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Glass in building — Glazing recommendations — Assembly principles for vertical and sloping glazing

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National foreword

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Verre dans la construction - Recommandations pour la mise en oeuvre - Principes de pose pour vitrage vertical et incliné

Glas im Bauwesen - Empfehlungen für die Verglasung - Verglasungsgrundlagen für vertikale und abfallende Verglasung

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Contents

Page

European foreword

This document (EN 12488:2016) has been prepared by Technical Committee CEN/TC 129 “Glass in building”, the secretariat of which is held by NBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2016, and conflicting national standards shall be withdrawn at the latest by December 2016.

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Introduction

This European Standard deals with the glazing system i.e. the glazing, the glazing blocks, the sealants, the gaskets and the components used to assemble the glazing into a frame, as well as the rebate.

It gives the basic principles to avoid damages due to the construction. The observance of these recommendations will ensure a reasonable working life of the glazing. Additional requirements and precisions are to be found in the national regulations and/or national codes of practice, in order to deal with regional particularities due to climate, professional habits, availability of materials, etc. Special requirements can also be specified by manufacturers of components of the glazing system, including glazing.

Mechanical, thermal, chemical and moisture conditions are essential to preserve the functionality and the operability of the glazing in the long term. Information with regards to the durability of a glass product is given in the applicable harmonized European Standard (hEN).

1 Scope

This European Standard defines principles of glazing as well as recommendations on the selection of components, e.g. frame sections, beads, drainage holes, etc., for fitting glazing into frames of any material.

This European Standard applies to all basic types of edge supported vertical and sloping glazing systems, in all types of fixed or opening frames used in buildings.

This European standard specifies also the functions, requirements and installation of glazing blocks within a frame during its manufacturing, transportation, installation and operational life. The standard applies to glazing blocks used for all types of flat or curved glass, as well as to derived processed types of glass.

For certain glass products, e.g. fire resistant glazing, security glass, other or additional requirements, rules or recommendations may apply.

The standard is applicable to European climate conditions.

This European Standard does not apply to the following:

— glass blocks and glass pavers (EN 1051-1);

— channel-shaped glass (EN 572-7);

— structural sealant glazing (see EN 13022-1 and EN 13022-2 and ETAG 002);

— adhesively bonded glazing in window;

— point fixed glazing;

— greenhouses (see EN 13031-1).

As this standard gives basic assembly principles only, national requirements, rules or recommendations may also apply.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1279-1, *Glass in Building — Insulating glass units — Part 1: Generalities, dimensional tolerances and rules for the system description*

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

EN 13241-1, *Industrial, commercial and garage doors and gates — Product standard — Part 1: Products without fire resistance or smoke control characteristics*

EN 13830, *Curtain walling — Product standard*

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

prEN 14351-2, *Windows and doors — Product standard, performance characteristics — Part 2: Internal pedestrian doorsets without resistance to fire and/or smoke leakage characteristics*

EN 16034, *Pedestrian doorsets, industrial, commercial, garage doors and openable windows — Product standard, performance characteristics — Fire resisting and/or smoke control characteristics*

EN 15651-2, *Sealants for non-structural use in joints in buildings and pedestrian walkways — Part 2: Sealants for glazing*

EN ISO 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE Whenever the word "frame" is used, it refers also to the sash and casement, according to EN 12519.

3.1
glazing
glass product that is monolithic, laminated, and/or insulating glass unit

Note 1 to entry: In French called "vitrage" and in German called "Glasaufbau".

3.2
vertical glazing
glazing which is not more than 15° from vertical, either inwards or outwards

3.3
sloping glazing
glazing which is sloping between 15° and 85° from the vertical

Note 1 to entry: Glazing between 85° and 90° may be subjected to water ponding that should be prevented by proper design

3.4
glazing system
materials and the conditions under which the glazing is installed into a frame

3.5
drained and pressure equalized glazing system
glazing system that enable any water and water vapour which has entered the rebate to be effectively removed

Note 1 to entry: Openings for ventilation and drainage in the frame are designed to achieve partial water vapour pressure equalization and evacuation of water from the glazing rebate to the outside of the building.

Note 2 to entry: Recommendations for drainage and ventilation are given in informative Annex A.

3.6
fully bedded glazing system
sealant that completely covers the perimeter of the glazing

Note 1 to entry: Fully bedded system is not recommended for insulating glass units and laminated glass.

3.7
glazing rebate
part of a frame or surround into which the glazing is glazed

Note 1 to entry: See Figure 1.

3.8
glazing rebate platform
face of the glazing rebate which forms an angle with the upstand

Note 1 to entry: See Figure 1.

Note 2 to entry: This can be opened or closed.

3.9
glazing rebate upstand
fixed face of the glazing rebate parallel to the face of the glazing

Note 1 to entry: See Figure 1.

3.10
glazing bead
component holding the glazing in place in the glazing rebate

Note 1 to entry: See Figure 1.

Note 2 to entry: For vertical windows, the bead may be fixed either internally or externally. For sloping glazing, the bead is fixed externally.

3.11
drainage channel
channel in the rebate platform aiming at collecting possible water coming from infiltration and/or condensation, in order to evacuate it to the exterior of the frame, and to connect rebate spaces to equalise pressure around the glazing

Note 1 to entry: See Figure 1.

3.12
drainage opening
opening that evacuate the possible water collected in the drainage channel to the outside of the frame

Note 1 to entry: See Figure 1.

3.13
glass retention area
r
height of the perimeter of the glass that transmits loads to the frame

Note 1 to entry: See Figure 2 and Annex B.

3.14
free intersection
f
non load-bearing part of the glass around the perimeter

Note 1 to entry: See Figure 2 and Annex B.

3.15
mechanical edge cover
m
sum of the glass retention area (r) and the free intersection (f)

Note 1 to entry: See Figure 2 and Annex B.

3.16
edge clearance
Jp
distance, which may be variable, between the edge of the glazing and the glazing rebate platform

Note 1 to entry: See Figure 2 and Annex B.

3.17
rebate depth
t
sum of the mechanical edge cover (m) and the edge clearance (Jp)

Note 1 to entry: See Figure 2 and Annex B.

Note 2 to entry: In German: Glasfalzhöhe.

3.18
face clearance
d
distance between either glazing and the rebate upstand or glazing and the bead

Note 1 to entry: See Figure 2 and Annex B.

3.19
glazing block
piece of suitable material placed between the glazing and the frame preventing direct contact between the two of them

Note 1 to entry: See Figure 3 and Annex C.

Note 2 to entry: Glazing blocks may not take over any loads from the construction.

Note 3 to entry: Glazing blocks include setting blocks, location blocks and distance pieces.

3.20
setting block
glazing block transferring the load of the glazing via the hardware and/or frame to the structure of the building

Note 1 to entry: See Figure 3 and Annex C.

3.21
location block
glazing block holding the correct position of the glazing in the frame

Note 1 to entry: See Figure 3 and Annex C.

3.22
distance piece
glazing block used to transmit the loads perpendicular to the plane of glazing

Note 1 to entry: See Figure 3 and Annex C.

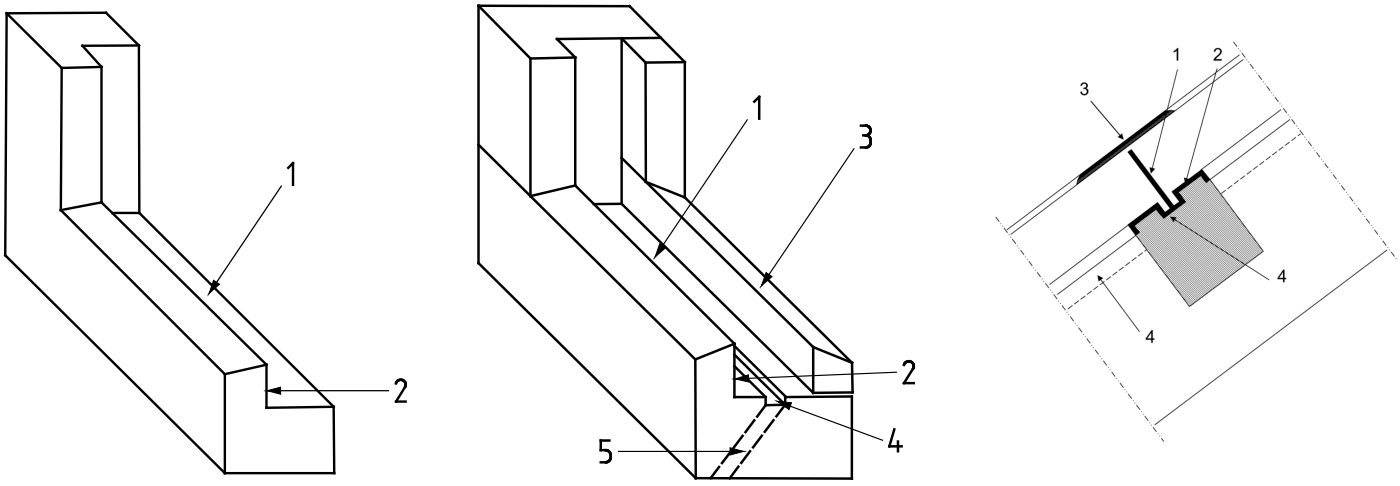
Note 2 to entry: This function can also be ensured by a strip or a gasket.

