SLOVENSKI STANDARD
SIST EN 1629:2021

01-september-2021

Nadomešča:
SIST EN 1629:2012+A1:2016

Vrata, okna, obešene fasade, mreže in polkna - Protivlomna odpornost - Preskusna metoda za ugotavljanje odpornosti proti dinamičnim obremenitvam

Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Test method for the determination of resistance under dynamic loading

Türen, Fenster, Vorhangfassaden, Gitterelemente und Abschlüsse - Einbruchhemmung - Prüfverfahren für die Ermittlung der Widerstandsfähigkeit unter dynamischer Belastung

Blocs-portes pour piétons, fenêtres, façades rideaux, grilles et fermetures - Résistance à l'effraction - Méthode d'essai pour la détermination de la résistance à la charge dynamique

Ta slovenski standard je istoveten z: **EN 1629:2021**

ICS:

13.310	Varstvo pred kriminalom	Protection against crime
91.060.50	Vrata in okna	Doors and windows

SIST EN 1629:2021 **en,fr,de**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1629

June 2021

ICS 13.310; 91.060.50

Supersedes EN 1629:2011+A1:2015

English Version

Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Test method for the determination of resistance under dynamic loading

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This European Standard was approved by CEN on 19 March 2021.

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Ref. No. EN 1629:2021 E

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European foreword

This document (EN 1629:2021) 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of an identical text or by endorsement, at the latest by December 2021, and conflicting national standards shall be withdrawn at the latest by December 2021.

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

This document supersedes EN 1629:2011+A1:2015.

Significant changes in this revision are:

a) updated editions of Normative References;

b) clarification of combined impact points in 6.2.1.

This document is one of a series of standards for burglar resistant pedestrian doorsets, windows, curtain walling, grilles and shutters. The other standards in the series are:

— EN 1627:2021, *Pedestrian doorsets, windows, curtain walling, grilles and shutters — Burglar resistance — Requirements and classification*;

— EN 1628:2021, *Pedestrian doorsets, windows, curtain walling, grilles and shutters — Burglar resistance — Test method for the determination of resistance under static loading*;

— EN 1630:2021, *Pedestrian doorsets, windows, curtain walling, grilles and shutters — Burglar resistance — Test method for the determination of resistance to manual burglary attempts*.

The test described in this document is intended to simulate physical attacks, e.g. shoulder charge, kicking.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies a test method for the determination of resistance to dynamic loading in order to assess the burglar resistant properties of pedestrian doorsets, windows, curtain walling, grilles and shutters. It is applicable to the following opening functions: turning, tilting, folding, turn-tilting, top or bottom hung, sliding (horizontally and vertically), projecting, pivoted (horizontally and vertically) and rolling as well as non-openable constructions.

It is acknowledged that there are two aspects to the burglar resistance performance of construction products, their normal resistance to forced operation and their ability to remain fixed to the building. This test method does not evaluate the performance of the fixing to the building.

The manufacturer's installation instructions will give guidance on the fixing of the product.

An example for the contents of the manufacturer's installation instructions is given in EN 1627:2021, Annex A.

This document does not apply to walls and roofs, as well as for doors, gates and barriers, intended for installation in areas in the reach of persons, and for which the main intended uses are giving safe access for goods and vehicles accompanied or driven by persons in industrial, commercial or residential premises, as covered by EN 13241:2003+A2:2016.

NOTE It is important that construction products that can be reached or driven through by vehicles are protected by appropriate measures such as barriers, extensible ramps, etc.

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.

EN 356:1999, *Glass in building — Security glazing — Testing and classification of resistance against manual attack*

EN 1627:2021, *Pedestrian doorsets, windows, curtain walling, grilles and shutters — Burglar resistance — Requirements and classification*

EN 1628:2021, *Pedestrian doorsets, windows, curtain walling, grilles and shutters — Burglar resistance — Test method for the determination of resistance under static loading*

EN 1630:2021, *Pedestrian doorsets, windows, curtain walling, grilles and shutters — Burglar resistance — Test method for the determination of resistance to manual burglary attempts*

EN 12216:2018, *Shutters, external blinds, internal blinds — Terminology, glossary and definitions*

EN 12519:2018, *Windows and pedestrian doors — Terminology*

EN 12600:2002, *Glass in building — Pendulum test — Impact test method and classification for flat glass*

