



**Recipients:**

- **Quality Director**
- **Technical director**
- **Head of Development, Standardization and Programming Service**

**RECORD OF CHANGES**

<i>No. Of change</i>	<i>Page</i>	<i>Date</i>	<i>Approved</i>	<i>Description of change</i>

## Content

<b>1. SUBJECT.....</b>	<b>6</b>
<b>2. SCOPE.....</b>	<b>6</b>
<b>3. RESPONSIBILITIES.....</b>	<b>6</b>
<b>4. TERMS, DEFINITIONS AND ABBREVIATIONS.....</b>	<b>6</b>
<b>5. VISUAL ASSESSMENT OF FRAME MATERIAL.....</b>	<b>7</b>
<i>5.1 PVC profiles.....</i>	<i>7</i>
5.1.1 Surface treatment.....	7
5.1.2 Gloss stage.....	7
5.1.3 Pollution.....	7
5.1.4 Decorative surfaces.....	8
5.1.5 Color.....	8
5.1.6 Appearance of the area where the profiles join at an angle of 45° and the position of the profiles towards each other.....	8
5.1.7 Repairs by expert.....	9
<i>5.2 Aluminum profiles.....</i>	<i>9</i>
5.2.1 Painted surfaces - characteristics or defects.....	10
5.2.2 Anodized (anodized) surfaces - characteristics or defects.....	11
5.2.3 Appearance of the area where the profiles are joined at an angle of 45° and the position of the profiles towards each other.....	11
5.2.4 Deviations of profiles / panels / cladding sheets.....	12
5.2.5 Filiform corrosion - corrosion on unpainted or raw machined profiles.....	12
<b>6 QUALITY ASSESSMENT OF INSULATION GLASS.....</b>	<b>13</b>
6.1 Glass surface.....	13
6.1.1 Glass characteristics.....	14
6.1.2 Seals.....	15
6.1.3 Double glazing effect.....	16
6.1.4 Natural color.....	16

6.1.5 Insulating glass with built-in bars in the space between the glass panes	16
6.1.6 Wetting the glass surface.....	16
6.1.7 Optical phenomena (anisotropy) for safety (tempered) glass and thermally prestressed glass.....	17
6.2 Rattle or crackle of bars.....	17
6.3 Thermal glass fractures.....	17
6.4 Condensation on glass elements.....	18
6.5 Spacer split outside the corner area.....	18
<b>7 INSTALLATION OF SUN PROTECTION ELEMENTS ON THE WINDOW</b>	<b>18</b>
7.1 Airtightness.....	18
7.2 Watertightness.....	19
7.3 Internal noise.....	20
7.4 Water permeability and condensation formation.....	20
7.5 Insulation.....	21
7.6 Installation instructions for facades with plaster and insulation System om.	21
7.7 Installation.....	22
<b>8 EFFICIENCY CHARACTERISTICS OF INSTALLED ELEMENTS.....</b>	<b>23</b>
8.1 Window permeability.....	23
8.2 Blower Door Test.....	24
8.3 Thermography.....	25
8.4 Measurement of sound insulation.....	25
8.4.1 Measurement of sound insulation on a building on site.....	26
<b>9 INSTALLATION CRITERIA.....</b>	<b>27</b>
9.1 Fastening.....	27
9.2 Connection join.....	27
9.3 Instructions for the construction phase.....	28
9.4 Visual assessment of the finished joint.....	29
9.5 The problem of creating moisture on windows based on plaster and screed application works.....	29
<b>10 DEFINITION OF QUALITY AND CERTIFICATION LABELS.....</b>	<b>29</b>

10.1 Quality Management System - ENISO 9001: 2000.....	29
10.2 Quality of product and assurance of quality.....	30
10.2.1 CE znak (Europa).....	30
10.2.2 Austrian Quality Label.....	30
10.2.3 RAL quality label (Germany).....	30
<b>11 CLEANING, CARE AND MAINTENANCE.....</b>	<b>30</b>
11.1 Surfaces of PVC elements.....	31
11.1.1 Pollution and external influences.....	31
11.1.2 Decorative surfaces.....	31
11.3 Aluminum elements and linings.....	31
11.3.1 Cleaning intervals and cleaning agents.....	31
11.3.2 Conservation.....	32
11.4 Fittings / Hardware.....	33
11.5 Seals.....	33
11.6 Insulating glass.....	33
11.7 Connecting joint.....	34
<b>12 CONDENSATION AND MOLD.....</b>	<b>34</b>

## 1. SUBJECT

This quality standard serves as a manual, so that the performance of a part of the application of windows, doors, facade elements and other elements of construction openings can be neutrally assessed. Technical data and recommendations are based on knowledge or insights when issuing this standard, from which no legal obligation arises.

This document defines:

- The quality of the product and its constituent elements
- Quality control of the product and its constituent elements

In Herceg d.o.o. organization.

## 2. SCOPE

This standard is applied in all organizational parts of Herceg d.o.o. and in relations with third parties.

## 3. RESPONSIBILITIES

The Head of the Development, technology and informatics Department is responsible for the establishment, implementation and maintenance of these procedures.

## 4. TERMS, DEFINITIONS AND ABBREVIATIONS

In this procedure, terms and definitions in accordance with the ISO 9001 standard are applied.

In addition, the following abbreviations are used in this procedure:

QMS - Quality Management System

## 5. VISUAL ASSESSMENT OF FRAME MATERIAL

### 5.1 PVC profiles

Control of the general appearance of visual defects is performed at a distance of three meters. The outer elements should be observed in diffused light, and the inner elements in adequate light in accordance with the appropriate space at an angle of 90 ° to the surface.

#### 5.1.1 Surface treatment

The color on the profiles on all surfaces, which are visible after installation, should be uniform and even. Surfaces should be smooth, free of holes and dirt, and the edges should not be sharp but flat. Lines and matte surfaces that occur during the pressing process are allowed - as long as they do not interfere with the visual appearance after observation in accordance with the above rules.

Source: ÖNORM EN 12608; 2003 09 01

#### 5.1.2 Gloss stage

There is no adequate scale for estimating the gloss of an extended surface. Gloss measurement using measuring devices is performed in some places. The assessment of the extended area can only be done on the basis of static aids. Evaluation with the eye is more adequate.

During the production process, a difference in gloss that occurs along the entire surface is almost inevitable. However, differences should not be considered when observed in accordance with the above methods. Gloss differences are not used for aging profiles, but differences disappear relatively quickly after window installation.

#### 5.1.3 Pollution

Pollution can occur during the production process, installation, as well as various environmental influences after installation. During thorough cleaning after installation, all residues of dirt from the production process must be able to be removed with ordinary cleaning agents. In addition, window manufacturers also offer appropriate cleaning agents. The protective foil on PVC windows is exclusively used to protect the profile during transport, as well as during installation. They must not remain on

the windows for a long time and must be removed immediately after installation. The foils must also be removed before the built-in element is intensely exposed to the sun.

#### **5.1.4 Decorative surfaces**

PVC profiles are often laminated with decorative foils, in order to apply color and structure. Once the foil has been applied, no folds or bubbles must be visible on all visible surfaces of the window when it is closed and installed. The edges may be separated from the profile in a closed state and in an invisible area only to the extent that no dirt can enter and that this does not interfere with cleaning.

The foil must not be separated from the individual layers (creating bubbles inside the foil).

