P-marking of construction products
Certification rules CR 020
- Windows of wood and wood/metal

This is a translation from the Swedish original document. In the event of any dispute as to the content of the document, the Swedish text shall take precedence.
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Preface

Certification rules describe the conditions for certification of construction products by SP Certification. They consist partly of product-specific rules and partly of general rules (Certification Rules no. 000 – General).

These certification rules (CR 020) are based on current standards, but may be revised in the future, e.g. to bring them into line with the requirements of European or international standards. They may also be revised if new regulations are introduced, or as a result of experience of application and operation of the rules. If it is necessary to complement the rules, or to define any aspects of them in more detail, they will be revised and published on SP's web site.

This certification rule supersedes the previous version dated March 2015.

Certification Rules no. CR 020 for Windows of Wood and/or Wood/Metal is issued by the authority of the Manager of SP Certification.

December, 2016

Anders Sjelvgren
Manager, SP Certification
1 Summary

These certification rules set out technical information for windows, glazed doors and ventilation units made of wood or wood/metal. General information on certification rules can be found in CR 000.

2 Intended application

Windows, glazed doors and ventilation units made of wood or wood/metal for installation in facades or walls.

3 Applicable requirements in accordance with the Planning and Building Act (2010:900), PBL Chapter 8, 4 §

<table>
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<th>Requirements in accordance with PBL</th>
<th>Applicable to windows</th>
</tr>
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<tbody>
<tr>
<td>1 Mechanical resistance and stability</td>
<td>X</td>
</tr>
<tr>
<td>2 Safety in case of fire</td>
<td>X</td>
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<td>X</td>
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<td>4 Safety in use</td>
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<td>X</td>
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<td>X</td>
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<td>7 Suitability for the intended purpose</td>
<td>X</td>
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<tr>
<td>8 Accessibility and usability for individuals with reduced mobility or sense of direction</td>
<td>-</td>
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<td>9 Economical management of water and waste</td>
<td>-</td>
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<td>10 Broadband access</td>
<td>-</td>
</tr>
</tbody>
</table>
3.1 Applicable requirements in the National Board of Housing, Building and Planning’s (Boverket) regulations

<table>
<thead>
<tr>
<th>Requirement in PBL</th>
<th>BBR/EKS</th>
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<tbody>
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<td>1</td>
<td>EKS 10</td>
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<tr>
<td></td>
<td>The Board’s mandatory provisions and general recommendations on the application of European design standards (Eurocodes)</td>
</tr>
<tr>
<td>2</td>
<td>5:231</td>
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<td></td>
<td>Fire resistance classes and other conditions – Structural elements, classes and definitions – Classes</td>
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<td>2</td>
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<tr>
<td></td>
<td>Protection against the development and spread of fire and smoke in buildings – Walls, ceilings, floors and fixtures</td>
</tr>
<tr>
<td>3</td>
<td>6:5324</td>
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<td></td>
<td>Moisture – Ground and structural elements – Walls, windows and doors</td>
</tr>
<tr>
<td>4</td>
<td>8:231</td>
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<td>Safety in use – Protection against falling from heights – openable windows, balcony doors etc.</td>
</tr>
<tr>
<td>4</td>
<td>8:35</td>
</tr>
<tr>
<td></td>
<td>Safety in use – Protection against collision and crushing – Glass in buildings</td>
</tr>
<tr>
<td>5</td>
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</tr>
<tr>
<td></td>
<td>Protection against noise</td>
</tr>
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<td></td>
<td>Energy management – Coefficient of thermal transmittance – U-value</td>
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<tr>
<td>6</td>
<td>9:21</td>
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<tr>
<td></td>
<td>Energy management – Dwellings – Building envelope’s airtightness</td>
</tr>
<tr>
<td>6</td>
<td>9:31</td>
</tr>
<tr>
<td></td>
<td>Energy management – Non-residential premises – Building envelope’s airtightness</td>
</tr>
</tbody>
</table>

3.2 Relevant sections in the P-marking rules

<table>
<thead>
<tr>
<th>Requirements in PBL</th>
<th>Sections in the P-marking rules defining the requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4.1.3 Resistance to wind load</td>
</tr>
<tr>
<td>2</td>
<td>4.1.9 Reaction to fire</td>
</tr>
<tr>
<td></td>
<td>4.3.1 Fire protection (additional requirement)</td>
</tr>
<tr>
<td>3</td>
<td>4.1.2 Watertightness</td>
</tr>
<tr>
<td></td>
<td>4.2.4 Design of profiles and corner sections</td>
</tr>
<tr>
<td>4</td>
<td>4.2.8 Fittings</td>
</tr>
<tr>
<td></td>
<td>4.2.9 Glass units and glazing</td>
</tr>
<tr>
<td>5</td>
<td>4.3.2 Airborne noise reduction (additional requirement)</td>
</tr>
<tr>
<td>6</td>
<td>4.1.1 Airtightness</td>
</tr>
<tr>
<td></td>
<td>4.1.4 Thermal insulation</td>
</tr>
</tbody>
</table>

4 Technical requirements

4.1 Function requirements

Windows to be tested shall be selected so that they together can be regarded as representing all window types that are to be approved, which means that different window types can be tested in respect of different performance requirements. However, at least one window type in the group must be tested for all the sub-tests, and be tested in the order set out below. Nevertheless, provided that other sub-tests are not regarded as affecting the results, any retesting that is needed due to failure of a test need be performed only in respect of the properties that failed their tests. The dimensions of the test windows shall be selected so that they are at least 70% of the size of the largest dimensions to be approved.

1. Racking and static torsion
2. Operating forces
3. Repeated opening and closing (including testing of operating forces after conclusion of the test)
4. Air permeability
5. Resistance to wind load (including testing of air permeability between stages of the test)
6. Watertightness

4.1.1 Air permeability

Testing
EN 1026

Requirement
At least Class 4 in accordance with EN 12207 (including any slot ventilator). Requirements to be applied in accordance with the leakage per unit area alternative.

4.1.2 Watertightness

Testing
EN 1027, method A or B.

Requirement
At least Class 7A or 7B in accordance with EN 12208

4.1.3 Resistance to wind load

Testing
EN 12211.

Requirement
Deflection Class C (<1/300) and at least Wind Load Class 3 in accordance with EN 12210.

4.1.4 Thermal performance

Testing
EN ISO 12567-1
Calculation
Detailed calculation for frame and casement in accordance with EN ISO 10077-2, with applicable equations in accordance with EN ISO 10077-1.

Requirement
For all P-marked constructions the manufacturer shall have access to correct U-values for a standard size (1.23 m x 1.48 m). By request the manufacturer shall also be able to provide U-values for the sizes in question. For all U-values that are stated, the size for which the values are valid shall also be stated.

