INSTALLATION MANUAL

TOTAL FACADE SOLUTIONS

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Page No:

Products of Deceuninck PVC Window, Door and Roller & Louvre Shutter systems hold an essential position in our sector due to the confort and high level of insulation which they provide where they are used.

However, even the windows produced in a high quality may lose from its qualities and functions if mounted in an improper way, while it is possible to eliminate some small errors with a proper mounting.

A long life is expected from a window as a building block. A window keeping its factory performance and functions depends on implementation of a proper mounting in addition to having high level qualities.

Numerous details may be encountered in a building. As it is impossible to provide a separate illustration for each detail to be encountered, this manual presents general information and rules of mounting, supported by illustrations of details belonging to the most frequent types of building.

What is a joint?:

A joint is a gap where the connection takes place between a wall and a window.

Factors with an impact on a joint :

Forces effecting a joint are illustrated in the following figure. A joint needs to stand against these forces created by interior and exterior factors.

A joint mounted is effected by temperature and moisture indoors as well as temperature, rain, wind, sound and sunlight outdoors. At the same time, changes in temperature lead to elongation or shortening in windows and parts of the building.

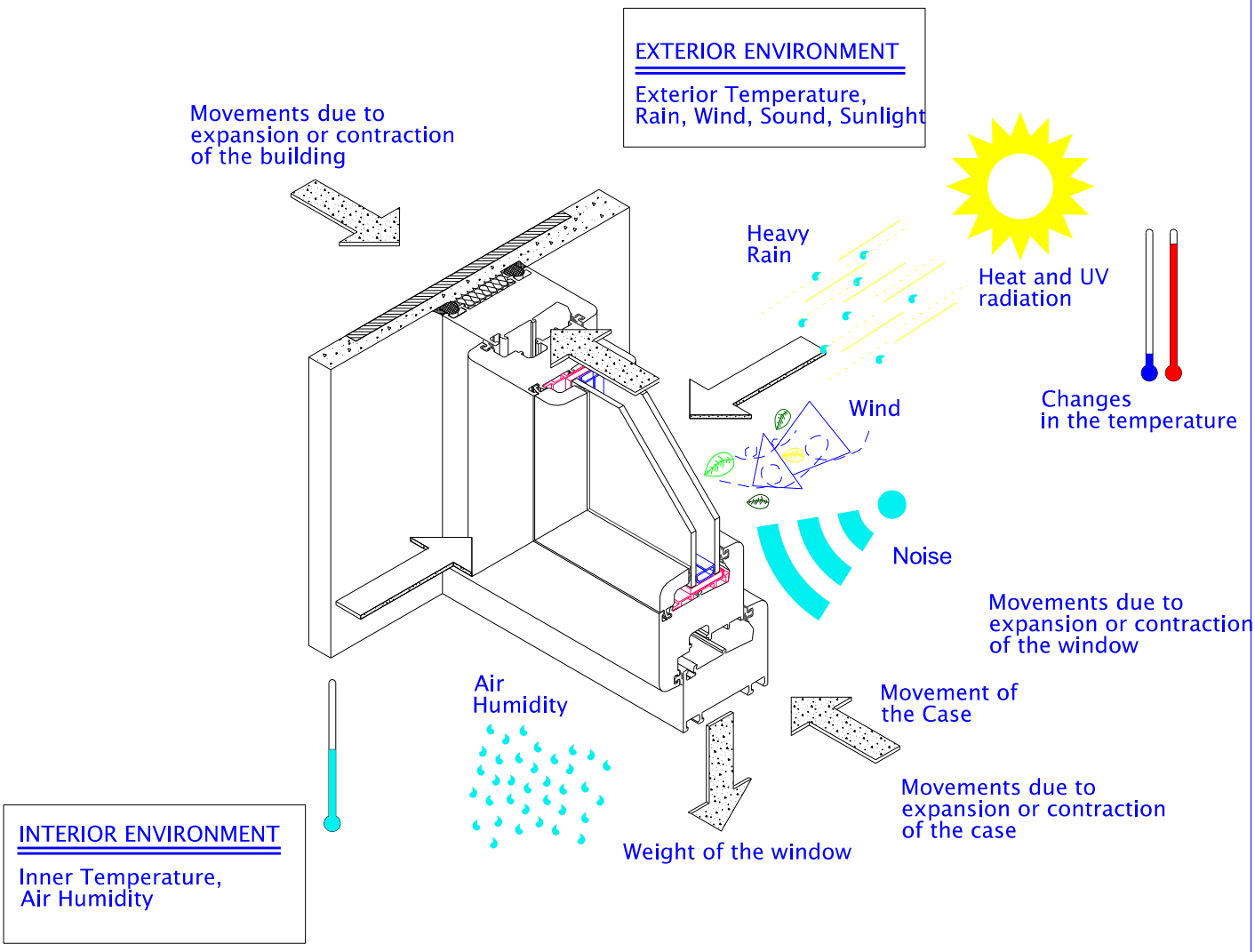


Figure. 1 – Factors with an impact on a joint

Features expected from a window joint include transfer of all the forces on the window to the building and water tightness against hitting rain. Water from rain should never enter into the building or construction. The exterior water tightness layer may get old due to and be destroyed by the heat or UV radiation of the sun, forming defective fields. Fractures in these fields may cause water to penetrate inside.

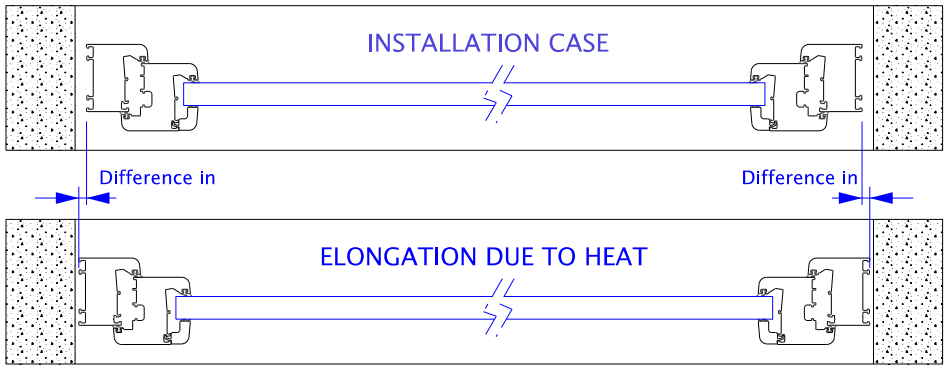
A joint has no fixed gap, and the measurement of a joint changes due to the movements caused by the following reasons:

* Window gap and window's elongation and shortening due to thermal changes,
* Measurement difference due to changes in humidity,
* Movements depend on the construction,
* Elastical deformations due to loading,
* Exterior environment effects

Elongation and shortening in the window gap is faced in every joint.

The following figure shows the change in length of a joint after mounting due to change in the temperature.

Figure.2 - Change in length after mounting due to difference in the temperature



Maximum change in temperature depends on changes in the ambient temperature as well as angle of the sun rays, elongation coefficient of the material and its color.

Table. 1 – Minimum and maximum surface temperature (°C) values on surfaces of construction materials

Type of Material	Temperature ° C		
	min.	max.	Difference
PVC (light color)	-20,-25	60	80-85
PVC (dark color)	-20,-25	70	90-95
Concrete wall (light color)	-20	50	70
Concrete wall (dark color)	-25	65	90
Glass	-25	80	105
Coated glass	-25	100	125

All the construction materials features elongation as the temperature gets higher, and they are contracted as the temperature gets lower.

Therefore, measurements of windows in length and width also change as the temperatures changes.

Table 2 – Elongation coefficient of some construction materials between 0°C and 100°C

Material	Elongation coefficient (α) x 10^{-6} /K	Elongation Increase in length△L(mm/mK)
Aluminium	24	0,024
Copper	16	0,016
Iron	12	0,012
Silver	12	0,012
Concrete	12	0,012
Glass	3 – 9	0,003–0,008
Wood	3 – 6	0,003–0,009
PVC–U	70	0,07
Polyethylene	200	0,20
Polypropylene (pp)	160	0,16

Accordingly, the amount of elongation is changing depending on the elongation coefficient, difference in temperature and length of the material.

Making use of the above table, maximum amount of various construction materials can be calculated with the following formula :

$$X = \triangle L \times \triangle T \times L$$

X : Maximum amount of elongation (mm)

△ L : Elongation in length (mm/mK)

△ T: Difference in temperature (°C or °K)

L : Length of the material (m)

Example:

If we want to calculate the elongation due to 30°C–increase in temperature for a PVC profile of 2.5 m–length:

$\triangle L_{PVC}$: 0.070 mm/mK (The value in the Table 2)

△ T : 30 °C

L : 2.5 m

$X = \triangle L \times \triangle T \times L$

X = 0.070 (mm/mK) x 30 (°C) x 2.5 m

The amount of elongation for the PVC profile in the case of a difference of 30 °C = 5.25 mm

Thus, the amount of elongation for the pure PVC profile of 2.5m–length is calculated to be 5.25 mm in the case of 30°C–increase in the temperature.

The actual elongation of a mounted window is lower than the elongation coefficient of the profile due to the fact that it contains various materials (e.g., jacking point, glass, etc.). RAL accepts 60% of the elongation coefficient of the profile to calculate the elongation coefficient of a window.
Thus, the elongation coefficient of a profile equal to 70 x10^{-6} is accepted for the window as:

$\alpha_{window} = 70 \times 10^{-6}/K \times 0.60 = 42 \times 10^{-6}/K$ is accepted like this.

Accepting the change in temperature as ± 30°C, the change in length for a white PVC profile and window is demonstrated in the following table:

Table 3 – Changes in length for a white profile and window based on width

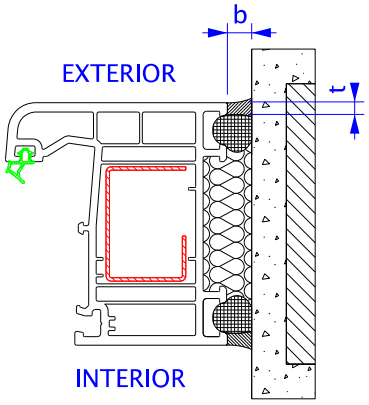
Window width (m)	Change in length due to a temperature change of ± 30°C△L (mm)	
	$\alpha_{profile} = 70 \times 10^{-6}/K$	$\alpha_{window} = 42 \times 10^{-6}/K$
1 m	± 2.1	± 1.26
1.5 m	± 3.15	± 1.90
2 m	± 4.2	± 2.52
2.5 m	± 5.25	± 3.20
3 m	± 6.3	± 3.78

This value may be doubled for colored windows, as surface difference in temperature may be 60°C instead of 30°C in the summer.

The amount of elongation for a material increases as its sizes are larger. For that reason, a larger joint gap should be left for larger sizes. In the event that sufficient gap has not been placed, such problems as deformation of the window, difficulty in working of of the wings, penetration of water may be encountered.

The width of the permeability material (b), should be twice as the depth (t)

$$b = 2 \times t$$



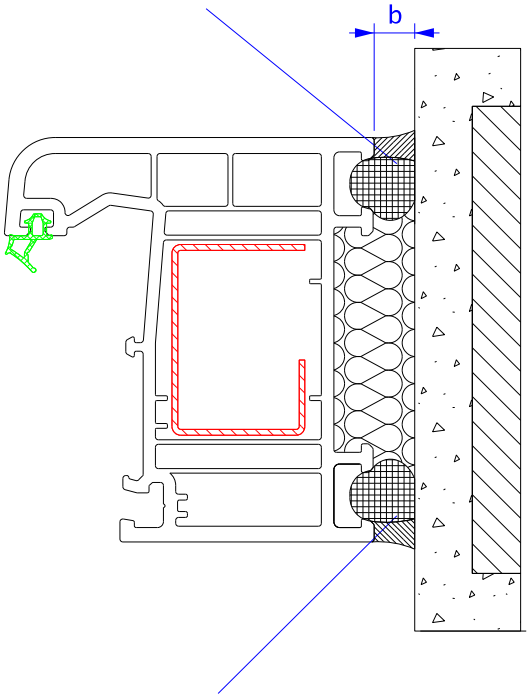
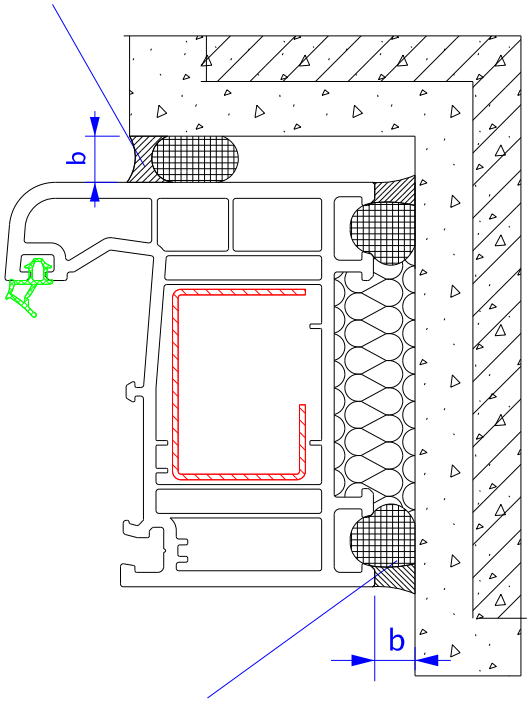
t = Depth of the insulation material inside a joint

b = Width of the joint insulation material

Figure.3 : Joint measurement for a frame

Changes of measurement in a joint due to changes in the temperature determine the width of a joint.

Table.4 – Determining measurements of a joint

	FLAT WALL				EXTERIOR WALL		
	On the outer side; permeability material that can tolerate a change in the width of the joint by 25%  On the inner side; permeability material that can tolerate a change in the width of the joint by 15%				On the outer side; permeability material that can tolerate a change in the width of the joint by 25%  On the inner side; permeability material that can tolerate a change in the width of the joint by 25%		
	Length of the window (m)						
	Up to 1.5	Up to 2.5	Up to 3.5	Up to 4.5	Up to 2.5	Up to 3.5	Up to 4.5
	Min. width of the joint for a flat wall b (mm)				Min. width of the joint for a exterior wall b (mm		
PVC-U (white)	10	15	20	25	10	10	15
PVC-U (colored surface)	15	20	25	30	10	15	20

Insuring permeability of a joint :

The inside of the room should be more permeable than the exterior side in terms of evoperation diffusion, and the gap between the two permeable layers should be fully filled with a material of thermal insulation

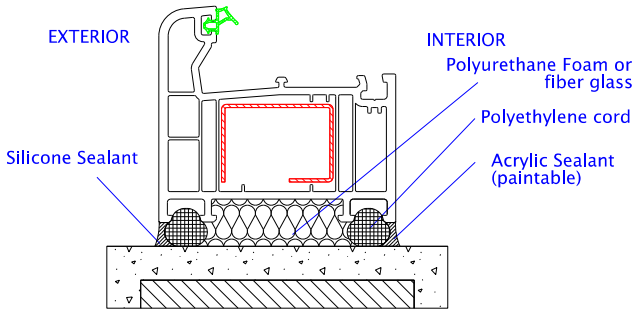


Figure.4 : Permeability materials

Platforms formed by the window between interior and exterior spaces may be examined in three categories:

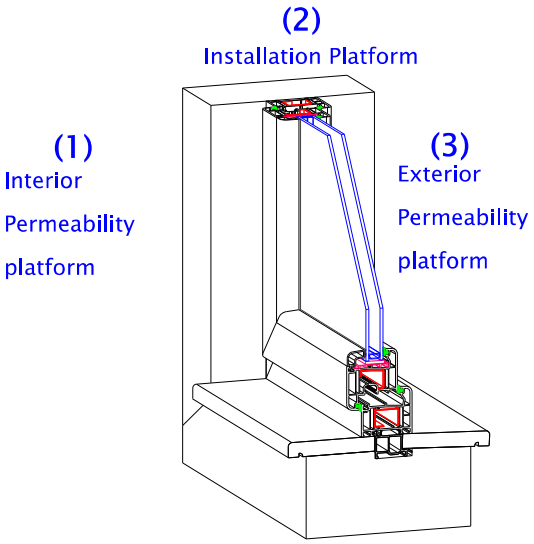


Figure.5 : Platforms in a window

1- Interior platform :

What separates the interior space from the exterior space should be air-proof, and it should have a quality to permit less evaporation compared to the exterior protection platform.

2-Mounting platform :

Place where the fixing is settled into the building Insulation platform and material of sound insulation

3- Exterior platform :

The exterior permeability should be made of a material which permenantly water tightness against hitting rain, open to evaporation diffusion and resistent to UV radiation

A polyethilene cord in the appropriate diameter for the expansion gap to be applied is chosen, and the gap is filled by the pressing method. Thus, it becomes possible to adjust the amount of permeability material needed. Sealant does not stick to such materials of permeability as silicone and operates in a different way.

Its value of thermal insulation is high, and it is resistant to water and evoperation.

What needs the greatest attention when applying the material of permeability is the situation of the place where it will be applied.

If it is to be used in the exterior side, the choice should be silicone sealant, which is appropriate for conditions of the exterior environment.

Table.5 : Differences between silicone sealant and acrylic sealant used for the purpose of insulation

FEATURE	SILICONE SEALANT	ACRYLIC SEALANT
Purpose of use	It is a material of insulation and sticking.	It is a material of filling and sticking.
Place of use	PVC and Wooden Windows; Bathtub, Sink, Closet,, Lamination and Seramics; water, sound and dust	PVC and Wooden Windows; Bathtub, Sink, Closet,, Lamination and Seramics; water, sound and dust
Color	Transparent, White, Black, Grey, Brown	White, Black, Grey, Brown
Weight	50 g - 70 g - 310 ml	100 g. 200g. 310 ml-25 kg
Paintable	No	Yes
Elasticity	Preserves elasticity when dry.	Loses elasticity when dry
Anti-bacterial	Yes	Yes
Curing Time	5 min.	25 min.
Drying Time	4-8 hours.	12-24 hours
UV Resistent	Yes	Yes
Type of Use	With a Silicone Layer	With a Selant Layer

The function of an permeability material is keep humid out of a joint. This holds true for tha humidity inside a room as well as hitting rain outside.

Some of the important features expected from a joint are as follows:

* It should be air-proof and insure thermal and sound insulation
* It should be able to compensate for changes in length due to movements of the building or elongation of the window.
* It should be resistant to aging and should not lead to fractures or side-breakaways.