In the area where the profiles are joined at an angle of 45°, the basic material of the PVC profile is visible in the profile with decor. This area where the profiles are joined at an angle of 45° is painted by many manufacturers with the appropriate color.

#### **5.1.5 Color**

The color of PVC profiles can vary slightly, but this color difference is often equated with natural aging.

This color difference can be determined using the so-called. spectrophotometer. See tolerances RAL GZ 716/1.

The visual comparison of the color takes place according to DIN ISO 105 A03, and the deviation must not be more than one degree on the gray scale.

#### **5.1.6 Appearance of the area where the profiles join at an angle of 45° and the position of the profiles towards each other**

The corners of the PVC profile are joined by welding. The finished seam must not have holes or inclusions. The color should largely match that of the profile. At the welding site, minimal differences in profile geometry are seen. The geometric tolerance, ie the tolerance of the position of visible profile surfaces at profile depths up to 80 mm, may not exceed 0.4 mm, and also at profile depths greater than 80 mm a maximum of 0.4 mm.

Source: ÖNORM EN 12608; ; 2003 09 01



### 5.1.7 Repairs by expert

Slight damage to the surface, deformation and matte surface can be repaired by a specialist using appropriate tools and cleaners. Based on professional repairs, the durability of the profile will not be compromised. The above criteria apply to the assessment of repair.

Izvori:

ÖNORM EN 12608: 2003 09 01 - Profile aus weichmacherfreiem Polyvinylchlorid (PVC-U) zur Herstellung von Fenstern und Türen - Klassifizierung, Anforderungen und Prüfverfahren

ÖNORM EN 513: 1999 10 01 - Profile aus weichmacherfreiem Polyvinylchlorid (PVC-U) zur Herstellung von Fenstern und Türen - Bestimmung der Wetterechtheit und Wetterbeständigkeit durch künstliche Bewitterung

RAL GZ 716/1: 2008-03 Kunststoff-Fensterprofilsysteme - Gütesicherung - Abschnitt I: Kunststoff-Fensterprofile

DIN EN 20105-A03: 1994-19 Textilien - Farbechtheitsprüfungen - Teil A03: Graumaßstab zur Bewertung des Anblutens

### 5.2 Aluminum profiles

The assessment of the decorative appearance with regard to the uniformity of color, gloss and structure must be performed on diffused light from the outside at a distance of > 3 m, and for interior elements at a distance of > 2 m. Larger observation intervals are recommended to assess the uniformity of the façade.

### 5.2.1 Painted surfaces - characteristics or defects

<b>craters, bubbles</b>	are allowed on the visible side profile: $\varnothing < 0.5\text{mm}$ , 10 pieces per m or m <sup>2</sup>
<b>inclusions</b>	are allowed on the visible side of the profile, as follows: $\varnothing < 0.5\text{mm}$ , 5 pieces per m or m <sup>2</sup>
<b>peeling paint</b>	not allowed on the visible side of the profile
<b>paint leakage</b>	not allowed on the visible side of the profile
<b>orange coa</b>	allowed on the visible side of the profile only in a fine structure, and also allowed in a rough structure, if the layer thickness $> 120\mu\text{m}$ is particularly emphasized or is required by order
<b>differences in brightness</b>	allowed on the visible side of the profile, if they are within the following tolerances: Evaluation of industrial paint measurements using reflection measurements according to DIN 67530 (ISO2813) (60 ° measuring geometry) with the following tolerances - surface gloss 70 to 100E (+/- 10E) - semi-gloss 31 to 70E (+/- 10E) - matt surfaces 0 to 30E (+/- 10E)
<b>color deviation</b>	allowed on the visible side of the profile, if they do not act intrusively and if observed in accordance with the rules of visual assessment, in metallic tones should be considered greater color deviations, and the same with regard to production can not be avoided, and do not represent any defect
<b>lines, indentations, seams</b>	allowed on the visible side of the profile, only if fine or slight lines are agreed
<b>mechanical damage caused by protrusion (such as dents, bulges, scratches)</b>	allowed on the visible side of the profile, if they do not appear intrusively and if they are observed in accordance with the rules of visual assessment

Source:

ÖNORM EN 12206- 1:2004 09 01 - Beschichtungsstoffe - Beschichtungen auf Aluminium und Aluminiumlegierungen für Bauzwecke - Teil 1: Beschichtungen aus Beschichtungspulvern

### 5.2.2 Anodized (anodized) surfaces - characteristics or defects

<b>silicon deposits</b>	not allowed on the visible side of the profile
<b>wall mapping</b>	allowed only provided that E0 / E6 staining according to ONORM C2531 (DIN17611) has been done
<b>in front of the corrosion</b>	allowed only provided that E0 / E6 staining according to ONORM C2531 (DIN17611) has been done
<b>differences in brightness</b>	allowed on the visible side of the profile, if they are within the following tolerances: when measuring the reflection according to DIN 67530 (85 ° measuring geomaria), differences of 20 units in assembled pieces usually apply. It is possible to compare profiles and sheets, which are anodized in natural colors or anodized in a single-stage or two-stage process.
<b>color deviation</b>	allowed on the visible side of the profile, only if they are explicitly inserted and if they are observed in accordance with the rules of visual assessment
<b>lines, indentations, seams</b>	permitted on the visible side of the profile, only if fine or slight lines are explicitly agreed or which do not fall intrusively when staining E0 / E6 according to ONORM C2531 (DIN17611)
<b>mechanical damage due to construction (such as dents, bulges, scratches)</b>	allowed on the visible side of the profile, only if they are explicitly inserted and if they are observed in accordance with the rules of visual assessment

### 5.2.3 Appearance of the area where the profiles are joined at an angle of 45° and the position of the profiles towards each other

The assessment is performed on the built-in and closed element.

#### **Blunt connection without mechanical connection**

Joints of aluminum cladding at an angle of 45°, which are placed on PVC elements, in the case of blunt connection must be able to accept the thermal expansion of PVC so that the creation and opening of a temperature-dependent opening is foreseen and allowed.

**Blunt connection with mechanical connection**

At profile joints, the remaining opening must not be larger than 0.2 mm, and at a solid joint, not larger than 0.3 mm.

**With the welded joints**

The finished seam must not have holes or inclusions. Due to the construction, small differences in the geometry of the profile are visible at the welding site.

**5.2.4 Deviations of profiles / panels / cladding sheets**

Based on different materials and methods of processing deviations of color, gloss, structure, etc. they can also occur when using the same output color.

Such deviations are allowed - the so-called agreement is recommended/final sample .

**5.2.5 Filiform corrosion - corrosion on unpainted or raw machined profiles**

Such corrosion (peeling) most often occurs on treated raw places (holes, cross-sections, grooves, etc.), and depends on the type of material and is inevitable. However, cleaning twice a year, as well as additional conservation, can slow down the chemical reaction. Areas with high salt concentration or humidity (salt sprinkling, proximity to the sea, etc.) are particularly endangered.

Sources:

ÖNORM EN 12020-2: 2008 08 - Aluminium und Aluminiumlegierungen - Stranggepresste Präzisionsprofile

aus Legierungen EN AW-6060 und EN AW-6063 - Teil 2: Grenzabmaße und Formtoleranzen.