4.1.5 Resistance to condensation

Window designs which from previous experience are known to have a low risk for condensation (inner surface or within the structure) are not required to be tested. For designs where information is lacking a test or calculation must be carried out.

Surface condensation on the inside

Testing
NT Build 235.

Calculation
Two-dimensional or three-dimensional method of calculation with coefficient of surface thermal transmittance in accordance with EN ISO 10077-2.

Requirement
Surface temperature index for insulated profiles ≥0.5.

Condensation in the window structure

Testing
NT Build 236, but with 5 Pa pressure difference. Testing is normally applicable only for linked casements, and shall be performed with the penetrations for ventilators, Venetian blinds etc. that can be used.

Requirement
No condensation may form inside the structure during testing.

4.1.6 Racking and static torsion

Testing
EN 14608 and EN 14609.

Requirement
At least Class 2 in accordance with EN 13115.

4.1.7 Operating forces

Testing
EN 12046-1

Requirement
At least Class 1 in accordance with EN 13115.
4.1.8 Repeated opening and closing

Testing
EN 1191.

Requirement
At least Class 2 in accordance with EN 12400 (10,000 cycles).

4.1.9 Reaction to fire

The reaction to fire class shall be declared.

Testing
In accordance to EN 14351-1, annex H

Requirement
Class in accordance to EN 13501-1. Class F may be declared without testing.

4.2 Materials and components – durability and other properties

4.2.1 Wood profiles

Wood profiles shall fulfill the requirements of EN 14220, with the additions and clarifications given below for the following approvable alternatives.

The wood material in the parts of profiles exposed to the weather shall consist either of material having resistance equivalent to at least Class 3 of EN 350-2, or of material that has been modified or treated in such a way as to have corresponding properties.

Examples of clarifications of approvable alternatives are given below. Other alternatives may in due course be approved and therefore become acceptable for P-marking. In such cases, not only shall the durability of the material be considered, but also all relevant properties as needed for function of the material, such as strength, surface treatment, adhesive bonding results and compatibility with other materials be considered.

A Pine

A.1 The wood raw material

The wood raw material must not be stored in water. The wood shall be of at least Grade B in accordance with the requirements of Nordic Timber - Sorting Rules, or of Grade G4-2 in accordance with EN 1611-1. After drying, the wood shall be conditioned for at least one day at 40 – 45 °C with a relative humidity of 70 ±10%.

A.2 Wood quality and appearance classes

No rot, mildew, blue stain, insect attack, mechanical damage, wane or compression wood can be accepted. Cross-grain must not exceed 50 mm/m. No pith edges, resin pockets or bark pockets can be accepted on visible or semi-concealed faces of profiles.
Diameters of knots or clusters of knots must not exceed the values given in Table A.2.1 below. The values are expressed as absolute maximum values in mm and as percentages of the width or thickness of the profile in which the knot is visible. For information, the table also shows the relevant classes in EN 942.

<table>
<thead>
<tr>
<th>Type of profile</th>
<th>Visible and semi-concealed faces</th>
<th>Concealed faces</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Max. knot diameter</td>
<td>Class EN 942</td>
</tr>
<tr>
<td>Frame, casement, mullion etc.</td>
<td>20 mm</td>
<td>30%</td>
</tr>
<tr>
<td>Glazing strip, glazing bar etc.</td>
<td>2 mm</td>
<td>10%</td>
</tr>
</tbody>
</table>

The length of cracks must not exceed the values given in Table A.2.2. The values are expressed as absolute maximum values in mm of any single crack, and as a percentage of the length of that part of the profile in which the cracks are visible. For information, the table also shows the relevant classes in EN 942.

<table>
<thead>
<tr>
<th>Type of profile</th>
<th>Visible and semi-concealed faces</th>
<th>Concealed faces</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Max. crack length</td>
<td>Class EN 942</td>
</tr>
<tr>
<td>Frame, casement, mullion etc.</td>
<td>Not permitted</td>
<td>J5</td>
</tr>
<tr>
<td>Glazing strip, glazing bar etc.</td>
<td>Not permitted</td>
<td>J5</td>
</tr>
</tbody>
</table>

The width of cracks must not exceed the values shown in Table A.2.3, below. The values are expressed as absolute values in mm for any given crack. For information, the table also shows the relevant classes in EN 942.

<table>
<thead>
<tr>
<th>Type of profile</th>
<th>Visible and semi-concealed faces</th>
<th>Concealed faces</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Max. crack width</td>
<td>Class EN 942</td>
</tr>
<tr>
<td>Frame, casement, mullion etc.</td>
<td>Not permitted</td>
<td>J5</td>
</tr>
<tr>
<td>Glazing strip, glazing bar etc.</td>
<td>Not permitted</td>
<td>J5</td>
</tr>
</tbody>
</table>

Special requirements, set out in Section 4.2.3, apply for horizontal surfaces that can be reached by water from precipitation or condensation.

A.3 Durability alternatives

Profiles exposed to the weather in accordance with the definition in EN 14220, Annex B, shall fulfil one of the following four durability alternatives:
Alternative 1
Metal cladding.

Alternative 2
100% of the profile to be heartwood.

Alternative 3
The wood shall be impregnated to Class B protection in accordance with Nordic Timber document no. 1, and the manufacturing process shall comply with the requirements of Nordic Timber document no. 3. The end surfaces of casement members shall be given surface treatment in the form of undercoat and/or top coat painting, and shall be assembled using an approved adhesive meeting the requirements of at least Class D4 adhesives in EN 204.

Alternative 4
The wood shall be impregnated to a depth of at least 4 mm in sapwood, and the manufacturing process shall comply with the requirements of Nordic Timber document no. 3. The end surfaces of casement members shall be given surface treatment in the form of undercoat and/or top coat painting, and shall be assembled using an approved adhesive meeting the requirements of at least Class D4 adhesives. As an alternative to the use of mastic for sealing the ends of casement members, sealing the end surfaces in their entirety with an approved Class D4 adhesive can be accepted.

A.4 Moisture ratio

During the entire process from reception inspection to final surface treatment, the moisture ratio of the wood shall be within the interval of 12% ± 2%, with 95% of test measurements lying within this range. This means that, for example, in a group of ten measurements, none may lie outside the limits, while one measurement can lie outside the limits in a group of twenty measurements. In the event of any dispute, moisture ratios shall be measured in accordance with CEN/TS 12169.

A.5 Density and growth rings

The density of the wood shall be not less than 450 kg/m³ at 12% moisture ratio. Average growth ring width of the lamella in profiles that will be exposed to the weather, or where fittings will be fastened, shall not exceed 3.0 mm, with no individual growth ring exceeding 5.0 mm. Corresponding requirements for other profiles are 4.0 mm and 6.0 mm respectively. Growth rings shall be measured in accordance with EN 1310, and at least 95% of the measured results shall lie within the permitted tolerances.

