

Installation Guidelines

These installation guidelines are valid for all VIEWSCAPE window systems.

These installation guidelines specify how the planning and execution of attachments to buildings must be conducted in order to ensure the operability of an installed window over a long period of time.

This technical information is intended to indicate which physical and mechanical structural loads are exerted on the installed structure to avoid damage to the building by the correct planning of the functional stages.

The quality of a high-grade window stands and falls with the execution of its attachment.

1. Demands on the wall connection joint

The position of the window in the brickwork and the form of the wall connection joint have effects on the production of condensation on the surface of the profile and the area of the wall opening. The installation circumstances are regulated by DIN 4108 (Part 7 and Appendix 2) and DIN EN ISO 10211-2.

The following requirements are made on the window and the building structure:

- ☒ Wind-tight
- ☒ Thermal insulation
- ☒ Resistance to driving rain
- ☒ UV resistance
- ☒ Interior vapour diffusion sealing
- ☒ Durability

The professional execution of the wall connection with regard to the joint geometry, attachment, insulation and sealing is highly significant to fulfil these requirements.

These fundamental requirements are implemented as technical properties and are compiled in two functional planes and one functional zone (Fig. 1).

Stage 1: Separation of interior and exterior environment

The separating stage of the interior and exterior environment must be obvious over the entire internal surface of the outside wall and must not be interrupted. Its temperature must be above the dew point of the room.

Stage 2: Functional area

In particular, the thermal and acoustic insulation properties must be ensured in this area for a reasonable period of time. To ensure this function, this area must "stay dry" and must be separated from the interior atmosphere.

Stage 3: Weather protection

The weather protection plane must largely prevent the entry of driving rain from the outside and must allow entered rainwater to drain to the outside in a controlled manner.

Any moisture, which has entered the functional area, must also be allowed to escape to the outside. This means that the weather protection plane is interrupted.

These should be planned according to the installation circumstances so that they can be installed protected against driv-

ing rain, i.e. beneath the thresh-

old or near the lintel. These openings are not depicted in the detail drawings because they must be planned according to the installation circumstances.

The following principle is derived from this knowledge:

"A better seal inside than out".

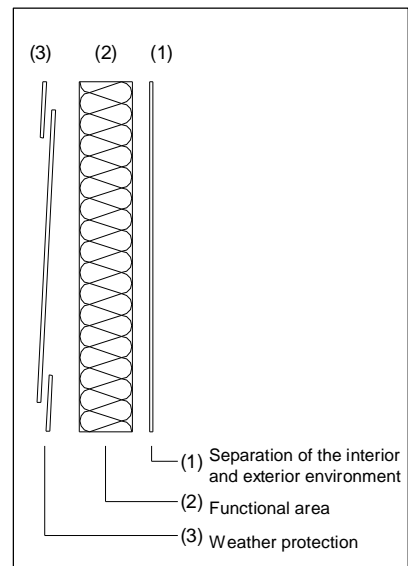
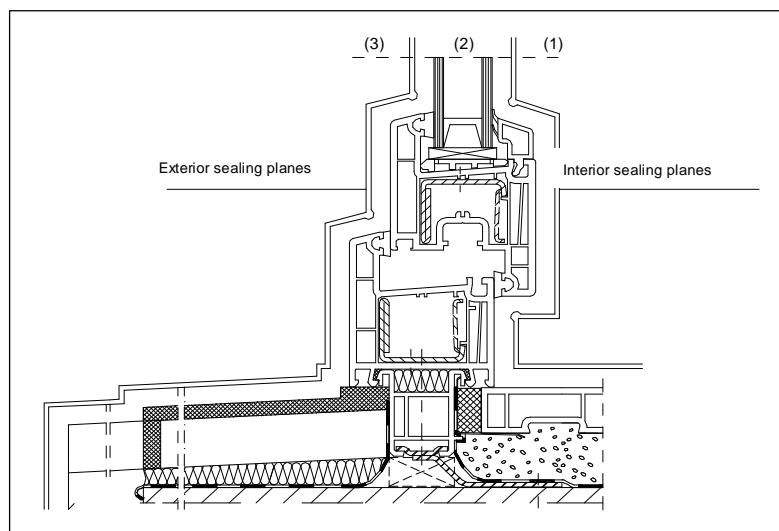


Fig. 1 - Functional planes and functional zone



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2. Physical principles of construction

The principles for professional planning of the building connection joints are provided by the following technical standards:

- ☒ DIN 4108 "Thermal insulation in building construction"
- ☒ DIN 4109 "Acoustic insulation in building construction"
- ☒ VDI Guideline 2719 "Thermal insulation of windows and their associated fittings"
- ☒ Thermal insulation ordinance

2.1 Behaviour in heat and moisture

The behaviour of the connecting joint in heat and moisture is determined by the interior and exterior environment.

