TECHNICAL GUIDE
FOR ALUMINUM FRAMES INSTALLATION

We build excellence, every day

ALUMIL is the largest company in the design and production of aluminum architectural systems in Greece and one of the largest in Europe having a presence in over 60 countries on all continents.

Always in compliance with the specifications and requirements of the most advanced markets worldwide, ALUMIL has created an extensive product portfolio that includes innovative aluminum architectural systems that fully meet modern building requirements.

For over 30 years now, **ALUMIL** has been innovating and raising the standards in the field of aluminum architectural systems. The company's course is characterized by technological evolution, design and construction excellence, and continues to trace new pathways in the field of aluminum constructions.

Both the extensive range of product options, as well as the deep knowledge of its object, render the company the most reliable choice for all those who wish to renovate or equip their home or business from scratch.

One of the main pillars of ALUMIL proposals is aluminum frames. As a major life investment, frames are a purchase that will accompany the buyer for many decades. In the journey from the search and the decision to buy aluminum frames up to their mounting, the last and most important stage is that of installation. The correct and smooth operation of a frame, in addition to its technical characteristics, also depends on its proper installation, which ensures the preservation of its overall performance at the levels set by its specifications.

In this context, we have created a complete **Technical Guide for the Installation of Aluminum Frames**, which shall constitute a handy tool for every frame manufacturer. From the basic installation stages and the factors that affect it, up to the chapters on the typologies of the frames and the certification of their performance, this book is a small encyclopedia on frames and their installation.

CONTENTS

Detailed Installation Drawings Search Guide

1) Based on the type of installation selected, create the code using table 1.
2) Search the code in Table 2 and find the pages that correspond to it.

Table 1

Masonry types	Frame installation location	Installation method	Frame type	Shading system type
A	1	1	W	RSX
B	2	2	D	RST
C	3	3		NRS
D				BS

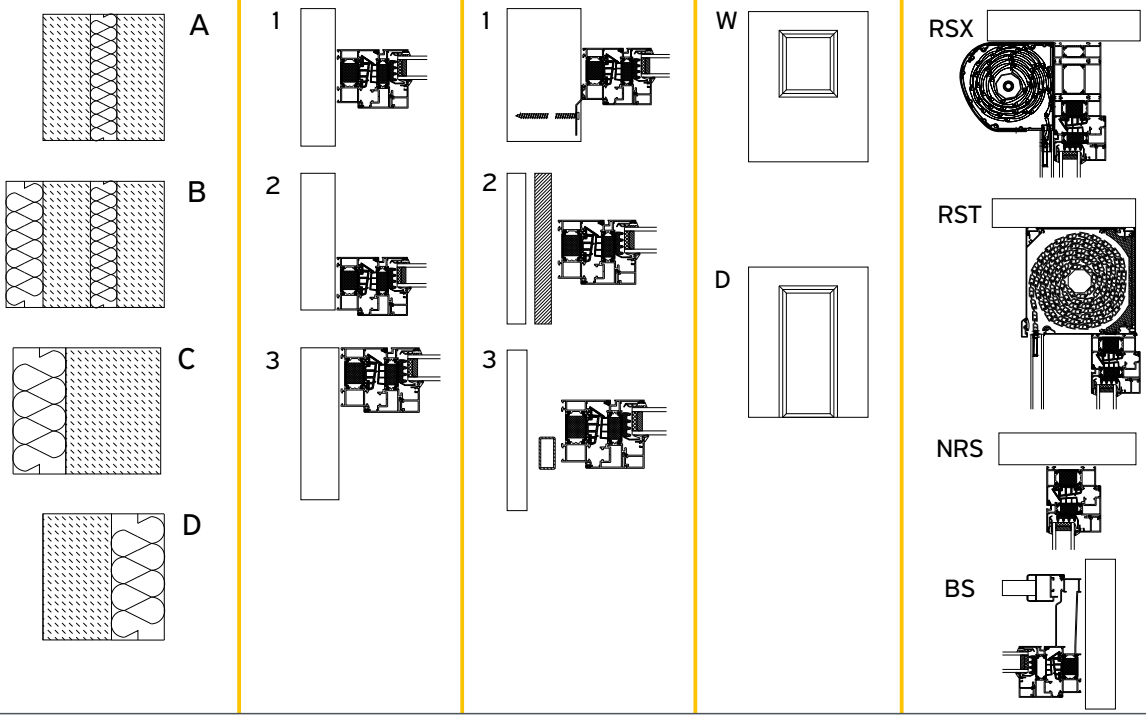


Table 2

Code	Description	Drawing	Page
A-1-1-W-NRS	Double masonry with 5cm thermal insulation in the middle of the opening with anchor brackets on a window without shading system	Top view of the left part of the window	56
A-1-1-W-NRS	Double masonry with 5cm thermal insulation in the middle of the opening with anchor brackets on a window without shading system	Section of the lower part of the window	57
A-2-1-W-NRS	Double masonry with 5cm thermal insulation on the inner edge of the opening with anchor brackets on a window without shading system	Top view of the left part of the window	58
A-2-1-W-NRS	Double masonry with 5cm thermal insulation on the inner edge of the opening with anchor brackets on a window without shading system	Section of the upper part of the frame	59
B-1-1-W-NRS	Double masonry with 5cm thermal insulation and 7cm external shell in the middle of the opening with anchor brackets on a window without shading system	Top view of the left part of the window	60
B-1-1-W-NRS	Double masonry with 5cm thermal insulation and 7cm external shell in the middle of the opening with anchor brackets on a window without shading system	Section of the lower part of the window	61
B-1-1-W-NRS	Double masonry with 5cm thermal insulation and 7cm external shell in the middle of the opening with anchor brackets on a window without shading system	Section of the upper part of the frame	62
B-1-1-D-NRS	Double masonry with 5cm thermal insulation and 7cm external shell in the middle of the opening with anchor brackets on a door without shading system	Section of the lower part of the window	63
B-2-1-W-RST	Double masonry with 5cm thermal insulation and 7cm external shell on the outer edge of the opening with anchor brackets on a window with built-in shade roller	Top view of the left part of the window	64
B-2-1-W-RST	Double masonry with 5cm thermal insulation and 7cm external shell on the outer edge of the opening with anchor brackets on a window with built-in shade roller	Section of the lower part of the window	65
B-2-1-W-RST	Double masonry with 5cm thermal insulation and 7cm external shell on the outer edge of the opening with anchor brackets on a window with built-in shade roller	Section of the upper part of the frame	66
B-2-1-W-NRS	Double masonry with 5cm thermal insulation and 7cm external shell on the outer edge of the opening with anchor brackets on a window without shading system	Top view of the left part of the window	67

1. Introduction

Frames construction is a complex process, involving several people, starting from the manufacturer and ending with the delivery of the frame to the end user. In order to reach the end user, they must first be constructed, packaged and transported safely to the building under construction. They must then be stored securely until they are installed on the structural element and finally the necessary instructions for safe use and maintenance must be provided to the end user.

1.1 Key installation stages

There are six basic stages to finally reveal the quality of the end product, in a manner perceived by the end user. The first stage, i.e. the manufacture of the product, concerns the manufacturer who, following the instructions of Alumil, manufactures a certified frame.
To reach the end user it passes through five more stages, which are presented in figure 1.1

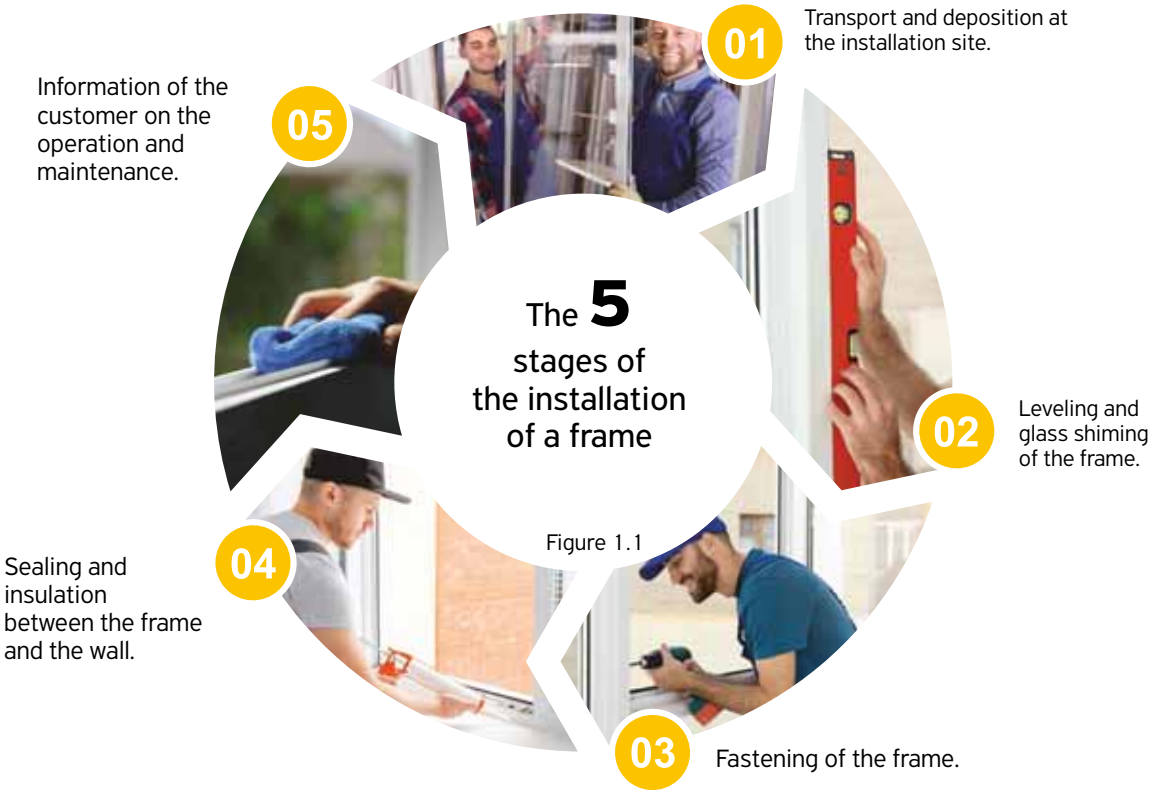


Figure 1.1

Customers understand the final quality of the frame after installation and thus the proper installation of the frame is a crucial element of the final quality, since 40% - 50% of the problems are attributed to incorrect installation.

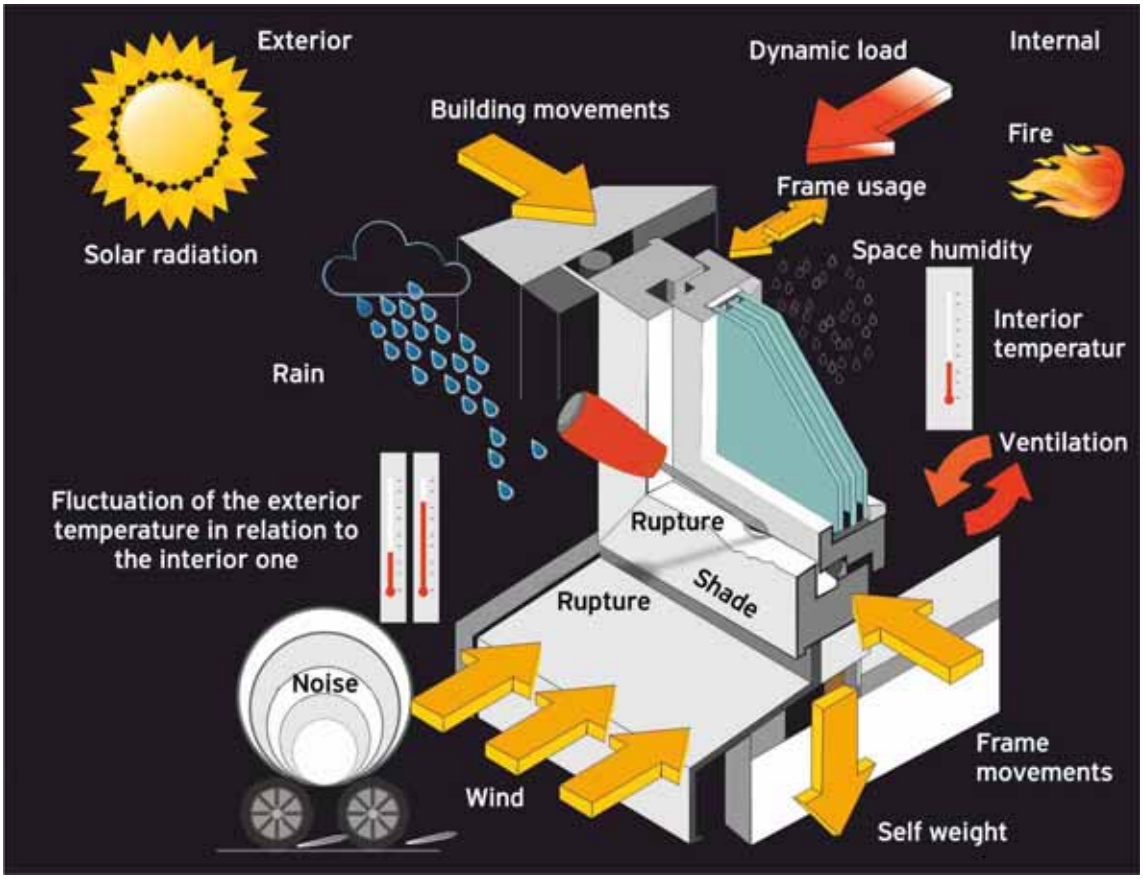
Incorrect installation of the frames on the structural elements means incorrect estimation of the parameters of the building, the frame, the transport and the management, more precisely:

1. Incorrect transport and deposition at the installation site.
2. Incorrect leveling /glass shiming of the frame.
3. Incorrect selection of anchors and wrong mounting position.
4. Incorrect selection and placement of sealing materials.
5. Incomplete customer information on operation and maintenance.

When one of the above 5 steps is not performed correctly, there is wrong application of the frame on the building, that is rupture of a link in the installation chain.

1.2 Forces acting on frames

Many forces are exerted on the frames on three levels, exterior, interior and at the frame level, as shown in Figure 1.2



Forces acting on frames
Figure 1.2

At the time of installation of the frames on the structural element, the installer must follow the instructions in order to anticipate all the above forces.

1.3 Frames installer

The CE marking does not cover the installation of the frames but according to the standard ELOT EN 14351-1 the manufacturer of the frame must provide information on the following:

- Storage and management of the manufactured product (if he does not carry out the installation himself).
- Requirements and installation techniques at the project site (if he does not implement the installation himself).
- Maintenance and cleaning.
- End-user instructions, including instructions for replacing components.
- Instructions on the safe use of the product.

2. Frame categories

This application manual refers to the following categories of frames as defined in ELOT EN 12519 standard.

The following frames are not included:

1. Doors (ELOT EN 14351-1).
2. Shading systems of all types (shutters, rollers, etc.) which are not an integral part of the window.
3. Windows with performances against fire and/or smoke (ELOT EN 16034).
4. Glass panels (ELOT EN 13830).
5. Anti-theft elements.
6. Anti-ballistic elements.
7. All frames with an angle >15°.

3. Dictionary

- **Frames installation:** mounting
- **Structural elements:** masonry, hollow beams, coating, etc.
- **Window:** opening of the structural element that allows light and possibly air to pass through.
- **Door:** opening to the structural element that allows light to pass through and allows access to adjacent space.
- **Sliding Folding Frame:** Bellows
- **Anchors:** plugs - mounting screws
- **Fore-frame:** Sub frame
- **Frame installers:** mounters
- **End user:** Civilians, manufacturers, public sector, etc.
- **Doorstep:** Low bottom profile of entrance door/kitchen door
- **Sill:** Normal lower profile of balcony / kitchen door
- **Vertical elements:** uprights, vertical Tee elements
- **Horizontal elements:** trusses/ horizontal Tee elements
- **Dew:** Liquefaction of vapors
- **Installation lamina:** Metal sheet plate (Anchor brackets)

4. Teams involved

There are five different professional groups involved in the construction chain.

1. Architects / civil engineers
2. The contractors / manufacturers
3. The creators of the systems
4. Frame fabricators
5. Frame installers

Many times the fabricators of aluminum frames install them on the buildings and therefore deal with both the construction and the installation of the frames.

The involvement of each crew in the relevant work, from the design to the delivery is listed in Table 4.1

Person involved / Work	Architect - Designer	Manufacturer - Subcontractor	Systems' creator	Frames fabricator	Installer
Design – application of the law	✓	✓	✓	✓	✓
Procurement of materials and implementation of construction works		✓		✓	✓
Production measures				✓	✓
Frame construction				✓	
Packaging – Transport at the project site				✓	✓
Procurement of installation materials				✓	
Fore-frame installation					✓
Frame installation					✓
Cleaning of materials at the installation site					✓
Leveling – glass shiming					✓
Support					✓
Sealing – Insulation					✓
System certificates			✓		
End product cleaning					✓
Good performance demonstration				✓	✓
Delivery	✓			✓	✓

Table 4.1 Teams involved in the implementation of the frames

4.1 Application types

Frames installation is performed in two different occasions:

1. On new buildings
2. In refurbishments

Table 4.2 presents the actions for each category.

Actions	New building	Renovation
Status assessment	The new construction avails all relevant technical specifications from the Architect - Engineer. Just follow these.	Usually, no drawings are provided. It is necessary to acquire the technical performance information of the infrastructure in order to use the appropriate materials.
Installation using the drawings	The construction details are provided by the Architect.	They must be designed from scratch.
Implementation	Implementation of the sealing-insulation study.	Creation of an ideal solution, which is applied on the existing materials of the structural element.

Table 4.2 Actions per building category

5. Frame performance certification

The application of the frames on the structural elements must support the qualitative evaluation of the frames at least in the basic type tests:

- Wind pressure resistance
- Waterproofing
- Air sealing

A failed or incomplete installation on the structural elements can negate the certified performance and consequently the quality of the frames. Also, the materials that will be used during the construction must be compliant in terms of mechanical and chemical properties with the aluminum and the structural elements, so that all elements cooperate with each other.

5.1 Wind pressure resistance

Depending on the wind pressure resistance category selected, the installation of the frame shall be performed using materials of corresponding strength. For example, for the installation of frames with resistance to wind pressure of category 1, the corresponding materials that can withstand a pressure of 400 Pa must be used. The table below presents the categories followed by an explanation of the limits and the test.

Wind pressure category	Certification pressures table		
	Distortion measurement pressure	Charge circles pressure	Structural control pressure
1	400	200	600
2	800	400	1200
3	1200	600	1800
4	1600	800	2400
5	2000	1000	3000

Deflection	Relevant deformation
A	<L/150
B	<L/200
C	<L/300

Wind pressure category	Relevant deformation		
	A	B	C
1	A1	B1	C1
2	A2	B2	C2
3	A3	B3	C3
4	A4	B4	C4
5	A5	B5	C5
Exxxx	Aexxxx	Bexxxx	Cexxxx

Table 5.1 A Wind pressure tests

- A, B, C: Various deflection categories where A= l/150, B=l/200, C=l/300 (A=most flexible, C=most stringent)
- Each test starts with 50 charge cycles in a selected wind pressure category, continues with a steady charge (where the deflection is measured) and ends with 7 + 7 seconds of structural control at positive and negative pressure
- The pressures at which the above tests are performed depend on the category selected

For example, Wind Pressure Category C4 means that:

- The deflection has been measured using type l/300
- The frame was subjected to a pressure of 1600Pa (when the deflection was measured)
- The frame was subjected to 50 pressure / suction cycles at 800Pa
- The frame was subjected to 7 seconds of pressure at 2400Pa followed by 7 seconds of suction at 2400Pa to verify structural stability

The wind is the main load of the frame and the loads are provided in the next table.

m/s	Km/h	Pa	Beaufort
8-10.7	29-38	40-72	5
10.8-13.8	39-49	73-119	6
13.9-17.1	50-61	120-183	7
17.2-20.7	62-74	184-268	8
20.8-24.4	75-88	269-373	9
24.5-28.4	89-102	374-505	10
28.5-32.6	103-117	506-665	11
32.7-36.9	118-133	666-853	12
37.0-41.4	134-149	854-1060	
41.5-46.1	150-166	1070-1320	

Table 5.1B Wind Category

In Greece, a maximum wind force of 130-140 km/h, i.e 110 Kg / m^2 has been recorded.
When the construction is large and on a floor above ground level, the load resulting from an earthquake should be taken into account; this is calculated based on the anti-seismic design of the frame, EAK 2003 ((0.4/q)*Q/m^2). The total load is 1.5KN/m^2 that is 150 Kg/m^2

5.2 Waterproofing

In the case of waterproofing, two cases are examined. In case A the frame is exposed to weather conditions, while in case B it is protected.

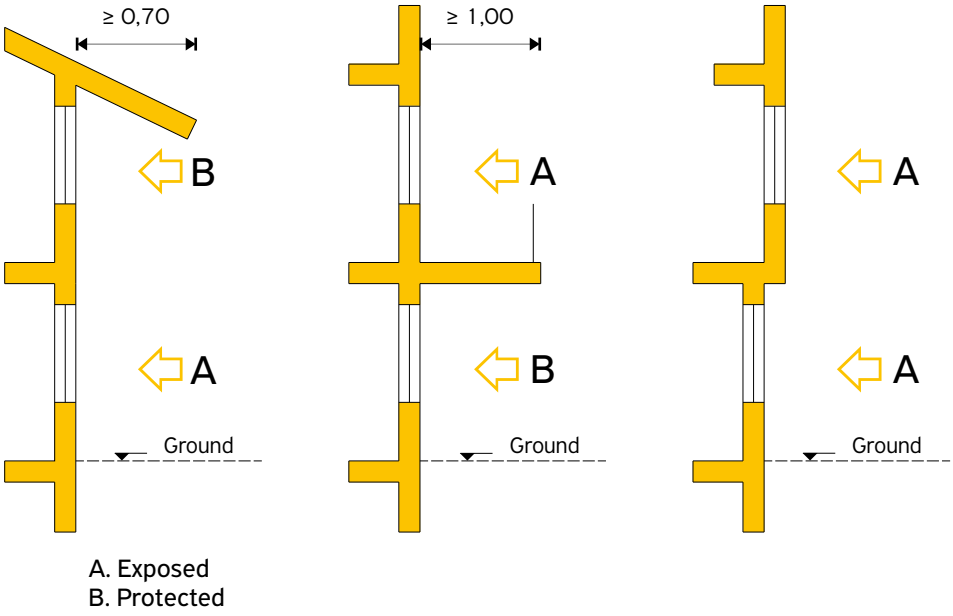


Figure 5.2 The two cases of waterproofing study

The test commences by soaking the sample at zero pressure for 15 minutes.
Then spraying continues increasing the pressure every five minutes.

CATEGORY (EN12208)		TEST PRESSURE (Pa)	SPRAY TIME (min)
1A	1B	0	15
2A	2B	50	20
3A	3B	100	25
4A	4B	150	30
5A	5B	200	35
6A	6B	250	40
7A	7B	300	45
8A	8B	450	50
9A	9B	600	55
EXXX	EXXX	>600	60
		AT +150 Pa STEPS	AT +5min STEPS

Table 5.2 Waterproofing Tests

5.3 Air sealing

The purpose of the air sealing test is to measure the air losses through the frame at various pressure conditions, which are proportional to the wind speed. This practically means that when a frame can withstand high pressures it will behave better at high wind speeds. The frame air sealing test measures the following:

- Its total surface.
- The joints.

From the comparison of these two, the final classification arises. If the classes in the two categories are adjacent, then the window receives the most favorable classification. If they have a difference of two classes then the window receives the middle class.

5.4 Certification of application to a building (Blower door test)

Using the on-site performance measurement system, there is also measurement of the performance of the installation joints, and therefore of the quality of installation of the frame on the structural elements. The end user can thus confirm whether the installation of the frame complies with the certification or not.

Figure 5.4 Blower door test

6. Factors affecting the installation of frames

The selection of the installation site and materials to be used when installing the frames on the structural element depends on eight key factors:

1. Frames installation site on a building.
2. Soil category.
3. Building usage.
4. Frames material.
5. Frames typology.
6. Structural element type.
7. Installation point on the structural element.
8. Building orientation.

6.1 Frame installation sites on a building

The location of the frames on the building is of great importance for the stress it receives from natural phenomena. Installation under a large terrace and in a recess is the best place to protect the frames, as opposed to installation on a facade without protection. There is a way of certification for both cases.

Figure 6.1 Frames installation sites

6.2 Soil category

The location of the building is also important, that is whether it is located on a mountain or by the sea. By the sea, the choice of application materials is different from that of a mountain site.

Figure 6.2 Building location

6.3 Building usage

The use of the building affects the load of the frames with different forces.
For example, the frames on public buildings with air conditioning receive the greatest stress, while the craft or industrial buildings, given that they do not have large temperature differences internally and externally, do not stress the frames too much. The choice of materials for sealing on the interior side is very important, as temperature changes affect the displacement of gas masses from outside - inside and vice versa.

Figure 6.3 Buildings with different uses

6.4 Frames material

The material from which the frames are made shapes the way of fixing, in relation to the support distances, the insulation, etc.

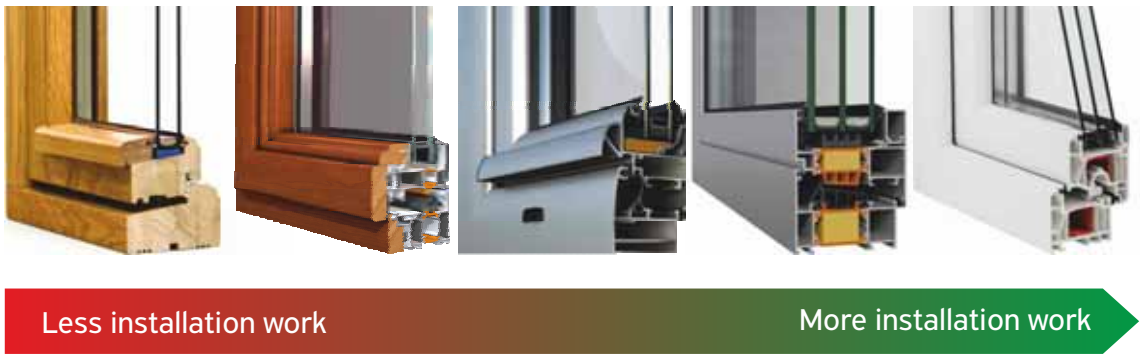


Figure 6.4 Frames with different materials.

6.5 Frames typology

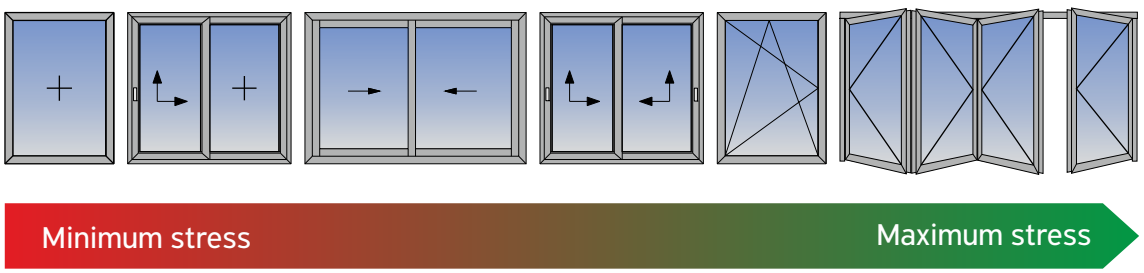


Figure 6.5 Typologies

6.6 Structural element type

The category of masonry also influences the selection of supports, with emphasis on the type of plug and the depth of anchorage.

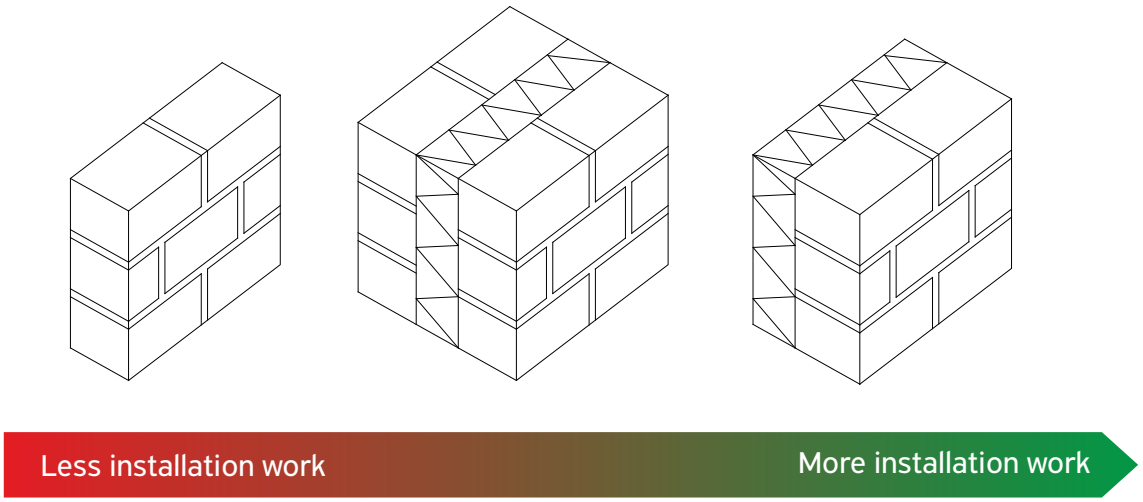


Figure 6.6 Masonry category

6.7 Installation point on the structural element

In addition to the material that constitutes the structural element, the location of the frames on the element is also important. The installation of the frames affects the isothermal lines, and consequently the possibility of mold formation.

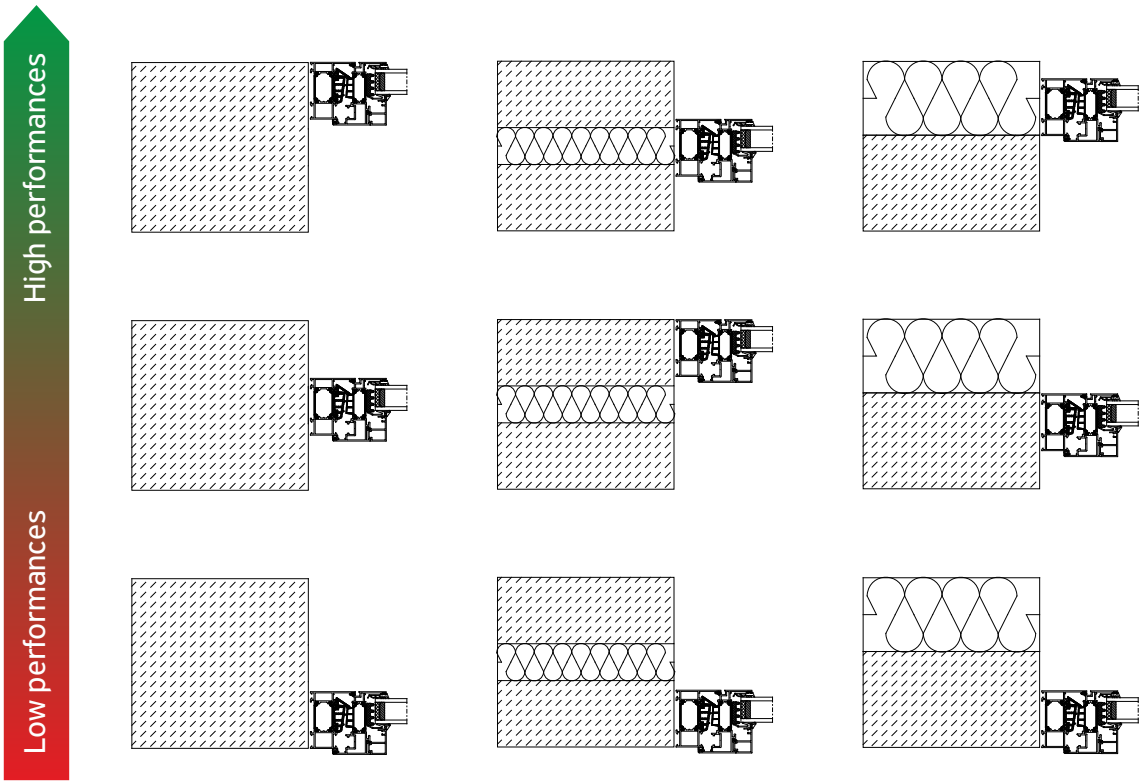


Figure 6.7 Different positions of the frame on the structural element.

6.8 Building orientation

The orientation of the building affects the amount of sunlight, the amount of wetting, the thermal stresses as well as the sealing capacity of the windows.

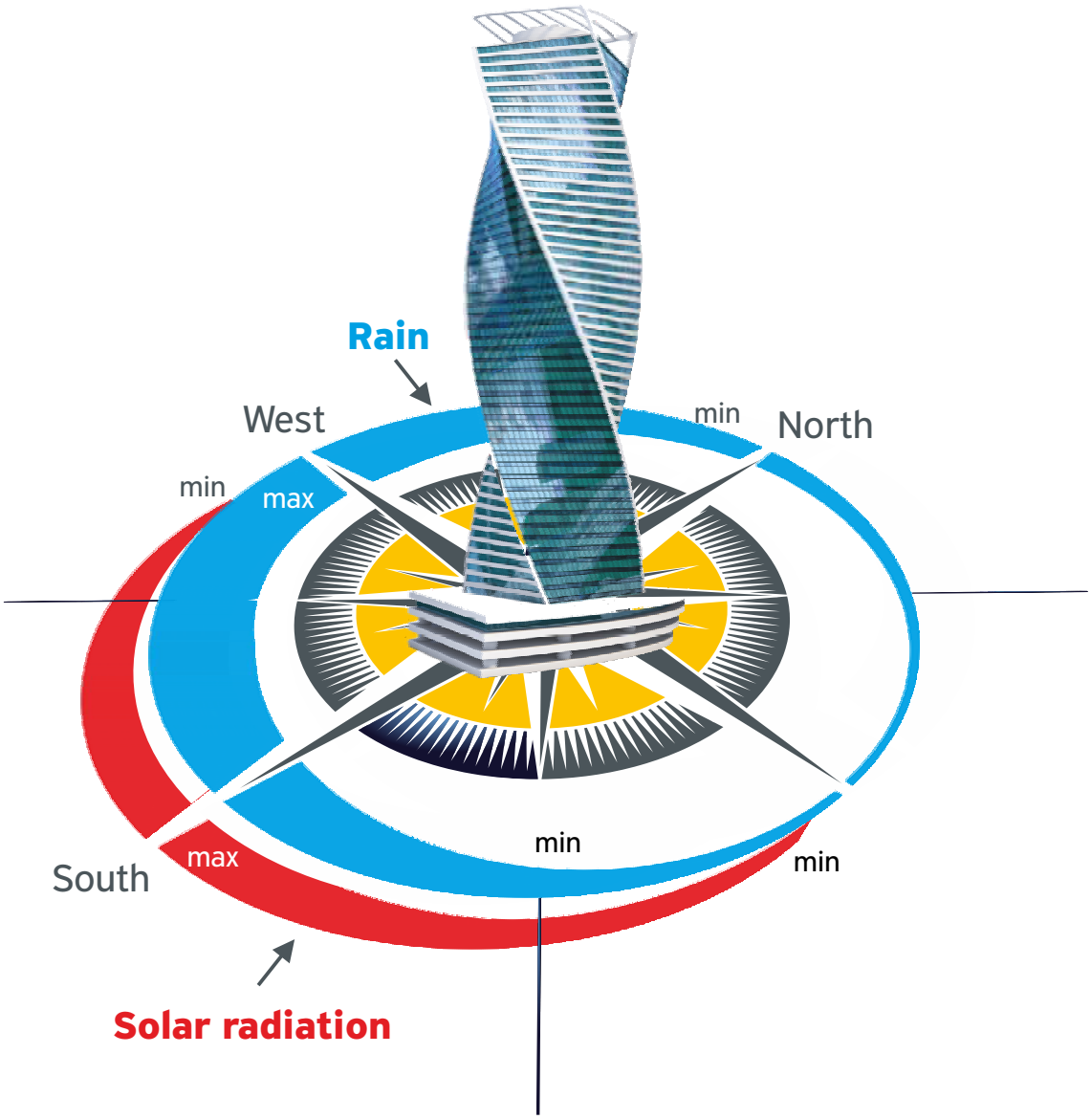


Figure 6.8 Building orientation

7. Frames storage and transport

7.1 Introduction

According to ELOT EN 14351-1 standard the manufacturer is responsible - if he is not the installer - to provide information on the following:

/

/

/

/

7.2 Frames storage and transport at the project

The transfer of the frames and the work at the construction site must be accompanied by the relevant safety precautions based on the provisions of **P.D. 305/1996** "Minimum Safety and Health Specifications to be applied on temporary or mobile construction sites in accordance with Directive 92 / 57EEC" (Government Gazette 212 / A / 29-8-96).
The transport of the frames must be performed considering the safety of both the workers and the goods using special metal cases with protective materials per frame and secure fastening.

The deposition of the frames at the construction site must also be performed in a safe manner, protecting both the frame and any attendants.

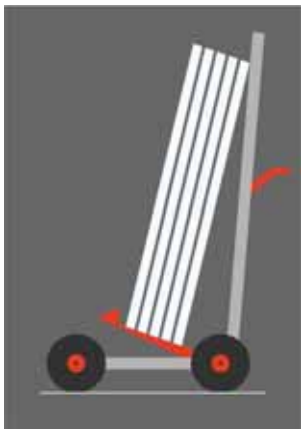


Figure 7.2
A Safe frames transport

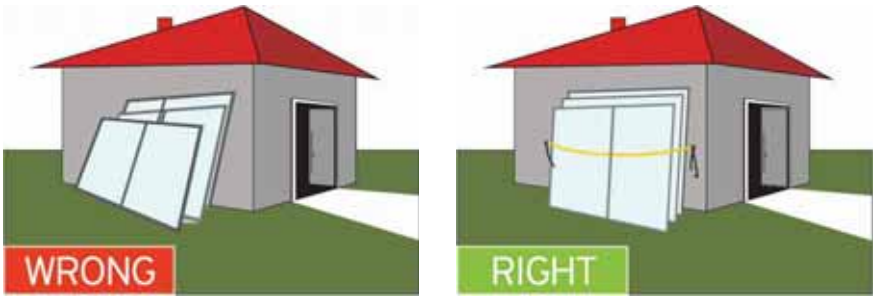


Figure 7.2B Safe deposition of frames

8. Frames installation

8.1 Tolerances - Measures

8.1.1 Theory

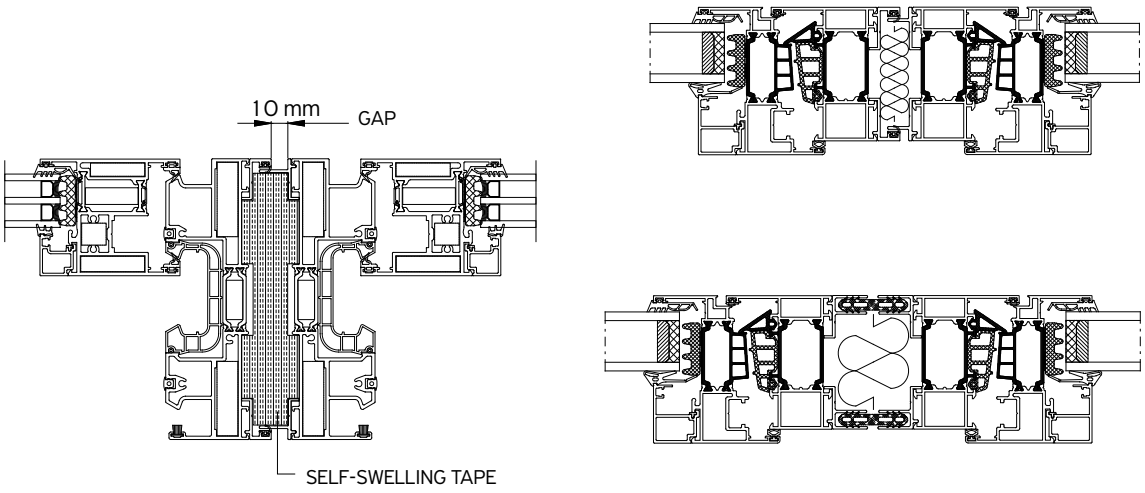
The temperature variations and movements of the structural elements of the building, require specific tolerances between the frames and the structural element. The following table uses the linear expansion coefficient of three basic materials for a difference of 50°C, that is from -10 °C to +40°C and for one meter of length.

Profile material	a	Δl (mm)
Aluminum	$24*10^{-6}$	1,20
Wood	$5*10^{-6}$	0,25
Iron	$12*10^{-6}$	0,60

Thermal expansion coefficient (a) and linear expansion in mm for temperature difference 50°C for one meter profile length

Table 8.1.1 Linear expansion coefficient

It is noted that 1m of aluminum has a difference of 1-2mm between winter and summer. Reinforced concrete structures also have a 0.5mm difference. Therefore, when calculating the production measures of the frames, there must be subtraction of the foreseen tolerances. In continuous dimensions greater than 6m there must be usage of expansion joints, i.e. independent frames.



Drawing 8.1.1 Various types of vertical joints on frames.

8.1.2 Example based on tables

The table shows the gap (joint) that must exist between a structural element and the frames:

Profile material	Gap (Joint) per frame size			
	< 1.500 mm	1.500 - 3.000 mm	3.000 - 4.000 mm	> 4,000 mm
Aluminum	10 mm	10 mm	15 mm	20 mm

Table 8.1.2 Gap between the structural element and the frames.

It is noted that for aluminum frames up to 3m wide, the manufacturer must ensure a peripheral tolerance of at least 10 mm on each side.

8.2 Leveling – glass shiming

8.2.1 Frames leveling

In order for the frames to work properly, they must be leveled on all three axes: vertically, horizontally and laterally. Vertical and horizontal leveling is performed by means of glass shiming the frame on the structural element.

Figure 8.2.1 Vertical and horizontal leveling

8.2.2 Frames glass shiming

8.2.2.1 Theory

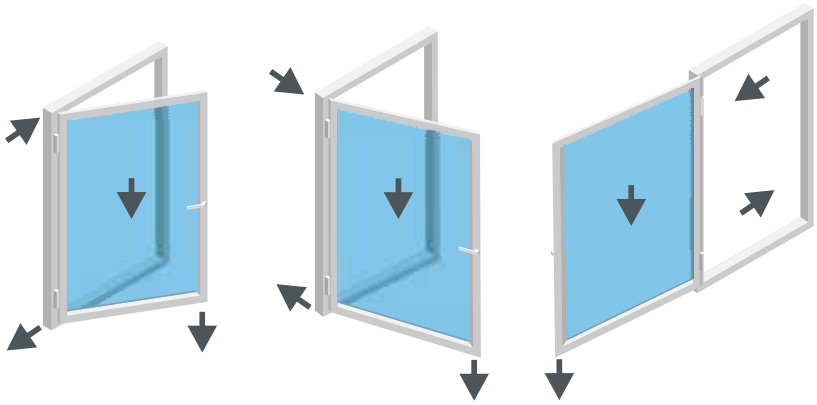
The glass shiming of the frames on the structural elements during the leveling process is based on the principle of transporting the mobile and self-loads of the structural elements to points where they can be absorbed-balanced, through the frame without the latter being deformed.

Before commencing the application of the frames on the structural element the following are necessary:

1. Clean the perimeter from material residues.
2. Check the dimensions of the frames in relation to the masonry (required tolerance).
3. Check the required materials for the installation.

8.2.2.2 Hinged frames

For the hinged frames the change of the load in relation to the position of the sash is a parameter very important for the positioning and method of placement of the glass setting blocks.



Εικόνα 8.2.2.2Α Μετατόπιση του φορτίου σε σχέση με την θέση του φύλλου

There is a different way of glass shiming of the frames for each frame typology.

The blue glass setting blocks are the ones that transfer the load to the structural element without deforming the frame

The yellow ones fill the gap so that the frame does not deform during mechanical fixing.

Pivot

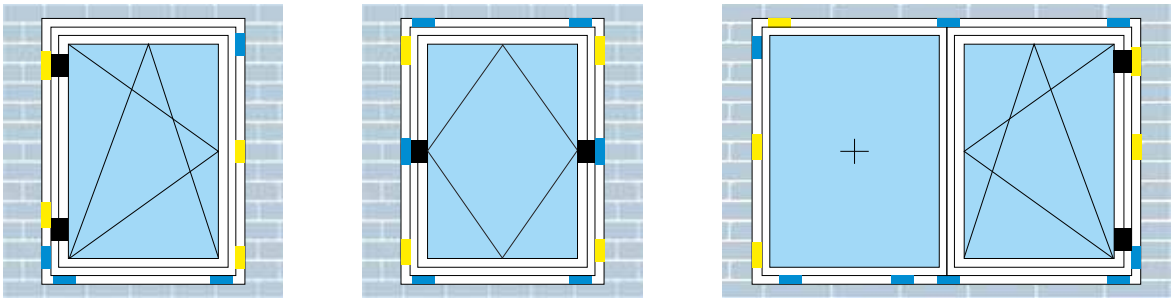


Figure 8.2.2.2.B Glass shiming

A setting block shall be placed at the bottom of the frame at a distance of 100-150 mm from the angles.
On the door, glass setting blocks are placed every 200mm on the sill due to changing loads such as the weight of the user.

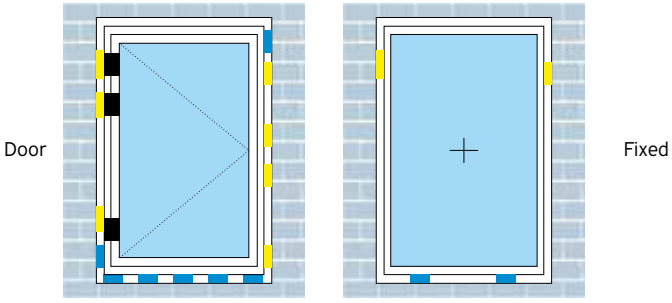


Figure 8.2.2.2C Glass shiming

8.2.2.3 Sliding frames

For sliding frames the principle is to transfer the loads to the floor, emphasizing on the two extreme positions of the sheet. Support chocks should be fitted where the rollers are located when the sheets are fully closed and fully open.