4.2.2 Adhesively bonded components

The adhesive bonding process for bonding lamella and making finger joints shall fulfil the requirements of CR 022, with specified wood requirements as for the P-marking of windows.

Adhesives shall be classified and approved, of not less than Class D4 of EN 204, or Class C4 of EN 12765. A list of approved adhesives is given in SP’s Approved Wood Adhesives list for the manufacture of components for windows and exterior doors.

Repairs to profiles may be made using adhesive-coated wood plugs or fillers. EN 204 Class D3 and Class D2 adhesives are accepted for use in indoor climates, i.e. inside weatherstrips. For use in other positions, Class D4 adhesives must be used. Fillers must
be suitable for being painted over and, when used for repairs etc. in surfaces exposed to the weather, shall be weather-resistant.

4.2.3 Design of profiles and corners

Casement and frame profiles shall be designed so that rain and condensate run off. Horizontal surfaces on the side exposed to the weather, and which can be reached by water from precipitation or condensation, shall have a slope of at least 1:8 (\( >7.1^\circ \)). Cracks, pith edges or bark pockets cannot be accepted on these surfaces. To prevent water penetration, corner joints in casements and frames shall be tight on weather-exposed sides and against surfaces that can be reached by water from precipitation or condensation.

Grooves should not be cut for securing metal window sills. As standard, manufacturers shall offer a design arrangement for metal window sills that does not involve cutting a groove, but which abuts the sill to the bottom member of the frame underneath a drip groove or equivalent. If customers request a groove for location of the sill, they shall be informed at the contract review stage that the arrangement is regarded as less suitable in terms of durability.

4.2.4 Surface treatment

4.2.4.1 Definitions

The window’s visible, semi-concealed and concealed are defined in EN 14220.

4.2.4.2 General requirements

Surface treatment finishes for windows can consist of top-coating paint or transparent treatment (varnish or stain). Paint shall be applied in at least two coats, to give a minimum dry thickness of 100 \( \mu \text{m} \). Transparent finishes can be varnished on the room side.

Surface treatment shall fulfil the requirements of Section 4.2.5.5 (below) after exposure in accordance with EN 927-3 (Paints and Varnishes. Coating Materials and Coating Systems for Exterior Wood. Natural Weathering Test), achieving the AVERAGE classification of EN 927-1 for windows’ interior surfaces, and of EN 927-5 (Paints and varnishes. Coating materials and coating systems for exterior wood. Assessment of the liquid water permeability).

4.2.4.3 Surface treatment of window parts

All visible and concealed wood surfaces in a window, including end grain surfaces, shall be surface-treated. In addition:

- wood surfaces under cladding, and in the glazing rebates, shall be impregnated, primed or top-coated;
- external wooden glazing strips shall be surface-treated on all sides (including end grains).
4.2.4.4 Documentation

The window manufacturer shall provide a description of the surface treatment system employed, in accordance with the model form in Appendix 2, with details of the following points:

1. The name of the supplier of the surface treatment system, with material names and information on materials’ composition
2. Specification of required conditions of surfaces to be painted
3. Methods of application and drying
4. Coating thicknesses (wet film and dry layer) for the primer and top coats
5. References to test reports on the condition and properties of the surface treatment system after exposure in accordance with Item 4.2.5.5
6. Information on the type of surface treatment of different parts of windows that shows that the requirements set out in Item 4.2.5.3 have been fulfilled
7. Painting class of finish-treated surfaces in accordance with SS 184280 (the type of coating, durability of surfaces and appearance for visible, semi-concealed and concealed parts).
8. Details of the window manufacturer’s internal inspection system for surface treatment processes
9. References to care and maintenance instructions for the surface treatment, intended for use by the window ‘user’.

4.2.4.5 Determination of properties after exposure

Pieces for testing
Prepare pieces for testing as specified in EN 927-3.

Select pieces for testing the knot staining as described in CEN/TS 16359.

Climate exposure
Perform climate exposure testing by means of natural exposure according to EN 927-3 at an exposure site in Scandinavia and in accordance with EN 927-2, A.4 “Exposure conditions”.

or:
by means of artificial ageing in accordance with EN 927-6.

Required properties after exposure testing
After exposure testing as described above, the surface treatment of the test pieces shall meet the requirements shown in the table below: ell:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blistering</td>
<td>EN ISO 4628-2</td>
<td>In accordance with the ’Stable’ requirement in EN 927-2, Table 1</td>
</tr>
<tr>
<td>Cracking</td>
<td>EN ISO 4628-4</td>
<td></td>
</tr>
<tr>
<td>Flaking</td>
<td>EN ISO 4628-5</td>
<td></td>
</tr>
<tr>
<td>Separation from substrate</td>
<td>EN ISO 2409</td>
<td></td>
</tr>
<tr>
<td>Knot stains</td>
<td>CEN/TS 16359</td>
<td>ΔE ≤ 1</td>
</tr>
<tr>
<td>Water permeability</td>
<td>EN 927-5</td>
<td>In accordance with the ’Stable’ requirement in EN 927-2, Table 1</td>
</tr>
</tbody>
</table>
4.2.5 Surface cladding

Metal profiles and fixing components shall be made of corrosion-resistant or corrosion-protected material. Steel parts shall be made of stainless steel, be galvanized or be galvanically insulated from aluminium profiles.

Wood beneath claddings shall be impregnated, primed or top coat-painted.

Joints between wood and metal profiles may be either diffusion-proof or ventilated. If ventilated, the distance between the metal profile and the wood shall be at least 6 mm, with contact surfaces between the wood and metal not exceeding 20 mm wide and not constituting more than one-third of the area. The space between the metal profile and the wood shall be vented to the outside air. Openings and joints shall be designed such as to prevent the entry of rainwater to as great an extent as possible.

4.2.6 Profiles of polymer materials

Resistance to artificial weathering

Testing
Climate exposure (ageing) in accordance with EN 513. Total irradiation 0.8 MWs/cm² for external profiles and 0.2 MWs/cm² for other profiles.

Requirement (homogenous profiles)
Charpy impact properties in accordance with EN ISO 179-1 or EN ISO 179-2 must not change by more than 20% after ageing.

Requirement (expanded materials)
Flexural properties in accordance with EN ISO 178 must not change by more than 20% after ageing.

Heat reversion

Testing
EN 479

Requirement
Mean value of length change not to exceed 2%, and the difference between the profile sides not to exceed 0.4 percentage points.