Assuming that the moisture held in the warm, interior air (assuming a normal climate) is precipitated as condensation at a temperature of approx. 10°C, the significance of functional level 1 can be clearly seen. Condensation in the connecting joint should be avoided under all circumstances; if condensation does occur, it must be certain that it is able to drain. The principle "**A better seal inside than out**" also applies here.

2.2 Thermal insulation in building construction

Heat losses at the connecting joint must be prevented, i.e. breaches must be sealed permanently and hermetically to the latest technical standards.

The connecting joints must be planned to avoid thermal bridges.

2.3 Acoustic insulation in building construction

The connecting joint to the building plays a significant role in achieving the desired acoustic insulation class.

To keep the noise through the joint as low as possible, special attention must be paid to the planning of the joint geometry, the insulation of the joint and the

joint seal. The higher the requirements of acoustic insulation, the greater the effort required for the execution of the joint.

3. Fastening

The fastening must reliably transmit all forces planned to be exerted on the window into the building. DIN 1055 applies as the principle for this. All loads, consisting of the intrinsic weight, the wind load and live loads must be taken into account.

3.1 Absorption of the loads in the window plane

Supporting wedges must be inserted for an optimum transmission of the forces applied in the window plane (e.g. intrinsic weight) because, for example, tubular wall plugs, lugs, anchor bolts and similar fittings are inadequate to absorb the intrinsic weight.

When the wedges are put in place, it must be ensured that they are inserted without tension and allow expansion of the profiles.

The supporting wedges must not breach the seals.

3.2 Absorption of the forces vertical to the window plane

Windows must be attached to the building sufficiently firm to ensure their stability, in which the expansion behaviour of the PVC material must be taken into account. Frames must be attached all-round, i.e. horizontally and vertically. A maximum interval of 70 cm must be ensured for the fastenings (Fig. 2).

The main criteria in the choice of the fastenings are:

- ☒ The wall connection system
- ☒ The size of the load
- ☒ The installation circumstances

It is important to request the manufacturer or the supplier of the fastenings to confirm that they are suitable for the intended purpose.

The following are employed:

Tubular wall plugs:

The loads involve mainly shear and bending stress; the suitability of these fastenings for heavy loads is limited. The size and the edge clearance of the fastenings as specified by the manufacturer must always be observed.

Lugs, anchor bolts (iron ties):

The load involved here is primarily shear. Longitudinal movements of the frame are absorbed very well. These fastenings are optimum to transmit forces vertical to the window plane.

Anchors:

Anchors are employed mainly when it is necessary to absorb heavy loads, e.g. for suspended curtain walls. Their tension and shear loads are determined by static calculation. See also the manufacturer's specifications.

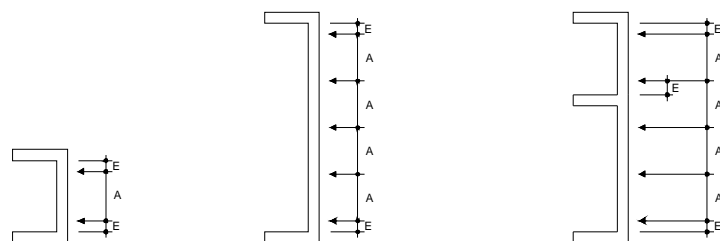
If it is necessary to reinforce couplings for static reasons, it is important that these are also attached to the brickwork to allow the forces resulting from the wind load to be absorbed.

PUR foam, silicone or adhesives are not permissible as fastenings!

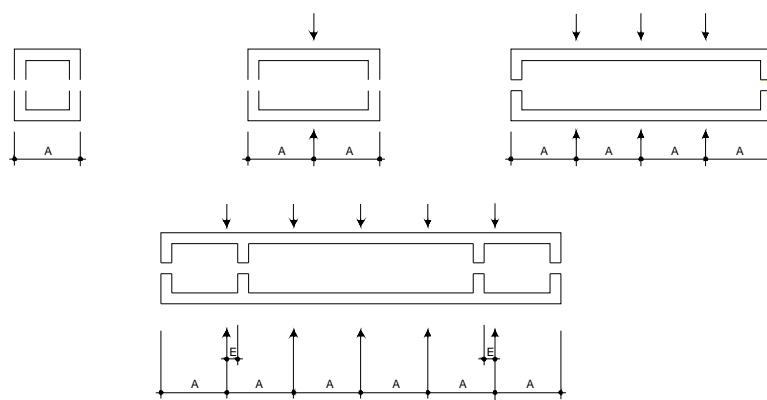
4. Sealing of the wall joints

The important role given the correct sealing of the wall joints is explained in Paragraph 1. Incorrectly executed wall connection joints are usually the cause of subsequent damage to the building.