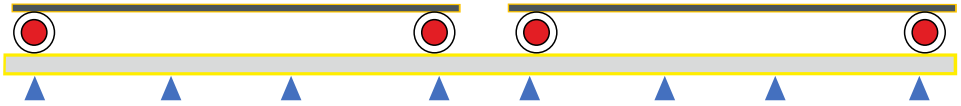
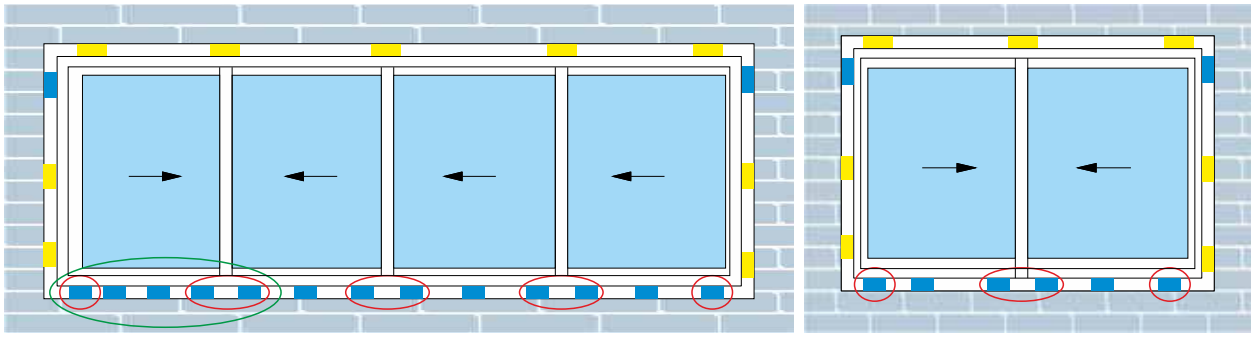


Figure 8.2.2.3 A Sliding frame glass shiming

For the remaining gaps, glass setting blocks are placed at a distance less than or equal to 400mm. Of course, the distance also depends on the cross section of the guide and the weight of the sheet.



Four horizontal sliding sashes

Two horizontal sliding sashes

Figure 8.2.2.3B Glass shiming at end positions

8.2.2.4 Folding sliding frame (Folding doors)

The proper operation of the folding sliding frame is primarily related to the correct glass shiming of the glass panels and the frame (with emphasis on the lower or upper track). The principle of glass shiming the frame is to place the key glass setting blocks where the loads of the sheets are transferred when the frame is closed.

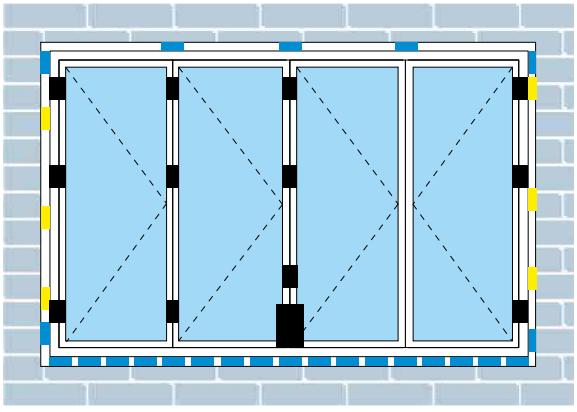


Figure 8.2.2.4A
Folding sliding frame glass shiming
with load on the lower track

In between, on the side where the doors are folded, glass setting blocks must be installed every 200mm, while in the remaining gaps every 350-400 mm.

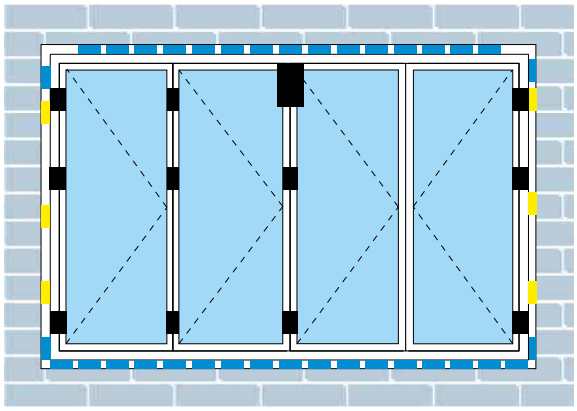


Figure 8.2.2.4B
Glass shiming of folding sliding frame with loads on the upper guide.

8.2.3 Frame fixing

8.2.3.1 Theory

The fixing of the frames is performed:

1. Directly to the structural element
2. On the fore-frame or sub frame

The fastening absorbs all acting forces which are:

1. Self-weight
2. Wind
3. Seismic stress
4. Handling

The fastening anchors aim to transfer all the calculated loads to the structural element. The basic principle is that the loads on the structural element are transferred through the vertical (Tee piece) and horizontal elements (trusses) to the frame.
In the image below, the red arrows indicate the points where initial fixing must be performed.

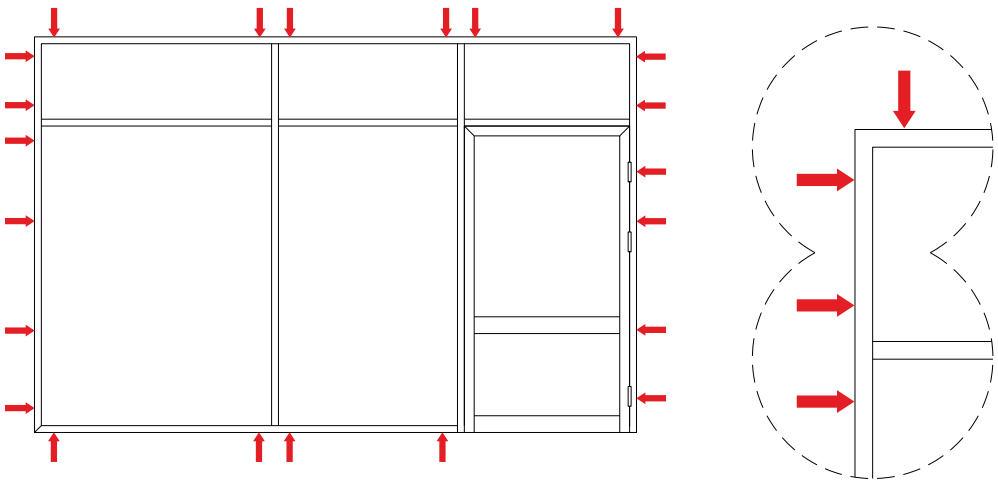


Figure 8.2.3.1A Fixing points

As shown in Figure 8.2.3.1A, anchors are applied, from the angles and every 100-150 mm on both sides and the remaining dimensions are distributed per a maximum distance of 800 mm.

Therefore, fixing is related to the following:

1. the typology of the frames
2. the size of the frames
3. the type of the structural element
4. wind conditions
5. the fixing sides of the frames

Figure 8.2.3.1B shows three different typologies with different dimensions. The installation of the anchors on the frame is performed on both sides of the angles of the frame. Then, the distances between them are divided by a maximum of 800mm.

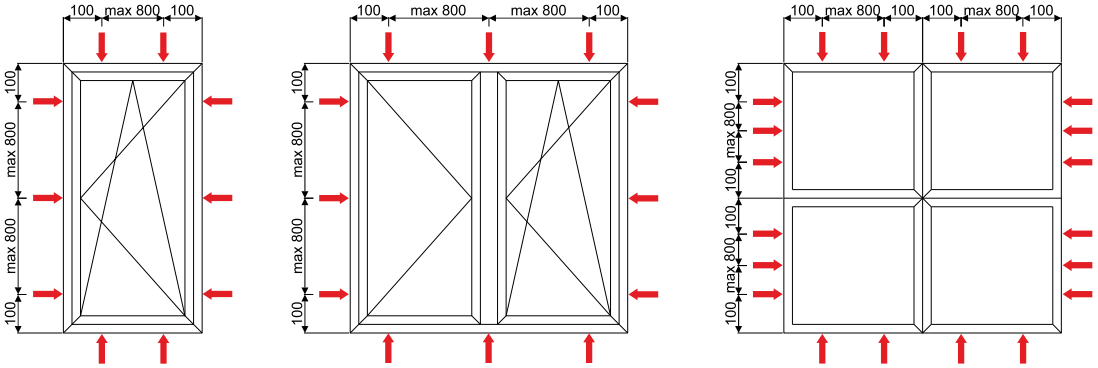


Figure 8.2.3.1B Installation of anchors using three different typologies with different dimensions

When applying the frames, the ideal case is to fasten the sill/ doorstep with a mounting plate as shown in figure 8.2.3.1C.

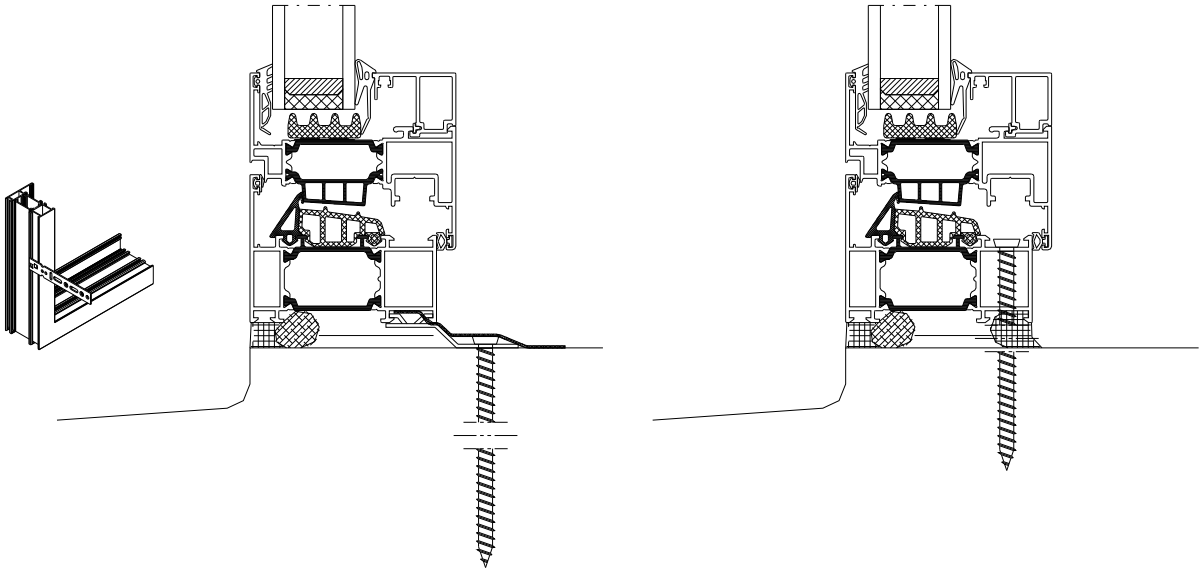


Figure 8.2.3.1C Mounting plate on the sill/ doorstep or direct screwing through the frame

This eliminates the possibility of water leaking from the sill/doorstep internally to the wall. The above application method presupposes the "construction of sill/doorstep" after the installation of the frames, as in figure 8.2.3.1D.

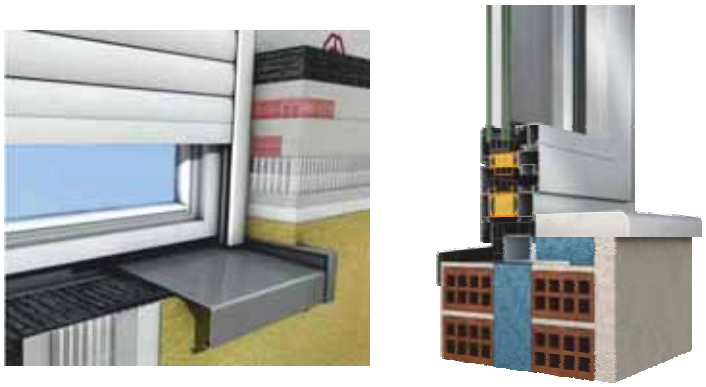


Figure 8.2.3.1D Installation of sill in the middle of the opening

When there is a roller built-in on the frames, usually frame fixing is performed on three sides, lateral and lower. Therefore the two sides at the top must receive an additional 2 screws per 150 mm from the angles towards the sill and then there must be implementation of the general instructions, as in figure 8.2.3.1E below.

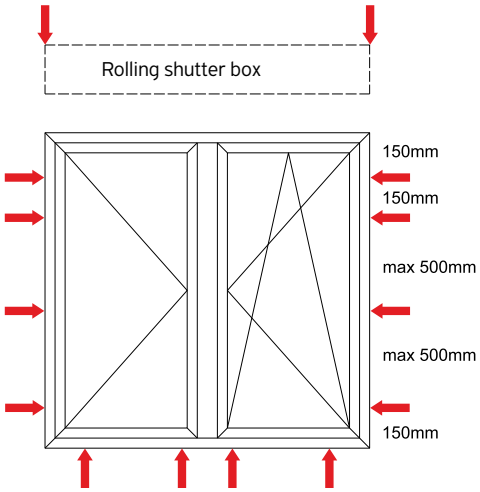


Figure 8.2.3.1E Tightening of a frame with Rolling Shutter

The category of materials in which the structural elements are built affects the way of fastening and the type of anchor used. Table 8.2.3.1G describes the different materials.

Figure 8.2.3.1G Structural elements materials

8.2.3.2 Anchors

The selection of the ideal anchor (diameter, length) and the quantity for fastening depends on the following:

1. the structural element type
2. the frames size
3. the frame cross-section
4. the installation location of the frames on the structural element
5. the fastening sides of the frame to the structural element

Figure 8.2.3.2A Different types of anchors

However, in addition to the shearing strength of the anchor, there should also be distribution of the forces on the structural element, per meter, so that there is no focal charging leading to cracks to the masonry or deformation of the frame. The number of anchors also depends on the fastening sides of the frame on the structural element, which can be 4, 3 or even 2 sides as in the picture below.

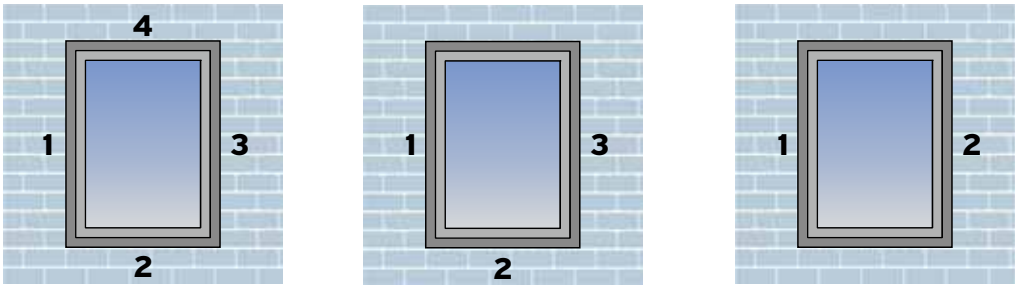


Figure 8.2.3.2B Fastening sides

The final number of minimum anchors used for fastening the frame will be the greatest number among the following:

1. The totality of necessary points based on the fastening rules provided in figure 8.2.3.1A for each frame and its typology
2. The minimum number of anchors obtained from the relevant table in Annex I, considering also the diameter of the anchor (screw) and the selected wind pressure.

Annex I, provides tables, as well as examples of calculating the required number of anchors needed depending on the typology and dimension of the frames.

8.2.3.2.1 Anchor length

In addition to the anchor pieces that must be used, there must also be selection of the appropriate lengths, depending on the type of structural element. The body is the part that penetrates the structural element as shown in Figure 8.2.3.2.1

The following figure shows the minimum penetration lengths of the anchor in the structural element.

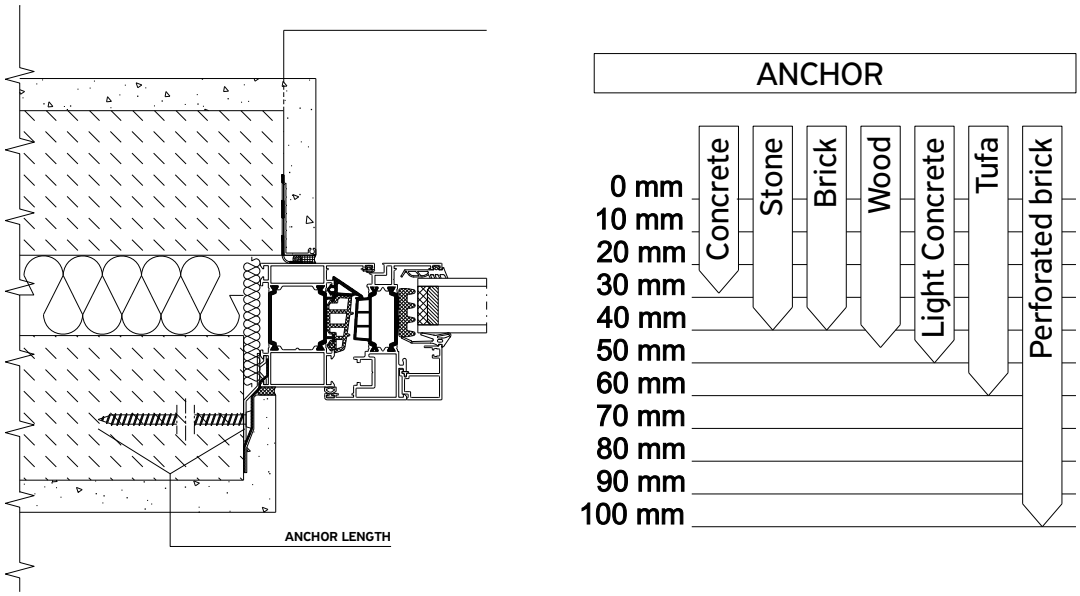


Figure 8.2.3.2.1 Penetration length depending on the masonry material

8.2.3.2.2 Anchor tightening

The anchor causes focal relief peripherally to the mass on which it is applied and therefore creates cracks. There are instructions on the distances to be complied with when fixing on the edge of the structural element and the basic rule is to observe a minimum distance of 1/2 anchor length from the edge.

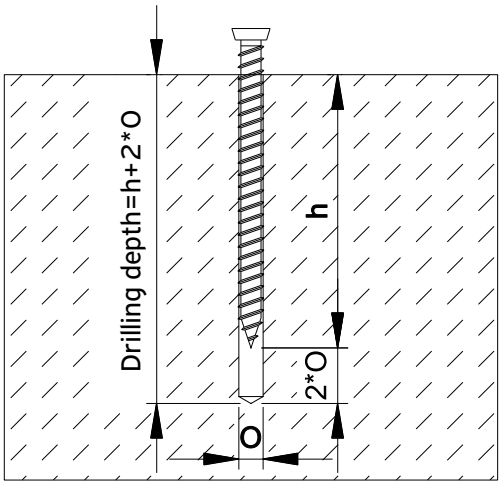


Figure 8.2.3.2.2 A Drilling length for fastening

It is also essential that the drilling depth is equal to the total length of the anchor plus 2 times its diameter, with a minimum of 10 mm as in Figure 8.2.3.2.2A.

For the perforated brick the anchor should penetrate at least 2 brick walls, vertically or sideways.

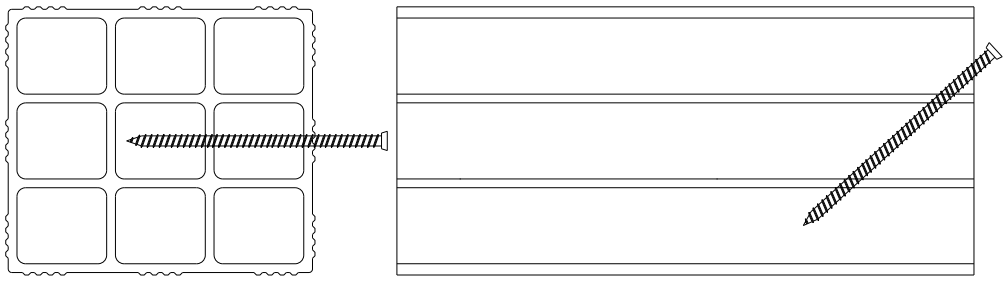


Figure 8.2.3.2.2B Fastening on brick

The drilling of the hole is performed through rotation and impact on concrete, stone and brick masonry, and through simple rotation on other materials. After drilling, the hole should be cleaned with compressed air and all debris must be removed. There are simple instructions that a frames installation crew can safely apply for minimum distances, as in figure 8.2.3.2.2C below, using the equilateral triangle rule. The equilateral triangle formed by the length of the anchor and the penetration depth must not protrude from a possible masonry edge nor must be insufficiently tightened.

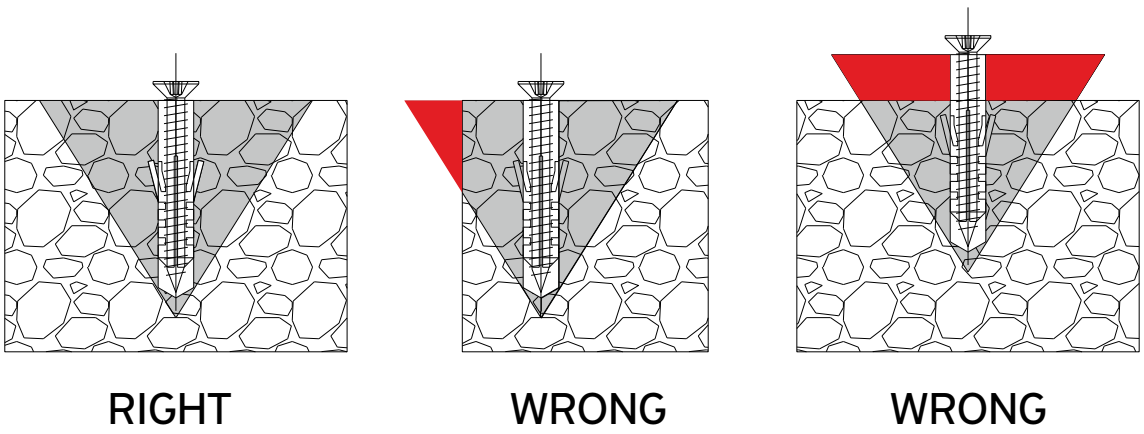


Figure 8.2.3.2.2C Equilateral triangle rule

8.2.4 Frame fixing

Depending on the window (sliding, hinged, folding) and the method the frame is mounted, the method of fastening to the opening is selected:

- Using metal anchor brackets or
- Using a special thermal insulation sub frame
- Or according to the specific instructions of the system manufacturer

In case we use Anchor brackets, there is direct tightening of the aluminum frame starting from the angles at a distance of 100-150mm and in between every 700-800mm on all sides.

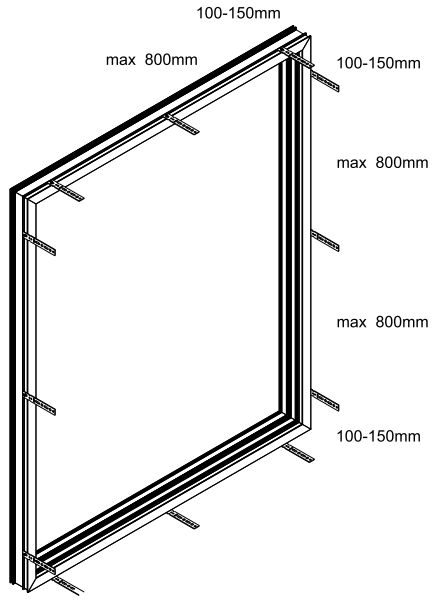


Figure 8.24A Fastening of anchor brackets

In case of usage of a special sub frame, this shall be glass shimed and fastened with appropriate anchors between or directly on the bricks or on aerated concrete.

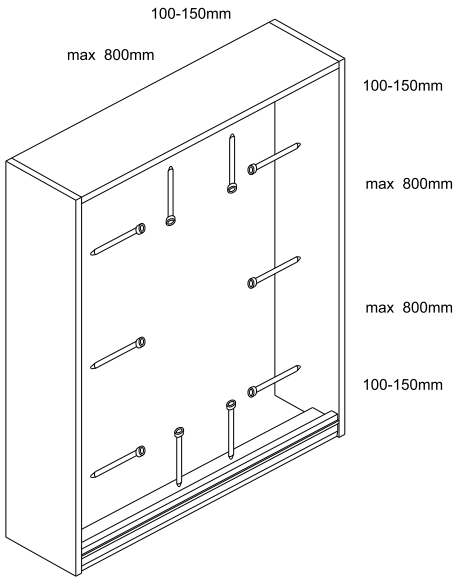


Figure 8.25B Sub frame fastening

9. Insulation – Proofing

9.1 Introduction

A frame features three insulation-proofing levels:

1. the inner level where airtightness takes place
2. the intermediate level where thermal insulation and sound reduction take place
2. the outer level, where waterproofing takes place

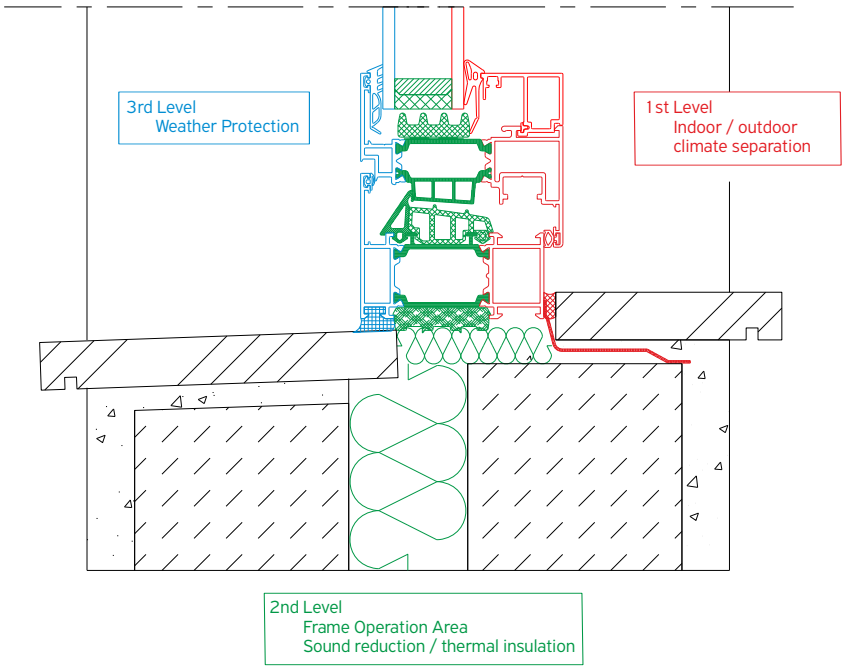


Figure 9.1A Levels of application of thermal insulation and proofing

Inadequate or poor thermal insulation as well as insufficient or poor waterproofing around the perimeter of the frame, creates a thermal bridge resulting in the accumulation of water vapors that lead to the formation of condensates.

Figure 9.2B Formation of condensates and mold

To avoid these phenomena, there must be application of protection measures using appropriate materials at the three levels of the frame.

9.2 Basic insulation - proofing principles

The basic principles of waterproofing are summarized in the following table:

INTERNAL WATERPROOFING	EXTERNAL WATERPROOFING
Warm air must be kept inside	Waterproof for rain
Humidity should only escape to the outside	Breathable sealants
Elastic waterproofing materials	Elastic waterproofing materials

Table 9.2 Basic proofing principles

There are two categories of materials used in different forms and with different chemical and mechanical properties:

- Waterproofing materials
- Thermal insulation materials

Waterproofing and thermal insulation processes require access to the surfaces between the frame and the structural element. In case of integration of a joint cover in the frame, it is not possible to apply sealing from the inside as there is no access.

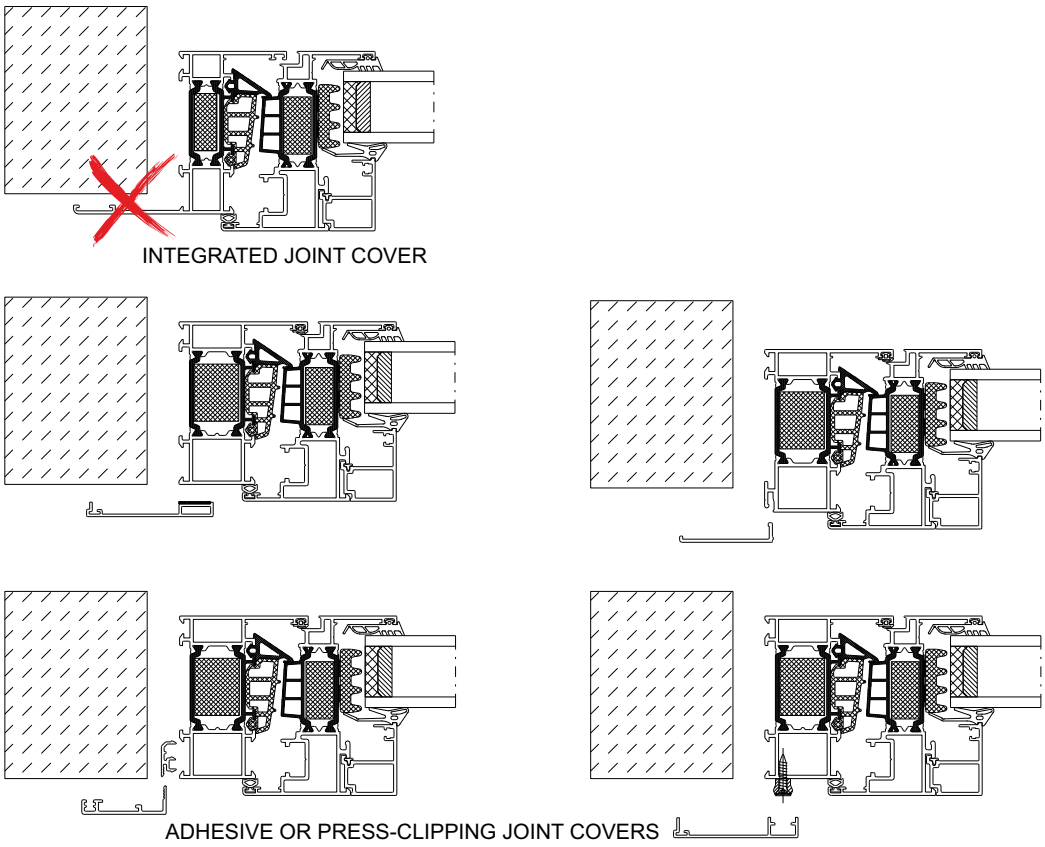


Figure 9.2 Different types of joint covers

In case the joint cover is clipped or adhesive, it is possible to apply sealing to the frames.

9.2.1 Sealants

Sealants prevent air and water from moving between the two levels - external and internal and are divided into four categories:

9.2.1.1 Self-expanding pre-pressed tapes

Self-expanding pre-compressed tapes are tapes that are permanently compressed when wrapped in a spool. When unwound and glued to the surface to be sealed, they commence their gradual decompression, filling the gaps encountered. With the pressure they exert on the walls, they ensure waterproofing against liquid element but at the same time they allow the escape of water vapors under the frame. They are also heat insulating and can replace the use of polyurethane if the application allows so.

The following table presents the technical specifications of pre-compressed tapes and their categorization:

Stresses	Category	
Stress type	BG1	BG2
Weather phenomena	Yes	No
Rain	Strong	Weak
Condensation	High	None
Ambient humidity	Long term	Long term
Wind force	Normal	Normal
Wind permeability 10 Pa	0,1 m^3(h m [dPa)"]	0,1 m^3(h m [dPa)"]
Joints waterproofing capability	600 Pa	300 Pa
Joints connection waterproofing capability	600 Pa	-
Heat resistance	From -20° to +60° C	From -20° to +60° C
Humidity resistance	To be detected	-
Compatibility with other construction materials	Up to 80° C	Up to 60° C
Fire resistant as per DIN 4102	B1	B2
Sealing category for vapor diffusion	100	100

Table 9.2.2.1 Categories of sealant tapes and self-swelling materials (DIN 18542:2009)

9.2.1.2 Sealing tapes

Tape sealants are very practical in their application as they also cover the gaps between the frames and the wall. For easier use, they are available in different colors - pink for indoor use and white for outdoor, while there is a category that has the same color for indoor and outdoor use, for even greater convenience for the constructor. Table 9.2.2.1 applies

9.2.1.3 Liquid sealants

In order to apply liquid sealants, these must be compatible with the adjacent materials and the surface must be properly prepared. The dimension and depth of the joint on which they shall be applied must also be defined.

In order to choose a waterproofing material there must be consideration of certain parameters such as:

- The elastic model of the material
- The chemical compatibility with adjacent elements
- The resistance to natural elements
- The mechanical deformation

Liquid sealants can be separated based on their chemical composition, elasticity or deformation, and are determined by all such properties:

A. Categories of sealants based on chemical composition
   - Acrylics
   - Polysulfonates (for glazing)
   - Polyurethanes
   - Silicone (Acidic or Neutral)
   - Hybrids

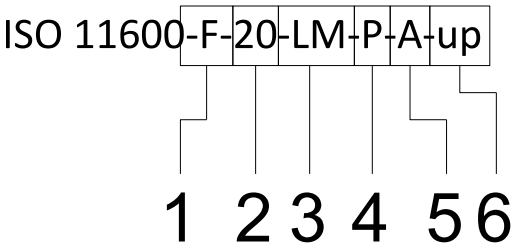
B. Categories of sealants based on elasticity
   - Low elastic model -LM, that is they deform very much <0.4 N / mm^2
   - Medium elastic model -MM between 0.4 <0.6 N / mm^2
   - Large elastic model -HM, that is they deform slightly> 0.6 N / mm^2

C. Categories of sealants based on deformation
   - Elastic - no deformation remains and returns to the original form more than 40%
   - Plastic - Deformation remains and are restored to less than 40%

Restoration	Category Sealant
>70%	Elastic
>40%<70%	Elastic-plastic
>20%<40%	Malleable-plastic
<20%	Plastic

Table 9.2.1.3A Materials deformation

Based on the international standards for the insulation-waterproofing of the structures (ELOT EN ISO 11600 & ELOT EN 15651-1) the label includes 6 specific parameters which characterize the material:



Example of material specification

1. The first digit indicates whether it concerns glass or another material. The letters are: G for glass or F for other materials – including frames
2. This is followed by a number indicating the shifting capability category (contraction & expansion) for the material, which is a necessary precondition for all materials. The following table presents the relevant categories:

Category	Elasticity range %	Shifting capability	Implementation
25	± 25	25,0	G & F
20	± 20	20,0	G & F
12,5	± 12,5	12,5	F
7,5	± 7,5	7,5	F

Table 9.2.1.3B Materials elasticity range

3. The above is followed by a pair of digits concerning material hardness: **LM**=Low Modulus ή **HM**=High Modulus
4. The next digit denotes material deformation: **E**=elastic or **P** = plastic
5. The fifth digit indicates the material on which the sealant is applied: **M**=plaster, **G**=glass panel, **A**=aluminum
6. The sixth digit indicates whether a primer is applied: **p** –primed or **up** – unprimed.

Example: ISO 11600-F-20LM-P-AUp, that is material also for frame/ category 20 contraction-expansion / small elastic model / low modulus/ use for aluminum / use without primer.

According to the standard ELOT EN 15651-1, which borrows many elements in terms of coding from ELOT EN ISO 11600, it is possible to find the following parameters on the label.

- **F = sealant for facade elements**
- **EXT-INT = external and internal application**
- **INT = internal application**
- **CC = suitable for cold climates**
- **LM-HM = Low Modulus or High Modulus**

Coding example according to ELOT EN 15651-1: Type F-EXT-INT CC, CLASS 25LM, that is frame material / suitable for outdoor and indoor use / suitable for use in cold climates / contraction-expansion category 25 / low modulus

9.2.1.4 Butyl tapes

Butyl tapes are a very tight material with high mechanical strength. Due to this property, tapes are placed on the floor frame so that aided by the weight of the frames it achieves proper sealing.
They are applied after thoroughly cleaning the surface of the frame. After the removal of the adhesive tape the material is applied. It can also be applied using a Primer.

9.2.2 Insulation materials

Thermal insulation materials are materials that trap stationary air in their mass. The thermal conductivity coefficient (λ) of these materials is the indicator of their thermal insulation capacity. The lower the λ, the better the thermal insulation material. Thermal efficiency also depends on their thickness. The greater the thickness, the greater the thermal resistance offered by the insulating materials used.

9.2.2.1 Polyurethane foams

Insulating materials include polyurethane foams that are placed in the middle level of the frame operation. It is important to fill all the empty space behind the frame to avoid the movement of cold air. There are foams that have low swelling and others with a high one. For the installation of the frames, it is advisable to use low-swelling foams so that they do not exert deforming stresses. The expansion rate depends on the ambient temperature. The higher the temperature the faster the expansion.

Before use, it is necessary to thoroughly clean the area and use water in order to accelerate the formation of a skin and the maturation of the foam. The foam should not be exposed to UV sunlight. The purpose of the foam is to insulate the frame and not to support or seal it. For its application there should be a clearance between the frame and the masonry of at least 8 mm and its application is performed from the bottom of the frame upwards as in figure 9.2.2.1.

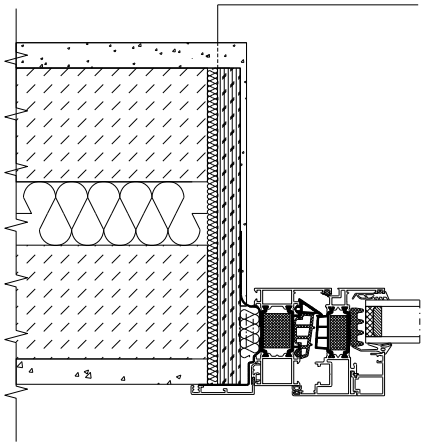
Figure 9.2.2.1 A Placement of polyurethane foam on the frame

If the foam is used for support the results may even be detachment of the frame due to wind loads as in the adjacent figure 9.2.2.1B

Figure 9.2.2.1B Improper material usage

9.2.2.2 Special wood heat insulation boards

Timber materials such as special OSB3 boards and plywood are an excellent choice as sub frames for thermal insulation and thermal break of the openings.



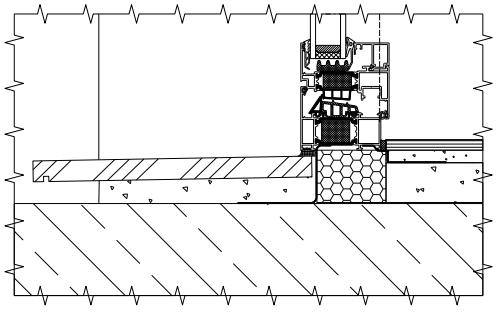


Figure 9.2.2.2 Use of OSB3 as a sub frame and polystyrene tape as a thermal break in the floor

9.2.2.3 Special polystyrene profiles used as sub frames

Special profile polystyrene sub frames ensure perfect cooperation with the window frame during installation. They create the necessary thermal break, achieving the best possible performance in insulation and the elimination of condensation that causes mold.

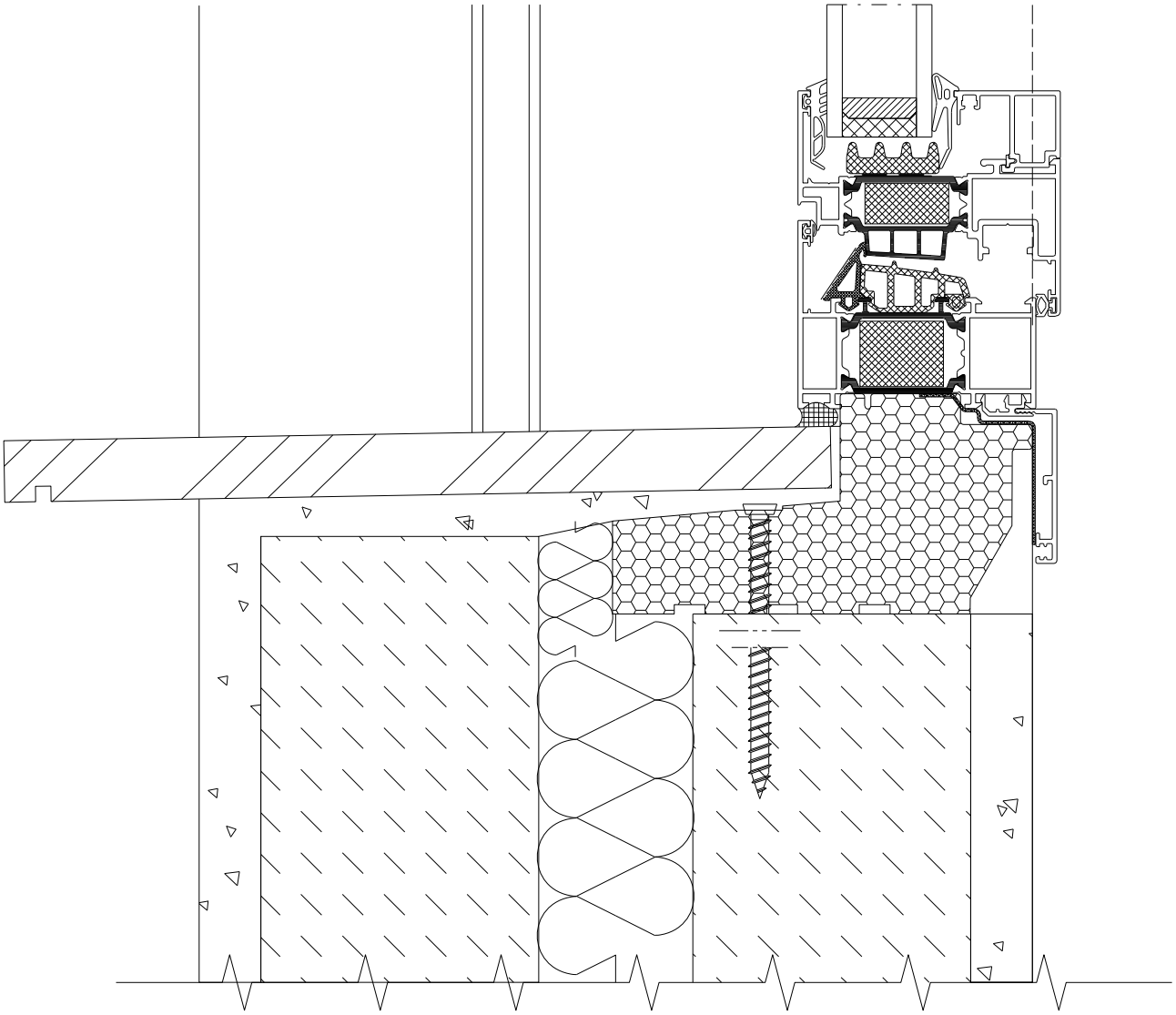


Figure 9.2.2.1B Use of sub frame made of special polystyrene profile for the installation of the frame

9.2.3 Joints

The shifting of the structural element due to contractions and expansions require proper joints-use of the materials. Applying correct jointing, prevents deformations and therefore the stressing of the frames by the structural elements. Also waterproofing materials can serve their purpose for decades without the slightest repair. The following figure shows the triaxial displacement of the frame in relation to its sub frame and the structural element where they are installed.

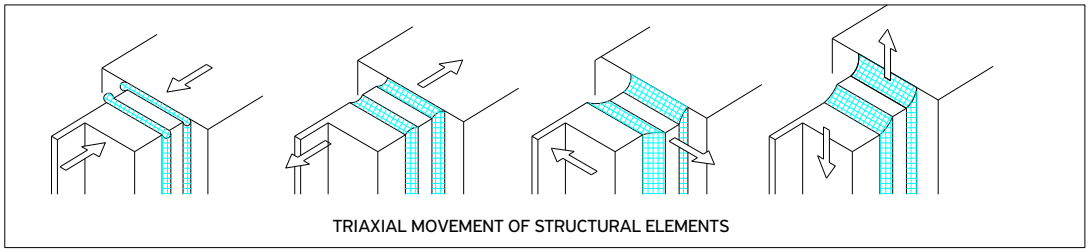
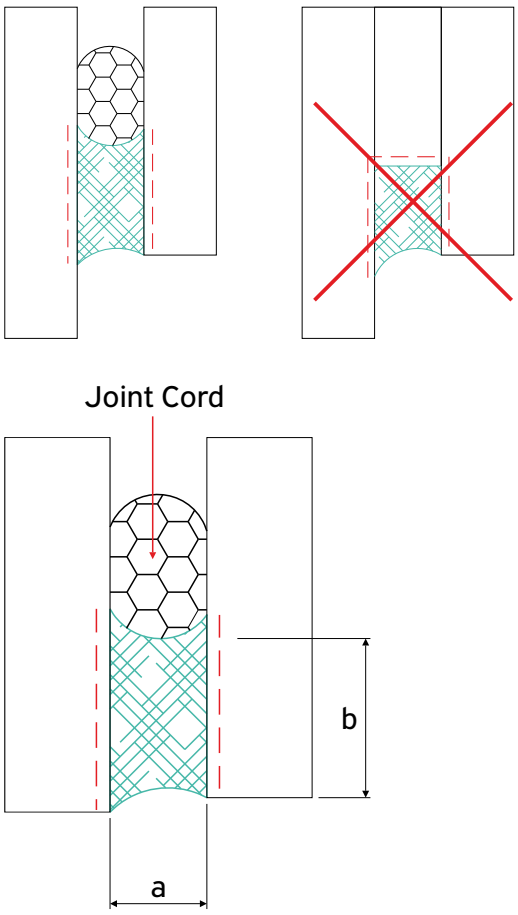


Figure 9.2.3A Elasticity of sealing and insulating materials

In order for a sealant such as silicone (outdoor use) or acrylic mastic (indoor use) to be able to receive shifts, the joint must have certain characteristics. As a rule of thumb, if a = distance between the frame and the wall, the thickness should be b = 2 x a



The sealant should adhere on two parallel surfaces and not on vertical ones. This is why a polyethylene joint cord must be placed before sealing. Polyethylene is a thermal insulating material that does not allow liquid sealants to stick on it. A hollow surface is created in the fluid sealing material when pressed on the joint cord. This results in proper bonding only between the frame and the wall. This joint will be able to operate without being cut for decades. In any case, before applying the sealant, it is necessary to thoroughly clean the application area. It is important to use special stainless steel trowels for compressing the material and layering and NOT the fingers as they have grease that destroys the consistency of the material. For acrylic mastics, compression and layering should be performed with a wet brush.

Figure 9.2.3B Proper Jointing and poor joint charging

10. Linear thermal loss coefficient (Ψ) and Relevant humidity (RH)

10.1 Linear thermal loss coefficient (Ψ) and $U_{w,installed}$

According to EN 14351-1 standard for CE marking, each window or door must have its thermal insulation coefficient Uw calculated according to its dimensions and glazing. The Uw coefficient is affected to the worst during installation of the frame and depending on the location of the frame and the masonry.

For each different installation method the corresponding linear heat loss coefficient (Ψ) has been calculated. This coefficient is calculated on the total thermal loss of the opening, reducing the performance of the window (U_w). The linear heat loss coefficient (Ψ) has been measured on each horizontal or vertical section of the installed frame. Thus, multiplying by the joint length it is possible to derive the linear loss of the installation joint. This loss is added to the originally calculated U_w and results in the final $U_{w,installed}$ coefficient which is always worse than U_w.

