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Polycarbonate Architecture

**Technical book**

# Poly Pac

**arcoTherm®**

**Translucent Cladding Systems  
with reinforced insulation**



**arcePlus®**

**dott.gallina**

## **Introduction**

This technical book has been developed by our Research & Development department, relying on both the CSTB Technical certification arcoTherm multiwall and our internal technical expertise.

Our Research & Development department deals with two main responsibilities:

- To develop new innovative systems.
- To bring its expertise to attend our customers and our technical and sales team in dealing with current complex projects.

Our R&D department has played a major role in providing the market with innovative polycarbonate systems solutions for over 10 years. For instance, its expertise led to such unprecedented polycarbonate applications as:

- 16 meters high ovoid towers in one single length (So Green shopping mall, Seclin, France)
- First CSTB certified solution in France for ventilated polycarbonate cladding application (CSTB Technical Certification N°2/13-1551)
- First ever implemented solution in France for 30 meters long stadium roofing (2x15 meters) with a slope lower than 5° (MMA ARENA Stadium in Le Mans, France)

Our R&D team works in close connection with the various technical departments in CSTB, LNE and GINGER in order to finalise new systems and specific solutions to complex projects falling out from the Technical Certification perimeter.

Our research department know-how has been recognised by the French Ministry of Industry through Poly-Pac recent certification for CIR (Tax Credit for Innovation)

## **Contents**

<b>Description</b>	<b>Page</b>
System definition	3
Field of application for the system	3
Technical assistance	3
Panels specifications	3
Thermal expansion	3
Thermal specifications	3
Shock resistance	3
Interior / Exterior Sound Absorption	3
Fire resistance	3
Optical characteristics	4
Resistance to chemical agents	4
Storage	4
Maintenance	4
How to replace a damaged panel?	4
Simplified field of application for the system according to AWW (air, water, wind)	5
Maximum load chart	6
Diagrams, cross-sections and 3D drawings	7

## 1 – System definition

ArcoTherm multi-wall® systems are used to create lighting glazing for applications such as cladding or roof "saw tooth". These systems are made of cellular polycarbonate panels, anti - UV co-extruded on both sides.

ArcoTherm multi-wall® systems have got specifically designed lateral edges allowing a single clip-on position for polycarbonate connectors double.

An optional polycarbonate panels can be added between the two skins 626 to obtain a thermal reinforcement (ar-coPlus 684) and/or acoustics (Polcomp 2x4mm)

ArcoTherm® multi-wall systems can be used without any restriction of width or height.

## 2 – Field of application of the system

ArcoTherm multi-wall® systems are suitable for cladding and glazing purposes on buildings of all categories while respecting:

- Regulations in force on a general level
- Implementation condition of uses such as defined in the CSTB Technical Certification 2/13-1582.

ArcoTherm multi-wall® systems can be put in work at an altitude lower than 900m. They can be used for any building type (industrial, air-conditioned offices, schools, hospitals, sport centers, housing, swimming pool, etc...), would they be heated or not, however not refrigerated.

ArcoTherm multi-wall® systems can be installed with a maximum slope of 15°, including for « saw tooth » application. They can also be installed in any humidity level (high of low) environments (ie: swimming pools).

ArcoTherm multi-wall® systems do not contribute to the global stability of the construction and cannot fulfill the functions of bracing and purlins anti-spilling. Those functions are dealt with by the supporting structure.

**Any application falling out from those general criteria, can be submitted to our technical department to be assessed within a specific analysis.**

## 3 – Technical assistance

Technical assistance and distribution over France and UK are provided by Poly-Pac, ZA La Porte de Ker Lann, Bruz (France).

Poly-Pac analyses the solution best suited to the project and develops a detailed list of panels, profiles and accessories required for the installation.

Even though Poly-Pac does not install, the company can attend the beginning of the implementation and provide advices at customer request.