ÖNORM C 2531:2005 06 01 - Anodisch oxidierte Erzeugnisse aus Aluminium und Aluminiumlegierungen - Technische Lieferbedingungen

DIN 67530 : 1982 01 - Reflektometer als Hilfsmittel zur Glanzbeurteilung an ebenen Anstrich- und Kunststoff-Oberflächen

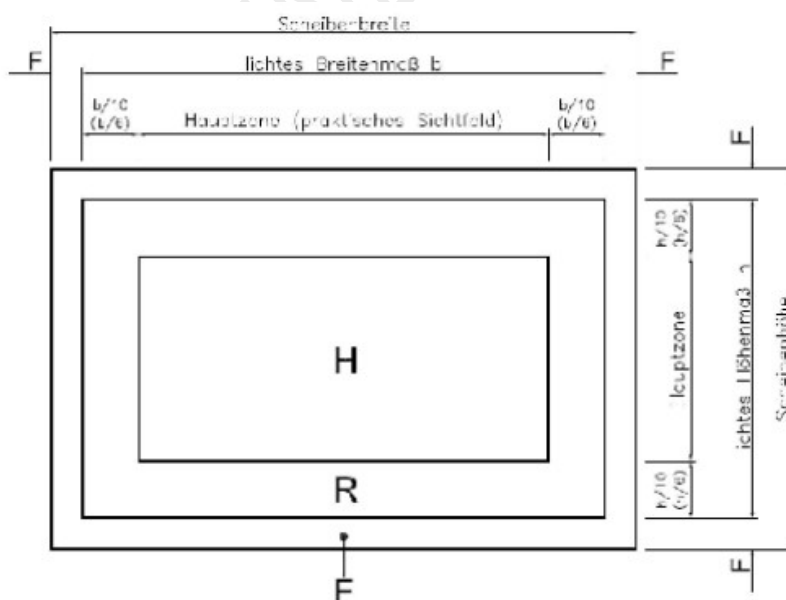
## 6 QUALITY ASSESSMENT OF INSULATION GLASS

### 6.1 Glass surface

Insulating glass based on the specifics of the material used and based on the workmanship have different characteristics. These characteristics may include: scratches thick hair, other scratches, bubbles, stains, deposits, inclusions, etc. Depending on the type of characteristics, their quantity, size and position, on the insulating glass it is necessary to assess whether there are any defects of quality.

The assessment follows according to ÖNORM B 3738 Glass in building - Insulating glass - Visual quality requirements (Edition 2008-07-01) according to the following principles with the help of Table 1 which lists the permits. Assessment of special glazing, such as burglar-proof glass, alarm or safety glass, fire protection glass, etc. based on this quality standard is only possible to a limited extent. In order to this case for assessment of such glasses should pay attention to the manufacturer's instructions.

First the insulating glass is divided into the area of the overlap F, then into the area of the frame R, and then into the main area H according to Picture 1. Different requirements are set for each of these divided areas: the greatest emphasis is placed on the main area H and the smallest as is usually the case in the area of frame R. It will then be checked according to the table which characteristics are allowed and which are not.



Picture 1 - Assessment areas for visual inspection of insulating glass

Label explanation :

F Folding area: 18mm (without agreed special constructions as well as constructions according to static requirements)

R Frame area: up to a glass surface of 5 m<sup>2</sup> one tenth (10%), for a glass surface greater than the corresponding clear width and height 5 m<sup>2</sup> one sixteenth (16.66%)

H Main area: practical field of view of assessment

### 6.1.1 Glass characteristics

In general, when inspecting for defects, the view through the glass is relevant, which means looking into the background and not at the glass itself. Defects must not be specially marked.

The control of glazing units as shown in Table 1 should be performed at a distance of 1 m from the observed surface from a certain viewing angle corresponding to the generally normal use of space. The control should be performed in diffuse daylight (eg when it is cloudy) without direct sunlight or artificial light.

Table 1 - Permissible errors in insulating glass consisting of float glass

Area (according to Figure 1)	Permissible per insulation element for double insulating glass		
Folding area F	Flat damage to the edges in the outer part or shells that do not affect the strength of the glass and that do not exceed the sealing edge of the glass. Internal shells without pieces of glass, which are filled with sealant.		
	Flat residues and residues in the form of dots, scratches and uneven and / or uneven (wavy) application of butyl, unlimited.		
Frame area R	inclusions, bubbles, dots, spots, etc.		
	glass surface	number of pieces	diameter / area
	≤ 1 m <sup>2</sup>	max. 4 pieces	Ø ≤ 3 mm
	> 1 m <sup>2</sup>	max. 1 piece with Ø ≤ 3 mm per meter of edge length	
	residues (in the form of dots) in the interspace of the glass		
	≤ 1 m <sup>2</sup>	max. 4 pieces	Ø ≤ 3 mm
	> 1 m <sup>2</sup>	max. 1 piece with Ø ≤ 3 mm per meter of edge length	
	residues (flat or flat) in the space between the glass (white-gray or transparent)		
	up to 5 m <sup>2</sup>	max. 1 piece	≤ 3 cm <sup>2</sup>
	for each next 5 m <sup>2</sup>	1 piece each	≤ 3 cm <sup>2</sup>
	scratches		
	glass surface	individual length	the sum of all individual lengths
	up to 5 m <sup>2</sup>	max. 30 mm max. 30 mm	max. 90 mm
> 5 m <sup>2</sup>	max. 30 mm	proportional estimate	
Note: "Proportional estimate" refers to the "sum of all individual areas" and not to their size or individual length.			
hair thickness scratches: not allowed on a larger scale			

Main area H	inclusions, bubbles, dots, spots, etc.		
	glass surface	number of pieces	diameter / area
	≤ 1 m <sup>2</sup>	max. 2 pieces	Ø ≤ 2 mm
	> 1 m <sup>2</sup> ≤ 2 m <sup>2</sup>	max. 3 pieces	Ø ≤ 2 mm
	> 2 m <sup>2</sup> ≤ 5 m <sup>2</sup>	max. 5 pieces	Ø ≤ 2 mm
	> 5 m <sup>2</sup>	proportional estimate	Ø ≤ 2 mm
Note: "Proportional estimate" refers to the "sum of individual errors" for a glass surface of > 2 m <sup>2</sup> to ≤ 5 m <sup>2</sup> , not the maximum size.			
scratches			
glass surface	individual length	the sum of all individual lengths	
up to 5 m <sup>2</sup>	max. 15 mm	max. 45 mm	
> 5 m <sup>2</sup>	max. 15 mm	proportional estimate	
Note: "Proportional estimate" refers to the "sum of all individual areas" and not to their size or individual length.			
hair thickness scratches: not allowed on a larger scale			
<p><b>The permissible number of these errors is increased by 50% for triple insulating glass and by 100% for quadruple insulating glass.</b>            Objections to ≤ 0.5 mm will not be considered. Existing faults or interferences must not exceed 3mm.</p> <p><b>Laminated safety glass and laminated glass:</b>            1) Permissibility in areas R and H is increased in frequency per unit of laminated glass by 50%.            2) With cast acrylic glass, waves can form which are conditioned by the production process itself.</p> <p><b>Single-layer safety glass and thermally prestressed glass</b>            1) Occasional distortions of the glass surface must not be greater than 0.5 mm, and which refer to a measuring length of 300 mm.            2) In the case of single-layer insulating glass with a nominal thickness of 3 mm to 19 mm and thermally prestressed glass with a nominal thickness of 3 mm to 12 mm, consisting of float glass, the normal distortion shall not exceed 3 mm per 1000 mm in terms of edge length or diagonal            3) In the case of laminated safety glass and laminated glass consisting of prestressed glass, 50% shall be added to the above distortion values.</p>			

### 6.1.2 Seals

The sealing and adhesive mass of the element in float glass must protrude a maximum of 2 mm over the frame and the glass as well as in the space between the glasses. The spacers must run parallel to the edge of the glass. The permissible deviations of the parallelism of the spacer towards the edge of the glass as well as towards other spacers (eg for triple insulating glass) can be taken from Table 2.

