



SLOVENSKI STANDARD

oSIST prEN 13123-2:2023

01-oktober-2023

Okna, vrata, polkna in obešene fasade - Odpornost proti eksplozijam - Zahteve in razvrstitve - 2. del: Preskus v areni

Windows, doors, shutters and curtain walling - Explosion resistance - Requirements and classification - Part 2: Arena test

Fenster, Türen, Abschlüsse und Vorhangfassaden - Sprengwirkungshemmung - Anforderungen und Klassifizierung - Teil 2: Freilandversuch

Fenêtres, portes, fermetures et façades rideaux - Résistance à l'explosion - Exigences et classification - Partie 2 : Essai en arène

Ta slovenski standard je istoveten z: prEN 13123-2

ICS:

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

oSIST prEN 13123-2:2023

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NORME EUROPÉENNE
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Will supersede EN 13123-2:2004

English Version

Windows, doors, shutters and curtain walling - Explosion resistance - Requirements and classification - Part 2: Arena test

Portes, fenêtres et fermetures - Résistance à l'explosion
- Exigences et classification - Partie 2: Essai en plein air

Fenster, Türen und Abschlüsse -
Sprengwirkungshemmung - Anforderungen und
Klassifizierung - Teil 2: Freilandversuch

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 33.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 13123-2:2023) 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 document is currently submitted to the CEN Enquiry.

This document will supersede EN 13123-2:2004.

In comparison with the previous edition EN 13123-2:2004, the following technical modifications have been made:

- inclusion of façade testing;
- inclusion of additional classes for small and large changes and user defined load class;
- editorial changes.

The EN 13123 series of standards *Windows, doors, shutters and curtain walling — Explosion resistance — Requirements and classification* currently consists of:

- Part 1: Shock tube;
- Part 2: Arena test.

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prEN 13123-2:2023 (E)

1 Scope

This document specifies the criteria, which windows, doors, shutters as well as curtain walling elements need to satisfy to achieve a classification when submitted to the test method described in prEN 13124-2:2023.

This document concerns a method of test against blast waves produced by high explosives in an arena test. This document considers free-field high explosive events equivalent to:

- 3 kg to 20 kg (TNT equivalent) at distances from 3 m to 9 m, described by the fixed classification levels PXR 1 to PXR 7;
- 100 kg to 500 kg (TNT equivalent) at distances from about 15 m to 30 m, described by the fixed classification levels VXR 1 to VXR 7.

It produces a classification according to prEN 13124-2:2023. Indicative charge sizes and stand-off distances producing these loading levels are shown in Annex B.

Blast loadings characterised by user specified blast parameters for other high explosive scenarios can also be specified.

Blast loads which cannot be produced in an arena test might be produced by a shock tube test following prEN 13123-1:2022 and prEN 13124-1:2022.

This document is applicable to blast waves generated by explosives in an arena test facility to produce high explosive blast loads on windows, doors and shutters as well as curtain walling systems, complete with their frames, infills and fixings, 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

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.

prEN 13124-1:2022, *Windows, doors, shutters and curtain walling — Explosion resistance — Test method — Part 1: Shock tube*

prEN 13124-2:2023, *Windows, doors, shutters and curtain walling — Explosion resistance — Test method — Part 2: Arena test*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 13124-2:2023 apply.

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

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

4 Requirements

Resistance to damage and pressure shall be classified in accordance with Clause 5. This issue of the test standard provides the possibility to do tests either:

- a) for fixed classification levels (PXR and VXR classes); or

- b) for user defined loading levels with specified parameters for peak positive reflected pressure and peak positive reflected specific impulse.

To achieve a particular class of explosion resistance, the test specimen shall

- c) be subjected to not less than the corresponding test level of each of peak positive reflected pressure, peak positive reflected specific impulse specified in Clause 5, Table 1, Table 2 and Figure 1;
- d) achieve a hazard class as specified in prEN 13124-2:2023, 8.2.

It is not a requirement of the test that performance in other respects such as air permeability, water tightness, wind resistance etc. be maintained.

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

Requirements for the performance of opening and locking mechanisms or for testing in an open condition may also be assessed.

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, shutter and curtain walling.

5 Classification of the level of explosion pressure resistance (PXR and VXR)

The classification of a test specimen is permitted for both:

- a) predefined classification levels (PXR 1 to PXR 7 and VXR 1 to VXR 7) with respect to peak positive reflected pressure and peak positive reflected specific impulse (Table 1 and Table 2). When a tested test specimen achieves a particular classification it also automatically achieves all classes characterized by lower peak pressure and lower peak positive reflected specific impulse and
- b) user defined classification levels described by peak positive reflected pressure and peak positive reflected specific impulse complementing the PXR and VXR classes to a wide range of possible classification levels suitable for various blast scenarios due to high explosive detonations.

