

MONTAGE GUIDELINES

PVC / ALUMINIUM

These instructions provide a short guide showing how to avoid basic errors when installing and sealing the connection of joinery and the building.

The following instructions contain guidelines related to:

1. Warnings and remarks
2. Preparation and measurement of the opening in the masonry wall
3. Installation methods
4. Sealing and thermal insulation
5. Inspection and functional check

1. Warnings and remarks

The drawings contained in these instructions show only proposed installation solutions for individual design solutions with different types of masonry walls. For each installation design, calculations and installation details should be provided, to be approved by the relevant decision-making bodies. When using the following instructions, please note that the joinery must not constitute any structural member of the building, but only its filling (!!!).

In special cases, structures made of profiles with large thermal partitions may experience unfavourable bending of the sash profiles. Such situations may occur as a result of the following factors:

- dark joinery colour
- structure installed on the southern or south-western side of the building
- structure exposed to direct sunlight (no cover in the form of awnings, canopies, sheltering enclosures or trees)
- filling of structures in a dark colour
- occurrence of lacings in the door leaf.

This bending is caused by uneven elongation of the inner section and the outer sash profile due to the difference in their temperatures. This effect is intensified in the case of better insulation of profiles with thermal breaks than those with less insulation.

The higher the temperature difference, the greater the bending of the profiles. This effect ceases when both temperatures are equalised, i.e. at the end of the day. Accordingly, in the case of a significant decrease in the temperature of the external section, the bending effect is opposite. In order to minimise this effect, one of the above factors occurring in a given structure should be eliminated, the size of the door leaves should be reduced .

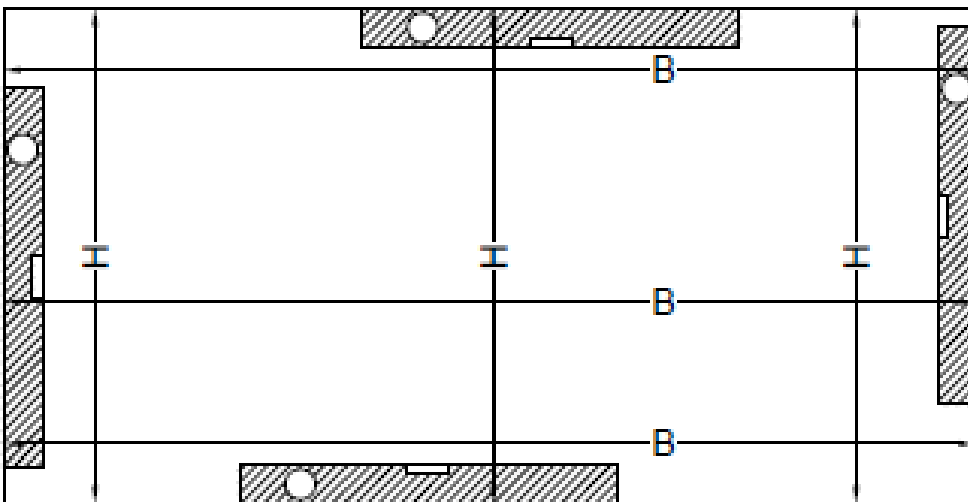
2. Preparation and measurement of the opening in the masonry wall

Before the construction and installation of window structures, the following should be checked:- compliance of the dimensions of the window openings made with the documentation and the location of the lower edge of the opening in relation to the floor level or elevation benchmarks)

- arrangement of thermal insulation of walls
- arrangement of window sills (inside and outside)
- conditions for window installation in the case of the existing façade made of stone slabs or other. The above steps are the basis for determining the dimensions of the window and the method of its installation. In order to determine the external dimension of the window correctly, the very first task is to check the diagonals of the window opening. The limit dimensional deviations for the diagonals of window openings are presented in the table below.