3.23
compensation block
block that create a flat platform for the correct positioning of setting block or location block in certain frame profiles

Note 1 to entry: See Figure 3.

Note 2 to entry: Compensation block is generally used with aluminium or plastic profiles.

3.24
temporary block
additional glazing block used to ensure the correct positioning of the glazing when glazed frames are transported to a work site, and that may be removed before installation of the glazed frame into the building

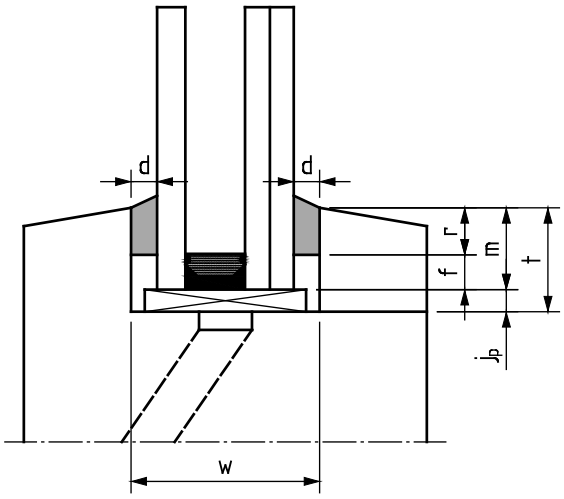


Vertical glazing, open rebate | **Vertical glazing, closed rebate** | **Sloping glazing**

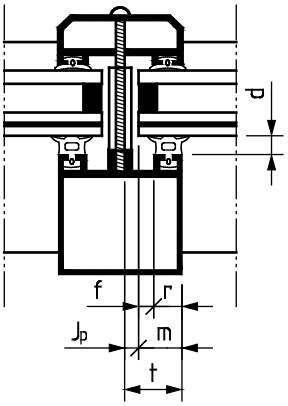
Key

1 glazing rebate platform
2 glazing rebate upstand
3 glazing bead
4 drainage channel
5 drainage opening

Figure 1 — Definition of a glazing rebate



Vertical glazing

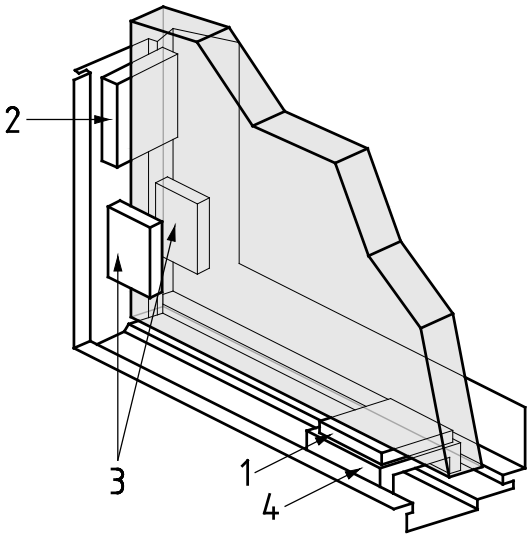


Glazed roof – transom

Key

r = glass retention area
f = free intersection
m = mechanical edge cover = r + f
w = width of glazing rebate
Jp = edge clearance
t = rebate depth = m + Jp
d = face clearance

Figure 2 — Symbols and terms for glazing rebate dimensions



Key

1 setting block
2 location block
3 distance pieces
4 compensation block

Figure 3 — Types of blocks

4 Basic requirements

4.1 General

The design of the framing, choice of materials and glazing methods shall be such that the following performance parameters are ensured for an economic service life:

— The glazing shall not carry any of the loads of the frame / construction.

— The glazing shall only carry the applied in-service loads such as self-weight, wind, snow, and where relevant, live load. The restraining system (i.e. bead) can transfer the loads back to the frame. Care should be taken to ensure that glazing beads, gaskets, etc. will not apply excessive stress to e.g. insulating glass unit and laminated glass edges.

— The glazing is supported during its service life, including transportation and installation where appropriate. This includes the stability of the frame and the substructure.

  Horizontal transport should be forbidden unless agreed with the glass supplier.

— The durability of the glazing is maintained, e.g. insulating glass unit edge seals and laminated glass interlayer(s) are to be protected from the impact of moisture, water penetration, ultraviolet radiation when relevant, incompatibilities, etc.

The manufacturing tolerances of the glazing and the frame, as well as the expansion and contraction of the components due to variations in temperature and humidity, shall be taken into account.

4.2 Support of glazing

The frame system shall support the glazing.

NOTE 1 Information on allowable frame deflections can be found in EN 14351–1 and EN 13830.

The frame and glazing system shall be sufficiently robust to ensure that the installed glazing does not come into contact with any part of the frame.

NOTE 2 Some types of wooden frame systems allow glass being in contact with the glazing rebate upstand and/or the bead.

This shall take account of any movement that may occur when the frame is being glazed and in service, similarly it shall cover transportation and installation in the case of factory glazing.

Improper transport of glazed frames may lead to displacement of setting blocks or location blocks. This shall be prevented by appropriate measures.

4.3 Mechanical stability

The framing and glazing rebate shall be designed in such a way as to prevent damage to the glazing during transportation, installation and when exposed to the design loads during its working life.

The frame including the bead shall be designed to ensure that:

— the glazing does not carry an undue proportion of any applied loads;

— all loads shall be transferred by the frame and glazing system back into the frame and surrounding structures;

— the frame shall be of sufficient stiffness to limit edge deflection.

NOTE Excessive edge deflection can have a detrimental effect on the lifetime of insulating glass units.

Glass should be designed according to prEN 16612 when this standard will be available, or according to national design regulation.

4.4 Durability

4.4.1 Ultraviolet attack on sensitive components

In order to maintain the design properties of the glazing, and to ensure that the insulating glass unit achieves an economically reasonable working life, UV-sensitive components shall be protected against direct UV-radiation, see EN 1279-1.

4.4.2 Chemical and atmospheric attack on sensitive components

Compatibility between materials, e.g. the edge seal of the insulating glass unit, the interlayer(s) of the laminated glass, the glazing materials, the coatings on the glass and on the frames, shall be checked by the producer of the window and façade system with the component suppliers.

The possible attack can be between materials in contact e.g. setting blocks and insulating glass unit seal, or not in contact e.g. gaskets and laminated glass interlayers.

These components should also be durable against chemical and atmospheric attacks due to pollution, or aggressive or chlorinated atmospheres like in swimming pools.

4.4.3 Weather tightness

The frame and glazing system shall be designed so as to ensure that the glazed window, door etc. offers a suitable degree of air and water tightness to the construction. This performance will also depend upon the conformity of the implementation to the relevant standard and/or national regulation, together with appropriate maintenance and repair.

The glazing rebates shall be drained and ventilated to protect the glazing against moisture causing attack on the following:

— insulating glass unit edge-seals;

— laminated glass interlayer;

— coated glass surfaces;

— edges of wired glass;

— frames, etc.

The function of the drainage system is to evacuate water present in the rebate as a consequence of water ingress or water vapour condensation. It shall not be used as a deliberate way to evacuate water from the building envelope.

See examples in Annex A.

It shall be ensured that no warm and humid air can pass from the room side (inside) to the rebate to create additional condensation.

4.4.4 Additional considerations for sloping glazing

For sloping glazing, additional aspects should be taken into account, for example water entrapment, snow and ice entrapment, see Annex D.

4.5 Special requirements

Additional measures may be required for the following:

— thermal insulation and risk of thermal bridges;

— integrated solar control;

— risk of thermal breakage;

— sound insulation;

— safety;

— security;

— fire and smoke;

— glazing with electrical component.

5 Requirements for the components

5.1 Frame selection, materials and finishes

5.1.1 Design of the frame

The frame shall be designed in such a way that it fulfils the requirements of the standards applicable to windows, doors and facades systems.

These standards, when appropriated, shall be followed:

— EN 13241-1: Windows and doors – Industrial, commercial and garage doors and gates – Part 1: Product without fire resistance or smoke control characteristics;

— EN 13830: Curtain walling – Product standard;

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

— prEN 14351-2: Windows and doors - Product standard, performance characteristics - Part 2: Internal pedestrian doorsets without resistance to fire and/or smoke leakage characteristics;

— EN 16034: Pedestrian doorsets, industrial, commercial, garage doors and openable windows - Product standard, performance characteristics - Fire resistance and/or smoke control characteristics.