Figure.6 : Examples for making an exterior joint permeable

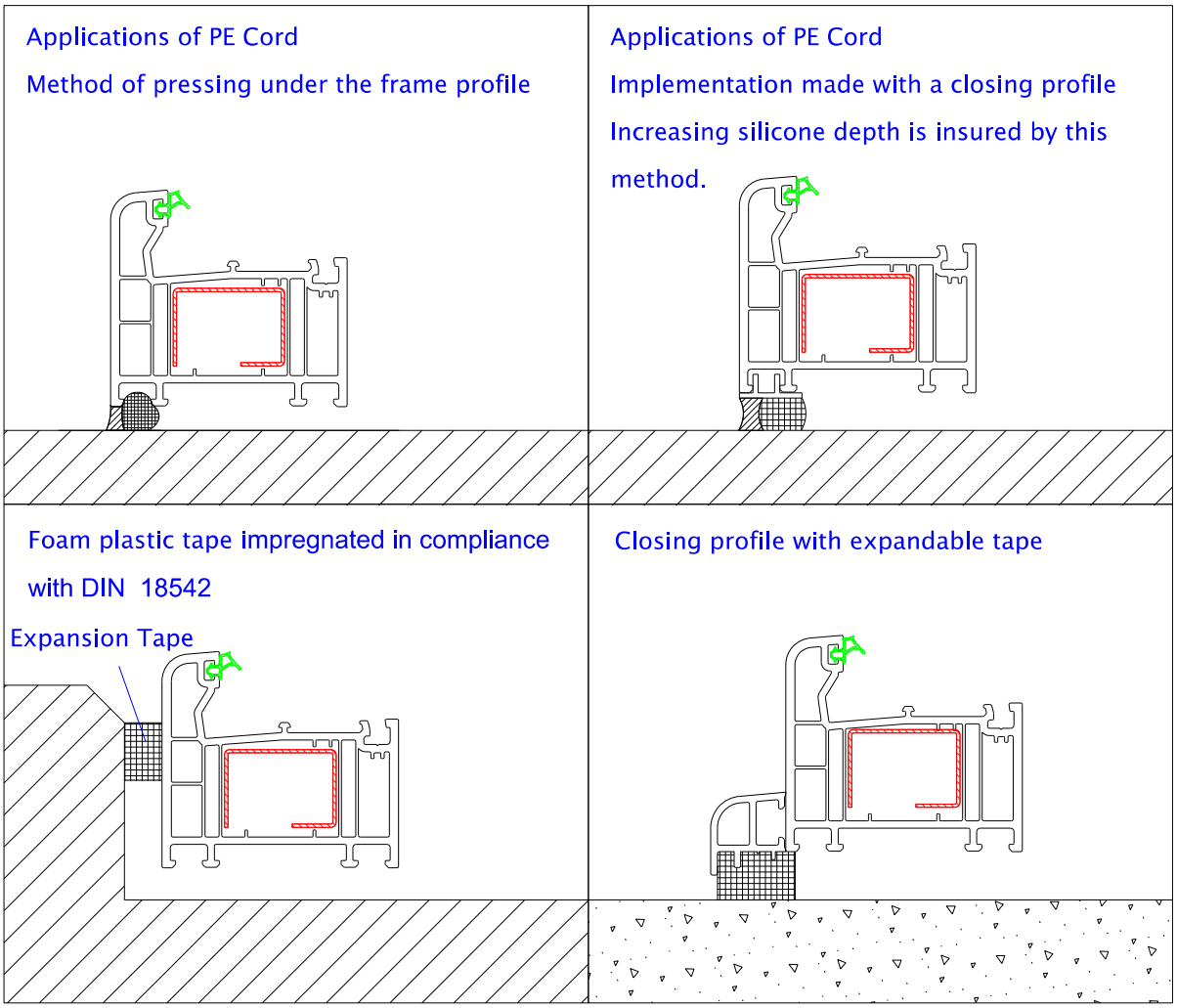
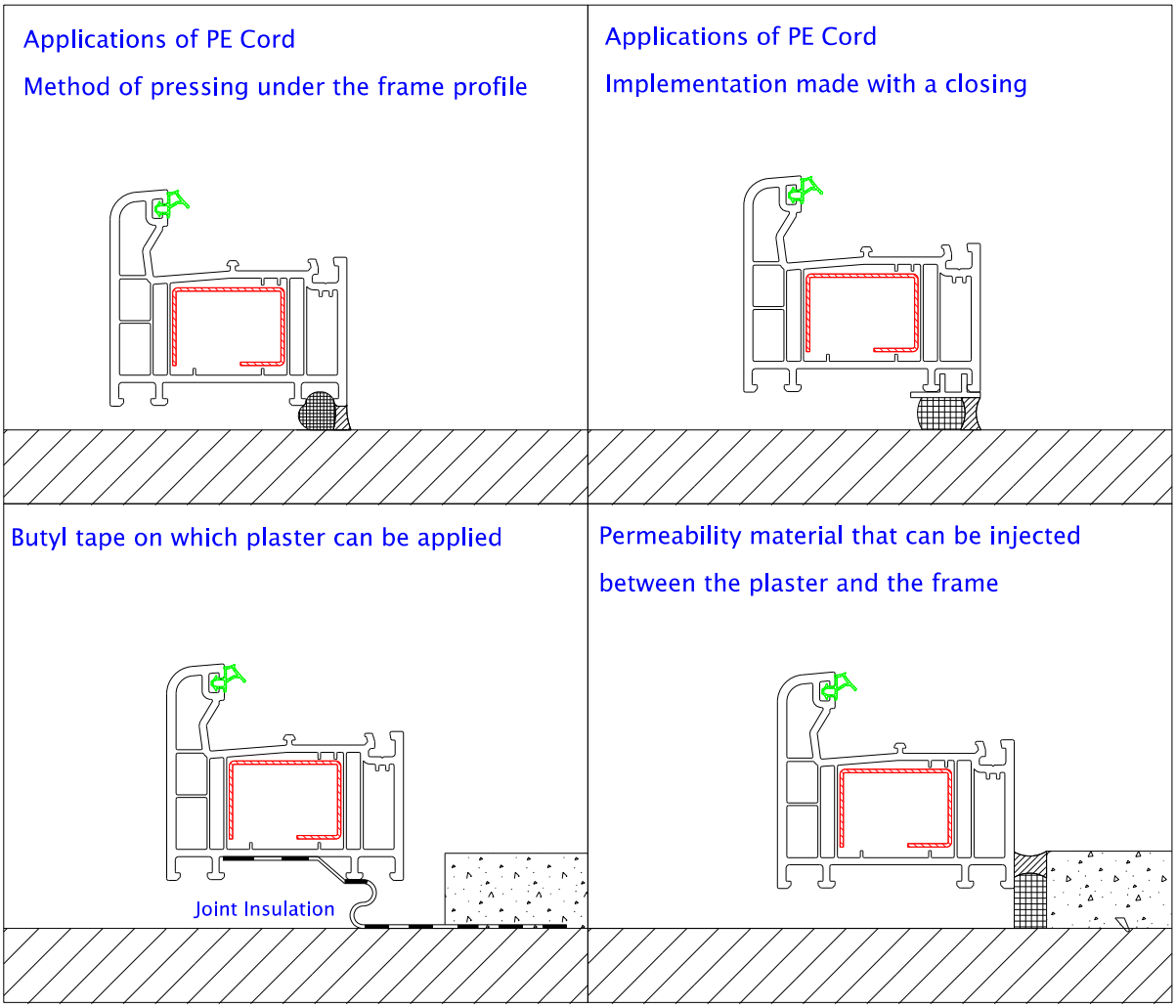


Figure.7 : Examples for making an interior joint permeable



ATTENTION:

THE INTERIOR SIDE SHOULD BE MORE PERMEABLE THAN

THE EXTERIOR SIDE

The joint between the window frame and the wall should be isolated by fiber glass or polyurethane foam.

The amount of the polyurethane foam used here effects the temperature on the interior surfaces of the profile. (Figure.8)

As the temperature will get lower in the event that this gap has not been isolated, a danger of humidity will be encountered.

The joint should be fully filled with fiber glass or polyurethane foam. Otherwise, impermeability and sound insulation will be effected poorly.

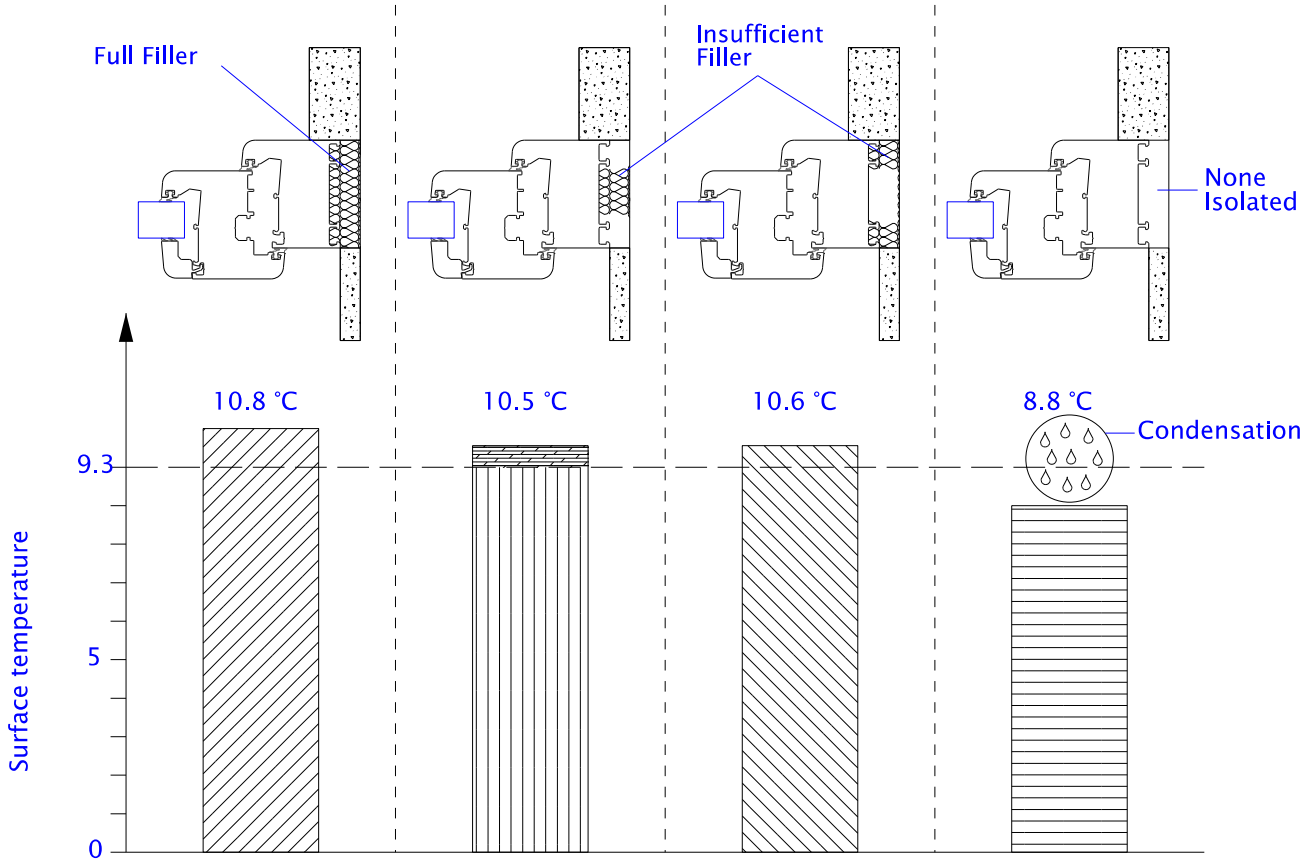


Figure.8 Different profile interior surface temperatures for various amounts of isolation

The above example demonstrates the effect of various degrees of filling on interior surface temperatures.

Taken the room temperature as 20°C and the humidity as 50%, condensation will start as the interior surface temperature falls below 9.3°C *

The last implementation without isolation in the example, condensation will take place due to the fact that the interior surface temperature is 8.8°C

What is most crucial in a joint is that a thermal bridge be not formed. To achieve this, the joint should be filled by pressing. Good permeability and sound insulation can be insured thereby.

* The diagram of condensation temperature dependent on the temperature and humidity is explained in the section “thermal insulation” in detail.

Wedges to be used in mounting

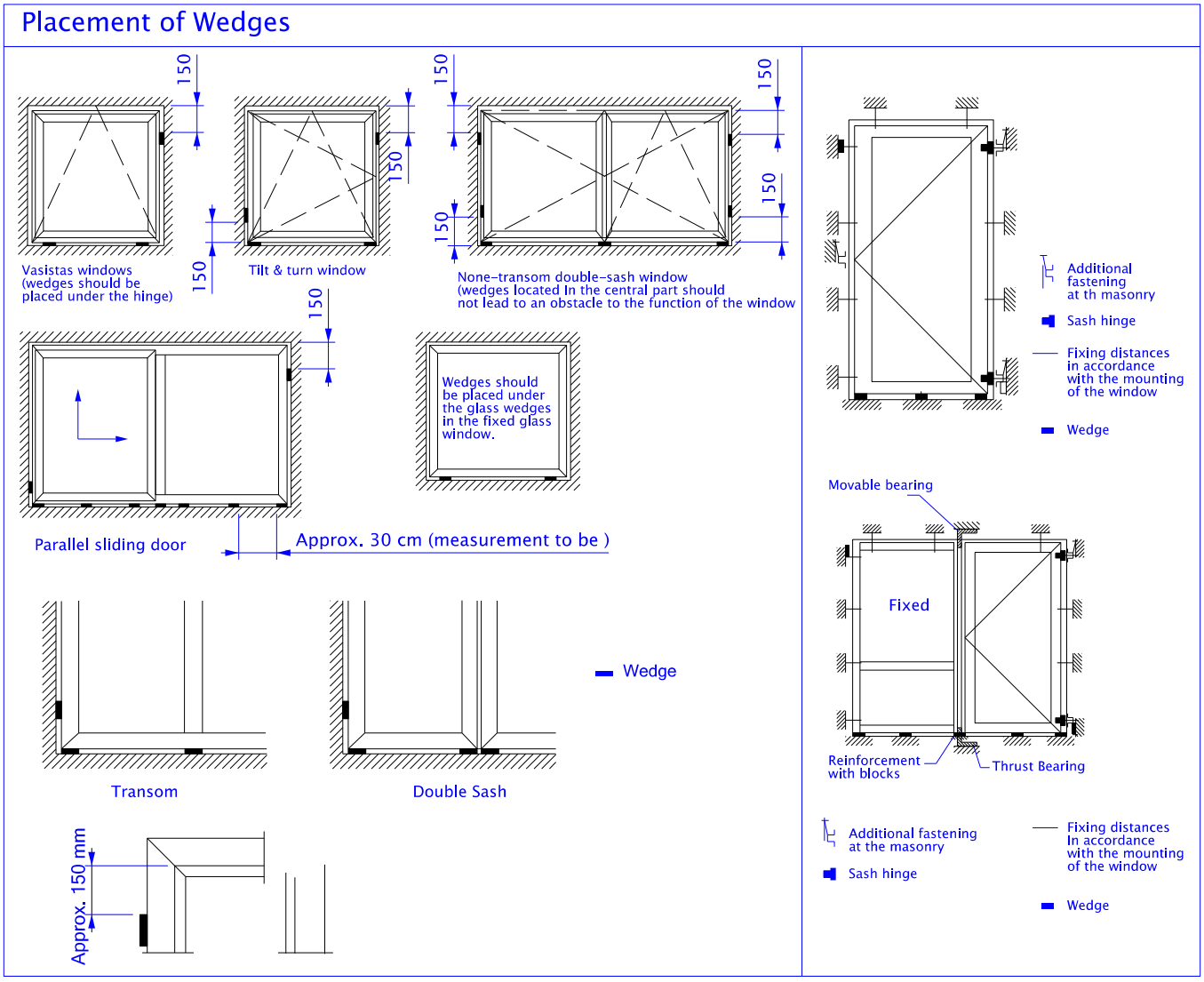
* Should be able to transfer all the loads on the window (window's own weight, wind forces, loads during usage, changes in length of the window due to expansion etc.) to the wall in the best way,
* Should provide sufficient space adjustment for insulation,
* Should be chosen to be an appropriate material as it will be perminant in the joint (etc. PVC-U),
* Should be well determined and prevented from sliding.

Placing wedges

When placing wedge, the window is lifted to the window gap, the surrounding gap is equally shared on every side, and then the window is plumbed and levelled. Afterwards, the window is fixed in the window gap with the help of wooden wedges. (Wedges to be used for the purpose of fixing are not apropriate wedges) Wedges should be placed in the joint in a way to transfer the load continuously and as closes as possible to the joining elements (screw, dowel etc.) Additionally, wedges should be placed as is shown below in order not to prevent elongation due to changes in the temperature. That is, wedges should not be placed in parallel to each other, and the window should not be fixed on the opposite sides. The window should be allowed for elongation. Deformations will be encountered on the window otherwise.

Note: Wooden wedges should always be dismantled after fixing the wedges.

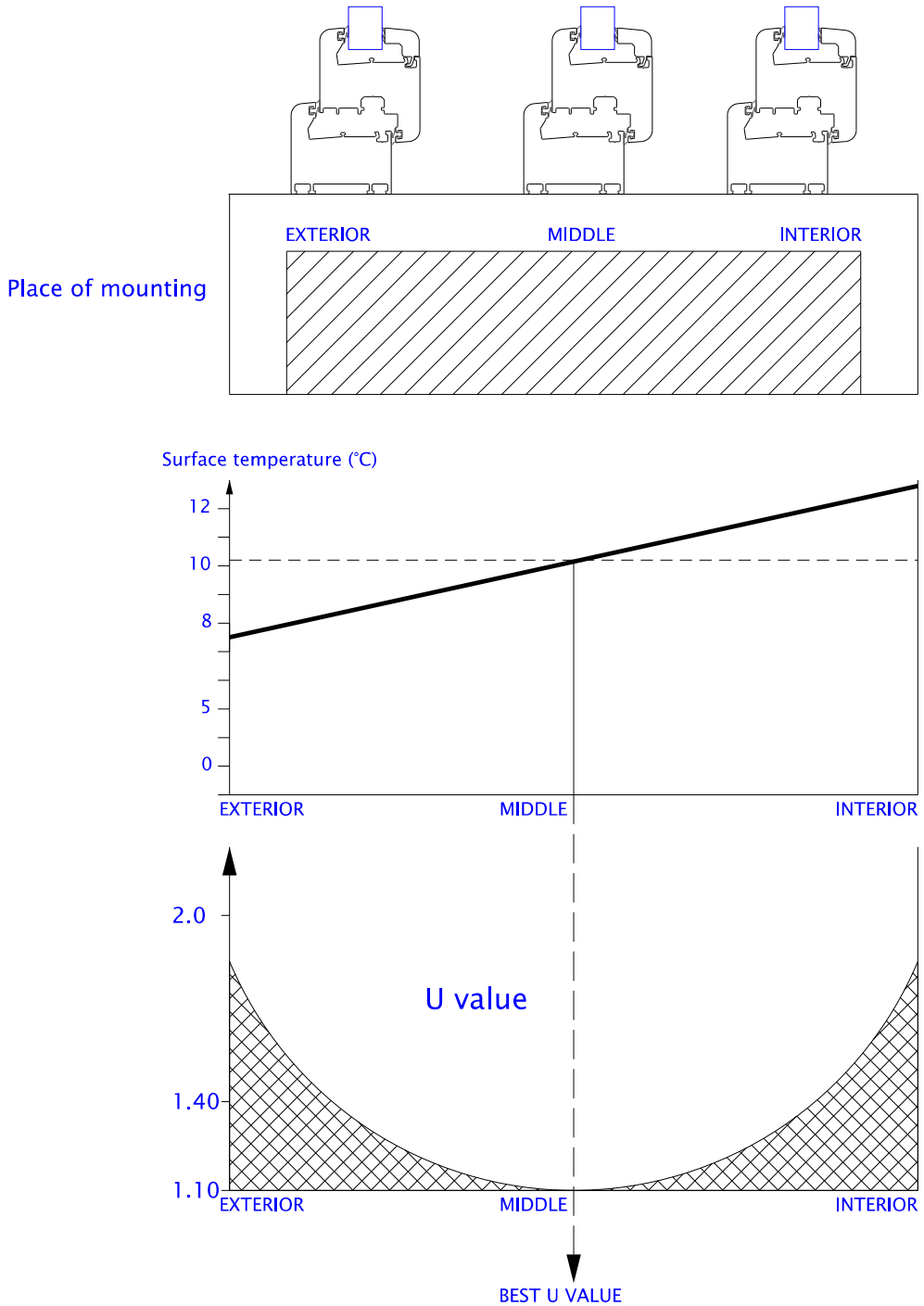
Figure.9 – Examples for using of wedges by window types



The place where the window is mounted to the wall is crucial for transfer of the temperature. The window should be mounted as centrally located as possible onto the wall. The loss of the temperature is thereby kept at minimum. Mounting a window closer to the interior or exterior side effects adversely, as it increases the value of thermal conductivity by 7%. Meanwhile, the temperature on the interior surface of the profile gets lower in the mounting closer to the exterior side of the wall.