Table 1 — Blast parameters of the blast wave generated in arena tests (small charges)

Classification code	Classification code according to EN 13123-2:2004	Minimum peak positive reflected pressure	Minimum peak positive reflected specific impulse
		p_{\max} kPa	i_+ kPa-ms
PXR 1	Not applicable	70	150
PXR 2	Not applicable	110	200
PXR 3	EXR 1	250	300
PXR 4	EXR 2	800	500
PXR 5	EXR 3	700	700
PXR 6	EXR 4	1 600	1 000
PXR 7	EXR 5	2 800	1 500
PXR U	Not applicable	User defined	User defined

Table 2 — Blast parameters of the blast wave generated in arena tests (large charges) (after the CPNI test standard)

Classification code	Minimum peak positive reflected pressure	Minimum peak positive reflected specific impulse
	p_{\max} kPa	i_+ kPa-ms
VXR 1	50	370
VXR 2	65	440
VXR 3	90	540
VXR 4	140	690
VXR 5	275	960
VXR 6	185	1 370
VXR 7	295	1 690
VXR U	User defined	User defined

Allowable tolerances:

Peak positive reflected pressure 0 % and +20 %;

Peak positive reflected specific impulse 0 % and +20 %

To ensure that clearing effects are managed, the impulse value at the top corners of the test sample should be no more than 10 % below the expected impulse value at that point when the classification value is achieved at the centre of the test specimen.

The classification refers to the peak positive reflected pressure and peak positive reflected specific impulse values which are experienced at the centre of the test specimen.

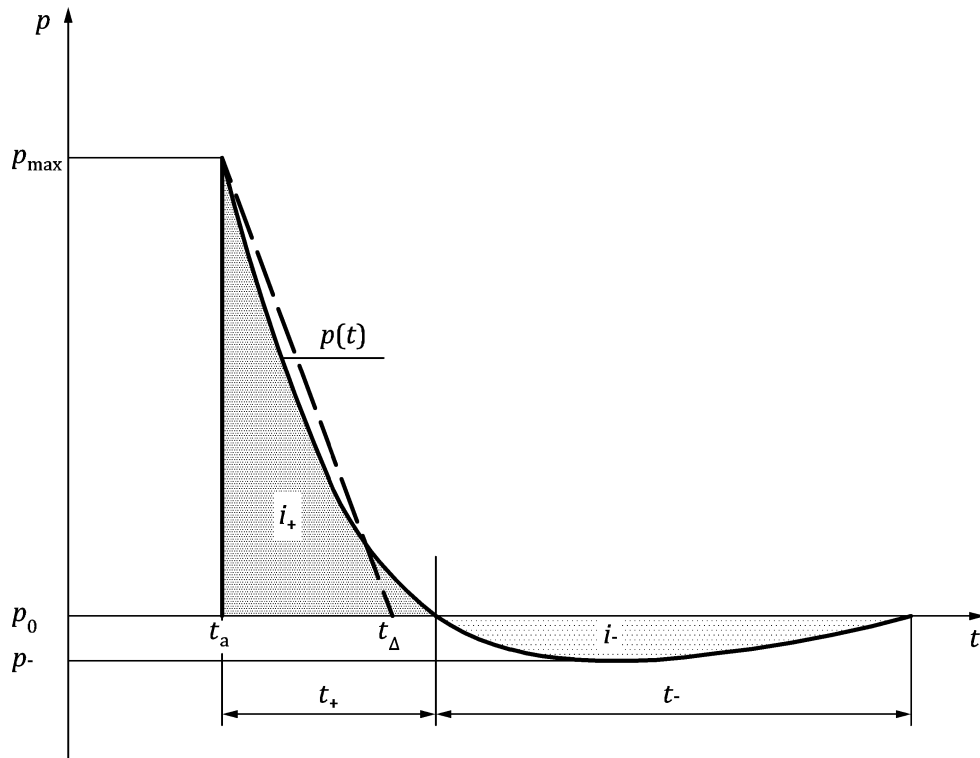
Peak positive reflected pressure, peak positive reflected specific impulse and positive duration values shall be determined in accordance with Annex A. The decay coefficient defining the shape of the mean pressure trace should lie within the values 0 to 4.

A user defined classification level shall contain the values of peak positive reflected pressure and peak positive reflected specific impulse.

Results of the tests is further annotated with hazard class according to prEN 13124-2:2023. Test results achieved according to EN 13123-2:2004 with a rating EXR NS are equivalent to hazard class B, and with a rating EXR S are equivalent to hazard class C.

The test criteria are the blast parameters shown in Table 1 and Table 2. For convenience Table B.1 and Table B.2 show approximate charge masses and stand-off distances for the standard classification levels.

Products tested according to prEN 13123-1:2022 may be classified under this standard provided that both pressure and impulse values are achieved or exceeded.

**Key**

t_a	time of arrival
p_0	ambient pressure
p	pressure
p_{\max}	peak positive reflected pressure
i_+	peak positive reflected specific impulse
t_+	duration of positive phase
i_-	peak negative reflected specific impulse
t_-	duration of negative phase
t_Δ	duration of theoretical triangular shaped positive pressure profile based on p_{\max} and i_+

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

Annex A (normative)

Blast parameters and derivation

A.1 General

This annex sets out the procedures to be followed by the test facility 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 and Table 2.

A.2 Symbols

A	decay coefficient or form parameter
$p(t)$	pressure, above ambient pressure, at time t
p_c	classification peak pressure
p_{\max}	peak positive reflected pressure (maximum pressure) derived from measured test values
i_{+c}	classification positive phase reflected specific impulse
i_+	peak positive reflected specific impulse, calculated from measured test values
t_{+c}	classification positive phase duration
t_+	positive phase duration derived from measured test values
$t_{\Delta c}$	triangular duration calculated from classification values of p_c and i_{+c}
t_{Δ}	triangular duration calculated from p_{\max} and i_+

A.3 Units

Units are given in Table A.1.

Table A.1 — Units

Parameter	Unit	Equivalent units
pressure	kPa	kilo-Pascal; 1 kPa = 1 kN/m ²
duration	ms	millisecond
impulse	kPa-ms	