SLOVENSKI STANDARD
SIST EN 1288-5:2001

01-september-2001

Steklo v stavbah - Ugotavljanje upogibne trdnosti stekla - 5. del: Metoda soosnega dvojnega obroļa na ravnem steklu z majhnimi povrġinami

Glass in building - Determination of the bending strength of glass - Part 5: Coaxial double ring test on flat specimens with small test surface areas

Glas im Bauwesen - Bestimmung der Biegefestigkeit von Glas - Teil 5: Doppelring-Biegeversuch an plattenförmigen Proben mit kleinen Prüfflächen

Verre dans la construction - Détermination de la résistance du verre a la flexion - Partie 5: Essais avec doubles anneaux concentriques sur éprouvettes planes, avec de petites surfaces de sollicitation

Ta slovenski standard je istoveten z: **EN 1288-5:2000**

ICS:

81.040.20	Steklo v gradbeništvu	Glass in building

SIST EN 1288-5:2001 **en**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1288-5

June 2000

ICS 81.040.20

English version

Glass in building - Determination of the bending strength of glass - Part 5: Coaxial double ring test on flat specimens with small test surface areas

Verre dans la construction - Détermination de la résistance du verre à la flexion - Partie 5: Essais avec doubles anneaux concentriques sur éprouvettes planes, avec de petites surfaces de sollicitation

Glas im Bauwesen - Bestimmung der Biegefestigkeit von Glas - Teil 5: Doppelring-Biegeversuch an plattenförmigen Proben mit kleinen Prüfflächen

This European Standard was approved by CEN on 5 September 1999.

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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 1288-5:2000 E

Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 129 "Glass in building", the secretariat of which is held by IBN.

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 December 2000, and conflicting national standards shall be withdrawn at the latest by December 2000.

CEN/TC 129/WG8 "Mechanical Strength" prepared the draft "Glass in building - Determination of the bending strength of glass" - Part 5 : Coaxial double ring test on flat specimens with small test surface areas".

There are four other parts to this standard:

- Part 1 : Fundamentals of testing glass
- Part 2 : Coaxial double ring test on flat specimens with large test surface areas
- Part 3 : Test with specimen supported at two points (four point bending)
- Part 4 : Testing of channel shaped glass

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

1 Scope

This European standard specifies a method for determining the comparative bending strength of glass for use in buildings, excluding the effects of the edges.

NOTE: See 5.1.4 in EN 1288-1 for an explanation as to why this test method should only be used for comparing the strength of types of glass, and not for assessing strength for design purposes.

The limitations of this standard are described in EN 1288-1.

EN 1288-1 should be read in conjunction with this standard.

This test is not suitable for patterned glass.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 1288-1	Glass in building - Determination of the bending strength of glass - Part 1 : Fundamentals of testing glass
EN 572-1	Glass in building - Basic soda lime silicate glass products - Part 1 : Definitions and general physical and mechanical properties
ISO 48	Rubber, vulcanised or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD)

3 Definitions

For the purposes of this standard, the following definition applies:

3.1 bending stress: the tensile bending stress induced in the surface of a specimen.

NOTE: For testing purposes, the bending stress should be uniform over a specified part of the surface.

4 Symbols

F Load

F_{max} Load at breakage, "breaking load"

h Thickness of specimen

L Side length of square specimens

K_1, K_2 Constants for calculation of bending stress

r_1 Radius of loading ring

r_2 Radius of supporting ring

r_3 Radius of circular specimens

r_{3m} Average specimen radius (for evaluation)