Table 2 - Spacer tolerances

Spacer material	Edge length < 2 m	Edge length > 2 m	
Aluminum and steel	3 mm	3 mm + 1 mm each extra meter	but a maximum of 5 mm
Stainless steel with wall thickness ≥ 0.2 mm			
Stainless steel with wall thickness < 0.2 mm	3 mm	3 mm + 1.5 mm for each additional meter	but a maximum of 6 mm
PVC	4 mm	4 mm + 1.5 mm for each additional meter	but a maximum of 6 mm

### **6.1.3 Double glazing effect**

Insulating glass is filled with gas, and its condition essentially depends on the air pressure, the height of the object over normal zero as well as the air temperature during and at the place of manufacture. With the use of insulating glass at other heights, temperature changes and fluctuations in air pressure (high and low pressure) inevitably lead to bending of individual glass, and thus to optical deformations. It is a physical phenomenon that occurs in all insulation units. The double glazing effect does not represent any lack of quality, provided that the glass must not touch.

### **6.1.4 Natural color**

All materials used in glass products have their natural color, which can become more pronounced with increasing thickness. This natural color can be differently noticeable depending on whether it is viewed through glass or on the glass itself. Inevitable color variations are also possible based on the iron oxide contained in the glass, the coloring process, the coloring material as well as changes in the thickness of the glass and the construction of the glass.

### **6.1.5 Insulating glass with built-in bars in the space between the glass panes**

Visible cross-sections and slight color separation in the cross-sectional area of the fabrication are permitted. Deviation from the right angle of the field is allowed with regard to the previously mentioned topic of "control". Changes that are reflected in the length of the bars in the interspace of the glass panels (such as bending, etc.), which occur due to temperature influences, cannot in principle be avoided and are allowed. The perception or color recognition of bars can be affected by the color or natural color of the glass.

### **6.1.6 Wetting the glass surface**

Kod vlažnih staklenih površina od kondenzacije, kiše ili tekućine za čišćenje može se vidjeti različito mokrenje ili vlaženje površine. Ta pojava može nastati npr. na osnovu tragova odnosno otisaka od točkica, naljepnica, vakuum usisavača, sredstava za zaglađivanje, itd. te stoga ne predstavlja nikakav defekt. Ta pojava se po pravilu reducira daljnjim korištenjem.



On wet glass surfaces of condensation, rain or current cleaning agent can be seen differently wetting of the surface. This phenomenon can occur e.g. based on traces or prints from wheels, stickers, vacuum cleaners, smoothing agents, etc. and therefore does not represent any defect. As a rule, this phenomenon is reduced by further use.

### ***6.1.7 Optical phenomena (anisotropy) for safety (tempered) glass and thermally prestressed glass***

When making heat-treated glasses, various mechanical stresses are created, the so-called anisotropy. They are visible under a certain light in the form of dark circles or lines. This is an inevitable physical effect created by the production and is not a reason for a complaint.

Sources:

ÖNORM B 3738 Glas im Bauwesen - Isolierglas, Anforderungen an die visuelle Qualität; Ausgabe 2008-07-01

### ***6.2 Rattle or crackle of bars***

External influences (eg double glazing effect) as well as on the basis of earthquakes or manually triggered vibrations in the case of bars located in the space between the insulating glass panes may temporarily cause rattling or cracking. This effect is not a mistake.

### ***6.3 Thermal glass fractures***

Thermal fractures of glass occur inside glass by uneven heating, shading or covering at temperature differences above 40 ° K (in float glass), which lead to load or tension and ultimately to glass breakage.

Thermal fractures of glass are not a defect in processing or a lack of product but only an unavoidable feature of the material that is not subject to warranty.

## 6.4 Condensation on glass elements

Condensation forms on the inside of the glass surface due to insufficient air circulation, e.g. due to the deep lower surface of arches, curtains, flowerpots, internal brisoles, etc. as well as inappropriate arrangement of radiators, etc.

Therefore, condensation is permitted according to ÖNORM B8110-2. But appropriate measures need to be taken to ensure that additional elements are not soaked. In the case of insulating glass with high thermal insulation, condensation or ice can temporarily form on the outside of the glass surface if the external humidity is high (relative humidity outside) and the air temperature is higher than the glass surface.

Sources:

ÖNORM B 8110-2 Wärmeschutz im Hochbau, Teil 2 Wasserdampfdiffusion und Kondensationsschutz; Ausgabe 2003-07-01

## 6.5 Spacer split outside the corner area

Within the development length of the spacer of 5 m, a maximum of two splits outside the area of the corners per spacer are allowed and conditioned by the production .

# 7 INSTALLATION OF SUN PROTECTION ELEMENTS ON THE WINDOW

## 7.1 Airtightness

On the air tightness of protection from the sun affects constructions (boxes for blinds) and operating mode (motor, gear, belt, cab). Airtightness requirements have been determined by a group of experts dealing with so-called roller shutter boxes. Association for Blinds and Sun Protection in Bonn. When it is true that when the differential pressure of 50 Pascals not circulate more than 0.25 m<sup>3</sup> of air per hour (per item). Testing of elements (such as belt guide, plain bearing) is performed according to DIN EN 12114.

There are certificates for the belt guide and plain bearing with significantly lower values (0.15 m<sup>3</sup> / h), which can be achieved if the rules (such as construction data, hole diameter) are followed. In order to achieve the stated values, the belt guides must be with the so-called. brush seal, and plain bearings with rubber seal.

Based on the installation situation, electric motors are considered airtight, and there are no certificates for cable guides.

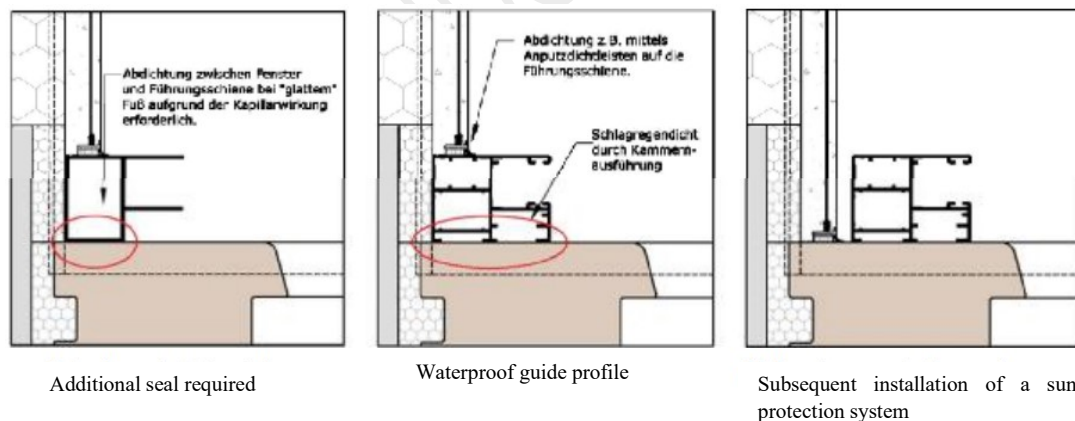
Example: In a house with 100m<sup>2</sup> of living space and a permitted air exchange rate of 0.6 m<sup>3</sup> // h, the percentage of air exchanged through the 10 belt guides (0.15m<sup>3</sup> / h) would be approximately 2%.