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Fastening intervals of the vertical frame components



Fastening intervals of the horizontal frame components

Legend:

- A Anchor spacing for PVCu windows: max. 700 mm
- E - Distance from the inside corner
- Distance of the mullion from the inner profile edge: min. 150 mm

Fig. 2: The transfer of forces vertical to the window plane

The following steps should be taken to allow the joints to the building to be planned correctly:

- ☞ The conditions found on the outside wall and the sealing levels must be analysed
- ☞ The dimensions of the joints in the building must be compared with the planned specifications
- ☞ The sealing systems must be adapted to the outer wall system, which will be encountered
- ☞ An all-round, interior seal must be ensured

☞ The obligatory standards such as DIN 4108 and 4109 and the RAL quality guidelines must be observed

In the planning of the sealing stages, it must once more be observed: **“A better seal inside than out”**.

Because rigid PVC is subject to expansion and contraction due to the thermal loads (see Table 1), the joints to the building must be planned so that the sealing materials can follow the movements of the frame without becoming

detached from other sealing planes Likewise, stress cracks must not occur in the welded corners of the frame.

The minimum joint widths of the respective sealing systems can be seen from Tables 2 and 3. Compliance with the minimum joint widths does not liberate from observing the manufacturer’s specification for the sealing materials and sealing tape.

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The selection of the suitable sealing system is influenced by the outer wall system. The planning of connections in new buildings poses no problems, but restrictions can be encountered due to the existing openings and the quality of the mortar when old buildings are refurbished.

The following materials can be employed as the sealing system:

- ☒ Injected sealant such as silicone and acrylic
- ☒ Pre-compacted sealing tape
- ☒ Builder's sealing felt (not containing bitumen).

It is often appropriate to combine these variants (e.g. silicone inside, sealing tape outside).

Injected silicone is most frequently employed as a sealant. In this, it is important to comply with the application instructions of the manufacturer.

An accurate dimensioning of the joint is prerequisite to a permanent seal (Fig. 3).

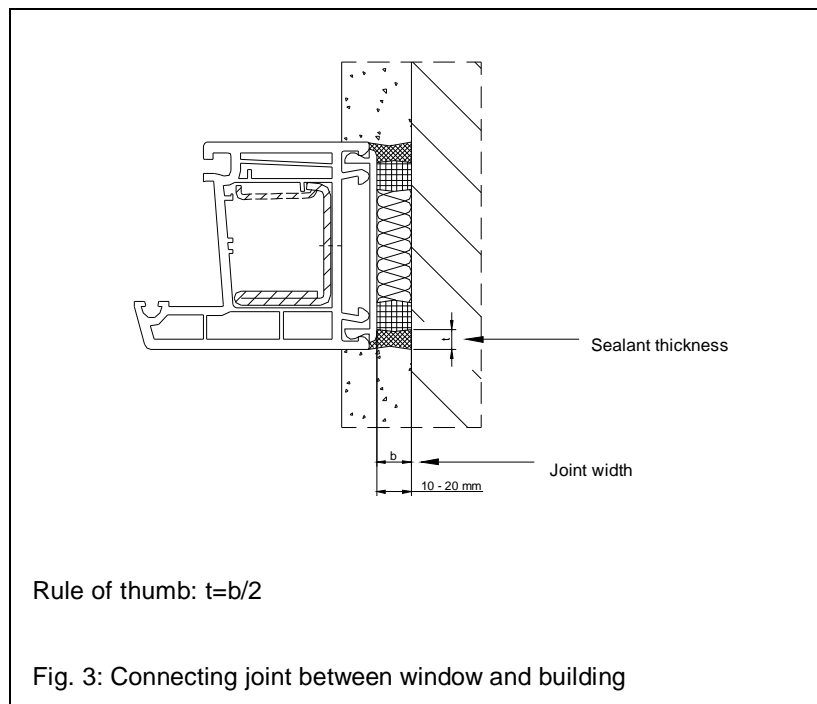
Direct sealing with silicone sealant on mortar surfaces impairs the permanent seal of the joint due to the low tensile strength of the mortar. It is necessary to use pre-compacted sealing tape in these cases. This consists of impregnated elastic foam. In contrast to injected sealant, this exerts compressive forces only at its adhering surface, and not tensile forces. It must be ensured that the surfaces to be sealed are parallel to each other. The manufacturer's specifications must also be observed when pre-compacted sealing tape is employed.

5. Measurements

A quality assured installation begins with the on site measurements. This is where the correct relationship of the joints to the building is specified.

Material of the window profiles	Temperature-related changes in length per joint (mm/m)
Rigid PVC, white	1.6
Rigid PVC, not white	2.4

Table 1: Temperature-related changes in length per joint, depending on the material of the frame



The following aspects should be taken into account when taking the site measurements:

- ☒ The dimensions for window fabrication must not be taken from drawings (only with the written approval of the architect / owner).
- ☒ In new buildings, it is essential that a draft plan is available for each floor to avoid subsequent complaints due to the failure to comply with railing heights or door heights.
- ☒ In new buildings, the wall openings must comply with DIN 18202.