Falling of the profile interior surface temperature below 10°C means start of condensation.

Figure.10 – Change of the profile surface temperature and the U value by the place of mounting the window

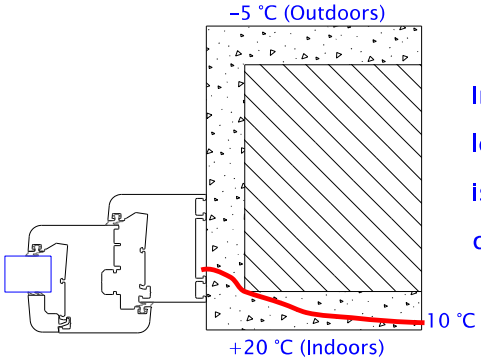


SINGLE-LAYER WALLS:

Isotherms may be examined in the Figure.11 to demonstrate condensation limit values in a setting where the temperature indoors is accepted as +20°C, the humidity is 50% and the temperature outdoors -5°C.

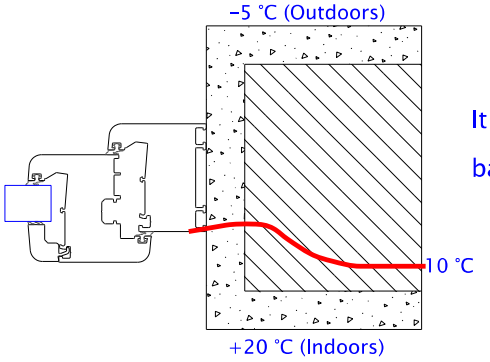
Figure. 11 - Isotherms based on the place of mounting the window on single-layer walls

INSTALLATION CLOSER to THE INTERIOR



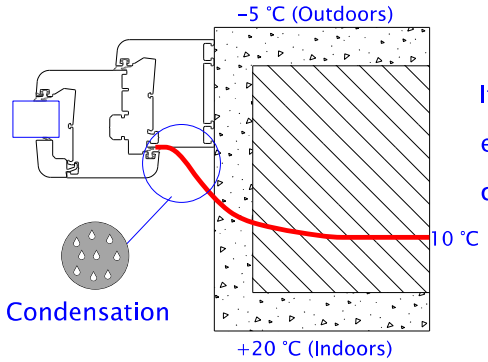
In the event that the window is mounted closer to the interior, loss of heat from the wall will increase due to the fact that the isotherm of 10°C approaches to the interior (even though condensation does not take place).

INSTALLATION to THE MIDDLE



It can be seen that mounting to the middle is the best implementation based on the isotherms.

INSTALLATION CLOSER to THE EXTERIOR

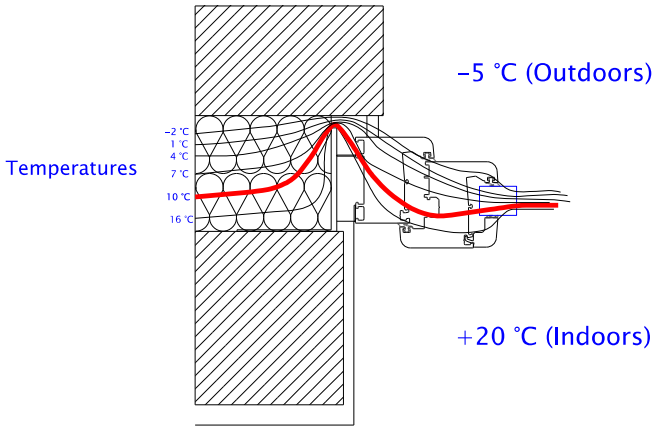


It can be seen that, when the window is mounted closer to the exterior, the profile surface temperature falls below 10°C and condensation starts.

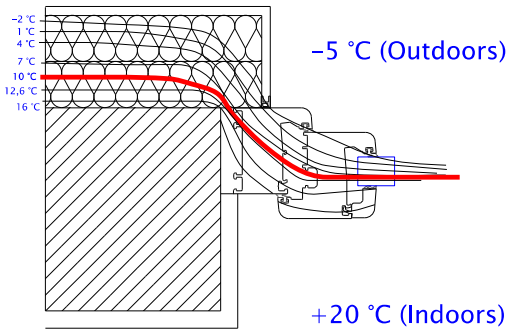
DOUBLE-LAYER WALLS

The mounting platform should be placed on the insulation for double-layer walls.

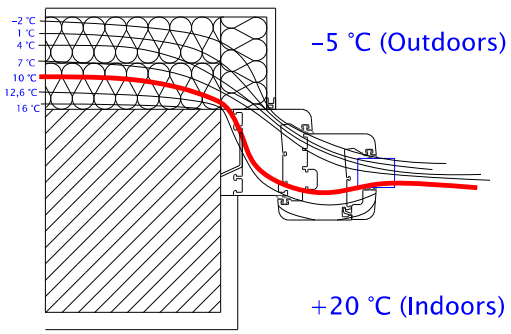
Figure.12 - Isotherms based on the place of mounting the window on double-layer walls



Concrete curtain wall with a insulation section surrounded by a brick wall from the outside and ventilated



Thermal-insulated concrete curtain wall out of mixed material, with the front of the PVC curtain adjacent to the concrete



Thermal-insulated concrete curtain wall out of mixed material, with the PVC window in the middle of the wall, window space isolated.

Measurement for a PVC window is a job of expertese, and it requires attention knowledge and care, and whoever is responsible for measurement should know very well all the profiles in the systems and mounting details. A probable mistake in the measurement will be reflected on manufacturing and mounting. As a mistake in the measurement will require the repetition of manufacturing of the window and lead to a delay in mounting, it results in customer dissatisfaction beside loss of time and money. Thus, measurement should never be treated in a hurry.

PRINCIPLES of MEASUREMENT

Miter check:

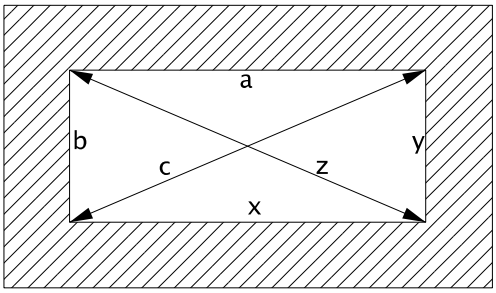
It should be checked whether the window gap to be measured is in the range of the miter. The window gap is checked for miter by using a telescopic gauge or water scales.

Cross-measurement check:

Cross-measurement is another method. To achieve this, two distances should be measured crosswise and compared to each other. If there is a difference between the two cross-measurements, then the angles are not equal to 90°.

Figure.13 - Cross-measurement check

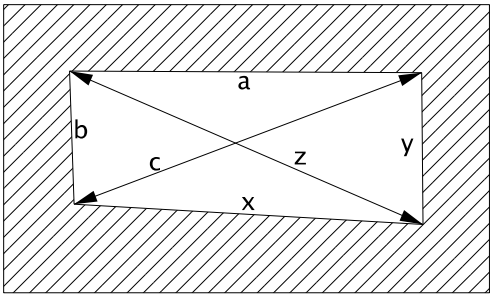
Window gap right-angle



$c^2 = a^2 + b^2 \iff z^2 = (x^2 + b^2)$

$c = z \Rightarrow 90°$ The right angle is confirmed.

Window gap not right-angle



$c^2 = a^2 + b^2 \iff z^2 = (x^2 + b^2)$

$c \neq z \Rightarrow 90°$ It is not a right angle

For the window and door gaps, tolerances to angles calculated according to DİN 18202 are demonstrated in the Table.6. For instance, the cross-measurement tolerance is 6 mm for the windows up to 1 m.
In the event that the difference is greater than 6 mm, then the gap should be corrected.

Table.6 : Tolerances to angles according to DIN 18202

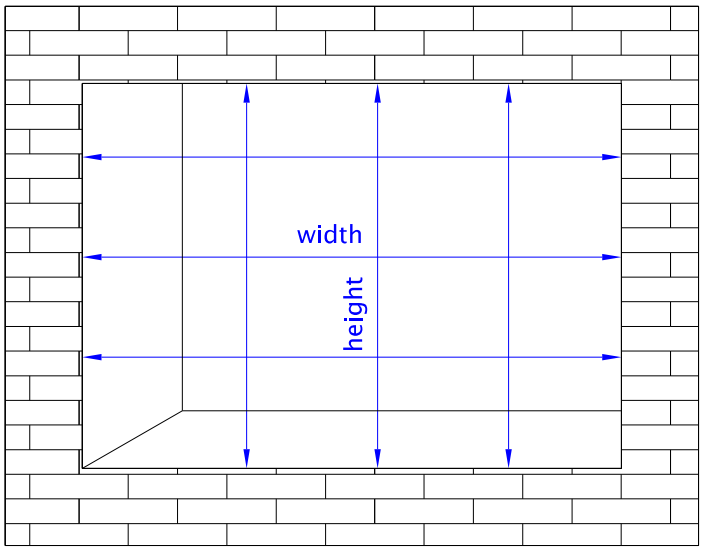
Subject	Valid tolerances to angles (mm), m for nominal measurements		
Vertical, horizontal and slopy fields	Up to 1m	From 1m up to 3m	From 3m up to longer than 6 m
	6 mm	8 mm	12 mm

During the task of measurement, attention should be payed to the following

* Measurement should be conducted in the unit of mm.

* In the window gaps, horizontal and vertical measurements should be repeated at least twice with each from another point (it may be three or more for larger gaps). The smallest measurement should be taken as the reference

Figure.14 – Measurement



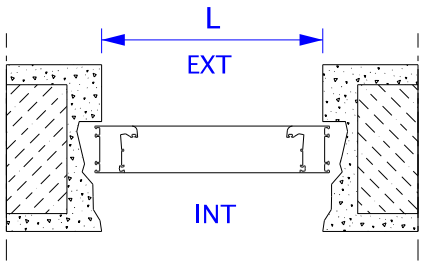
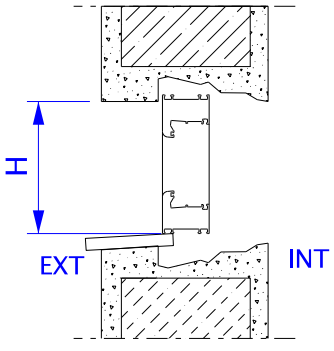
* Based on the current state of the window gap, addition or subtruction may be performed on the measurement

a) For the tasks of renewing,

Measurement of a PVC window should always be conducted from the exterior surface of the current window, if a special case is not applicable. For the external plaster will be the reference to the measurement as it will not be damaged in renewing tasks.

The measurement is added 10x2 mm (for the plaster in the left and the right) on the horizontal and 10 mm (for the plaster on the top) on the vertical.

Figure.15

MEASUREMENT IN RENEWING TASKS		
Horizontal		L+20 mm
Vertical		H+10 mm

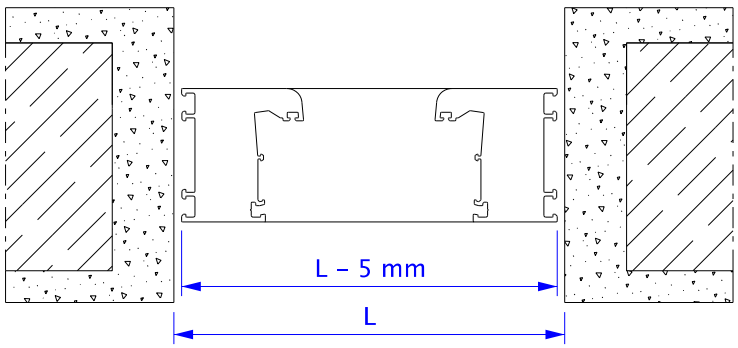
b)Measurement of windows in jobs prior to rough plaster

* It is not appropriate to carry out measurement of windows manufacture in these jobs where the window gap is not ready yet.
* However, a written guarantee should be demanded from the construction official in the case this is obligatory.
* In these works, mounting of PVC windows is materialized following the rough plaster. As the glass will be mounted after the fine plaster, side parts inside PVC profiles should be protected by being srapped with a nylon.
* Fine plaster will be applied approx. 1 cm over the window.
* All the construction measurements including distances between the two walls, beam-wall, beam-flooring and window gaps should be carried out separately.
* Measurements should be matched so that measurements of standard window gaps could be determined.
* The measurement of the width should be decreased by 2+2=4 cm at total (for the rough plaster).
* The measurement of the height should be decreased by 1 cm on the top, and by approx. 6 cm from the bottom for the parapet and the sill so that the measurement of PVC windows could be determined.

c) In the works following the rough plaster but prior to the fine plaster

* The smallest measurement is decreased by 5 mm to determine the manufacture measurement.
* The decreasing in the vertical measurement should be carried out in consideration of the flooring to be applied to the floor of the window.
* Following the mounting, the fine plaster should be applied as wide as 1 cm on the top and on the sides.

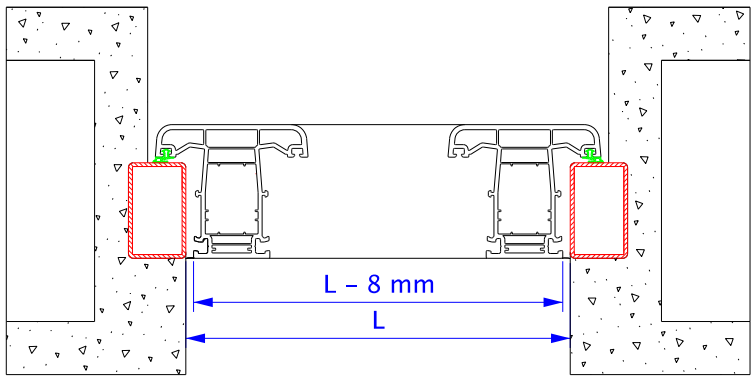
Figure.16 Measurement in the works prior to the fine plaster

Horizontal Vertical		L – 5 mm

d) In the case of steel mounting (T-Frame)

* In the event that the case of steel mounting protrudes from the plaster, a transom T-frame should be used
* Two seperate measurements of current steel of mounting should be conducted for both horizontal and vertical sizes inside.
* The steel inner measurements should be decreased by 8 mm from the horizontal and vertical measurements.
* According to the profile series that will be used, the final measurement is obtained by subtracting decreased value.

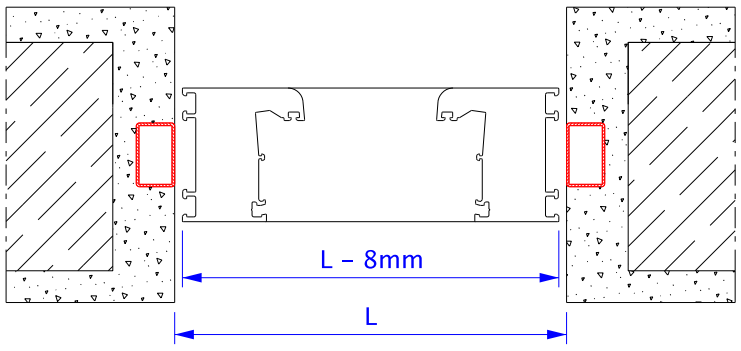
Figure.17 Measurement in the works with case of steel mounting with T-Frame

Horizontal Vertical		L-8 mm

e) Measurement in the works with case of steel mounting (Frame)

* Two separate measurements of current case of steel mounting should be conducted for both horizontal and vertical sizes inside.
* For the measurement of PVC manufacture, the width and the height should be decreased by 8 mm at total to determine the manufacture measurement.

Figure. 18 Measurement in the works with case of steel mounting with frame

Horizontal Vertical		L - 8 mm

DRAWING of WINDOWS :

* Drawings should always be prepared according to the perspective from the inside.
* Measurements should be written down in the unit of milimeters.
* Measurements should be given from the edge to the axis, from the axis to the axis and as a total.
* For each type of window should the type of the glass be defined.
* Measurements of opening sashes should be equal in every order, and differing measurements should be left in the fixed parts.
* Side and additional products should be explained in drawings for each order. (Couplings, L profile, box profile, dowel, screw, silicone, handle etc.)
* In the tasks of renewing, it should be asked the customer if s/he approves the general use of the current windows. If a change in the type of windows is demanded, renewing of the window should be revied in consideration of the exterior of the building.
* Based on the final decission made with the customer, all the windows should be properly drawn with a scale (by demonstrating the opening points and directions by the perspective if necessary).

MAKING A CONTRACT WITH THE CUSTOMER

* Drawings should be described to the customer so that s/he can understand better, and a written agreement regarding the types of windows should be issued.
* In larger works (new buildings or projects etc.), types and numbers of windows should be determined based on the measurements on site. Illustrations of each type should be drawn, and a written agreement should be made with the customer or the construction official.
* Determining the types of the windows, the sizes of the windows and the glass, manufacture standards, transportation, carrying to its place and mounting should be taken into consideration.
* Written agreements should be signed by both sides and dated, and a copy should be given to the customer. Today, drawings of windows are materialized with print out from a computer.