5.1.2 Selection

When selecting a frame, the following shall be ensured:

— the materials used are suitable for the proposed method of glazing;

— the rebate upstand is sufficient to give adequate edge cover to the glazing, and sufficient edge clearance taking into account frame and glazing tolerances;

— the rebate platform is of sufficient size to allow the required thickness of glazing material on each side of the glazing, and to allow for the correct positioning and fixing of the beads;

— the beads have the required dimensions to enable them to be positioned, fixed correctly and to give adequate edge cover to the glazing;

— the design of any drainage/ventilation system is adequate for pressure equalization and the rapid removal of any water that may be present in the rebate area;

— the rebate upstands shall all be in the same plane at the corners.

5.1.3 Frame materials

5.1.3.1 General

The material used for the manufacturing of a frame or surround shall be selected so as to ensure the following:

— sufficient robustness so that the glazing is adequately supported, see 4.2;

— appropriate mechanical resistance when correctly designed, see 4.3;

— correct durability when used with the appropriate glazing system, see 4.4;

— meet specific performance requirements, see 4.5.

5.1.3.2 Material used

The frame materials used can be:

— timber;

— aluminium;

— steel;

— PVC-U.

Other materials or composites (e.g. glass fibre reinforced plastic) are sometimes used.

Combinations of two or more materials (e.g. timber and aluminium) are also possible.

5.1.3.3 Requirements

The basic frame design, in terms of materials (including preservative), profile design, workmanship, construction, security and safety, weather-tightness, operation and strength performances shall be such that the requirements of the relevant standard(s) on doors, windows and curtain walling are met.

When profiles are produced by a system supplier, the frames shall be fabricated from these profiles in accordance with the system supplier's recommendations and conform to the appropriate standard.

In order to achieve good contact with glazing materials, rebates and beads shall be smooth, e.g. free from knots and holes in case of timber frame, or residues from cuttings in case of PVC or aluminium, etc.

5.2 Sealants

Sealants are gun-applied materials generally used for capping and bedding applications.

— The sealants and their application shall comply with EN 15651-2. When necessary, the correct use of primers and/or cleaners to ensure adhesion to frame and glass shall be ensured.

— The materials shall be applied and used as specified by the manufacturer.

NOTE The type and dimension of the seal can be defined in the national glazing rules.

— The party who's bringing all materials together shall ensure that the materials used are compatible, for example:

  — any components e.g. sealant, joint backing, setting block, interlayer of the laminated glass, outer and inner seal of the insulating glass unit;

  — certain coatings e.g. self-cleaning coatings on glass.

5.3 Preformed strip materials

Preformed glazing profiles are an integral part of any window or façade system and shall be selected and installed as specified in the description of the system.

The following parameters shall be taken into consideration: geometry of the preformed strip materials, overall glass thickness and tolerances, glazing bead system, coating of glass surfaces, workmanship at corners and method of application.

— The preformed strip materials and their application shall comply with EN 12365-1.

— The materials shall be applied and used as specified by the manufacturer.

NOTE The type and dimension of the preformed strip material can be defined in the national glazing rules.

— The party who's bringing all materials together shall ensure that the materials used are compatible, for example:

  — any components e.g. sealant, joint backing, setting block, interlayer of the laminated glass, outer and inner seal of the insulating glass unit;

  — certain coatings e.g. self-cleaning coatings on glass.

5.4 Putty

These materials are classified as workable sealing compounds.

They are used to seal and fix glazing units in glazing rebates. The surface of the glazing rebate shall be compatible with the putty used and be appropriate for the intended use.

The exposed surface should also be painted over. Their use is for all fronting glazing systems, see Figure 4, with the following frame materials and finishes:

— primed or base coat stained softwood;

— painted or stained hardwood;

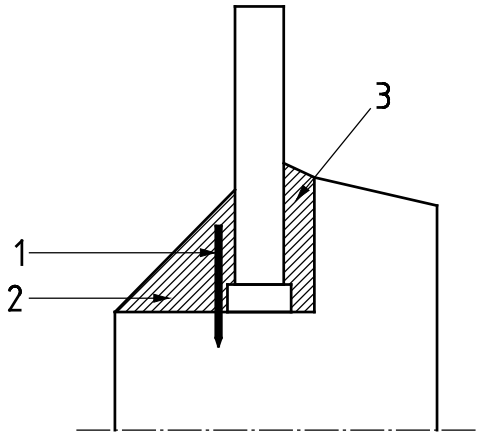
— galvanised steel to be painted after glazing;

— suitable coated frame surfaces.

Putty is only used for single monolithic (i.e. not laminated) glazing.

NOTE In some countries, the use of this system is restricted or not allowed

Installed putty should be painted.



Key

1 glazing sprig (or suitable nail)

2 front Bedding

3 back Bedding

Figure 4 — Example of glazing with putty

5.5 Glazing blocks

5.5.1 General

The glazing shall not bear any imposed load.

The choice of the material for the blocks is governed by the glazing system.

The following shall be observed:

a) Glazing blocks shall be imperishable and compatible with the glazing materials, the frame and with all components of the glazing, (e.g. the interlayer in laminated glass, or the seal of insulating glass units). The chosen material shall have such properties that damaging of the glass edge and/or edge seal is prevented.

b) For the selection of material, environmental conditions and the system of glazing shall be taken into account.

c) The functional characteristics of the blocks shall be maintained during the economically reasonable working life of the glazing.

d) The glazing blocks shall not prevent drainage or equalization of vapour pressure.

e) Glazing blocks shall be fixed in their intended position. They shall not be fixed in a manner that will impair the tightening function of the glazing rebate.

f) The glazing blocks shall be positioned parallel to the glass edge, see Figure 3, to ensure that glazing is supported over the whole length of the blocks.

Requirements and position of glazing blocks are described in Annex C.

There are 3 types of glazing blocks: setting blocks, location blocks and distance pieces.

NOTE Temporary blocks may be needed during transport.

5.5.2 Setting blocks

Setting blocks shall be used in all types of frames.

5.5.2.1 Functions

— To distribute or equalize the weight of the glazing within the frame in such a manner that the frame is able to bear the glazing. In addition, foreseeable strains and stresses arising from temperature, operating forces etc. are transmitted, to avoid damage to glass edges and edge seal;

— to transmit the forces into the frame, and then via the fittings, into the surrounding area (e.g. bearing structure, masonry), so that the functioning of the window or door is not impaired;

— to avoid distortion of the window or door when open; to ensure an unobstructed operation of the opening mechanism;

— to position the glazing in the correct position in the frame, e.g. to create space between frame and glazing for vapour pressure equalization and drainage;

— to prevent contact between glass and any component of the frame.

5.5.2.2 Positioning

Setting blocks shall be positioned according to the type of frame. Maximum two positions for setting blocks at the bottom edge of the glazing shall be foreseen, see Annex C.

The minimum distance between the corner of the glazing and the nearest edge of the block shall be 50 mm. It shall be adapted to the dimensions and the weight of the glazing.

The distance from the corner to the glazing block is usually 80–100 mm. The distance can be reduced by up to 20 mm if the frame construction, weight and size of the glazing do not increase the risk of breakage.

NOTE Setting blocks positions are shown in Annex C.

5.5.2.3 Material

Setting blocks shall be made of either:

a) Synthetic materials

Hardness shall be between 60 and 70 Shore “D” measured in accordance with EN ISO 868:

For heavy IGU and for glazing with possible displacement at the edges, e.g. laminated glass, the hardness of the blocks shall be between 60 and 80 Shore “A”.

NOTE Required hardness can also be defined by national regulation.

b) Suitably treated hardwood (density ≥ 650 kg/m^3).

NOTE In some countries, hardwood blocks are not allowed.

5.5.2.4 Dimensions of the setting blocks

5.5.2.4.1 Width

Setting blocks shall always be such that the glazing is supported over its full thickness. Unless otherwise specified, the width of the setting blocks shall be at least 2 mm larger than the thickness of the glazing.

5.5.2.4.2 Length

The length of a setting block shall not be less than 80 mm.

The required length of a setting block is depending on:

a) the weight of the glazing and its transfer to the rebate platform;

b) the resistance to compression of the material;

c) the frame and setting block geometry.

In the case of glazing with a surface of ≥ 10 m^2 and/or with a weight of ≥ 500 kg, blocks of sufficient compressive strength are to be employed. Permissible surface pressure shall in this case be ≥ 5 N/mm^2.

Care should be taken to avoid the occurrence of any changes in the shape of the glazing block which may arise under the effect of load, and result in its proper functioning no longer being ensured.

NOTE The length of the setting blocks may be determined nationally. Setting blocks with a length of 50mm may be allowed in some countries.

5.5.2.4.3 Thickness

The thickness of setting blocks, including the possible compensation block, shall be at least equal to the minimum edge clearance between glass and glazing rebate platform, sufficient for ventilation and/or drainage.

5.5.3 Location block

5.5.3.1 Functions

Location blocks can be mandatory or optional, (see Annex C).