Since the airtightness of the built-in elements or boxes depends on the windows, they are not subject to testing. For roller shutter boxes, a maximum air change (at 50 differential pressure pascals ) of 0.25 m<sup>3</sup> / h and one meter of element width applies . In principle, roller shutter boxes are considered airtight from the outside, as they are completely plastered on the inside.

## 7.2 Watertightness

The connection joint for window and sunshade systems must comply with ÖNORM B5320.

When installing windows together with pre-assembled sun protection, a guide seal can also be made. In this case, care must be taken to ensure that the sun protection on the window is also watertight, and the construction of the guide must ensure watertightness between the window and the guide or be secured with a suitable seal.



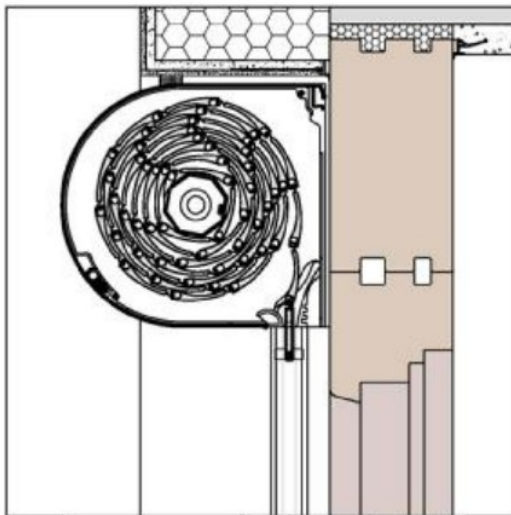
### 7.3 Internal noise

Based on external influences (such as wind gusts), rattling or clapping can occur, which occurs in the free space between the guides and the slats.

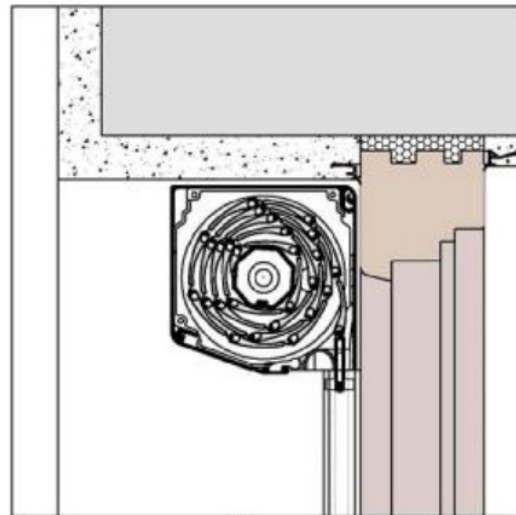
Rattles can also be caused by handling or use (such as lifting or lowering). In the case of motor-driven elements, a slight hum may occur which is caused by the motor.

### 7.4 Water permeability and condensation formation

If the roller shutter box protrudes beyond the façade, the connection between the box and the upper arch must be watertight, in order to prevent water from entering above the box as well as from the sides, or for the water to come out again between the box and the window over the lever guides go inside.



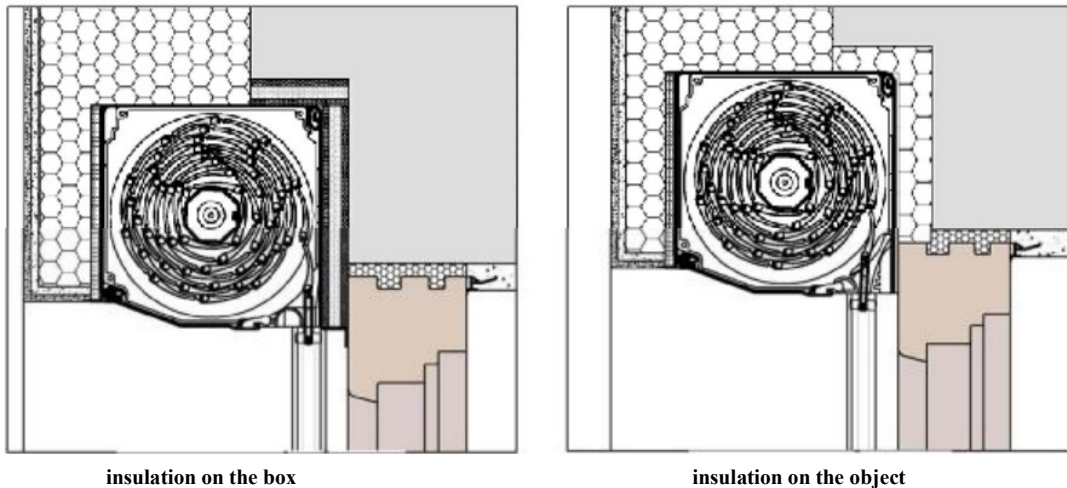
box for blinds protruding beyond the facade (sealing required from above)



the blind box is located inside the arch (additional waterproof protection required)

## 7.5 Insulation

Insulation is recommended for roller shutter boxes. (see the following examples)

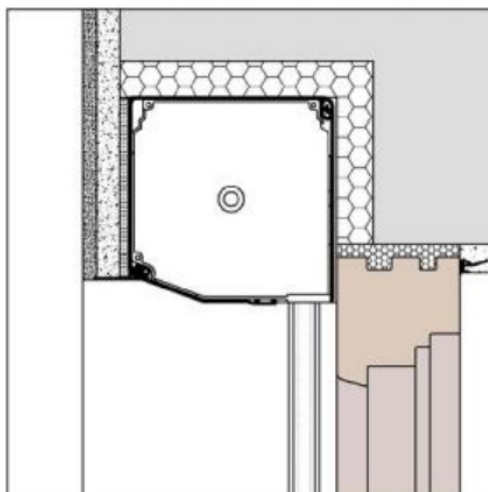


Shutter boxes should be treated as part of the outer wall, the joint between the window and the floor of the box should therefore be sealed.

## 7.6 Installation instructions for facades with plaster and insulation System on

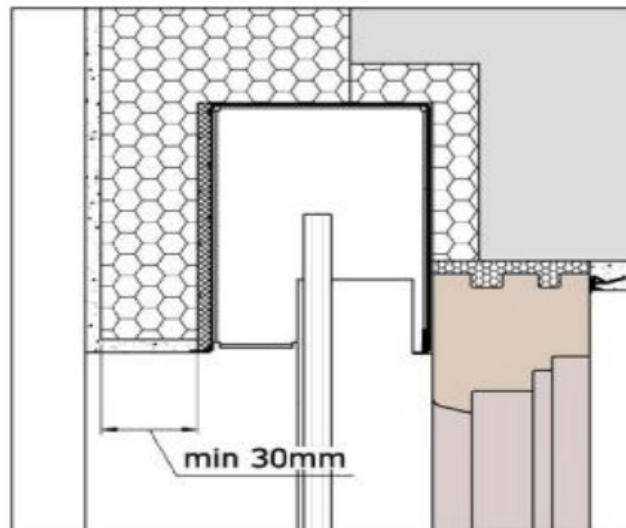
Facades with plaster (ÖNORM B 3346):

The plaster support plate for blinds and shutters should be at the same height as the non-plastered element. The plaster can therefore be applied evenly to the element and the support plate in the minimum and maximum thickness prescribed by the manufacturer. The measures prescribed by the manufacturer (such as syringe, reinforcement, drying time, ...) must be observed.