NOTIFICATION of THE MOUNTING DAY:

In THE TASKS OF RENEWING

* All the materials should be checked, and the customer should be notified about the mounting day.
* The customer should be asked to make the required preparations (removing the things before the window, covering them, removing such things as curtains or carpets, etc.)

In NEW CONSTRUCTION WORKS

* The mounting schedule of the PVC windows delivered to the construction should be decided upon with the construction official

MOUNTING in TASKS of RENEWING

* Mounting should be carried out with steel dowels, special mounting screws and fixing lugs.
* For the windows to be dismantled, warning and protective precautions should be taken on the street against the materials with a possibility to fall down.
* A nylon should be spread over the floor where a window is to be mounted.
* A place of stacking should be prepared outside the house for the windows and pieces of glass to be removed.

Dismantling the current wooden window.

* First, the sashes should be removed from their hinges.
* Of the fixed parts, the glass cement should be cleaned with a chisel, and the glazing sprig should be removed with nippers. The glass should not be left unsupported, but someone should be holding it by pressing from the outside.
* The glass should be insured to detach from the window on every point when pushed by two people from the inside towards the outside.
* It should be remembered that a piece of glass in use is highly fragile
* The glass should be taken inside diagonally, close to the right angle.
* Pieces of glass that cannot be detached in one piece should be dismantled by braking it from the outside in a way that its pieces should fall inside.

a) If its interior and exterior are covered with plaster

* The sashes should be removed from the places,
* Transom and then the frame should be sawed, and the window should be dismantled by pulling it vertically and horizontally. Its purpose is keep damage to the plaster at minimum.

b) If the interior and the exterior is with a tongue-and-groove joint, or the exterior is with plaster and the interior is ribbed with architrave.

* The sashes should be removed from the places,
* The glazing beads and the architraves should be dismantled. The window should be completely pulled inside.

MOUNTING in TASKS WITH A PRECAST ELEMENT

* Mounting should be carried out with steel dowels and special mounting screws.
* Typically a top-connected frame profile should be used.
* Windows should be distributed to their places in the plans of window distribution and mounting, based on their pose numbers.
* In precast elements, concrete burrs due to formwork deformations should be cleaned in order to insure that the top-connected frame profile be properly settled.

MOUNTING onto THE NEW BUILDING (ONTO THE ROUGH PLASTER)

* Mounting should be carried out with steel dowels, special mounting screws and fixing lugs.
* Especially in multifloor buildings, a piece of rope should be stretched on the side of the building with a plummet, and floors should be marked (with a water scale) so that the windows on the same vertical and horizontal line.
* Windows should be distributed to their places in the plans of window distribution and mounting, based on their pose numbers.
* First only the top determination hole should be made on the windows.
* The window should be lifted to the place of mounting. It should be pressed by adjusting the plummet and the water scale.
* It should be fixed by the steel dowels, special mounting screws and fixing lugs in the top holes.
* Then the the bottom and the sides should be fixed. However their holes should made on the mortar between two bricks.

MOUNTING WITH A DOWEL : (Mounting is carried out with a steel dowel.)

* Mounting could be carried out with a steel dowel especially in renewing tasks, in new buildings (If there is no case of steel mounting), in tasks with coatings finished and in tasks with a precast element.
* The sashes should be marked, and then removed from their hinges.
* The sections of the window's glazing beads should be taken out after being marked, and wrapped in groups.
* As is seen in the illustrations below, the profile should be drilled first in the diameter of Ø5.5 mm. And then Ø11 mm, based on their series. Then a hole is made only on the inside of the case with a drill end of Ø13 mm .
* The window should be lifted to the window gap, and its vertical and horizontal position should be adjusted.
* The operation of leveling the window vertically, horizontally and on the interior-exterior-axis should be completed by pressing the wedges placed close to the holes made on the window.
* On the partial window, a piece of rope is stretched horizontally so that the window will be on the same line.
* Fixing onto the build should be carried out in the following order: top, bottom and the sides.
* A hole is made on the wall through the hole on the window with Ø10 mm diamond drill.
* The steel dowel should be pushed to the exterior screen of the frame with the end of a screw driver. The dowel bolt should be tightened to insure that the cheeks open and pressing is in place.
* The mounting is finished after placing plastic plugs into every mounting hole, including on the sashes and fixed parts.

MOUNTING WITH STEEL MOUNTING SCREWS

Today, torque headed steel mounting screws are used in renewing tasks, buildings without case of steel mounting, and tasks with coatings finished. These screws accelerate the mounting process. There are a few things to be considered in using them. First, holes in the diameter of 6 mm are made on the window for mounting. When doing so, it should be paid attention to where the screw is on the side wall. Screws should be fixed on the brick line.Otherwise screws will not help fixing the window if it is on the brick holes.

As a mounting screw is on the top surface of a window, it as well looks on the opening sash after the mounting. It is therefore aesthetically crucial that the screw is both placed in a right angle and tightened in a proper torque. It should be paid attention to that the head of the screw not lead to a damage to the window. After the tasks of screwing is completed, proper plastic covers should be placed on the screws after being siliconed.

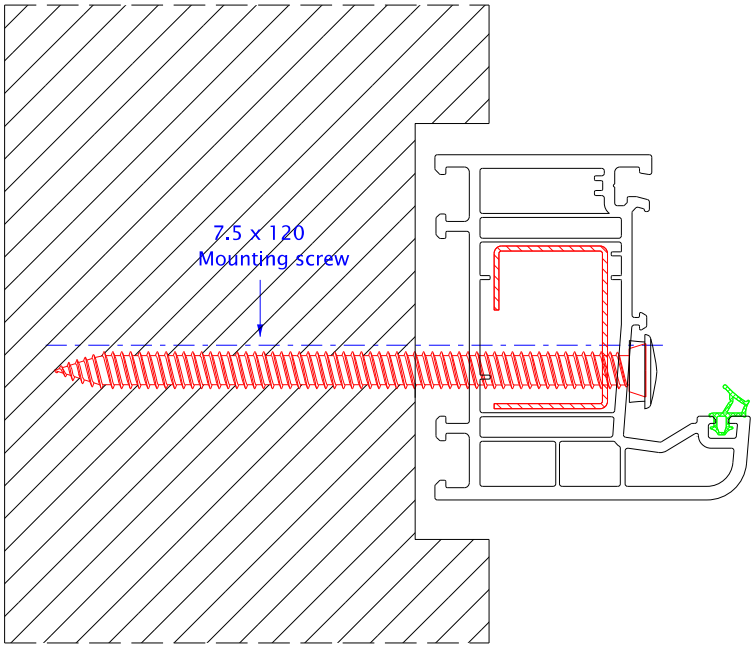
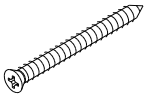


Figure.19 Application of a steel mounting screw

Table.6 – Installation screws

Codes	
13021	7.5 x 60 installation screw
13024	7.5 x 80 installation screw
13025	7.5 x 100 installation screw
13026	7.5 x 120 installation screw
13027	7.5 x 150 installation screw
13028	7.5 x 180 installation screw

MOUNTING WITH A FIXING LUG

A fixing lug should be clipsed exterior nails of a case with a hammer.

Fixing lugs should be used in the same number as that of the screws required to fix the window. If a mounting sill profile is to be applied to the bottom of the window, the lug should be screwed onto this profile.

If the width of the wall allows, fixing lugs should be fixed in an upright position.

In cases where the width of the wall does not suffice for the upright positioning,the fixing lug should be fixed after being brought to the proper angle.Fixing lugs should be screwed onto the interior side of the wall.Then they should be covered with a correct material (gypsum, plaster, etc.).

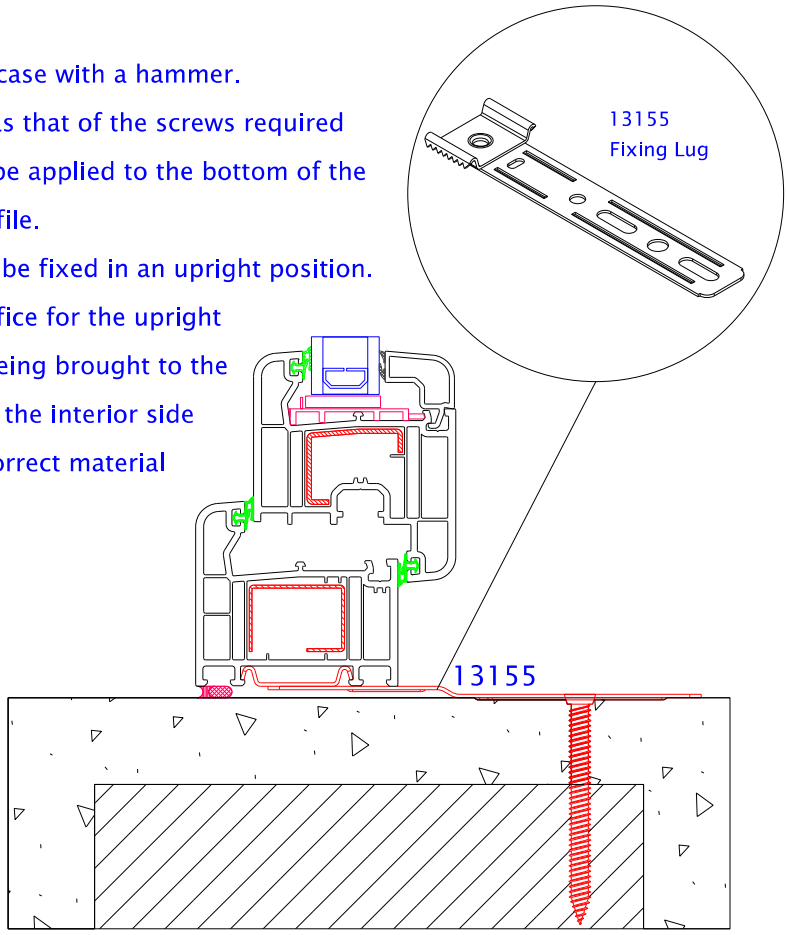
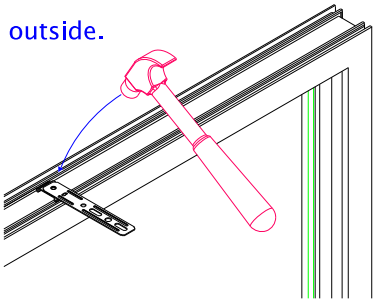
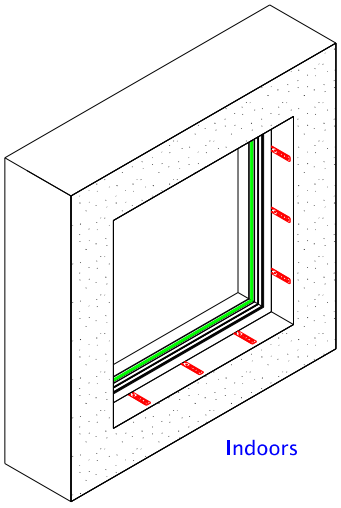


Figure.20 – Application of a fixing lug

Fixing Lug (13155) , should be fixed on the frame profile with the help of a hammer from the outside.





Şekil.21 Fixing of the fixing lug on the wall.

In summary,

* Mounting with a fixing lug helps saving time,
* There are no screw holes on the window as a lug is clipsed to the window.
* Thus there is no risk of water penetration through the holes made on the window for mounting.
* As it is fixed from the outside of the window, it enable to use a glazed window.

CASE OF STEEL MOUNTING FIXING:

* Mounting onto a blind case 4.8 should be carried out with a cylindiric headed lag screw (the size of the screw should be selected according to the application details).
* The holes of fixing should be made according to the window fixing measurements in the Figure.23. First, hole should be made on the enterior and exterior sides of the window with a drill end in the diameter of Ø5.5 mm.
* The case of steel mounting should be lifted to the place of mounting the window, and centered.
* The window should be clamped with glass adjustment wedges made of plastics placed close to the holes of fixing in a way that equal gap will be left on every side of the window.
* It should be checked vertically, horizontally, on the interior-exterior axis and against the plummet and the water scale.
* Mounting should be started on the top, then move to the bottom and finishes on the sides.
* A hole should be made on the case of steel mounting with a drill end in the diameter of Ø4.5 mm.
* The head of the 4.8 lag screw should lean at the supporting lag,
* The mounting should be completed after placing plastic plugs into every hole of fixing.

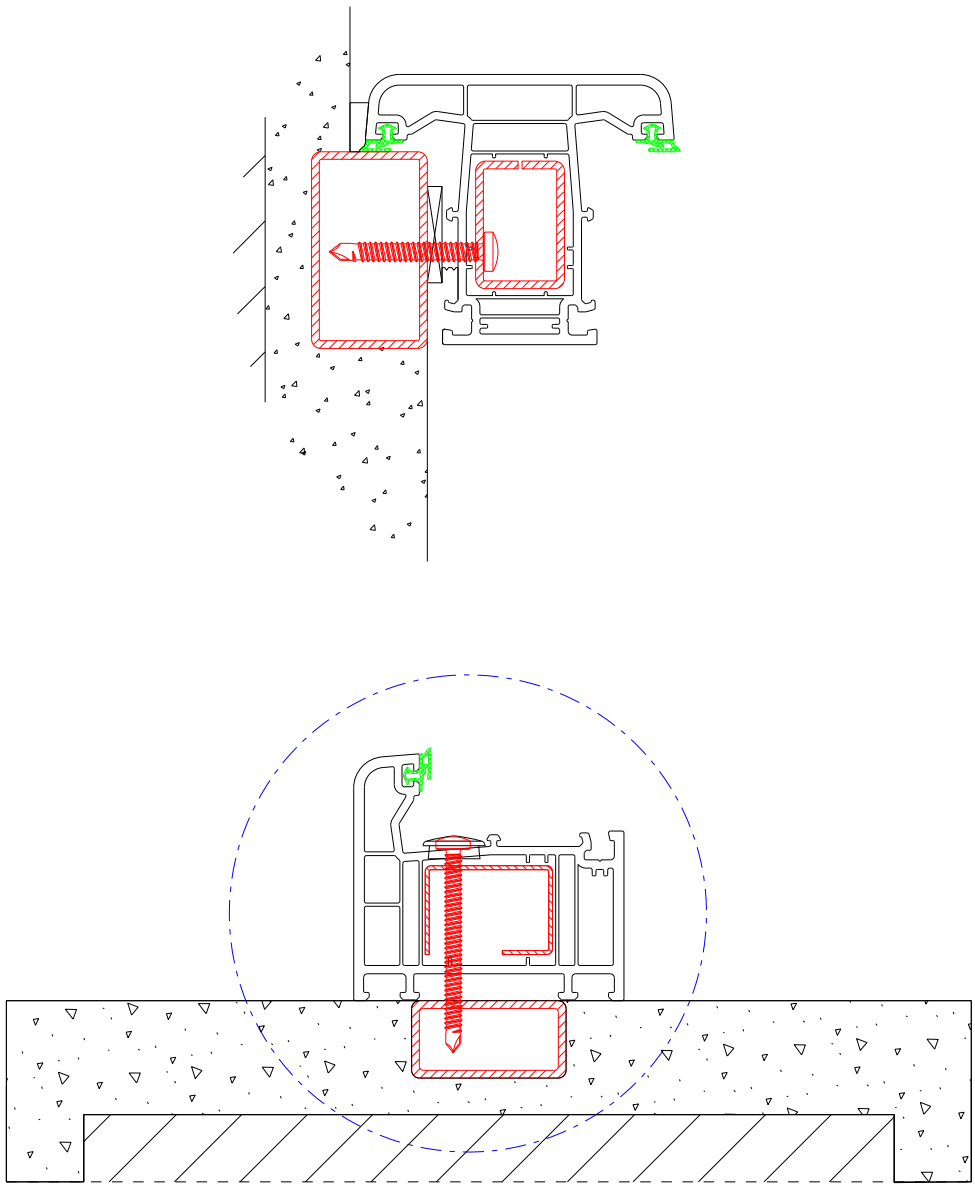
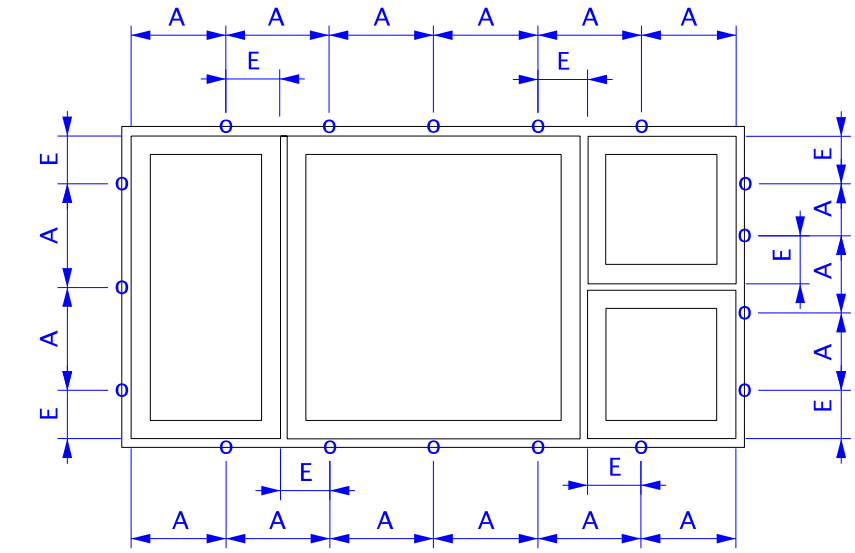


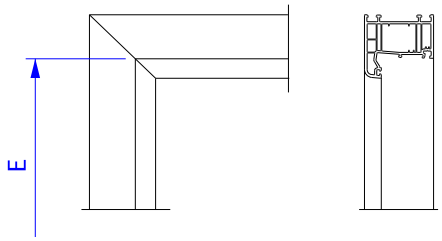
Figure.22 - Case of steel mounting applications with standard frame and T-frame profiles

MEASUREMENTS OF FIXING :

Mounting should be carried out by leaving a gap of 150 mm from the corners of the window (inner angle).

The distance of fixing should be max. 700 mm.