4.2.7 Fittings

Fittings (all metal parts, except any surface cladding) shall:

- have a surface finish treatment equivalent to at least Class 3 of EN 1670. Fittings mounted on the inside of the window shall have a surface finish treatment equivalent to at least Class 1.

Alternatively:

- after exposure*, fulfil the following requirements as specified in EN ISO 11997-1, Cycle B:
1. Suffer from no base metal corrosion in those cases where the base metal is steel. Base metal corrosion is therefore not included in the definition of a ‘defect’ in Requirements 4 and 5.
2. Have no delamination of the surface coating layer.
3. Have no penetrating cracks.
4. Have a maximum permitted rating of 3 for quantity/density of defects in accordance with EN ISO 4628-1, Table 1. Interpretation of ‘moderate’ shall be that not more than 10% of the surface may show defects.
5. Maximum defect size 4, as given in EN ISO 4628-1, Table 2.
6. Change of surface appearance in the form of matting or colour change; maximum 2, as given in EN ISO 4628-1, Table 3.
7. Blistering; maximum density 2, and maximum size 3, i.e. 2S3 as given in EN ISO 4628-2.

*) Two weeks’ exposure for fittings mounted inside the inner weatherstrip, and four weeks’ exposure for other fittings.

Child safety fittings shall fulfil the requirements of Nordtest NT cons 018, SS 3587, EN 13126-1 or EN 16281. In certain cases, child safety devices are a requirement of the Swedish Building Regulations, Section 8:231.

4.2.8 Glass units and glazing

Sealed glazing units

Sealed glazing units shall fulfil the appropriate requirements for P-marking them. Fitting of the units in accordance with the MTK instructions ‘Fitting of Sealed Glazing Units’ is approved.

Safety glass

Any need for safety glass in accordance with Section 8:35 of the Swedish Building Regulations and/or MTK’s Safety instructions shall be identified at the contract review. Where such needs are identified or specified, the glass shall be selected and fitted in accordance with the MTK Safety regulations.

Mastics

Mastics for use with single panes shall fulfil the requirements of SS 818135 Class 2.
4.2.9 Weatherstrips and gaskets

Evaluate all respects of the performance of weatherstrips and gaskets entirely by full-scale testing. Nevertheless, the long-term properties of the products shall fulfil at least the following minimum requirements.

Weatherstrips and gaskets shall be P-marked according to CR 076 or fulfil the requirements according to ISO 3934 or EN 12365-1 as shown in the table below:

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Class as in ISO 3934</th>
<th>Class as in EN 12365-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inside</td>
<td>Temperature class P1, Weathering resistance R1</td>
<td>Temperature class 2, 3, 4 or 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recovery after ageing : at least class 1</td>
</tr>
<tr>
<td>Outside, sun protected position,</td>
<td>Temperature class P2, P3 or P4. Weathering resistance R1</td>
<td>Temperature class 3, 4 or 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recovery after ageing : at least class 3</td>
</tr>
<tr>
<td>Outside, direct sun</td>
<td>Temperature class P2, P3 or P4. Weathering resistance R2</td>
<td>Not possible</td>
</tr>
</tbody>
</table>

4.2.10 Slot ventilators

Testing
In accordance with EN 1026

Requirement
The window manufacturer shall provide correct information on the air flow (l/s) through the ventilator at a pressure difference of 10 Pa.

4.3 Additional requirements

The requirements in this section (4.3) are not obligatory. However, manufacturers may agree that certain products comply with one or more of these additional requirements. A condition for approval of such requirements is that the function requirements and other requirements in accordance with Items 4.1 and 4.2 are fulfilled for the product in question.

4.3.1 Fire resistance

Testing
SIS 024820/SS 024828/SS 024827 (ISO 834/ISO 3009/ISO 3008) or equivalent European standard in accordance with the table below:

<table>
<thead>
<tr>
<th>Product</th>
<th>European test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openable windows</td>
<td>EN 1634-1</td>
</tr>
<tr>
<td>Fixed windows</td>
<td>EN 1364-1</td>
</tr>
</tbody>
</table>

Requirement
In accordance with the requirements of the National Board of Housing, Building and Planning’s General Guidelines no. 1993:2, Guidelines for Type-approval of Fire Resistance, Edition 2. Classification of integrity and insulation (EI), or integrity alone €, with associated time requirements in accordance with the National Board of Housing, Building and Planning’s Building Regulations, Section 5:23. When testing in accordance with European standards, classify windows in accordance with EN 13501-2.
4.3.2 Airborne sound insulation

The requirements are based on section 4.11 of the product standard EN 14351-1.

**Testing**
EN ISO 10140-2

**Evaluation**
Weighted sound reduction index ($R_w$) and spectrum adaptation terms ($C$ and $C_{tr}$) are evaluated in accordance with EN ISO 717-1. $C_{tr}$ must normally be evaluated over the frequency range of 100 Hz to 3150 Hz, but can (upon voluntarily request) be evaluated over the frequency range 50 Hz to 5000 Hz, in accordance with the Swedish acoustic classification system. Note, however, that Annex B of EN 14351-1 must not be used for measurements outside the 100 Hz to 3150 Hz frequency range.

**Presentation of results and marking**
The sound insulation of windows can be expressed as shown in the following example:

Sound insulation $R_w$ ($C; C_{tr}$) = 33 (-1; -5) dB

**Note** Necessary safety margins must be added to the results of laboratory measurements when designing in order to ensure that the desired acoustic performance is obtained under field conditions.

4.3.3 Burglar resistance

**Testing**
EN 1627, EN 1628, EN 1629 and EN 1630

**Requirement**
Class RC2 in accordance with EN 1627

4.3.4 Passive windows

In order to be marketed and marked as a P-marked passive window the window design must meet the following additional requirements:

- The window must have a $U$-value that is equal to or better than 0.8 for the reference size according to product standard EN 14351-1. The $U$-value shall be determined in accordance with paragraph 4.1.4 Thermal performance.
- The window air permeability must be better than 1/3 of the allowable leakage for class 4 according to EN 12207.
  The reference value $Q_{100}$ is set to 1 for allowable leakage per m².

$$Q = Q_{100} \left( \frac{P}{100} \right)^{\frac{2}{3}}$$

$Q$ = Permissible max flow at the measured pressure (m³/m², h)
$P$ = Measured pressure (Pa)
$Q_{100}$ = Reference value, (max permissible flow at 100 Pa)
- The windows $G$-value (total solar energy transmittance) and LT-value (light transmittance) are declared in accordance with product standard EN 14351-1.
5 Manufacturer’s own inspection

5.1 Quality manual

The manufacturer shall prepare a quality manual containing or referring to all documents (specification documents) and document types (documents presenting results etc.) included in the manufacturer’s quality system.

5.2 Organisation

A person shall be appointed as responsible for quality, with responsibility and authority as needed to ensure that quality requirements are met and that the quality system is applied.