Insulation System - (ÖNORM B6410):

ÖNORM prescribes: "Parts protruding from the façade, such as shutter boxes [, ...], must be joined without panels. Excess insulation may be cut off from the rear of the insulation board from a remaining thickness of at least 30mm."



## 7.7 Installation

Shutter boxes should be fastened in accordance with the manufacturer's instructions and static requirements. The window must be fastened according to the size of the floor of the blind box, then it must be sealed and, if necessary, it must be sufficiently statically stable. When retrofitting the sun protection or insect protection, the load-bearing capacity of the substructure should be checked with regard to the fastening.

## 8 EFFICIENCY CHARACTERISTICS OF INSTALLED ELEMENTS

### 8.1 Window permeability

The required tightness of windows and doors was determined as follows:

- In BiH according to BAS EN 12207
- in Austria according to ÖNORM B5300
- in Germany according to ift-regulation FE-05/2 (recommendations for the use of windows and exterior doors. rulebook for determining the minimum classification depending on the requirement. part 1: wind load resistance, watertightness and air permeability)

The determining factor for determining the class or class of exposure is the wind effect depending on the geographical position, the influence of the wind in a certain area, the shape and height of the building as well as the installation situation. Based on these factors, the required classification for air permeability according to ÖNORM B5300 follows (according to ÖNORM EN 12207). EN 12207 classifies the air permeability of windows into 4 classes, which on the one hand refer to the complete surface of the element, and on the other hand to the length of the joint. High-quality windows from well-known manufacturers usually have an airworthiness class of 3 or 4.

Case study:

Double-leaf window-doors with external dimensions of 2 x 2.4 m have a total area of 4.8 m<sup>2</sup> and a joint length of 10.72 m.

If these doors meet the (highest) class 4 according to EN 12207, then at a differential pressure of 50 pascals (eg by measuring the air permeability of the so-called Blower-Door-Test) on the complete surface air permeability of 9 [m<sup>3</sup> / h] is allowed, and at joint length 5 [m<sup>3</sup> / h].

It does not matter whether this air permeability is evenly distributed on the window or whether it appears in a concentrated way only in some or even only one place.

In practice, this air permeability can occur even in only a few places or only in one place, depending on the construction, which does not automatically mean that the corresponding window is leaky. Such places are e.g. The corners of the sash, the ends of the lock catch, as well as the tightness in the upper central part of the door for lifting and pushing.

If in the previously mentioned example of a window of the highest impermeability class there is air permeability in only two places of 1 cm<sup>2</sup> each size, then it is possible to measure the air flow rate of 12 [m / s] at these places.

For this reason, punctual measurements of the air flow rate (such as the Blower-Door-Test) cannot prove that the window is sufficiently impermeable.

## **8.2 Blower Door Test**

The method of measuring differential pressure (also: Blower-Door-Test or the so-called Flow-Vent-Method) measures the air permeability of a building or object. The method is used to see if the building has any gaps and to determine the rate of air exchange. The goal of building a facility is to achieve daily comfort and reduce the energy used. For that, it is necessary that the facade cladding on each building is relatively airtight.

Measurement by Blower-Door-Method:

The object is tested by injecting air into the object with the help of a fan with a calibrated opening for the required air flow or suction. The fan on which the speed is regulated is adjusted so that a differential pressure of 50 pascals is created according to the air pressure.

Differential pressure occurs of course when e.g. the wind is blowing. At a wind speed of 5, the differential pressure is also about 50 pascals. The fan is inserted into the window or door opening using an adjustable metal frame wrapped in an airtight tarpaulin. This presses the frame firmly against the window or door frame via rubber seals. Based on such a measurement, the name Blower-Door-Test was created. The window or door into which the measuring device is inserted cannot be measured in the same way. Since it is often very important that most large entrance doors are also measured, balcony doors can also be used to install the Blower Door device. Measuring instruments determine the differential pressure produced by the fan as well as the indirect amounts of air it transports. The fan speed is regulated so that a certain pressure of 50 pascals is formed between the outdoor and indoor space. When measuring under pressure, the fan must release as much air outside as air enters the building in the case of existing open spaces. The measured air is distributed inside the building. This value of air exchange of 50 can now be compared with other objects and norms.

The Blower Door Method offers the following options:

- Determine the place of throughput (qualitative)
- Air flow (V<sub>50</sub> per m<sup>3</sup> / h) is determined by the sum of all openings at a pressure of 50 pascals (quantitative)



-As a rule, the rate of air exchange per hour ( $V_{50} / V_{\text{space}} = n_{50}$ ) should be measured at pressure differences of +/- 50 pascals

### **8.3 Thermography**

Thermography is a non-contact measurement method. With the help of thermography, it is possible to spatially measure and display the temperature (compare with point measurements such as a thermometer), if all the characteristic values of the observed surface are known. (For the infrared area, there are "colored" surfaces as well as visible light, which give infrared radiation in different amounts).

Thermography means determining the thermal values of objects, machines, houses, etc. Thermography can give a rough picture of possible heat losses or existing heat sources, if the final conditions and results are correctly interpreted.

To do this, heat-sensitive sensors, infrared cameras and airflow testers are used, which collect the appropriate data and then evaluate them via a computer and compare the results with standard values. An important factor for thermograms are the results obtained by examining an object as well as the "thermal story" of the observed piece in the time before retrieval.

To ensure the quality of thermography, they are used to check the correct or flawless insulation of buildings (thermography in buildings). So the error that occurs during construction can be clearly proven. Simultaneous thermal testing of the façade and air permeability testing are particularly effective.

Only an expert can make a thermogram and give certain results. The basic condition is certification according to EN 473 level 2 or that the test is performed by an accredited institution.

Thermography cannot be used to determine the U-value or the rate of air exchange, for which the boundary conditions and measurement uncertainty are too high, currently e.g. when estimating the U-value by thermography, an uncertainty of 15% - 36% is taken into account.

### **8.4 Measurement of sound insulation**

Sound is generally a mechanical vibration in an elastic medium (gases, liquids, solids).

Audible sounds generally mean tones, sounds and noise that a person can feel or experience, for example, in music at different pitches. Animals have a much more pronounced and developed hearing than human (infrasound and ultrasound). We distinguish between useful sound such as music or gals during conversation and

harmful sound such as traffic noise or noise from road works. Noise is an unwanted sound.

Sound insulation is a measure of the acoustic insulation of a space from unwanted noise coming from adjacent rooms or from outside.

The sound insulation of building elements and structures is expressed by the sound insulation index  $R$ . In order to simplify the sound insulation by expressing one number, the sound insulation process of an element is evaluated according to an acoustically important sound frequency range according to the standard. .

Also, the airborne sound insulation of windows is evaluated by the sound insulation index  $R_w$ . Since windows often have to provide some noise protection, another value is added to the so-called. spectrum - adjustment values  $C_{tr}$  for adjustment of sound insulation measures to certain standard noise sources. The abbreviation "tr" comes from the word "traffic", ie traffic. In order to assess how good the insulation of windows is from traffic noise, the values of  $R_w + C_{tr}$  expressed in decibels are summed, and this value should not be less than 5 decibels than the required value of sound insulation.