## 4 – Panels specifications

	626	684	Polcomp 4
Width (mm)	600±2	560±2	560±2
Thickness	20	8	4
AR	✓	✗	✗
IR	✓	✗	✗
Bi-coloured	✓	✗	✗
UVTech	✓	✗	✗

AR: Anti-glare treatment (visual comfort, prevent from neon effect)

IR: Infrared treatment (prevent from heat increase within the building)

UV Tech: Reinforced UV Protection – 15 years warranty.

Panels are available in various colors. Please refer to our Caleido range.

Due to extrusion process constraints, a visual difference in color shade is admitted as long as it does not interfere with the mechanical characteristics of the polycarbonate components.

Some treatments like AR (anti-glare) and IR (infrared) can create some shade variations with the color range.

## 5 – Thermal expansion

The linear expansion coefficient is 0,065mm/ml/°C.

Exemple: For a difference of temperature of 90° and a length of 5ml, the expansion will be:

$0.065 \times 5 \text{ ml} \times 90^\circ = \pm 29 \text{ mm}$  of expansion.

Panels are freely expanding within the connectors and the top lateral profiles.

Expansion works towards the top.

Expansion over the width of the facade is contained by the connectors juxtaposition system.

## 6 – Thermal specifications

Configuration	Uc (W/m <sup>2</sup> .K)	ψi (W/m.K)	χk (W/k)
626 + 626	0.80	0.062	0.009
626 + 2x4 + 626	0.70	0.045	0.009
626 + 684 + 626	0.62	0.045	0.009

CSTB Test Report: DRI/HTO 2013-088-RB/LS

Uc: Thermal coefficient in the core part of the panel (in between connectors)

ψi et χk : Thermal coefficient alongside the connectors

## 7 – Shock resistance

Panels	External shocks	Internal shocks
626 + 626	Q4	O3
626+2x4+626	Q4	O3
626+684+626	Q4	O3

Report: GINGER CEBTP n°ORE6.B.0015 du 13/09/2011 according to the norm P08-302 (Octobre 1990) and CSTB booklet 3534 (Decembre 2005).

## 8 – Interior / Exterior sound absorption

Panels	Interior	Exterior	Rw (C, Ctr)
626 + 626	25 dB(A)	22 dB(A)	27 (-2,-5) dB
626+2x4+626	32 dB(A)	29 dB(A)	34 (-2,-5) dB
626+684+626	27 dB(A)	24 dB(A)	28 (-1,-4) dB

Phonic Test according to norm ISO 717

## 9 – Fire resistance

Resistance fire of ArcoTherm system in accordance to the NF EN 16153 norm regulating systems with polycarbonate applicable from 01/01/2014.

Panel	Euro classe Fire classification	Combustible mass (MJ/m <sup>2</sup> )
626 + 626	B, s1-d0	190
626+2x4+626	B, s1-d0	476
626+684+626	B, s1-d0	245

Fire classification Euro-Classe on the system following the norm EN 13501-1:2018.

PV LNE n° P206810 DEC/3 - 17/12/20

PV LNE n° P211653 DEC/5 - 20/08/21

PV LNE n° P215361 DEC/6 - 27/09/21

## 10 – Optical characteristics

Panel	Color (Ext=>Int)	Light transmission (TL) en %	Solar factor (SF) en %
626 + 626	Cristal + Cristal	39	43
	Cristal + Opale	23	37
	Opale + Cristal	23	33
	Opale + Opale	14	30
626 + 2x4 + 626	Cristal + Cristal + Cristal	34	39
	Cristal + Cristal + Opale	20	35
	Opale + Cristal + Cristal	20	30
	Opale + Cristal + Opale	12	28
626 + 684 + 626	Cristal + Cristal + Cristal	32	36
	Cristal + Cristal + Opale	20	33
	Opale + Cristal + Cristal	20	28
	Opale + Cristal + Opale	12	26

CSTB report: DER/HTO 2012-223-RB/LS

## 11 – Resistance to chemical agents

ArcoPlus® connectable panels have good resistance to most chemicals with which it is likely to come into contact during normal use.