Opening size	100mm - 500mm	501mm - 1000mm	1001mm - 3000mm	3001mm - 6000mm
Deviation	± 3 mm	± 6 mm	± 8 mm	± 12 mm

To determine the correct dimensions of the height and width of the window opening in the frame, follow the drawing below.



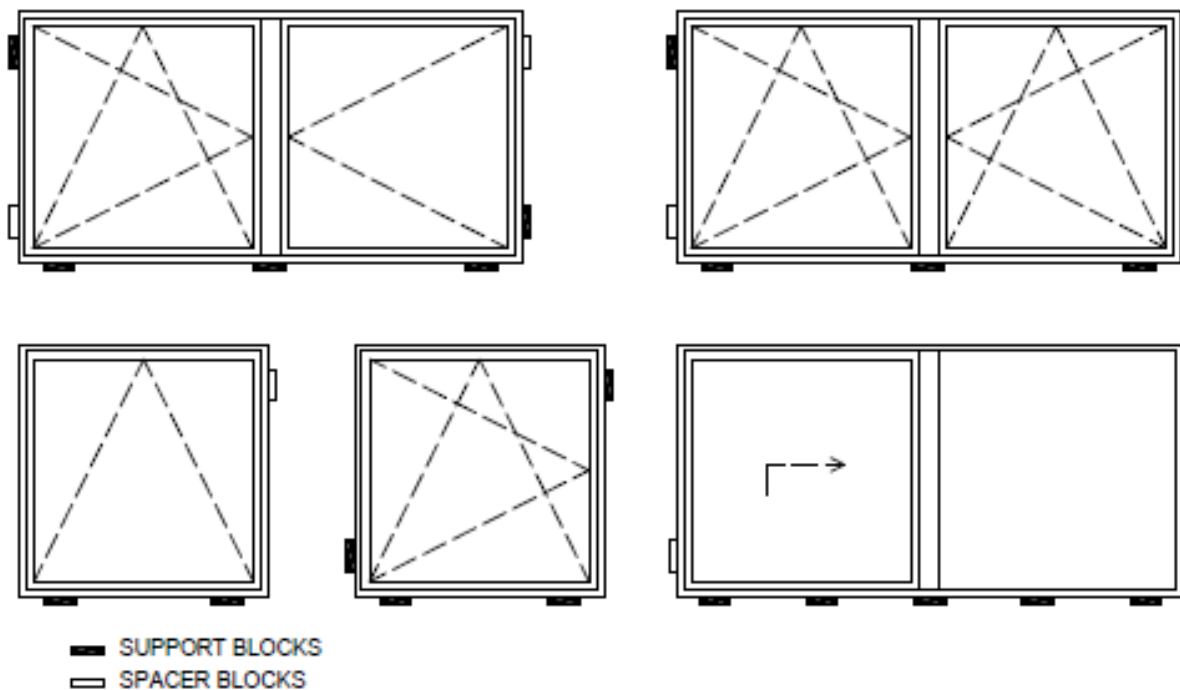
3. Installation methods

Window and door structures should be installed in a plane parallel to the wall of the building, maintaining the vertical and horizontal position. The location of the window in the opening of a new building should be in accordance with the design and technical documentation and be placed in the frame, protruding partially or completely so as to minimise linear thermal bridges.

The extension of the window in front of the wall face occurs in the case of energy-efficient or passive buildings. The occurrence of the above bridges leads to condensation of water vapour on the inner side of the frame, the surface of the frame or inside the window-wall connection. In the case of windows protruding from the wall face, system solutions using brackets, supports, sections or supporting frames are used. Windows should be located in the thermal insulation layer of the building. In the case of frames with jambs, it is recommended to position the window so that the frame profiles, those vertical and horizontal, are covered by the jamb no more than half the width of the frame section and that it does not interfere with the functioning of the window.

Support and spacer blocks are used to position the window in the opening. Their arrangement varies depending on the type, size of the window and its opening.