Responsibilities, authority and interworking conditions shall be defined for all persons performing work connected to product and service quality, and shall be notified to all persons within the organisation affected by such arrangements. Examples of areas to be covered include:

- Contract reviews
- Document control
- Purchasing
- Manufacture
- Inspection and testing
- Management of measuring equipment
- Control of nonconforming products
- Corrective actions
- Storage, packing and delivery

5.3 Contract reviews

The company shall have a procedure for reviewing and processing contracts. It need not necessarily be set down in writing, but work must be carried out on the basis of working through a checklist or using a model form prepared for the purpose, and covering at least the following points:

- The name and address of the purchaser, including contact person and telephone number
- Lists of documents received and notes of telephone instructions, information etc.
- Window types, sizes and quantity
- Surface treatment, type and colour
- Requirements in respect of U-values, fire, noise or burglar resistance
- Glazing alternatives
- Other special manufacturing requirements or departures from standard designs
- Marking requirements
- P-marking
- Checking that production capacity is available
- Delivery time plan
- Packing and delivery requirements
- Price and terms of payment
Each contract shall be reviewed by the manufacturer to ensure that

- requirements are adequately defined and documented;
- any requirement that differs from what was offered in the tender is clarified and dealt with;
- the manufacturer is able to fulfil the contract requirements.

Documentation from such contract reviews shall be kept.

5.4 Document control

Procedures shall be established for control of quality documents, including such as (but not necessarily limited to) the following:

- the quality manual, including descriptions of procedures and working instructions
- product descriptions and drawings
- documentation of materials and components used
- external documents (including these P-marking rules)
- contract documents and product specifications
- service reports and customer complaints
- records of inspection activities required in connection with P-marking
- reports from surveillance inspection visits and testing.

Document control shall ensure that the correct editions of appropriate documents are available at the places where they are to be used, and shall prevent accidental use of out-of-date documents. Documents of external origin shall be identified, and their distribution shall be controlled.

All quality documents shall be clear and be traceable back to their specific products or orders. Quality documents shall be kept available for inspection by SP, and be filed in such as way as to enable them easily to be found.

5.5 Purchasing

The manufacturer shall ensure that purchased products comply with the requirements of these P-marking rules in one of the following ways:

- Choosing products specified in the product description approved for P-marking
- Choosing products from a list of approved products to which the P-marking rules refer
- Including the requirements and specifications that result from the P-marking rules in the purchasing specifications sent to suppliers.

5.6 Product identification

The manufacturer shall have and apply procedures for identification of the products during all stages of production, delivery and installation, in order to prevent confusion of one item with another. Products, packaging, storage sites etc. shall be marked as necessary.
5.7 Production control

Manufacture shall be carried out under controlled and planned conditions, which means that it must be performed in accordance with documented working instructions, and must be appropriately controlled. Criteria for approved quality shall be drawn up and be made known to production and inspection personnel.

Working instructions shall be prepared where and when necessary. They shall contain:

- descriptions of methods and sequence of working;
- necessary references to relevant instruction manuals, descriptions of equipment etc.;
- information on necessary maintenance requirements of machinery and equipment;
- descriptions of quality control and inspection procedures;
- criteria for approval;
- descriptions of authorities and report paths for dealing with any nonconforming products discovered.

5.8 Inspection and testing

5.8.1 Receiving inspection

The manufacturer shall ensure that incoming products are not used or worked on before inspection or other verification has shown that they comply with the approved product description and with all specified requirements. Receiving inspection shall include, but not necessarily be limited to, the following products:

- wood raw materials or profiles;
- adhesives;
- glass products;
- mastics, gaskets, glazing beads etc.;
- weatherstrips;
- fittings;
- surface treatment materials;
- materials for surface cladding.

Receiving inspection of products from manufacturers with approved quality management systems (including sealed glazing units) can be limited to identification and inspection for any damage in transit.

Incoming products that do not meet their specified requirements may not be used for P-marked products.

5.8.2 Manufacturing inspection

The manufacturer shall at all times ensure that production and work in progress comply with work instructions, manufacturing specifications and approved product descriptions. This inspection shall include, but not necessarily be limited to, the following:

- timber drying (moisture ratios, process conditions);
- machining to profiles (dimensions, wood quality, interior climate);
- adhesive bonding (application conditions, quality of the bonded joints);
• impregnation (in accordance with NTR Document no. 3);
• surface treatment (quality, process conditions);
• fitting of hardware (quality of workmanship, dimensions);
• frame and casement assembly (quality of workmanship and tightness);
• fitting of weatherstrips (quality of workmanship);
• glazing (spacers, joints and compression of gaskets);
• marking.

Inspection shall be carried out in accordance with the requirements in these P-marking rules and with the approved product description.

Nonconforming products that can adversely affect the function or durability shall be made good. Products that cannot be made good may not be P-marked.

The results from inspection of timber drying, adhesive bonding, impregnation and marking shall be documented, as shall details of the actions taken in response to unsatisfactory test/inspection results. Measured values shall normally be included, i.e. with numerical quantities.

5.8.3 Final inspection

The manufacturer shall inspect all products before delivery in respect of dimensions and quality of workmanship. In addition, there shall be full inspection of a sample of finished products, covering (where applicable) at least the following aspects:

• main dimensions;
• the quality of corner joints;
• the width of gaps between the frame and casement;
• fittings;
• opening and closing performance;
• securing of weatherstrips;
• gaskets (compression, tightness);
• glazing quality;
• quality of surface treatment;
• marking.

When being inspected as above, units that can be opened shall be secured in a position that corresponds to that in which they are intended to be installed and used.

The numbers of units to be inspected in sample-based final inspection shall be not less than as shown in the table below.

<table>
<thead>
<tr>
<th>Number of P-marked units manufactured per week</th>
<th>No. of units to be tested in final inspection per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100</td>
<td>1</td>
</tr>
<tr>
<td>101 – 250</td>
<td>2</td>
</tr>
<tr>
<td>251 – 500</td>
<td>3</td>
</tr>
<tr>
<td>501 – 1,000</td>
<td>4</td>
</tr>
<tr>
<td>&gt;1,000</td>
<td>4 + a further one per thousand units produced per week</td>
</tr>
</tbody>
</table>
The results from final inspection shall be documented, as shall details of the actions taken in response to unsatisfactory test/inspection results. Measured values (numerical quantities) shall be included. If non-compliances are found, further products shall be inspected, in such quantities as enable the extent of the non-compliance to be evaluated. Nonconforming products that can adversely affect the function or durability shall be made good, and errors in marking shall be corrected. Nonconforming products that cannot be made good may not be P-marked.