Chemical agents	Resistance
Diluted acids	Good
Concentrated acids	Average to good
Alkali	Low to average
Organic solvents – alcohol	Good
Chlorinated hydrocarbons	Low
Aromatic hydrocarbons	Low
Aliphatic polycarbons	Low
Lubricating oils	Good
Detergents	Good

Preliminary tests are recommended in case of intense or specific exposure. Use of solvent must be avoided.

## 12 – Storage

ArcoTherm® systems should be stored avoiding exposure to direct sunlight and rain. Should storage be outside, it should not be directly in contact with the ground (a ventilation space must be kept) and should be protected with a light-colored non-transparent tarpaulin.

To avoid oxidation, untreated aluminium profiles should be unpacked straight away after unloading to avoid any

contact with potential residual humidity within the package and stored in a dry environment. In any case, untreated aluminium profiles should not be kept in contact of each others in a humid environment.

Do not store more than two pallets on top of each other.

In case of heavy wind, use straps.

## 13 – Maintenance

ArcoTherm multi walls® panels should be frequently cleaned with mild soapy water (neutral detergent) and thoroughly rinsed with clear water. Do not use warm water.

Do not use organic solvents, abrasive or alkaline products.

## 14 – How to replace a damaged panel?

### 14.1 – Panel of external face

1. Remove the 1169 gasket.
2. Unclip the AL clip for profile while swivelling it towards the interior of the boarding.
3. Using a portable grinder with a diamond disc, cut the damaged panel carefully, alongside the connector.  
A guide could be used to protect the other panels against any damage.  
Then unclip the weakened panel.  
Starting from the bottom, install the replacement panel.
4. Put back in place the AL clip for profile, and finally clip back the 1169 gasket.