The following drawings show the principle of their placement



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The following drawings show the principle of their placement.

Support and spacer blocks should be made of impregnated hardwood, plastic or aluminium or anti-corrosion protected steel.

Support and spacer blocks should be arranged so that it is not possible to deform the frames due to the impact of temperature and mass of the window as well as pose a risk of reduced functionality. The support blocks should be located centrally under the vertical members of the frame and mullions ((including movable mullions). If arranged differently, it may cause significant deflection of the lower profile of the frame due to the mass of the window. In the case of sliding or tilt-and-slide balcony doors, the lower part of the frame must be supported steadily over the entire length by the use of a continuous support beam or the arrangement of support blocks (together with brackets if such a door protrude from the wall face) under the rail, with a maximum spacing between them up to 400 mm.

Support blocks are not used in the case of installing windows protruding from the window face and located in the thermal insulation layer. The spacer blocks used during installation to fix temporarily the position of the window in the opening should be removed after fixing the frame in the opening. However, the support blocks should not be removed. Wedges or shims used during installation to position the window are not support blocks!!!

The installation of windows using only dowels, screws or anchors, without the use of support blocks, is not sufficient to transfer the loads acting in the plane of the window or balcony door.

Permissible vertical and horizontal deviations of the window in the opening with the length of the member up to 3 m are 1.5 mm, and the maximum is not more than 3 mm.

The minimum dimensions of the gaps between the frame and the reveal are shown in the table below. When using a sealant impregnated with expanding tapes, the values given below may be reduced to 50%.

Member length	100mm - 1500mm	1501mm - 2500mm	2501mm - 3500mm	3501mm - 4500mm
Minimum gap width	10 mm	15 mm	20 mm	25 mm

The maximum size of the gap between the frame and the reveal should not exceed 40 mm. In special cases, larger dimensions are permissible, but the method of sealing and the use of materials require a separate solution.

All types of single and multi-functional tapes and membranes should be used in accordance with the manufacturer's recommendations for these products and the requirements for the preparation of surfaces to be bonded. Wide expansion tapes should be applied over the entire depth of installation.

The windows should be installed mechanically directly or indirectly (using anchors) to the wall.

All fasteners should be protected against corrosion or made of material that is resistant to moisture and weather conditions. To fix the frame, elements selected according to the expected loads that can be applied to the window and the wall material are used. The selection of fasteners should always be suitable for the material used to make the wall, which should previously be taken into account in the window installation design.

Direct fixing such as a dowel/wall plug and fixing the anchor/bracket to the wall should take place at a distance not less than 60 mm from the edge of the wall.

Use wall plugs/dowels only for vertical members and upper frames of sliding systems. However, the anchors may be placed around the perimeter of the frame.

When using anchors, the distance from one another must not exceed 400 mm.

The fixing of windows partially or completely protruding from the wall face may be made with the use of brackets and supports or steel angles. These items should be appropriately selected to transfer the external loads acting on the window and the mass of the window.

The arrangement of these members and their fastening is shown in the drawing later in these instructions. System solutions consisting of lower brackets, side and upper supports for fixing windows protruding from the wall face should be used in accordance with the guidelines and scope specified by their manufacturer. Such a bracket is an element on which the window is embedded with all its weight. It can be treated at the same time as a support block and a fixing point. The side and upper supports are elements transferring the loads caused by wind to the wall structure and related to the movement of the sashes.