t Time

σ Stress

σ_{bB} Bending strength

μ Poisson number of specimen

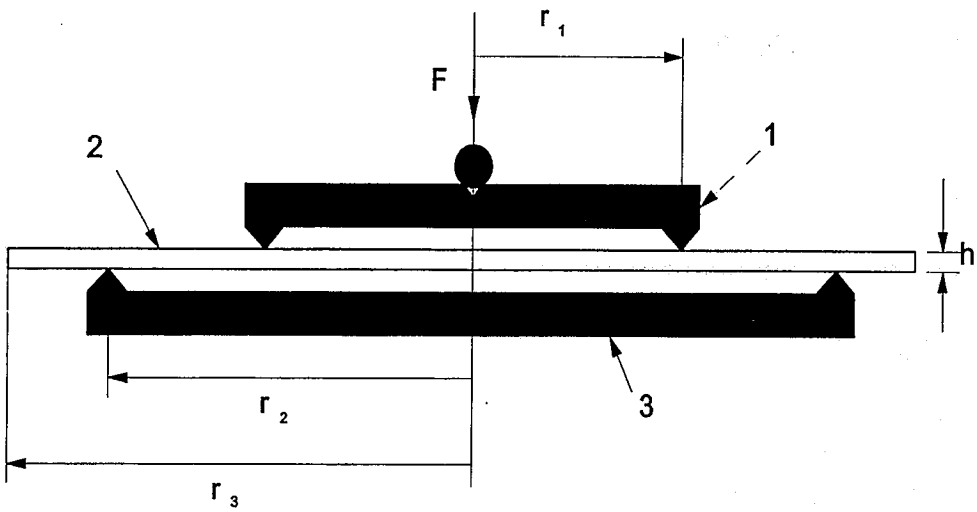
NOTE: for soda lime silicate glass (see EN 572-1) a value of 0,23 is used.

$\Delta F/\Delta t$ Rate of increase of load

$\Delta\sigma/\Delta t$ Rate of increase of stress

5 Principle of test method

A circular or square plane-parallel specimen with radius r_3, or length of side L, resting on a supporting ring (radius r_2) shall be loaded by means of a loading ring (radius r_1) arranged concentrically relative to the supporting ring (see figure 1).



1 Loading ring
2 Specimen
3 Supporting ring

Figure 1 : Test arrangement (indicating the principle), illustrated for a circular specimen.

Outside the loading ring, the radial and tangential stresses in the specimen decrease towards the edge, so that the risk of failure there is small.

For limited loads, F, (depending on the values of r_1, r_2, r_3 and h) there is, in the central region of the convexly bent specimen surface, a tensile stress field (see [1] in annex A) extending in all directions and uniform, the area in this field being bounded by the loading ring.

By increasing the load, F, the tensile stress in the middle of the specimen is increased at a constant rate until failure occurs, the expected point of failure being in the most severely stressed surface region defined by the loading ring.

The bending strength, σ_{bB}, shall be calculated from the maximum load, F_{max}, measured when failure occurs and the specimen thickness, h, taking into account the dimensions of the square or circular specimens and the value for Poisson number, μ, of the specimen.

6 Apparatus

6.1 Testing machine

The bending test shall be carried out using a suitable bending testing machine, which shall incorporate the following features:

a) The stressing of the specimen shall be capable of being applied from zero up to a maximum value in a manner which minimizes shock and is stepless;

b) The stressing device shall be capable of the specified rate of stressing;

c) The testing machine shall incorporate a load measuring device with a limit of error of ± 2,0 % within the measuring range.

6.2 Loading device

The loading device shall be arranged as illustrated in figure 2, with dimensions conforming to table 1 for the two combinations of loading ring and supporting ring accepted for the coaxial double ring bending test. The radius ratio, $r_1 : r_2$, shall be 1 : 5.

Table 1: Dimensions of loading ring and supporting ring

Loading device	Radius of loading ring, r_1 mm	Radius of supporting ring, r_2 mm	Radius r_3 or $L/2$ of specimen as specified in table 2 mm
R45	9	45	50
R30	6	30	33

a) The radius of curvature of the bearing surface of the supporting ring shall be 2,5 mm;

b) The silicone rubber shall be 3 mm thick, or alternatively a rubber section, 3 mm thick, matched to the supporting ring with a hardness of (40 ± 10) IRHD, (according to ISO 48);

c) The radius of curvature of the bearing surface of the loading ring shall be 2,5 mm.