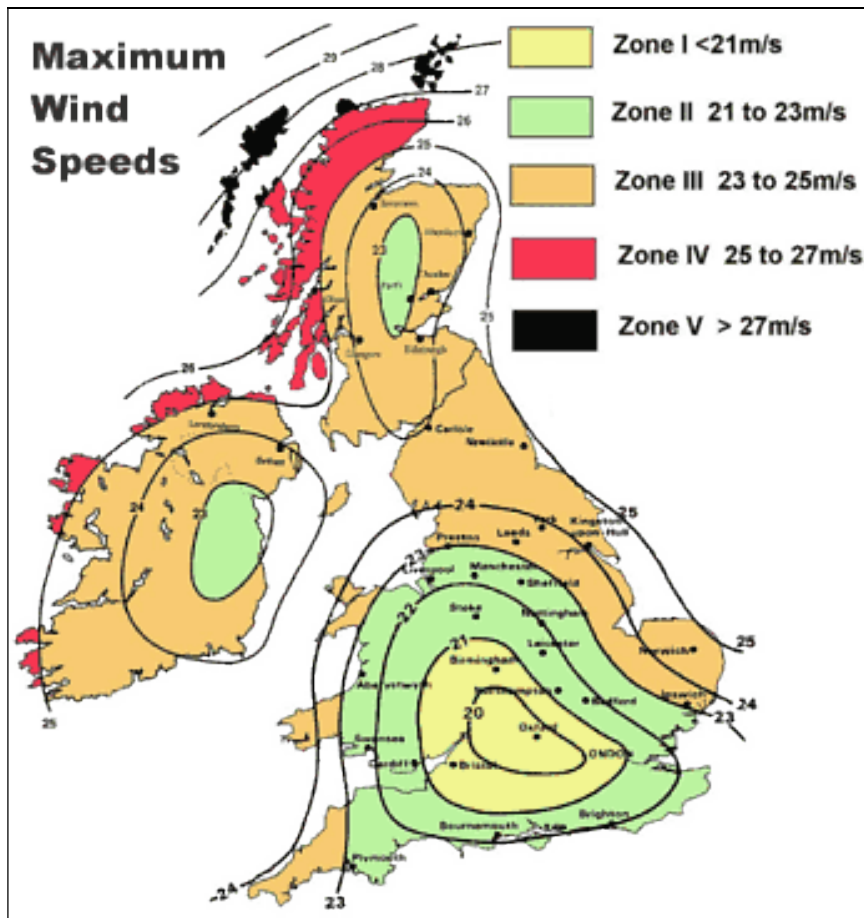
### 14.2 – Panel of the internal face

1. Remove the 1169 gasket.
2. Unclip AL clip for profile while swivelling it towards the interior of the boarding.
3. Using a portable grinder with a diamond disc, cut the damaged panel carefully, alongside the connector.  
A guide could be used in order to protect the other panels against any damage.
4. Remove the spacer at the top of the boarding.
5. Remove the optional panel if it exists, by pushing it at the bottom on the left or on the right in one of the connectors by making it swivel from the interior towards outside using suction cups.
6. Unclip the connectors PC ref.2282 while starting with the low part.
7. Cut the damaged panel on two on its height, then remove it by making it swivel in the halters 4328.
8. Unscrew the accessible halters 4328 and replace them by stainless steel flat halters by untwisting their pin slightly.
9. Replace the damaged panel, then slip the low spacer under the latter.
10. Fold up the pins by using a mallet and re-clip the connectors PC ref 2282 (Check that the spacer on low part of the boarding is correctly positioned before the clipping of the connectors).
11. Put the optional panel back if it exists by making it slip into the other connector.
12. Re-clip the panel of the external face (provide for 3 new panels)
13. Replace the spacer at the top of the boarding.
14. Replace the AL clip for profile. Put back in place the 1169 gasket.

**15 - Simplified field of application for the system according to AWW (air, water, wind)**

Height Building (m)	Zone I		Zone II		Zone III		Zone IV	
	Normal	Exposed	Normal	Exposed	Normal	Exposed	Normal	Exposed
10	✓	✓	✓	✓	✓	✓	✓	✓
20	✓	✓	✓	✓	✓	✓	✓	✓
30	✓	✓	✓	✓	✓	✓	✓	✗
40	✓	✓	✓	✓	✓	✓	✓	✗
50	✓	✓	✓	✓	✓	✗	✗	✗

Based on air and water infiltration resistance performances under normal pressure of 1800Pa.



## 16 - Maximum loads charts

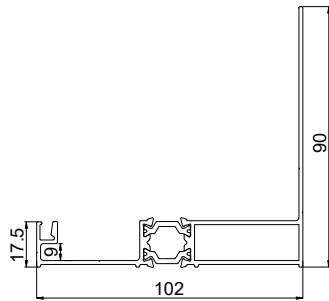
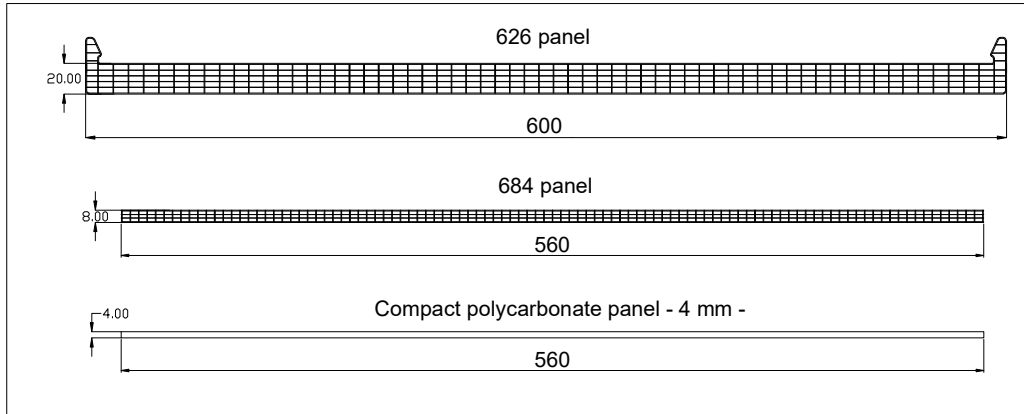
### 16.1 - Maximum load on 2 supports