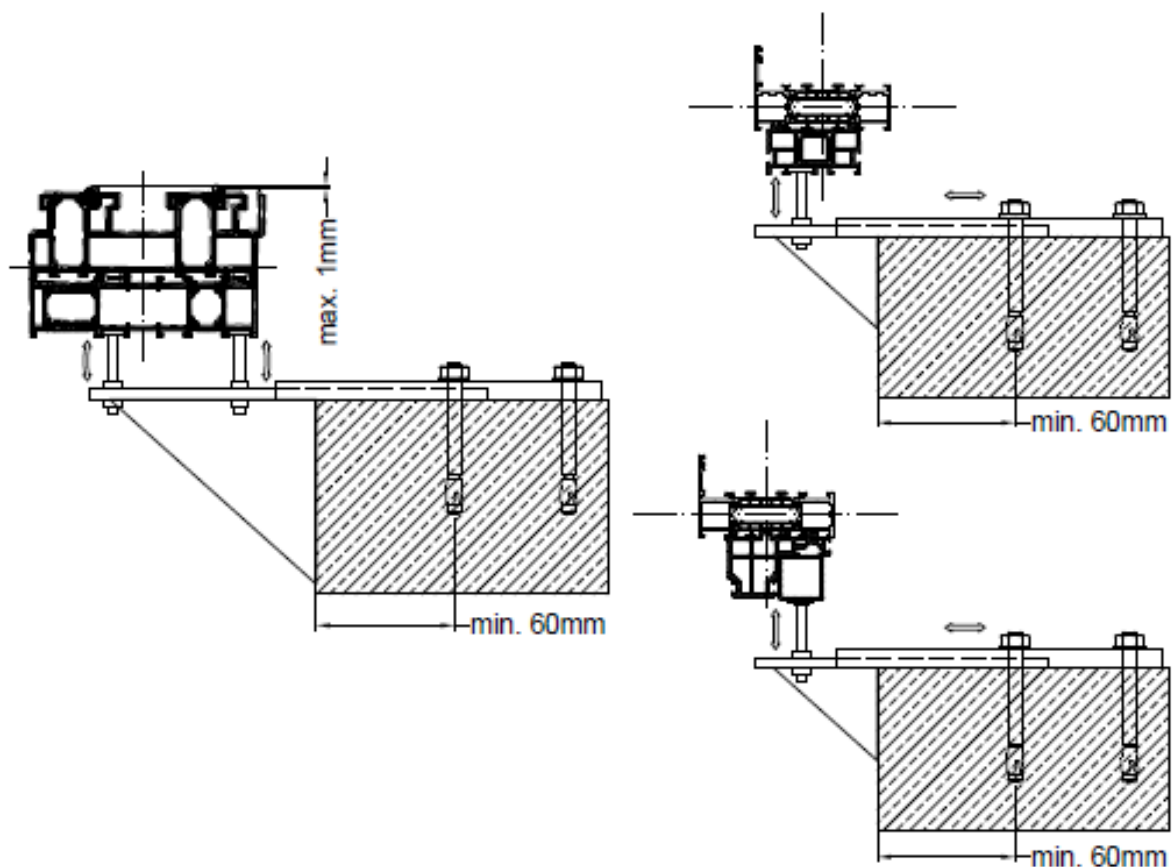
The following drawing presents a diagram of an example lower bracket for the section protruding from the wall face, with the under-sill profile. In addition, it shows the section with under-sill profiles. The under-sill profile in this case ensures the stiffness of the frame and allows the lower bracket to be fastened directly to the section. Such a solution ensures simultaneous tightness of drainage (the frame profile has no holes) as well as stiffness in each direction of the forces exerted onto the lower section of the frame.