- ☒ Firm and stable placement of the elements
- ☒ Transport and storage of the elements in a vertical position
- ☒ Protection against damage due to slipping, twisting, jamming and bending of the elements
- ☒ Protection against mechanical damage and dirt
- ☒ Prevention of direct contact between elements.
- ☒ Support of the hardware in larger elements with transport brace profiles.

6. Transport and storage on the building site

When the elements are transported and then stored on the building site, the following factors must be taken into account:

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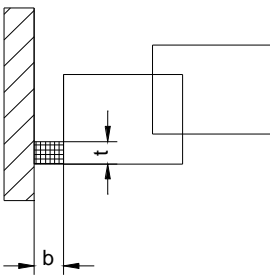
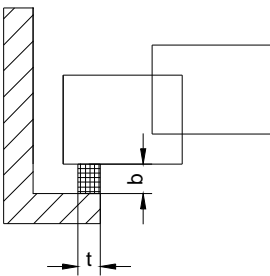
Window element in	Joint execution for element length						
							
	Up to 1.5 m	Up to 2.5 m	Up to 3.5 m	Up to 4.0 m	Up to 2.5 m	Up to 3.5 m	Up to 4.0 m
light colours	8 mm	8 mm	10 mm	10 mm	8 mm	8 mm	8 mm
dark colours	8 mm	10 mm	—	—	8 mm	—	—

Table 2: Minimum widths of sealing tape

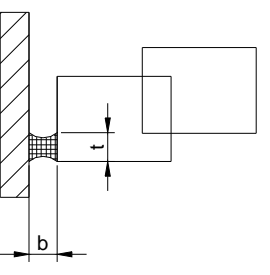
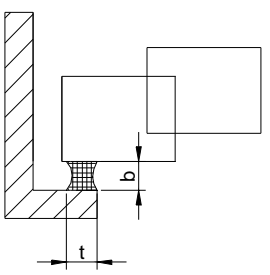
Window element in	Joint execution for element length						
							
	Up to 1.5 m	Up to 2.5 m	Up to 3.5 m	Up to 4.0 m	Up to 2.5 m	Up to 3.5 m	Up to 4.0 m
light colours	10 mm	15 mm	20 mm	25 mm	10 mm	10 mm	15 mm
dark colours	15 mm	20 mm	—	—	10 mm	—	—

Table 3: Minimum widths of seals

The joint depth – t – dependent on the joint width – b – must be verified with the sealant manufacturer.

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7. General installation guidelines

The windows must be installed in plumb, level and flush. Deviations from this requirement should be stipulated in writing.

When the lower frame profile is attached with tubular wall plugs, the reinforcement chamber must be permanently sealed against penetrating moisture.

If windows are installed below 5°C, the specific properties of the materials used for installation must be observed.

Direct impact on the frame and sash parts must then be avoided.

The protective film must be removed from all profiles immediately after installation.

If profiles are grouted in, their surfaces must receive a protective covering.

8. Quality assurance

The first step to installation with assured quality is taken in the planning phase. The following criteria should therefore be observed:

- ☞ Type of brickwork
- ☞ Specified dimensions

- ☞ Anticipated movement
- ☞ Joint geometry
- ☞ Sealing (suitability and compatibility)
- ☞ Position in wall
- ☞ Weather protection
- ☞ Anticipated forces
- ☞ Fastening
- ☞ Insulation
- ☞ Ancillary equipment

A checklist for the window installation should contain the following steps of inspection:

Production monitoring

- ☞ Specifications fulfilled?
- ☞ Correct elements?
- ☞ Matching accessories?
- ☞ Detail drawings?

On-site inspections before installation begins

- ☞ Rough opening tolerances?
- ☞ Walls straight?
- ☞ Wall rebate
- ☞ Openings smooth at the sealing stages?
- ☞ Connecting elements free of deficiencies?

- ☞ Installation necessary for a sample frame?

Instructions to the fitters

- ☞ On the basis of detail drawings
- ☞ Special attention to critical details
- ☞ Discussion with the installation manager and appointment of a responsible construction manager
- ☞ Only faultless windows for installation!
- ☞ Check correct dimensions before installing!
- ☞ Settling of the windows – inspect!
- ☞ Has the required joint width of 10 - 20 mm been realised?
- ☞ Are the fastenings adequate?
- ☞ Which sequence do the sealing planes have?

Approval inspection

- ☞ An approval inspection should definitely be conducted.
- ☞ Are acoustic insulation measurements necessary? If so, then only in the presence of the installation manager.