— Location blocks, mandatory and optional, hold the glazing in the correct position in the frame and avoid contact between the glass and the frame.

— Mandatory location blocks are transferring loads from the glass to the frame, and may also temporarily ensure the function of a setting block in some types of windows (e.g. in tilt and turn windows). In that case, the mandatory location block shall fulfil the requirements of the setting blocks (i.e. positioning, material, dimensions.)

— Optional location blocks are not aimed at transferring loads.

NOTE Position of location blocks is shown in Annex C.

5.5.3.2 Positioning

Location blocks are required in frames where there is a risk of glass slippage (opening windows, sloping glazing, vibrations etc.).

The positioning of location blocks shall be in accordance with the type of frame, see Annex C.

The minimum distance between the corner of the glazing and the nearest edge of the block shall be 50 mm.

In some systems where the design is taking it into account, the minimum distance between the corner of the frame and the nearest edge of the block can be 20 mm.

5.5.3.3 Material

Location blocks shall be made of materials with a hardness of 60 - 80 Shore A measured in accordance with ISO 868.

5.5.3.4 Dimensions

5.5.3.4.1 Width

Location blocks shall always be such that the glazing is supported over its full thickness. Unless otherwise specified, the width of the location blocks shall be at least 2 mm larger than the thickness of the glazing.

5.5.3.4.2 Length

The length of location blocks shall be at least 50 mm.

5.5.3.4.3 Thickness

The thickness of location blocks shall be at least equal to the minimum edge clearance.

The thickness shall be such that they do not interfere with the function of any other block.

5.5.4 Distance pieces

5.5.4.1 Function

Distance pieces maintain the face clearance, transmit the loads applied on the glazing to the frame system and negate the effect of local peak stresses i.e. avoid contact between the glass and the rebate upstand or glazing bead.

This function can also be ensured by a lining tape.

NOTE Some types of wooden frame systems allow installation of glass without additional lining tape, provided that the surface of the glazing is ≤ 6 m^2 and the length of the edges is ≤ 3 m.

5.5.4.2 Positioning

Distance pieces shall be placed near setting blocks or location blocks. At least two pairs of distance pieces shall be placed on each side of the frame, opposite to each other, except where the glazing method permits them to be used on one side only.

The distance between the centres of two successive blocks should not create excessive stress on the glazing.

5.5.4.3 Material

Distance pieces shall be made of elastomeric materials of hardness 50-70 Shore A measured in accordance with the ISO 868.

5.5.4.4 Dimensions

5.5.4.4.1 Length

The minimum length of distance pieces shall be 30 mm.

5.5.4.4.2 Height

The height of distance pieces shall ensure that the water tightness of the glazing seal is not impaired.

The contact height with the glass shall be at least 5 mm.

5.5.4.4.3 Thickness

The thickness of distance pieces shall be equal to the face clearance.

5.5.5 Temporary blocks

Additional glazing blocks may be used to ensure the correct positioning of the glazing when glazed frames are transported to a work site. The positioning of these additional blocks depends on the type of frame and the way in which it may be transported (e.g. in cases where they are tilted).

These blocks shall be removed before installation of the glazed frame into the building or when not removed, shall not cause any stresses on the glazing during its lifetime.

Annex A
(informative)

Recommendations for drainage and ventilation

A.1 General

Drainage, ventilation and pressure equalization can be done by the same or separate openings.

Drainage openings should be located at the lowest part of the rebate.

Glazing blocks, gaskets, compensation platform, adhesive and other materials should not obstruct the free path to the openings.

A.2 Drainage and ventilation per module:

In this instance, each glazing is drained and ventilated independently, directly to the outside ambiance. This system is used for windows (vertical or sloped) and glazed doors as well as in some curtain walling.

It allows making drainage according to the principle of pressure equalization, thanks to appropriate openings correctly placed.

Depending on the construction, the performance of the drainage/ventilation can vary. The drainage/ventilation can be in the form of holes, slots or raised glazing beads, see figures below.

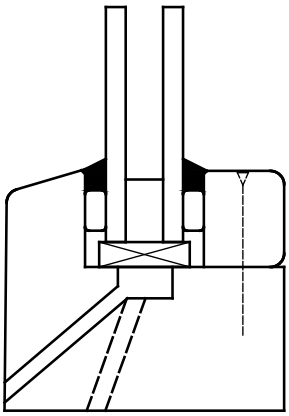


Figure A.1 — Holes for drainage and ventilation

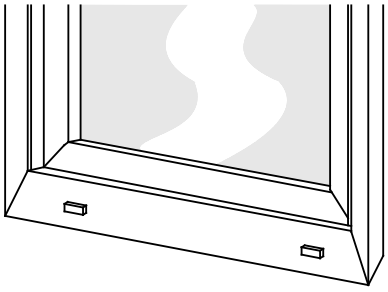
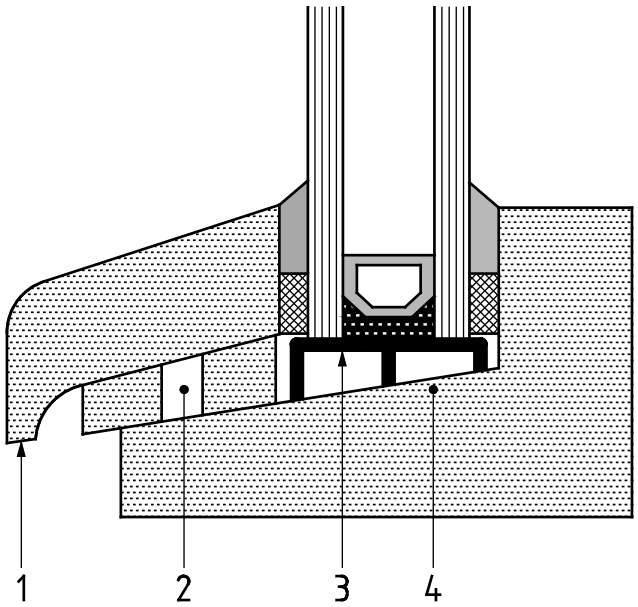


Figure A.2 — Slots for drainage and ventilation



Key:

1 drip
2 capillary groove
3 glazing block
4 slope

Figure A.3 — Raised glazing bead

The setting glazing blocks should not obstruct the drainage/ventilation, see Figure A.4.

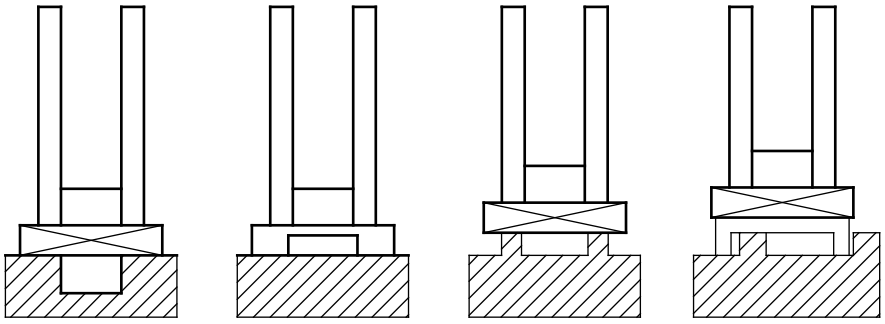


Figure A.4 — Examples of glazing blocks that do not obstruct the drainage

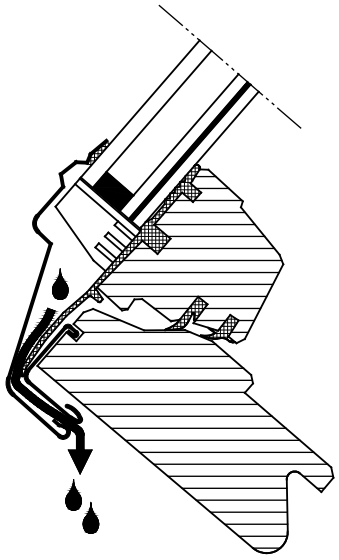


Figure A.5 — Example of drainage in a roof window

A.3 Cascading drainage and ventilation

In this instance, each glazing is drained and ventilated independently through the rebate of the transom and which is connected to the rebate of the mullion. This principle is typical for stick construction and also used for glazed roofs. When the glazed surface is divided with horizontal profiles/beads, problems can occur depending on the performance of these profiles/beads. The profile should be such that complete drainage of water is enabled. Pressure equalization is necessary to ensure a correct drainage of the system.

In cascading drainage systems, the rebate of the transom should be connected to the rebate of the mullion in such a way that the free flowing of water is not prevented.

The evacuation of the water to the outside is done at the lower part of the framing system and the evacuation of the water vapour at the highest part.