10.2 Relevant humidity (RH)

Condensation is the phenomenon that occurs when the humidity of the air is converted into water and adheres to the inner surface of the frame (sweating).

When the surface temperature of the frame is lower than the room temperature and the relative humidity in the room is high then condensation (sweating) occurs. Depending on the percentage of relative humidity in the room, it is possible for condensation to occur even at high temperatures.

Indoor air temperature	max humid.	DEW POINT (surface temperature) (°C)					
°C	g/m³	40%	50%	60%	70%	80%	90%
16	13,8	2,4	5,6	8,2	10,5	12,6	14,4
18	15,4	4,2	7,4	10,1	12,5	14,5	16,3
20	17,3	6,0	9,3	12,0	14,4	16,4	18,3
22	19,4	7,8	11,1	13,9	16,3	18,4	20,3
24	21,8	9,6	12,9	15,8	18,2	20,3	22,3

Figure 10.2 Dew point

Applying the rules, techniques and required materials presented in this installation manual, this phenomenon is limited and there is assurance of the following:

- quality of life to the user of the residence
- long service life of the frames
- the least possible burden on the heating costs of the residence.

The RH coefficient is the point above which the phenomenon of condensation begins inside the frame. When the relative humidity of the room exceeds the RH coefficient, then condensation is observed on the frame or the wall.

The goal of the best possible installation is to achieve the highest RH coefficient possible.

10.3 Hygiene Criterion (f_{RSI})

In a residence, if there is a lot of moisture, mold can appear. For reasons of hygiene and to prevent damage to the window, wall and waterproofing materials, the conditions that cause it should be avoided. This can be achieved if the internal temperature on the surfaces is above 13°C; a temperature below which there is activation of the mold-forming mechanism.

The f_{RSI} coefficient is between 1 and 0. When the lowest temperature on the surface of the frame or wall is the same as the indoor temperature (i.e. 20°C), then $f_{RSI}=1$ and this is the best value it can have. But only in theory. In practice it is impossible to achieve. Hence, attention should be paid so that f_{RSI} tends to be as close to the unit as possible and in any case not less than 0.7.

10.4 Measurement and comparison of various installation methods

In order to demonstrate the quantitative differences between the respective installation methods, below follow 10 installation scenarios of a specific frame. In these scenarios, the importance of the installation point of the window in relation to the masonry, as well as the use of insulation and appropriate installation materials are highlighted. These scenarios are presented in performance ascending order for the frame and can in no way be considered to cover all possible installation methods.

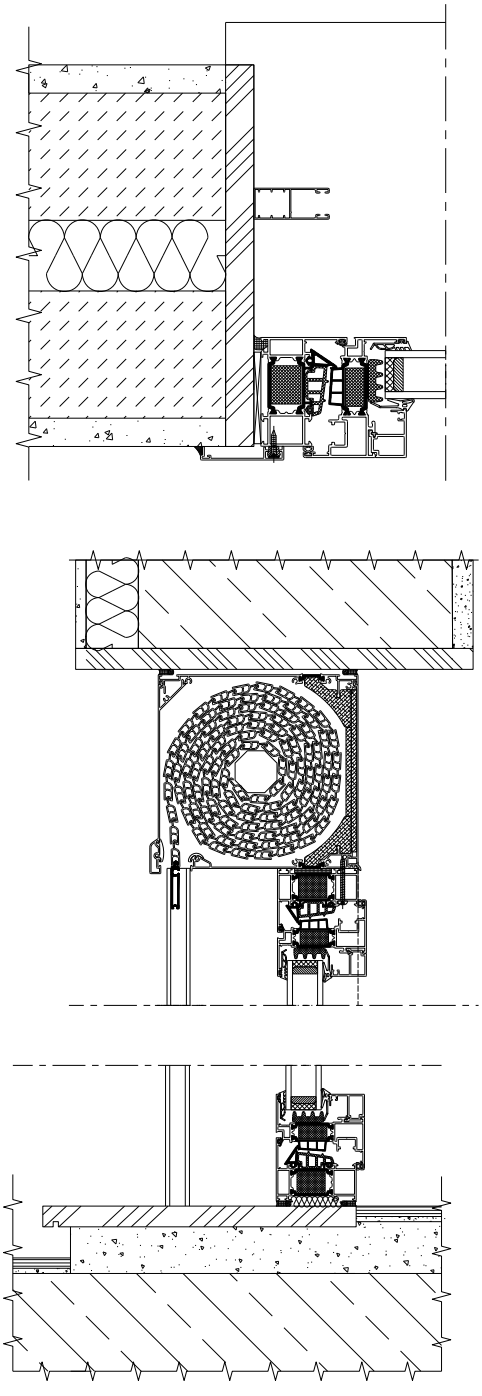
The measurements were made according to the standard EN10077-2. The standard defines an outdoor temperature of 0°C and an indoor temperature of 20°C.

Note: the frame system used as a reference is the S77 High version which has excellent thermal insulation. The use of less thermally insulating frames reduces the thermal insulation and increases the risk of condensation as it also reduces the hygiene criterion (f_{RSI}).

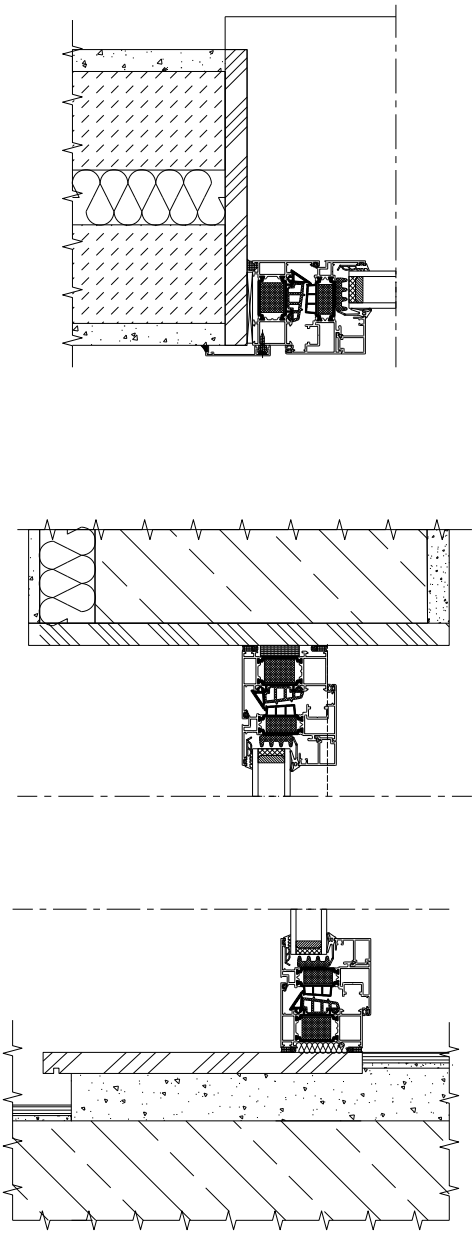
Σύστημα αναφοράς

System: S77 High Dimensions: 1000 mm x 2500 mm Glazing: $U_g = 1.1\ W/m^2K$, $\Psi_g = 0.11\ W/m$	
Thermal loss coefficient	$U_w = 1.43\ W/m^2K$
Thermal loss coefficient with built-in roller M13800	$U_{w,sb} = 1.47\ W/m^2K$

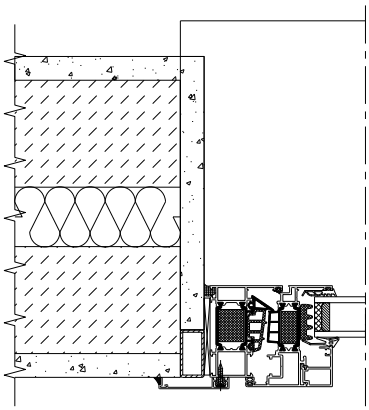
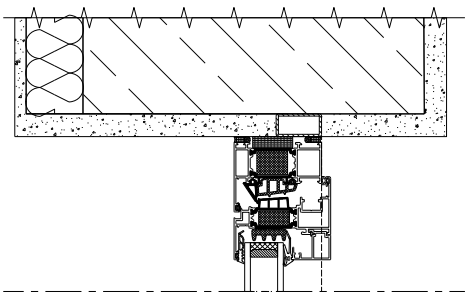
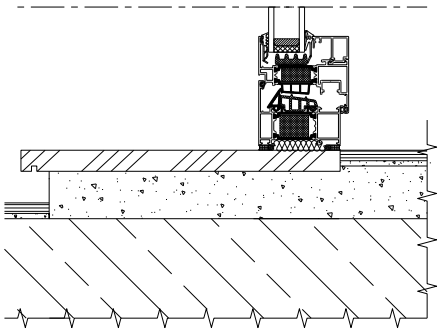
1st Installation scenario: Installation of a frame on marble finish at the inner edge of the opening, with a built-in roller and placement of the sill directly on marble.

% of U_w performance reduction	Installation sections	Conclusion
74%		Following calculation arises that **$U_{w,installed}$=2.56W/m²K, hence U_w is downgraded by 74%.** Installation of marble finish causes thermal bridging to the wall and the frame, resulting in low temperatures inside the resident and causing heat loss, condensation and mold

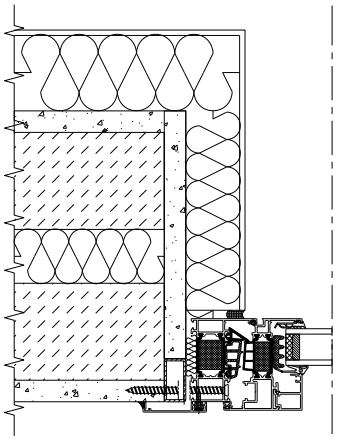
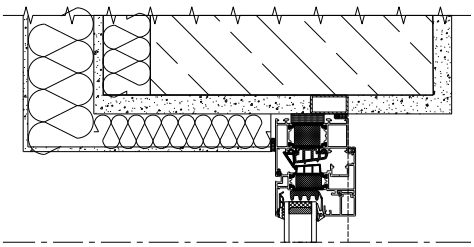
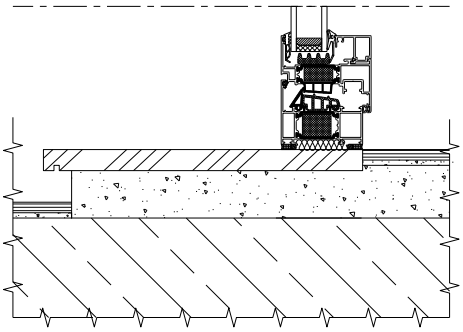
2nd Installation scenario: Installation of a frame on marble finish on the inner edge of the opening, without roller, without thermal break on the sill

% of U_w performance reduction	Installation sections	Conclusion
68%		Following calculation it arises that **$U_{w,installed}$=2.4W/m²K, hence U_w is downgraded by 68%.** Installation of marble finish causes thermal bridging to the wall and the frame, resulting in low temperatures inside the resident and causing heat loss, condensation and mold.

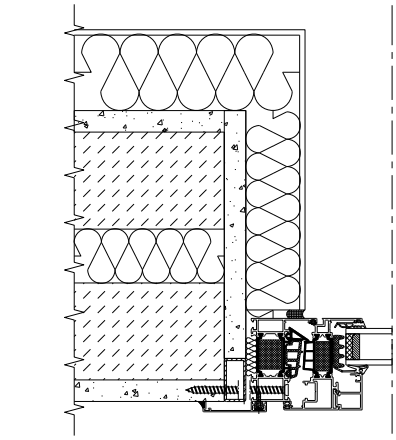
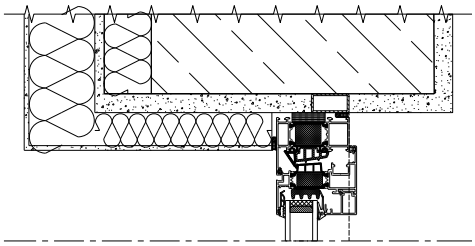
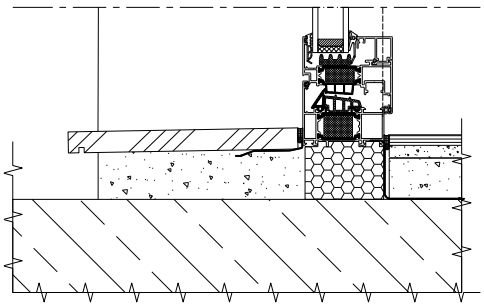
3rd Installation scenario: Installation of a frame on metal sub frame on the inner edge of the opening, without roller, without thermal break on the sill

% of U_w performance reduction	Installation sections	Conclusion
63%	  	Following calculation it arises that **$U_{w,installed}$=2.33W/m²K, hence U_w is downgraded by 63%.** The metal sub frame and external finish cause thermal bridging to the wall and the frame, resulting in low temperatures inside the resident and causing heat loss, condensation and mold

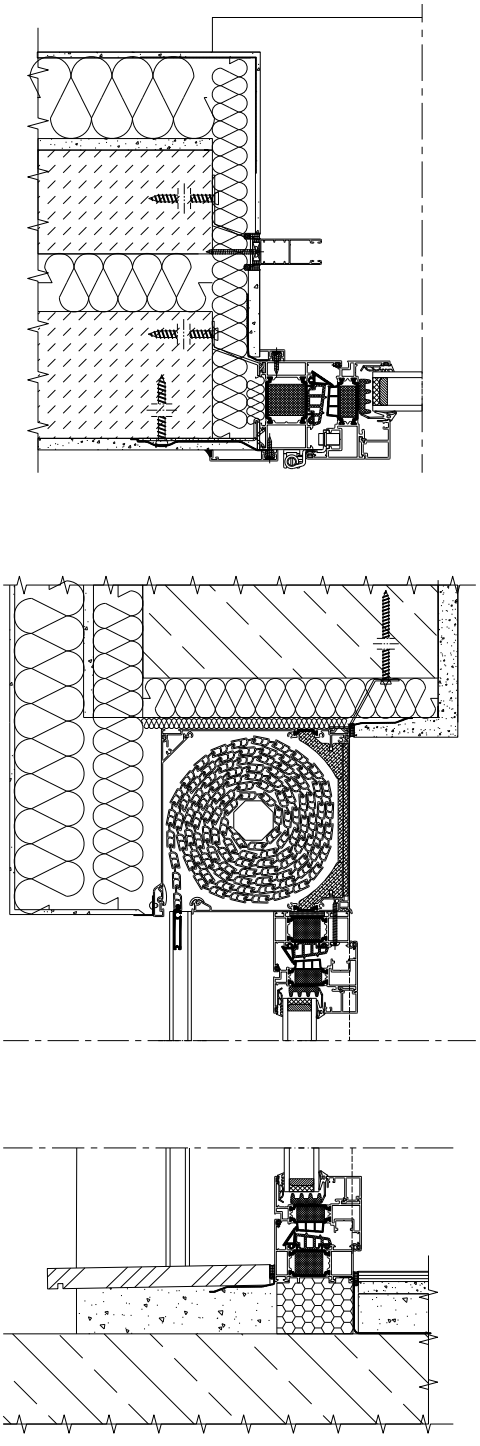
4th Installation scenario: Coating with heat insulating facade of a frame installed on a metal sub frame on the inner edge of the opening, without a roller and without thermal break on the sill

% of U_w performance reduction	Installation sections	Conclusion
36%	  	Following calculation it arises that **$U_{w,installed}$ = 1.94W/m²K, hence U_w is downgraded by 36%.** For this case, the construction of a heat insulating facade and its folding on the frame has the effect of reducing the thermal bridging and improving the heat losses, reducing condensation and mold formation There is a risk of condensation and mold formation in the interior floor due to thermal bridging on the sill

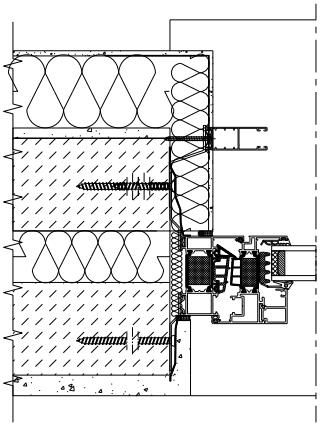
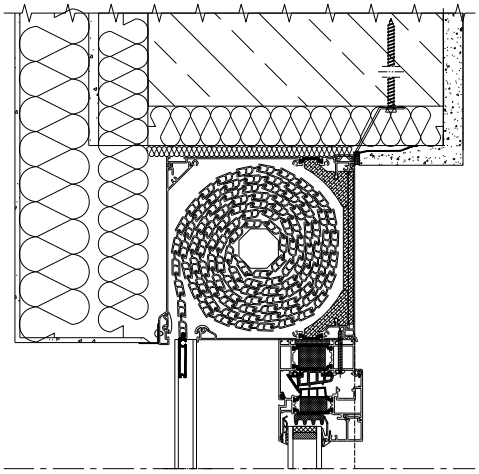
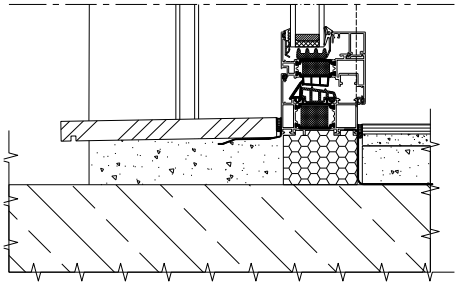
5th Installation scenario: Coating with heat insulating facade of a frame installed on a metal sub frame on the inner edge of the opening, without a roller, with thermal break on the sill

% of U_w performance reduction	Installation sections	Conclusion
32%	  	Following calculation it arises that **$U_{w,installed}$ = 1.89W/m²K, hence U_w is downgraded by 32%.** For this case, the construction of a heat insulating facade and its folding on the frame has the effect of reducing the thermal bridging and improving the heat losses, reducing condensation and mold formation It is recommended to remove part of the coating on the side of the sub frame and fill the empty space with polyurethane foam It is necessary to remove and reinstall the frame to create thermal break on the sill

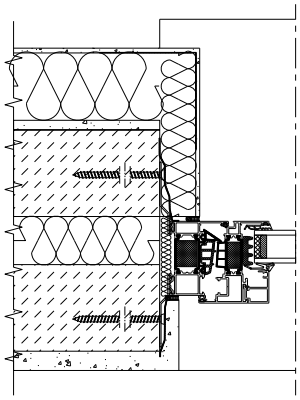
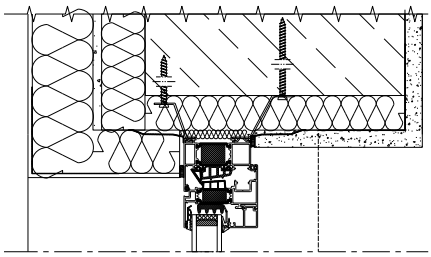
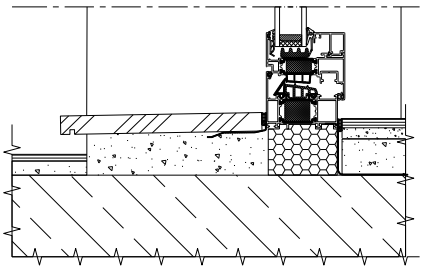
6th Installation scenario: Reinstallation of a frame on the inner edge of the opening with thermal facade coating and thermal break at the sill, with a built-in roller

% of U_w performance reduction	Installation sections	Conclusion
28%		Following calculation it arises that $U_{w,installed}$ = 1.88W/m²K, **hence Uw is downgraded by 28%.** Construction of a thermal facade by uninstalling the frame with a built-in roller with simultaneous removal of the marble finish or metal sub frame and creation of thermal break on the sill Installation of the frame on the inner edge of the wall using metal anchors

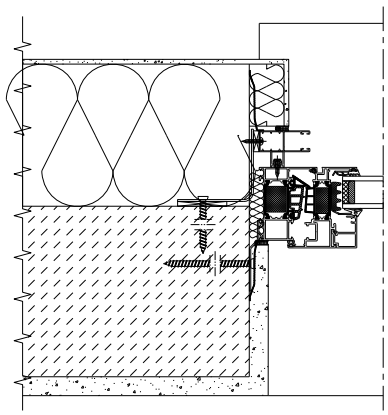
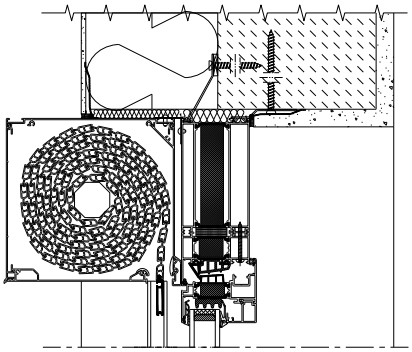
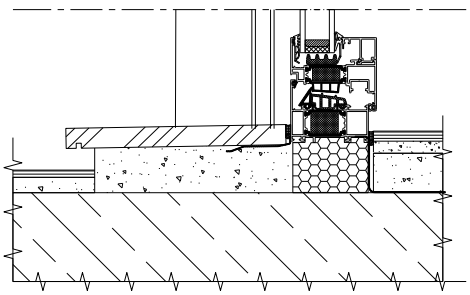
7th Installation scenario: Reinstallation of a frame following intermediate insulation, with thermal facade coating, with a built-in roller and thermal break on the sill

% of U_w performance reduction	Installation sections	Conclusion
22%	  	Following calculation it arises that **$U_{w,installed}$ = 1.79W/m²K, hence U_w is downgraded by 22%.** Construction of a thermal facade by uninstalling the frame with a built-in roller with simultaneous removal of the marble finish or metal sub frame and creation of thermal break on the sill Installation of the frame in continuation of the clearance of the double wall using metal anchors

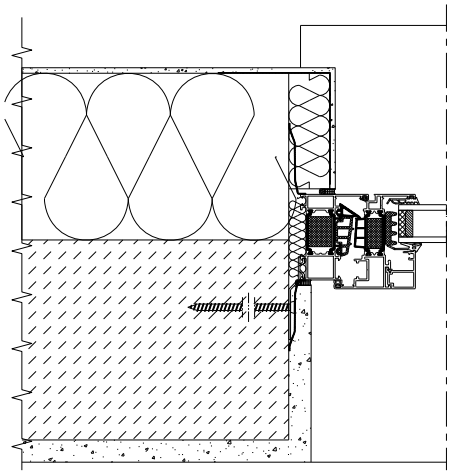
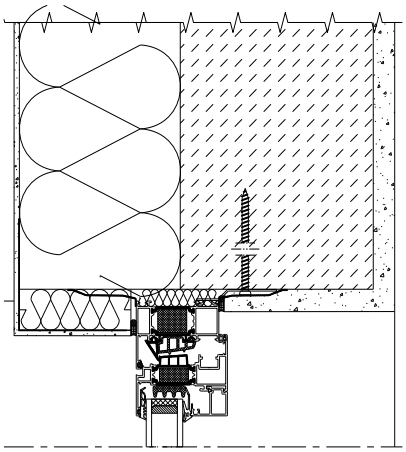
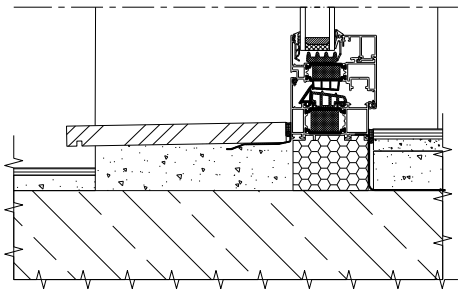
8th Installation scenario: Reinstallation of a frame following intermediate insulation, with thermal facade coating, without a roller and with a thermal break on the sill

% of U_w performance reduction	Installation sections	Conclusion
21%	  	Following calculation it arises that **$U_{w,installed}$ = 1.74W/m²K, hence Uw is downgraded by 21%.** Construction of a thermal facade by uninstalling the frame with simultaneous removal of the marble finish or metal sub frame and creation of thermal break on the sill Installation of the frame in continuation of the clearance of the double wall using metal anchors

9th Installation scenario: Installation of a frame on wall with external thermal insulation (ETICS) internally to the opening, with external roller and thermal break on the sill

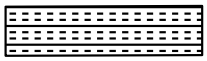
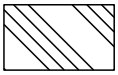
% of U_w performance reduction	Installation sections	Conclusion
21%	  	Following calculation it arises that **$U_{w,installed}$ = 1.72W/m²K, hence Uw is downgraded by 21%.** Thermal-block wall with external thick insulation (ETICS) and installation of the frame on the heat insulation using metal anchors. Linear heat losses are minimized and it is the most modern way of masonry construction. The external roller should be installed independently

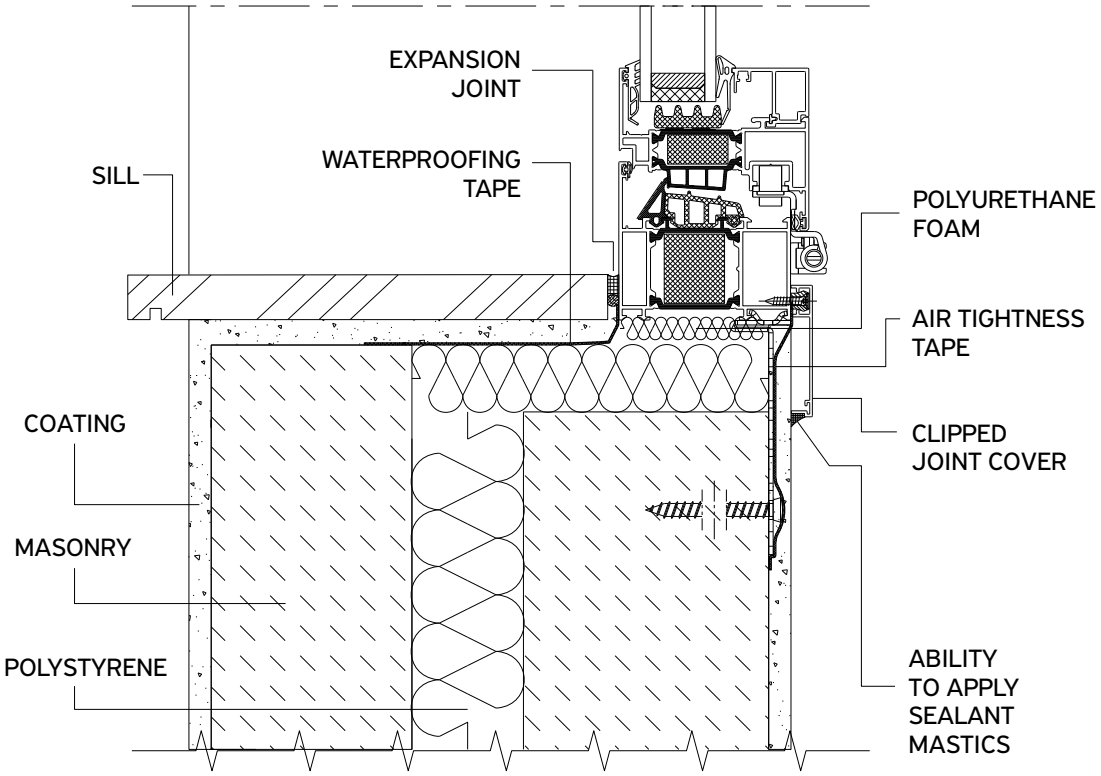
10th Installation scenario: Installation of a frame on wall with external thermal insulation (ETICS) internally to the opening, without a roller and with thermal break on the sill

% of U_w performance reduction	Installation sections	Conclusion
16%	  	Following calculation it arises that **$U_{w,installed}$ = 1.65W/m²K, hence U_w is downgraded by 16%.** Thermal-block wall with external thick insulation (ETICS) and installation of the frame on the heat insulation using metal anchors. Linear heat losses are minimized and it is the most modern way of masonry construction.

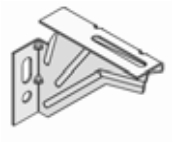
11. Frame installation examples

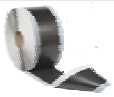
11.1 Materials used on the frame installation sections

Material	Description
	Precom pressed multi-function sealing tape
	Backer Rod
	Hybrid Sealant or Neutral Silicone
	Styrodur high density board
	Marble
	Polyurethane Foam
	Polystyrene
	Wall Construction
	Wall Finish
	Reinforced Concrete
	Air-Water Vapor Barrier Tape

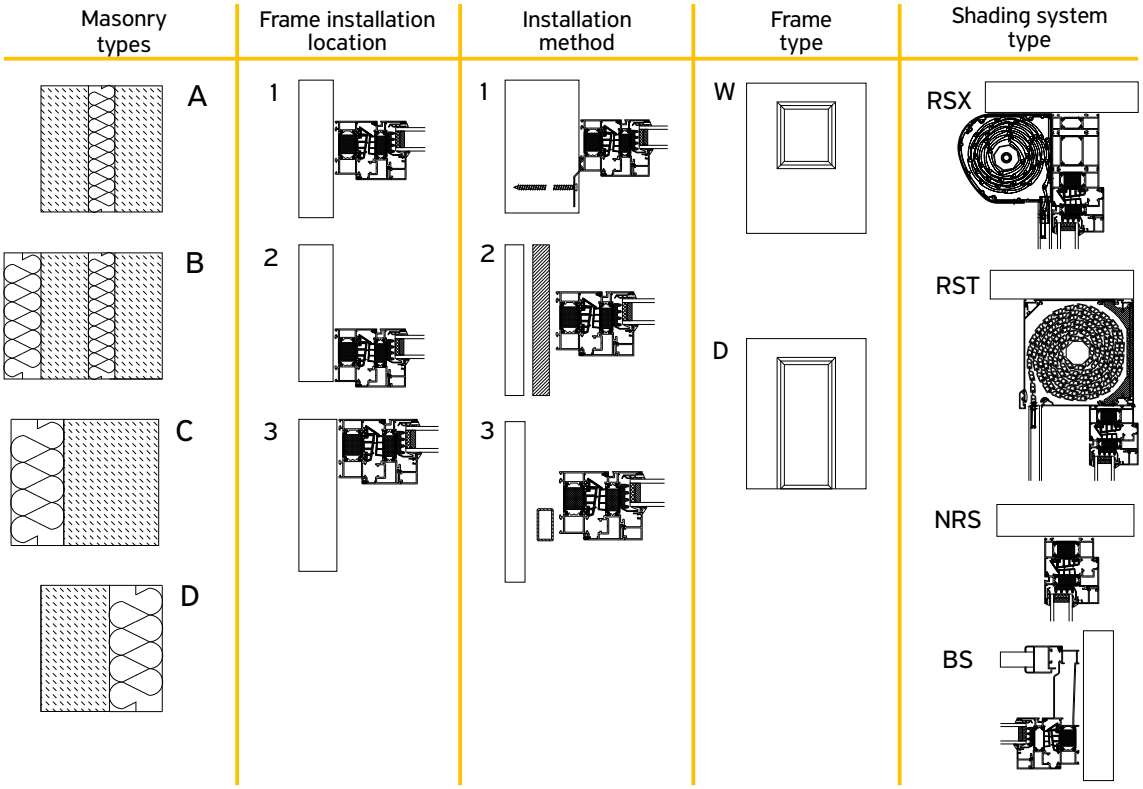

EXPANSION JOINT
WATERPROOFING TAPE
SILL
POLYURETHANE FOAM
AIR TIGHTNESS TAPE
COATING
CLIPPED JOINT COVER
MASONRY
POLYSTYRENE
ABILITY TO APPLY SEALANT MASTICS

11.2 Installation materials

Code	Description	
290-00-002-00	GLASS SETTING BLOCK 2 mm	
290-00-003-00	GLASS SETTING BLOCK 3 mm	
290-00-004-00	GLASS SETTING BLOCK 4 mm	
290-00-005-00	GLASS SETTING BLOCK 5 mm	
762-75-100-00	MILLED CONCRETE SCREW T30 7,5x100 mm GALVANIZED	
762-75-120-00	MILLED CONCRETE SCREW T30 7,5x120 mm GALVANIZED	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150 mm GALVANIZED	
798-21-255-80	SELF-TAPPING HEAD SCREW ISO 7049/DIN 7981 INOX A2 5,5X80 PH	
798-32-255-75	MILLED SELF-TAPPING BOLT ISO 7050/DIN 7982 GALVANIZED 5,5X75 PH	
798-41-242-50	SELF-TAPPING HEAD SCREW ISO 7049/DIN 7981 GALVANIZED 4,2X50 PH	
798-41-248-60	SELF-TAPPING HEAD SCREW ISO 7049/DIN 7981 GALVANIZED 4,8X60 PH	
798-41-255-75	SELF-TAPPING HEAD SCREW ISO 7049/DIN 7981 GALVANI ED 5,5X75 PH	
470-07-700-00	FRAME INSTALLATION ANCHOR 14x18	
470-77-560-00	FRAME INSTALLATION ANCHOR 200x30	
470-12-320-00	FRENCH TYPE METAL ANCHOR BRACKET 100X85 mm	
470-12-330-00	FRENCH TYPE METAL ANCHOR BRACKET 120X70 mm	
470-12-340-00	FRENCH TYPE METAL ANCHOR BRACKET 140X70 mm	
470-12-350-00	FRENCH TYPE METAL ANCHOR BRACKET 160 x 70 mm	
470-07-770-00	FRENCH TYPE METAL ANGLE SUPPORT 100 x 100 mm	
470-08-670-00	FRENCH TYPE METAL ANGLE SUPPORT 100 x 120 mm	
470-12-460-00	FRENCH TYPE METAL ANGLE SUPPORT 100 x 80 mm	
470-13-380-00	FRENCH TYPE METAL ANGLE SUPPORT 100 x 60 mm	
470-14-059-20	FRENCH TYPE FRAME SUPPORT TAB	
770-30-608-00	JOINT CORD Φ15	
770-30-609-00	JOINT CORD Φ10	

Code	Description	
312-11-000-00	PVC CORNER FOR FRAME INSTALLATION M11000	
312-11-500-00	PVC CORNER FOR FRAME INSTALLATION M11500	
250-77-000-03	ELASTIC SEALING SKIRTING BULB S77	
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-00-569-02	NEUTRAL SILICONE, 280 ML CARTRIDGE WHITE	
770-11-200-06	NEUTRAL SILICONE, 280 ML CARTRIDGE BROWN RAL 8014	
770-11-200-04	NEUTRAL SILICONE, 280 ML CARTRIDGE GREY 7045	
770-71-306-06	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE BROWN	
770-71-306-04	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE GREY	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ALUMIL ACRYLIC PATTY 280 ML CARTRIDGE WHITE	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-71-000-01	POLYURETHANE FOAM CLEANING SPRAY 500 ML	
770-10-020-00	AIR AND WATER SEALING TAPE	
770-54-102-00	PRE-PRESSED SELF-SWELLING INSULATION TAPE 54/10-20 mm	
770-35-370-00	PRE-PRESSED SELF-SWELLING INSULATION TAPE 35/3-7 mm	
770-35-480-00	PRE-PRESSED SELF-SWELLING INSULATION TAPE 35/4-8 mm	
770-35-715-00	PRE-PRESSED SELF-SWELLING INSULATION TAPE 35/7-15 mm	
720-90-150-00	BUTYL ALUMINUM TAPE 150 x 0.8 mm	
720-90-745-00	BUTYL ALUMINUM TAPE 50 x 1,0 mm	

11.3 Characteristic installation details



11.3.1 Masonry types

A. Double masonry with 5cm thermal insulation.
B. Double masonry with 5cm thermal insulation and 7cm external shell.
C. Single masonry with external shell 10cm. and upper ETICS type.
D. Single masonry with internal thermal insulation (French construction).

11.3.2 Frame installation location

1. In the middle of the opening.
2. On the inner edge of the opening.
3. On the outer edge of the opening.

11.3.3 Installation method

1. With anchor brackets.
2. With heat insulating sub frame.
3. With metal sub frame.

11.3.4 Frame type

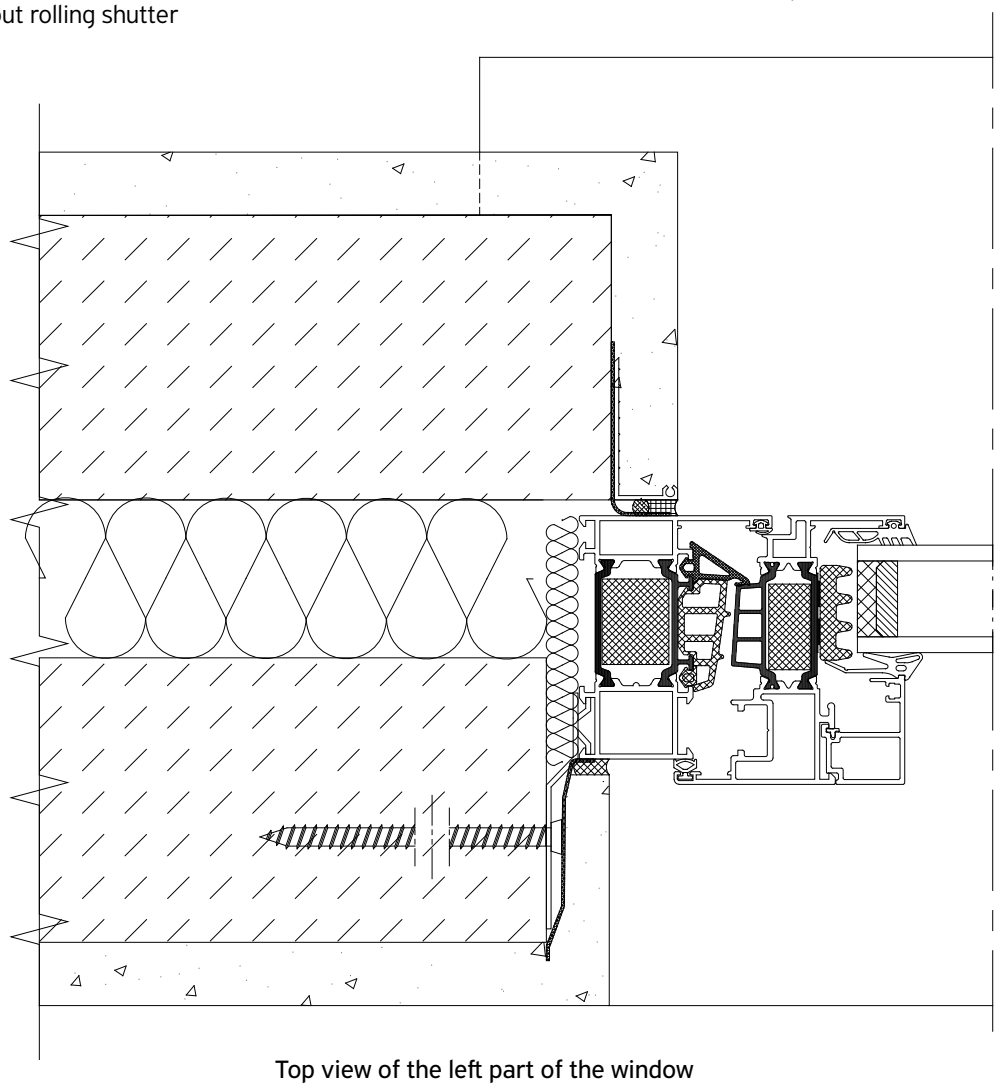
W. Window
D. Door

11.3.5 Shading system type

RSX. External Rolling Shutter
RST. Top mounted Rolling Shutter
NRS. No Rolling Shutter
BS. Shutter shading system

11.4 Installation examples

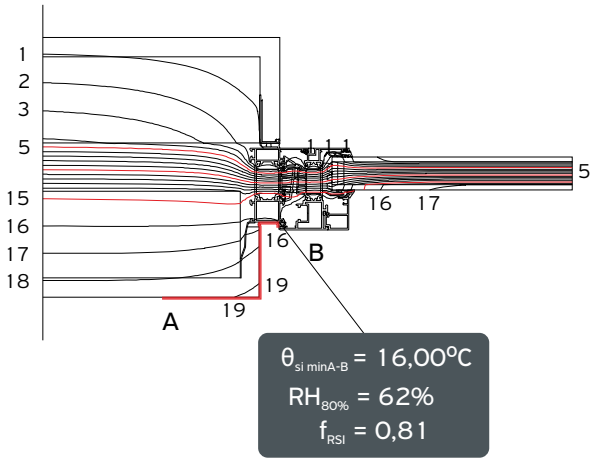
A-1-1-W-NRS: Double masonry with 5cm thermal insulation in the middle of the opening with anchor brackets on a window without rolling shutter



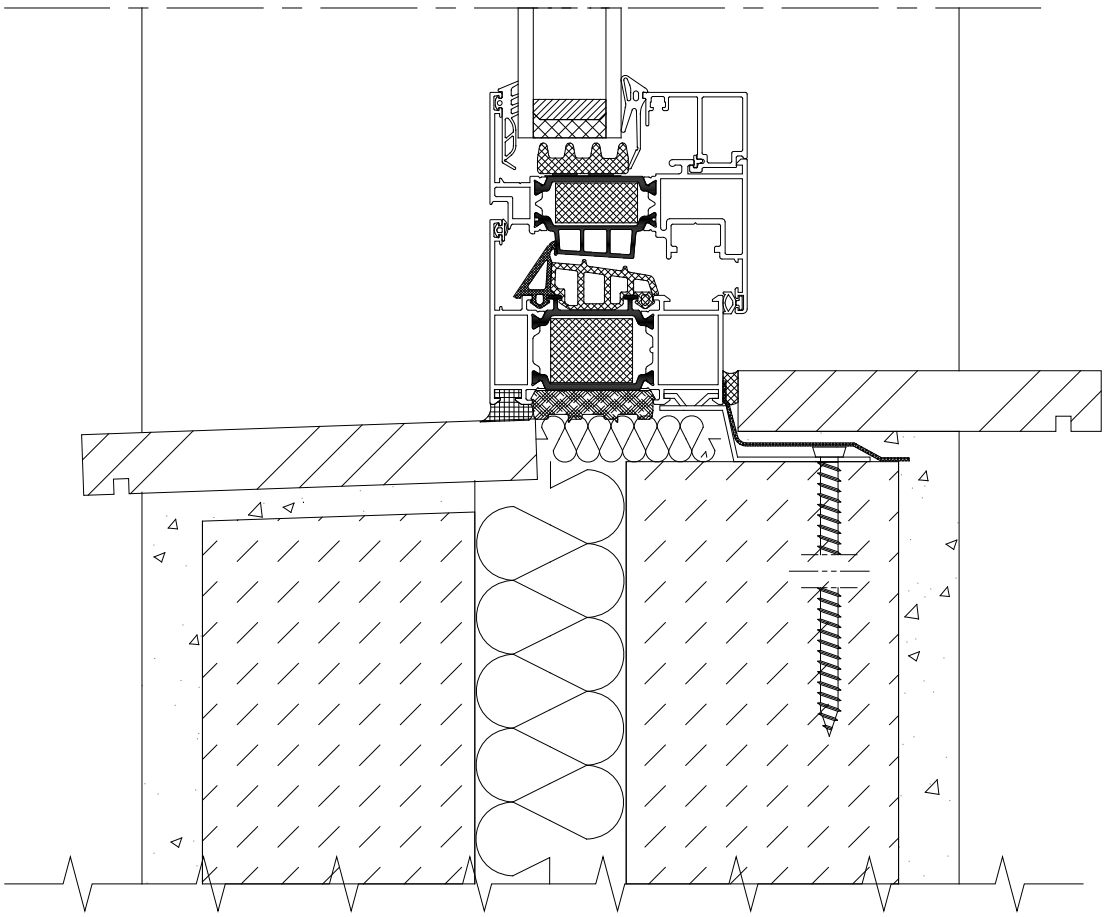
Top view of the left part of the window

	Code	Description	Material
INSIDE OUTSIDE	770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
	770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
	770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
	770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
	770-30-609-00	JOINT CORD Ø10	
	762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
	470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
	770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
	770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



A-1-1-W-NRS: Double masonry with 5cm thermal insulation in the middle of the opening with anchor brackets on a window without rolling shutter

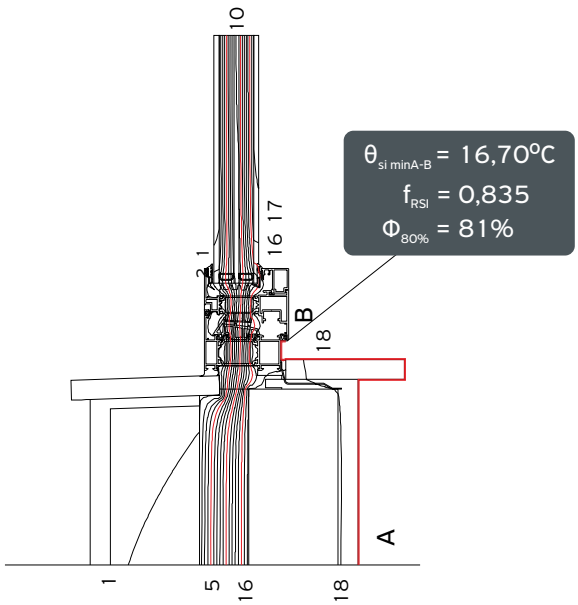


Section of the lower part of the window

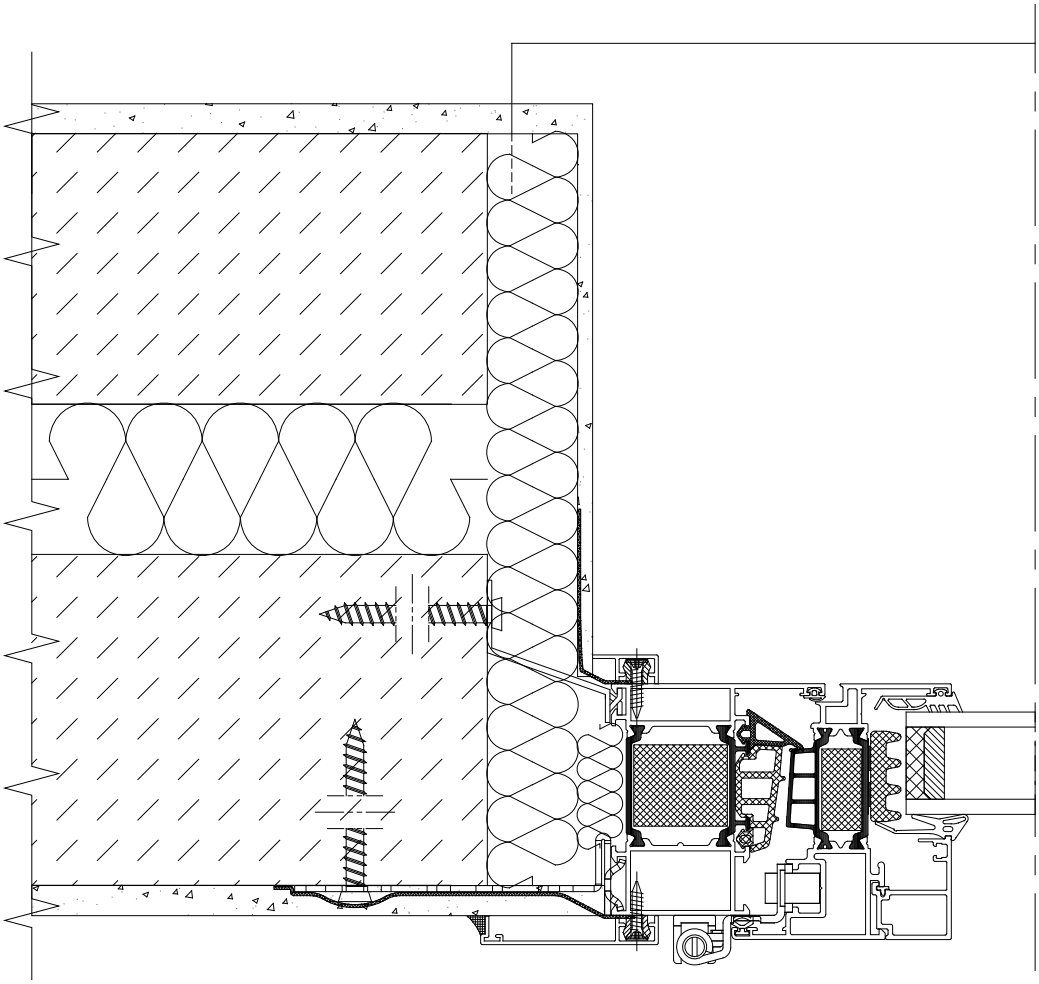
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