Distance between fixed points	Maximum load N/m <sup>2</sup> - 1/50 <sup>th</sup> deflection	
	2000 mm	Positive Pressure
Negative pressure		850
2500 mm	Positive Pressure	1560
	Negative pressure	890
3000 mm	Positive Pressure	560
	Negative pressure	510

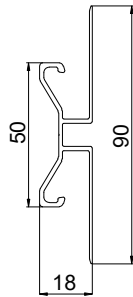
### 16.2 - Maximum load on 3 supports

Distance between fixed points	Maximum load N/m <sup>2</sup> - 1/50 <sup>th</sup> deflection	
	1000 mm	Positive Pressure
Negative pressure		1930
1250 mm	Positive Pressure	3000
	Negative pressure	1760
2000 mm	Positive Pressure	2900
	Negative pressure	980
2500 mm	Positive Pressure	1820
	Negative pressure	750
3000 mm	Positive Pressure	1160
	Negative pressure	600

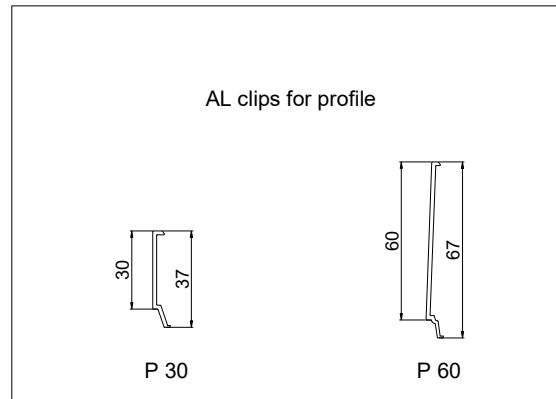
**arcoPlus panels, Connectors, Profiles & Accessories**