EN 13119:2016, *Curtain walling — Terminology*

EN 13241:2003+A2:2016, *Industrial, commercial, garage doors and gates — Product standard, performance characteristics*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1627:2021, EN 12519:2018, EN 12216:2018 and EN 13119:2016 and the following 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

3.1
test specimen
complete, fully functioning construction product as detailed in the scope of this document

3.2
sub-frame
standard surrounding frame into which the test specimen is mounted for testing purpose

3.3
test rig
surrounding substantial steel frame with movable steel supports into which the sub-frames containing test specimens of various dimensions can be mounted

3.4
impacting unit
impactor suspended by means of a suitable steel cable, as a pendulum of fixed length, with a release hook and height regulating device

3.5
impactor
body used to strike the test specimen

3.6
impact point
position on the surface of the test specimen where the dynamic load is applied

4 Apparatus

4.1 Test rig

The test rig into which test specimens of various dimensions can be mounted is shown in Annex A, Figure A.1. The stiffness of the rig shall be such that a 15 kN force applied to any of the defined points and normal to the plane of the frame will not cause a deflection of more than 5 mm and shall not affect the results of the test. The test rig shall not impede the execution of the test.

4.2 Pendulum impactor

The pendulum impactor, conforming to EN 12600:2002, is listed with individual components and pictured in Annex A, Figure A.2 and Figure A.3. The impactor shall consist of two pneumatic tyres (type 3.50 R8 4PR[1]) inflated to a pressure of (0,35 ± 0,02) MPa with round section and flat longitudinal tread and shall be suspended by means of a suitable steel cable giving a minimum pendulum length of 1 000 mm, with a release hook and height regulating device. The tyres shall be fitted to the rims (type 250-8) of wheels that carry two steel weights of equal mass. The weights shall be dimensioned so that the total mass of the impactor is (50 ± 0,1) kg (excluding the steel cable and release hook) and the weights do not have any contact with the test specimen during the impact.

The drop height shall be the vertical height through which the centre of gravity of the impactor falls, with a tolerance of ± 10 mm. The impactor support point shall allow the impactor to strike the test specimen at all relevant points. The complete pendulum impactor unit shall be adjustable and may be installed either on the test rig, as shown in Annex A, Figure A.1, or as an independent unit.

4.3 Suspension system

The suspension system shall conform to EN 12600:2002.

4.4 Sub-frame

The sub-frame shall simulate the support given to the product when installed into a building. It shall typically consist of the following:

a) for group 1 to group 4 products, a rectangular minimum metal tube 120 mm × 120 mm × 5 mm or a rectangular timber frame minimum 100 mm × 70 mm;

NOTE High quality wood, e.g. glue laminated timber.

b) additionally, for group 3 products and group 4 products a steel tube 40 mm × 40 mm × 3 mm and a base plate of 8 mm steel, consisting of several segments which shall be removable for the purposes of loading, if necessary.

4.5 Measuring equipment

The measuring equipment consists of the following:

a) suitable device for measuring the drop height;

b) equipment for determining temperature and relative humidity;

c) gap gauge C, as shown in EN 1628:2021, Figure A.14.

The dimensions of the gap gauge shall have a tolerance of ± 1 mm.

[1] Tyre 3.50-R8 4PR can be used for the pendulum test. Tyre 3.50-R8 4PR is the trade name of a product supplied by Vredestein BV. This information is given for the convenience of users of this European Standard and does not constitute an endorsement by CEN of the product named. Equivalent products may be used if they can be shown to lead to the same results.

5 Test specimen

5.1 General

The test specimen shall be a functioning product complete with its frames, hardware, guide rails, curtain, tube, roller box and accessories, as appropriate.

The test specimen shall be fixed square and plumb and without twist or bend into a sub-frame. The installation shall be in accordance with the manufacturer's installation instructions relevant for the given subframe material/dimensions (see examples in Figure A.4 to A.20 b).

For the purposes of this document, the test specimen shall be glazed according to the relevant glazing resistance class of EN 356:1999, corresponding to the resistance class of the construction product according to EN 1627:2021, as shown in Table 1 of this document.

For the purpose of this test, the glass pane offering the highest security level shall be placed on the impact side of the product. The test specimen used in this test may also be used for the pre-test in accordance with EN 1630:2024, provided that any damage caused by these tests will not affect the result of the pre-test. See EN 1627:2021, Clause 11.