Measurement of sound insulation values is performed with special measuring instruments according to ÖNORMEN EN ISO 140-1, 140-12, as well as ÖNORMEN EN 20140-3, 20140-9 and 20140-10. The assessment is performed according to ÖNORM EN ISO 717-1.

#### **8.4.1 Measurement of sound insulation on a building on site**

If the window is built into the wall, the sound insulation is located between the interior and exterior space, as well as between parts of the wall, joints, built-in windows and possibly interior walls leaning against the exterior. .

As a rule, the sound insulation of the wall is at least twice as big as that of the window (that is, more than 10 decibels difference). If this is the case, and the sound cannot reach the room by other side roads - on the basis of poorly sealed connecting elements or e.g. through the ventilation openings, then the sound insulation can be determined on site by special measurements of the windows. Measurements are performed according to ÖNORM EN ISO 140-5 standards. As a rule, the method of measuring noise using speakers is used, and in special circumstances, e.g. use and traffic noise on site. Depending on the measurement process, a microphone that is placed on the window records external noise, and another that is placed in the room measures the noise level in the room. The measurement is evaluated taking into account the acoustics within the space, but also the method of measurement as well as its boundary conditions. Because on-site measurements are subject to different measurement conditions than laboratory measurements, these differences need to be taken into account when evaluating measurements. For this purpose, a series of

ÖNORM B 8115 standards is developed as a support. The sound insulation index estimated on a certain element on the construction site is denoted by an apostrophe (R'w for the element, R'res, w for the external wall with elements).

## 9 INSTALLATION CRITERIA

The quality of the assembly or connection joint is the key to the usability of the assembly parts.

The installation must be carried out taking into account the elasticity, fastening as well as statics, and the connection joint to the structure of the building must be carried out according to the technical rules (ÖNORM B 5320).

### 9.1 Fastening

All loads that occur on the window should be securely attached to the structure. This is done by selecting the type and method of supporting the installation part as well as the fastening means.

When choosing fastening means, attention should be paid to the transmission forces, connecting elements, as well as the displacement that occurs inside the connection joint.

### 9.2 Connection join

The connection joint should be planned constructively - the following points should be determined:

- Determining the profile material for the frame
- Surfaces of joints used to create joints
- Intended insulation material
- Outer and inner spongy round profiles / spongy fillings
- Sealing
- Filling joints
- Foils for protection against rain and wind depending on the case, as well as gradual insulation from moisture
- Determining the material of the installation part

- Assembly and fastening of installation elements as well as joint components
- Tolerances of wall openings and built-in elements
- Coordination dimensions
- Nominal dimensions of the joint

Care should be taken with the technically and economically justified size of the joint.

The substrate (the surface of the wall components in the area of the window connection joints) must be clean, dry, load-bearing, smooth, flat, solid, without cracks, so that no materials are present on it, in order to avoid poor adhesion of sealing materials. Grooves such as cracks, falling or scattering of concrete, holes should be permanently leveled. Mortar or plaster joints should be made in the plane of the stone. In a given case, a smooth top coat can also be applied.

The circular connection of the facade to the window construction, which is not watertight, is a prerequisite for the proper connection of the structure of the building, regardless of the design of the bench. According to the structure of the building and the window frame, the bench must be made so that it is watertight. Further attention should be paid to the different thermal expansion of the joining materials.

### **9.3 Instructions for the construction phase**

After the installation, the functionality of the elements should be ensured after the fittings have been installed.

During the installation phase, windows and doors are affected by various mechanical, climatic and chemical loads. Therefore, the components should be protected by covering / gluing, with sufficient ventilation to ensure drainage of excess moisture. There are especially problems with plastering and screeding. The increased humidity can result in damage to the elements and joints. For this reason, sufficient radiation should be provided. Suitable adhesive tapes should be used to protect the surface, which must be compatible with the surfaces to which they are glued. The strips should be removed as soon as possible.

If, despite great care, dirt remains on the components, they must be removed immediately without residues with non-aggressive or non-corrosive surfaces (pH between 5 and 8).

Excessive humidity (maximum 55%) should be avoided. It leads to damage such as swelling of wood parts, corrosion damage to fittings, decay of thick-layer stain, formation of fungi and mold, and unhealthy indoor climate.

#### **9.4 Visual assessment of the finished joint**

Holes and cracks can occur due to various movements in the connection area of the joining material and proper installation. The connection joint made according to ÖNORM B 5320 takes over this movement and thus does not reduce the function. Such openings and cracks do not represent any connection joint defect.

#### **9.5 The problem of creating moisture on windows based on plaster and screed application works**

After the application of plaster and screed on the basis of high humidity inside the room, there may be a decrease in function or damage to the windows and doors made of wood or a combination of wood / aluminum. Therefore, loads of moisture > 55% (zB: radiation, dehumidification, etc.) should be avoided.

For all details you can see the brochure - Estrich / Schäden am Bauelement Fenster (which you can download via the following link [www.fensterundfassaden.at](http://www.fensterundfassaden.at))

Sources:

ÖNORM B 5320 construction fittings for windows, windows, doors and towers in outdoor buildings - foundations for planning and planning; 2006-09-01

## **10 DEFINITION OF QUALITY AND CERTIFICATION LABELS**

### **10.1 Quality Management System - ENISO 9001: 2000**

Certified company has its own system of quality management has built and documented according to international standard. The system of a quality management per business unit is established that the requirements must be met as far as areas of service delivery and production, to maximize efficiency and ensure quality in all departments / areas. On the basis of annual internal and external audits, the fulfillment of all requirements is checked, and recertification is performed every 3 years.

The company Herceg doo is certified according to the ISO 9001: 2015 standard.

## **10.2 Quality of product and assurance of quality**

### **10.2.1 CE mark (Europa)**

The CE mark is a pass for the product market throughout the European Economic Area. It covers all legal norms that are aimed at the appropriate technical specification, which is applicable in all EU member states. A prerequisite for the CE mark is the implementation of EN 14351- "Windows and doors - product standard, performance characteristics".

### **10.2.2 Austrian Quality Label**

In order to obtain the "Austrian Quality Label", certain measures must be implemented, such as product control and quality assurance measures, which are documented in the "Quality Standard". Annual external audits check the implementation, and in case of a positive result, a certificate is issued.

### **10.2.3 RAL quality label (Germany)**

The RAL quality label generally stands for external monitoring of product quality (such as frame materials). In order to obtain the RAL quality certificate, the finished products (windows and doors), as well as the materials and semi-finished products used, must be regularly inspected externally. The requirements also apply to the installation, as well as the Quality Assurance System. Based on the annual external audits, the fulfillment of all requirements is checked and the certificate is issued or extended.

## **11 CLEANING, CARE AND MAINTENANCE**

In principle, all surfaces should be regularly cleaned, cared for and maintained according to the manufacturer's standard. Only in this way can long-term usability and surface quality be guaranteed.

ÖNORM B 5305 2006 11 01 contains criteria for assessing the condition of windows, instructions and guidelines for maintenance measures, as well as for taking maintenance and repair measures. Regular cleaning and the correct layout of the

cleaning interval depending on the dirt prevents the formation of difficult-to-remove contaminants. When cleaning, work is often done in dangerous places where there is a possibility of falling. Therefore, before starting work, it is necessary to check whether safe working conditions are guaranteed.