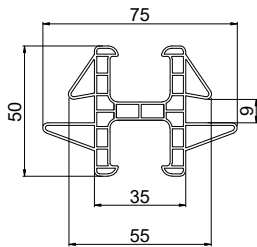
4272 profile



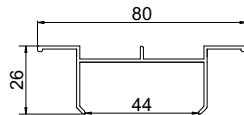
1/2 Connector  
Ref. 4275



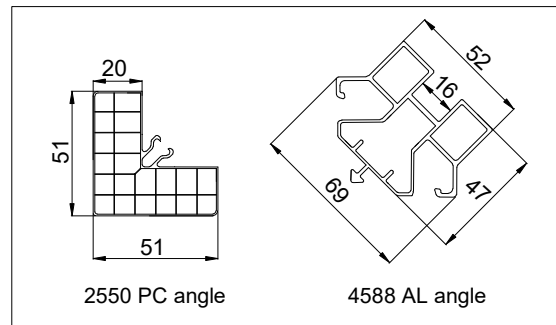
AL clips for profile



2282 PC connector

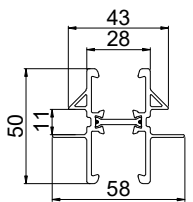


4273 spacer



2550 PC angle

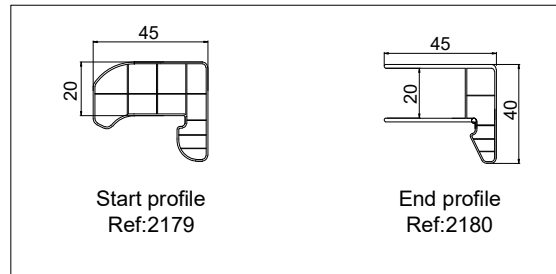
4588 AL angle



4833 AL connector

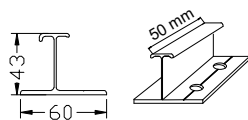


Rubber gasket  
Ref:1169

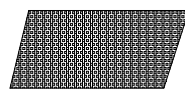


Start profile  
Ref:2179

End profile  
Ref:2180



Fixing halter  
Ref: 4328

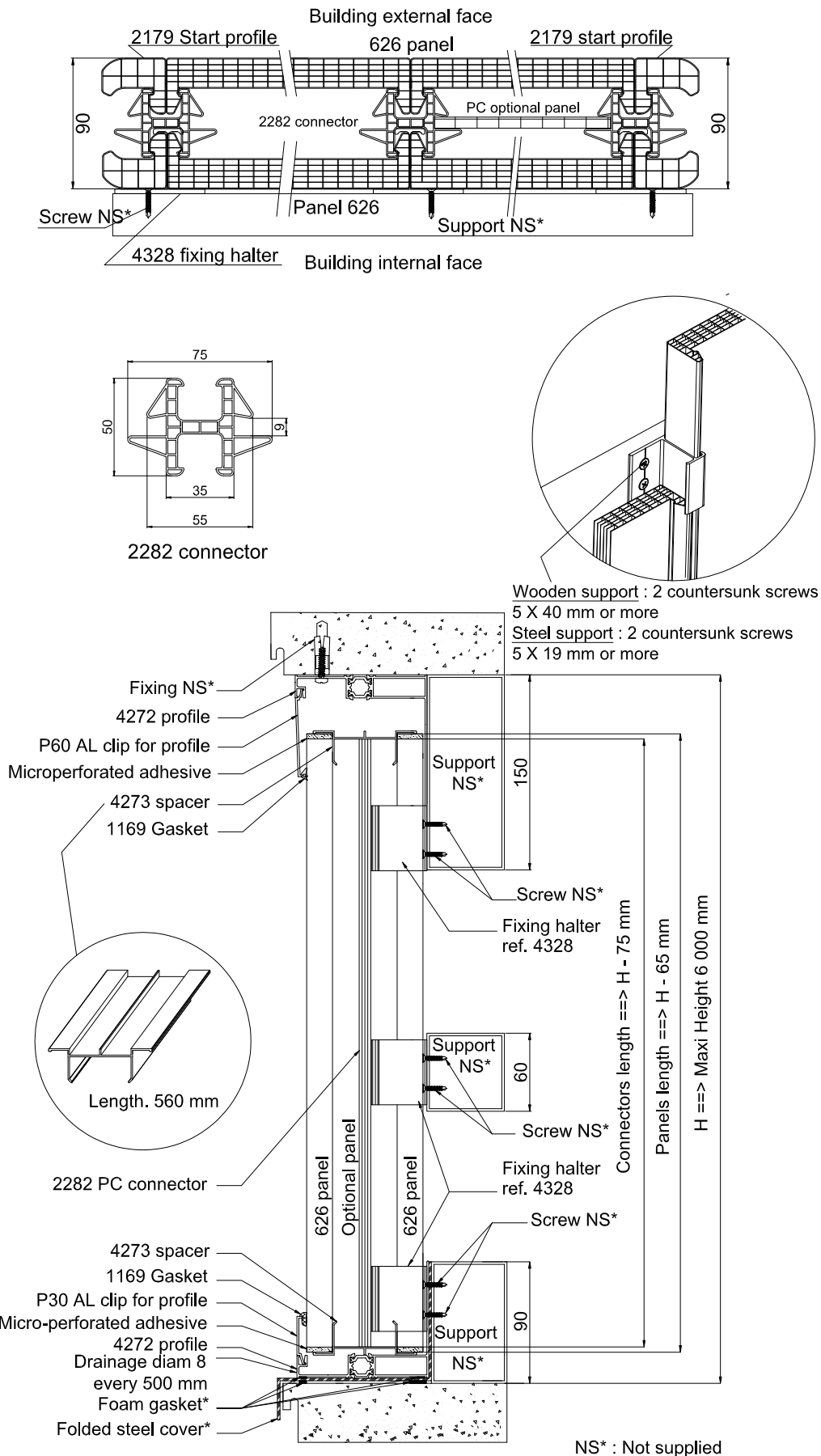


