccentricity of 5 % with 75 % confidence

Subscript

l	left
r	right

5 Method of evaluation

5.1 General

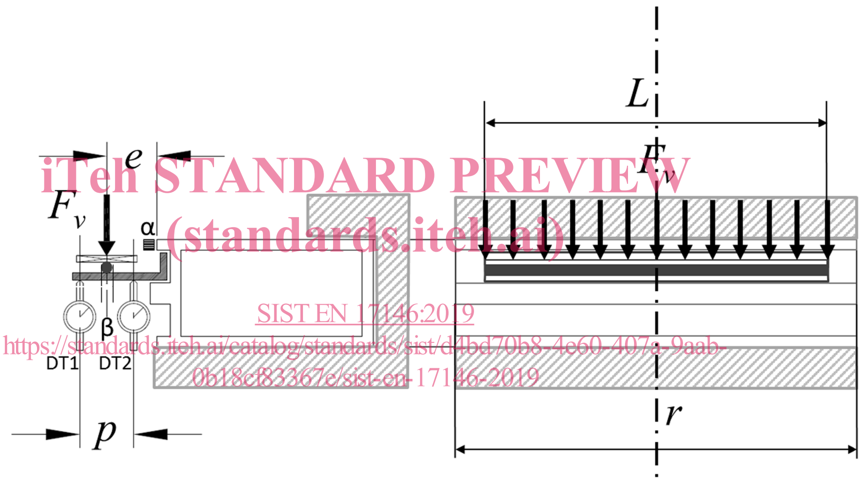
Infill (glass) supports are subjected to permanent loads. These accessories shall transfer the loads in such way that the serviceability of the work in which they are applied is preserved.

5.2 Samples

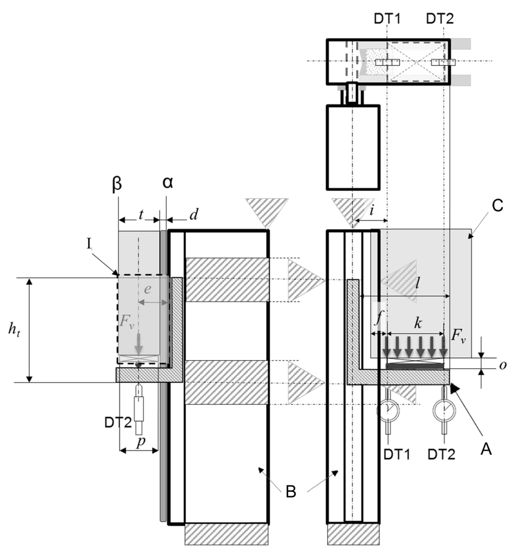
The samples shall be representative of the design with which the infill (glass) support transfers the permanent load to the frame profile. The supports of the samples shall restrain vertical and rotational movements of the frame profile.

Principles of typical test configurations are shown in Figure 1 for the cantilever infill support, the corner infill support, the cruciform infill support, but different configurations may be used depending on product's technology.

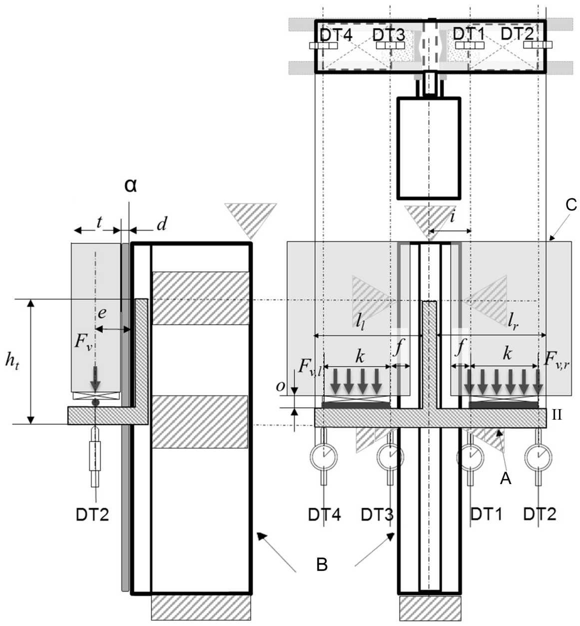
The infill (glass) support frame is to be blocked against rotation in order to minimize the influence of the frame on the glass support.



a) Cantilever infill (glass) support



b) Corner infill (glass) support



c) Cruciform infill support

Key

 sample restraints

I infill support stiffener

II infill support flange

A infill (glass) support

B frame profile (mullion)

C infill (glass)

Figure 1 —Schematic examples of application of vertical load (F_V)

Vertical load (F_V) should be applied to the glass support in the way the permanent vertical load is applied in practice.

In case the infill is an insulating glass unit, to establish the serviceability limit state (Annex A), in absence of evidence from the glass manufacturer or the system designer, it is advised to limit the deformation of the glass support in order to obtain a maximum displacement of 1 mm between two consecutive glass panes and the distance *"g"* should not be less than 25 mm.

The samples are built according to Figure 1 for which the following apply:

- For the cantilever infill support
  - *p*: maximum thickness of the infill panel, also measurement reference points for the infill support deflection;
  - the length of the frame profile "*r*" should not be less than the length of the glass support "L" + 20mm.
  - the transducers DT1, DT2 are normally placed at the orthogonal projection of the end of the width of setting blocks.

- For the corner/cruciform infill support

  — "*i*", the maximum distance between the longitudinal axis of the mullion and the infill setting block;

  — "*k*", the maximum length of the setting block;

  — the total height of the mullion of the sample is not less than height of the cruciform h_t + 2 x 25mm;

  — the transducers DT2, DT4 are normally placed at the projected ends of the setting blocks except if contact between the extremity of the horizontal flange of the glass support and the infill is can be expected during the test. In the case, the transducers DT2, DT4 shall be placed at extremity of the flange(s) *l*, l_l, *and lr*;

  — the transducer DT1, DT3 are normally placed at the projected ends of the nearest of the mullion setting blocks extremity.

5.3 Loadings

5.3.1 General

5.3.1.1 Preloading

Prior to any loading, a vertical force of 100 N is applied after which the displacement transducers (DT) is reset.

5.3.1.2 Vertical loading for the cantilever and corner infill supports

The design static loading is defined as follows:

— minimum *n* = 5 infill supports are submitted to vertical loading until break, using a deformation speed of 5 mm/min, the force/deformation curve is recorded;

— the design load $F_{v,des}$ for the Serviceability Limit State is determined according to the procedure described in Annex A;

— the design load for the Ultimate Limit State is determined according to the procedure described in Annex B.

5.3.1.3 Vertical loadings for the cruciform infill supports

This method is applicable insofar as the infill support is strengthened by a stiffener that is fixed to the horizontal flanges, the width and the stiffness of the stiffener to be at least equal to those of the flange.

The flange taking up the dead load of the infills is not mechanically connected to any transom.

Minimum *n* = 5 infill supports for each loading ($F_{v,l}$; $F_{v,r}$) are submitted to vertical loading, using a deformation speed of 5 mm/min, according to the following load schemes, the force/deformation curves are recorded:

1. symmetrical loading ($F_{v,l} = F_{v,r}$) is performed until break;

2. the determination of the maximum elastic deformation $\varepsilon_{max,s}$ for symmetrical loading is determined according to Annex C;