



SLOVENSKI STANDARD
SIST EN 13123-1:2001
01-september-2001

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Windows, doors and shutters - Explosion resistance - Requirements and classification -
Part 1: Shock tube

Fenster, Türen und Abschlüsse - Sprengwirkungshemmung - Anforderungen und
Klassifizierung - Teil 1: Stoßrohr

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

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Ta slovenski standard je istoveten z: EN 13123-1:2001

ICS:

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

SIST EN 13123-1:2001

en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13123-1

April 2001

ICS 13.230; 91.060.50

English version

Windows, doors and shutters - Explosion resistance - Requirements and classification - Part 1: Shock tube

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

Fenster, Türen und Abschlüsse - Sprengwirkungshemmung
- Anforderungen und Klassifizierung - 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

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Foreword

This European Standard 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 October 2001, and conflicting national standards shall be withdrawn at the latest by October 2001.

This European Standard is one of a series of standards for windows, doors and curtain walling. The requirements and classification relate to a test specified in EN 13124-1.

Annex A is normative.

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 the criteria which windows, doors and shutters shall satisfy to achieve a classification when submitted to the test method described in EN 13124-1.

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 is applicable to blast overpressure generated in a shock tube test facility used to simulate a high explosive detonation on windows, doors and shutters, complete with their frames and infills, for use in both internal and external locations in buildings. It gives no information on the explosion resistance capacity of the wall or other surrounding structure.

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).

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EN 13124-1:2001 Windows, doors and shutters – Explosion resistance – Test method –
Part 1: Shock tube
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3 Terms and definitions

For the purposes of this European Standard the terms and definitions given in EN 13124-1 apply.

4 Requirements

Resistance to perforation and pressure shall be classified in accordance with clause 5. To achieve a particular class of explosion resistance, the test specimen shall

(a) be subjected to not less than the corresponding level of each of peak pressure, positive specific impulse and minimum duration specified in clause 5, Table 1

and,

(b) show no perforation or damage exceeding that specified in 9.2 of EN 13124-1:2001.

After the test the door leaf and/or any opening sash shall remain retained in the closed position whether the opening mechanisms shall be still operable or not. It shall not be possible to gain unauthorised access from the attack face as a result of damage or exposure during the test of any security closure mechanisms which were intentionally secure prior to the test. It is not a requirement of the test that performance in other respects such as air permeability, watertightness, wind resistance etc. be maintained.

If the intended application of the window, door and shutter is such that it will be specifically subjected to climatic extremes, the test specimen shall be tested at these climatic extremes.

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.

5 Classification of the level of explosion pressure resistance (EPR)

The classes EPR1 to EPR4 given in Table 1 are in order of increasing explosion pressure resistance. When a window, door or shutter achieves a particular class it also automatically achieves all lower classes.

Table 1 - Characteristics of the shock wave

Minimum values of :		
Classification code	Peak pressure P_{max} bar ^a	Positive specific impulsion i_+ bar-ms
EPR1	0,50	3,7
EPR2	1,00	9,0
EPR3	1,50	15,0
EPR4	2,00	22,0

^aThe duration of the positive phase (t_+) shall be not less than 20 ms

NOTE 1 The classification refers to the reflected pressure values which the test specimen experiences.

NOTE 2 A latitude of -5 % is permitted on the pressure value to allow for gauge reading tolerance. No reduction is permitted on the impulse and duration values which shall be determined in accordance with annex A. The decay coefficient defining the shape of the mean pressure trace lies within the values 0 to 4.