Table 1 — Test specimen glazing requirements

Resistance class	Minimum resistance class of glazing according to EN 356:1999 fitted on the test specimen for testing purpose
RC 1 N	P4 A
RC 1	P4 A
RC 2 N	P4 A
RC 2	P4 A
RC 3	P5 A

Products that use infilling other than glass shall be tested with the intended infill material. The test specimen used in the static test in accordance with EN 1628:2021 may also be used for this test.

Products that are intended to be installed in orientations other than vertical (e.g. roof lights) shall be installed in the vertical orientation for the purpose of this test.

Should the glass break during any tests, the test programme shall proceed with the broken glass *in situ*. Adhesive film may be applied to the glass to protect the tester.

5.2 Preparation and examination of the test specimen

The specimen shall be stored for at least 8 h in a temperature range between 15 °C and 30 °C until the start of the test to ensure that it is fully tempered for the test.

The test specimen and sub-frame mounted in the test rig shall be visually examined for damage, defects or other particular conditions of finish, etc. These shall be recorded.

During testing, the test specimen shall be closed and locked at the declared secured condition in accordance with the manufacturer's instructions.

All locking hardware that can be disengaged from the attack side without the use of a key or tools shall be disengaged during all tests.

Products in resistance class 1 shall additionally be prepared prior to the dynamic loading test by removing all parts on the attack side that can be unscrewed, dismounted or disassembled using the tools described in EN 1630:2021, Annex A, tool set A1. Parts shall not be damaged during this procedure. The total time for this preparation procedure shall not exceed 3 min. If the test specimen has been previously subjected to a preparation period of 3 min then it shall not be repeated.

The parts removed during this preparation shall be recorded.

6 Procedure

6.1 Test room climate

The test room temperature shall be maintained between 15 °C and 30 °C.

The relative humidity in the test room shall be between 30 % and 70 %.

6.2 Impact points, directions and test sequence

6.2.1 General

The dynamic loads specified in EN 1627:2021, Table 13 shall be applied at the impact points and in the impact directions given in 6.2.2 (group 1, 2 and 3 products) and 6.2.3 (group 4 products), using the specified impacting unit. The impact direction shall be perpendicular to the plane of the test specimen.

Any impact points that are within 300 mm of each other shall be combined into a single impact point, mid-way between the two original impact points. No more than two impact points may be combined into a single impact point.

The test sequence shall be as given in Annex B, Figure B.1.

6.2.2 Group 1, Group 2 and Group 3 products

6.2.2.1 General

For Group 1, Group 2 and Group 3 products, the impacts shall be applied once to each corner first and then three times to the centre of the test specimen. For test specimens without corners (circular), four points shall be selected that are approximately equidistant around the edge of the test specimen. The impact points shall be as described in 6.2.2.2 to 6.2.2.8 and, as shown in Annex A, Figures A.21 to A.29. A test specimen with more than one glazing or infilling smaller than 150 mm × 300 mm (w × h) shall be impacted three times at the centre of the glazed or infilling area. Test specimen with glazing or infillings smaller than 150 mm × 300 mm (w × h) shall not be tested.

As the dynamic test is intended to simulate physical attacks without the use of tools (e.g. shoulder blows or kicks), the impacts shall strike the product on the attack side.

6.2.2.2 Hinged doors, single or double leaf doors and sliding doors

This test shall not be performed on any door leaf or infilling of less than 150 mm wide (see Annex A, Figure A.21, dimension A and C).

If the distance between two adjacent impact points is less than 300 mm (see Annex A, Figure A.21, dimension B), only the mid-point between those impact points shall be tested.

6.2.2.3 Double doors

Unless the applicant instructs to the contrary, both doors shall be tested. The applicant may request the test for the double door on one door only, in which case the test shall be applied as for a single-leaf door.

The inside leaf of the double door shall be fully removed to allow a complete dynamic test of the outer door. The outer door shall then be removed, and the inside door tested.

The test procedure is shown in Annex A, Figure A.22.

6.2.2.4 Side-hinged windows, sliding windows and pivot windows with one or more casements

The test shall not be performed on infillings of less than 150 mm wide (see Annex A, Figure A.23, dimension A).

If the distance between two adjacent impact points is less than 300 mm (see Annex A, Figure A.23, dimension B), only the mid-point between those impact points shall be tested.