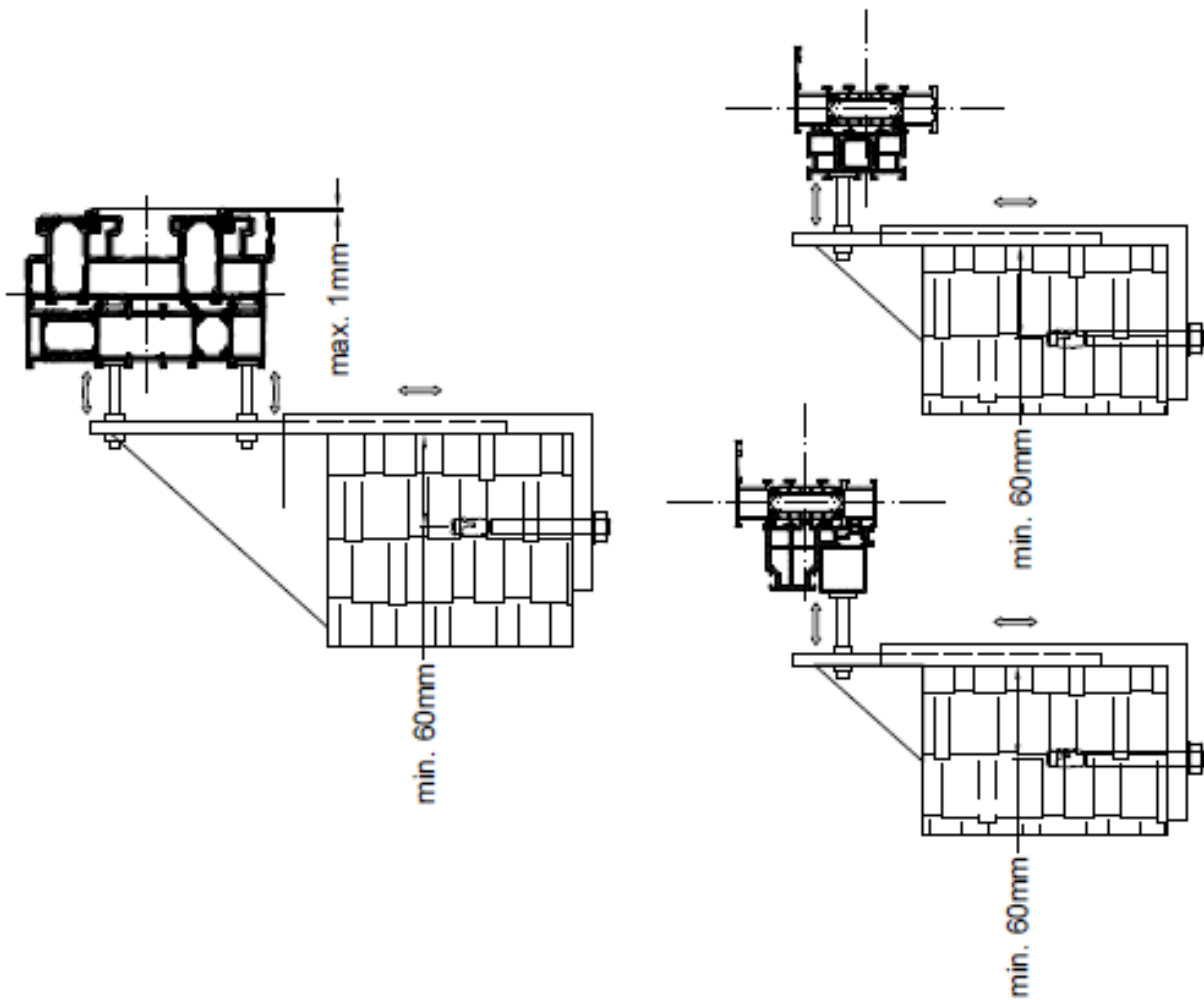
The diagram below shows how to adjust the height the frame installation, frame depth in relation to the wall face as well as possible corrections of frame twisting along the axis of the profile (the difference in the height of the tracks on the frame).

When designing the fixing of windows protruding from the wall face, the following factors should be taken into account:

- mass of the structure to be installed
- window protrusion depth in relation to the outer wall plane
- type of material used to build the wall. For solid walls, the brackets are fixed as shown in The drawing above. For walls made of ceramic hollow bricks or cavity bricks, in which there are vertical channels, the installation takes place from the inner plane of the hollow brick.
- the selection of lower brackets and fasteners must be based on the maximum load and type of bracket as well as the size of protrusion from the wall face.
- the selection of side and upper supports must be based on the general principles of the arrangement of mechanical fixing points.

