SLOVENSKI STANDARD
SIST EN 13541:2012

01-maj-2012

Nadomešča:
SIST EN 13541:2001

Steklo v gradbeništvu - Varnostna zasteklitev - Preskušanje in razvrščanje odpornosti proti zvočnemu tlaku pri eksploziji

Glass in building - Security glazing - Testing and classification of resistance against explosion pressure

Glas im Bauwesen - Sicherheitssonderverglasung - Prüfverfahren und Klasseneinteilung des Widerstandes gegen Sprengwirkung

Verre dans la construction - Vitrage de sécurité - Mise à essai et classification de la résistance à la pression d'explosion

Ta slovenski standard je istoveten z: **EN 13541:2012**

ICS:

13.230	Varstvo pred eksplozijo	Explosion protection
81.040.20	Steklo v gradbeništvu	Glass in building

SIST EN 13541:2012 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13541

February 2012

ICS 13.230; 81.040.20

Supersedes EN 13541:2000

English Version

Glass in building - Security glazing - Testing and classification of resistance against explosion pressure

Verre dans la construction - Vitrage de sécurité - Mise à essai et classification de la résistance à la pression d'explosion

Glas im Bauwesen - Sicherheitssonderverglasung - Prüfverfahren und Klasseneinteilung des Widerstandes gegen Sprengwirkung

This European Standard was approved by CEN on 31 December 2011.

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 13541:2012: E

Contents

Page

Foreword

This document (EN 13541:2012) has been prepared by Technical Committee CEN/TC 129 “Glass in building”, the secretariat of which is held by NBN.

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 August 2012, and conflicting national standards shall be withdrawn at the latest by August 2012.

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

This document supersedes EN 13541:2000.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

According to the CEN/CENELEC Internal Regulations, the national standards organizations 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The choice of an explosion pressure resistant glazing material (e.g. security and/or anti terrorism glazing product) in an individual case should be established by the user. Experts in the field of explosions are able to determine in most situations the expected level and duration of the shock wave, based on the type of explosion and the distance from the heart of the explosion.

The classification of explosion pressure resistance is based on the maximum overpressure of the reflected shock wave and the duration of the overpressure phase.

1 Scope

This European Standard specifies a test method, performance requirements and classification for explosion pressure resistant glazing for use in buildings.

The explosion pressure resistant glazing is intended to offer resistance against explosives with respect to human safety.

This European Standard concerns a method of test against blast waves generated using a shock tube or similar facility to simulate a high explosive detonation.

The classification is only valid for tested glass sizes of about 1 m^2. Based on theoretical considerations and/or experimental work, the results can be used for estimating the explosion-pressure-resistance of other glass sizes.

NOTE 1 The resistance classes are not assigned to specific situations. For each individual case the individual who specifies, if necessary with the help of experts in the field of explosion, should be consulted.

NOTE 2 The protection provided by explosion-resistant-glazing not only depends on the product itself, but also on the design and fixing of the glass.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 48, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

3 Terms and definitions

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

3.1
explosion pressure resistant glazing
security glazing that affords a defined resistance against a specified explosive blast

NOTE The glass and/or plastics component of an explosion pressure resistant glazing unit may be separated by air spaces.

3.2
sample
number of nominally identical glazing units on which type testing is performed for a certain explosion pressure class

3.3
shock tube
tube with sufficient dimensions and rigidity in order to generate a plane shock wave as from a spherical detonation

3.4
test piece
one member of the sample prepared for testing

3.5
attack face
face of the explosion pressure resistant glazing, marked by the manufacturer and/or supplier, that is designed to face the explosive blast

4 Classification and designation

Table 1 specifies the classification of and the appropriate test conditions for explosion pressure resistant glazing.

If all three test pieces of the sample fulfil the performance requirements of a certain class according to Clause 6, and the test conditions lie within the tolerance given in Table 1, then the glazing product may be classified in the relevant class. When a security glass pane achieves a particular class, it also automatically achieves all lower classes.

Table 1 — Classification of explosion-pressure-resistant glazing

Classification Code	Characteristics of the plane shock wave		
	Maximum overpressure of the reflected blast wave Pr (kPa)	Positive specific impulse i_+ (kPa ms)	Duration of the overpressure phase t_+ (ms)
ER1	$50 \leq p_r < 100$	$370 \leq i_+ < 900$	≥ 20
ER2	$100 \leq p_r < 150$	$900 \leq i_+ < 1500$	≥ 20
ER3	$150 \leq p_r < 200$	$1500 \leq i_+ < 2200$	≥ 20
ER4	$200 \leq p_r < 250$	$2200 \leq i_+ < 3200$	≥ 20

NOTE 1 The specific impulse (i+) results from the pressure-time history versus time, in accordance with EN 13123-1. Annex A of EN 13123-1 specifies the methods to be applied by the testing laboratory in order to obtain consistent measurements and derivations of the parameters of test shock waves to be used in the comparison with the classification parameters specified in Table 1.

$$i_+ = \int_0^{t+} p(t) \cdot dt = pr \cdot t_+ \left\{ 1/A - 1/A^2 \left[1 - exp(-A) \right] \right\} \quad (1)$$

where:

p_r is the maximum overpressure;

t_+ is the duration of the positive pressure phase;

A is the wave form parameter (values lie between 0 and 4).

NOTE 2 No extrapolation can be made for bigger samples.

5 Test pieces for type testing

5.1 Type, dimensions and marking

The construction and materials of the test pieces shall comply with the specification of the manufacturer.

The test pieces (or the sample) submitted for type testing shall be representative of the normal production.

The dimensions of the test pieces shall be:

— length (1100 ± 5) mm;

— width (900 ± 5) mm.

The edges of the test pieces should be raised for ease of handling.

The sample shall be identified with a permanent label or removable label, which may not be removed, indicating, as a minimum, the attack face of the product.

5.2 Number of test pieces

The sample submitted for testing shall consist of three test pieces for each attack face and each class for which testing shall be required.

NOTE One extra test piece should be supplied in case of transport breakage or other logistic handling.

6 Requirements

Each of the three test pieces of a sample, according to Clause 5, submitted for testing, shall comply with the following requirements when tested according to Clause 7:

— the test piece shall not have any "through" holes, from the front to the back;

— no openings from the front to the back as defined in this standard shall be permitted between the clamping frame and the edges of the test piece.

NOTE An opening between the clamping frame and the edges of the test piece can be caused by insufficient clamping pressure. If so, the test can be repeated with a higher clamping pressure. In this case the test report shall state the applied clamping pressure.

7 Test Method

7.1 Apparatus

7.1.1 Specimen holder

The specimen holder shall be intrinsically rigid, and rigidly fixed onto a solid foundation and/or into solid masonry.

The specimen holder shall have facilities to ensure:

— plane parallel clamping of the test piece in a vertical position;

— support of the test piece only by the frame;