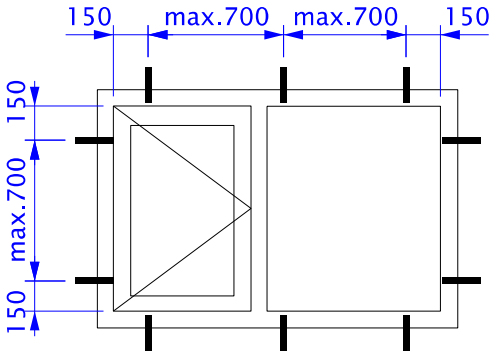




o =Place of fixing

A =Interval of fixing (approx. 700 mm)

E =Distance from the inner border of the profile (approx. 150 mm)



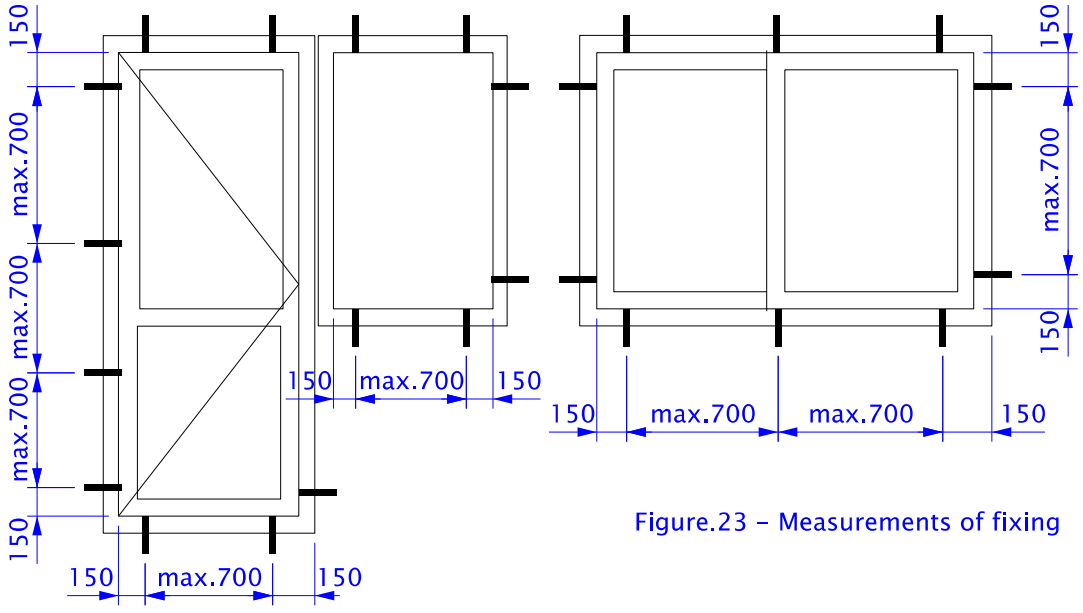
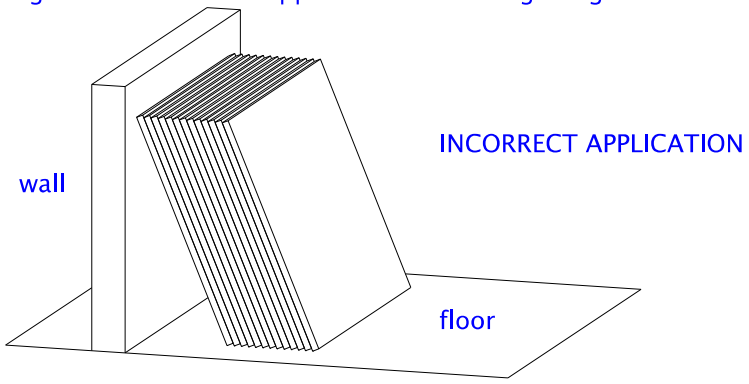


Figure.23 - Measurements of fixing

STORAGE of THE GLASS

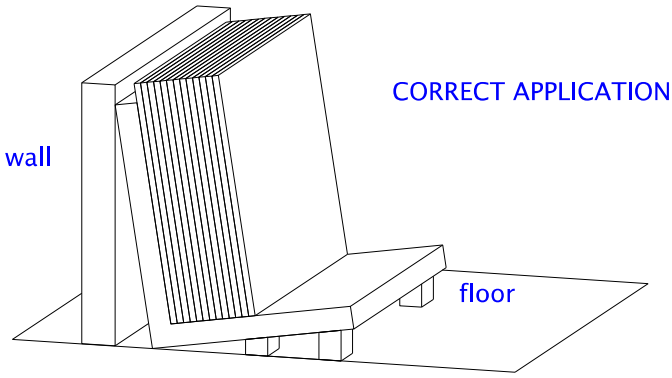
* A piece of glass should not be leaned at a wall or floor directly,

Figure.24 – Incorrect application in stacking the glass:



* For daily stacking for a short time, Pieces of glass should be placed close to a right angle and in a way that the load moves on the longer border after wooden laths have been placed onto the wall and the floor.
* For stacking for a long time, pieces of glass should be placed onto a wooden table with a slope of 10°, and plates of glass should be stacked with gap in-between.
* The thickness of the stacking should not exceed 50 cm.

Figure.25 – Correct application in stacking the glass:

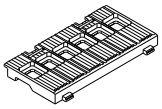
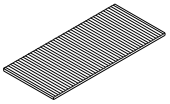
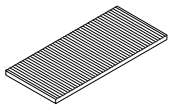
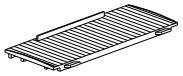
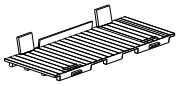
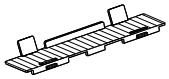
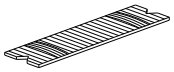
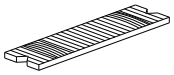


* In stacking pieces of glass in various sizes, the piece of glass in a larger dimension should be placed first, followed by wooden laths before placing pieces of in smaller dimensions in order to prevent them from leading to a pressure on the same point.
* Glass should be stored in an environment with no humidity.
* Glass should be protected from the direct exposure to heat during the storage.
  (sunlight, central heating and stove etc.)
  Otherwise they will be stretched and easily break down.

ACCESSORIES

Specially designed glazing wedges are used in mounting the window glass at Deceuninck.

Table.7 – Glazing wedges according to the systems

CODES	DRAWING	LEGEND	ZENDOW	EVEREST MAX	SLIDING	HS 76
11655		✓				
11652		✓				
11653		✓				
13106			✓			✓
11641				✓		
13165					✓	
13111			✓	✓	✓	✓
13110			✓	✓	✓	✓

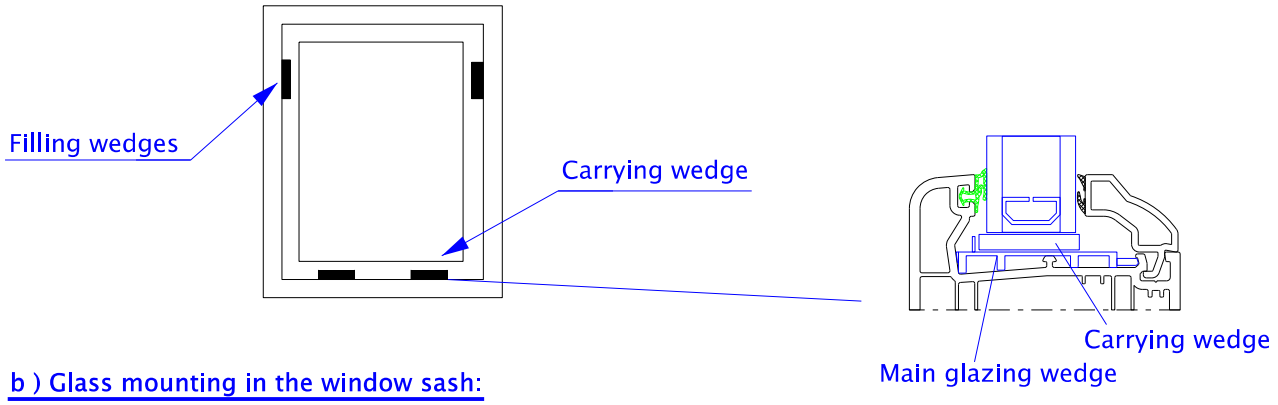
GLASS INSTALLATION

* Dust in the glass bevels should be cleaned.
* The parts touching the bolt inside and outside may be made wet with water and detergene to make it easier to put the glass in place.
* When using of wedges on the glass, the main glazing wedge should be put first, followed by carrying and filling wedges in proper places (see Figure.26 – Examples for using of wedges).
* When mounting the glazing beads, first glazing bead on the bottom, then other one on the top, and finally glazing beads on the two sides should be attached.

a) Glass mouting in windows with a fixed part

* Glass mounting should start with the fixed parts.
* The glass should be placed first on the bottom wedge, and then the top section of the glass should be leaned slowly at the gasket.
* Gaps on the bottom, top and the sides should be filled with siliconed wedges to prevent the glass from sliding.

Figure.26– Using of wedges on the glass in the fixed part of a window

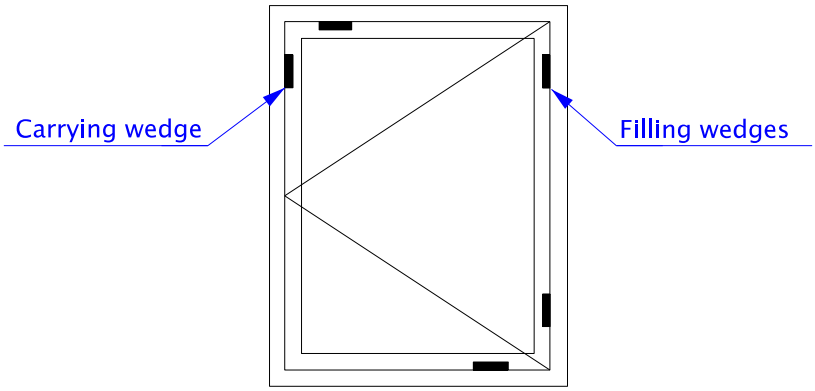


b) Glass mounting in the window sash:

The siliconed main wedge should be placed vertically and horizontally to the corner of the the bottom hinge.

* The siliconed main wedge should be placed vertically and horizontally to the corner next to the espagnolette.
* The sash glass should be settled in place.
* The sash should be brought to the open position. Siliconed adjustment wedges should be added onto the main wedge until the pin of the espagnolette and its counterpart come to a proper adjustment.

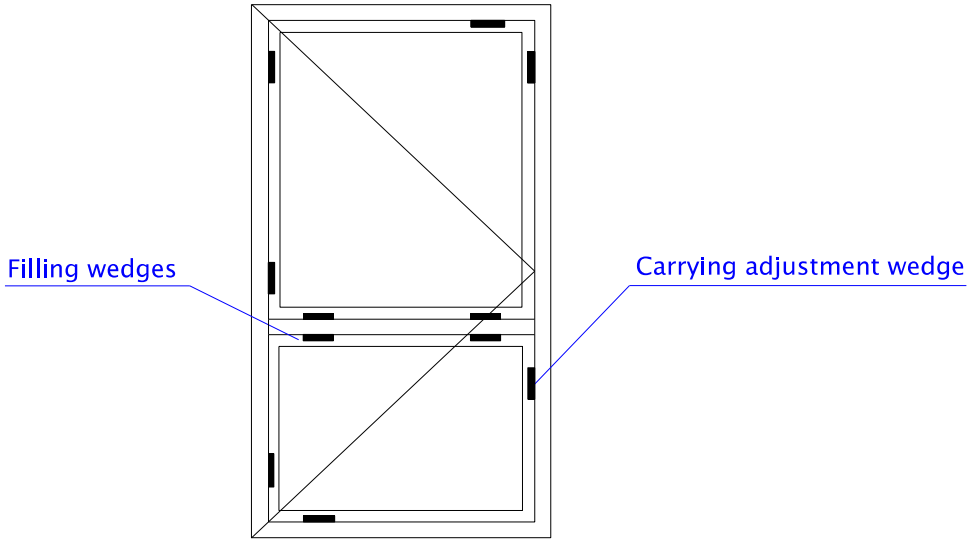
Figure.27– Using of wedges on the glass in the window sash



c) Glass mounting in a door sash

* In the doors without an transom, the operation is the same as in the window sash.
* In the doors with an transom, first the bottom should be wedged as in the window sash, and additionally siliconed wedges should be added so that there will be no space left between the glass and the transom on the side of the hinge.
* The same procedure of using of wedge should be followed in the event that the bottom section is plastic panelling, PVC board or sandwich panel.
* The procedure to be followed for the glass mounting on the top section is the same as in the window sash.

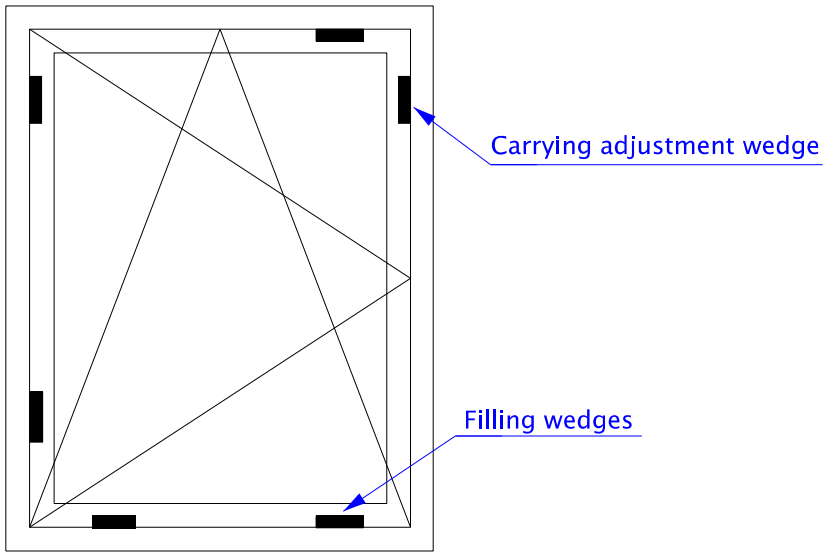
Figure.28- Using of wedge on the glass in the door sash



d) Using of wedge on the glass in a tilt-and-turn window

* Using of wedge should be applied as in a single-open window. Additionally, filling wedges should be placed vertically to the top hinge corner and horizontally to the side of espagnolette in the bottom.

Figure.29 - Wedging the glass in a tilt-and-turn window



e) Glass mounting in a botton hung opening sash

* Carrying wedges should be placed to the left and right corners of a window, and filling wedges should be placed vertically on the top.

Figure.30 – Using of wedge on the glass in a vasistas sash

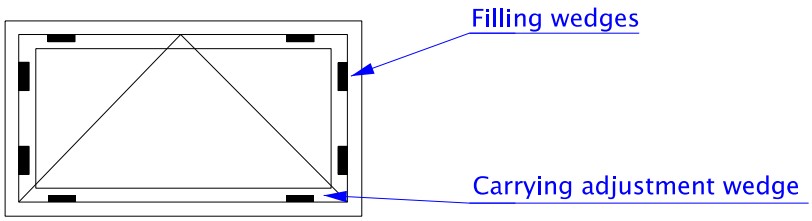
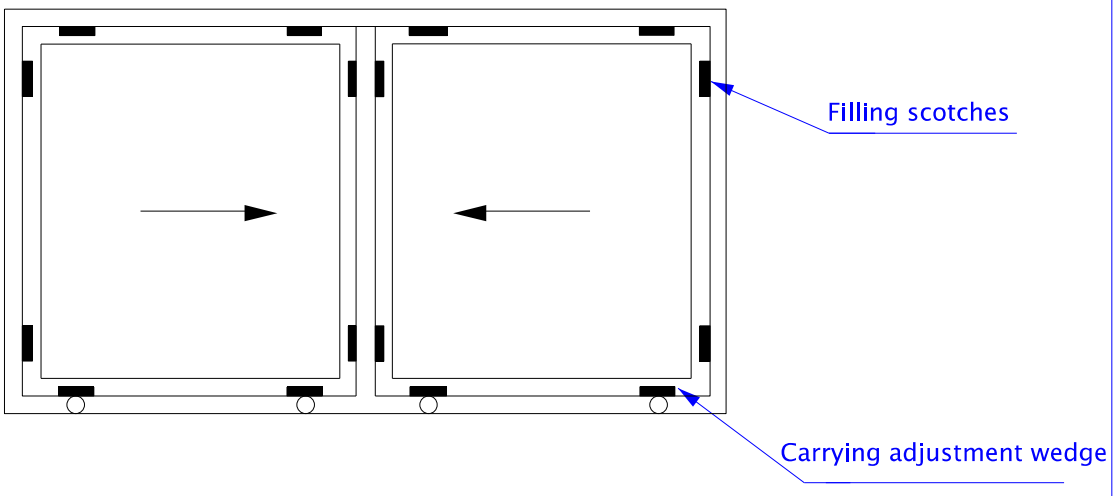


Figure.31 – Using of wedge on the glass in a sliding window



* In renewing tasks, the gaps between the window and the wall should be filled with polyurethane foam after Deceuninck window and glass mounting is completed. Once the polyurethane has been frozen, the overflowing parts should be cut down with a sharp knife.
* Using the centers vertically and horizontally inside, plaster should be applied in a way that it overlays by 1cm on the window.
* The plaster mixture should be always prepared outside the house.
* First, the top and the sides should be roughly plastered.
* If marbles to be used on the bottom on the interior side, they should be placed in a way that they go under the window.
* It is necessary to wait for the plaster to lose the water for a few hours.
* Afterwards, all the four sides should be fine-plastered. This prevents possible fractures in the plaster.
* Application of plaster is the task that pollutes the inside of a house most. It is required to take protective precautions to reduce the irritations to the minimum.
* The plaster should be applied in small fillings, slowly, as clean as possible and with an attention to not splashing around.
* GYPSUM OR A SIMILAR MATERIAL SHOULD BE NEVER USED ON THE EXTERIOR SIDE IN THE WORKS OF DECEUNINCK MOUNTING.

* GYPSUM AS WELL AS ALL ITS TYPES IS A MATERIAL NON-RESISTANT TO WATER. IT ABSORBS WATER, TRANSFERS AND BECOMES DISSOLVED

In the marble mounting and application of plaster, the following points should be considered:

* A marble should be mounted with a slope outwards and with black plaster under it.
* Especially in balcony windows with an angle, it should be carried out by marble craftsmen so that there will not be a mistake in joining points.
* Possible fractures on the exterior side of the wall should be repaired with black plaster.
* On the interior side of the wall, black plaster or gypsum plaster (which is easier to use) may be applied according to the details of the wall. Perlite plaster gypsum is widely used in mounting.
* Using qualified products of such brands as Kalekim and Sika prevents the risk of water penetration on that wall.
* Application of plaster should be carried out by plaster craftsmen.