## **11.1 Surfaces of PVC elements**

The manufacturer offers various cleaning products, which are specially designed for cleaning PVC surfaces, and whose tolerability has been proven. In principle, soap-containing cleaning agents are suitable. Abrasive cleaners as well as solvent-based cleaners can damage the surface and should only be used by qualified personnel. Surface protection agents can extend the cleaning interval and simplify cleaning.

### **11.1.1 Pollution and external influences**

Dirt can form on PVC surfaces and can only be removed with great effort. The reason for this is the interaction of the sun, water, pollen deposits, insect droppings or dust deposits, dirt, etc. over a longer period of time.

### **11.1.2 Decorative surfaces**

Decorative surfaces can be cleaned with the same cleaners as PVC surfaces. Under no circumstances should abrasives be used. In specialty stores, there are products for the care of decorative surfaces, which, if used regularly, clean and refresh the surface.

## **11.3 Aluminum elements and linings**

### **11.3.1 Cleaning intervals and cleaning agents**

Cleaning must normally be carried out twice a year using the means recommended by the manufacturer. Cleaning agents must comply with the GRM RAL-GZ632 cleaning regulations.

### 11.3.2 Conservation

To prolong the cleaning interval, as well as to simplify cleaning, conservation agents are offered that prevent or block aggressive substances generated by atmospheric influences.

#### **Cleaning and care products**

Below are the cleaning recommendations:

*Cleaning at least 2 times a year:*

Only clean water, in a given case, at least neutral detergents can be added, such as e.g. dishwashing detergents, using soft, non-abrasive wipes, cloths or cotton (which do not scrape or scratch the surface). Avoid heavy rubbing. Immediately after each cleaning process, rinse with clean and cold water.

*Conservation at least once a year:*

After cleaning, perform preservation with the product or agent according to the manufacturer's specification

Fatty, oily or sooty substances can be removed with denatured alcohol or isopropyl alcohol. Residues of glue, silicone rubber, adhesive tapes, etc. in a given case they can also be removed in the same way. Do not use solvents / thinners, abrasives / cleaning cloths that corrode the surface!

Do not use strong acids or alkaline cleaning and degreasing agents. We recommend neutral cleaners.

*Do not use cleaning agents of unknown composition.*

Due to the danger of color change or effect, the so-called aptitude test.

Cleaning agents can have a maximum of 25 ° C. Do not use steam and compressed air cleaners.

The surface temperature of the façade elements during cleaning must also not exceed a temperature of 25 ° C.

The maximum duration of action of these cleaning agents must not exceed one hour, after at least 24 hours, if necessary the whole cleaning process can be repeated.

Depending on the degree of surface wear, products specific to the manufacturers are used. The products must be used according to the manufacturer's instructions or specifications!



### *Warnings*

Any protective films that serve as protection during transport must be removed immediately after installation, in order to avoid damage to the lacquered surface due to sun exposure.

Painted pieces that are protected for transport must be stored in a dry place and must not be exposed to the sun.

### **11.4 Fittings / Hardware**

All parts of the fittings that are visible and movable when the element is open must be lubricated with suitable oils or spray oil on all sliding surfaces at least once a year. After applying the lubricant, it is necessary to try all the opening functions of the element several times, so that the oil can reach all sliding surfaces. If the mechanism and fittings are difficult to move, the cause is poorly adjusted fittings. In this case, the fittings must be adjusted immediately by qualified personnel. The interval for subsequent adjustment of the fitting depends on the size of the element and the method of opening.

The fittings must be checked regularly to see if they are in position or worn, and in a given case they must be replaced by an expert.

### **11.5 Seals**

After cleaning the elements, the seals should be maintained at least once a year with the means recommended by the manufacturer.

The function and durability of the seals is poor, when the seals are pressed too hard or too tight to the surface. A slight creaking of the seals is possible when opening the window elements which is not a fault. With good lubrication, such creaking can be avoided in most cases.

### **11.6 Insulating glass**

Insulating glass does not need to be maintained, and it is cleaned with ordinary glass cleaners, which prevent the surface from being damaged. Abrasives can damage the glass and are therefore not permitted! For self-cleaning glass, special maintenance instructions from the manufacturer must be followed. Insulating glass / frame seals should be checked regularly to see if the seals are cracked or detached from the frame

and glass. All errors must be rectified immediately by an expert, otherwise damage may occur.

### **11.7 Connecting joint**

The seals between the installation part and the element should also be checked and faults repaired.

Sources:

ÖNORM B 5305 2006 11 01 - window control and maintenance

## **12 CONDENSATION AND MOLD**

Insufficient air exchange (insufficient ventilation) due to excessive humidity can lead to moisture penetration into the elements, reduction of thermal insulation, as well as the growth of microorganisms, which leads to the formation of mold on the elements.

ÖNORM B 8110-2 Wärmeschutz im Hochbau - Teil 2: Wasserdampfdiffusion und Kondensationsschutz prescribes permitted indoor air conditions in living rooms and other rooms used for similar purposes, namely:

- Maximum humidity of 65% for a maximum of 8 hours / day
- Maximum humidity of 55% for the rest of the time

where for each degree of outdoor temperature below 0 ° C 1% humidity must be subtracted. Therefore, in no case should the specified maximum values be exceeded, as otherwise harmful effects on the material as well as the health of the user may be caused.

The following measures are recommended for planning:

- Insulating glass with high thermal insulation creates a higher temperature on the inner glass. This on the one hand leads to greater comfort near the glass, and on the other hand reduces the tendency to form condensation on the inner area of the glass.
- Use of technically optimized insulating glass edges.
- Planning of reinforced heating in niches, in outer corners, in front of large glass surfaces, with frameless glass surfaces.

- If it is possible to install controlled room ventilation. It is intended for hygienically sufficient air exchange (also during the night).
- However, the use of controlled room ventilation requires special planning and selection with regard to heat flow, protection against condensation and airtightness. If the ventilation is not sufficient, there may be disturbances on and around the window elements, ie condensation and mold may form.

The following measures are recommended for use:

- Sufficient and continuous heating of all rooms. Avoiding occasional temperature drops such as during the night. This also applies to rooms that are not used often or where you want to keep the temperature low.
- Do not stop the flow of air towards the window and external walls.
- Do not prevent the heat transfer of the radiator by placing various linings around the radiator, long curtains or furniture in front of the radiator.
- Avoid constant ventilation of the room through a sculpted window.
- Ventilation must be active, according to needs, but energy savings must still be taken into account. In doing so, some heat energy is lost, but this loss serves to ensure healthy climatic conditions and prevent damage caused by moisture. It is important that this loss be as small as possible, and this is best achieved by short and intensive ventilation of the room.

Windows and doors should be opened completely for a short time - preferably make a draft. After about five minutes, the used, moist air is replaced by dry, fresh air which, after heating, can take over the water vapor again, i. moisture. The advantage of such ventilation is that only the heat that is in the exhaust air is lost, while the heat energy that is in the walls and furniture remains in the room, and based on which fresh air soon reaches the desired temperature immediately after closing the window.

Such ventilation should be repeated several times a day, if you are at home.

Some rooms where large amounts of humid air are generated due to cooking or showering should be ventilated immediately. The interior door must be closed during ventilation, so that moist air does not spread throughout the apartment.

Sources:

ÖNORM B 8110-2 Heat protection in high construction, part 2 water vapor diffusion and condensation protection; Exhaustion 2003-07-01