



SLOVENSKI STANDARD

SIST EN 13124-1:2001

01-september-2001

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Windows, doors and shutters - Explosion resistance - Test method - Part 1: Shock tube

Fenster, Türen und Abschlüsse - Sprengwirkungshemmung - Prüfverfahren - Teil 1:
Stoßrohr

iTeh STANDARD PREVIEW

Fenêtres, portes et fermetures - Résistance à l'explosion - Méthode d'essai - Partie 1:
Tube à effet de souffle (shock tube)

[SIST EN 13124-1:2001](https://standards.iteh.ai/catalog/standards/sist/81c66330-40a3-4383-9efe-250c19d8f8d/sist-en-13124-1-2001)

Ta slovenski standard je istoveten z: **EN 13124-1:2001**

ICS:

13.230	Varstvo pred eksplozijo	Explosion protection
91.060.50	Vrata in okna	Doors and windows

SIST EN 13124-1:2001

en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13124-1

April 2001

ICS 13.230; 91.060.50

English version

Windows, doors and shutters - Explosion resistance - Test method - Part 1: Shock tube

Fenêtres, portes et fermetures - Résistance à l'explosion -
Méthode d'essai - Partie 1: Tube à effet de souffle (shock
tube)

Fenster, Türen und Abschlüsse - Sprengwirkungshemmung
- Prüfverfahren - Teil 1: Stossrohr

This European Standard was approved by CEN on 7 March 2001.

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 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 Management Centre 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.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 33, "Windows, doors, 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 October 2001, and conflicting national standards shall be withdrawn at the latest by October 2001.

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.

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1 Scope

This European Standard specifies a conventional test procedure to permit classification of the explosion resistance of windows, doors and shutter together with their infills.

This European Standard concerns a method of test against blast waves generated by using a shock tube facility to simulate a high explosive detonation in the order of 100 kg to 2 500 kg TNT at distances from about 35 m to 50 m .

This European Standard covers only the behaviour of the complete unit including infill, frame and fixings as tested. It gives no information on the ability of the surrounding wall or building structure to resist the direct or transmitted forces.

If the windows, doors and shutters are intended for specific conditions of climate, specific test conditions may be required.

It gives no information on the behaviour of the units subjected to other types of loading.

NOTE Care should be taken to ensure that all joints between the wall and the window or door have protection which is at least equal to that of the window or door.

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 (including amendments).

EN 13123-1:2001 Windows, doors and shutters – Explosion resistance – Requirements and classification – Part 1 : Shock tube

3 Terms and definitions

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

3.1

test specimen

sample prepared and submitted for testing

3.2

attack face

the face of the test specimen designed to face the explosion

3.3

rear face

the opposite side of the test specimen to the attack face

3.4**breach**

an opening created by distortion in the test specimen during the test and evident after the test exceeding that specified in clause 9. Any opening created by a fragment of the specimen passing through or ejected from the test specimen

3.5**explosive pressure resistance [EXR]**

resistance offered against a defined pressure wave

3.6**pressure wave**

blast pressure pulse impinging on the test specimen defined in the terms below. The pressure recorded and referred to shall be the reflected pressure experienced by the test specimen when it is positioned at the end of the shock tube

3.6.1**peak pressure (P_{\max})**

the initial peak pressure above the ambient atmospheric pressure following an instantaneous rise at the time of arrival of the pulse at the test specimen

3.6.2**reflected pressure**

a reflected pressure occurs when a blast wave strikes the surface of a target which obstructs the flow. The shock wave moving through the air impacts against the test specimen and is reflected producing a pressure on the surface of the test specimen having a higher value than would have occurred within an unobstructed flow

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3.6.3**duration**

duration of the positive phase of the mean pressure trace (t_+)

3.6.4**pressure-time wave trace**

the pressure expressed as a function of time (see Figure 1)

3.6.5**positive specific impulse (i_+)**

the area under the pressure-time trace during the first positive phase duration (see hatched area in Figure 1)

3.6.6**equivalent triangular duration (t_{Δ})**

the duration of the equivalent pressure-time trace following a straight line from the peak pressure at the time of arrival to zero pressure, forming a triangle having the same impulse area as the defined pressure wave

i.e. $t =$ two times specific impulse divided by pressure expressed as

$$t = \frac{2i}{P_{\max}}$$

4 Requirements

Classification requirements relating to the explosion resistance of windows, doors and shutters are given in EN 13123-1.