A-2-1-W-NRS: Double masonry with 5cm thermal insulation on the internal edge of the opening with anchor brackets on a window without rolling shutter

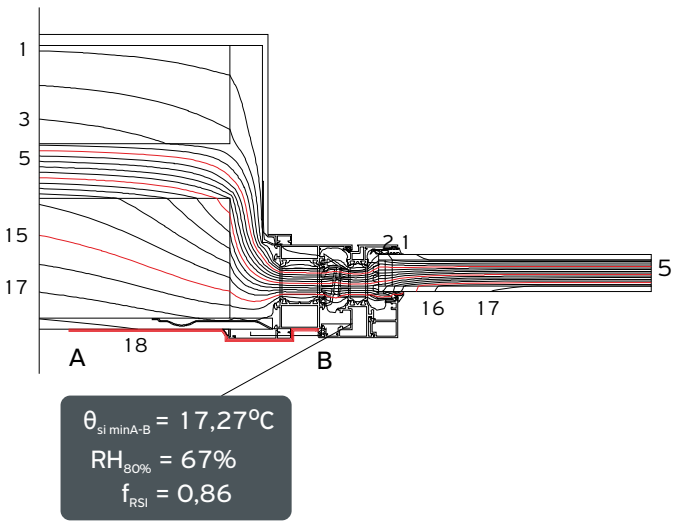


Top view of the left part of the window

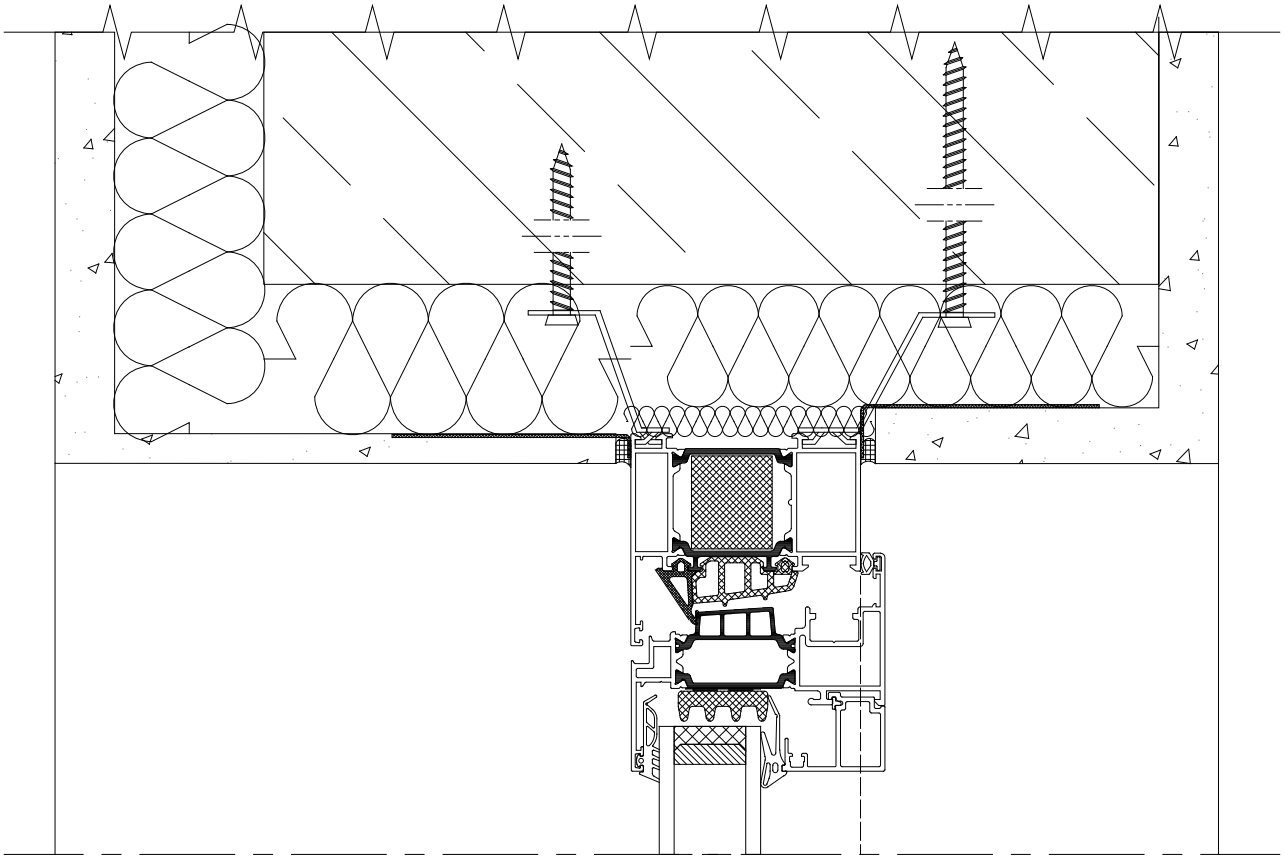
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



A-2-1-W-NRS: Double masonry with 5cm thermal insulation on the internal edge of the opening with anchor brackets on a window without rolling shutter

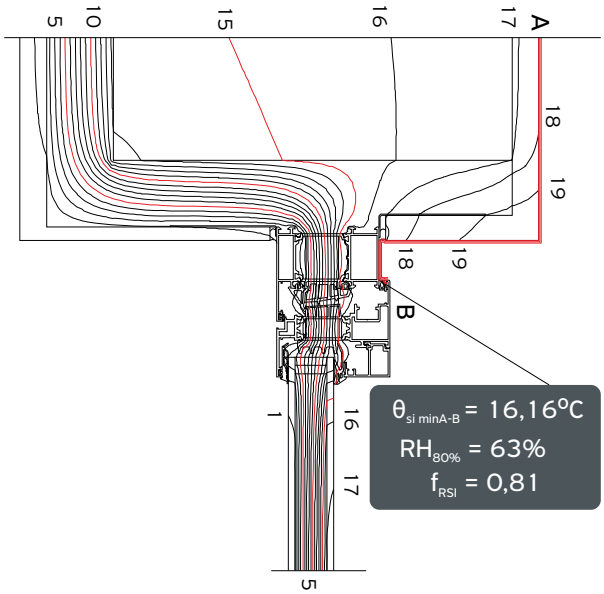


Section of the upper part of the frame

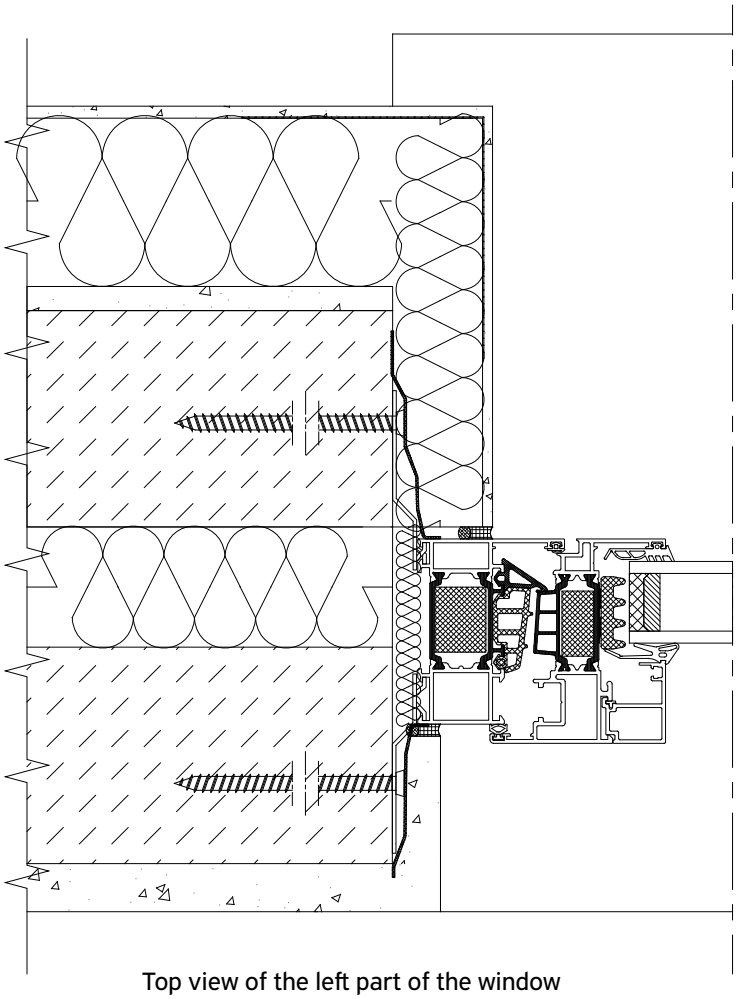
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



B-1-1-W-NRS: Double masonry with 5cm thermal insulation and 7 cm external shell in the middle of the opening with anchor brackets on a window without rolling shutter

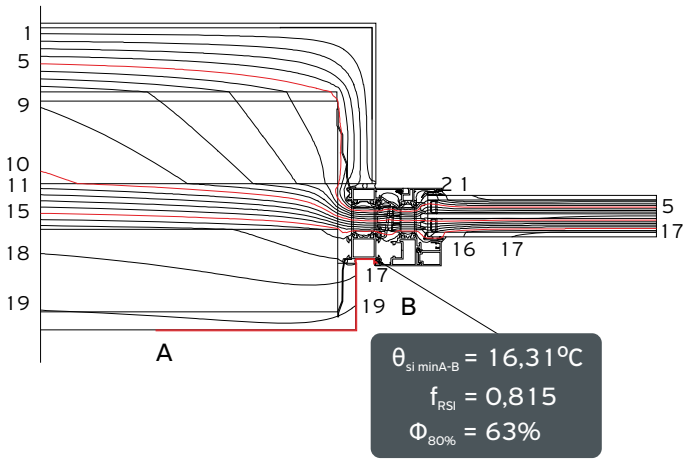


Top view of the left part of the window

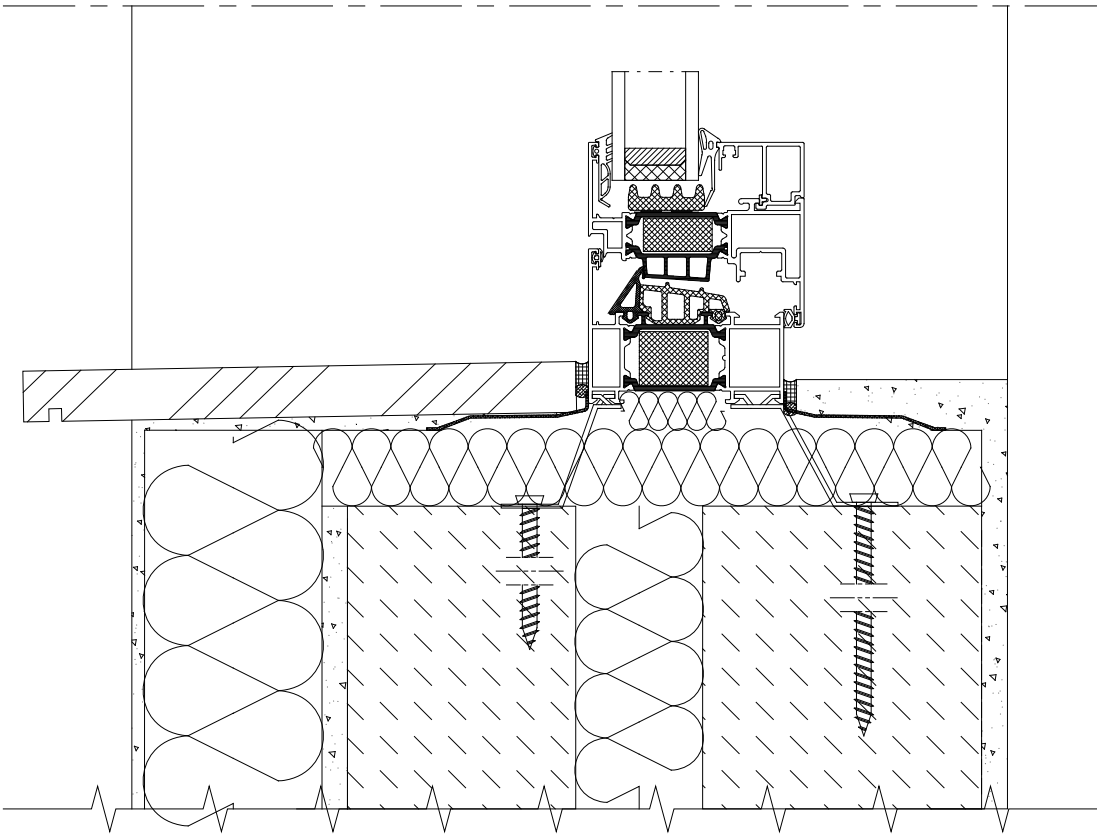
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



B-1-1-W-NRS: Double masonry with 5cm thermal insulation and 7 cm external shell in the middle of the opening with anchor brackets on a window without rolling shutter

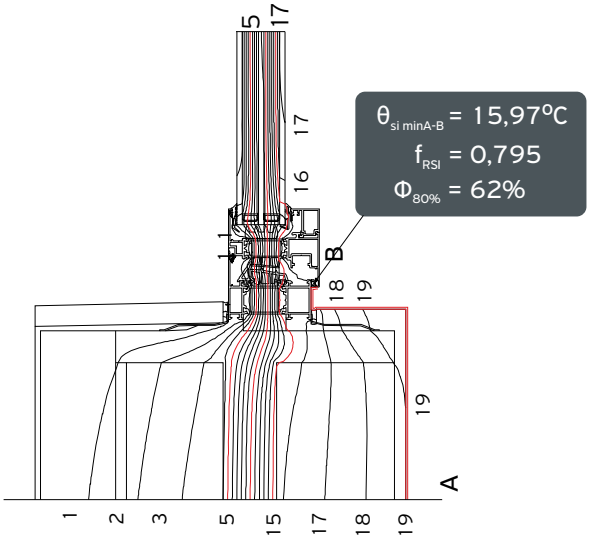


Section of the lower part of the window

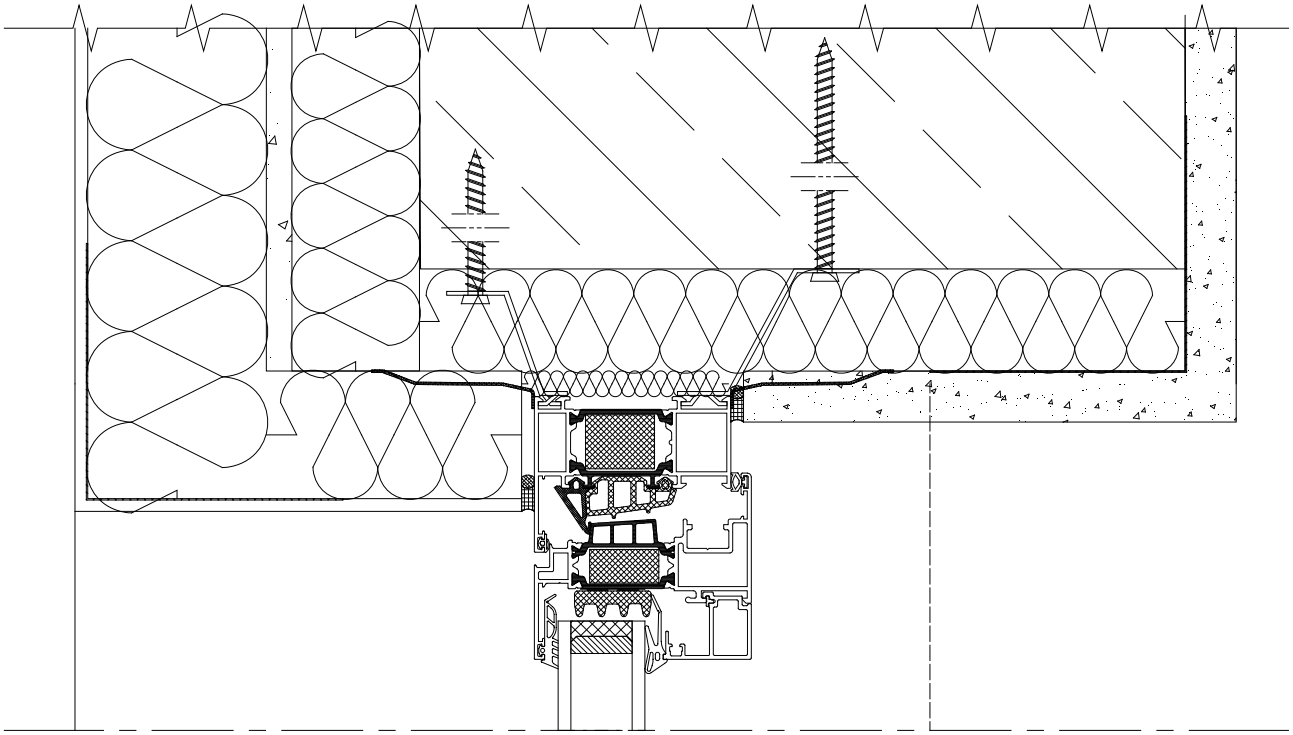
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



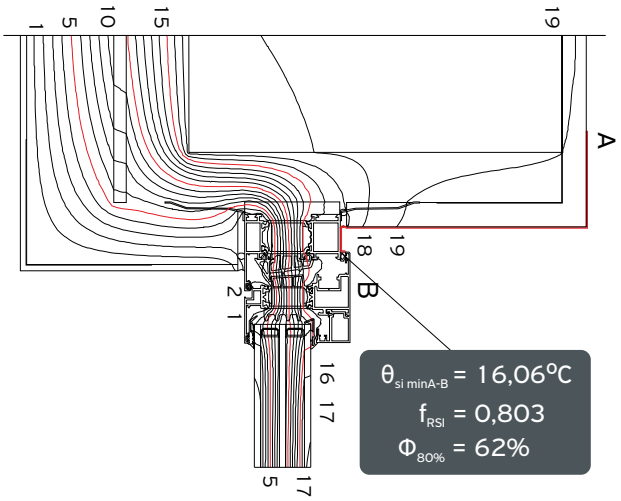
B-1-1-W-NRS: Double masonry with 5cm thermal insulation and 7 cm external shell in the middle of the opening with anchor brackets on a window without shading system



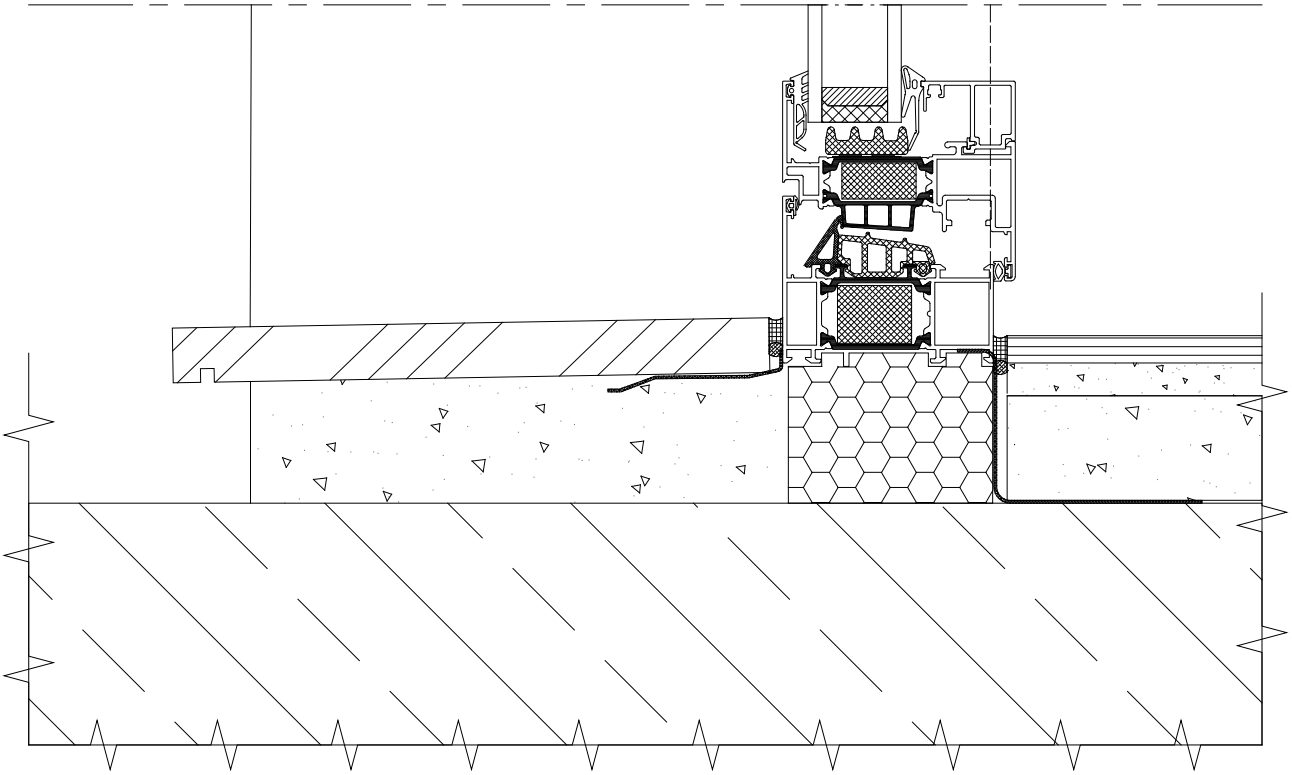
Section of the upper part of the frame

	Code	Description	Material
OUTSIDE	770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
	770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
	770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
INSIDE	770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
	770-30-609-00	JOINT CORD Ø10	
	762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
	470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
	770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
	770-10-020-00	AIR AND WATER SEALING TAPE	

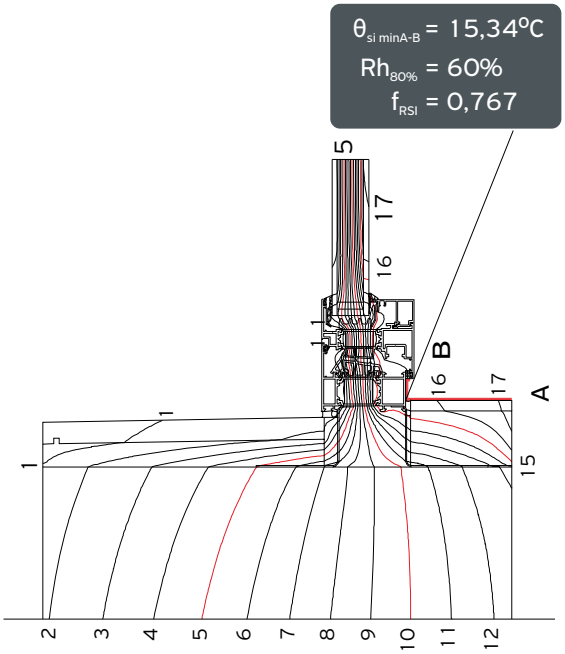
* The codes referenced are indicative and vary depending on the case



B-1-1-D-NRS: Double masonry with 5cm thermal insulation and 7 cm external shell in the middle of the opening with anchor brackets on a door without rolling shutter



Section of the lower part of the window

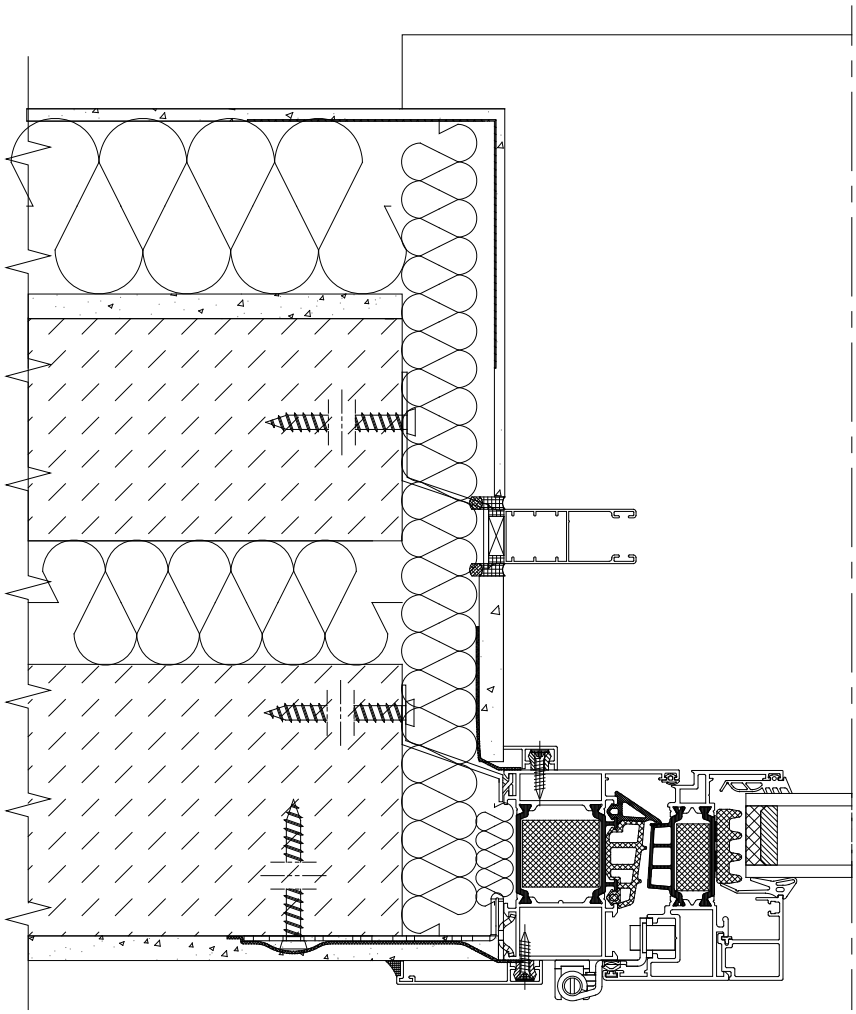


INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case

B-2-1-W-RST: Double masonry with 5cm thermal insulation and 7 cm external shell on the inner edge of the opening with anchor brackets on a window with top mounted rolling shutter

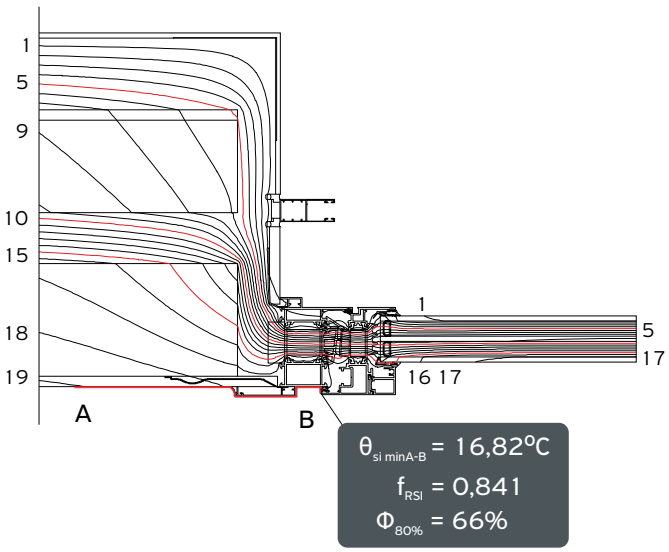


Top view of the left part of the frame

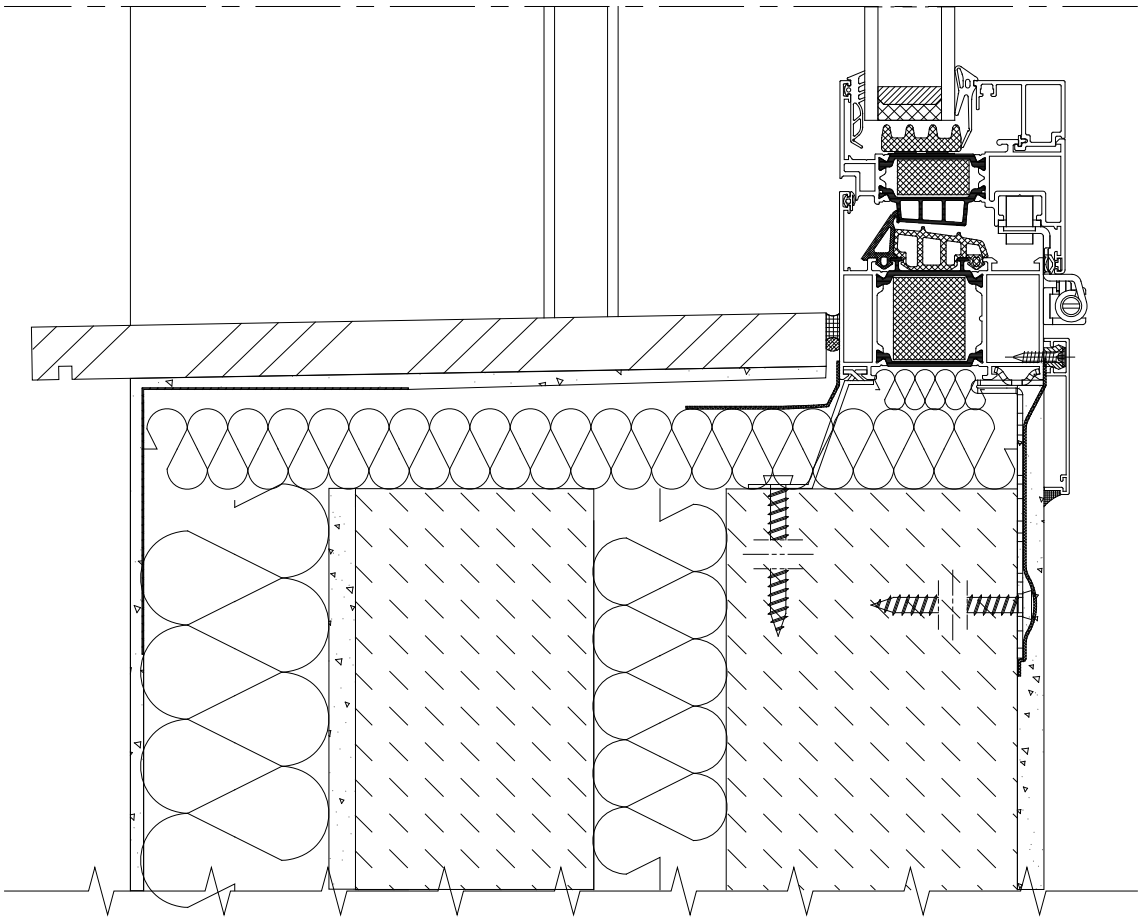
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



B-2-1-W-RST: Double masonry with 5cm thermal insulation and 7 cm external shell on the inner edge of the opening with anchor brackets on a window with top mounted rolling shutter

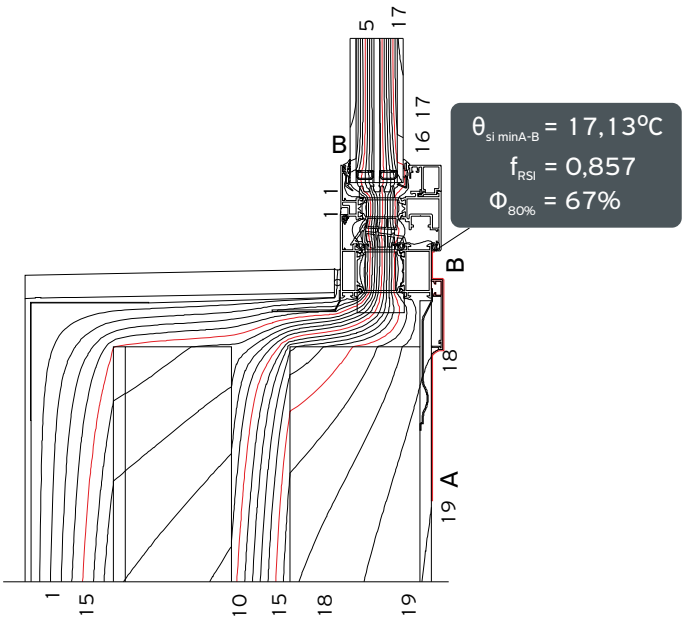


Section of the lower part of the window

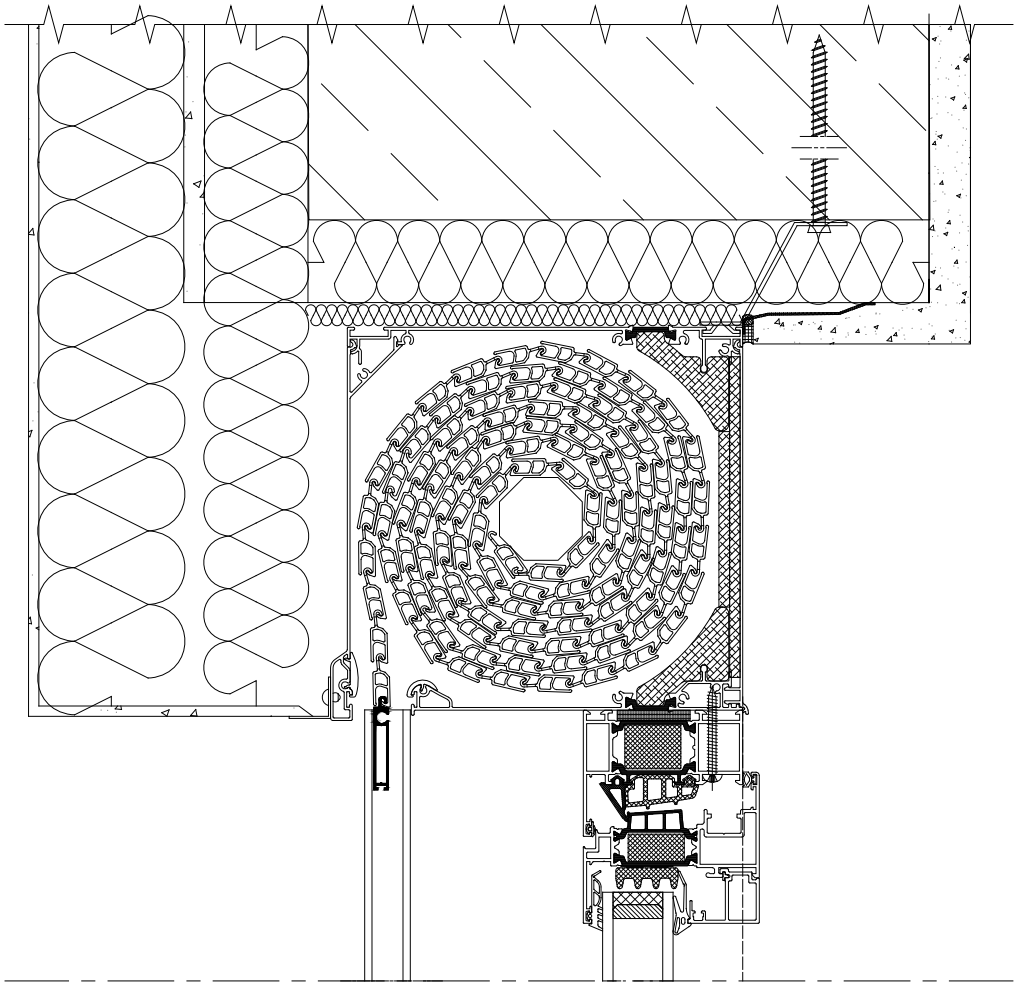
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



B-2-1-W-RST: Double masonry with 5cm thermal insulation and 7 cm external shell on the inner edge of the opening with anchor brackets on a window with top mounted rolling shutter

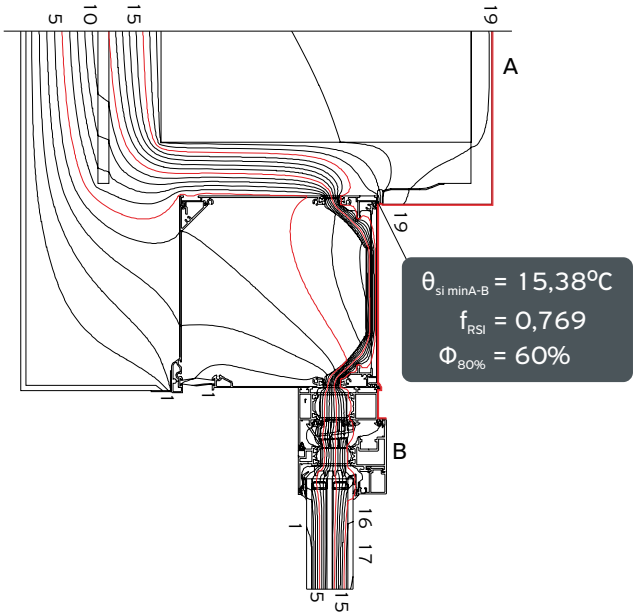


Section of the upper part of the frame

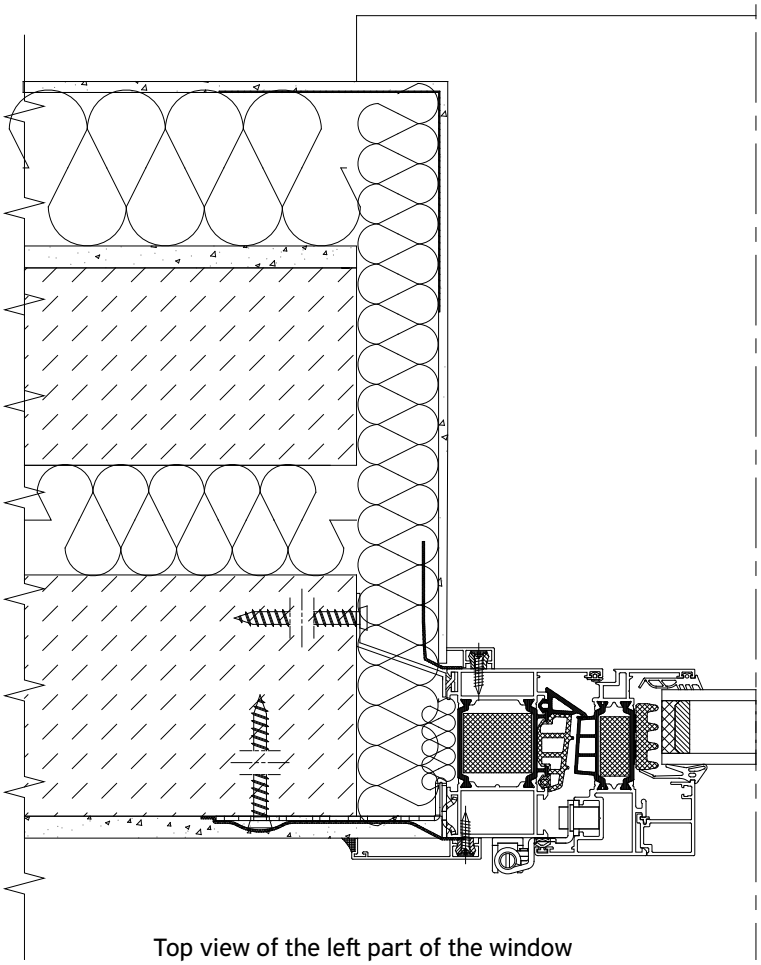
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	
770-35-370-00	PRE-PRESSED SELF-SWELLING INSULATION TAPE 35/3-7 mm	

* The codes referenced are indicative and vary depending on the case



B-2-1-W-NRS: Double masonry with 5cm thermal insulation and 7 cm external shell on the internal edge of the opening with anchor brackets on a window without rolling shutter

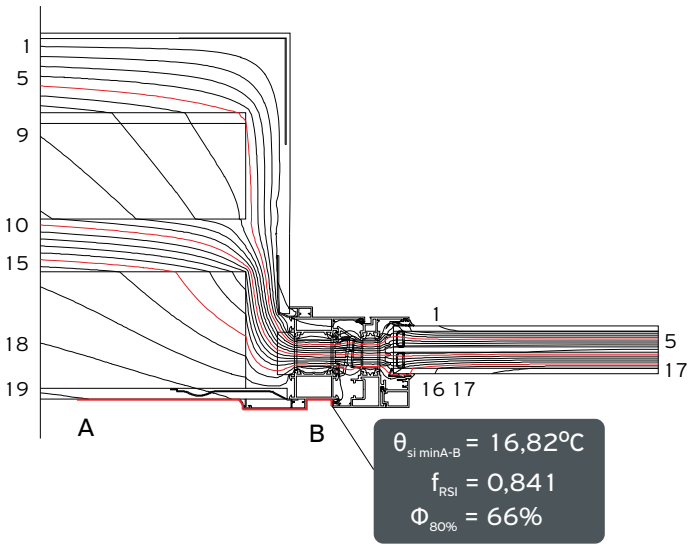


Top view of the left part of the window

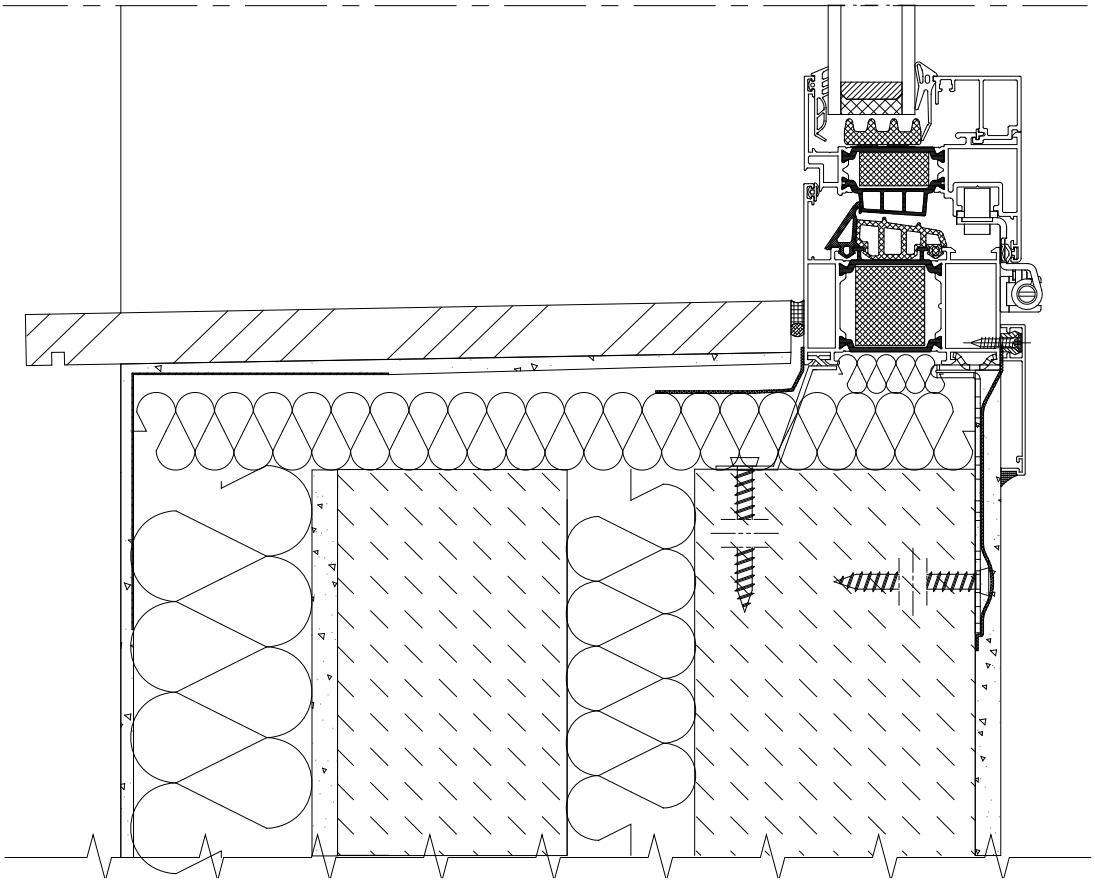
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



B-2-1-W-NRS: Double masonry with 5cm thermal insulation and 7 cm external shell on the internal edge of the opening with anchor brackets on a window without rolling shutter