* Monoblock roller shutter is mounted on the Deceuninck window in the manufacturing workshop, and transported to the place of mounting afterwards.
* Normally, there is no need a top connection for monoblock systems Only in too large measurements may there be sagging or oscillations in the roller shutter box. In order not to encounter these problems, a join should be established platfrom the inside or a proper exterior point of the roller shutter box to the wall

Figure.32 – Roller shutter applications

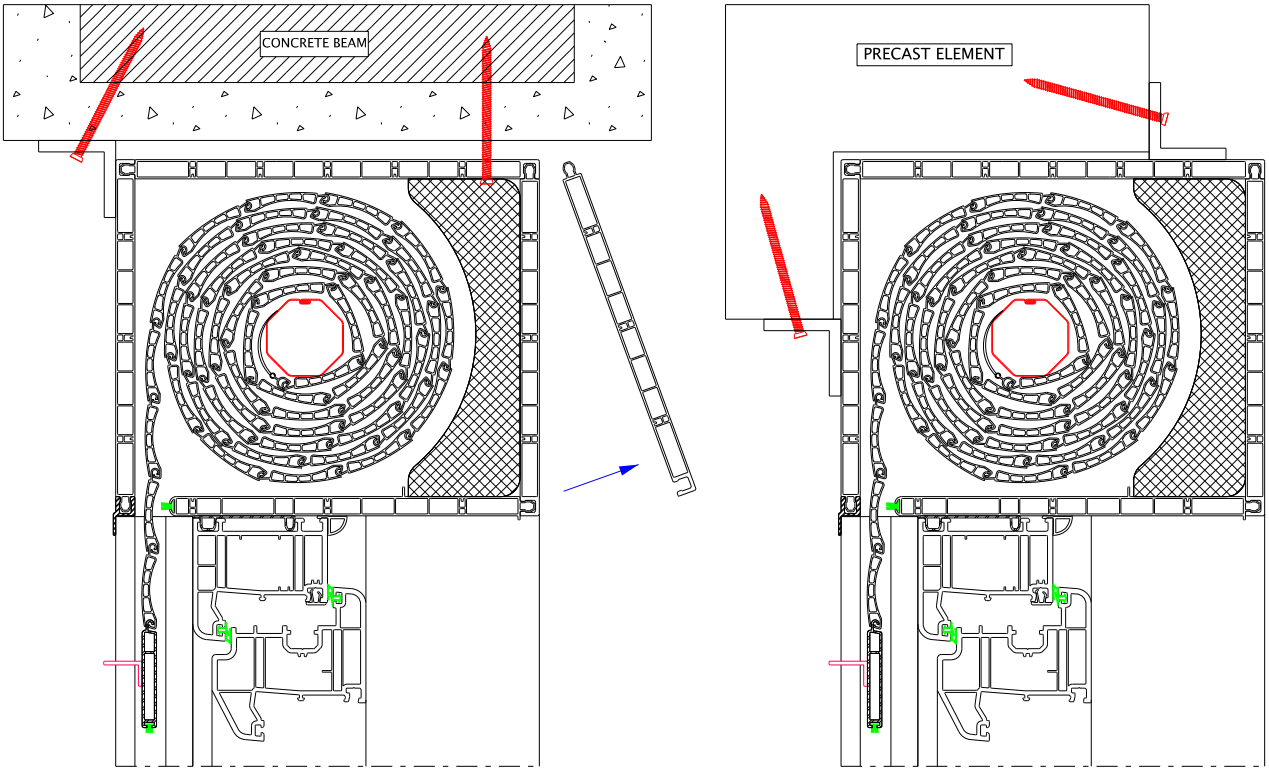
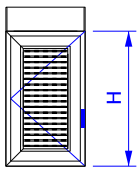
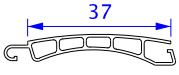
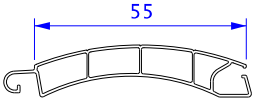


Table.8 Maximum heights of a roller shutter

Height 		ROLLER SHUTTER BOX 165 mm		ROLLER SHUTTER BOX 200 mm	
		11727 -->Ø40	11728 -->Ø60	11727 -->Ø40	11728 -->Ø60
295		2380 mm	2270 mm	3750 mm	3600 mm
12707		1315 mm	1260 mm	2140 mm	2085 mm

Usually the measurement for the roller shutter box is carried out in a way that it becomes equal to that of the window. However, in renewing works or if the window is to be embedded in the plaster, then it should be measured from the plaster to the plaster. Thus the shutter manufactured smaller by the size of embedding.

Although it is not a very common implementation to mount louvre shutters, due to the aesthetic appearance it can be seen in featured buildings and villas. As a roller shutter is to be applied to every window, one should pay attention to some points:

Important information about the louvre shutter system

The total sash width in a louvre system should not exceed 2100 mm.

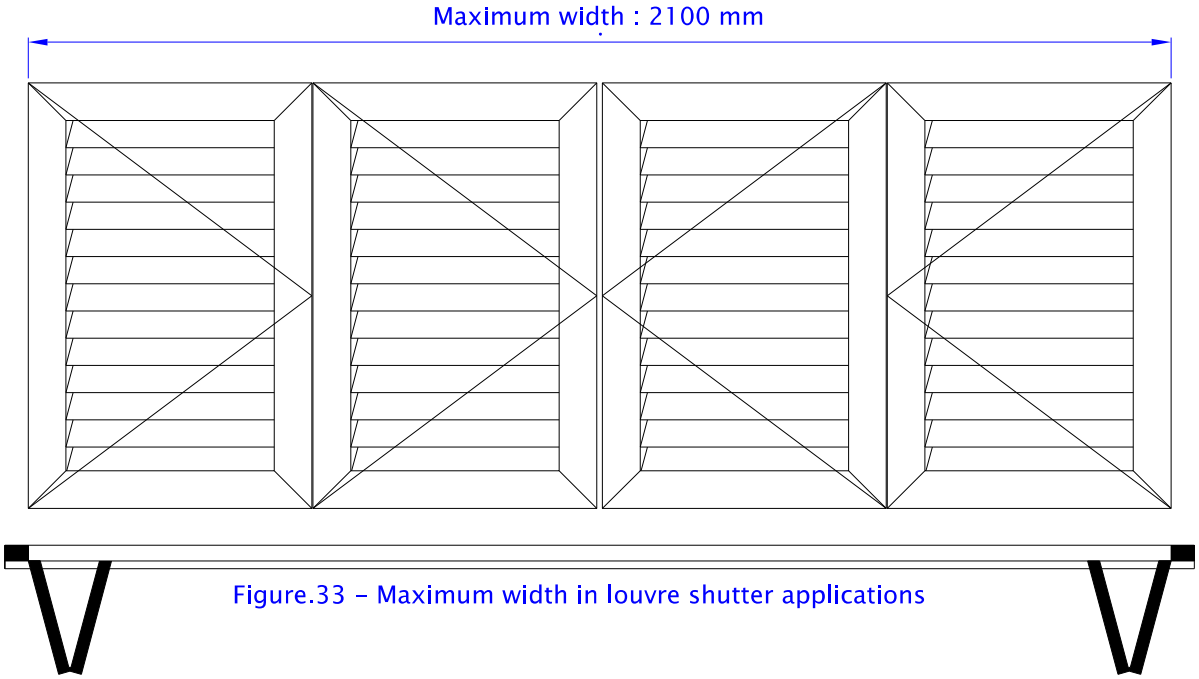
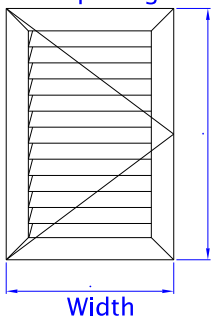


Figure.33 – Maximum width in louvre shutter applications

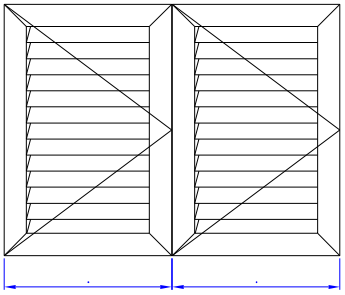
* In single- or double-sash louvre shutters, the maximum width of a sash may be up to 600 mm, and the maximum height of a sash may be up to 2300 mm. It is a must to attach a horizontal transom to the sashes that are higher than 1600 mm

* Application of a louvre shutter is impossible in pivot windows, outward-opening windows and outward-opening doors.



Sash Height
maximum : 2300 mm
(Three hinges should be used if the height is greater than 2000 mm.)

Width
minimum : 250 mm
maximum : 600 mm



Foldable width of a sash in folding sashes should not exceed 525 mm.

Width
minimum : 525 mm

Width
maximum : 525 mm

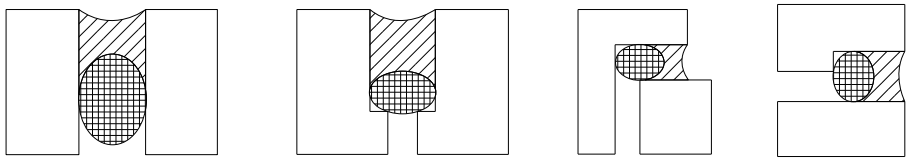
General information about water tightness

* Water tightness should be applied in PVC windows if glass mounting and work of plaster (If necessary) is completed.
* Buildings are continuously in movement due to various reasons. Some of these movements result from the Earth movements, which is impossible for us to control. The second category of building movements include the movements due to thermal expansion, drying, inflaming and wind effect. All these movements have an impact on the joining points between the window and the building. The gaps in the joining points should be filled with elastic materials and in proper measurement and detail so that these points could be insured to be impermeable in all terms.
* In PVC window mounting, silicone and previously pressed permeability belts and foam belts should be used in the joining points of PVC windows and such building elements and concrete, marble and wall to insure the water tightness.
* In the application of silicone, polyethalene cords or folding belts should be used to determine the depth of the silicone as a filling material. There is no need for an auxiliary material in application of previously pressed belts.
* The properties of silicone sealant material must be selected country weather conditions in use due to its elasticity, resistency, durability against UV, etc.
* In interior surfaces, acrylic sealant may be used just as a filling or covering material.
* Silicone sealants cannot be painted. Acrylic sealants can be painted.

General information about application of silicone

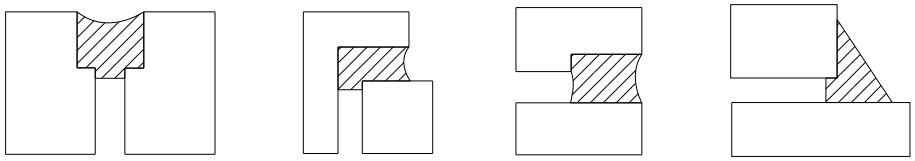
Silicone should be always in a joint. In other words, it should be filled in the gap between two facing and adjacent surfaces . It should be never spread over a surface.

Figure.34 – Correct applications



Silicone should stick only to the two surfaces where it is applied, and it should be never stick behind. To achieve this, polyethilene filling cords or any material that determines the depth of the silicone and prevents it from sticking to a fixed point behind (it can be a stack of newspaper pages) should be used.

Figure.35



The gap between two facing adjacent surfaces should be at least 4–5 mm. Otherwise, the body elasticity would be poor.

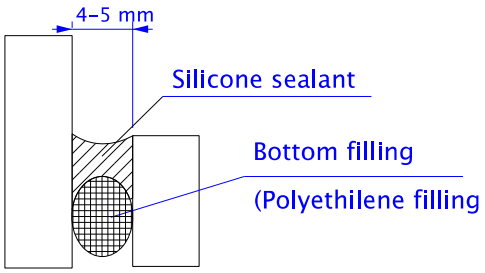


Figure.36

To obtain a better result, it is necessary to pay attention to the ratio of the distance between the two adjacent surfaces where silicone is to be applied and the depth of the silicone.
In gaps up to 1 cm, the depth and the width should be equal.

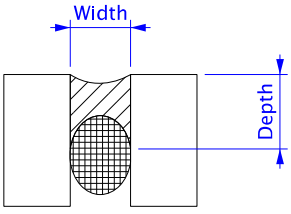


Figure.37

* The area where silicone is to be applied should be always square or rectangular, and it should never be a triangle. In the case of a triangle area, there might be a breakaway from one side or tearing in the middle

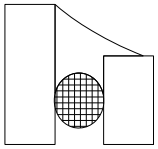
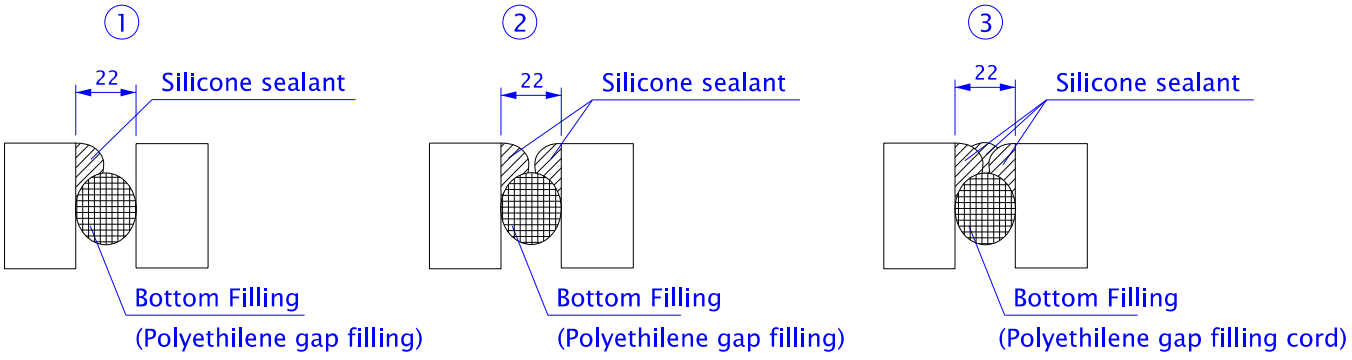


Figure.38

* The gaps should be filled from the bottom to the top, and there should be no space left.
* Gaps larger than 20 mm should be insulated first on the one side followed by the other side, and the rest of the gap should be filled by starting from the bottom.



Şekil.39

* A cartridge should be used for silicon application, and its ends should be cut down with a correct slope to the floor.
* Just after applying the silicone, its surface should be smoothed with wet fingers or a correct plastic spatula.
* The surface where silicone is to be applied should be dry, and cleaned from dust and oil.
* Silicone should not be applied in rainy or highly humid whether or below 5°C.
* Silicone should be protected from dust during the application and when drying.

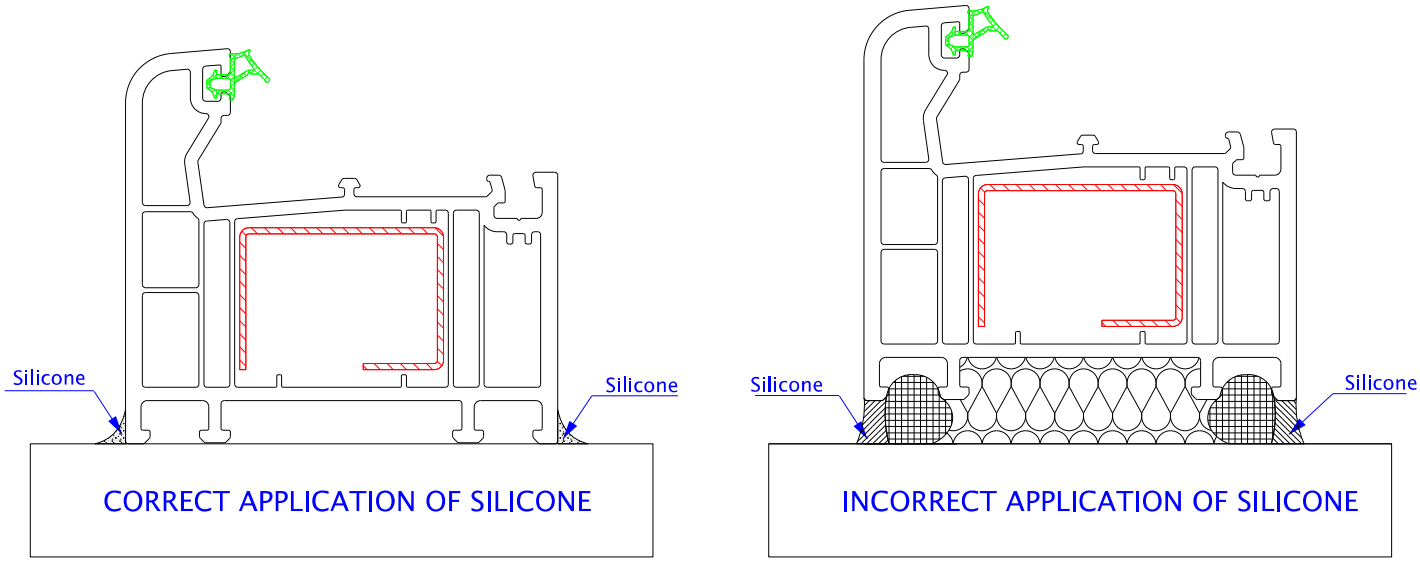


Figure.40

General information about inflaming belt (foam belt)

* Foam belts are made of such plastic types as polyethilene or synthetic foam.
* Lateral sections of these belts are usually in square, rectangular or triangle. They are on the sales as rolls.
* The belt exposed to a pressure due to its positioning gains air and water tightness, and sound insulation quality based on the degree of pressing.
* Foam belts are classified as in the following:
  - Close cellular structured, foam belts,
  - Semi-close cellular structured, foam belts,
  - Foam belts covered with butyl
  - Open cellular structured foam belts.

* The most appropriate type for the PVC window mounting is open cellular structured foam belts.

* Open cellular structured foam belts: (Polyurethane inflaming belts)
  - They are made of polyurethane foam.
  - They are highly soft and flexible.
  - The belt does not permit water in when exposed to pressure on the condition that it is impregnatedç
  - It is resistant to UV radiation.
  - It does not feature aging or wearing.
  - It is on the sales as a tightened roll.
  - It is quite useful especially in gaps with irregular surfaces.

What should be the width of a foam belt?

–In order to insure a good gap insulation, it is necessary to choose the type and size of the foam belt correctly.

–The factor called compression factor is used to calculate the width of the foam belt.

–Foam belts with the factor 4 are water tightness against rain.

–The width of the gap has been taken as maximum 10 mm.

–The width of the widest gap is always applicable in determining the thickness of the foam belt.

–Accordingly, the correct thickness is 4x10mm=40mm.