The reasons for non-compliances shall be investigated, and corrective actions shall be taken in production.

5.9 Inspection, measurement and test equipment

The manufacturer shall have routines for ensuring the function and accuracy of equipment for inspection, measurement and testing. Properties that affect the quality of the products shall be inspected, measured and tested using equipment that is identified and approved.

Equipment that is used for function testing of completed windows shall be inspected by SP.

5.10 Inspection status

The manufacturer shall employ suitable methods, such as marking or physical storage positions, to indicate if a product or batch has been inspected, and if the result is approved or not.

5.11 Control of nonconforming products

There shall be procedures for finding and dealing with nonconforming products. These procedures shall describe the means of identifying such products, documenting results, decisions on treatment/response and information to parties concerned. The procedures shall clearly state who has authority to make decisions on accepting, rectifying or scrapping nonconforming products, and whom is to be informed. These procedures shall cover defective products in process of manufacture or in store, as well as claims from customers.

5.12 Corrective actions

The reason for nonconforming of products shall be investigated and corrective action(s) shall be taken to prevent a repetition. Documentation from internal inspection, testing, customer claims etc. shall be used as sources of information. The results of corrective actions taken shall be documented.

5.13 Handling, storage, packing and delivery

Handling, storage, packing and delivery of products shall be arranged and performed in a planned and controlled manner. Stores and stock areas shall be arranged and operated in such a way as to avoid damage to, or deterioration of, products. Suppliers' instructions shall be followed in connection with handling and storage of materials and components (such as glass).
6 SP’s surveillance inspection

6.1 Inspection visits

Surveillance inspection will be performed by SP through surveillance inspection visits to the place of manufacture, normally once or twice a year. In the event of more serious non-compliances being found, further visits will be made.

Inspection shall cover:

- examination of materials, components and finished products, in respect of their compliance with the requirements set out above in Section 4 and against approved product descriptions
- examination of the manufacturer’s quality management systems and own inspection systems in respect of their compliance with the requirements set out above in Section 5
- inspection of instruments and test equipment used in the manufacturer’s own inspection
- taking of samples for testing in accordance with Item 6.2.

The inspection result is stated for the items of the checklist below:

1. Product description
2. Quality manual
3. Organization
4. Contract reviews
5. Document control
6. Production control
7. Corrective actions
8. Other quality procedures
9. Premises
10. Wood profiles – Moisture content
11. Wood profiles – Wood quality
12. Wood profiles – Manufacturing
13. Wood profiles – Internal control
14. Adhesive bonding – Process
15. Adhesive bonding – Internal control
16. Impregnation – Process
17. Impregnation – Internal control
18. Corner joints
19. Surface treatment
20. Surface cladding
21. Weatherstrips
22. Glass and glazing
23. Fittings
24. Slot ventilators etc.
25. Additions for fire, sound or burglary
26. Marking
27. Control of finished units
28. Additional remarks
6.2 Function testing of finished products

Testing of finished products shall include those of the following properties that are covered by the certificate. The three first properties must be tested in the order shown here.

- Resistance to wind load (EN 12211 item 7.3)
- Air permeability (EN 1026)
- Watertightness (EN 1027)
- Operating forces (EN 12046-1)
- Airborne sound insulation (EN ISO 10140-2)

The numbers of windows to be tested are as shown in the table below. They shall be taken such as to provide a selection of different approved types and sizes. If test results are not approved, or if non-compliances are found in the production, further samples can be taken for testing. Equally, if test results are constantly approved, the number of samples for testing can be reduced.

<table>
<thead>
<tr>
<th>Total number of approved types of windows manufactured per year</th>
<th>No. of units to be tested per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 1.000</td>
<td>1</td>
</tr>
<tr>
<td>1.001 – 2.000</td>
<td>2</td>
</tr>
<tr>
<td>2.001 – 5.000</td>
<td>3</td>
</tr>
<tr>
<td>5.001 – 10.000</td>
<td>4</td>
</tr>
<tr>
<td>10.001 – 20.000</td>
<td>5</td>
</tr>
<tr>
<td>20.001 – 50.000</td>
<td>6</td>
</tr>
<tr>
<td>50.001 – 100.000</td>
<td>7</td>
</tr>
<tr>
<td>100.001 -</td>
<td>8</td>
</tr>
</tbody>
</table>

At least half of the samples shall be taken and tested by SP or by some other test institution approved by SP. Other samples can be taken for testing and be tested by the manufacturer, but the test equipment must be inspected and approved by SP.

6.3 Actions if a product or assessment of the manufacturer’s own inspection results in failure

If inspection testing and/or surveillance inspection of the manufacturer’s own inspection procedures results in failure, the reasons for the failure shall be investigated. The results of this investigation may lead to a further surveillance visit, further testing or failure to approve the manufacturer’s own inspection procedures.

6.4 Reporting

The results of SP’s surveillance inspection shall be reported in writing to the manufacturer and, if the manufacturer is not the holder of the certificate, also to the holder of the certificate.
7 Other requirements

7.1 Product description

Product descriptions of window systems shall be in accordance with the model form shown in Appendix 1, while those of surface treatment processes shall be in accordance with the model form shown in Appendix 2. U-values shall be given in accordance with the model form shown in Appendix 3.

7.2 Handling, installation and maintenance instructions

Products shall be accompanied by written instructions contain necessary information for handling and installing windows at site, and for their subsequent care, including instructions for maintenance of the surface treatment.

7.3 Marking

Manufactured products that fulfil the requirements for P-marking shall be marked with SP’s certification symbol. The label displaying the symbol shall show the following details:

- The P-symbol
- The number of the certificate
- The name of the holder of the certificate
- The manufacturer (if this is other than the holder of the certificate)
- Possible class for additional requirement
- Information for traceability (e.g. order number and position)

The label may also contain the following details:

- Address information for the certificate-holder or manufacturer
- Product name / type designation
- Any function classes over and above the basic P-marking requirements

SP’s certification symbol [In Swedish.]
7.4 CE-marking and Declaration of Performance

For products covered by harmonized standard, the manufacturer shall draw up a declaration of performance and CE mark the product.
7.5 References


Boverket’s Building Regulations - mandatory provisions and general recommendations, BFS 2011:6, BBR

Boverket’s mandatory provisions and general recommendations on the application of European design standards (Eurocodes), BFS 2011:10, EKS 8

SP list: Approved wood adhesives for manufacture of pieces for windows and exterior doors. [In Swedish.] (Revised annually.)

CR 022 – SP's P-marking rules for adhesively bonded timber components for timber products

CR 076 – SP’s P-marking rules for Weatherstrips and gaskets

"Inspection rules for MTK approval of mastics (MTK 011101)". [In Swedish.]

"MTK Rules: Fitting of sealed glazing units". [In Swedish.]