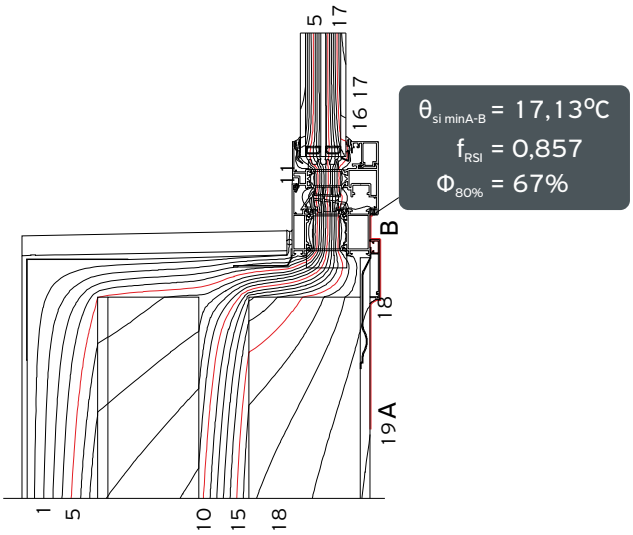


Section of the lower part of the window

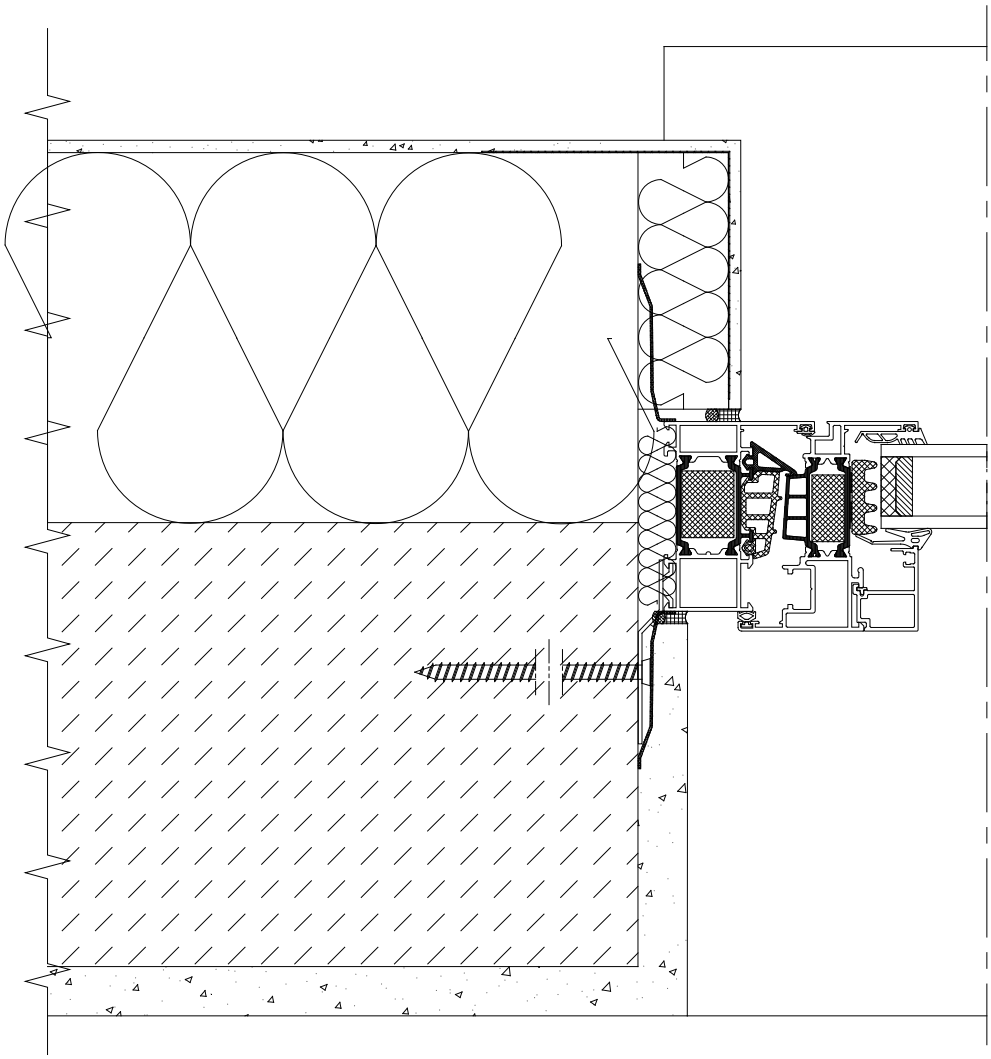
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-1-1-W-NRS: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a window without rolling shutter

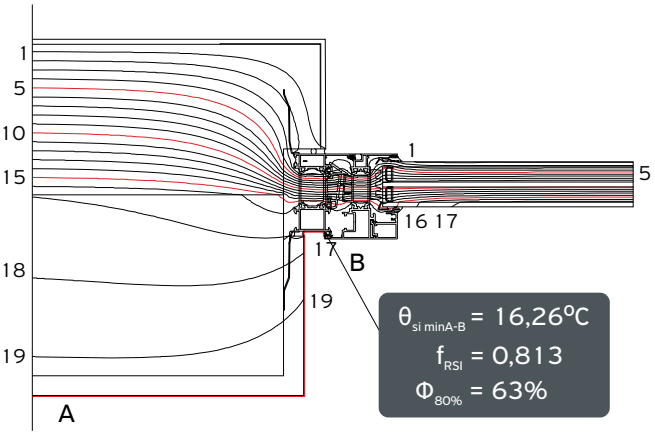


Top view of the left part of the window

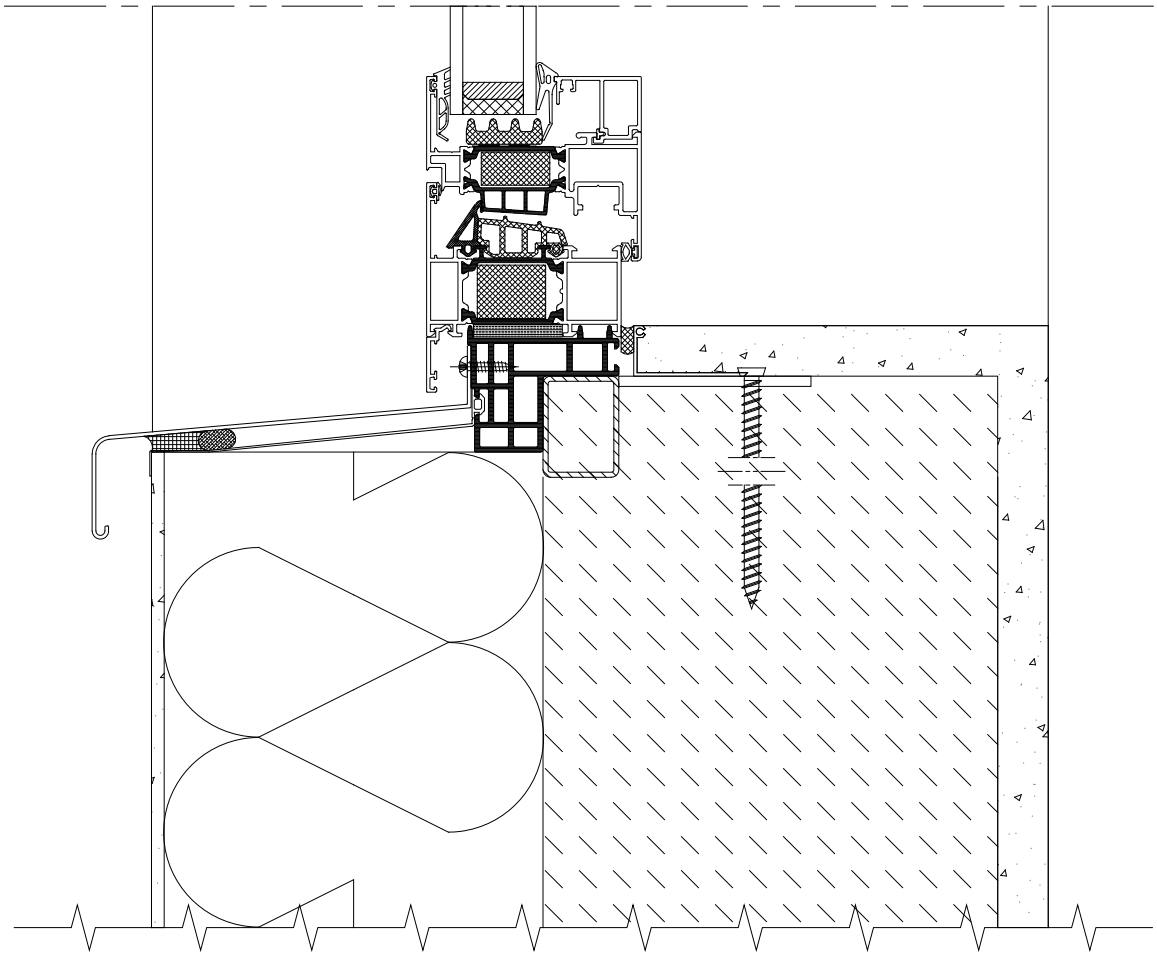
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-1-1-W-NRS: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a window without rolling shutter

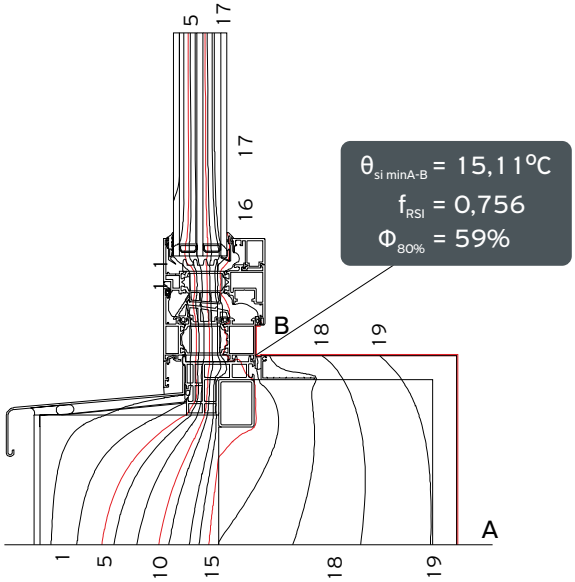


Section of the lower part of the window

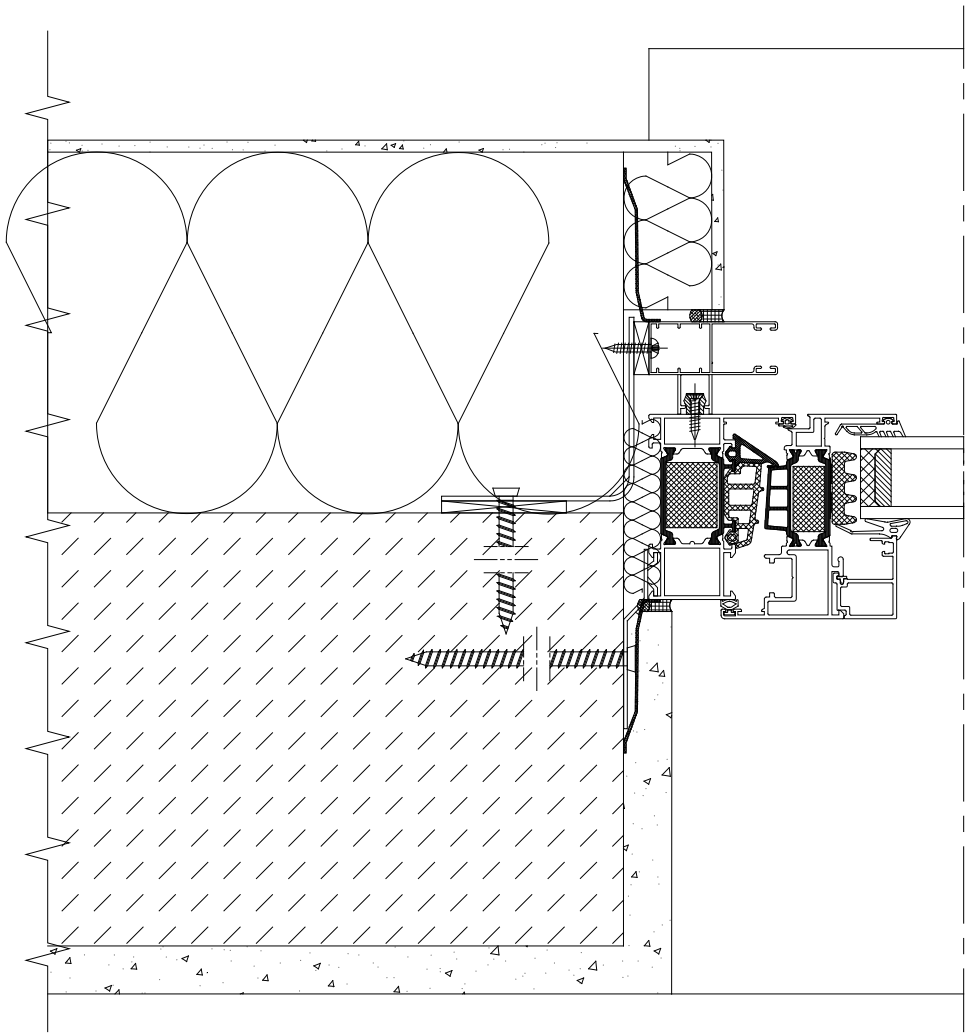
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	
770-35-370-00	PRE-PRESSED SELF-SWELLING INSULATION TAPE 35/3-7 mm	

* The codes referenced are indicative and vary depending on the case



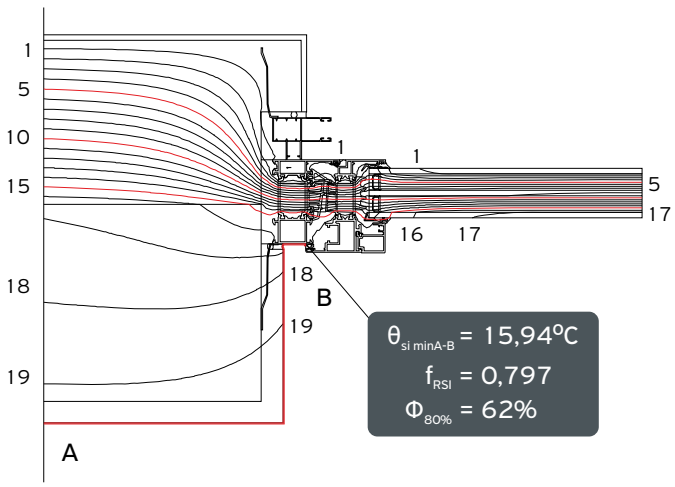
C-1-1-W-RSX: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a window with external rolling shutter



Top view of the left part of the window

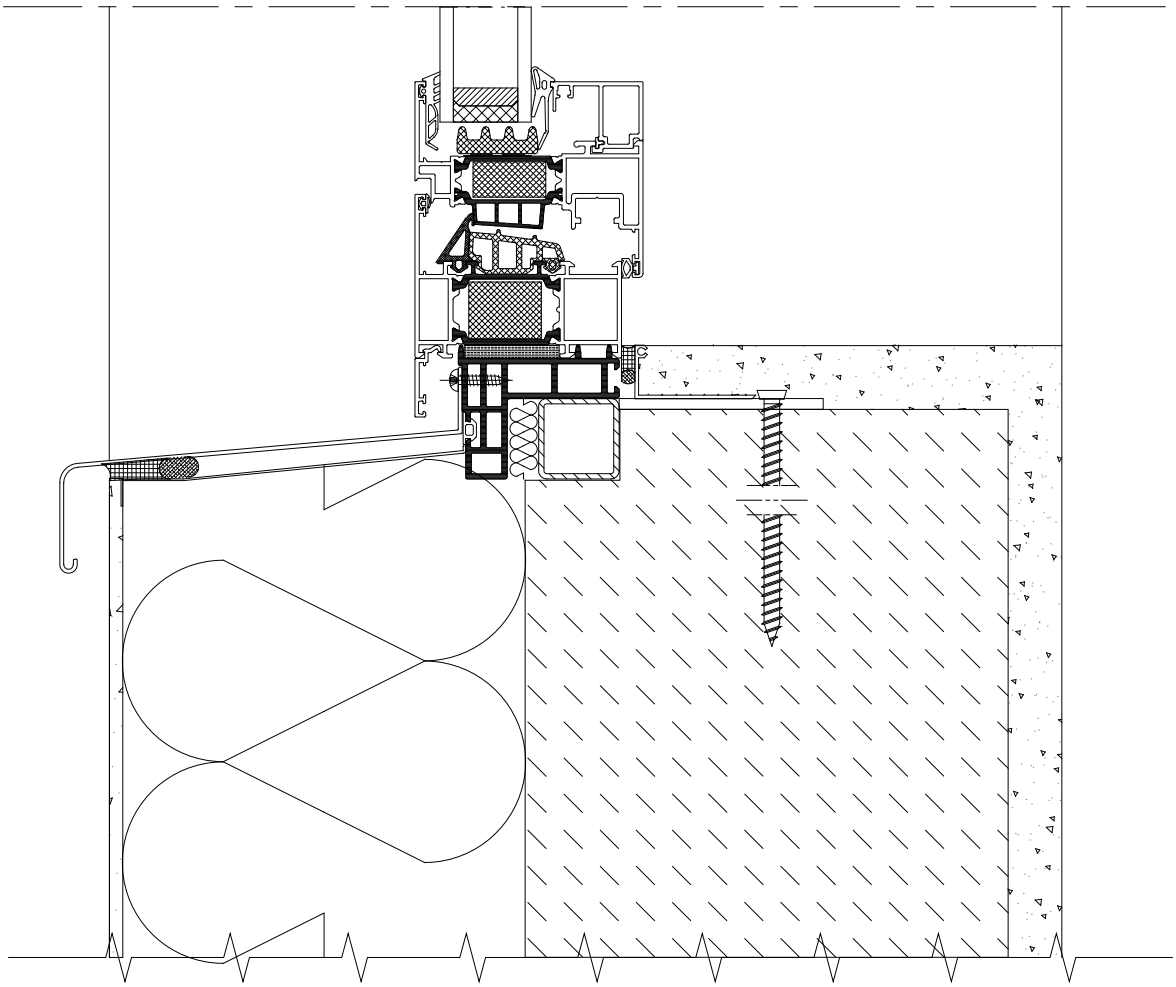
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	



* The codes referenced are indicative and vary depending on the case

C-1-1-W-RSX: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a window with external rolling shutter

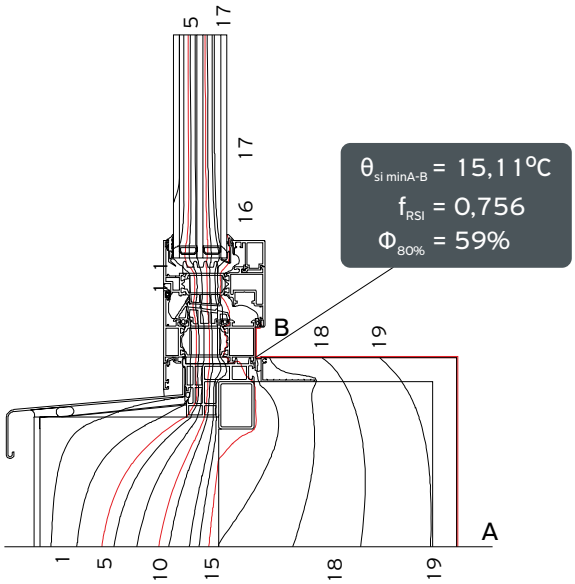


Section of the lower part of the window

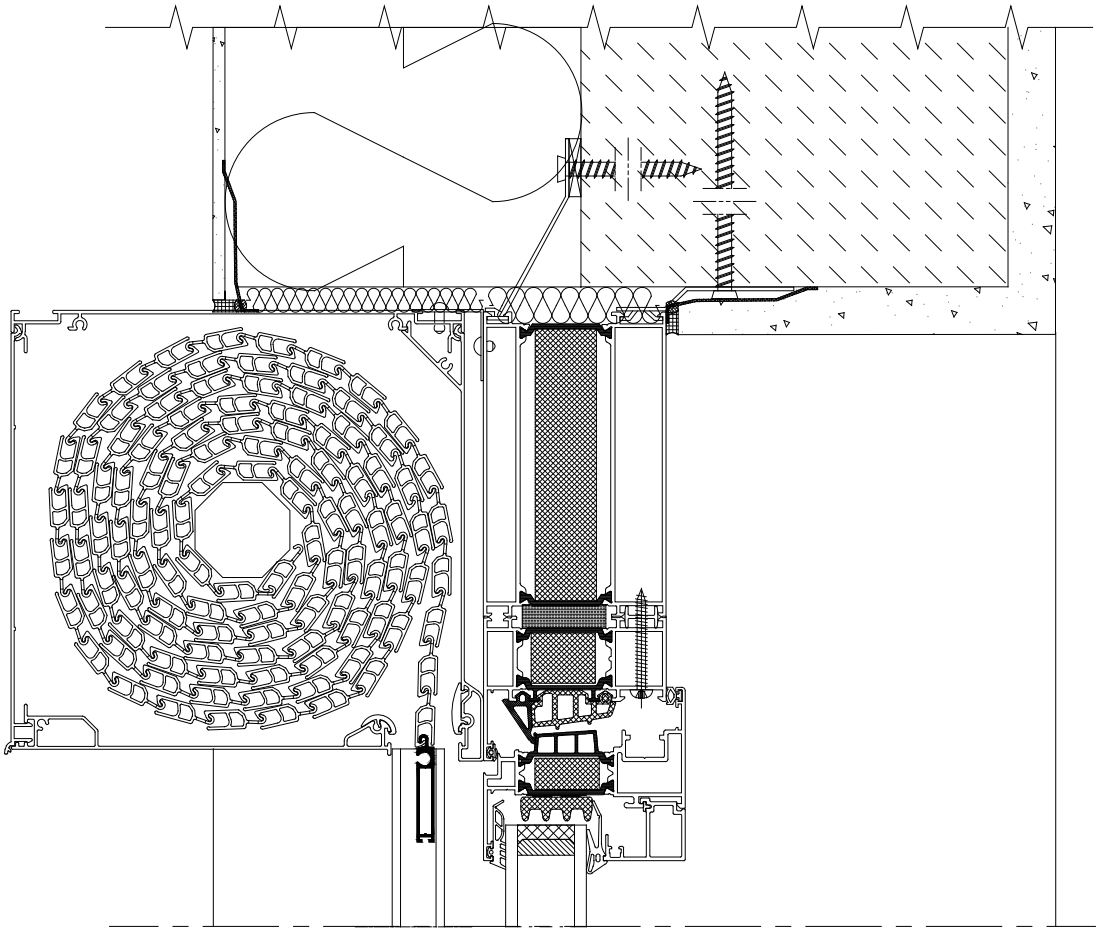
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	
770-35-370-00	PRE-PRESSED SELF-SWELLING INSULATION TAPE 35/3-7 mm	

* The codes referenced are indicative and vary depending on the case



C-1-1-W-RSX V1: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a window with external rolling shutter

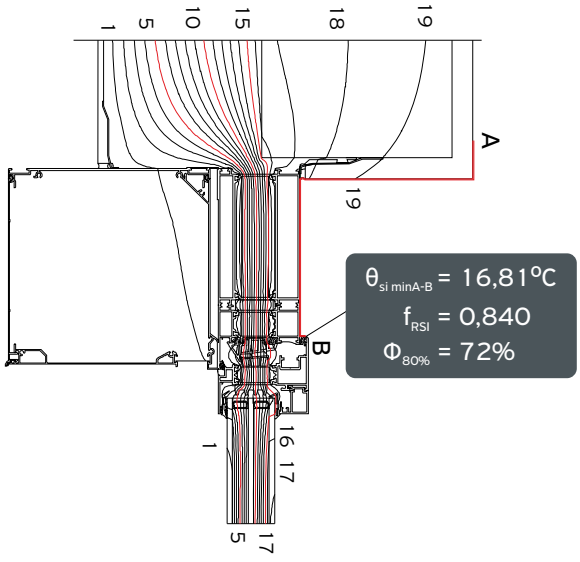


Section of the upper part of the frame

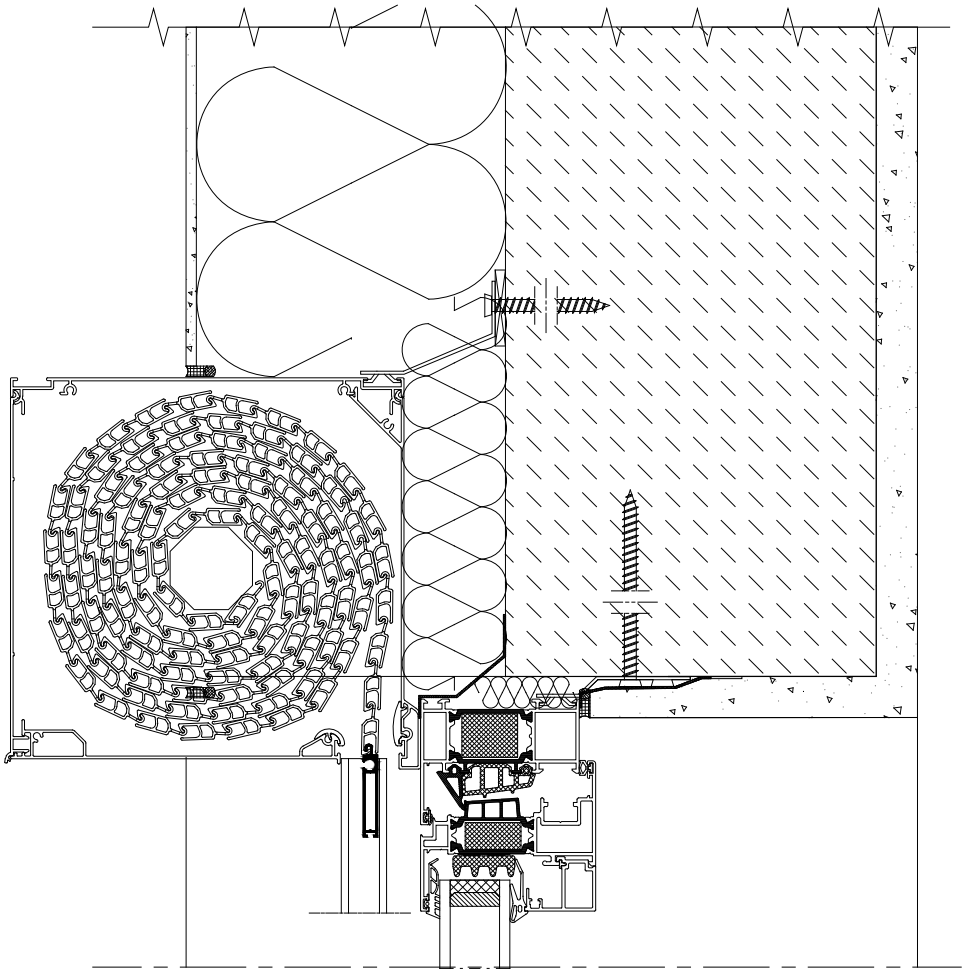
INSIDE | OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	
770-35-370-00	PRE-PRESSED SELF-SWELLING INSULATION TAPE 35/3-7 mm	

* The codes referenced are indicative and vary depending on the case



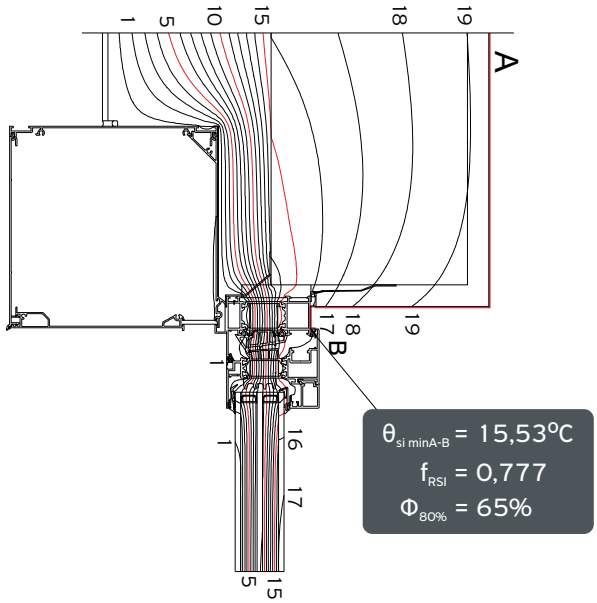
C-1-1-W-RSX V2: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a window with external rolling shutter



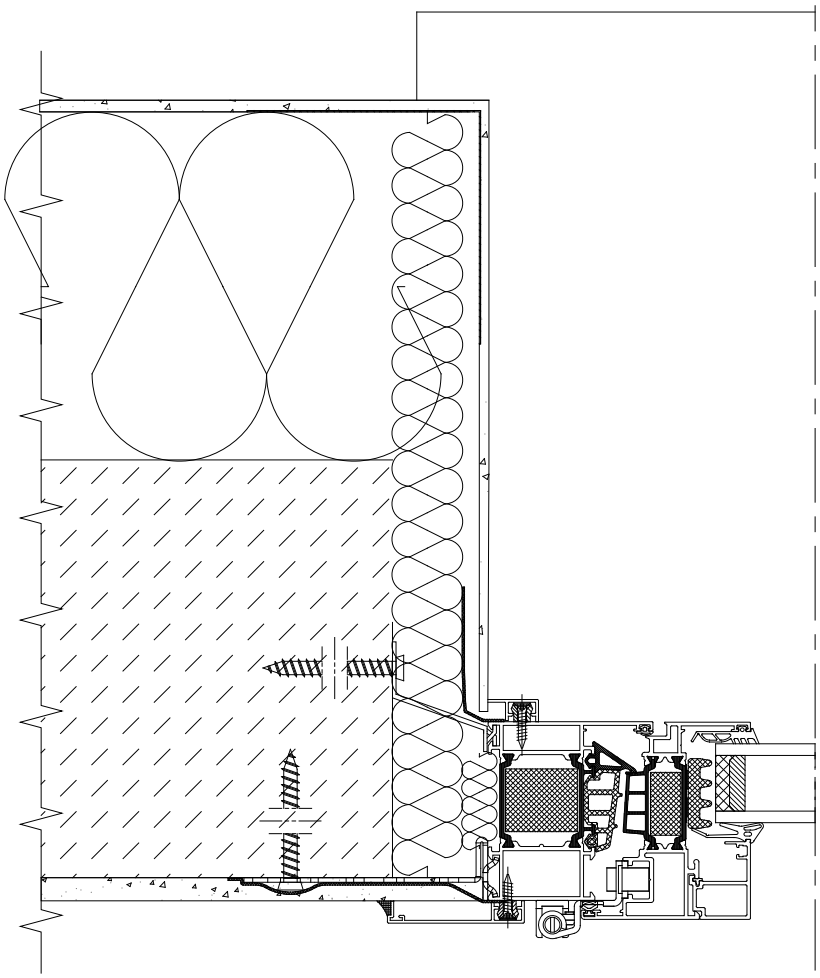
Section of the upper part of the frame

	Code	Description	Material
OUTSIDE	770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
	770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
	770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
INSIDE	770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
	770-30-609-00	JOINT CORD Ø10	
	762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
	470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
	770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
	770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-2-1-W-NRS: Single masonry with 10 cm or more external shell of ETICS type on the inner edge of the opening with anchor brackets on a window without rolling shutter

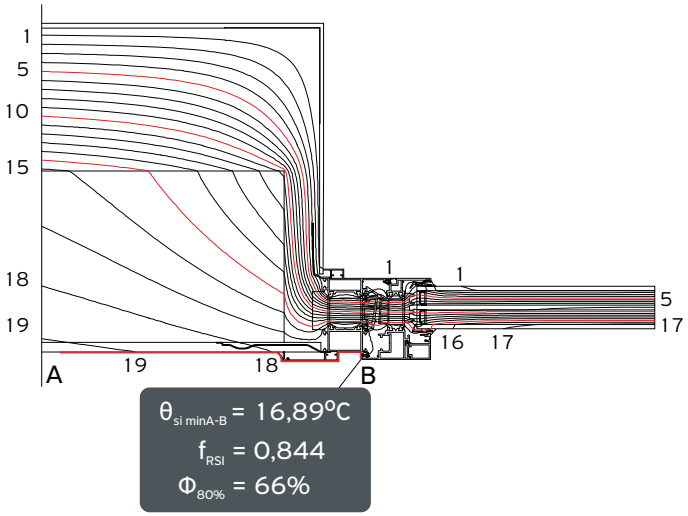


Top view of the left part of the window

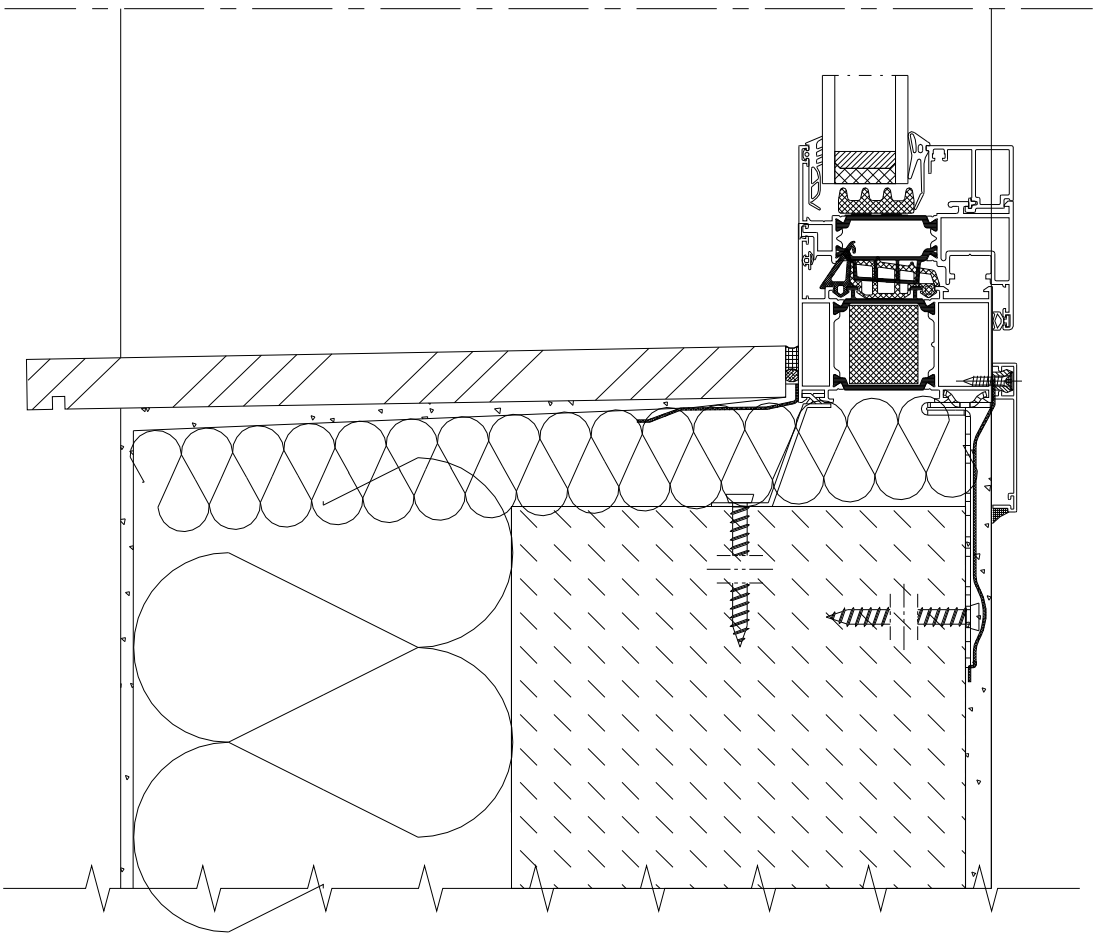
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-2-1-W-NRS: Single masonry with 10 cm or more external shell of ETICS type on the inner edge of the opening with anchor brackets on a window without rolling shutter

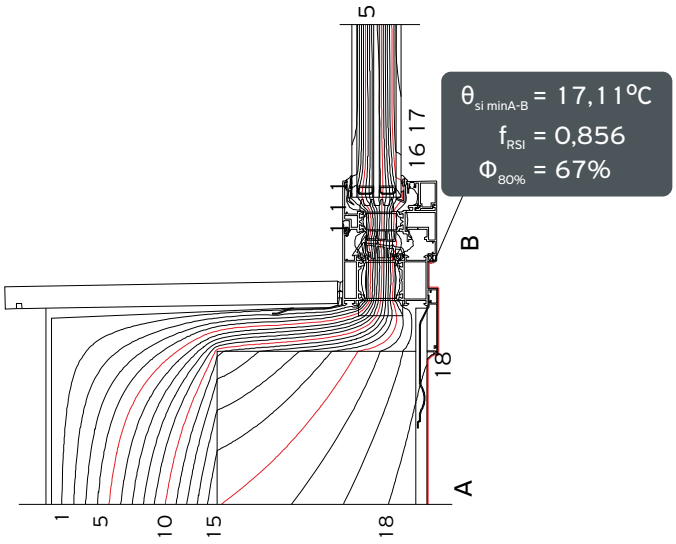


Section of the lower part of the window

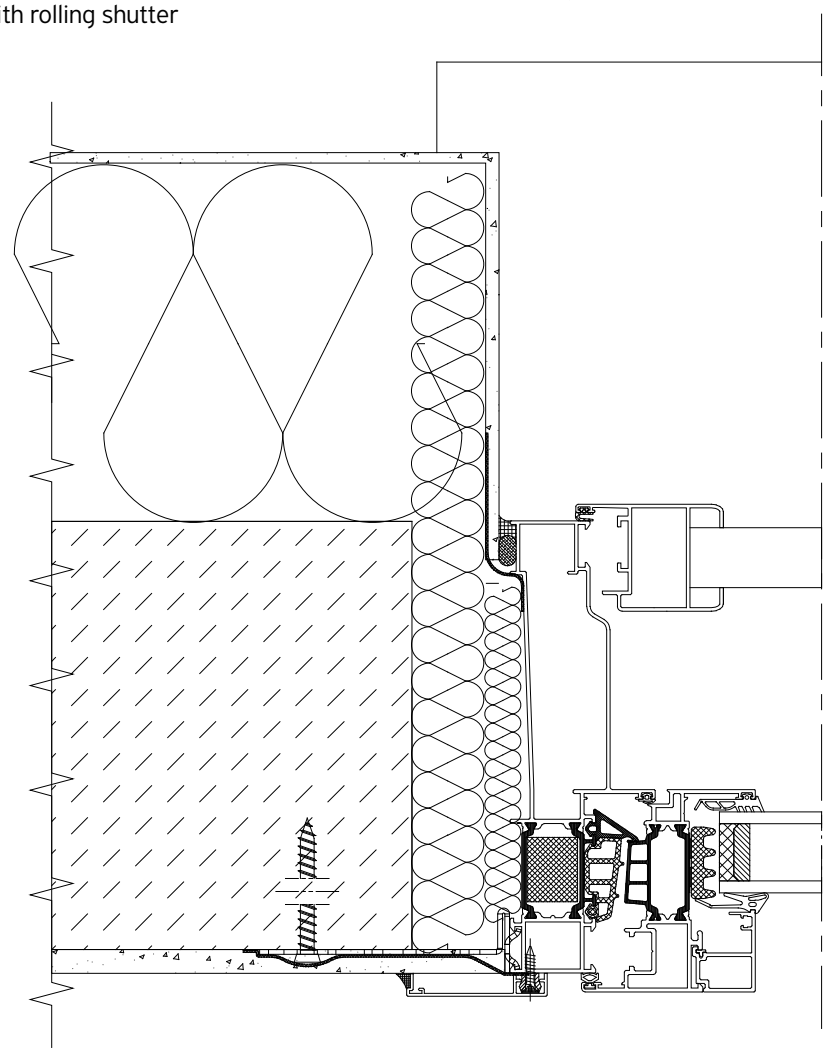
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-1-1-D-BS: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a door with rolling shutter

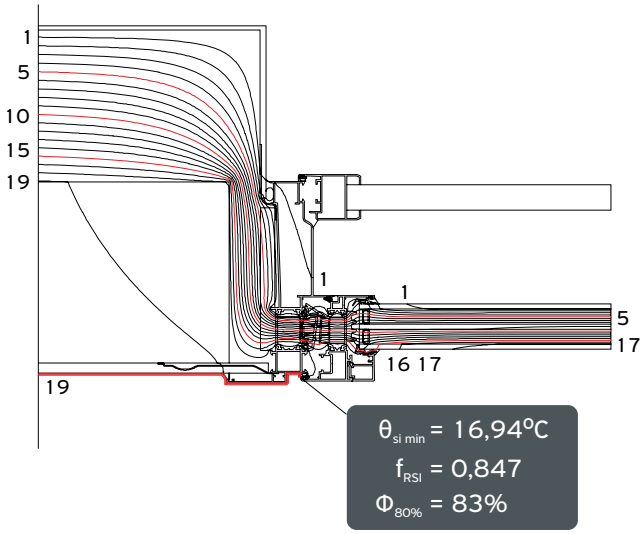


Top view of the left part of the window

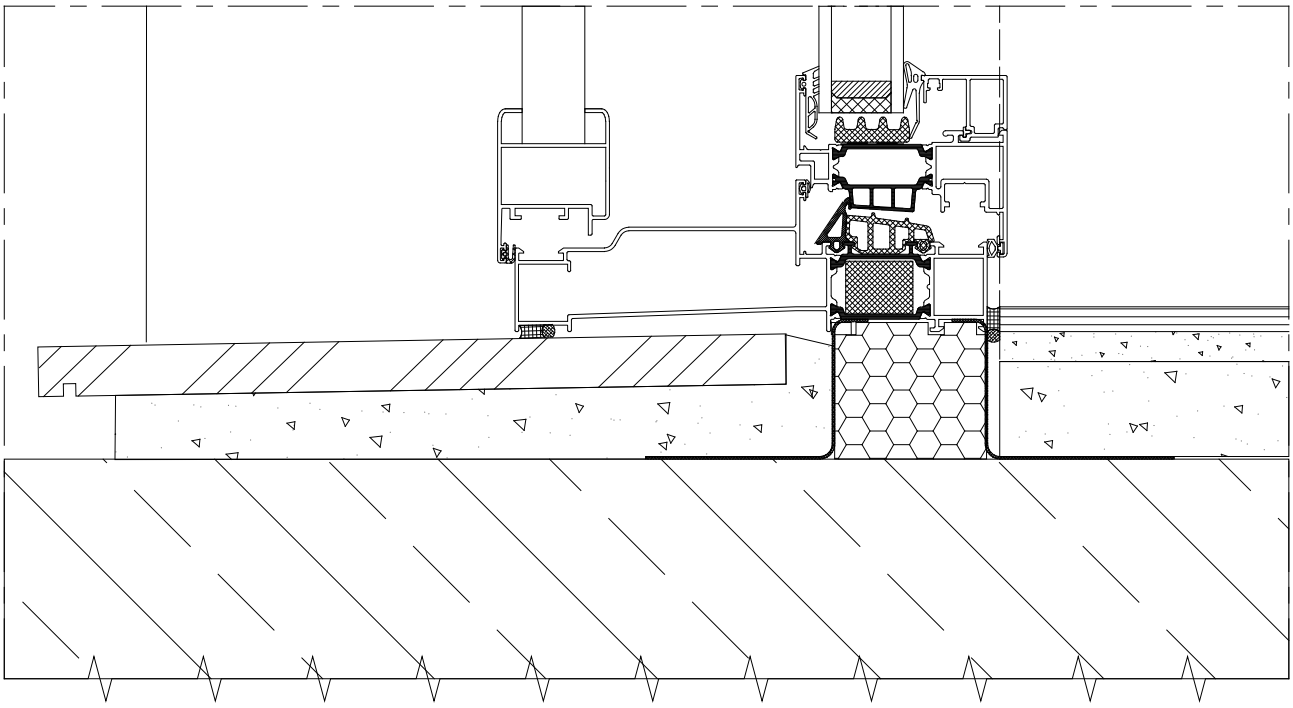
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-1-1-D-BS: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a door with rolling shutter

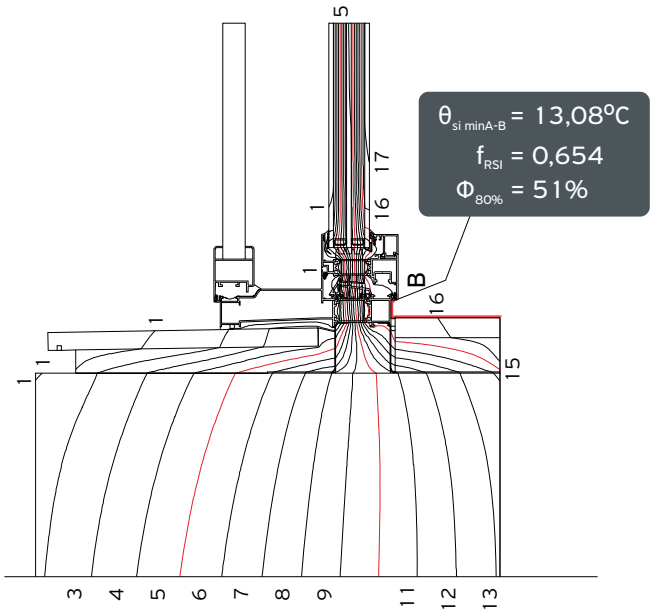


Section of the lower part of the window

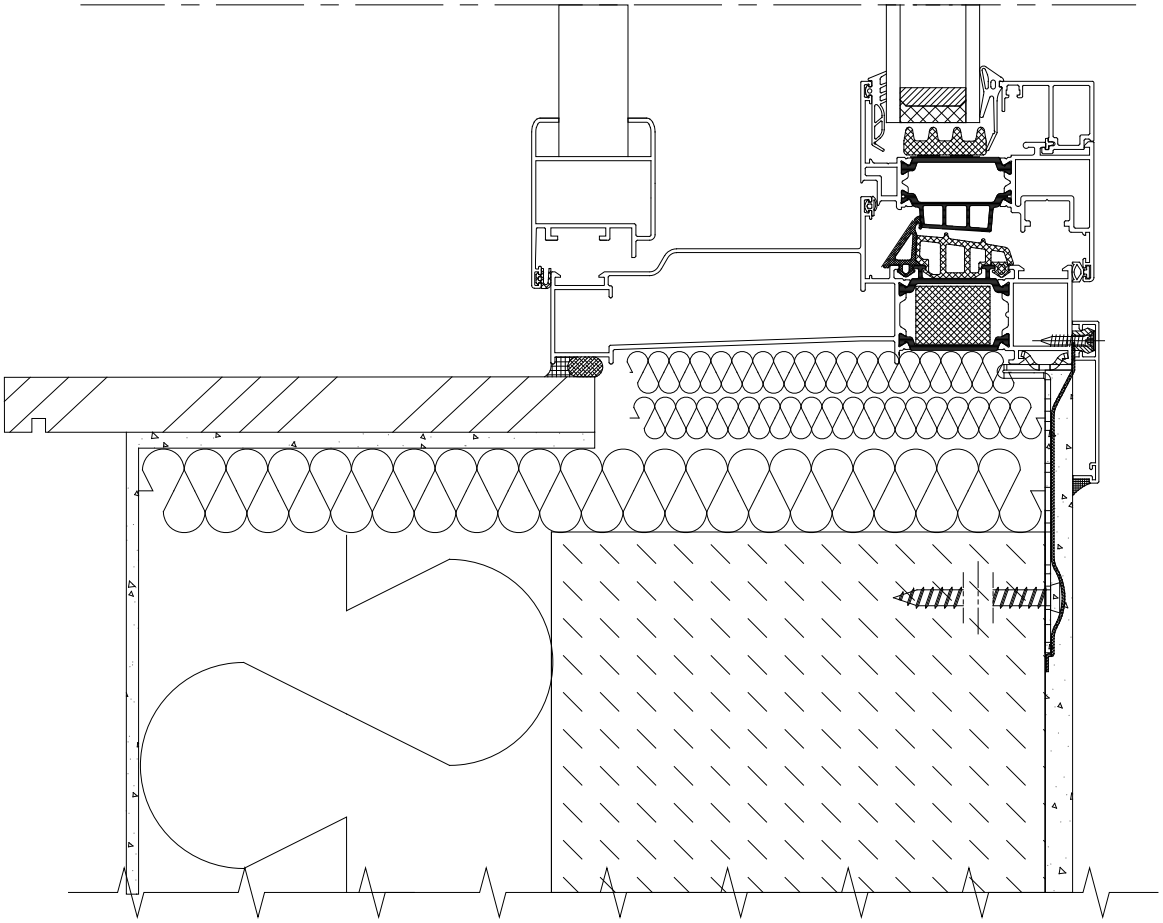
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-1-1-W-BS: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a window with rolling shutter