One impact shall be applied to each corner of the infilling and three impacts shall be applied to the centre of each infilling.

6.2.2.5 Single wing shutters

The test shall not be performed on infillings of less than 200 mm wide (see Annex A, Figure A.24, dimension A).

If the distance between two adjacent impact points is less than 300 mm (see Annex A, Figure A.24, dimension B), only the mid-point between those impact points shall be tested.

One impact shall be applied to each corner of infilling or leaf and three impacts shall be applied to the centre of each infilling or leaf.

6.2.2.6 Multi-leaf wing shutters

Multi-leaf wing shutters shall first be impacted at the impact points on the meeting edges as shown in Annex A, Figure A.25 (V) and thereafter at the hinges as shown in Annex A, Figure A.25 (B).

All other impact points shall be tested as described in 6.2.2.2.

6.2.2.7 Folding shutters

Folding shutters shall first be impacted at the impact points on the meeting edges and thereafter at the hinges, as shown in Annex A, Figure A.26.

If all hinges are identical then a minimum of four shall be chosen and tested.

All other impact points shall be tested as described in 6.2.2.2.

6.2.2.8 Roller shutters

One impact shall be applied to each corner of the roller curtain and three impacts shall be applied to the centre of the roller curtain. The impact points are shown in Annex A, Figure A.27.

6.2.3 Group 4 products

For Group 4 products, the impacts shall be applied to the specimen as shown in Figures A.28 and A.29. Infilling openings that are smaller than gap gauge C as shown in EN 1628:2021, Figure A.14 shall not be tested.

One impact shall be applied to each corner of the specimen and three impacts shall be applied to the centre of the grille.

As the dynamic test is intended to simulate a physical attack test in which the primary objective is to remove the products from the building without the use of tools, the impacts shall strike the product from the attack side or non-attack side as appropriate for the intended installation.

When impacting grilles, a plate 250 mm square may be used to spread the impact and prevent damage to the impactor.

6.3 Impact test procedure

The dynamic loads specified in EN 1627:2021 shall be applied at the impact points shown in Annex A, Figures A.21 to A.29 of this document using the pendulum impactor, which shall be raised to the appropriate drop height and stabilized. At the drop height the suspension cable shall be taut and the axis of the cable and pendulum impactor shall be in line.

The pendulum impactor shall be released and allowed to swing freely against the test specimen. If it rebounds, then the impactor shall be restrained and not allowed to strike the product for a second time. After each impact, the test specimen shall be inspected for damage and assessed for failure and any damage to the specimen shall be recorded. When using the gap gauge C to assess failure, a force of 200 N shall be applied directly to the test specimen and at a point to increase any aperture and therefore increase the possibility that the gap gauge can pass through.

NOTE A hand-held force gauge has been successfully used for this procedure.

At rest, the impactor shall be positioned (10 ± 5) mm from the face of the test specimen.

7 Expression of results

The product shall be deemed to have failed if the gap gauge C can pass through an aperture in the product. Moving direction of the gauge (C) shall be perpendicular to the largest cross section of the gauge.

8 Test report

The test report shall include the following details:

a) name and address of the person or body carrying out the testing;

b) name of the applicant, plus the name of the manufacturer of the test specimen, if different;

c) details of the test specimen, to include:

   1) types of construction;

   2) profile references (codes, names, dimensions etc.);

   3) types of materials used;

   4) thickness of infilling and glazing;

   5) used building hardware and it's fixing.

d) designation of materials;

e) date of manufacture;

f) declared classification of glazing used in the test specimen according to Table 1 of this document;

g) declared classification of applicable hardware standards or the result of additional tests if relevant (see EN 1627:2021, Clause 6);

h) attack side(s) of the test specimen;

i) secured condition(s) during the test and the method of power supply during the testing of electromechanical hardware;

j) drop height of the pendulum impactor, expressed in millimetres, the mass of the pendulum impactor, expressed in kilograms and tool set used;

k) dimensioned drawings of the specimen, to include the following, which shall be inspected and stamped by the testing laboratory and retained by the applicant;

   1) dimensions and tolerances;

   2) list of the various parts of the construction product, including precise manufacturer's designation.

l) installation instructions of the product (see EN 1627:2021, Annex A);

m) all relevant test results;

n) range of sizes covered by the test;

o) report of the condition of the specimen before the test including detailed description of any damage caused during the test;

p) date of report;

q) signature of responsible person.