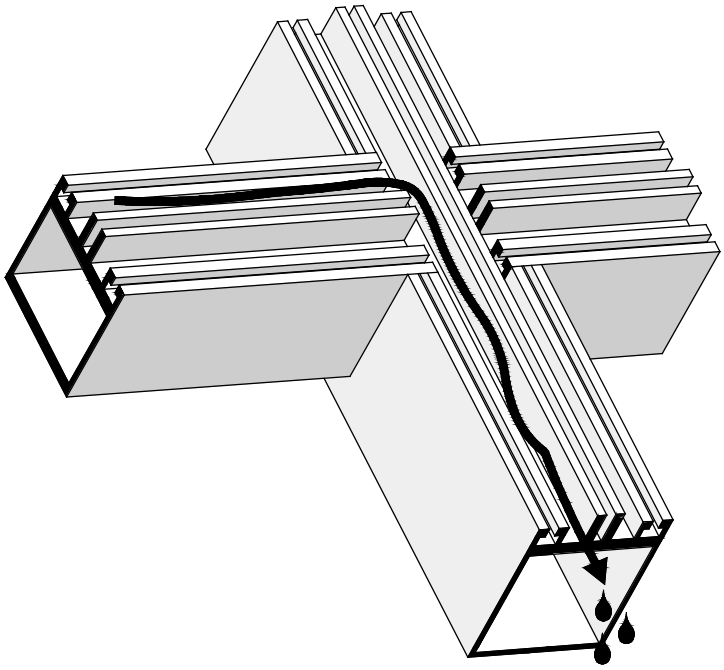


Figure A.6 —Example of drainage in mullions and transoms glazed roof

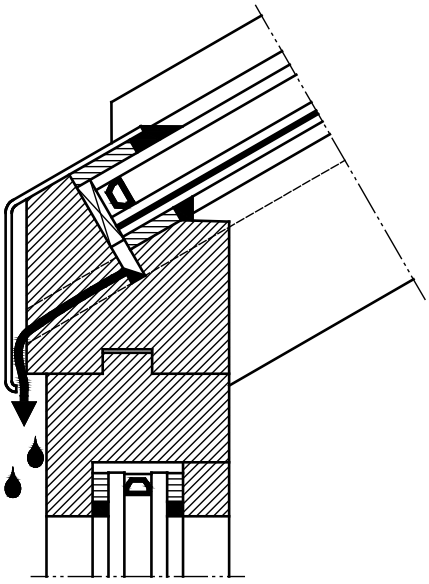


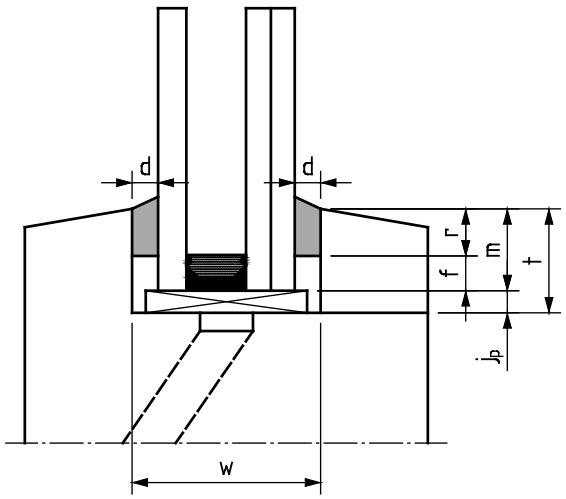
Figure A.7 — Example of water evacuation at the bottom of a glazed roof

Annex B
(informative)

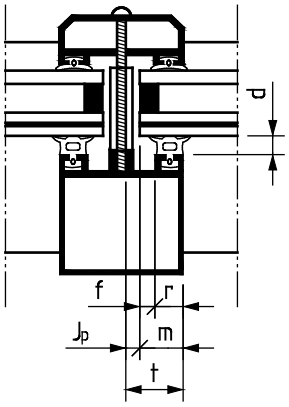
Aspects for determining the rebate dimensions

B.1 General

The rebate as shown in Figure B.1 is defined as follows:



Vertical window



Glazed roof - transom

Key

r = glass retention area
f = free intersection
m = mechanical edge cover = r + f
w = width of glazing rebate
Jp = edge clearance
t = rebate depth = m + Jp
d = face clearance

Figure B.1 — Glazing rebate

NOTE The minimum rebate dimensions may be given nationally.

The factors to be taken into account for determining the mechanical edge cover (*m*) and the edge clearance (j_p) are: (list is not exhaustive)

— type of glazing, e.g. laminated glass, double or triple glazing, etc.;

— glazing width and height tolerances (see glass product standards or manufacturer's recommendations);

— relevant loads (e.g. wind, self-weight, snow, thermal stress, human impact);

— thermal expansion difference between glass and frame;

— possible building movements due to various actions;

— possible building vibrations due to various actions;

— racking of the frame;

— climatic influences (e.g; UV light, moisture, etc.);

— accuracy in manufacturing and installation of the frame;

— shortening of panes due to deflection.

B.2 Insulating glass unit

In cases where the edge seal of the insulating glass unit is susceptible to degradation from the effects of solar radiation, it is essential that the complete edge seal is permanently shielded from the rays of the sun. Where necessary, this additional protection to the insulating glass unit seal may be provided by, for example, chamfering the top edge of the glazing material to cover the insulating glass unit spacer bar or by the lip of a gasket; but such protection is non-structural and not part of the mechanical edge cover requirement.

Annex C
(informative)

Positioning of glazing blocks as a function of frame type

C.1 General

There are 3 types of glazing blocks, depending on their function:

— Mandatory blocks:

  — setting blocks. They transfer the load of the glazing via the frame and hardware to the structure of the building. A maximum of two setting blocks are sufficient. They are indicated in the Figures C.2 to C.17 by a triangle "▲"

  — mandatory location blocks. They transfer loads from the glazing to the frame, depending on the type of window. These blocks should not be removed after installation and are usually of the same material as setting blocks. Mandatory blocks are indicated in the Figures C.2 to C.17 by a circle "O"

— Optional blocks:

  — location blocks. They are holding the correct position of the glazing in the frame and avoid the contact between the frame and the glass but are not aimed at transferring loads from the glazing to the frame. Optional blocks are indicated in the Figures C.2 to C.17 by a cross "✕".

    Location blocks should be positioned close to the hinges and the handles when presents.

— Distance pieces:

  The distance pieces are used to transmit the loads perpendicular to the plane of glazing. They should be placed in such a way that the glazing is maintained at an appropriate distance from the rebate upstand and the bead. They should be positioned so that they do not interfere with setting or location blocks.

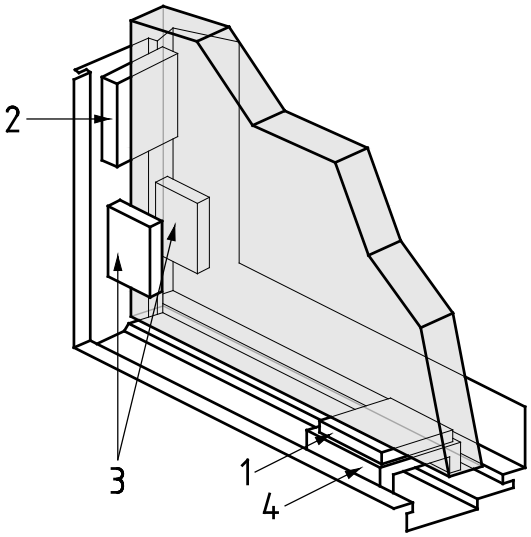
  In sloped glazing, certain distance pieces carry a part of the self-weight loads, see C.3.

  NOTE The function of the distance pieces is very often taken over by appropriate strips or gaskets.

Depending on the glazing system, glazing blocks may need a compensation block.

As the direction of the opening has no influence on the position of the glazing blocks (to the inside or to the outside), the direction indicated in the figures should be considered as an example only.

In the instances where U-shape gaskets are used, glazing blocks are not required. This should not prevent the drainage from functioning properly.



Key

1 setting block
2 location block
3 distance pieces
4 compensation block

Figure C.1 — Function of blocks

C.2 Position of the glazing blocks for vertical windows and doors

The position of the glazing blocks depends on the type of window:

— Fixed frame: Figure C.2;

— Side hung frame: Figure C.3;

— Tilt and turn frames: Figure C.4;

— Eccentrically vertically pivoting frame: Figure C.5;

— Centrally vertically pivoting frame: Figure C.6;

— Bottom hung frame: Figure C.7;

— Horizontally pivoting frame and top guided fully reversible frame: Figure C.8;

— Top hung frame: Figure C.9;

— Vertically sliding frame: Figure C.10;

— Horizontally sliding frame: Figure C.11;

— Sliding projecting top hung casement: Figure C.12;

— Triangular glazing: Figure C.13;

— Arched frame: Figure C.14;

— Oval and half oval frame: Figure C.15;

— Multiple glazing window or door: Figure C.16;

— Curved glass: Figure C.17.

For placing blocks in other cases then those described here, the glass manufacturer should be consulted.