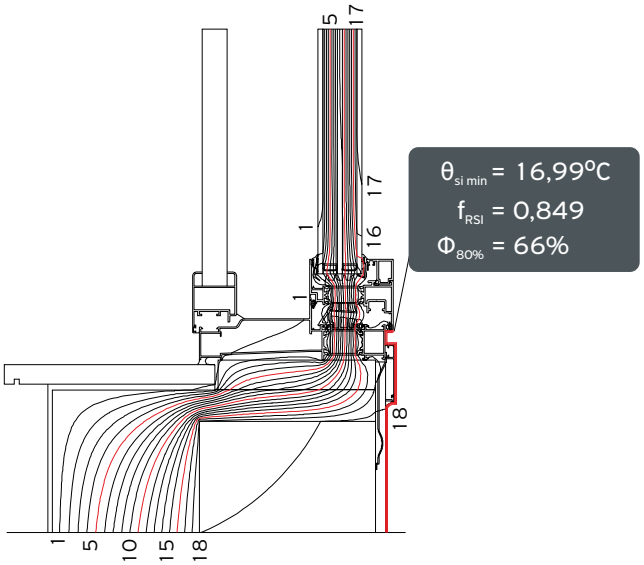


Section of the lower part of the window

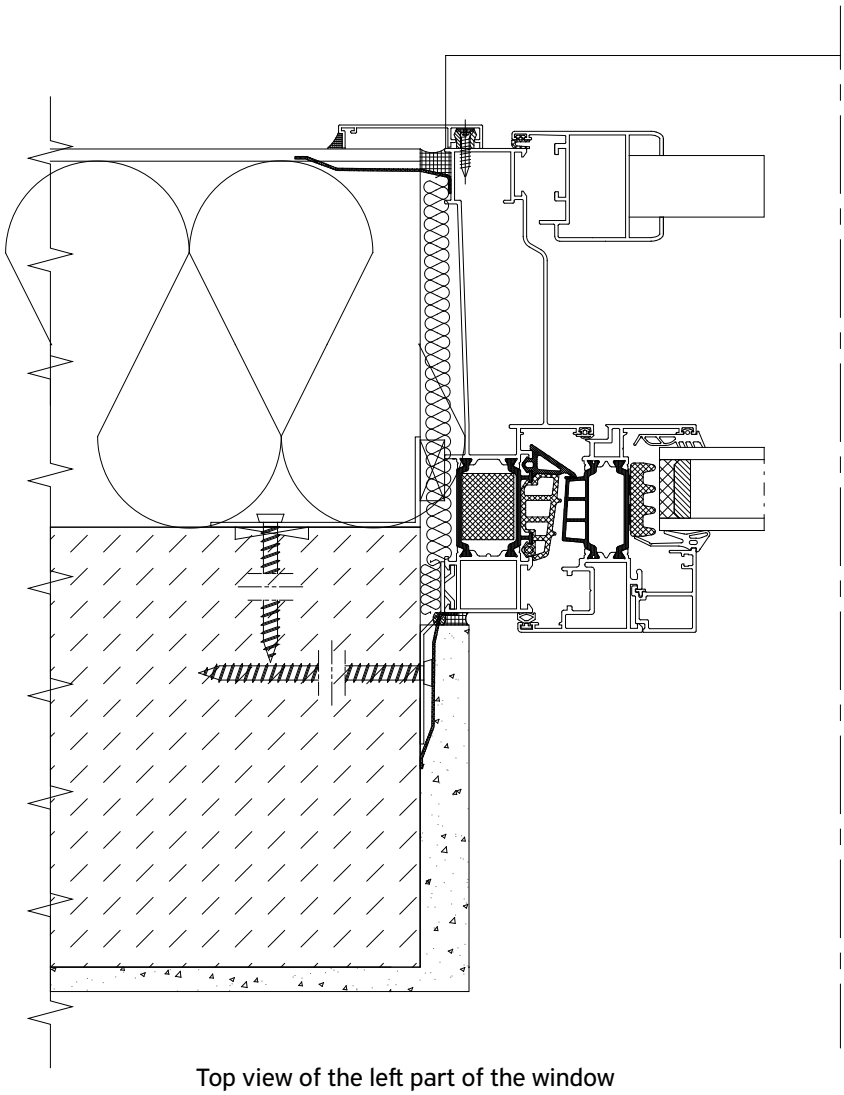
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-3-1-W-BS: Single masonry with 10 cm or more external shell of ETICS type on the external edge of the opening with anchor brackets on a window with rolling shutter

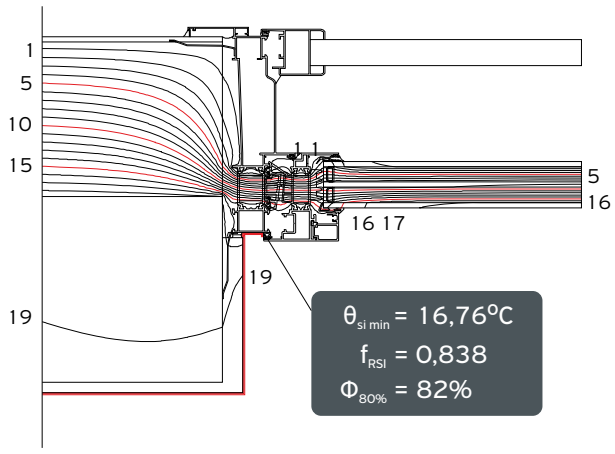


Top view of the left part of the window

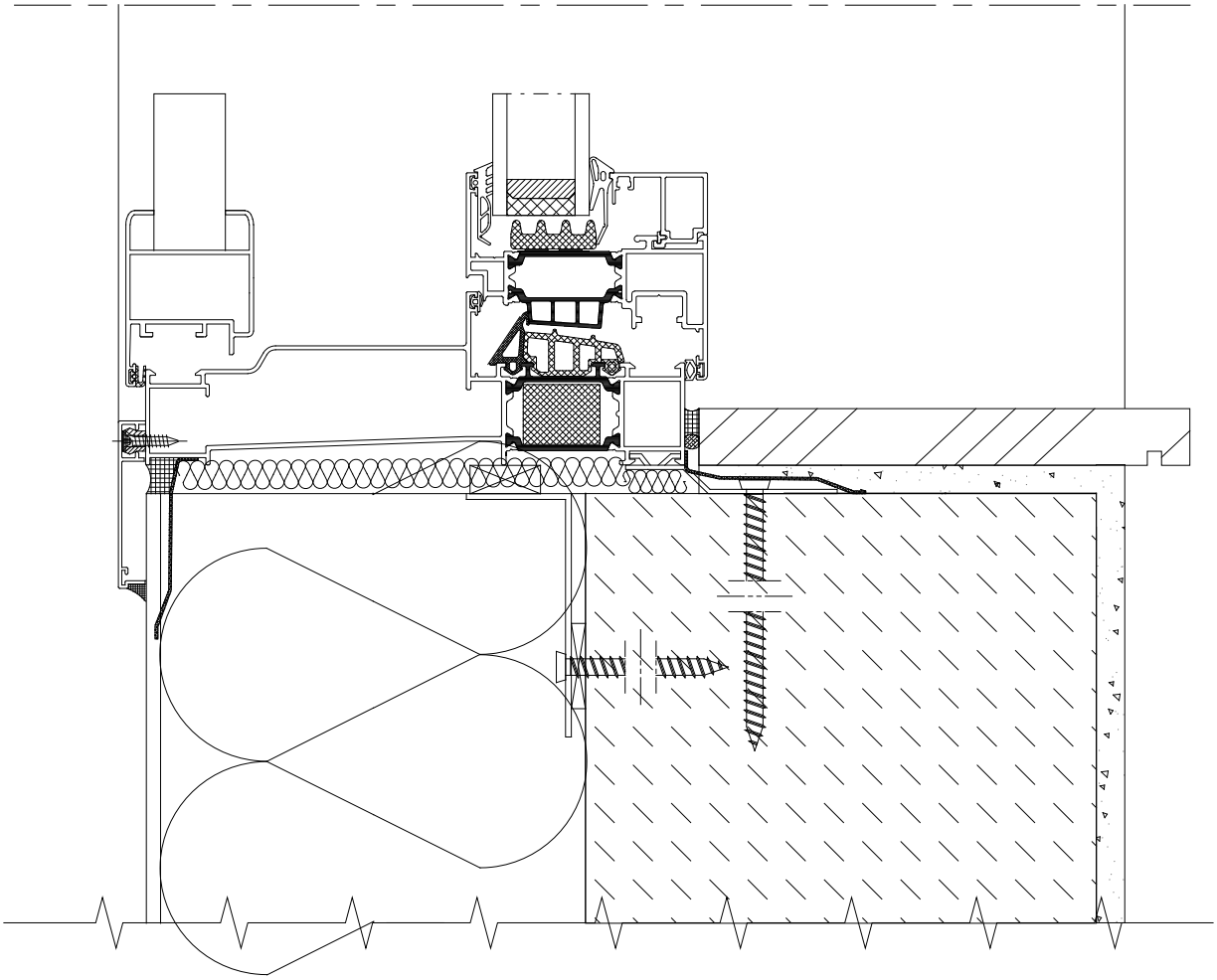
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-3-1-W-BS: Single masonry with 10 cm or more external shell of ETICS type on the external edge of the opening with anchor brackets on a window with rolling shutter

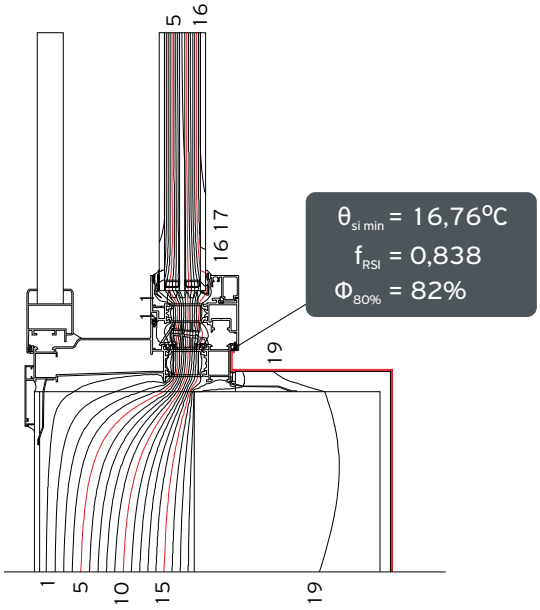


Section of the lower part of the window

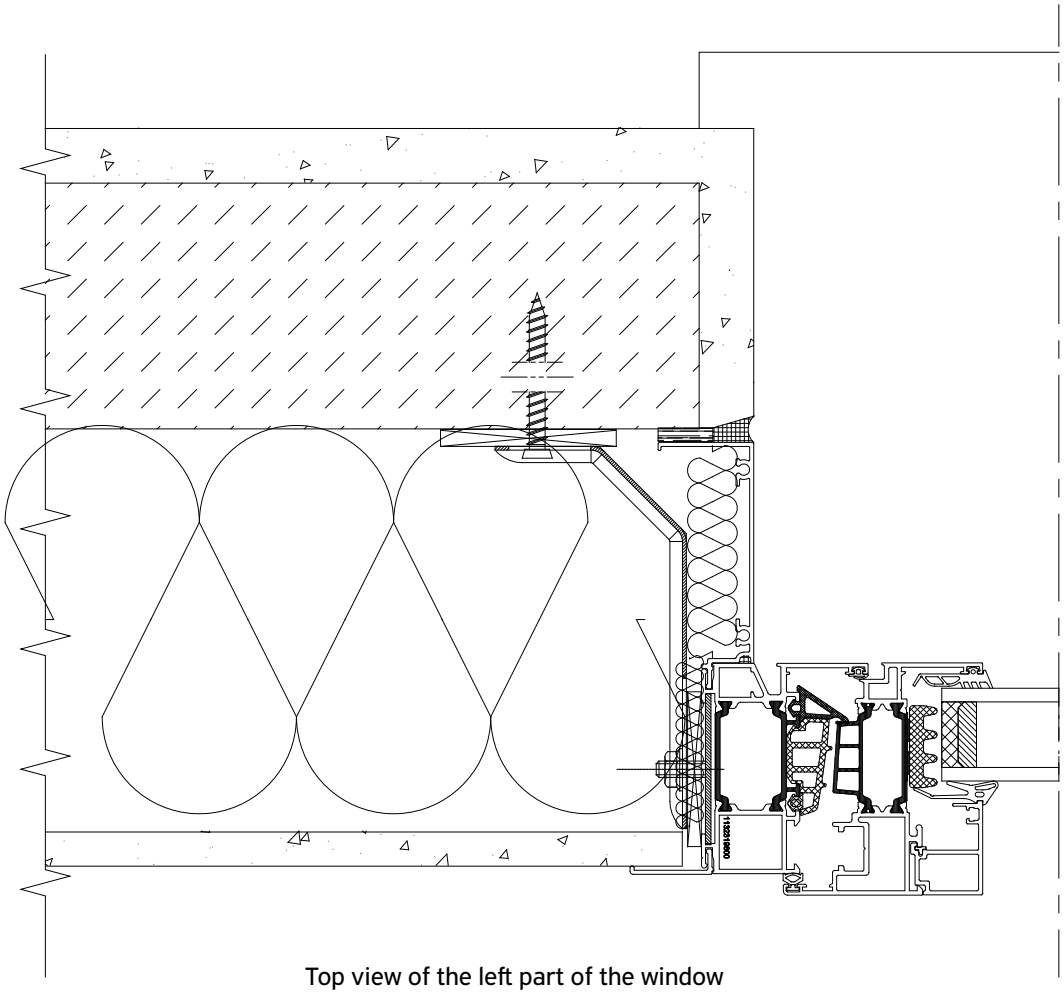
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



D-2-1-W-NRS: Single masonry with internal thermal insulation (French construction) on the internal edge of the opening with anchor brackets on a window without rolling shutter

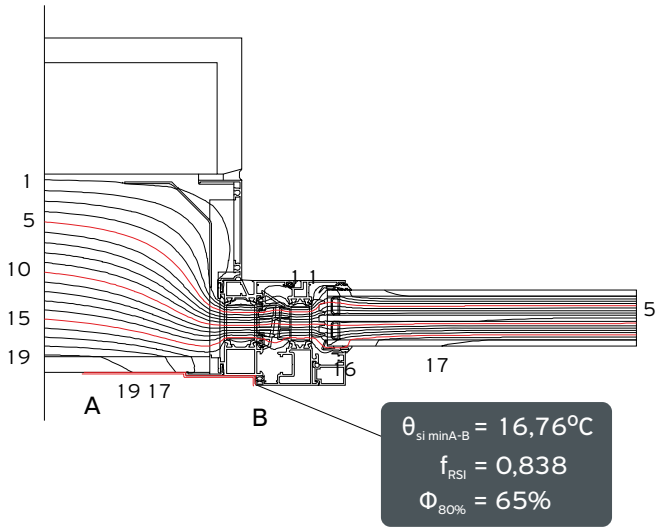


Top view of the left part of the window

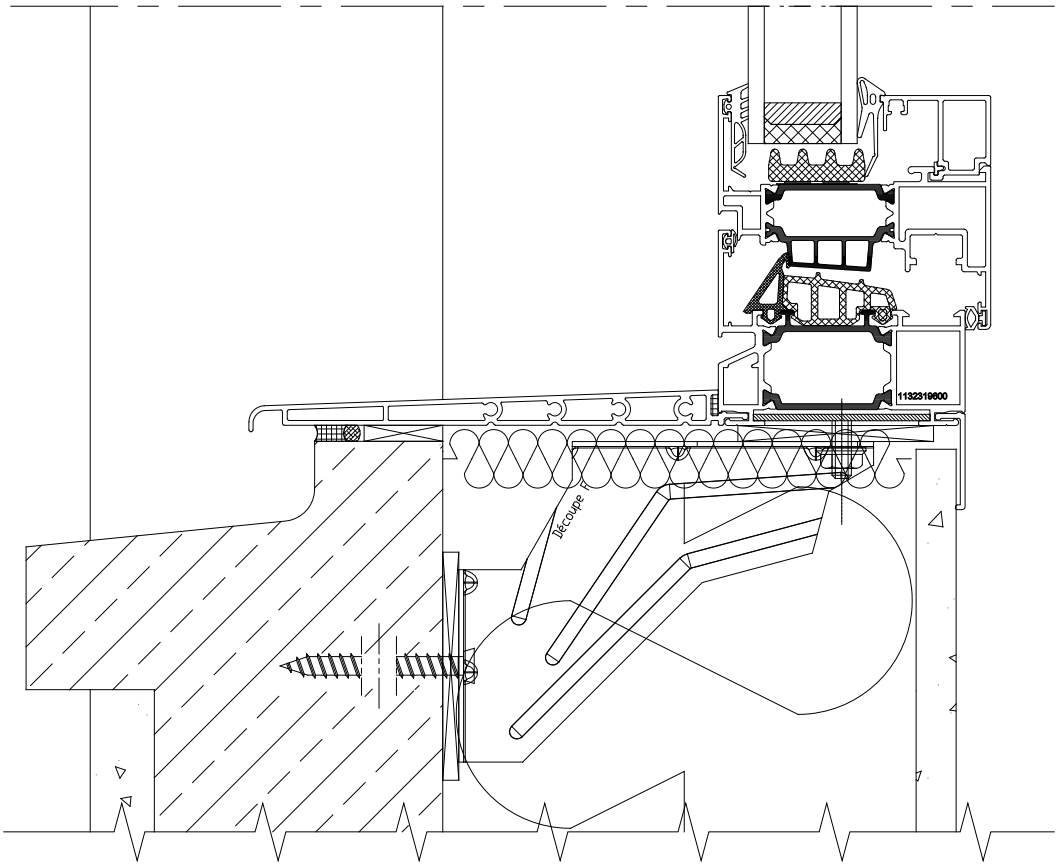
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	
470-12-320-00	FRENCH TYPE METAL ANCHOR 100x85mm	
470-14-059-20	FRENCH TYPE FRAME SUPPORT TAB	

* The codes referenced are indicative and vary depending on the case



D-2-1-W-NRS: Single masonry with internal thermal insulation (French construction) on the internal edge of the opening with anchor brackets on a window without rolling shutter

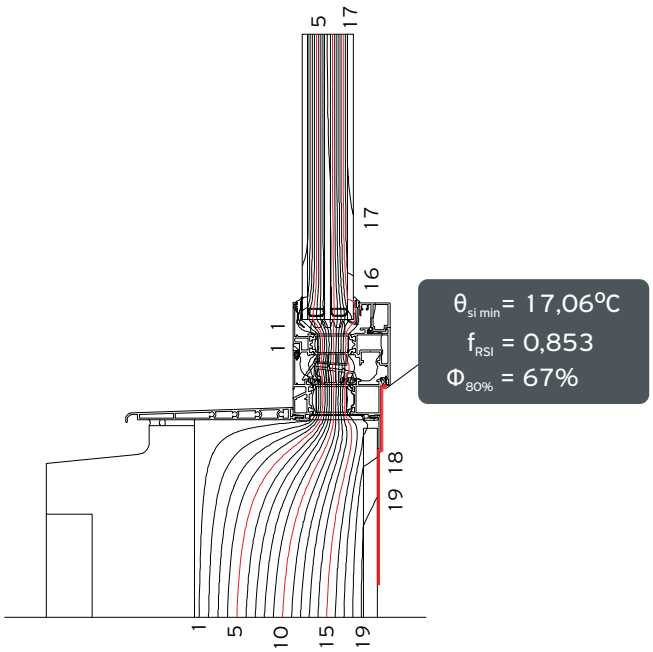


Section of the lower part of the window

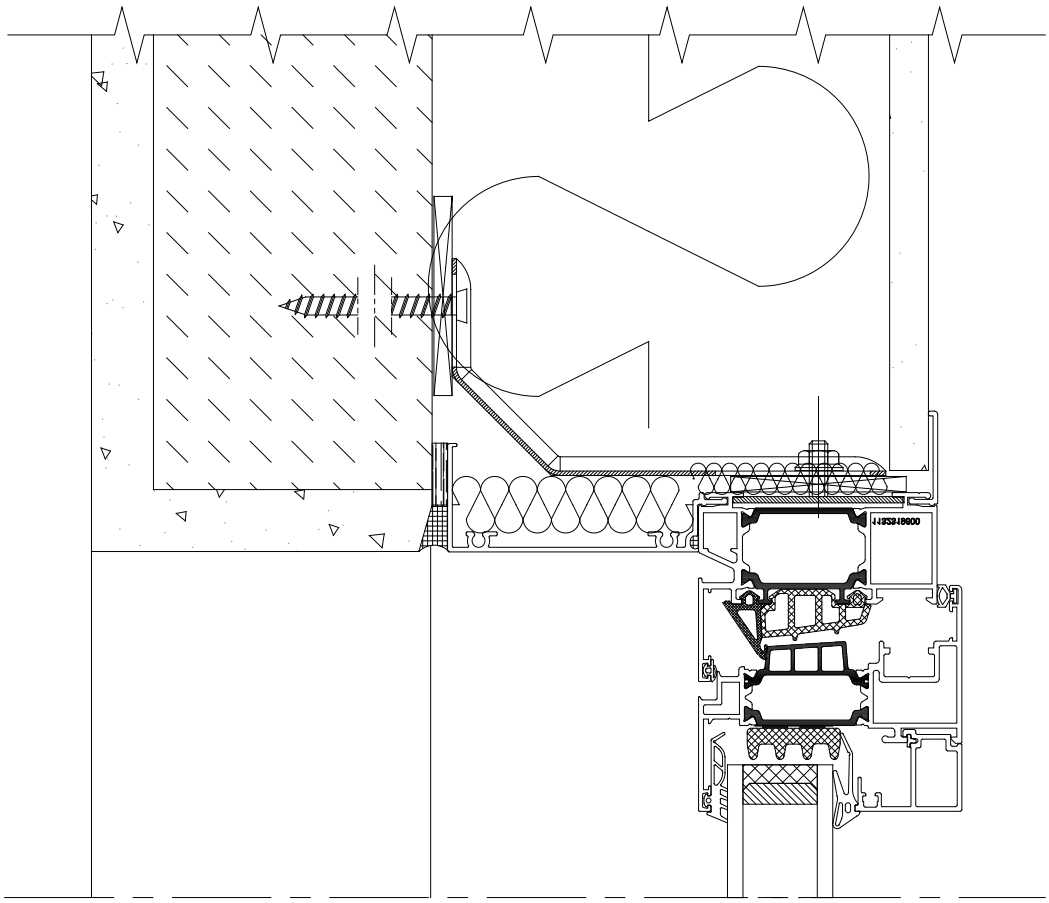
INSIDE | OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	
470-12-460-00	FRENCH TYPE METAL SUPPORT ANGLE-PIECE 100 x 80 mm	
470-14-059-20	FRENCH TYPE FRAME SUPPORT TAB	

* The codes referenced are indicative and vary depending on the case



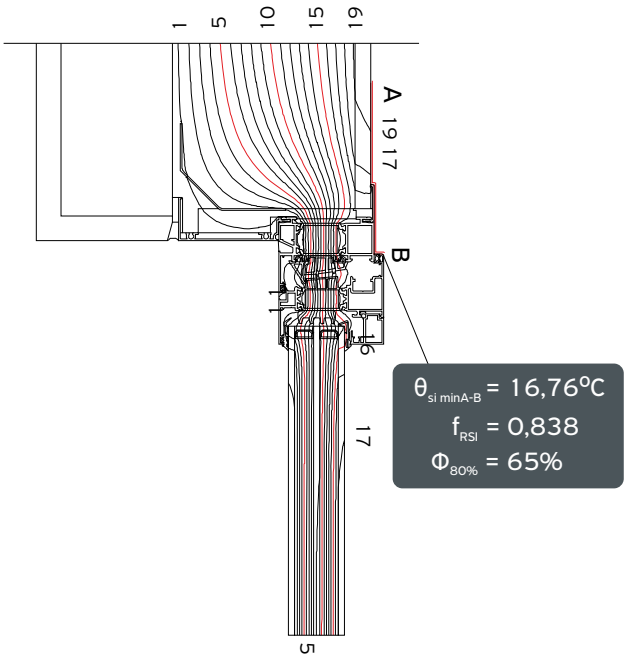
D-2-1-W-NRS: Single masonry with internal thermal insulation (French construction) on the internal edge of the opening with anchor brackets on a window without rolling shutter



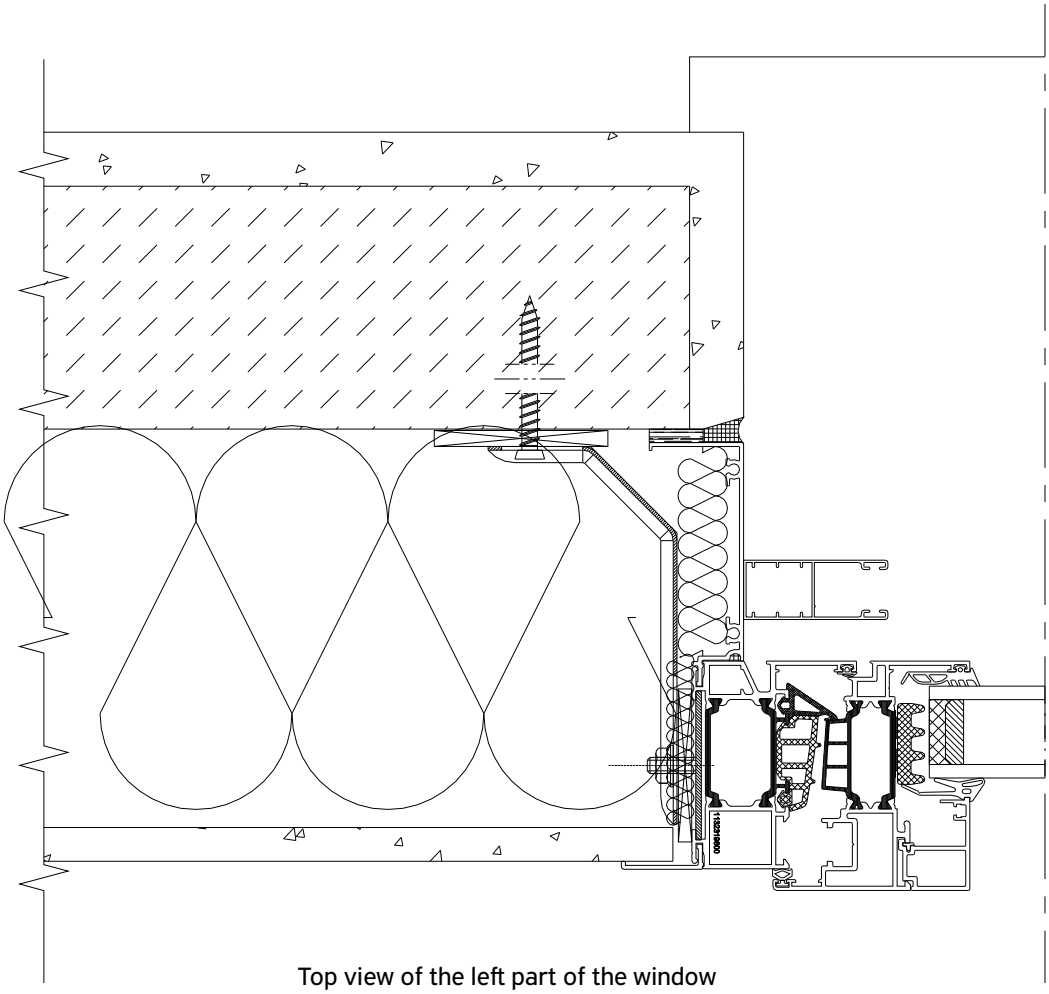
Section of the upper part of the frame

	Code	Description	Material
INSIDE / OUTSIDE	770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
	770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
	770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
	770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
	770-30-609-00	JOINT CORD Ø10	
	762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
	470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
	770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
	770-10-020-00	AIR AND WATER SEALING TAPE	
	470-12-320-00	FRENCH TYPE METAL ANCHOR 100x85mm	
	470-14-059-20	FRENCH TYPE FRAME SUPPORT TAB	

* The codes referenced are indicative and vary depending on the case



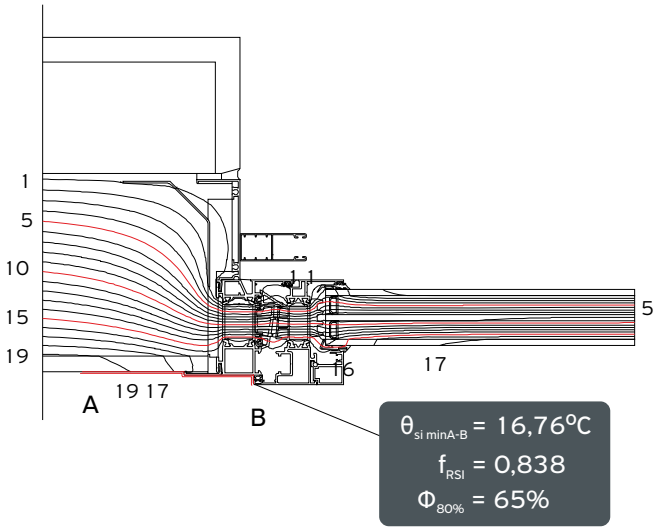
D-2-1-W-RSX: Single masonry with internal thermal insulation (French construction) on the inner edge of the opening with anchor brackets on a window with external rolling shutter



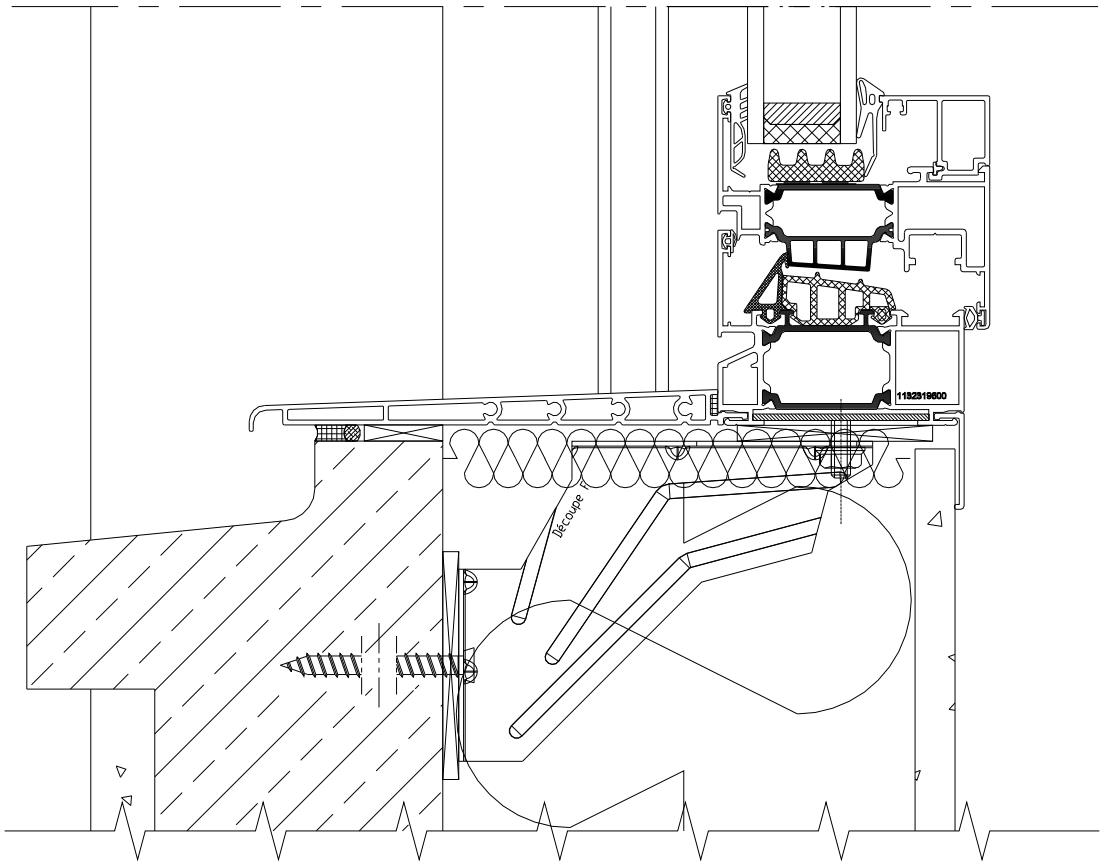
Top view of the left part of the window

	Code	Description	Material
OUTSIDE	770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
	770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
	770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
INSIDE	770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
	770-30-609-00	JOINT CORD Ø10	
	762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
	470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
	770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
	770-10-020-00	AIR AND WATER SEALING TAPE	
	470-12-320-00	FRENCH TYPE METAL ANCHOR 100x85mm	
	470-14-059-20	FRENCH TYPE FRAME SUPPORT TAB	

* The codes referenced are indicative and vary depending on the case



D-2-1-W-RSX: Single masonry with internal thermal insulation (French construction) on the inner edge of the opening with anchor brackets on a window with external rolling shutter

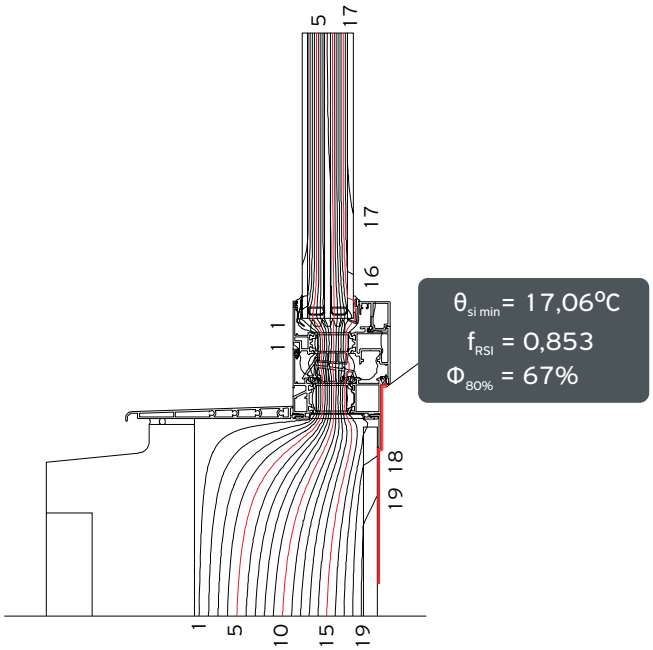


Section of the lower part of the window

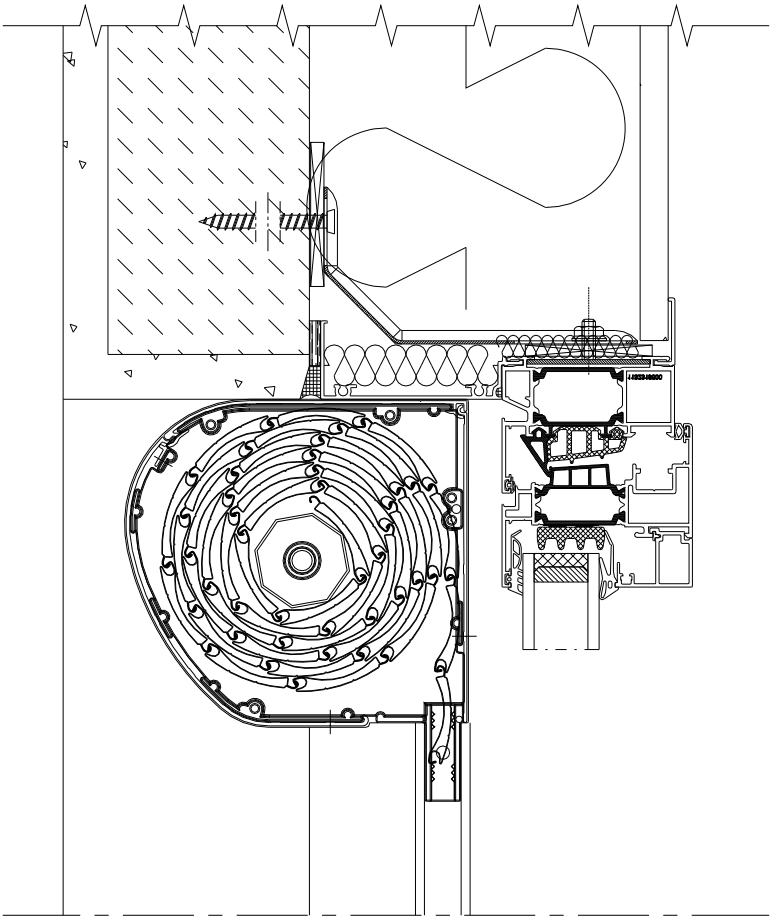
INSIDE | OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	
470-12-460-00	FRENCH TYPE METAL SUPPORT ANGLE-PIECE 100 x 80 mm	
470-14-059-20	FRENCH TYPE FRAME SUPPORT TAB	

* The codes referenced are indicative and vary depending on the case



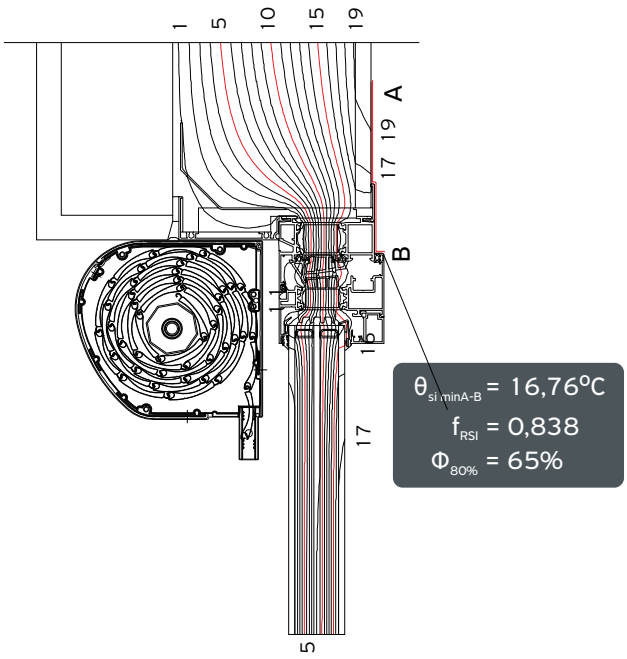
D-2-1-W-RSX: Single masonry with internal thermal insulation (French construction) on the inner edge of the opening with anchor brackets on a window with external rolling shutter



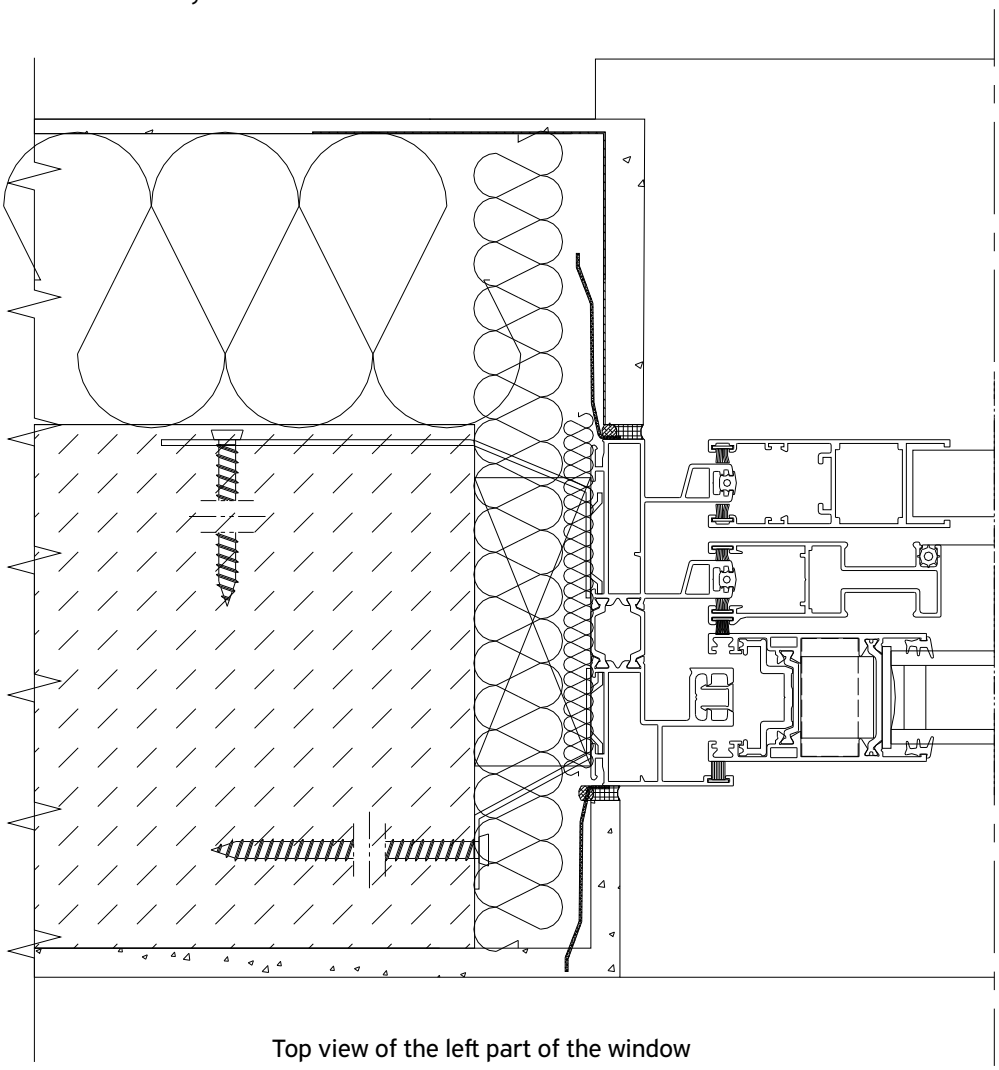
Section of the upper part of the frame

	Code	Description	Material
OUTSIDE	770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
	770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
	770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
INSIDE	770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
	770-30-609-00	JOINT CORD Ø10	
	762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
	470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
	770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
	770-10-020-00	AIR AND WATER SEALING TAPE	
	470-12-320-00	FRENCH TYPE METAL ANCHOR 100x85mm	
	470-14-059-20	FRENCH TYPE FRAME SUPPORT TAB	

* The codes referenced are indicative and vary depending on the case



C-1-1-D-NRS: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a door without rolling shutter

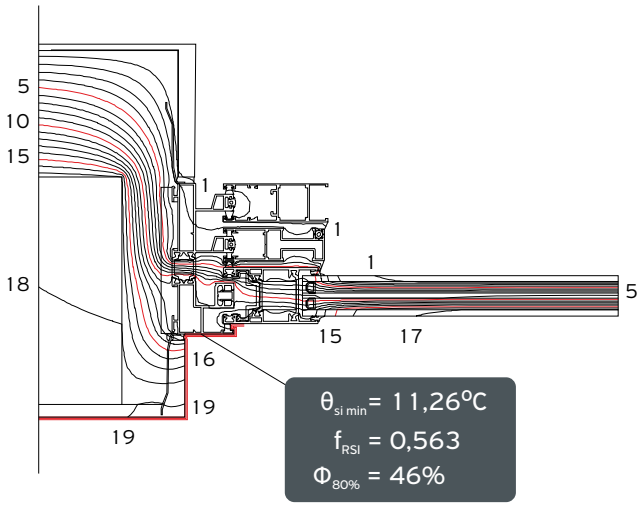


Top view of the left part of the window

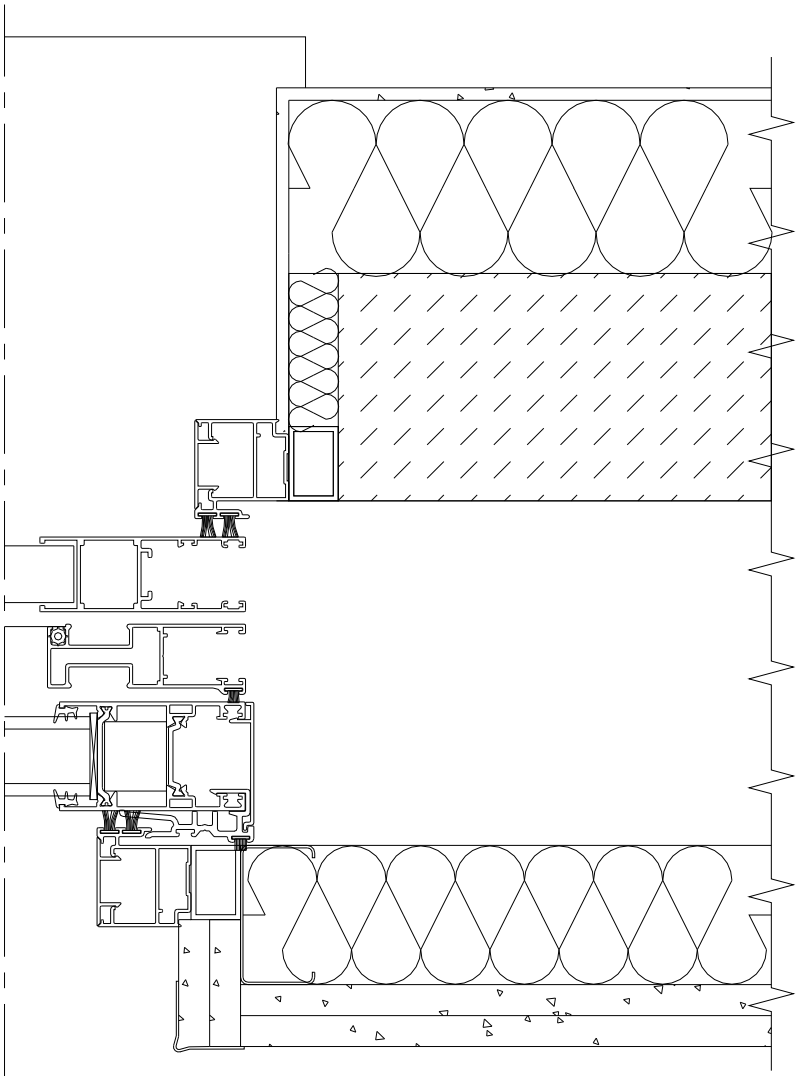
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-1-1-D-NRS: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a door without rolling shutter