5 Apparatus

5.1 Pressure generating device

Shock tube or similar device capable of reproducing the effects of a plane shock wave from a high explosive.

5.2 Test specimen support

The test specimen support shall be a rigid frame or construction through which the test specimen may be securely attached to the shock tube. It shall:

- (a) be sufficiently strong to resist the blast forces without deformation and without imparting deformations to the test specimen.
- (b) allow the test specimen to be fixed in a manner representative of its as built condition without imposing abnormal stresses.
- (c) prevent passage of blast pressure other than through deformation or by design intention of the test specimen.
- (d) accept mounting of pressure gauges next to the attack face.

Dimensioned drawings of standard supports shall be prepared by the testing authority and made available to potential applicants. These shall show clearly the locations and dimensions of openings and all suitable fixing points, brackets, holes and bolts.

All and any additional or purpose made frames, fixing points, methods or supports and their designs shall be agreed between the applicant and the testing authority prior to a test as being suitable for the purpose.

5.3 Equipment for measuring

Equipment shall comprise :

- (a) Thermometers suitable for measuring the ambient air temperature and the temperature of the rear face of the test specimen taking into account variations due to shade, sunlight or other weather conditions to an accuracy of $\pm 1^\circ \text{C}$. Measurements to be taken within 30 min of the test.
- (b) A barometer suitable for measuring the ambient air pressure outside the shock tube to an accuracy of $\pm 2 \text{ mbar}$.
- (c) Gauges instrumentation systems for measuring and recording the pressure-time history of the blast pulse. These can be : gauges incorporating piezoelectric/piezoresistive or equivalent pressure transducers capable of responding to variations in pressures within 0,1 ms and recording pressures to an accuracy of $\pm 5 \%$ of the peak pressure throughout the range of pressures and durations to be experienced.

6 Test specimen

The test specimen shall be representative of the relevant window, door or shutter (see clause 11).

The applicant shall supply drawings showing dimensions and all other details of the test specimen to scale together with description and composition of all materials including infills, fixings etc.

The test specimen size and method of fixing to the test specimen support shall be agreed between the testing authority and the applicant. The attack face shall be clearly marked.

After the test, at the request of the applicant, the testing authority shall return the test specimen, adequately and indelibly marked for retention.

7 Procedure

7.1 Installation

Install the test specimen in the test specimen support, ensuring that :

- (a) The alignment/relationship between all components is correct.
- (b) The fixings do not create abnormal stresses in the test specimen.
- (c) No opening exists between/around the test specimen and the test specimen support.
- (d) The hardware, mechanisms, movable sashes and door leaves are operable.
- (e) The method of fixing and type/quantity of fixings used are identical in all respects to the intended application.
- (f) Pressure gauges are installed in suitably shaped, robust mountings designed to minimise vibration effects. A minimum of two gauges shall be used to record the blast pressures experienced by the attack face of the test specimen. In the normal location for the test specimen, across the end of the shock tube, these gauges shall be positioned to record the reflected pressure-time history and shall be mounted in the reflected pressure zone. Records shall be taken to permit the evaluation of the test in accordance with clause 9.
- (g) All measurement devices are checked so as to verify their correct calibration.

7.2 Test – Explosion pressure resistance (EPR)

The test shall reproduce the effects of a blast wave front striking at the attack face of the specimen with pressure generated within a shock tube facility or similar process.

Measurement of the positive maximum over pressure created by the shock wave, shape and the duration of the positive pressure phase shall be calculated in accordance with the procedure given in annex A « Blast parameters and derivation » found in EN 13123-1.