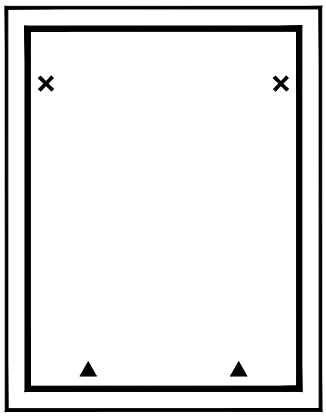


Figure C.2 — Fixed frame

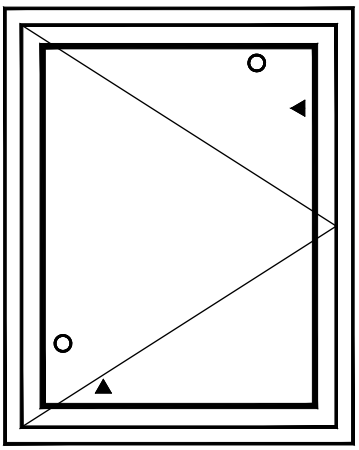
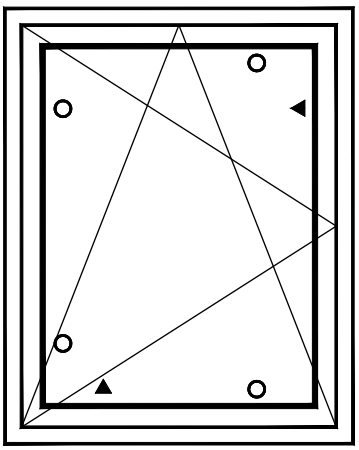


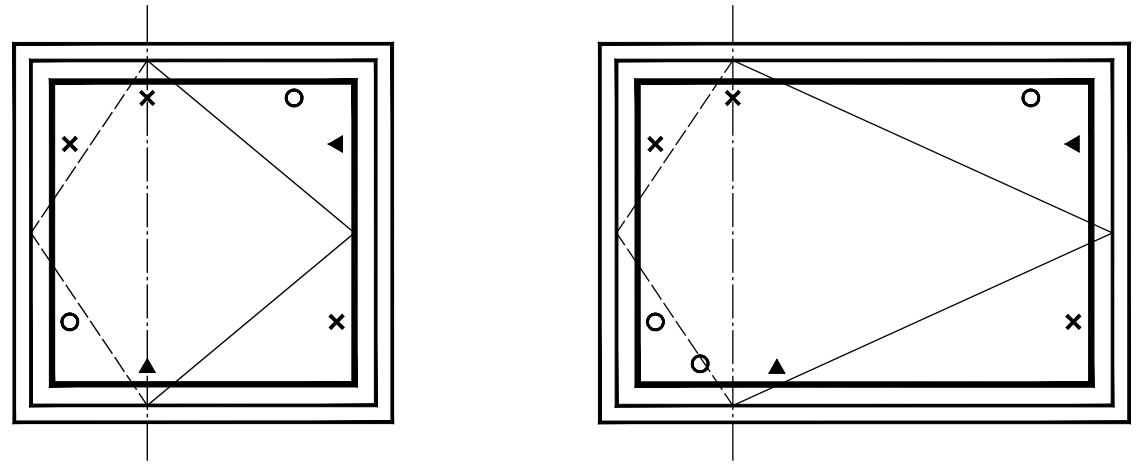
Figure C.3 — Side hung frame



Tilting frame: Bottom hung opening frame

Turning frame: Side hung opening frame

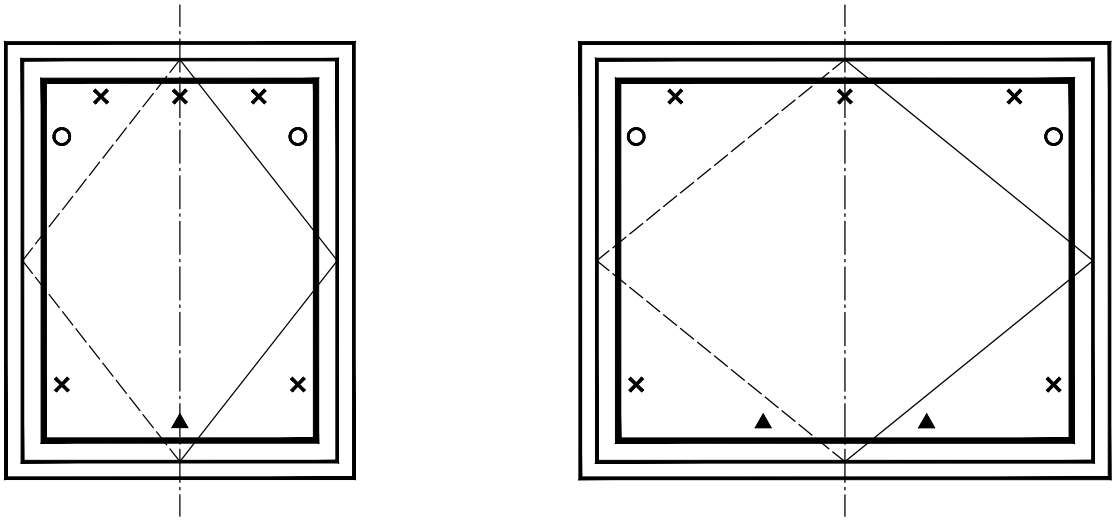
Figure C.4 — Tilt and turn frames



Total width of the window ≤ 1m

Total width of the window > 1m

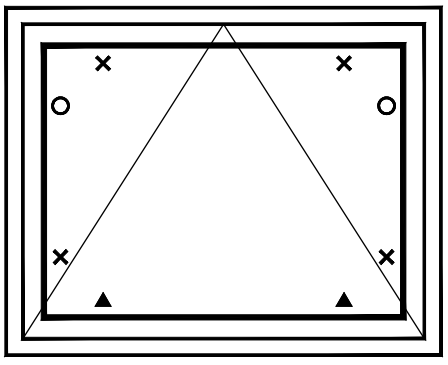
Figure C.5 — Eccentrically vertically pivoting frame



Width of the window ≤ 1m

Width of the window > 1m

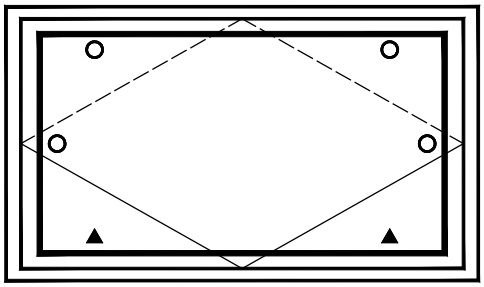
Figure C.6 — Centrally vertically pivoting frame



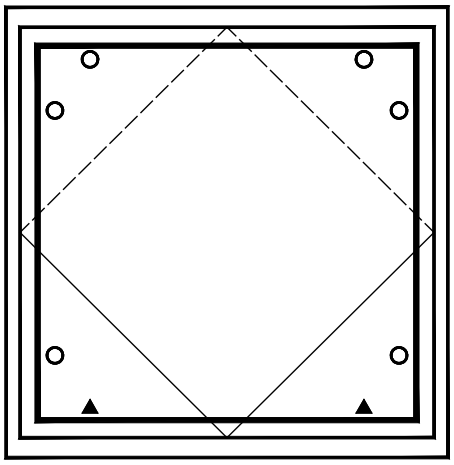
Setting blocks should be located above of hinges.

Location blocks at the top side are obligatory to maintain the glazing during its positioning, and during cleaning when the window is turned more than 90°.

Figure C.7 — Bottom hung frame



Height of the window ≤ 1 m



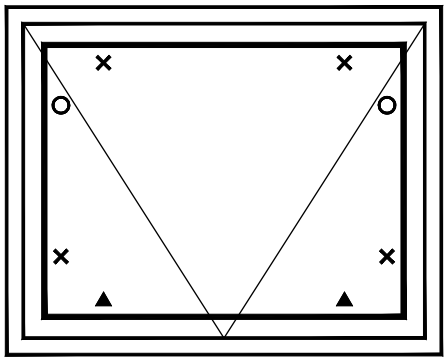
Height of the window > 1 m

Blocks at the top and bottom edges should be located near corners to prevent bending.

Depending on the design of the frame, there are either two location blocks at the extremities or one location block at pivot level.

Setting blocks at the top edge should support the weight of the glazing when it turns through more than 90°.

Figure C.8 — Horizontally pivoting frame and top guided fully reversible frame



Setting blocks should be located near corners to prevent twisting of the bottom frame member.

The location blocks at the top edge depend on the design of the frame.