Table.9

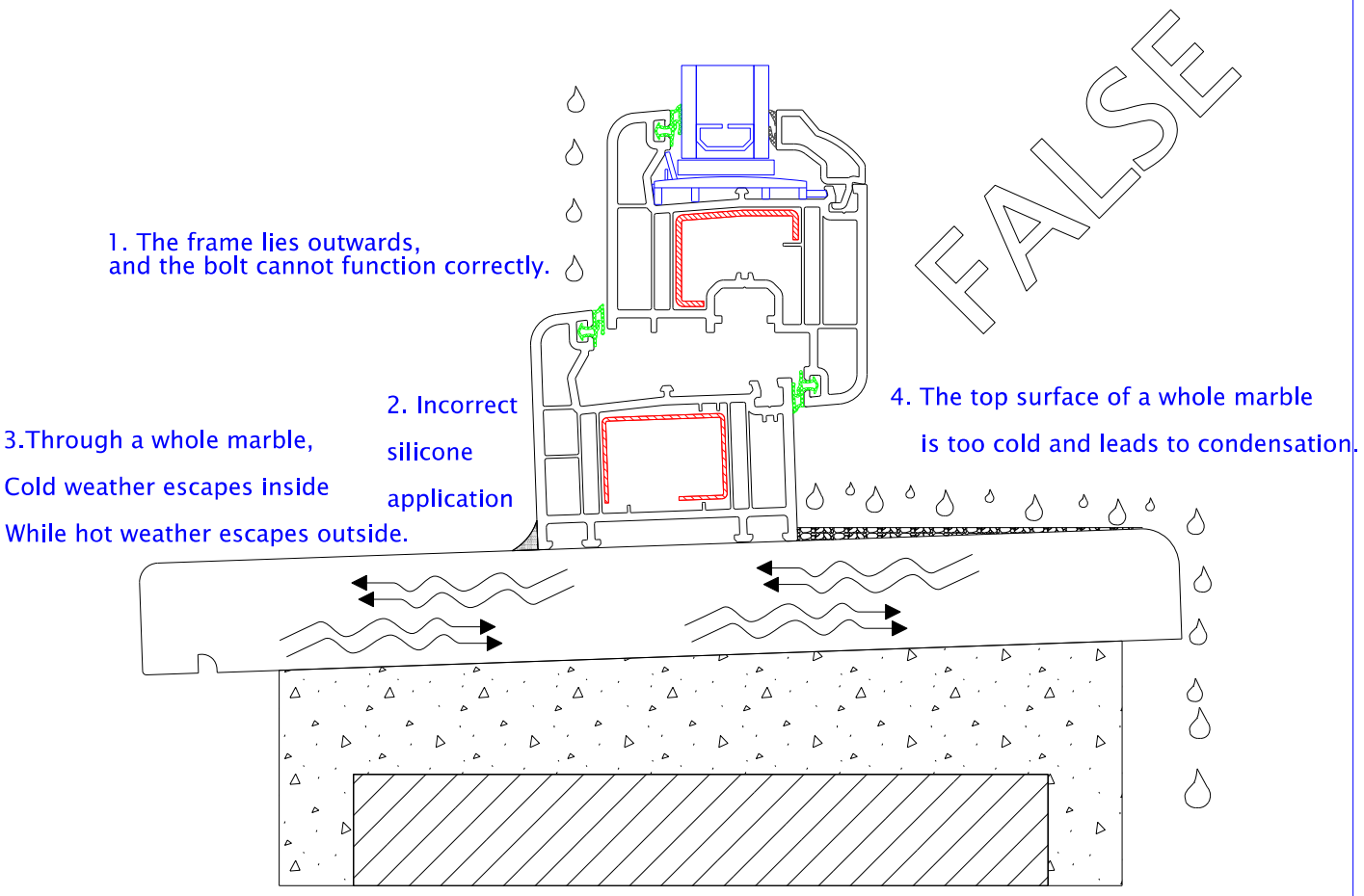
Foam type	Open cellular (impregnated)
Compression	% 25 – 80
Final thickness	% 75 – 20
Compression factor	2 – 5

* What should be the width of a foam belt?

  In impregnated foam belts, for instance, a foam belt to be used for a gap of 10 mm should be at least as wide as 20 mm.

General Information

* Thermal insulation in the buildings is a developing issue with a increasing importance today.
* Among the biggest mistakes in PVC window mounting in terms of thermal insulation comes mounting marbles as a whole on the interior-exterior axis. This incorrect application, having become a habitual action, may lead to water penetration in addition to lose of heat, as is seen below:



* In a window mounting carried out with marbles applied,
* The marble should not be one-piece.
* Application should be carried out with two pieces of marble and a sill mounting profile in-between.

Constructing buildings in compliance with the thermal insulation techniques have certain reasons:

* Need for Minimizing Costs of Heating (Fuel or energy saving), obligation to minimizing damages to the natural environment,
* Need for creating more comfortable places by heating them better with less fuel,
* And minimizing or eliminating damages due to condensation.

Minimizing or eliminating damages due to condensation at buildings :

Changes in construction techniques and understanding of planning from the eat 20th century, new conditions due to changing of human life and the industrial revolution have brought on the table the damages due to condensation at buildings.

* In older buildings, massive walls were constructed quite thick as they are carrying, and this thickness could make the wall resistant enough for thermal insulation, and diffusion could go outside without a condensation as it did not encounter a preventive layer when stones, bricks, soil, or plaster was used. In our century, however, walls have become less thick as they are no longer used for the carrying purpose in the modern construction methodology, which leads to a considerable drop in their resistance and thermal transfer. During diffusion on these walls, evoperation can easily fall below the temperature of condensation, resulting in condensation on such cold surfaces as walls and glass.

* In order to increase the walls' resistance to thermal conductivity, walls have started to be built in a layered structure, and thermal insulation materials have entered into use.

* Such coating materials as mosaics or seramics used on exterior walls to protect the building from external effects lead to water evaporation trapped in the wall and causing condensation there, which in turn results in fractures, breakaways or color changes on the coatings.

* In older buildings, amount of fresh air per person was much higher and relative humidity was lower due to the fact that the floor height was greater and rooms were larger. On the other hand, every room had such mechanisms as oven, chemine or chimney to take the humidity out, while ventilation does not suffice in today's buildings.

* Today, more people live in a limited space, and such needs as cooking and washing clothes are met collectively in a smaller space. This leads to increase of relative humidity at the building.

* As is in every construction material water evaporation is permitted through the external walls due to difference in pressure. If the water evaporation encounters a cold layer which is not absorbant during the process of diffusion, then humidity inside the air is condensated and trapped in the wall.

* Especially painting the interior sides of the walls with oil-based paints makes it impossible for diffusion to take place. Plastic-based wall papers have the same effect, and the walls cannot absorb the humid, increasing the relative humidity.

IMPACT of PVC WINDOWS on HUMIDITY

In older buildings, greater gaps between the sash and the frame prevents excessive humidity as it allows infilteration. The constant air stream functions as a natural ventilation mechanism and balances the humidity in the air.

* In PVC windows, however, humidity cannot escape outside due to the bolts placed between the frame and the sashes The excess of the relative humidity increases the condensation.
* In this respect, it becomes a must for the user to open the sashes periodically to allow ventilation.
* It is an advantage of PVC windows that the user can realize ventilation under his/her control as s/he wishes. On the other hand, it is great importance that ventilation provides fresh air, which is needed by the human beings, in addition to balancing the humidity.

HUMID PRODUCING SOURCES at A BUILDING

The most importance humid production is triggered during the use of the building. The humid load is much greater compared to the outside. Cooking, washing the clothes and drying them, washing the floor, wiping the glass, etc. Are sources that produce humid.

For example:

Moisture production in the kitchen:In the morning.....700 grams,
At noon .....800 grams,
In the evening.....1700 grams,
WC and the bathroom: daily (approx.).....600 grams,
Washing the clothes: weekly.....3000 grams,
Drying clothes.....9000 grams,
Washing the floors:.....300 grams of evaporation is triggered.

On the other hand ;
Though in exhaling, a person having a rest Produces .....40-50 gr./hour,
While a working person at a moderate hardness produces.....0-80 gr. evaporation per hour.
Through exhaling and the skin, a sleeping person Produces....1000 gr. evaporation per night.1000 gr.

* Such fuels as gas, natural gas, liquid gas and coal gas produce an important amount of water vapor as they are of a carbonhydrad origin.

For example :
Burning of 1 m^3 natural gas produces 1000-1 500 grams water vapor
Burning of 1 lt. gas releases approx. 1 300 grams water vapor.

HUMIDITY in THE AIR

The capability of the air to include water is dependent on the temperature, yet limited. If the line equal to the maximum amount of water it can include is exceeded, the excess of the water vapor is condensated. Warmer air can include more water than colder air. In order for condensation to take place, there must be a relative humidity of 100%. If the warmer air gets colder and dependingly the relative humidity is increasing, the excess of the vapor converts to water when it comes to the condensation temperature.The following table demonstrates the changes in the condensation temperatures according to various temperatures and humidity.

Table. 10 – Condensation temperature based on the temperature and the relative humidity

Ambient °C Temperature	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
30	10.6	12.9	14.9	16.8	18.4	20.0	21.4	22.7	23.9	25.1	26.2	27.2	28.2	29.1
29	9.7	12.0	14.0	15.9	17.5	19.0	20.4	21.7	23.0	24.1	25.2	26.2	27.2	28.1
28	8.8	11.1	13.1	15.0	16.6	18.1	19.5	20.8	22.0	23.2	24.2	25.2	26.2	27.1
27	8.0	10.2	12.2	14.1	15.7	17.2	18.6	19.9	21.1	22.2	23.3	24.3	25.2	26.1
26	7.1	9.4	11.4	13.2	14.8	16.3	17.6	18.9	20.1	21.2	22.3	23.3	24.2	25.1
25	6.2	8.5	10.5	12.2	13.9	15.3	16.7	18.0	19.1	20.3	21.3	22.3	23.2	24.1
24	5.4	7.6	9.6	11.3	12.9	14.4	15.8	17.0	18.2	19.3	20.3	21.3	22.3	23.1
23	4.5	6.7	8.7	10.4	12.0	13.5	14.8	16.1	17.2	18.3	19.4	20.3	21.3	22.2
22	3.6	5.9	7.8	9.5	11.1	12.5	13.9	15.1	16.3	17.4	18.4	19.4	20.3	21.1
21	2.8	5.0	6.9	8.6	10.2	11.6	12.9	14.2	15.3	16.4	17.4	18.4	19.3	20.2
20	1.9	4.1	6.0	7.7	9.3	10.7	12.0	13.2	14.4	15.4	16.4	17.4	18.3	19.2
19	1.0	3.2	5.1	6.8	8.3	9.8	11.1	12.3	13.4	14.5	15.5	16.4	17.3	18.2
18	0.2	2.3	4.2	5.9	7.4	8.8	10.1	11.3	12.5	13.5	14.5	15.4	16.3	17.2
17	-0.6	1.4	3.3	5.0	6.5	7.9	9.2	10.4	11.5	12.5	13.5	14.5	15.3	16.2
16	-1.4	0.5	2.4	4.1	5.6	7.0	8.2	9.4	10.5	11.6	12.6	13.5	14.4	15.2
15	-2.2	-0.3	1.5	3.2	4.7	6.1	7.3	8.5	9.6	10.6	11.6	12.5	13.4	14.2
14	-2.9	-1.0	0.6	2.3	3.7	5.1	6.4	7.5	8.6	9.6	10.6	11.5	12.4	13.2
13	-3.7	-1.9	-0.1	1.3	2.8	4.2	5.5	6.6	7.7	8.7	9.6	10.5	11.4	12.2
12	-4.5	-2.6	-1.0	0.4	1.9	3.2	4.5	5.7	6.7	7.7	8.7	9.6	10.4	11.2
11	-5.2	-3.4	-1.8	-0.4	1.0	2.3	3.5	4.7	5.8	6.7	7.7	8.6	9.4	10.2
10	-6.0	-4.2	-2.6	-1.2	0.1	1.4	2.6	3.7	4.8	5.8	6.7	7.6	8.4	9.2

EXAMPLE-1:

The table above determines the condensation temperature as 9.3 ° C for 20 °C as the ambient temperature and 50% as the relative humidity. That is, if the air in the room touches a surface colder than 9.3°C, condensation will take place.The amount of condensation will increase as it falls below the condensation temperature.

Table.11 – Condensation points according to various temperatures at a relative temperature of 100%

Temperature	Amount of condensation (g/m^3)
- 10 °C	2.14
0 °C	4.84
+ 10 °C	9.4
+ 20 °C	17.3
+ 30 °C	30.3

As the temperatures gets increase, the amount of the water vapor that the air can carry will also increase. Similarly, as the temperature gets decrease, the air can carry less water vapor, which may start condensation.

CONDENSATION TEMPERATURES at VARIOUS TEMPERATURES AND HUMIDITY

If the humidity could be kept at 60% instead of 100% in this room at 20C°, condensation will not take place until the temperature falls below 12°C.

Table. 11 – Condensation temperature dependent on the temperature and relative humidity

Ambient °C Temperature	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
30	10.6	12.9	14.9	16.8	18.4	20.0	21.4	22.7	23.9	25.1	26.2	27.2	28.2	29.1
29	9.7	12.0	14.0	15.9	17.5	19.0	20.4	21.7	23.0	24.1	25.2	26.2	27.2	28.1
28	8.8	11.1	13.1	15.0	16.6	18.1	19.5	20.8	22.0	23.2	24.2	25.2	26.2	27.1
27	8.0	10.2	12.2	14.1	15.7	17.2	18.6	19.9	21.1	22.2	23.3	24.3	25.2	26.1
26	7.1	9.4	11.4	13.2	14.8	16.3	17.6	18.9	20.1	21.2	22.3	23.3	24.2	25.1
25	6.2	8.5	10.5	12.2	13.9	15.3	16.7	18.0	19.1	20.3	21.3	22.3	23.2	24.1
24	5.4	7.6	9.6	11.3	12.9	14.4	15.8	17.0	18.2	19.3	20.3	21.3	22.3	23.1
23	4.5	6.7	8.7	10.4	12.0	13.5	14.8	16.1	17.2	18.3	19.4	20.3	21.3	22.2
22	3.6	5.9	7.8	9.5	11.1	12.5	13.9	15.1	16.3	17.4	18.4	19.4	20.3	21.1
21	2.8	5.0	6.9	8.6	10.2	11.6	12.9	14.2	15.3	16.4	17.4	18.4	19.3	20.2
20	1.9	4.1	6.0	7.7	9.3	10.7	12.0	13.2	14.4	15.4	16.4	17.4	18.3	19.2
19	1.0	3.2	5.1	6.8	8.3	9.8	11.1	12.3	13.4	14.5	15.5	16.4	17.3	18.2
18	0.2	2.3	4.2	5.9	7.4	8.8	10.1	11.3	12.5	13.5	14.5	15.4	16.3	17.2
17	-0.6	1.4	3.3	5.0	6.5	7.9	9.2	10.4	11.5	12.5	13.5	14.5	15.3	16.2
16	-1.4	0.5	2.4	4.1	5.6	7.0	8.2	9.4	10.5	11.6	12.6	13.5	14.4	15.2
15	-2.2	-0.3	1.5	3.2	4.7	6.1	7.3	8.5	9.6	10.6	11.6	12.5	13.4	14.2
14	-2.9	-1.0	0.6	2.3	3.7	5.1	6.4	7.5	8.6	9.6	10.6	11.5	12.4	13.2
13	-3.7	-1.9	-0.1	1.3	2.8	4.2	5.5	6.6	7.7	8.7	9.6	10.5	11.4	12.2
12	-4.5	-2.6	-1.0	0.4	1.9	3.2	4.5	5.7	6.7	7.7	8.7	9.6	10.4	11.2
11	-5.2	-3.4	-1.8	-0.4	1.0	2.3	3.5	4.7	5.8	6.7	7.7	8.6	9.4	10.2
10	-6.0	-4.2	-2.6	-1.2	0.1	1.4	2.6	3.7	4.8	5.8	6.7	7.6	8.4	9.2

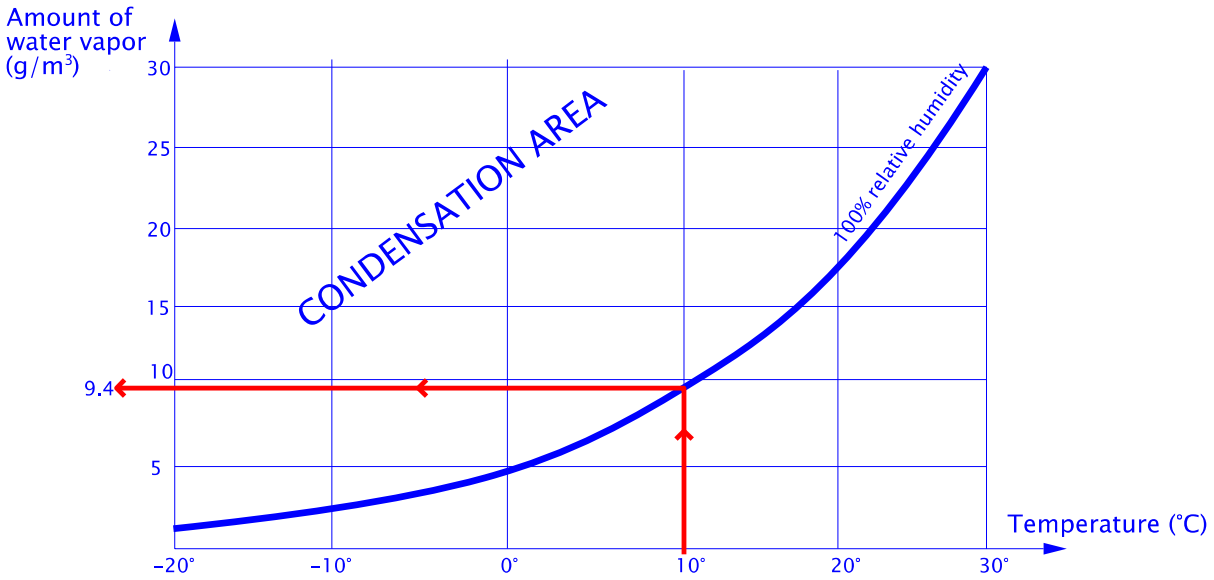
* As is seen in the table, as the temperature gets increase, the amount of the water carried by the air also increases.As the temperature gets increase due to the more use of insulation at the roof, on the walls and the windows, the amount of condensation will decrease.

ISOTHERMS :

The curves and the surfaces at the same temperature are called isotherms. Transfer of heat, or stream of heat, takes places from the high temperature to the low temperature, or from warmer areas to cooler areas. Accordingly, the water vapor that moves from the inside to the outside gets colder and the capacity of carrying decreases thereby. The excess of the water vapor converts to condensation water as it reaches the condensation temperature. It is ideal to reach the first condensation temperature on the exterior surface of the building or outdoors.

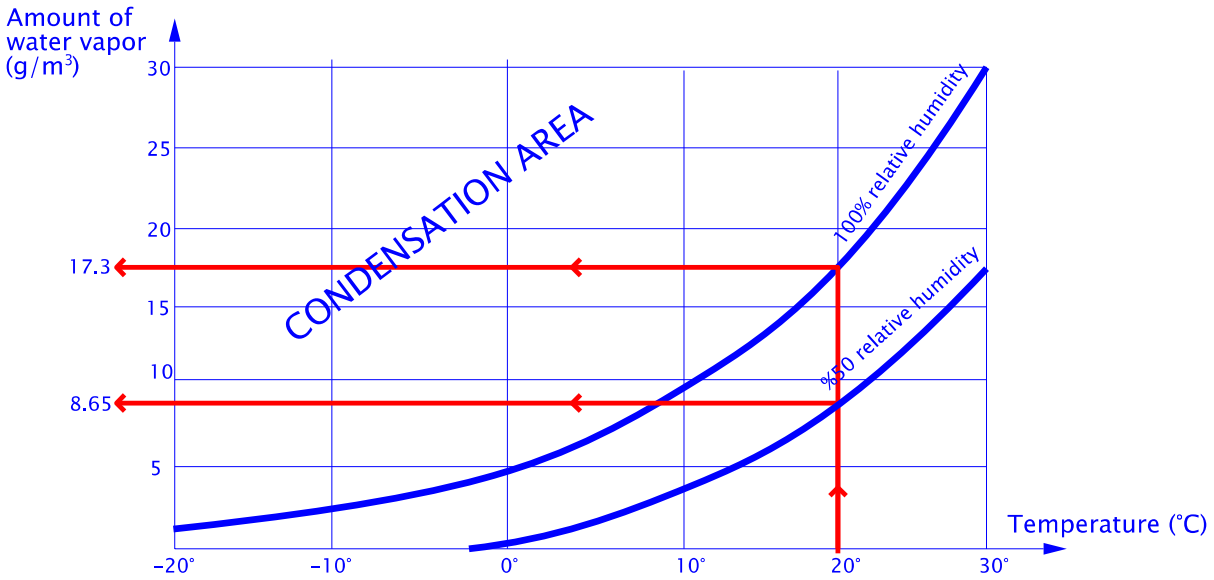
EXAMPLE-2:

Taking 100% as the relative humidity, the maximum amount of water vapor carried by the air is 9.4 g/m^3 at 10°C.