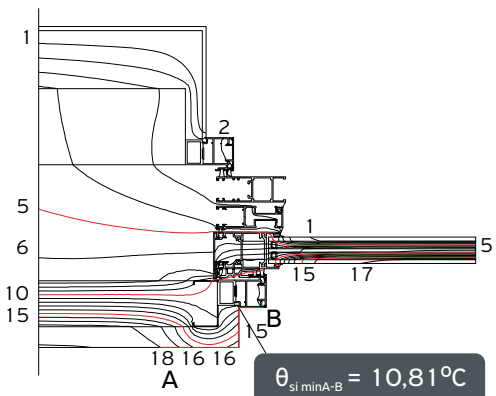


Top view of the right part of the frame

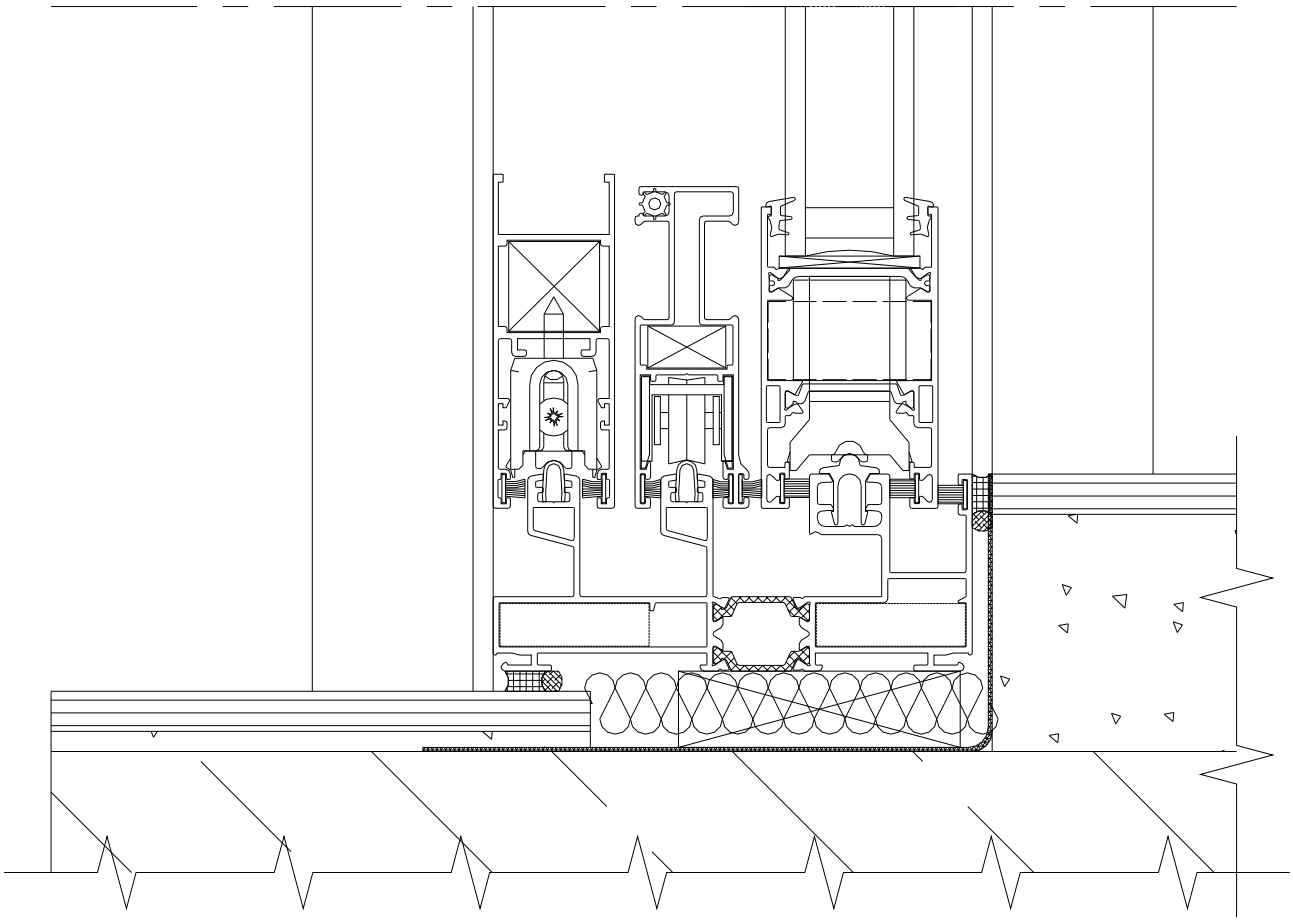
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-1-1-D-NRS: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a door without rolling shutter

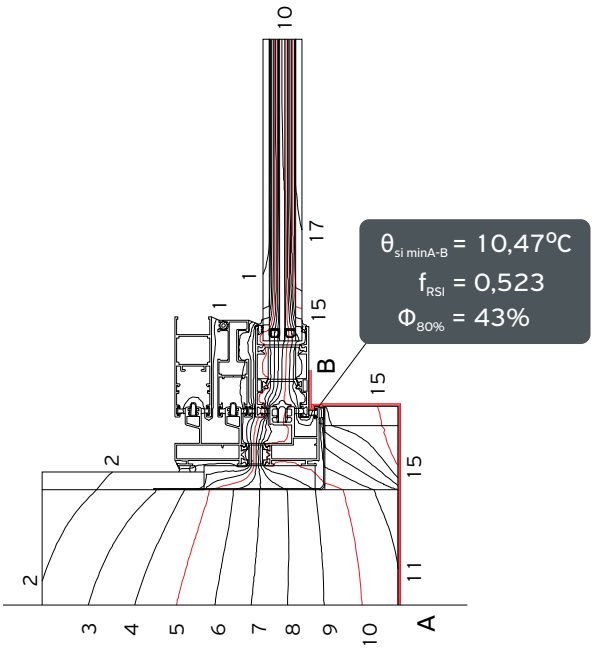


Section of the lower part of the window

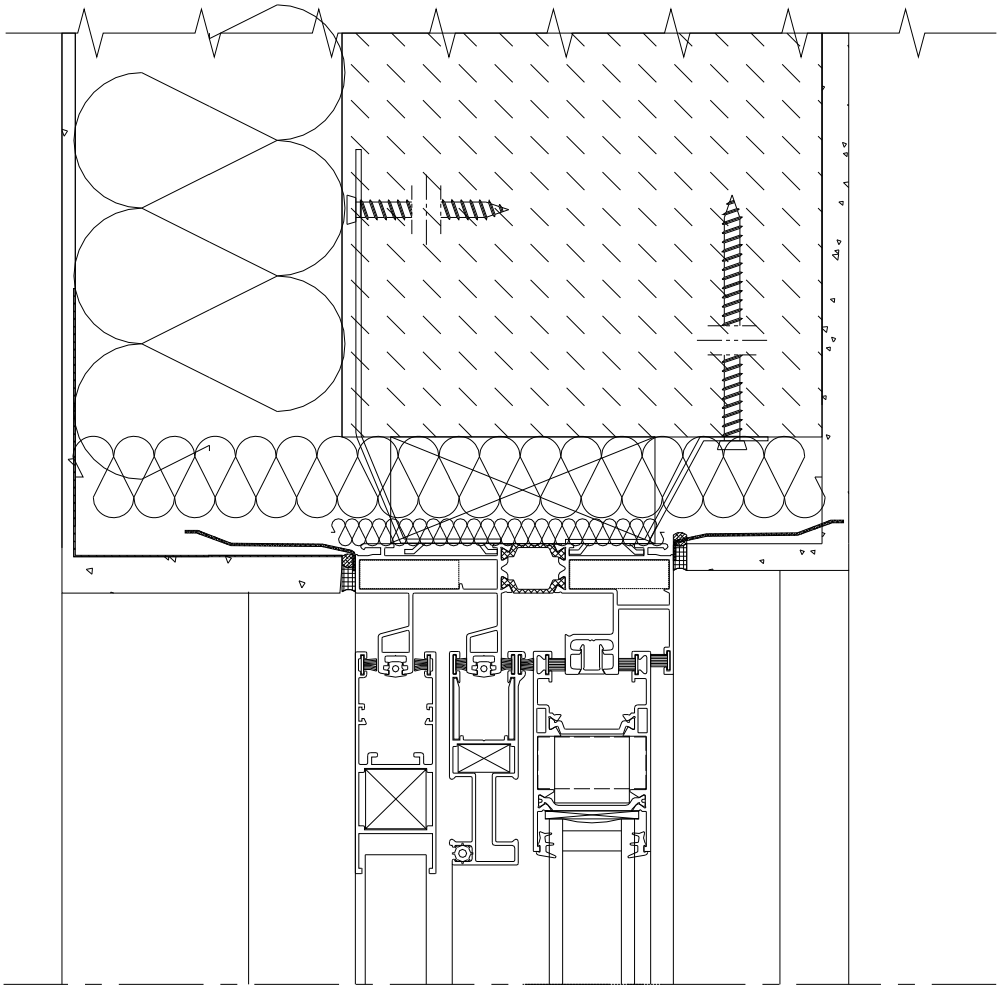
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-1-1-D-NRS: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a door without rolling shutter

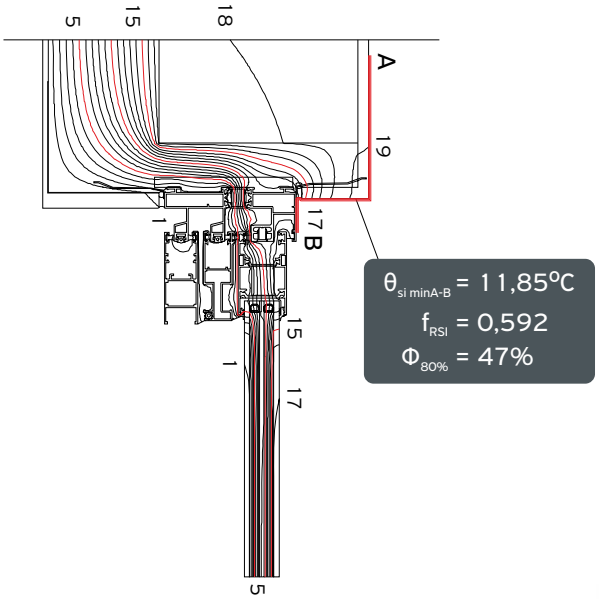


Section of the upper part of the frame

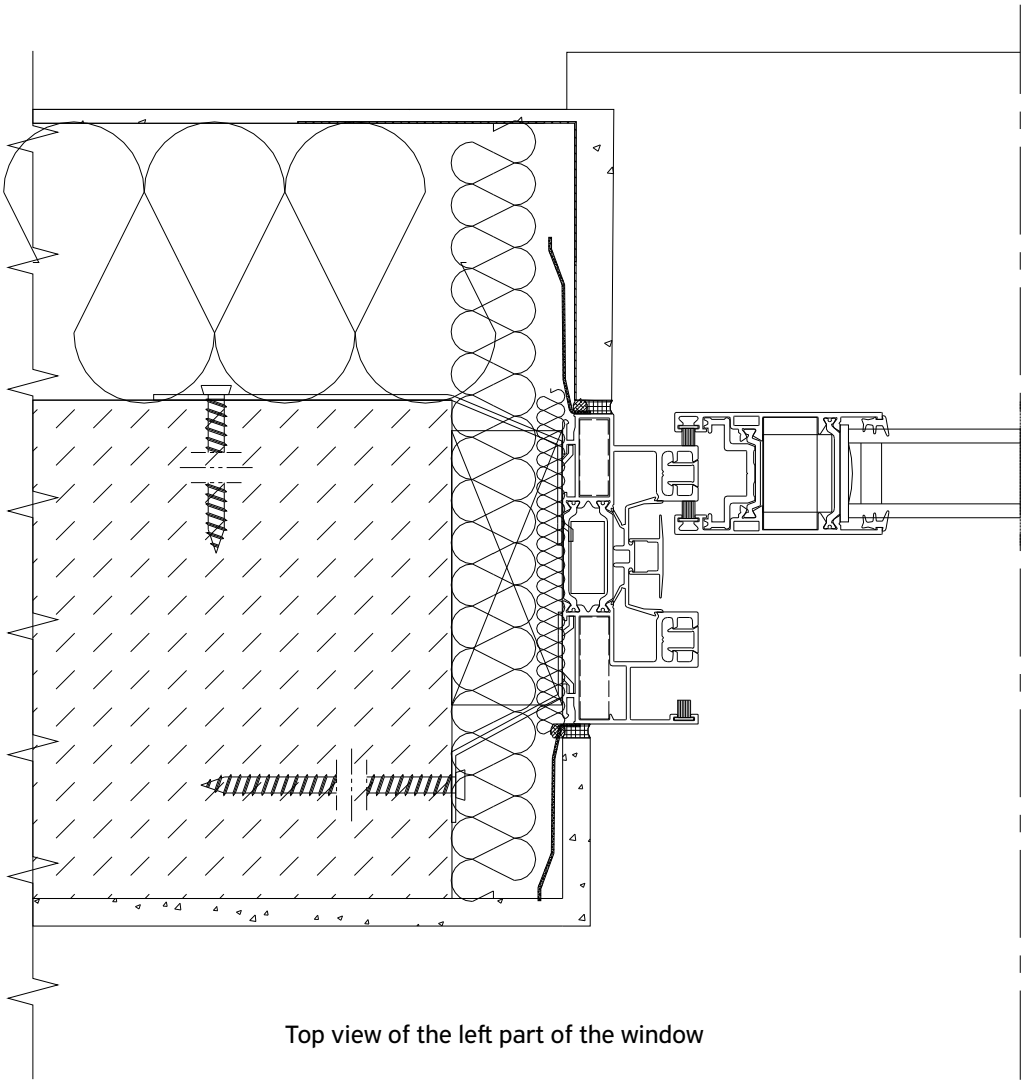
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-1-1-D-NRS: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a door without rolling shutter

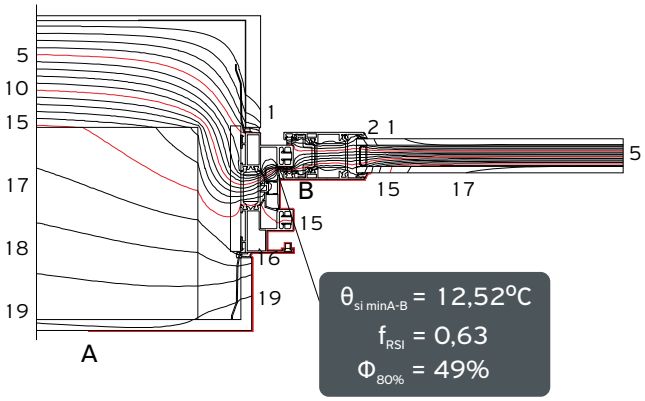


Top view of the left part of the window

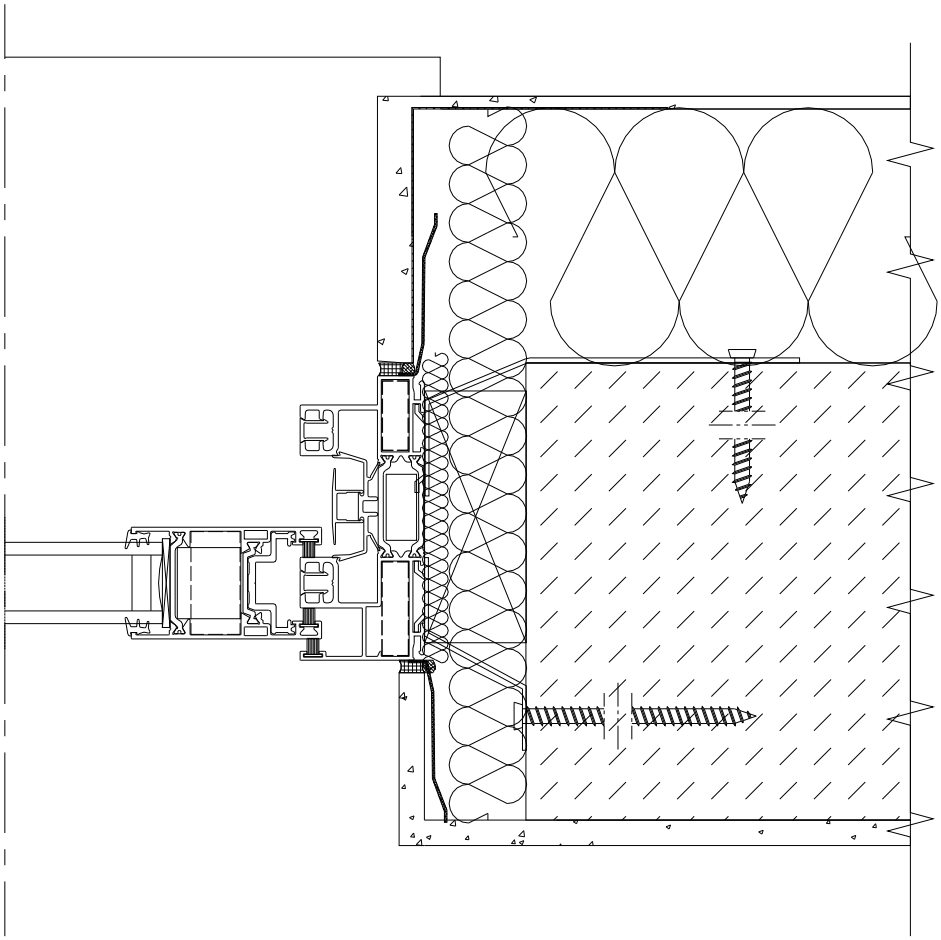
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-1-1-D-NRS: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a door without rolling shutter

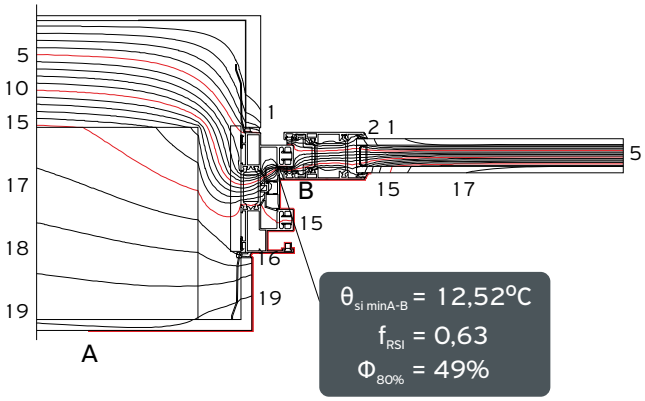


Top view of the right part of the frame

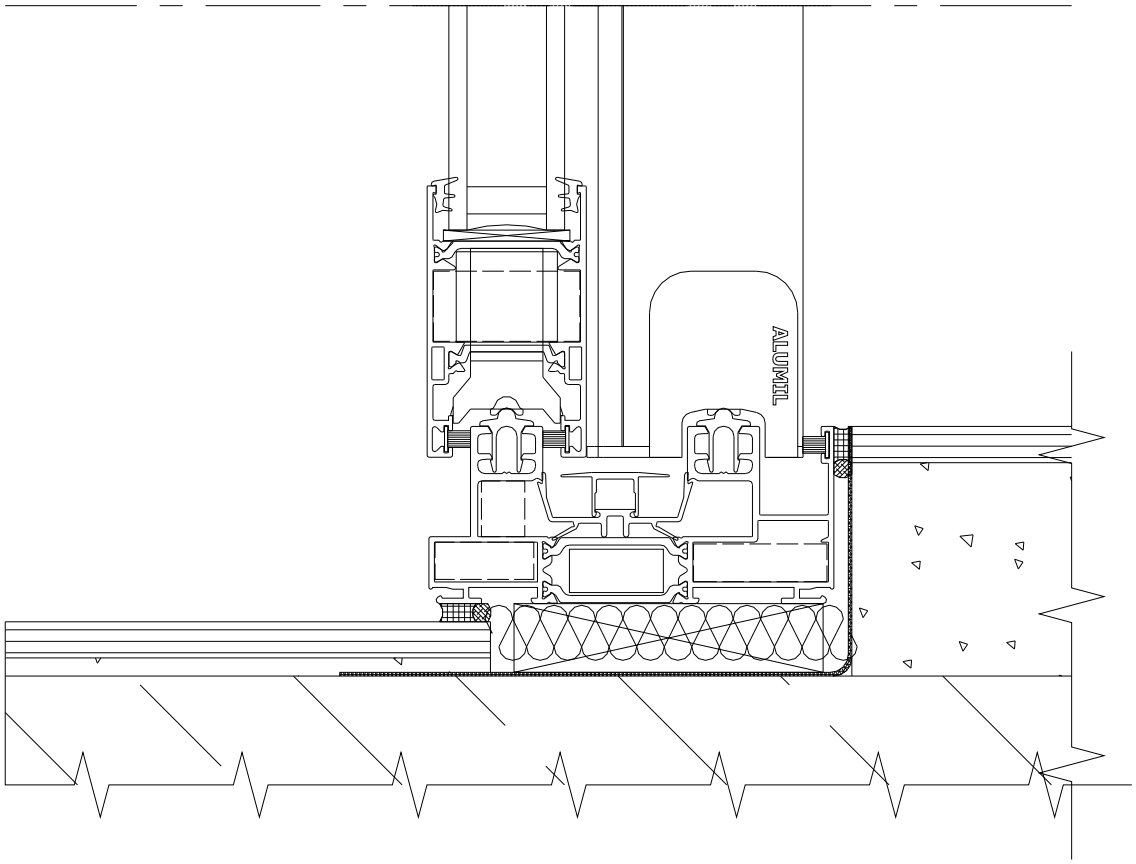
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



C-1-1-D-NRS: Single masonry with 10 cm or more external shell of ETICS type in the middle of the opening with anchor brackets on a door without rolling shutter

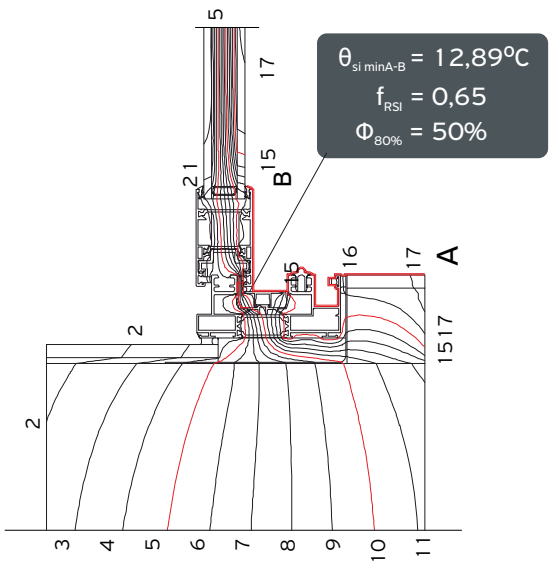


Section of the lower part of the window

INSIDE OUTSIDE

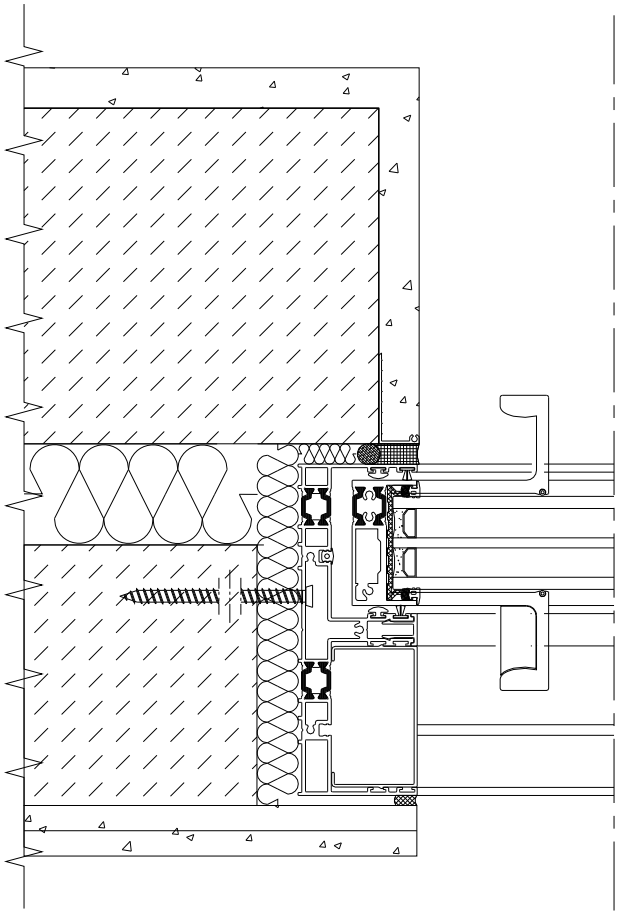
Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



The following drawing presents the installation of minimal boxed frame on the structural element.

A-2-1-D-NRS: Double masonry with 5cm thermal insulation on the internal edge of the opening with anchor brackets on a door without rolling shutter

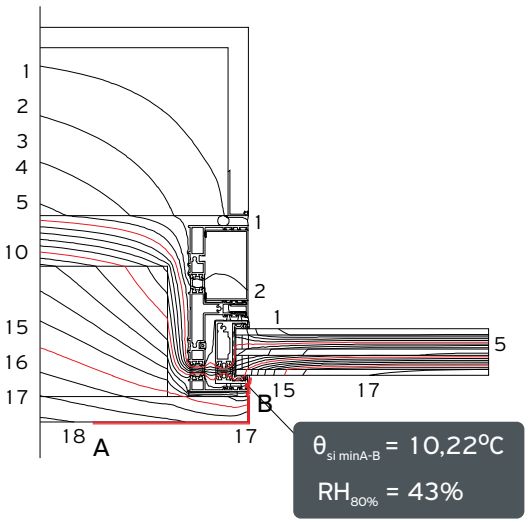


Top view of the left part of the window

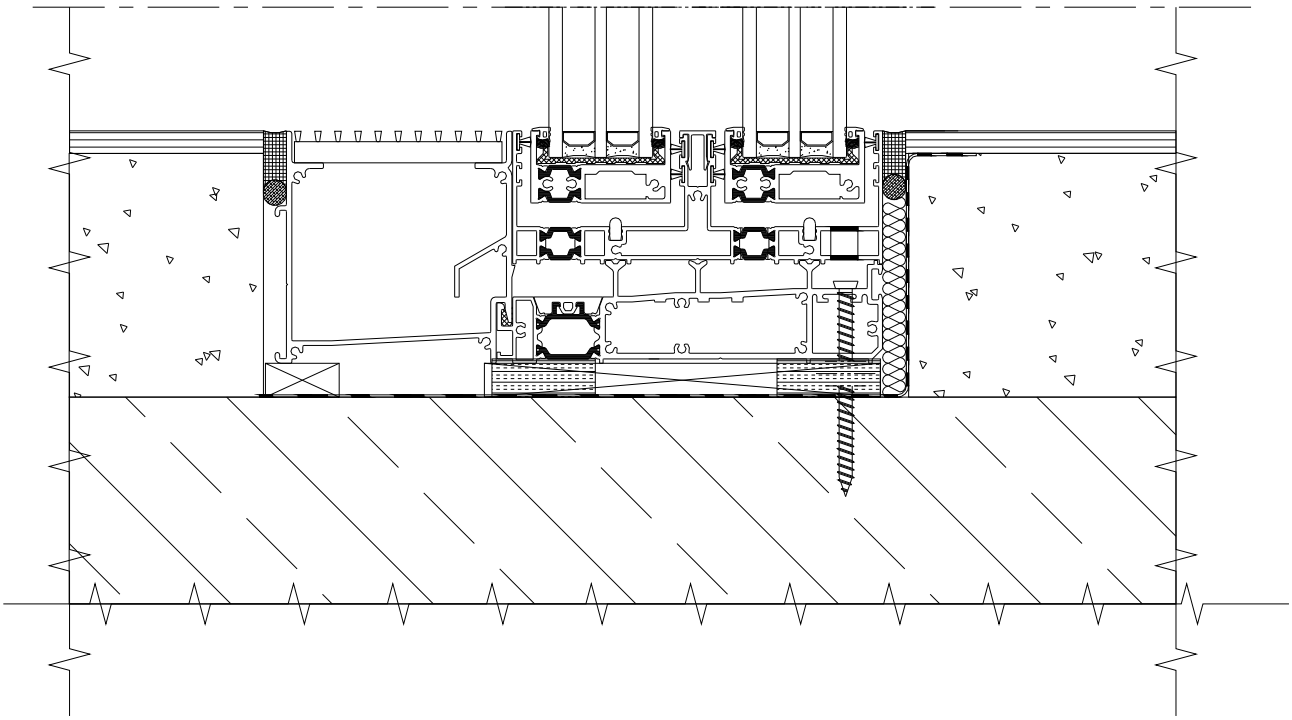
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



A-2-1-D-NRS: Double masonry with 5cm thermal insulation on the internal edge of the opening with anchor brackets on a door without rolling shutter

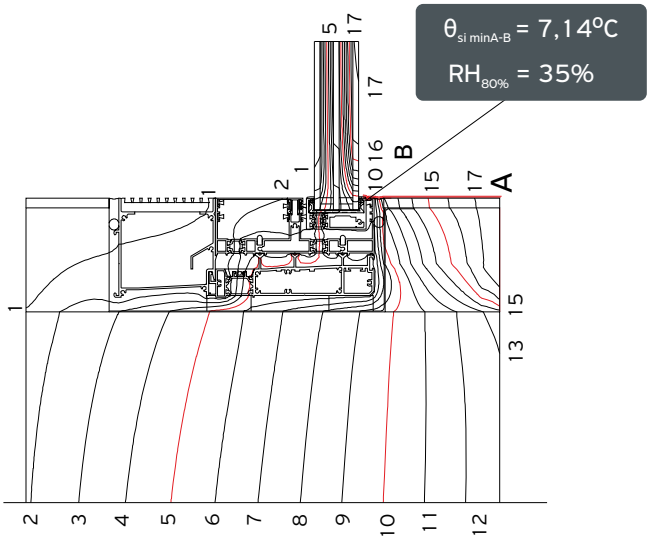


Section of the lower part of the window

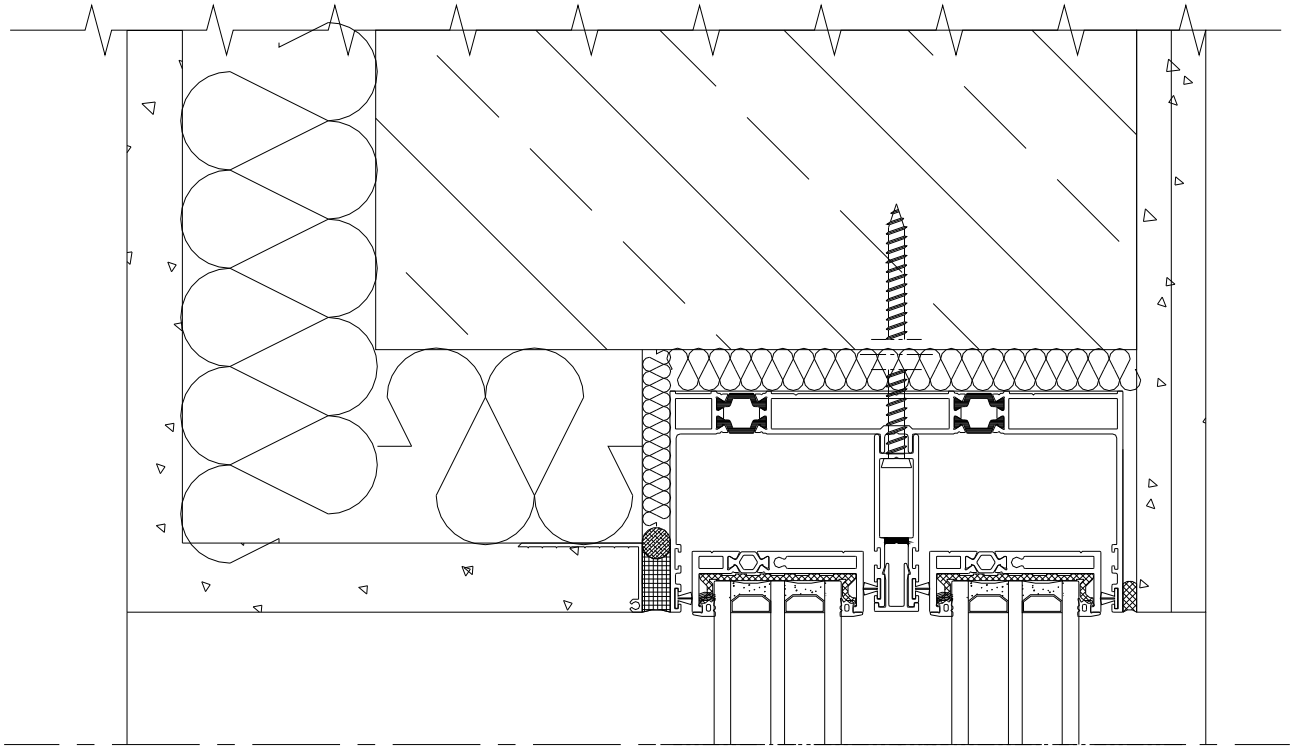
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	
770-54-102-00	PRE-PRESSED SELF-SWELLING INSULATION TAPE 54/10-20 mm	

* The codes referenced are indicative and vary depending on the case



A-2-1-D-NRS: Double masonry with 5cm thermal insulation on the internal edge of the opening with anchor brackets on a door without rolling shutter

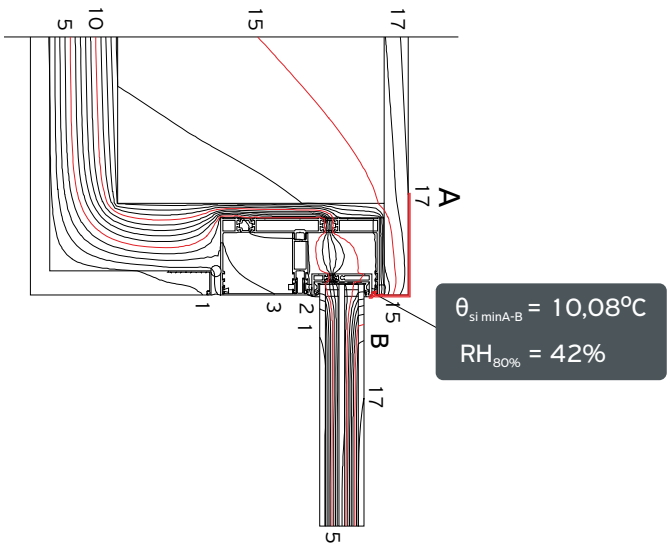


Section of the upper part of the frame

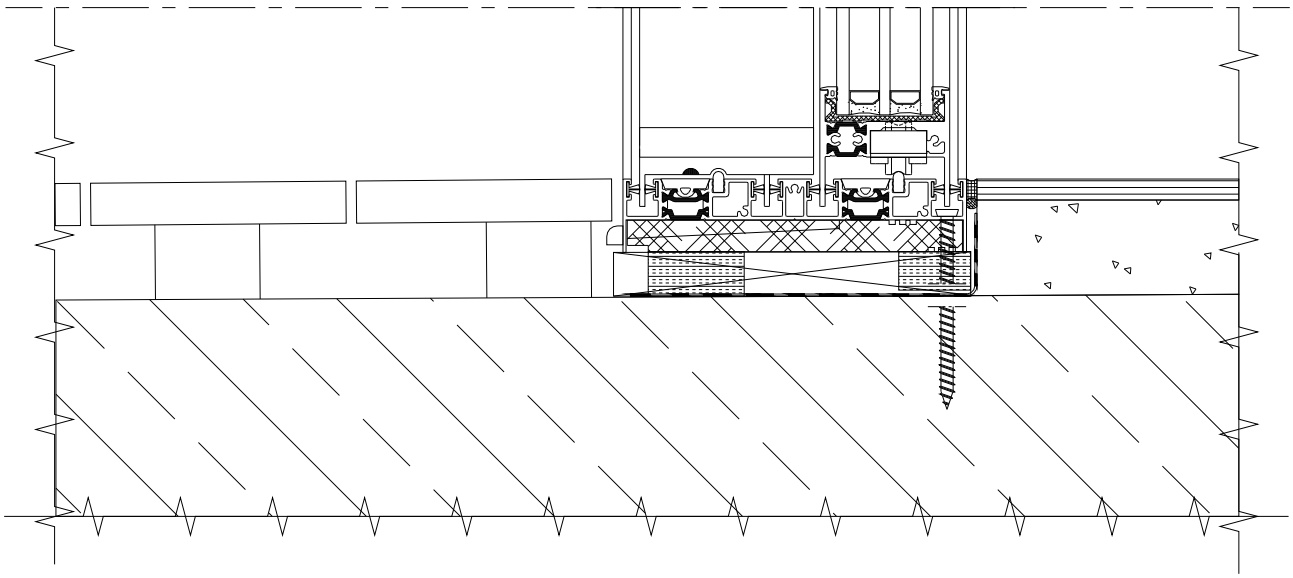
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	

* The codes referenced are indicative and vary depending on the case



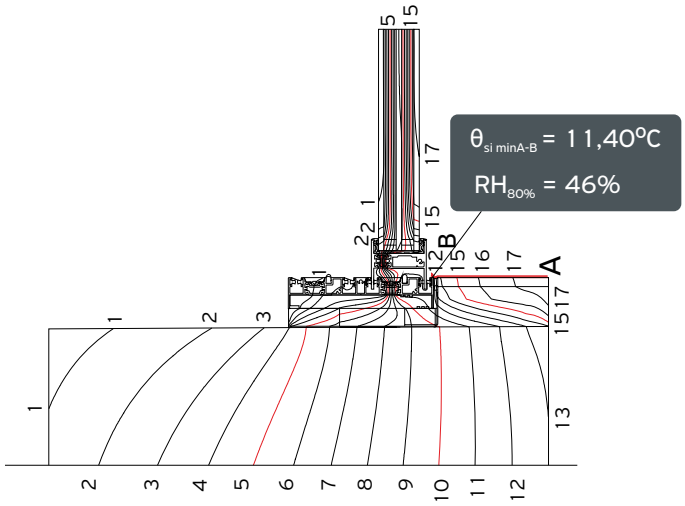
A-2-1-D-NRS: Double masonry with 5cm thermal insulation on the internal edge of the opening with anchor brackets on a door without rolling shutter



Section of the lower part of the window

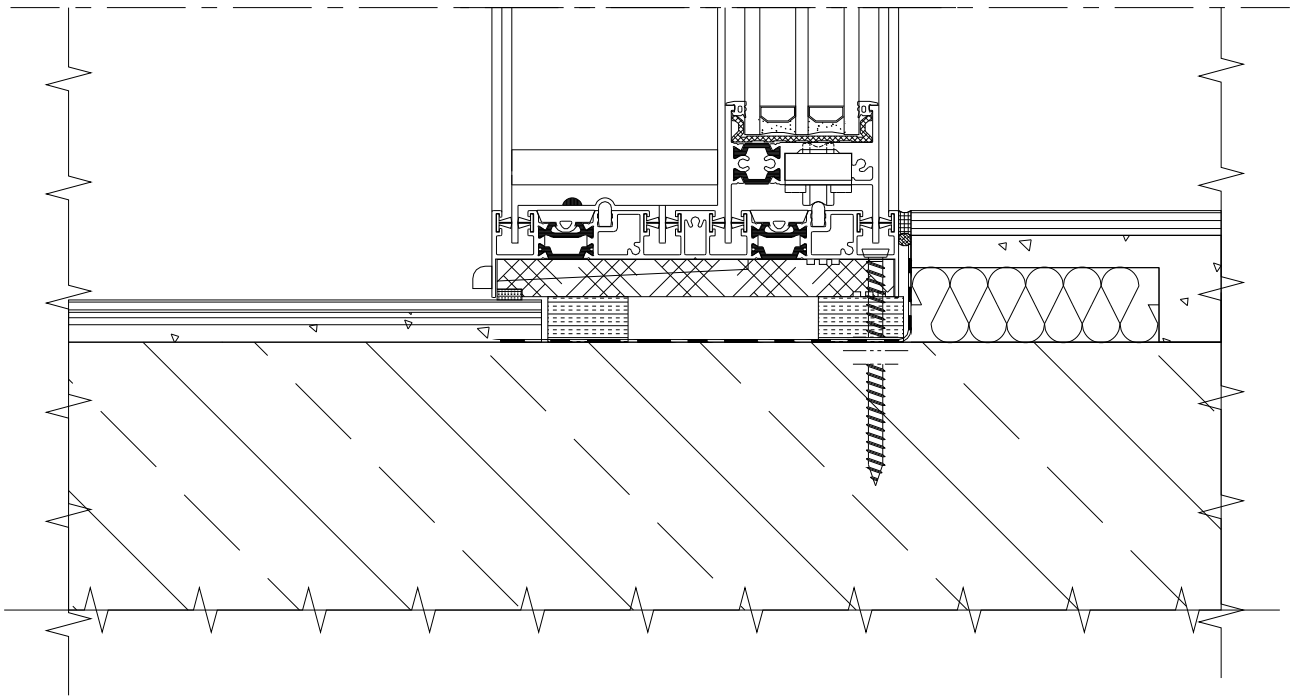
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	
770-54-102-00	PRE-PRESSED SELF-SWELLING INSULATION TAPE 54/10-20 mm	



* The codes referenced are indicative and vary depending on the case

A-2-1-D-NRS: Double masonry with 5cm thermal insulation on the internal edge of the opening with anchor brackets on a door without rolling shutter

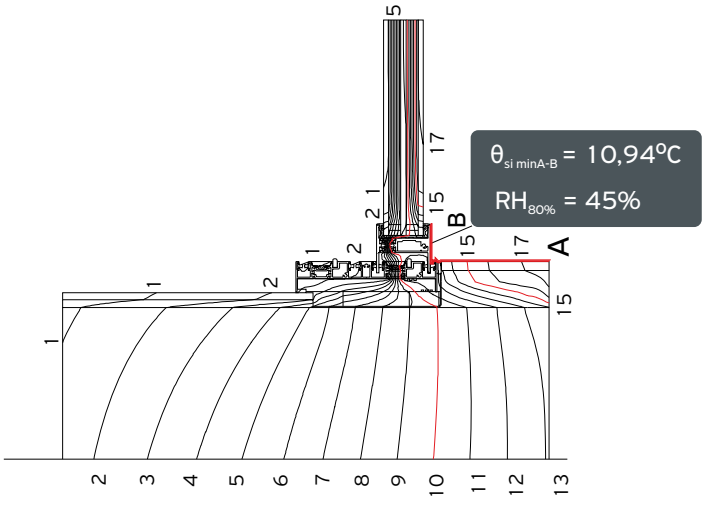


Τομή κάτω τμήματος κουφώματος

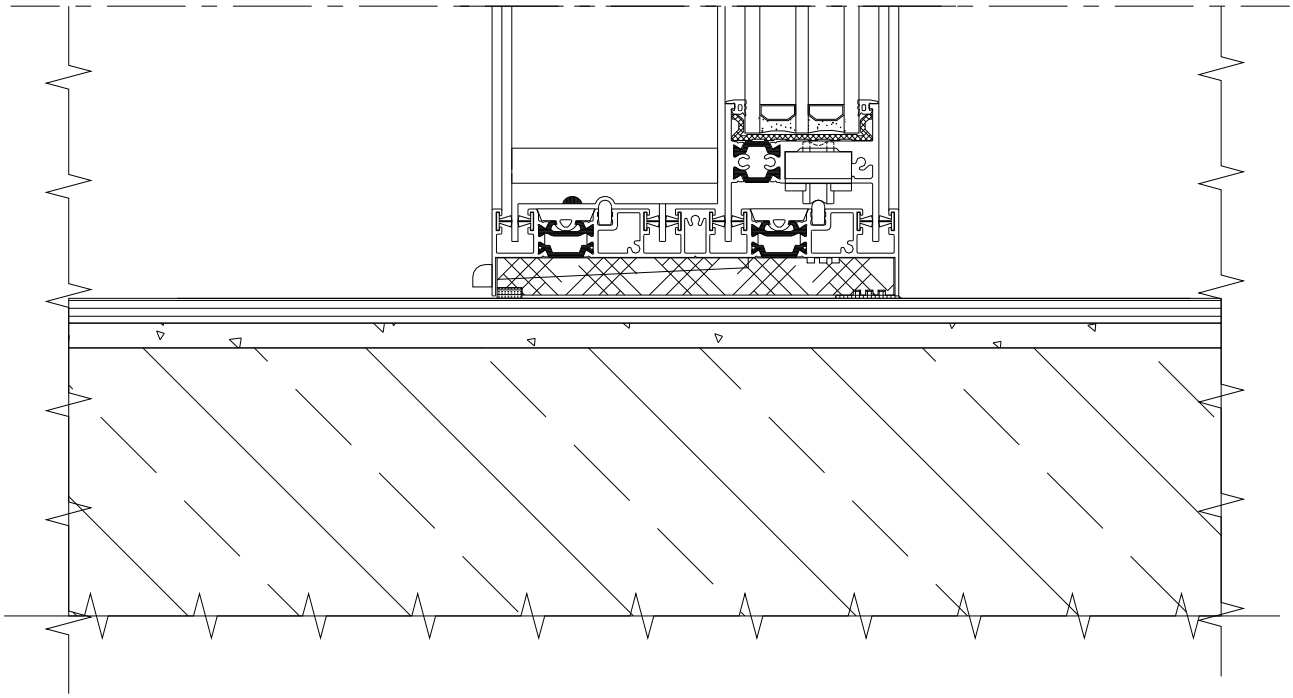
INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	
770-54-102-00	PRE-PRESSED SELF-SWELLING INSULATION TAPE 54/10-20 mm	

* The codes referenced are indicative and vary depending on the case



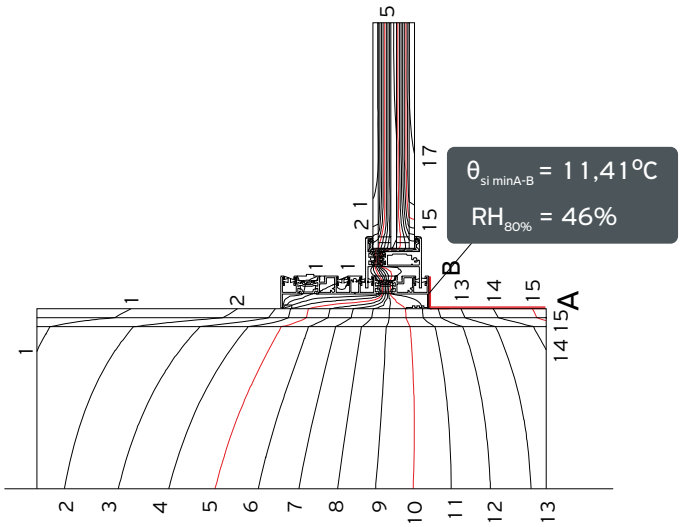
A-2-1-D-NRS: Double masonry with 5cm thermal insulation on the internal edge of the opening with anchor brackets on a door without rolling shutter



Section of the lower part of the window

INSIDE OUTSIDE

Code	Description	Material
770-02-001-05	NEUTRAL SILICONE, 280 ML CARTRIDGE TRANSPARENT	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-71-211-02	ACRYLIC PATTY 280 ML CARTRIDGE ALUMIL WHITE	
770-71-306-02	HYBRID JOINT SEALANT ALUMIL 280 ML CARTRIDGE WHITE	
770-30-609-00	JOINT CORD Ø10	
762-75-150-00	MILLED CONCRETE SCREW T30 7,5x150mm GALVANIZED	
470-00-770-00	FRAME INSTALLATION ANCHOR 14x18	
770-00-001-00	POLYURETHANE FOAM 750 ML LOW SWELLING ALUMIL	
770-10-020-00	AIR AND WATER SEALING TAPE	



* The codes referenced are indicative and vary depending on the case

12. Delivery - good performance demonstration

At the end of the works, the installer is responsible to demonstrate the proper operation and maintenance of the frame to the consumer. He should inform the owner on the method of maintenance of the mechanism, the cleaning and protection of the frames against external factors. Maintenance is performed in four stages.