Figure C.9 — Top hung frame

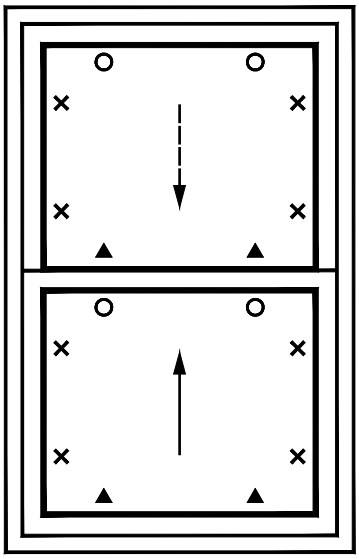
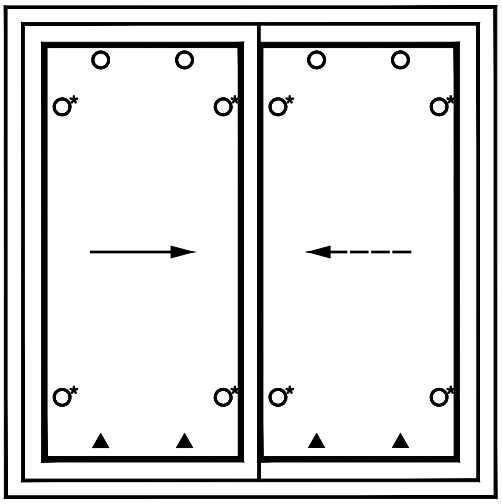


Figure C.10 — Vertically sliding frame



*) this block should have a hardness between 60 and 80° shore A.

Setting blocks should be located immediately above rollers.

Location blocks on the top side depend on the design of the frame.

Figure C.11 — Horizontally sliding frame

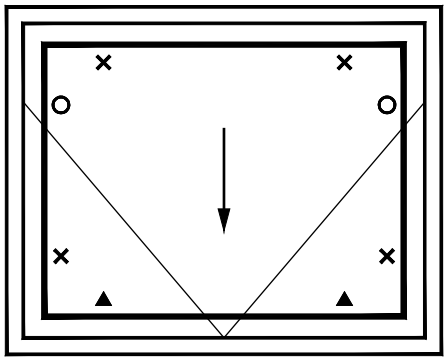
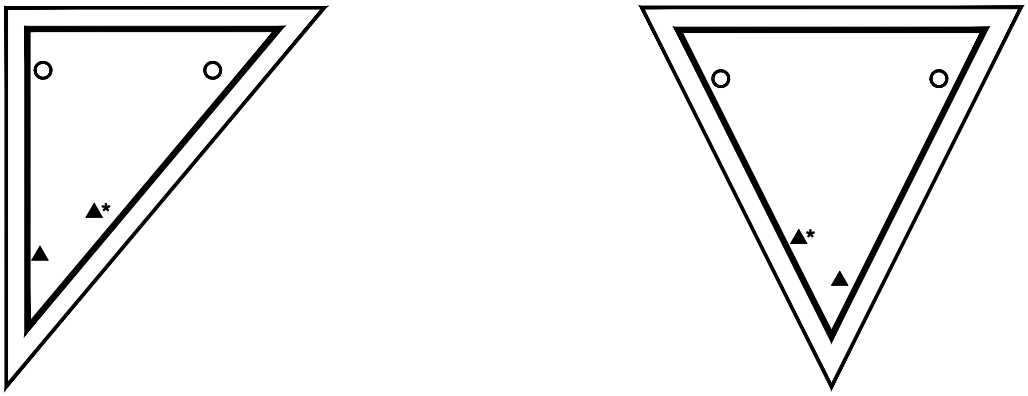


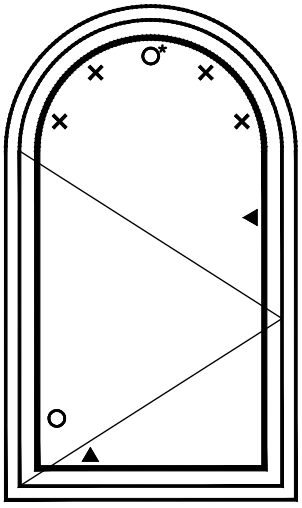
Figure C.12 — Sliding projecting top hung casement (not reversible)



*) this block should have a hardness between 60 and 80° shore A.

The blocks should not be placed exactly opposite to each other.

Figure C.13 —Triangular frame



*) this block should have a hardness between 60 and 80° shore A.

Figure C.14 — Arched frame

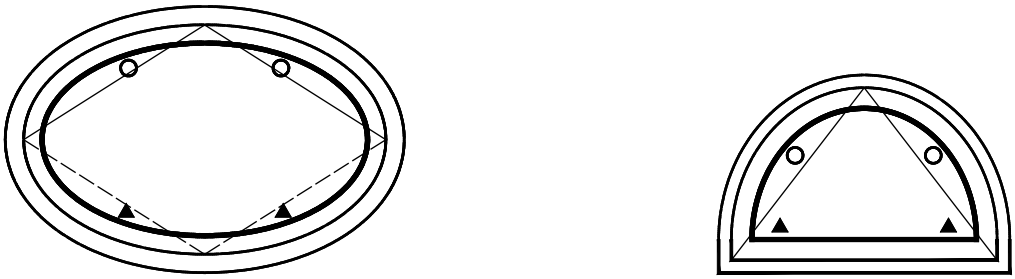


Figure C.15 — Oval and half oval frame

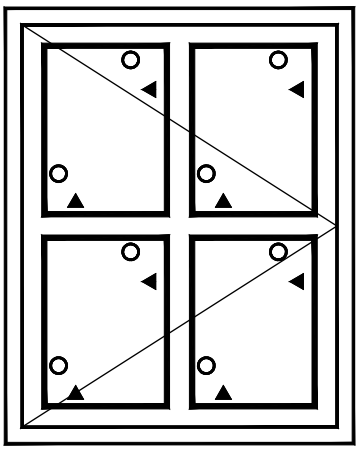
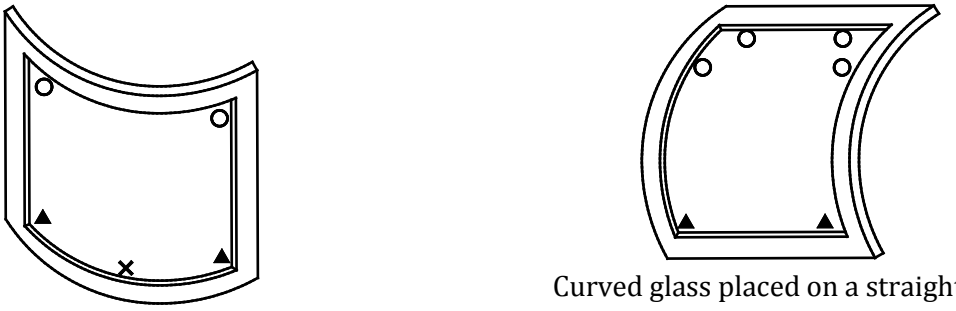


Figure C.16 — Multiple glazing window or door



Curved glass placed on a girth

Curved glass placed on a straight edge

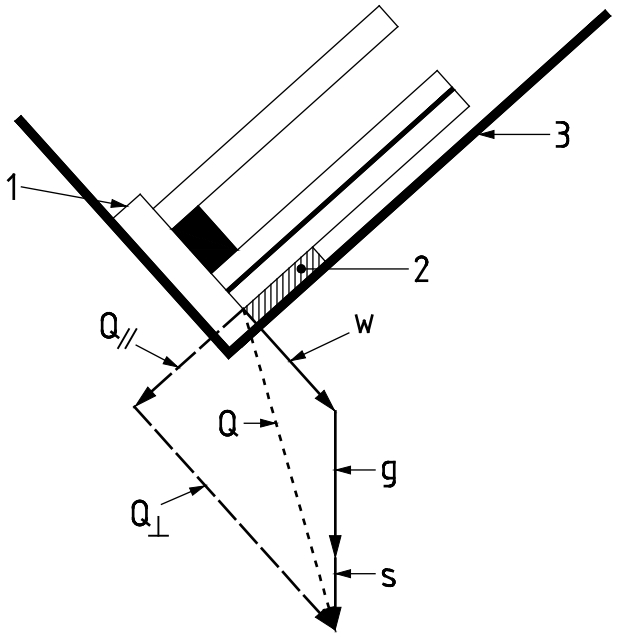
Figure C.17 — Curved glass

C.3 Position of the glazing blocks for sloped glazings

C.3.1 Distribution of loads

It is important that the actual loads, i.e. wind, snow, self-weight of the glazing, are transferred equally to the setting blocks. Depending on the actual slope a part of the load is transferred to the glazing material, which has to have the capability to absorb the load, keeping its tightening function.

The distribution of actual loads is shown in Figure C.18.



Key

1	setting block	w	action of the wind	Q	resulting action
2	distance piece or strip	g	self-weight	$Q_{//}$	component parallel to the glazing
3	frame	s	action of the snow	$Q_{\perp}$	component perpendicular to the glazing

Figure C.18 — Example of distribution of loads

C.3.2 Position of the setting blocks

In fixed frames, setting blocks and location blocks are placed according to Figure C.19. Minimum distance from corners is 50 mm.