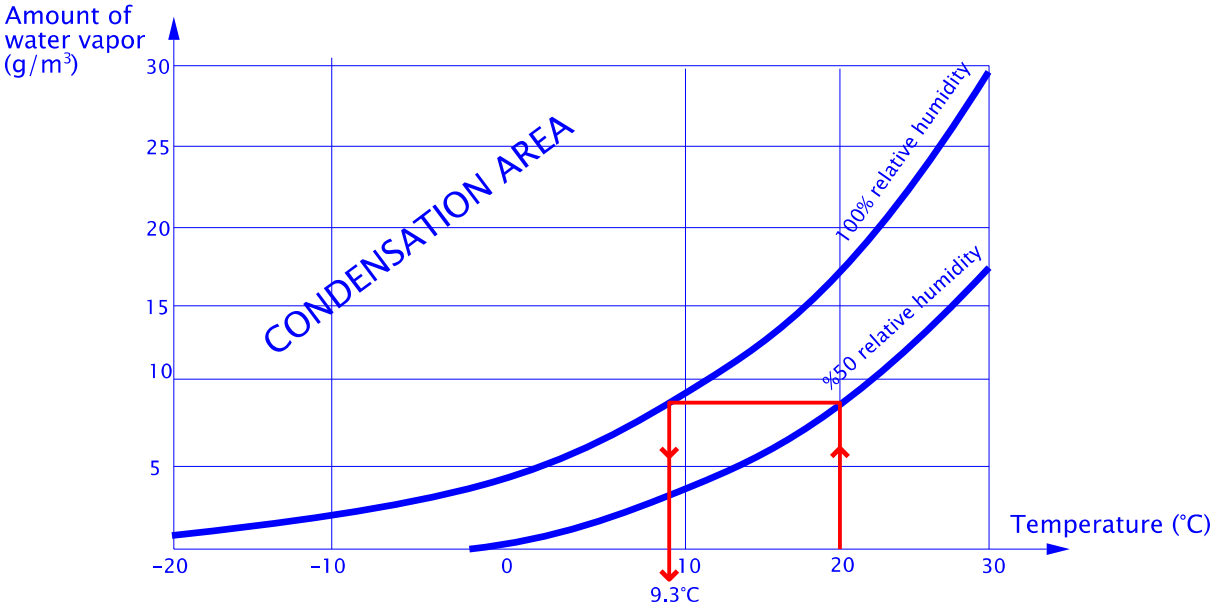
EXAMPLE-3

The amount of water vapor in the air is 8.65 g/m^3 at 20°C and at 50% relative humidity. At the same temperature (20 °C), the maximum amount of water vapor to be able to be carried by the air is 17.3 g/m^3 (100% humidity) If the humidity gets increase, then the condensation will start.



EXAMPLE-4

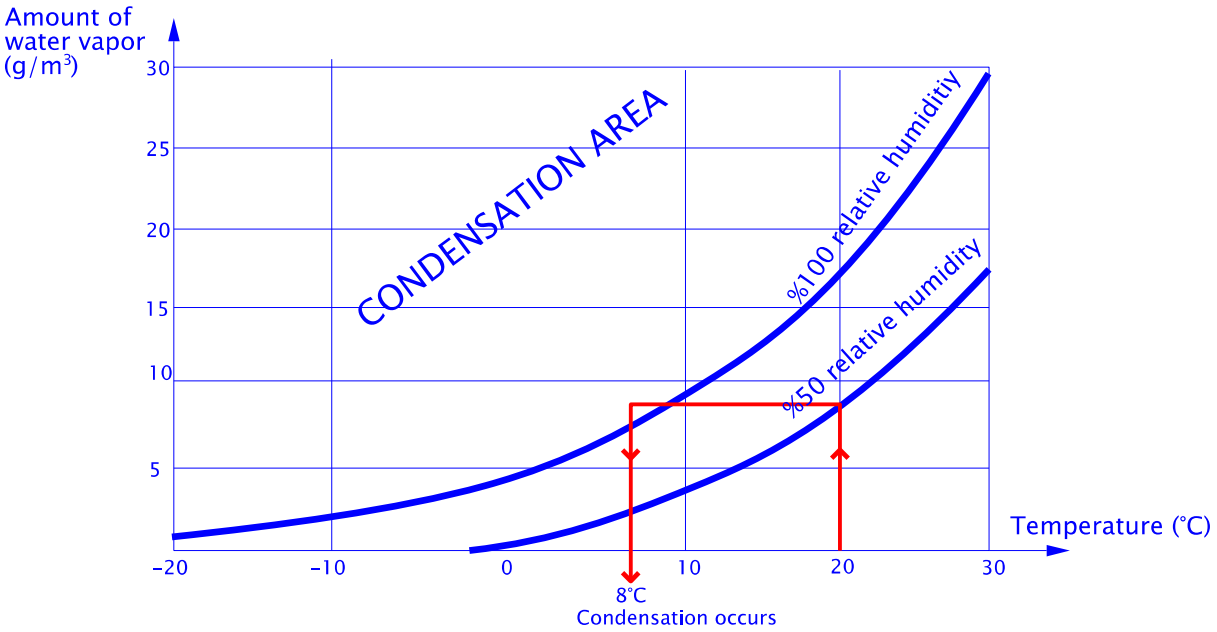
In a place at 20°C and 50% relative humidity, condensation will take place at 9.3°C. Condensation will take place if the air gets in touch with a surface at 9.3°C or lower.



* The relative humidity starts to increase if the ambient temperature starts to get lower while the amount of water vapor remains the same. For, the lower the ambient temperature gets, the less the capacity of carrying water vapor gets. Condensation will take place if the ambient temperature reaches a value below the condensation temperature (100% relative humidity).

EXAMPLE-5

Condensation will take place in a place at 20°C and 50% relative humidity if temperature is 8°C on the interior surface of the glass.



Thus, based on the thickness and features of the glass to be used, the interior side of the glass should be kept warm. (by choosing a covered glass, for example)

CONDENSATION on A DOUBLE-GLASS PVC WINDOW

* It is not possible to say that there will be no sweating when the PVC window is used with a double-glass. Condensation depends on the ambient temperature, the relative humidity and the temperature on the interior surface of the glass. As covered double-glass applications keep the interior surface of the glass warmer than the normal double-glass applications, less frequently is sweating encountered in covered double-glass windows than the normal ones. Thus, covered glass aplications bring an advantage in terms of condensation.

* The water vapor in the air has a condensation temperature. Condensation will start on the surface (such as glass) touched by the air if its temperature falls below the condensation temperature.

For example:

* If the room temperature is 20°C and the relative humidity is 95%, sweating will start when the temperature on the surface of the glass is 19.2 °C. At the same temperature, and when the humidity is 60%, condensation will not start untill the temperature on the surface of the glass falls below 12°C. (See Table.12) Thus, keeping the humidity low is the most important factor in preventing condensation.
* Condensation will start on the surface of the glass in a car waiting in cold in the winter once the humidity increase with the people breathing. It is an example visible to the eyes that the sweating is eliminated when the interior of the car is heated, insuring that this heat increase the temperature on the surface of the glass.
* The following table demonstrates the ambient temperatures and relative humidity values to be reached at certain places. Percentages of humidity are measured with a HYGROMETER.

Table.12

Place description	Inner Temperature °C	Inner Relative Humidity %
Housing:		
-Living and working rooms.....	20 - 22	50 - 60
-Bedrooms.....	18 - 20	55 - 65
-Kitchens.....	15 - 18	65 - 80
-Bathrooms.....	26	65 - 100
Schools (classes etc.)	18 - 20	50 - 65
Indoor swimming pools	20 - 25	80 - 90
Hospitals	24 - 35	40 - 60
Restaurants (ventilated)	18 - 20	50 - 70
Stores	20	50 - 60
Cold stores	1 - 2	70 - 80
Boiler Rooms	25 - 35	45 - 50
Laundries	20 - 25	85 - 95

* We will have obtained healthy places so long as we keep the values in the table.12.
* The relative humidity of the rooms at 18-20°C is scientifically considered:
    * Dry if below %40
    * Normal if between 40%-60%,
    * Humid if between 60%-75%,
    * Wet if above 75%.

As a summary,

In order to prevent condensation on the the surfaces of building elements,

a) Increasing the inner temperature (20-22°C). Increasing the temperature on the surfaces by applying insulation on the walls if required.

b) Decreasing the relative humidity of the air indoors. The biggest source that produces water vapor is the kitchen. The water vapor released due to cooking in the kitchen should be taken out through the chimney and the ventilator. (The ideal ventilation is provided by the ventilator placed over the cooker.)

c) In the other parts of the house where water vapor is produced (such as toilettes and bathrooms), the water vapor released should be taken out through the window after being used.

d) The inner doors of the kitchen, bathroom and toilette should be kept closed to prevent the humid from spreading to the other parts of the house,

e) Clothes should never be dried in the house, but, if this is obligatory, it should be insured in the bathroom with windows open and the inner door closed.

f) Heating artificially the surfaces of condensation (placing radiators before windows),

g) Increasing the surface temperature by causing the air adjacent to the surface to move (with fan-heaters and air conditioners),

h) Paying attention to whether other rooms are at the same temperature (20-22°C) in houses with a chemine, setting up chemines in other rooms as well or keeping the door open to allow the heat to spread equally,

k) Using no catalytic type heater, or gas stove, as furnaces of this type, cause the formation of excessive water vapor. Wood or coal stoves should be preferred,

l) A teapot should never be placed on a stove to boil water,

m) In additio to all these precautions, all the rooms of a house should be periodically ventilated for 15-20 minutes or half an hour twice or three times a day. Condensation will have thus been prevented as the relative humidity indoors is descreased by taking the water vapor out.

n) When cleaning the glass or floors wet, ventilation should last until all the places wiped become dry.

p) The walls and the ceiling the house should never be painted with oil-based paints, and should never be covered with plastic wall papers. Plastic paint even whitewash should be preferred.

r) Too many flowers should not be grown up in the house, and an aquarium should not be kept in the house if possible.

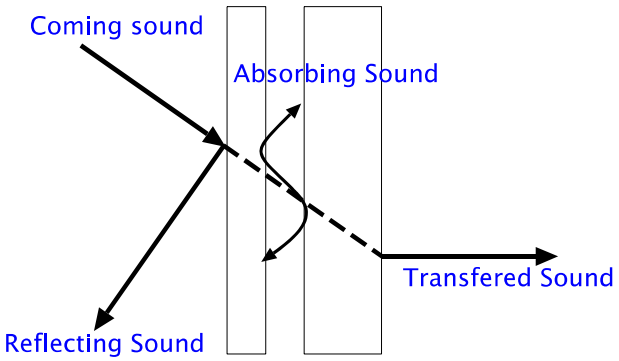
s) If the house has unused stove pipe holes, these should not be closed but attached a filter to allow the humid air to escape through these holes.

t) On the other hand, keeping a hygrometer in addition to the termometer helps insuring the humidity at desired values.

SOUND INSULATION

* Sound insulation is a type of insulation to be carried out for the purpose of minimizing adverse effects of sound. Taking under control dispursion of the sound in the athmosphere is the biggest goal at sound insulation. A portion of sound is reflected like other physical events when hitting a surface during its dispursion. Another portion of its is absorbed by the obstacle.

And another portion passes to the other side of the obstacle.



The following table demonstrates the pressure values created by various sound sources:

Sound Pressure Level dB (A)	Sound Source and Position
140	Jet in the take-off - 25 m away
100	Car horn sound-3 m away
80	Alarm clock Bell-1 m away
70	Interior of a car at the speed of 50 km/h
50	Normal - 1 m away
40	Quiet living room
35	At night, the bed room
25	Rural area away from the traffic
15	Background noise in the broadcasting studio

Sound waves are exposed to refractions at different frequencies when passing through pieces of glass in different thickness, which results in absorption of some sound waves. The more the difference in thickness is between the pieces of glass, the better the sound insulation becomes. What is most crucial is to place the thicker glass to the side of the noise source when applying the double glass.

* Another crucial point in window mounting is gaps in terms of sound insulation.

Gaps between the window and the wall should be filled with sound-absorbing materials. Polyurethane or self-inflaming belts are sound-absorbing materials at the same time.

There are some points to be considered during the delivery following the mounting of windows. These can be examined in the two categories as retail works and projects.

In retail works :

* Fine adjustments of windows should be made after the mounting of PVC windows.
* In the opening parts, mounting hole plugs, drainage covers, recess profiles, architrave and closing profiles if any should be mounted in compliance to the technique.
* Such tasks as channel filler bead, rotation of bolts and silicone application etc. should be checked for the last time.
* Espagnolette and hinges should be lubricated with fine machine oil.
* Rough pollution on the PVC window should be cleaned.
* In the drainage and air holes as well as the interior of the sashes, drainage holes and PVC BURRS created by manufacturing or mounting should be cleaned.
* Protective foiling on the profiles of PVC windows should be completely removed.
* The nylon spread prior to the floor should be removed, and the mounting area should be roughly cleaned.
* At this time, information about cleaning and maintenance of the window should be given to the customer for the future use. The user guide prepared by the Deceuninck should be given to the customer.
* As a cleaning material for the PVC windows, water with liquid detergene or soap should be used. Dust detergenes should never be used.
* It should be told the customer that the channels and drainage holes on the sashes should be periodically cleaned for better functioning.
* The importance of lubricating the espagnolette and hinges with fine machine oils should be told the customer.
* It should be told the customer that it is necessary to clean the dusts and pollution on the bolts when cleaning the PVC window, (so that the elasticity and permeability of the bolts can continue)

In the projects

* In case of steel mounting, the glass should be plugged immediately after the mounting of the window. The window should be fine-adjusted and delivered.
* In the buildings without fine plaster made, glazing beads should be installed in place. Glass bevels and hinges should be protected against the cement (covering with a belt of nylon). Recess profiles, drainage covers and handles should not be installed.

  These materials should be delivered to the construction company in turn for an official report. An official report should be signed with the construction company to show that all the windows have been properly and completely mounted. After the completion of plaster, side and floor coatings, mounting of the glass and other side products should be carried out.

The overall delivery should be signed on an official report.

In the larger works where the tasks of glazing belongs to the customer, recess, wind vane and handles should be installed immediately after the mounting of the windows. The precautions in the glass bevels should be notified to. Completed works should be delivered agaist a signature on an official report. It should be additionally stated on the official report that no liability for the fractures or breakoffs due to lack of adjustment in the sashes or other damages shall be accepted.

RECEIVING THE OFFICIAL REPORT OF DELIVERY

* Signing an official report of delivery is necessary after the completion of the mounting whatever the size of the work is. This report is a source of assurance for the customer and the subcontractor alike.
* The official report of delivery should be prepared as two copies. They should be signed and dated, and one of the copies should be given to the customer.
* Leaving with good wishes, Deceuninck mounting should be completed.

Consequently,

* Mounting according to the proper measurement and in compliance with the techniques will eliminate the need for advertisement costs by time.
* The good relation between the salesman and the customer is an indicator of the satisfaction from the job done.
* Such a service is the best reference to produce new sales of PVC windows all over the country.

POINTS to BE CONSIDERED in THE ENTIRE MOUNTING PROCESS

In addition to the compliance of the mounting work with the techniques, related rules of good manners also hold a great importance. We would like remember that our dealers should obey the following rules especially in renewing tasks, as they are the house currently occupied by our customers in this case.

The first impression is very important and physical appearance is always effective. The mounting team should be clean and well behaved as the overall appearance.

The features and behaviors of the personnel in the mounting team hold a great importance. A mounting work properly done with care forms a reference to possible sales in that area.

During the mounting work, no one from the personnel of mounting should smoke, and only when the team takes a break should they smoke in the place allowed by the customer.

Each team should have a mounting chief and explain to the customer the works to be done in detail.

At least two days prior to the mounting day, the time of starting the mounting should be communicated to the customer. Within this period, your customer will make the necessary preparation in his/her house or workplace. It is another crucial criteria to show up at the time previously communicated to the customer.

The person or the team who will be responsible for the mounting of doors and windows should make the preparations beforehand, and receive the information about the customer and detailed illustrations about windows.

The following job principles should always be paid great attention to:
Especially in renewing tasks, the current windows should be matched with the windows to be mounted, and the mounting should start only after making sure that each has its counterpart. In renewing tasks, a window gap should never be open if the mounting cannot be completed within one day.

The equipment should be cleaned for the next mounting work, and the same care should be paid to every work. If the mounting team needs to take to the place of mounting the materials such as glass, marbles and windows, They should ask the customer for a suitable place, and the materials should be carried to the shown place.

Plaster repair materials should not be taken to the place of mounting.

Possible troubles should not be hidden from the customers, and they should be corrected. If something is wrong with the material and there is a timing problem, the customer should always be notified. If the customer makes sure that s/he is notified about everything, his/her reactions will be more positive.

The mounting team should collect all the rubbish and wastes, and talk to the customer for the place of disposal. Former parts of joineries and the glass should not be taken without being permitted by the customer.

The mounting team should take all the precautions for the protection of the things and the environment in the place of mounting. The ground should be covered with a thick nylon or brands to prevent a possible damage to the floow, and the pollution should not be allowed to spread to other parts of the house. If possible, air streaming should be prevented by not dismantling the opposite windows at the same time. Sensitive and fragile things such as vases and electronic devices should be kept away from the place of mounting.

Small details such as keeping close the door between the place of mounting and the other parts of the house and not touching the things, curtains and the walls as it is indispensible for the hands of the mounting personnel to have dusts contribute greatly to the customer satisfaction.

Following the mounting, the brands should be removed with care, and the environment should be left as clean as possible.

At the end of the mounting, the chief of the team or the dealer official should check all the windows with the customer one by one, make explanations regarding the usage, and ask if they have complaints or demands. Opening and closing and (un)locking functions should be demonstrated especially for windows and doors. Finally, "user manual" should be given, and the warranty certificate and the invoice must be delivered