"MTK Safety. – Selection and fitting of glass in exposed positions in order to reduce the risk of injury to persons". [In Swedish.]


NT build 235 - Windows: Resistance to condensation on the inner surface

NT build 236 - Windows: Resistance to condensation inside the window

NT cons 018 - Windows and French doors, child-resistant devices: Strength and function

NWPC Document No 1. Nordic wood preservation classes

NWPC Document No 3. Nordic requirements for quality control and marking of pressure-treated timber

EN ISO 178. Plastics – Determination of flexural properties

EN ISO 179-1. Plastics - Determination of Charpy impact properties - Part 1: Non-instrumented impact test


EN 204. Classification of thermoplastic wood adhesives for non-structural applications

EN 479. Unplasticised polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors - Determination of heat reversion

EN 513. Unplasticised polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors - Determination of the resistance to artificial weathering


EN 927-1. Paints and varnishes - Coating materials and coating systems for exterior wood - Part 1: Classification and selection

EN 927-2. Paints and varnishes - Coating materials and coating systems for exterior wood - Part 2: Performance specification

EN 927-3. Paints and varnishes - Coating materials and coating systems for exterior wood - Part 3: Natural weathering test

EN 927-5. Paints and varnishes - Coating materials and coating systems for exterior wood - Part 5: Assessment of the liquid water permeability

EN 927-6. Paints and varnishes - Coating materials and coating systems for exterior wood - Part 6: Exposure of wood coatings to artificial weathering using fluorescent UV lamps and water

EN 942. Timber in joinery - General requirements

EN 1026. Windows and doors – Air permeability – Test method

EN 1027. Windows and doors – Watertightness – Test method

EN 1191. Windows and doors – Resistance to repeated opening and closing – Test method

EN 1310. Round and sawn timber - Method of measurement of features

EN 1364-1. Fire resistance tests for non-loadbearing elements - Part 1: Walls


EN 1627. Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Requirements and classification

EN 1628. Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Test method for the determination of resistance under static loading

EN 1629. Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Test method for the determination of resistance under dynamic loading

EN 1630. Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Test method for the determination of resistance to manual burglary attempts
EN 1634-1. Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware - Part 1: Fire resistance tests for doors, shutters and openable windows

EN 1670. Building hardware – Corrosion resistance – Requirements and test methods

EN ISO 2409. Paints and varnishes - Cross-cut test

EN ISO 2813. Paints and varnishes – Determination of specular gloss of non-metallic paint films at 20 degrees, 60 degrees and 85 degrees


ISO 3934. Rubber, vulcanized and thermoplastic – Preformed gaskets used in buildings – Classification, specification and test methods

EN ISO 4628-1. Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 1: General introduction and designation system

EN ISO 4628-2. Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 2: Assessment of degree of blistering

EN ISO 4628-4. Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 4: Assessment of degree of cracking

EN ISO 4628-5. Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 5: Assessment of degree of flaking

EN ISO 4628-6. Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 6: Assessment of degree of chalking by tape method

ISO 7724. Paints and varnishes – Colorimetry
  Part 1: Principles
  Part 2: Colour measurement
  Part 3: Calculation of colour differences

EN ISO 10077-1. Thermal performance of windows, doors and shutters – Calculation of thermal transmittance – Part 1: General


EN ISO 11997-1. Paints and varnishes - Determination of resistance to cyclic corrosion conditions - Part 1: Wet (salt fog)/dry/humidity

CEN/TS 12169. Criteria for the assessment of conformity of a lot of sawn timber

EN 12207. Windows and doors – Air permeability – Classification

EN 12208. Windows and doors – Watertightness – Classification

EN 12210. Windows and doors – Resistance to wind load - Classification

EN 12211. Windows and doors – Resistance to wind load – Test method

EN 12365-1. Building hardware - Gasket and weatherstripping for doors, windows, shutters and curtain walling - Part 1: Performance requirements and classification

EN 12365-4. Building hardware - Gasket and weatherstripping for doors, windows, shutters and curtain walling - Part 4: Recovery after accelerated ageing test method

EN 12400. Windows and pedestrian doors – Mechanical durability – Requirements and classification

EN ISO 12567-1. Thermal performance of windows and doors – Determination of thermal transmittance by hot box method – Part 1 Complete windows and doors

EN ISO 12567-2. Thermal performance of windows and doors – Determination of thermal transmittance by hot box method – Part 2 Roof windows and other projecting windows

EN 13115. Windows – Classification of mechanical properties – Racking, torsion and operating forces

EN 13126-1. Building hardware - Hardware for windows and door height windows - Requirements and test methods - Part 1: Requirements common to all types of hardware

EN 13501-2. Fire classification of construction products and building elements - Part 2: Classification using data from fire resistance tests, excluding ventilation services

EN 14220. Timber and wood-based materials in external windows, external door leaves and external doorframes - Requirements and specifications

EN 14351-1. Windows and doors - Product standard, performance characteristics - Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics

EN 14608 Windows – Determination of the resistance to racking

EN 14609 Windows – Determination of the resistance to static torsion

EN 16281. Child protective products - Consumer fitted child resistant locking devices for windows and balcony doors - Safety requirements and test methods

CEN/TS 16359. Windows and doors - Product standard, performance characteristics - Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics

SIS 024820 (ISO 834). Fire test. Fire resistance tests – Elements of building construction
SS 024827 (ISO 3008). Fire tests – Building products – Door and shutter assemblies

SS 024828 (ISO 3009). Fire tests – Building construction – Glazed elements

SS 25267. Acoustics – Sound classification of spaces in buildings - Dwellings

SS 818135. Windows – Glazing material for single glazing – Requirements and tests. 1982
Description of windows approved for P-marking

Company: Date:

Product range

<table>
<thead>
<tr>
<th>Product</th>
<th>Drawing no., date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>View</td>
</tr>
<tr>
<td></td>
<td>Vertical section</td>
</tr>
<tr>
<td></td>
<td>Horizontal section</td>
</tr>
</tbody>
</table>

Size limits

Product minimum size (w x h), maximum size (w x h)

Frame and casement profiles

Timber quality:
Impregnation:
Surface treatment:
Frame:
Casement:
Mullion:
Glazing bar:
Sill:

Corner joints

Frame:
Casement:
Mullion:
Glazing bar:
Adhesive:
Sealing:
Fill material
Insulation material:
Vapour barrier:
Surface covering:
Frame:
Glazing aperture:

Adhesive joints
Laminar bonding:
Finger joints:
Corner joints:
Knot repairs:

Surface cladding
Material:
Surface treatment:
Thickness:
Fastening:

Weatherstrips
Type:
Manufacturer:
Material:
Dimensions:
Position:
Joints:
Gap width:

Glazing
Single panes:
Sealed glazing units:
Spacers:
Gaskets:
Mastic:
Putty:
Glazing beads:
**Fittings**
- Main hinges:
- Linking fittings:
- Opening restrictor:
- Closing/locking fittings:
- Striking plate:
- Lock:
- Casement support plate:

**Additional features**
- Ventilation device:
- Additional features for fire protection:
- Miscellaneous:

**Handling, installation and maintenance instructions**
- Handling:
- Installation:
- Maintenance:

**Approval classes and properties**
- Airtightness:
- Watertightness:
- Security against wind load:
- U-values:
- Fire resistance:
- Airborne noise insulation:
- Burglar resistance:

**Miscellaneous**
Documentation of surface treatment system

Window manufacturer

Surface treatment system

Type, name etc.
Supplier
Material

Condition of the substrate

Method of application and drying

Documentation of properties after exposure

Extent of surface treatment

Paint classes

Manufacturing inspection

Final inspection of windows

Maintenance instructions
List of U-values of P-marked windows and glazed doors

List of U-values of P-marked windows

U-values are as measured/calculated for a reference format of 1.2 m x 1.2 m, with at least a further two different formats. Testing shall be carried out in accordance with EN ISO 12567-1, and calculation in accordance with EN ISO 10077-2.

Manufacturer:

<table>
<thead>
<tr>
<th>Window model</th>
<th>Window type</th>
<th>Glazing</th>
<th>U-value, W/(m²K)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.2 m x 1.2 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
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</tbody>
</table>

Window type: State the material and method of opening etc.

Glazing: Describe the glazing system and type of spacers
LE = low-emission coating, Ar = argon (2Ar = in two air gaps)

U-value: State whether the value is measured (m) or calculated (c)
**List of U-values of P-marked glazed doors**

U-values are as measured/calculated for a reference format of 0.9 m x 2.1 m, with a glazed aperture of 0.9 m x 1.3 m, and can be complemented by values for other formats. Testing shall be carried out in accordance with EN ISO 12567-1, and calculation in accordance with EN ISO 10077-2.

Manufacturer:

<table>
<thead>
<tr>
<th>Glazed door model</th>
<th>Type</th>
<th>Glass</th>
<th>Fill</th>
<th>0.9 m x 2.1 m (0.9 m x 1.3 m)</th>
<th>m x  m</th>
<th>m x  m</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

**Type of glazed door:** State materials and method of opening etc.

**Glass:** Describe the glazing system and type of spacers

**Filling:** State the thickness and type of material (product name) of the thermal insulation

**U-value:** State whether the value has been obtained by testing (p) or by calculation (b)
## List of revisions

<table>
<thead>
<tr>
<th>Change</th>
<th>Decision date</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Section 4.1.1. Limitation to 450 Pa is deleted</td>
<td>2016-12-13</td>
</tr>
<tr>
<td>- Section 4.1.2. Requirement on watertightness is increased from class</td>
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<tr>
<td>5A/B to 7A/B.</td>
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<tr>
<td>- Section 4.2.8. Requirements on gaskets is incorporated in section 4.2.9.</td>
<td></td>
</tr>
<tr>
<td>- Section 4.2.9. New requirements for inside. Adjustment of other</td>
<td></td>
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<tr>
<td>requirements. Reference to P-marked gaskets in accordance to CR 076.</td>
<td></td>
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<tr>
<td>- New section 7.4. Requirement of declaration of performance and CE</td>
<td></td>
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<tr>
<td>marking.</td>
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<tr>
<td>- Section 3.1 is supplemented with reference to BBR 5:521.</td>
<td>2015-03-18</td>
</tr>
<tr>
<td>- Section 3.2 is supplemented with reference to section 4.1.9 reaction to fire.</td>
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<tr>
<td>- Section 4.1.4. Reference to standard for roof windows is removed because the rules apply to windows in facades. The text for declaration of U-value is updated.</td>
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<tr>
<td>- New section 4.1.9 reaction to fire.</td>
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<tr>
<td>- New section 4.3.4 passive windows.</td>
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<tr>
<td>- Section 6.1 Inspection visit is supplemented with check list.</td>
<td></td>
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<tr>
<td>- Section 7.3 Marking is supplemented with text for passive windows.</td>
<td></td>
</tr>
<tr>
<td>- Section 3 and other affected sections have been aligned with BBR 19 and to the Planning and Building Act.</td>
<td>2013-04-30</td>
</tr>
<tr>
<td>- Changed requirements for wood profiles (4.2.1). Replaces the previous 4.2.1 and 4.2.2.</td>
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<tr>
<td>- Changed requirements for adhesively bonded components (4.2.2).</td>
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<tr>
<td>Replaces the previous 4.2.3.</td>
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<tr>
<td>- Changed requirements for profile and corner design (4.2.3). Replaces the previous 4.2.3.</td>
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<tr>
<td>- Changed requirements for surface treatment (4.2.4). Replaces the previous 4.2.4.</td>
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<tr>
<td>- No change of requirements for surface treatment, but the second paragraph (4.2.5) has been removed. Replaces the previous 4.2.6.</td>
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<tr>
<td>- Section 4.2.6 replaces the previous 4.2.7.</td>
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<tr>
<td>- Reduced requirements for surface treatment of internal fittings, alternative requirements for surface treatment of fittings and alternative standards for child safety (4.2.7). Replaces the previous 4.2.8.</td>
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</tr>
<tr>
<td>- Changed requirements for weatherstrips and gaskets (4.2.9). Replaces the previous 4.2.10.</td>
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<tr>
<td>- The required test standard for airborne noise attenuation has been changed from EN ISO 140-3 to EN ISO 10120-2 (4.3.2).</td>
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<tr>
<td>- The required test standards for protection against forced entry have been changed from ENV to EN, with the same number. The class requirement has been changed from Class 2 to Class RC2 (4.3.3)</td>
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<tr>
<td>- Section 4.3.4, Industrial Surface Treatment, has been incorporated in Section 4.2.5.</td>
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<tr>
<td>- Updating of a number of standards from prEN to EN.</td>
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<tr>
<td>Requirement</td>
<td>Date</td>
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<td>----------------------------------------------------------------------------</td>
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<tr>
<td>Requirement of air-borne sound insulation according to 4.3.2 has been</td>
<td>2008-07-21</td>
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<tr>
<td>Requirement for resistance to condensation according to 4.1.5 has been</td>
<td>2007-12-31</td>
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<tr>
<td>Requirement for strength of corner joints according to 4.1.7 has been</td>
<td>2007-10-02</td>
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<tr>
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<tr>
<td>Requirement for centre yield of timber according to 4.2.1 has been deleted</td>
<td>2007-10-02</td>
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