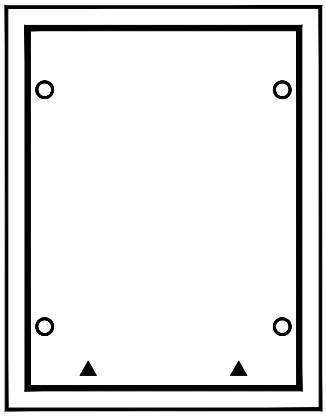


Figure C.19 — Fixed roof frame

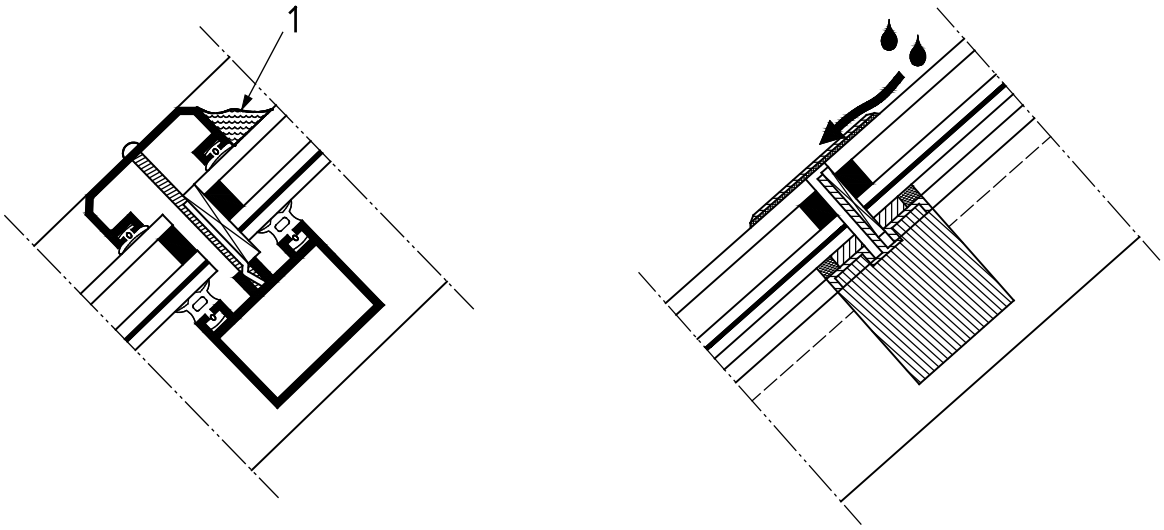
Annex D
(informative)

Additional considerations for sloped glazing

D.1 Water entrapment

In case of slopes with an angle below 15° on the horizontal, care should be taken to avoid water ponding, e.g. by deflection of the construction and/or the glazing, due to its self-weight.

If the transverse bead does not perform satisfactorily, it may lead to entrapped water, see Figure D.1. A risk of water penetration into the rebate is possible. Appropriate measures should be taken to evacuate the water.



Bad example Good example

Key:

1. entrapped water against bead

Figure D.1 — Entrapped water

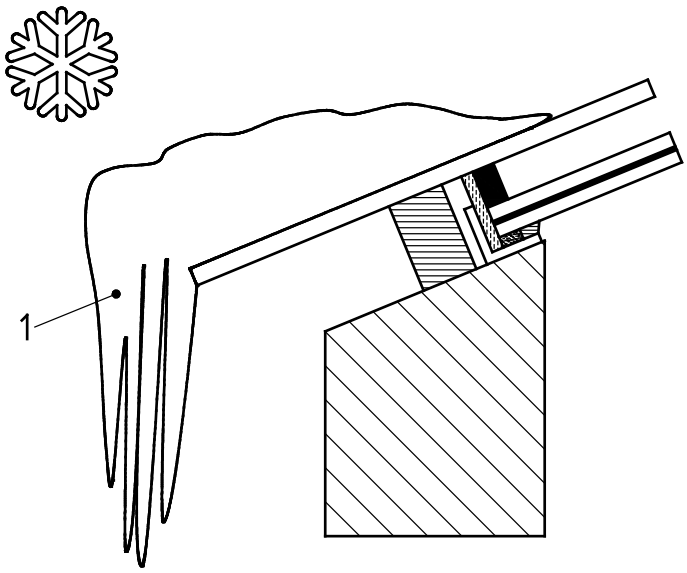
D.2 Snow and ice entrapment

D.2.1 General

As a consequence of higher heat transfer through the glazed part of the roof, snow melting is more likely to occur on the glazed part than on the more insulated part. Two situations should therefore be considered.

D.2.2 The roof glazing is subjected to internal and external climate conditions

At the bottom edge, there is a much colder zone in the external climate conditions. This is exacerbated by the reduced heat transfer from the inside of the building. There is a big risk of icing occurring in the drainage system. This could disable the drainage and lead to high stresses on the glass edge and edge seal of an IGU (see Figure D.2).



Key

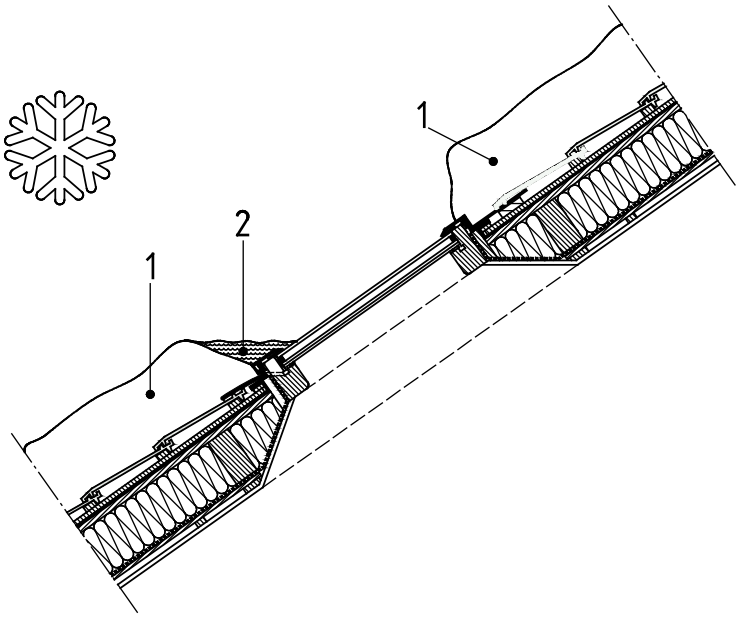
1 ice at the bottom of the glazing

Figure D.2 — Example of glazing subjected to internal and external climate conditions

D.2.3 Only a part of the roof is glazed

When a better insulated part of the roof is above the glazed part, normally there is no problem.

If a better insulated part of the roof is below the glazed part, melt water may run down over the glazing and freeze to ice on the better insulated part. The ice may disable the drainage system and cause stresses on glass edges and edge seals of insulating glass units, see Figure D.3.



Key

1 snow

2 melted snow that can freeze again and obstruct the drainage

Figure D.3 — Example of partially glazed roof

Bibliography

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[5] EN 1748-1 (all parts), *Glass in building — Basic borosilicate glass products*

[6] EN 1748-2 (all parts), *Glass in building — Basic glass ceramics products*

[7] EN 1863 (all parts), *Glass in building — Heat strengthened soda lime silicate glass*

[8] EN 12150 (all parts), *Glass in building — Thermally toughened soda lime silicate safety glass*

[9] EN 12337 (all parts), *Glass in building — Chemically strengthened soda lime silicate glass*

[10] EN ISO 12543 (all parts), *Glass in building — Laminated and laminated safety glass*

[11] EN 13022-1:2014, *Glass in building — Structural sealant glazing — Part 1: Glass products for structural sealant glazing systems for supported and unsupported monolithic and multiple glazing*

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[15] EN 14178 (all parts), *Glass in building — Basic alkaline earth silicate glass products*

[16] EN 14179 (all parts), *Glass in building — Heat soaked thermally toughened soda lime silicate safety glass*

[17] EN 14321 (all parts), *Glass in building — Thermally toughened alkaline earth silicate safety glass*

[18] EN 14449, *Glass in building — Laminated glass and laminated safety glass — Evaluation of conformity/Product standard*

[19] prEN 16612, *Glass in building — Determination of the load resistance of glass panes by calculation and testing*

[20] ETAG 002: Edition November 1999, amended October 2001: Guideline for European technical approval for structural sealant glazing systems (SSGS), Part 1: Supported and unsupported systems

[21] ETAG 002: Edition January 2002: Guideline for European technical approval for structural sealant glazing systems (SSGS), Part 2: Coated aluminium systems

[22] ETAG 002: Edition March 2002: Guideline for European technical approval for structural sealant glazing systems (SSGS), Part 3: Systems incorporating profiles with a thermal barrier

[23] EN 12519, *Windows and pedestrian doors — Terminology*

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