At the same time, it is to be remembered that the installation and sealing of threshold sections in the case of lift-and-slide, hoist-and-slide, tilt-and-slide balcony doors and accordion doors with significant dimensions should be designed individually. Particular attention must be paid to the support of the rail, which should prevent possible deflections due to static load and caused by the movement of the sash





When designing the window fixing, one should also take into account the expansion joint of the building and the structure. The assumed rules in the case of aluminium are the expansion of the profile length of 1000 mm by 1 mm for its cooling in winter and heating in summer. The expansion joint of the structure is provided by special joints of two structures. If, however, it is one structure that exceeds the length of 6000 mm, the expansion joint should be arranged on anchors or mounting brackets.

4. Sealing and thermal insulation

The sealing and thermal insulation of the window-wall joint should consist of three layers:

- inner layer made of vapour-tight materials in the form of various types of tapes or membranes that do not allow air and water vapour to pass through;
- the middle layer constituting the thermal and acoustic insulation of the window and the wall, made of polyurethane foam or mineral wool, and thus preventing condensation of water vapour in the gap with thermal insulation. Please note that polyurethane foams and other similar insulating materials are not used for fixing windows.
- the outer layer constituting the seal, made of impregnated expansion tapes or vapour permeable membranes. Sealing materials fulfilling two or three of the above functions at the same time can be used provided that their properties are documented by the manufacturer in the specific case.

When making the seal, always follow the general rule stating that “tighter on the inside than on the outside”. It should be remembered that the installation of windows without sealing and insulation of all three layers is not correct as it does not ensure tightness of the joint as well as adequate thermal and acoustic insulation. The outer window sill should protrude beyond the plane of the wall about 30-40 mm, but not less than 20 mm. The outer sill must be inserted under the lower part of the frame and the joint location must be sealed permanently with flexible sealant.

If the window sill is fixed with screws to the window profile, the screw heads should be additionally sealed. The joint of the window sill in the corner, along the length or with the reveal, should ensure the continuity of the seal. The window sill must be provided with expansion joints every 2.5 m and be protected against being pulled by wind. Proper support and insulation will dampen falling rain. The end caps of the window sill should be selected depending on the applied façade solution. The inner window sill should be embedded in the lower part of the window after prior sealing on the inner side of the contact between the frame and the reveal. Thermal insulation of sliding and lift-and-slide structures of HS type is worse than for typical windows. The sashes of the sliding structures are not co-planar. There is an uneven distribution of isotherms within the labyrinth connections. This may result in local cooling of the surface of profiles under adverse climatic conditions, mainly in the labyrinth area.

As a result, moisture can condense on the inner surfaces of the profiles.

It is recommended to use dedicated system base profiles (aluminium or Modulotherm type).

5. Inspection and functional check

Inspection of fixed windows and balcony doors should take place in terms of correct installation and functionality, in compliance with the following requirements:

- deviations from the vertical and horizontal must not exceed 1.5 mm with the length of the member up to 3 m;
- the difference in the length of the diagonals of the frame and the sash should not exceed:
 - 2 mm with the length of the member up to 2 m,
 - 3 mm with the length of the member over 2 m;
- opening and closing of the sashes should be done without resistance;
- the open sash should not close or open by gravity;
- the closed sash should cling evenly to the frame, ensuring tightness between the two elements.
- the gap between the frame and the sash on the closed structure may feature a deviation of ± 0.5 mm for a given system according to system catalogues.
- frame deformations should not exceed 1 mm per 1 m;
- changes in the shape and dimensions of windows and balcony doors should not significantly impair their performance, require replacement of hardware or cause damage to window members, i.e. damage to hardware, seals, frames, corrosion of hardware, etc.

All deformations should be measured on closed sashes when the hardware is not locked.