1. Cleaning of the frame components using neutral soap 6.5 pH
2. Unblocking of the drainage holes to allow the flow of rainwater
3. Cleaning and spraying with silicone lubricant of EPDM rubbers so that they are always flexible and ensure waterproofing
4. Adjustment and lubrication of the mechanism locks so that the desired airtightness and waterproofing is always achieved

The protection at the sill of the sliding guide is important for the proper sealing and operation of the closing mechanism.

During repairs, painting, etc. the floor profiles must be covered, while wheeled vehicle crossing requires the use of a ramp as in figure 12.1

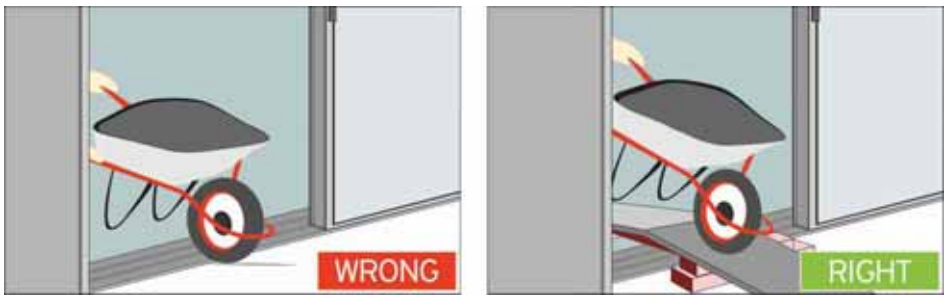


Figure 12.1

Another important fact is the method of cleaning the frames, since the results from the type tests and therefore certification were performed based on a specific procedure.

The use of pressurized cleaner or pressure hose focusing on specific points is prohibited. In addition that it is not consistent with the frames testing method - and therefore it does not correspond to the type tests - it can also damage the frame.

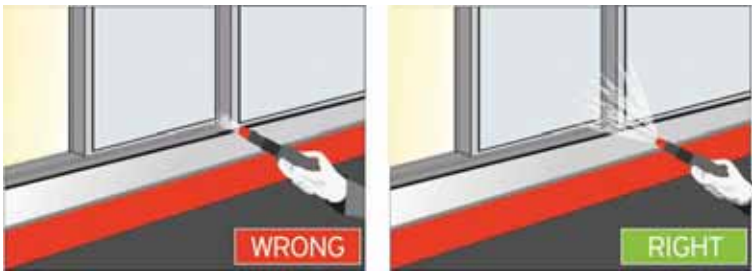


Figure 12.2

The instructions should provide simple but important remarks on the service life of the frames, the cleaning method and the materials to be used.

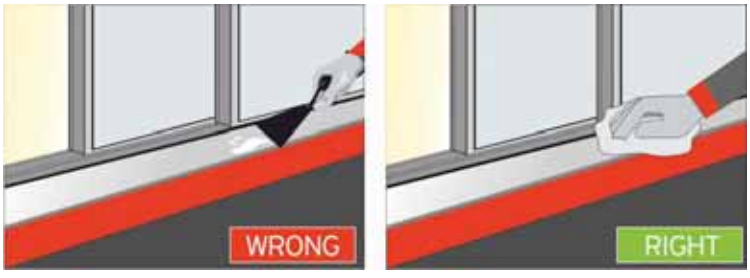


Figure 12.3

LITERATURE

- AAAMSA. SELECTION GUIDE FOR BASIC FASTENING POSITIONS OF SIMPLE FENESTRATION APPLICATION
- Aluplast Ideal - Installation
- ASTM E2112-07 Standard Practice for Installation of Exterior Windows, Doors and Skylights
- AWA. An Industry Guide to the Correct Installation of Windows and Doors
- Beton Kalender
- Building construction-jointing products - classification ISO 11600
- Buildings and civil engineering works - Sealants - Vocabular ISO 6927
- Due Zeta LA POSA IN OPERA DEL SERRAMENTO
- Duraflex - installation - guide
- EESTI STANDART EN 14351-1
- EESTI STANDART EVS-EN 12519:2006 Terminology
- Finestra - Shop Guida pratica per l'installazione ed il montaggio di finestre e portefinestre
- FMA/AAMA 200-12 Standard practice for the installation of windows
- GGF. The Good Practice Guide for the Installation of Replacement Windows and Doors
- Improve Skills and Qualifications in the Building Workforce in Cyprus
- Instructions RAL montage / Guideline for installation IFT
- MAPEI. GUIDA ALLA SCELTA DI SIGILLANTI E ADESIVI ELASTICI
- NF DTU 36.5 Mise en œuvre des fenêtres et portes extérieures
- NorDAN. OPERATION, MAINTENANCE & INSTALLATION MANUAL
- Norme CAN/CSA-A440.4-07
- NOTE D'INFORMATION TECHNIQUE 188 LA POSE DES MENUISERIES EXTERIEURES
- RECA. Sistemi di fissaggio e sigillatura professionale
- REHAU. Technische information montaGerichtLinie
- SMART. Guide to Installation, Maintenance & Care
- uFme. ACCESSIBILITE DES FENETRES ET PORTES EXTERIEURES
- UNI 11673-1 Posa in opera di serramenti
- wurth posa in opera serramenti
- Aravatinos, Vapor barriers on external masonry
- POVAS. Frames installation technical manual

ANNEX

Selection of number of screws per frame dimension and screw thickness.

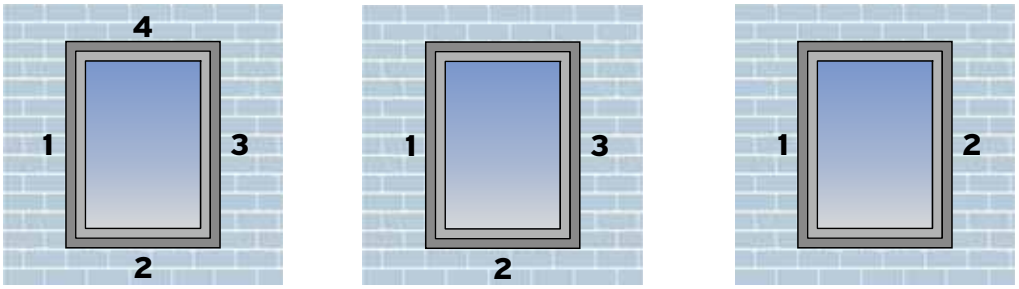


Figure 8.19 Fixing sides

The number of minimum anchors used for fastening the frame will be the greatest number among the following:

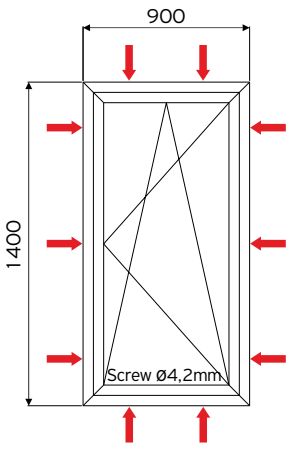
1. The totality of necessary points based on the fastening rules provided in paragraph 8.2.3 for each frame and its typology
2. The minimum number of anchors obtained from the relevant table in Annex I, considering also the diameter of the anchor (screw) and the selected wind pressure.

Example of tables' usage:

The following window shows frames of dimensions 900x1400 mm on which following installation of the necessary 10 anchors Ø4.2, based on the support rules of paragraph 8.2.3, it is evident that the table defines a number of 8. Hence the minimum anchors to be used are 10.

Number of screws Ø4,2 for various dimensions and load 1,5KN/pcs (150 kg/pcs)

Width	1	1,2	1,4	1,6	1,8	2	2,2	2,4	2,6	2,8	3	3,2	3,4	3,6	3,8	4	4,2	4,4	4,6	4,8	5	5,2	5,4	5,6	5,8	6
Height																										
1	5	7	8	9	10	11	12	13	14	15	16	17	18	20	21	22	23	24	25	26	27	28	29	30	32	33
1,2	7	8	9	10	12	13	14	16	17	18	20	21	22	23	25	26	27	29	30	31	33	34	35	37	38	39
1,4	8	9	11	12	14	15	17	18	20	21	23	24	26	27	29	30	32	33	35	37	38	40	41	43	44	46
1,6	9	10	12	14	16	17	19	21	23	24	26	28	30	31	33	35	37	38	40	42	43	45	47	49	50	52
1,8	10	12	14	16	18	20	22	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
2	11	13	15	17	20	22	24	26	28	30	33	35	37	39	41	43	46	48	50	52	54	57	59	61	63	65
2,2	12	14	17	19	22	24	26	29	31	33	36	38	41	43	45	48	50	53	55	57	60	62	65	67	69	72
2,4	13	16	18	21	23	26	29	31	34	37	39	42	44	47	50	52	55	57	60	63	65	68	70	73	76	78
2,6	14	17	20	23	25	28	31	34	37	40	42	45	48	51	54	57	59	62	65	68	71	73	76	79	82	85
2,8	15	18	21	24	27	30	33	37	40	43	46	49	52	55	58	61	64	67	70	73	76	79	82	85	88	91
3	16	20	23	26	29	33	36	39	42	46	49	52	55	59	62	65	68	72	75	78	82	85	88	91	95	98
3,2	17	21	24	28	31	35	38	42	45	49	52	56	59	63	66	70	73	77	80	83	87	90	94	97	101	104
3,4	18	22	26	30	33	37	41	44	48	52	55	59	63	67	70	74	78	81	85	89	92	96	100	103	107	111
3,6	20	23	27	31	35	39	43	47	51	55	59	63	67	70	74	78	82	86	90	94	98	102	106	110	113	117
3,8	21	25	29	33	37	41	45	50	54	58	62	66	70	74	78	83	87	91	95	99	103	107	112	116	120	124
4	22	26	30	35	39	43	48	52	57	61	65	70	74	78	83	87	91	96	100	104	109	113	117	122	126	130
4,2	23	27	32	37	41	46	50	55	59	64	68	73	78	82	87	91	96	100	105	110	114	119	123	128	132	137
4,4	24	29	33	38	43	48	53	57	62	67	72	77	81	86	91	96	100	105	110	115	120	124	129	134	139	143
4,6	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150
4,8	26	31	37	42	47	52	57	63	68	73	78	83	89	94	99	104	110	115	120	125	130	136	141	146	151	157
5	27	33	38	43	49	54	60	65	71	76	82	87	92	98	103	109	114	120	125	130	136	141	147	152	158	163
5,2	28	34	40	45	51	57	62	68	73	79	85	90	96	102	107	113	119	124	130	136	141	147	153	158	164	170
5,4	29	35	41	47	53	59	65	70	76	82	88	94	100	106	112	117	123	129	135	141	147	153	158	164	170	176
5,6	30	37	43	49	55	61	67	73	79	85	91	97	103	110	116	122	128	134	140	146	152	158	164	170	177	183
5,8	32	38	44	50	57	63	69	76	82	88	95	101	107	113	120	126	132	139	145	151	158	164	170	177	183	189
6	33	39	46	52	59	65	72	78	85	91	98	104	111	117	124	130	137	143	150	157	163	170	176	183	189	196

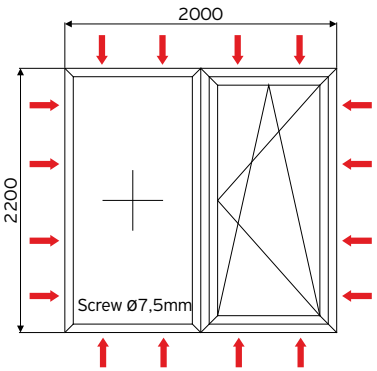


The following typology shows a frame of dimensions 2000x2200mm in which following installation of the necessary 16 anchors Ø6.3 it is derived that the table defines a number of 11.

Therefore, fastening is performed with the minimum number of 16 anchors.

Number of screws Ø6,3 for various dimensions and load 1,5KN/pcs (150 kg/pcs)

Width	1	1,2	1,4	1,6	1,8	2	2,2	2,4	2,6	2,8	3	3,2	3,4	3,6	3,8	4	4,2	4,4	4,6	4,8	5	5,2	5,4	5,6	5,8	6
Height																										
1	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15
1,2	3	4	4	5	5	6	7	7	8	8	9	10	10	11	11	12	13	13	14	14	15	16	16	17	17	18
1,4	3	4	5	6	6	7	8	8	9	10	10	11	12	13	13	14	15	15	16	17	17	18	19	20	20	21
1,6	4	5	6	6	7	8	9	10	10	11	12	13	14	14	15	16	17	18	18	19	20	21	22	22	23	24
1,8	4	5	6	7	8	9	10	11	12	13	13	14	15	16	17	18	19	20	21	22	22	23	24	25	26	27
2	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2,2	5	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25	26	27	29	30	31	32	33
2,4	6	7	8	10	11	12	13	14	16	17	18	19	20	22	23	24	25	26	28	29	30	31	32	33	35	36
2,6	6	8	9	10	12	13	14	16	17	18	19	21	22	23	25	26	27	29	30	31	32	34	35	36	38	39
2,8	7	8	10	11	13	14	15	17	18	20	21	22	24	25	27	28	29	31	32	33	35	36	38	39	40	42
3	7	9	10	12	13	15	16	18	19	21	22	24	25	27	28	30	31	33	34	36	37	39	40	42	43	45
3,2	8	10	11	13	14	16	18	19	21	22	24	26	27	29	30	32	33	35	37	38	40	41	43	45	46	48
3,4	8	10	12	14	15	17	19	20	22	24	25	27	29	30	32	34	36	37	39	41	42	44	46	47	49	51
3,6	9	11	13	14	16	18	20	22	23	25	27	29	30	32	34	36	38	39	41	43	45	47	48	50	52	54
3,8	9	11	13	15	17	19	21	23	25	27	28	30	32	34	36	38	40	42	44	45	47	49	51	53	55	57
4	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
4,2	10	13	15	17	19	21	23	25	27	29	31	33	36	38	40	42	44	46	48	50	52	54	57	59	61	63
4,4	11	13	15	18	20	22	24	26	29	31	33	35	37	39	42	44	46	48	50	53	55	57	59	61	64	66
4,6	11	14	16	18	21	23	25	28	30	32	34	37	39	41	44	46	48	50	53	55	57	60	62	64	66	69
4,8	12	14	17	19	22	24	26	29	31	33	36	38	41	43	45	48	50	53	55	57	60	62	65	67	69	72
5	12	15	17	20	22	25	27	30	32	35	37	40	42	45	47	50	52	55	57	60	62	65	67	70	72	75
5,2	13	16	18	21	23	26	29	31	34	36	39	41	44	47	49	52	54	57	60	62	65	67	70	73	75	78
5,4	13	16	19	22	24	27	30	32	35	38	40	43	46	48	51	54	57	59	62	65	67	70	73	75	78	81
5,6	14	17	20	22	25	28	31	33	36	39	42	45	47	50	53	56	59	61	64	67	70	73	75	78	81	84
5,8	14	17	20	23	26	29	32	35	38	40	43	46	49	52	55	58	61	64	66	69	72	75	78	81	84	87
6	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90

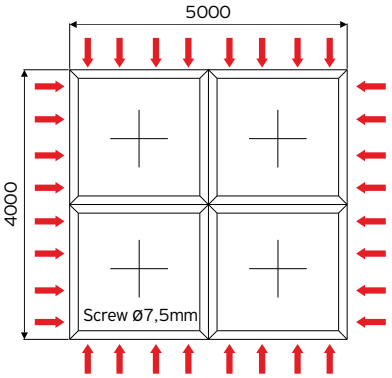


Finally, in the complex typology that follows with dimensions 5000x4000 mm and after installing the necessary 32 anchors, it is evidenced that for the Ø6.3 screw to be used, the table defines a number of 50.

Therefore, fastening is performed with the minimum number of 50 anchors.

Number of screws Ø6,3 for various dimensions and load 1,5KN/pcs (150 kg/pcs)

Width	1	1,2	1,4	1,6	1,8	2	2,2	2,4	2,6	2,8	3	3,2	3,4	3,6	3,8	4	4,2	4,4	4,6	4,8	5	5,2	5,4	5,6	5,8	6
Height																										
1	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15
1,2	3	4	4	5	5	6	7	7	8	8	9	10	10	11	11	12	13	13	14	14	15	16	16	17	17	18
1,4	3	4	5	6	6	7	8	8	9	10	10	11	12	13	13	14	15	15	16	17	17	18	19	20	20	21
1,6	4	5	6	6	7	8	9	10	10	11	12	13	14	14	15	16	17	18	18	19	20	21	22	22	23	24
1,8	4	5	6	7	8	9	10	11	12	13	13	14	15	16	17	18	19	20	21	22	22	23	24	25	26	27
2	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2,2	5	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25	26	27	29	30	31	32	33
2,4	6	7	8	10	11	12	13	14	16	17	18	19	20	22	23	24	25	26	28	29	30	31	32	33	35	36
2,6	6	8	9	10	12	13	14	16	17	18	19	21	22	23	25	26	27	29	30	31	32	34	35	36	38	39
2,8	7	8	10	11	13	14	15	17	18	20	21	22	24	25	27	28	29	31	32	33	35	36	38	39	40	42
3	7	9	10	12	13	15	16	18	19	21	22	24	25	27	28	30	31	33	34	36	37	39	40	42	43	45
3,2	8	10	11	13	14	16	18	19	21	22	24	26	27	29	30	32	33	35	37	38	40	41	43	45	46	48
3,4	8	10	12	14	15	17	19	20	22	24	25	27	29	30	32	34	36	37	39	41	42	44	46	47	49	51
3,6	9	11	13	14	16	18	20	22	23	25	27	29	30	32	34	36	38	39	41	43	45	47	48	50	52	54
3,8	9	11	13	15	17	19	21	23	25	27	28	30	32	34	36	38	40	42	44	45	47	49	51	53	55	57
4	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
4,2	10	13	15	17	19	21	23	25	27	29	31	33	36	38	40	42	44	46	48	50	52	54	57	59	61	63
4,4	11	13	15	18	20	22	24	26	29	31	33	35	37	39	42	44	46	48	50	53	55	57	59	61	64	66
4,6	11	14	16	18	21	23	25	28	30	32	34	37	39	41	44	46	48	50	53	55	57	60	62	64	66	69
4,8	12	14	17	19	22	24	26	29	31	33	36	38	41	43	45	48	50	53	55	57	60	62	65	67	69	72
5	12	15	17	20	22	25	27	30	32	35	37	40	42	45	47	50	52	55	57	60	62	65	67	70	72	75
5,2	13	16	18	21	23	26	29	31	34	36	39	41	44	47	49	52	54	57	60	62	65	67	70	73	75	78
5,4	13	16	19	22	24	27	30	32	35	38	40	43	46	48	51	54	57	59	62	65	67	70	73	75	78	81
5,6	14	17	20	22	25	28	31	33	36	39	42	45	47	50	53	56	59	61	64	67	70	73	75	78	81	84
5,8	14	17	20	23	26	29	32	35	38	40	43	46	49	52	55	58	61	64	66	69	72	75	78	81	84	87
6	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90

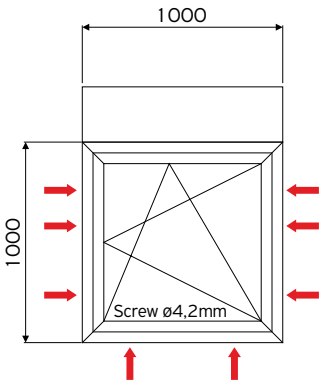


In the following case, there must be installation of a single-leaf hinged frame with dimensions 1000x1000mm, with a built-in roller, on which there is infrastructure for tightening using Ø4.2 screws. A pre-compressed tape for airtight, thermal insulation and sound reduction will be used on the intermediate surface between the frame and the mounted roller box.

The required number of anchors according to the instructions is 6, but according to the instructions of the roller box, there is addition of 2 screws on the vertical sides at the upper ends. Thus, the total is 8. While the load table states 5, there must be eventual use of 8 pieces.

Number of screws Ø4,2 for various dimensions and load 1,5KN/pcs (150 kg/pcs)

Width / Height	1	1,2	1,4	1,6	1,8	2	2,2	2,4	2,6	2,8	3	3,2	3,4	3,6	3,8	4	4,2	4,4	4,6	4,8	5	5,2	5,4	5,6	5,8	6
1	5	7	8	9	10	11	12	13	14	15	16	17	18	20	21	22	23	24	25	26	27	28	29	30	32	33
1,2	7	8	9	10	12	13	14	16	17	18	20	21	22	23	25	26	27	29	30	31	33	34	35	37	38	39
1,4	8	9	11	12	14	15	17	18	20	21	23	24	26	27	29	30	32	33	35	37	38	40	41	43	44	46
1,6	9	10	12	14	16	17	19	21	23	24	26	28	30	31	33	35	37	38	40	42	43	45	47	49	50	52
1,8	10	12	14	16	18	20	22	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
2	11	13	15	17	20	22	24	26	28	30	33	35	37	39	41	43	46	48	50	52	54	57	59	61	63	65
2,2	12	14	17	19	22	24	26	29	31	33	36	38	41	43	45	48	50	53	55	57	60	62	65	67	69	72
2,4	13	16	18	21	23	26	29	31	34	37	39	42	44	47	50	52	55	57	60	63	65	68	70	73	76	78
2,6	14	17	20	23	25	28	31	34	37	40	42	45	48	51	54	57	59	62	65	68	71	73	76	79	82	85
2,8	15	18	21	24	27	30	33	37	40	43	46	49	52	55	58	61	64	67	70	73	76	79	82	85	88	91
3	16	20	23	26	29	33	36	39	42	46	49	52	55	59	62	65	68	72	75	78	82	85	88	91	95	98
3,2	17	21	24	28	31	35	38	42	45	49	52	56	59	63	66	70	73	77	80	83	87	90	94	97	101	104
3,4	18	22	26	30	33	37	41	44	48	52	55	59	63	67	70	74	78	81	85	89	92	96	100	103	107	111
3,6	20	23	27	31	35	39	43	47	51	55	59	63	67	70	74	78	82	86	90	94	98	102	106	110	113	117
3,8	21	25	29	33	37	41	45	50	54	58	62	66	70	74	78	83	87	91	95	99	103	107	112	116	120	124
4	22	26	30	35	39	43	48	52	57	61	65	70	74	78	83	87	91	96	100	104	109	113	117	122	126	130
4,2	23	27	32	37	41	46	50	55	59	64	68	73	78	82	87	91	96	100	105	110	114	119	123	128	132	137
4,4	24	29	33	38	43	48	53	57	62	67	72	77	81	86	91	96	100	105	110	115	120	124	129	134	139	143
4,6	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150
4,8	26	31	37	42	47	52	57	63	68	73	78	83	89	94	99	104	110	115	120	125	130	136	141	146	151	157
5	27	33	38	43	49	54	60	65	71	76	82	87	92	98	103	109	114	120	125	130	136	141	147	152	158	163
5,2	28	34	40	45	51	57	62	68	73	79	85	90	96	102	107	113	119	124	130	136	141	147	153	158	164	170
5,4	29	35	41	47	53	59	65	70	76	82	88	94	100	106	112	117	123	129	135	141	147	153	158	164	170	176
5,6	30	37	43	49	55	61	67	73	79	85	91	97	103	110	116	122	128	134	140	146	152	158	164	170	177	183
5,8	32	38	44	50	57	63	69	76	82	88	95	101	107	113	120	126	132	139	145	151	158	164	170	177	183	189
6	33	39	46	52	59	65	72	78	85	91	98	104	111	117	124	130	137	143	150	157	163	170	176	183	189	196

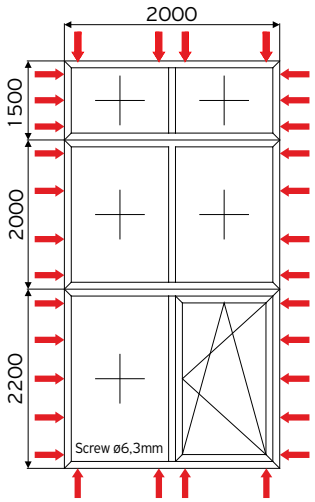


The following example provides three frames of different construction heights, of which the middle one is supported on the wall, on its two free vertical sides and the ones on the angles are supported on their three free sides using Ø6.3 anchors.

We examine each frame separately and, select the necessary items in relation to the dimension and the mounting sides.

Number of screws Ø6,3 for various dimensions and load 1,5KN/pcs (150 kg/pcs)

Width / Height	1	1,2	1,4	1,6	1,8	2	2,2	2,4	2,6	2,8	3	3,2	3,4	3,6	3,8	4	4,2	4,4	4,6	4,8	5	5,2	5,4	5,6	5,8	6
1	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15
1,2	3	4	4	5	5	6	7	7	8	8	9	10	10	11	11	12	13	13	14	14	15	16	16	17	17	18
1,4	3	4	5	6	6	7	8	8	9	10	10	11	12	13	13	14	15	15	16	17	17	18	19	20	20	21
1,6	4	5	6	6	7	8	9	10	10	11	12	13	14	14	15	16	17	18	18	19	20	21	22	22	23	24
1,8	4	5	6	7	8	9	10	11	12	13	13	14	15	16	17	18	19	20	21	22	22	23	24	25	26	27
2	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2,2	5	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25	26	27	29	30	31	32	33
2,4	6	7	8	10	11	12	13	14	16	17	18	19	20	22	23	24	25	26	28	29	30	31	32	33	35	36
2,6	6	8	9	10	12	13	14	16	17	18	19	21	22	23	25	26	27	29	30	31	32	34	35	36	38	39
2,8	7	8	10	11	13	14	15	17	18	20	21	22	24	25	27	28	29	31	32	33	35	36	38	39	40	42
3	7	9	10	12	13	15	16	18	19	21	22	24	25	27	28	30	31	33	34	36	37	39	40	42	43	45
3,2	8	10	11	13	14	16	18	19	21	22	24	26	27	29	30	32	33	35	37	38	40	41	43	45	46	48
3,4	8	10	12	14	15	17	19	20	22	24	25	27	29	30	32	34	36	37	39	41	42	44	46	47	49	51
3,6	9	11	13	14	16	18	20	22	23	25	27	29	30	32	34	36	38	39	41	43	45	47	48	50	52	54
3,8	9	11	13	15	17	19	21	23	25	27	28	30	32	34	36	38	40	42	44	45	47	49	51	53	55	57
4	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
4,2	10	13	15	17	19	21	23	25	27	29	31	33	36	38	40	42	44	46	48	50	52	54	57	59	61	63
4,4	11	13	15	18	20	22	24	26	29	31	33	35	37	39	42	44	46	48	50	53	55	57	59	61	64	66
4,6	11	14	16	18	21	23	25	28	30	32	34	37	39	41	44	46	48	50	53	55	57	60	62	64	66	69
4,8	12	14	17	19	22	24	26	29	31	33	36	38	41	43	45	48	50	53	55	57	60	62	65	67	69	72
5	12	15	17	20	22	25	27	30	32	35	37	40	42	45	47	50	52	55	57	60	62	65	67	70	72	75
5,2	13	16	18	21	23	26	29	31	34	36	39	41	44	47	49	52	54	57	60	62	65	67	70	73	75	78
5,4	13	16	19	22	24	27	30	32	35	38	40	43	46	48	51	54	57	59	62	65	67	70	73	75	78	81
5,6	14	17	20	22	25	28	31	33	36	39	42	45	47	50	53	56	59	61	64	67	70	73	75	78	81	84
5,8	14	17	20	23	26	29	32	35	38	40	43	46	49	52	55	58	61	64	66	69	72	75	78	81	84	87
6	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90



Thus, using the support rules, 14 anchors are required for the sill while the loads table specifies 11. Hence there shall be usage of 14. For the intermediate frame, according to the rules, it is necessary to use 8, while the load table states 10. Hence there shall be usage of 10. For the upper frame there must be usage of 10 anchors while the load table states 7.

Number of screws Ø7,5 for various dimensions and load 1,5KN/pcs (150 kg/pcs)																										
Width	1,0	1,2	1,4	1,6	1,8	2,0	2,2	2,4	2,6	2,8	3,0	3,2	3,4	3,6	3,8	4,0	4,2	4,4	4,6	4,8	5,0	5,2	5,4	5,6	5,8	6,0
Height																										
1	2	2	3	3	3	4	4	4	5	5	6	6	6	7	7	7	8	8	8	9	9	10	10	10	11	11
1,2	2	3	3	4	4	4	5	5	6	6	7	7	8	8	8	9	9	10	10	11	11	11	12	12	13	13
1,4	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15
1,6	3	4	4	5	5	6	6	7	8	8	9	9	10	11	11	12	12	13	14	14	15	15	16	17	17	18
1,8	3	4	5	5	6	7	7	8	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19	19	20
2	4	4	5	6	7	7	8	9	10	10	11	12	13	13	14	15	15	16	17	18	18	19	20	21	21	22
2,2	4	5	6	6	7	8	9	10	11	11	12	13	14	15	15	16	17	18	19	19	20	21	22	23	24	24
2,4	4	5	6	7	8	9	10	11	11	12	13	14	15	16	17	18	19	19	20	21	22	23	24	25	26	27
2,6	5	6	7	8	9	10	11	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
2,8	5	6	7	8	9	10	11	12	13	14	15	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
3	6	7	8	9	10	11	12	13	14	15	17	18	19	20	21	22	23	24	25	27	28	29	30	31	32	33
3,2	6	7	8	9	11	12	13	14	15	17	18	19	20	21	22	24	25	26	27	28	29	31	32	33	34	35
3,4	6	8	9	10	11	13	14	15	16	18	19	20	21	23	24	25	26	28	29	30	31	33	34	35	36	38
3,6	7	8	9	11	12	13	15	16	17	19	20	21	23	24	25	27	28	29	31	32	33	34	36	37	38	40
3,8	7	8	10	11	13	14	15	17	18	20	21	22	24	25	27	28	29	31	32	34	35	36	38	39	41	42
4	7	9	10	12	13	15	16	18	19	21	22	24	25	27	28	29	31	32	34	35	37	38	40	41	43	44
4,2	8	9	11	12	14	15	17	19	20	22	23	25	26	28	29	31	33	34	36	37	39	40	42	43	45	46
4,4	8	10	11	13	15	16	18	19	21	23	24	26	28	29	31	32	34	36	37	39	41	42	44	45	47	49
4,6	8	10	12	14	15	17	19	20	22	24	25	27	29	31	32	34	36	37	39	41	42	44	46	47	49	51
4,8	9	11	12	14	16	18	19	21	23	25	27	28	30	32	34	35	37	39	41	42	44	46	48	50	51	53
5	9	11	13	15	17	18	20	22	24	26	28	29	31	33	35	37	39	41	42	44	46	48	50	52	53	55
5,2	10	11	13	15	17	19	21	23	25	27	29	31	33	34	36	38	40	42	44	46	48	50	52	54	56	57
5,4	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
5,6	10	12	14	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	50	52	54	56	58	60	62
5,8	11	13	15	17	19	21	24	26	28	30	32	34	36	38	41	43	45	47	49	51	53	56	58	60	62	64
6	11	13	15	18	20	22	24	27	29	31	33	35	38	40	42	44	46	49	51	53	55	57	60	62	64	66

Number of screws Ø6,3 for various dimensions and load 1,5KN/pcs (150 kg/pcs)																										
Width	1	1,2	1,4	1,6	1,8	2	2,2	2,4	2,6	2,8	3	3,2	3,4	3,6	3,8	4	4,2	4,4	4,6	4,8	5	5,2	5,4	5,6	5,8	6
Height																										
1	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15
1,2	3	4	4	5	5	6	7	7	8	8	9	10	10	11	11	12	13	13	14	14	15	16	16	17	17	18
1,4	3	4	5	6	6	7	8	8	9	10	10	11	12	13	13	14	15	15	16	17	17	18	19	20	20	21
1,6	4	5	6	6	7	8	9	10	10	11	12	13	14	14	15	16	17	18	18	19	20	21	22	22	23	24
1,8	4	5	6	7	8	9	10	11	12	13	13	14	15	16	17	18	19	20	21	22	22	23	24	25	26	27
2	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2,2	5	7	8	9	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25	26	27	29	30	31	32	33
2,4	6	7	8	10	11	12	13	14	16	17	18	19	20	22	23	24	25	26	28	29	30	31	32	33	35	36
2,6	6	8	9	10	12	13	14	16	17	18	19	21	22	23	25	26	27	29	30	31	32	34	35	36	38	39
2,8	7	8	10	11	13	14	15	17	18	20	21	22	24	25	27	28	29	31	32	33	35	36	38	39	40	42
3	7	9	10	12	13	15	16	18	19	21	22	24	25	27	28	30	31	33	34	36	37	39	40	42	43	45
3,2	8	10	11	13	14	16	18	19	21	22	24	26	27	29	30	32	33	35	37	38	40	41	43	45	46	48
3,4	8	10	12	14	15	17	19	20	22	24	25	27	29	30	32	34	36	37	39	41	42	44	46	47	49	51
3,6	9	11	13	14	16	18	20	22	23	25	27	29	30	32	34	36	38	39	41	43	45	47	48	50	52	54
3,8	9	11	13	15	17	19	21	23	25	27	28	30	32	34	36	38	40	42	44	45	47	49	51	53	55	57
4	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
4,2	10	13	15	17	19	21	23	25	27	29	31	33	36	38	40	42	44	46	48	50	52	54	57	59	61	63
4,4	11	13	15	18	20	22	24	26	29	31	33	35	37	39	42	44	46	48	50	53	55	57	59	61	64	66
4,6	11	14	16	18	21	23	25	28	30	32	34	37	39	41	44	46	48	50	53	55	57	60	62	64	66	69
4,8	12	14	17	19	22	24	26	29	31	33	36	38	41	43	45	48	50	53	55	57	60	62	65	67	69	72
5	12	15	17	20	22	25	27	30	32	35	37	40	42	45	47	50	52	55	57	60	62	65	67	70	72	75
5,2	13	16	18	21	23	26	29	31	34	36	39	41	44	47	49	52	54	57	60	62	65	67	70	73	75	78
5,4	13	16	19	22	24	27	30	32	35	38	40	43	46	48	51	54	57	59	62	65	67	70	73	75	78	81
5,6	14	17	20	22	25	28	31	33	36	39	42	45	47	50	53	56	59	61	64	67	70	73	75	78	81	84
5,8	14	17	20	23	26	29	32	35	38	40	43	46	49	52	55	58	61	64	66	69	72	75	78	81	84	87
6	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90

Number of screws Ø5,5 for various dimensions and load 1,5KN/pcs (150 kg/pcs)																										
Width	1	1,2	1,4	1,6	1,8	2	2,2	2,4	2,6	2,8	3	3,2	3,4	3,6	3,8	4	4,2	4,4	4,6	4,8	5	5,2	5,4	5,6	5,8	6
Height																										
1	3	4	4	5	6	6	7	8	8	9	9	10	11	11	12	13	13	14	15	15	16	16	17	18	18	19
1,2	4	5	5	6	7	8	8	9	10	11	11	12	13	14	14	15	16	17	17	18	19	20	21	21	22	23
1,4	4	5	6	7	8	9	10	11	12	12	13	14	15	16	17	18	19	19	20	21	22	23	24	25	26	27
1,6	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1,8	6	7	8	9	10	11	13	14	15	16	17	18	19	21	22	23	24	25	26	27	28	30	31	32	33	34
2	6	8	9	10	11	13	14	15	16	18	19	20	22	23	24	25	27	28	29	30	32	33	34	35	37	38
2,2	7	8	10	11	13	14	15	17	18	19	21	22	24	25	26	28	29	31	32	33	35	36	38	39	40	42
2,4	8	9	11	12	14	15	17	18	20	21	23	24	26	27	29	30	32	33	35	36	38	39	41	43	44	46
2,6	8	10	12	13	15	16	18	20	21	23	25	26	28	30	31	33	35	36	38	39	41	43	44	46	48	49
2,8	9	11	12	14	16	18	19	21	23	25	27	28	30	32	34	35	37	39	41	43	44	46	48	50	51	53
3	9	11	13	15	17	19	21	23	25	27	28	30	32	34	36	38	40	42	44	46	47	49	51	53	55	57
3,2	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	41	43	45	47	49	51	53	55	57	59	61
3,4	11	13	15	17	19	22	24	26	28	30	32	34	37	39	41	43	45	47	49	52	54	56	58	60	62	65
3,6	11	14	16	18	21	23	25	27	30	32	34	36	39	41	43	46	48	50	52	55	57	59	62	64	66	68
3,8	12	14	17	19	22	24	26	29	31	34	36	38	41	43	46	48	51	53	55	58	60	63	65	67	70	72
4	13	15	18	20	23	25	28	30	33	35	38	41	43	46	48	51	53	56	58	61	63	66	68	71	73	76
4,2	13	16	19	21	24	27	29	32	35	37	40	43	45	48	51	53	56	58	61	64	66	69	72	74	77	80
4,4	14	17	19	22	25	28	31	33	36	39	42	45	47	50	53	56	58	61	64	67	70	72	75	78	81	84
4,6	15	17	20	23	26	29	32	35	38	41	44	47	49	52	55	58	61	64	67	70	73	76	79	82	84	87
4,8	15	18	21	24	27	30	33	36	39	43	46	49	52	55	58	61	64	67	70	73	76	79	82	85	88	91
5	16	19	22	25	28	32	35	38	41	44	47	51	54	57	60	63	66	70	73	76	79	82	85	89	92	95
5,2	16	20	23	26	30	33	36	39	43	46	49	53	56	59	63	66	69	72	76	79	82	86	89	92	95	99
5,4	17	21	24	27	31	34	38	41	44	48	51	55	58	62	65	68	72	75	79	82	85	89	92	96	99	103
5,6	18	21	25	28	32	35	39	43	46	50	53	57	60	64	67	71	74	78	82	85	89	92	96	99	103	106
5,8	18	22	26	29	33	37	40	44	48	51	55	59	62	66	70	73	77	81	84	88	92	95	99	103	106	110
6	19	23	27	30	34	38	42	46	49	53	57	61	65	68	72	76	80	84	87	91	95	99	103	106	110	114

Number of screws Ø4,8 for various dimensions and load 1,5KN/pcs (150 kg/pcs)																										
Width	1	1,2	1,4	1,6	1,8	2	2,2	2,4	2,6	2,8	3	3,2	3,4	3,6	3,8	4	4,2	4,4	4,6	4,8	5	5,2	5,4	5,6	5,8	6
Height																										
1	4	5	6	7	8	8	9	10	11	12	13	13	14	15	16	17	18	18	19	20	21	22	23	23	24	25
1,2	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1,4	6	7	8	9	11	12	13	14	15	16	18	19	20	21	22	23	25	26	27	28	29	30	32	33	34	35
1,6	7	8	9	11	12	13	15	16	17	19	20	21	23	24	25	27	28	29	31	32	33	35	36	37	39	40
1,8	8	9	11	12	14	15	17	18	20	21	23	24	26	27	29	30	32	33	35	36	38	39	41	42	44	45
2	8	10	12	13	15	17	18	20	22	23	25	27	28	30	32	33	35	37	38	40	42	43	45	47	48	50
2,2	9	11	13	15	17	18	20	22	24	26	28	29	31	33	35	37	39	40	42	44	46	48	50	51	53	55
2,4	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
2,6	11	13	15	17	20	22	24	26	28	30	33	35	37	39	41	43	46	48	50	52	54	56	59	61	63	65
2,8	12	14	16	19	21	23	26	28	30	33	35	37	40	42	44	47	49	51	54	56	58	61	63	65	68	70
3	13	15	18	20	23	25	28	30	33	35	38	40	43	45	48	50	53	55	58	60	63	65	68	70	73	75
3,2	13	16	19	21	24	27	29	32	35	37	40	43	45	48	51	53	56	59	61	64	67	69	72	75	77	80
3,4	14	17	20	23	26	28	31	34	37	40	43	45	48	51	54	57	60	62	65	68	71	74	77	79	82	85
3,6	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90
3,8	16	19	22	25	29	32	35	38	41	44	48	51	54	57	60	63	67	70	73	76	79	82	86	89	92	95
4	17	20	23	27	30	33	37	40	43	47	50	53	57	60	63	67	70	73	77	80	83	87	90	93	97	100
4,2	18	21	25	28	32	35	39	42	46	49	53	56	60	63	67	70	74	77	81	84	88	91	95	98	102	105
4,4	18	22	26	29	33	37	40	44	48	51	55	59	62	66	70	73	77	81	84	88	92	95	99	103	106	110
4,6	19	23	27	31	35	38	42	46	50	54	58	61	65	69	73	77	81	84	88	92	96	100	104	107	111	115
4,8	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84	88	92	96	100	104	108	112	116	120
5	21	25	29	33	38	42	46	50	54	58	63	67	71	75	79	83	88	92	96	100	104	108	113	117	121	125
5,2	22	26	30	35	39	43	48	52	56	61	65	69	74	78	82	87	91	95	100	104	108	113	117	121	126	130
5,4	23	27	32	36	41	45	50	54	59	63	68	72	77	81	86	90	95	99	104	108	113	117	122	126	131	135
5,6	23	28	33	37	42	47	51	56	61	65	70	75	79	84	89	93	98	103	107	112	117	121	126	131	135	140
5,8	24	29	34	39	44	48	53	58	63	68	73	77	82	87	92	97	102	106	111	116	121	126	131	135	140	145
6	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150

Number of screws Ø4,2 for various dimensions and load 1,5KN/pcs (150 kg/pcs)																										
Width	1	1,2	1,4	1,6	1,8	2	2,2	2,4	2,6	2,8	3	3,2	3,4	3,6	3,8	4	4,2	4,4	4,6	4,8	5	5,2	5,4	5,6	5,8	6
Height																										
1	5	7	8	9	10	11	12	13	14	15	16	17	18	20	21	22	23	24	25	26	27	28	29	30	32	33
1,2	7	8	9	10	12	13	14	16	17	18	20	21	22	23	25	26	27	29	30	31	33	34	35	37	38	39
1,4	8	9	11	12	14	15	17	18	20	21	23	24	26	27	29	30	32	33	35	37	38	40	41	43	44	46
1,6	9	10	12	14	16	17	19	21	23	24	26	28	30	31	33	35	37	38	40	42	43	45	47	49	50	52
1,8	10	12	14	16	18	20	22	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59
2	11	13	15	17	20	22	24	26	28	30	33	35	37	39	41	43	46	48	50	52	54	57	59	61	63	65
2,2	12	14	17	19	22	24	26	29	31	33	36	38	41	43	45	48	50	53	55	57	60	62	65	67	69	72
2,4	13	16	18	21	23	26	29	31	34	37	39	42	44	47	50	52	55	57	60	63	65	68	70	73	76	78
2,6	14	17	20	23	25	28	31	34	37	40	42	45	48	51	54	57	59	62	65	68	71	73	76	79	82	85
2,8	15	18	21	24	27	30	33	37	40	43	46	49	52	55	58	61	64	67	70	73	76	79	82	85	88	91
3	16	20	23	26	29	33	36	39	42	46	49	52	55	59	62	65	68	72	75	78	82	85	88	91	95	98
3,2	17	21	24	28	31	35	38	42	45	49	52	56	59	63	66	70	73	77	80	83	87	90	94	97	101	104
3,4	18	22	26	30	33	37	41	44	48	52	55	59	63	67	70	74	78	81	85	89	92	96	100	103	107	111
3,6	20	23	27	31	35	39	43	47	51	55	59	63	67	70	74	78	82	86	90	94	98	102	106	110	113	117
3,8	21	25	29	33	37	41	45	50	54	58	62	66	70	74	78	83	87	91	95	99	103	107	112	116	120	124
4	22	26	30	35	39	43	48	52	57	61	65	70	74	78	83	87	91	96	100	104	109	113	117	122	126	130
4,2	23	27	32	37	41	46	50	55	59	64	68	73	78	82	87	91	96	100	105	110	114	119	123	128	132	137
4,4	24	29	33	38	43	48	53	57	62	67	72	77	81	86	91	96	100	105	110	115	120	124	129	134	139	143
4,6	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150
4,8	26	31	37	42	47	52	57	63	68	73	78	83	89	94	99	104	110	115	120	125	130	136	141	146	151	157
5	27	33	38	43	49	54	60	65	71	76	82	87	92	98	103	109	114	120	125	130	136	141	147	152	158	163
5,2	28	34	40	45	51	57	62	68	73	79	85	90	96	102	107	113	119	124	130	136	141	147	153	158	164	170
5,4	29	35	41	47	53	59	65	70	76	82	88	94	100	106	112	117	123	129	135	141	147	153	158	164	170	176
5,6	30	37	43	49	55	61	67	73	79	85	91	97	103	110	116	122	128	134	140	146	152	158	164	170	177	183
5,8	32	38	44	50	57	63	69	76	82	88	95	101	107	113	120	126	132	139	145	151	158	164	170	177	183	189
6	33	39	46	52	59	65	72	78	85	91	98	104	111	117	124	130	137	143	150	157	163	170	176	183	189	196

JULY 2021
1st VERSION

Alumil
Building excellence every day

THESSALONIKI
HEAD OFFICES & SHOWROOM
GOGOUSI 8, EFKARPIA
THESSALONIKI - GR 564 29
TEL.: +30 2313 011000
FAX: +30 2310 692473

HEADQUARTERS
KILKIS INDUSTRIAL AREA
KILKIS - GR 61100
TEL.: +30 23410 79300
FAX: +30 23410 71988
www.alumil.com
info@alumil.com