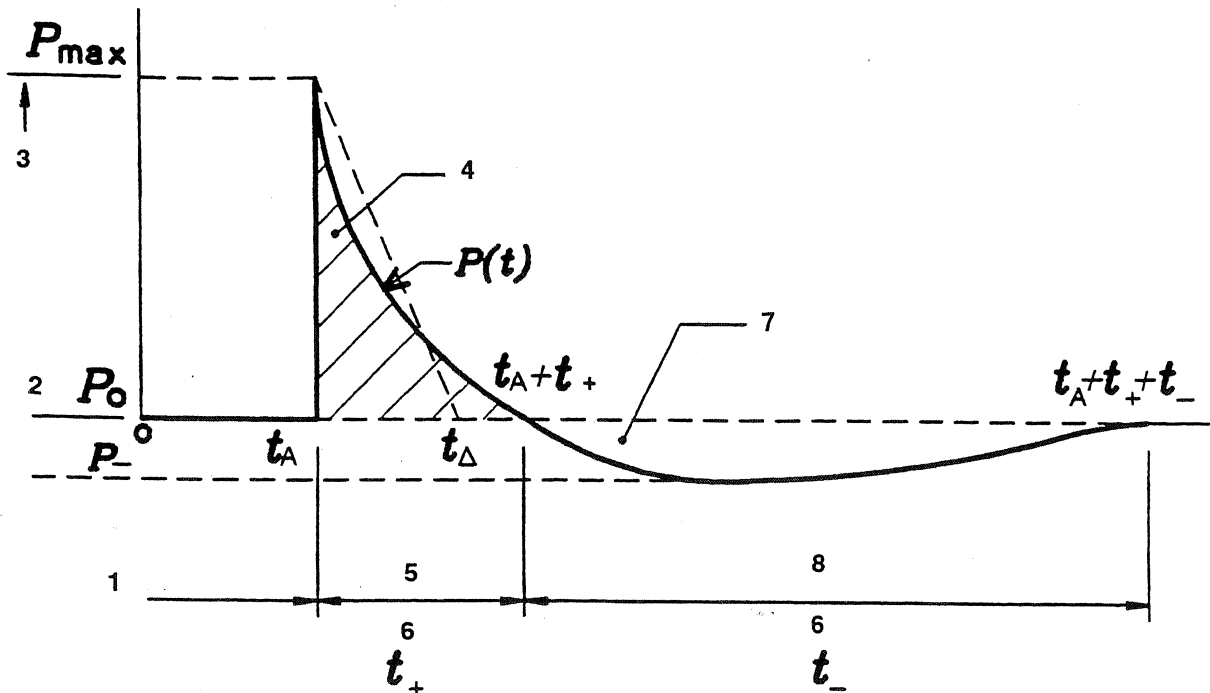
NOTE 3 The testing authority is required to ensure that the pressure and impulse values for any one classification test remain below that of the next higher classification or, in the case of EPR4, the upper bound values given as P_{max} 2,5 et $i_+ = 32$ (see Figure A.1 in annex A).

NOTE 4 Results of the tests is further notated with an addition of an « S » or « NS » suffix with regard to the presence or absence of splinters originating from the rear (protected) face of the test specimen.

Examples :

EPR 1 (S) = Splinters ejected from rear (protected side) of the glass or infill material.

EPR 1 (NS) = No splinters ejected from rear (protected side) of the glass or infill material.



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Key

- 1 Time of arrival
- 2 Ambient pressure
- 3 Pressure
- 4 Positive specific impulse, i_+
- 5 Positive phase
- 6 Duration
- 7 Negative specific impulse, i_-
- 8 Negative phase
- 9 Time after explosion

NOTE With a blast wave generated by a shock tube the negative phase may not be present.

For definitions refer to clause 3.

Figure 1 - Idealised pressure-time variation for a blast wave

Annex A (normative)

Blast parameters and derivation

A.1 Scope

This annex sets out the procedures to be followed by the testing authority to achieve consistent measurement and derivation of the test blast parameters for comparison against the classification parameters defined in requirements and classification clause 5, Table 1.

A.2 Symbols

$P(t)$	=	Pressure, above ambient pressure, at time t
P_c	=	Classification peak pressure
P_{\max}	=	Peak pressure derived from measured test values
i_{+c}	=	Classification positive phase specific impulse
i_+	=	Positive phase specific impulse, calculated from measured test values
t_{+c}	=	Classification positive phase duration
t_+	=	Positive phase duration derived from measured test values
$t_{\blacktriangle c}$	=	Triangular duration calculated from classification values of P_c and i_{+c}
t_{\blacktriangle}	=	Triangular duration calculated from P_{\max} and i_+

A.3 Units

Parameter	Units	Equivalent units
Pressure	bar	= 100 kPa - (kilopascal) = 100 kN/m ² - (kilonewton/m ²)
Duration	ms	= ms = milliseconds
Impulse	bar-ms	= area enclosed by pressure time curve

A.4 Mathematical relationships

The relationship between the parameters P_{\max} , i_+ , t_+ and t_{\blacktriangle} can be expressed as functions of the exponential decay shape of the idealised pressure-time trace using the following formulae :

(a) the modified Friedlander equation :

$$P(t) = P_{\max} \{1 - t/t_+\} \times \exp\{-A \times t/t_+\}$$

where :