Microperforated  
adhesive  
Ref:4083



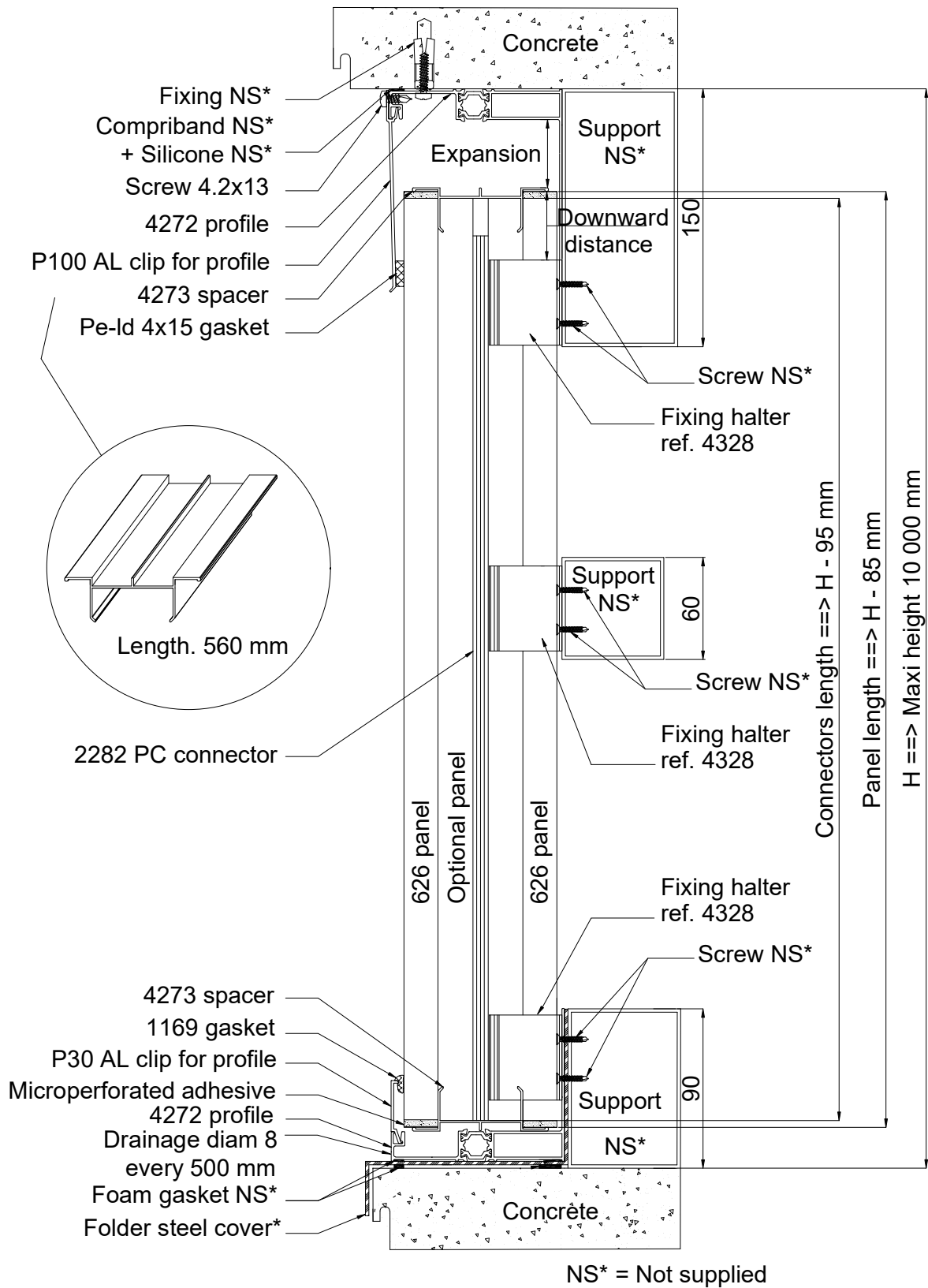
Pe-Id gasket  
Ref:4329

**Principe of Installation: Vertical section: Installation from 0 to 6 meters**

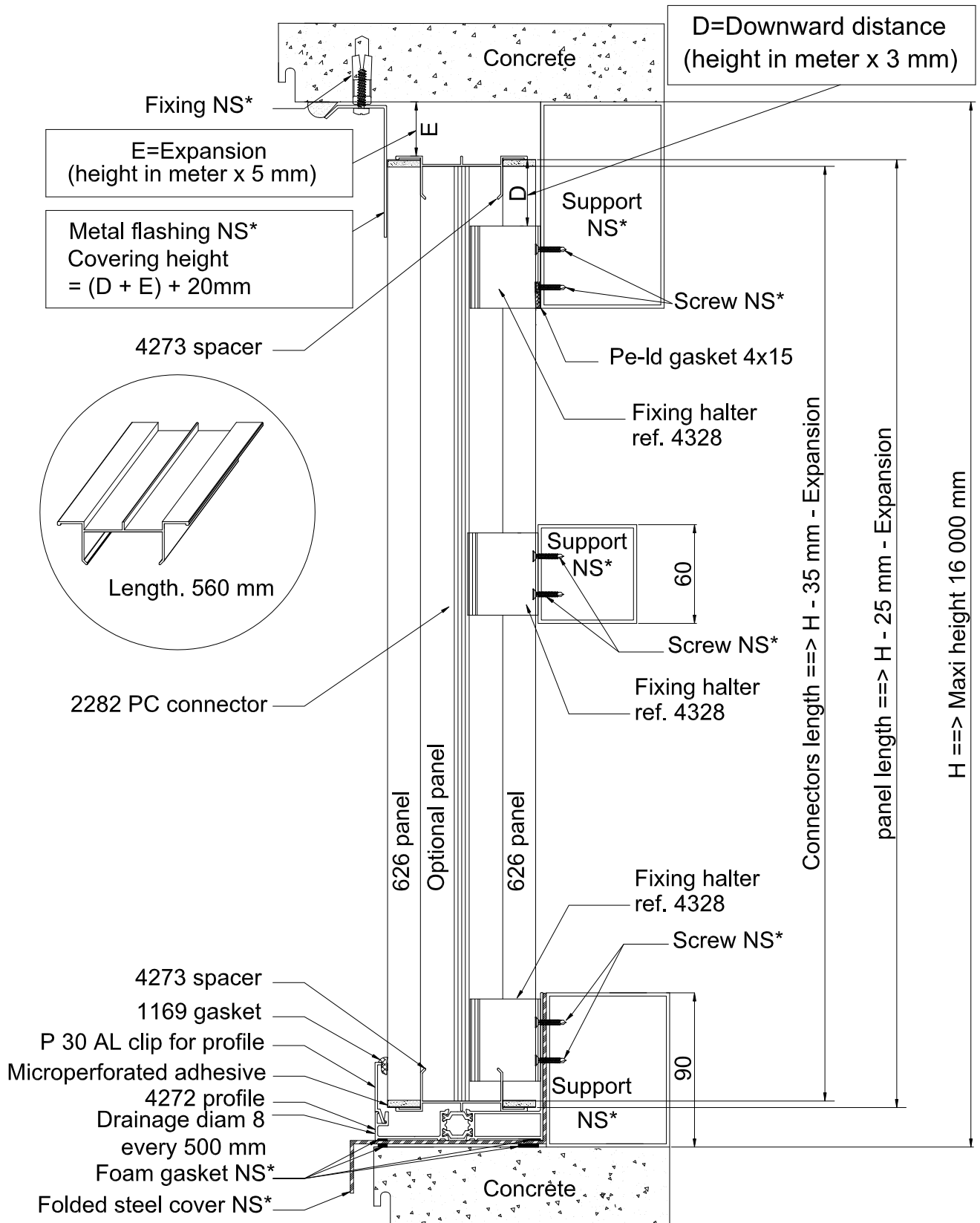




**Vertical section: Installation from 0 to 10 meters**

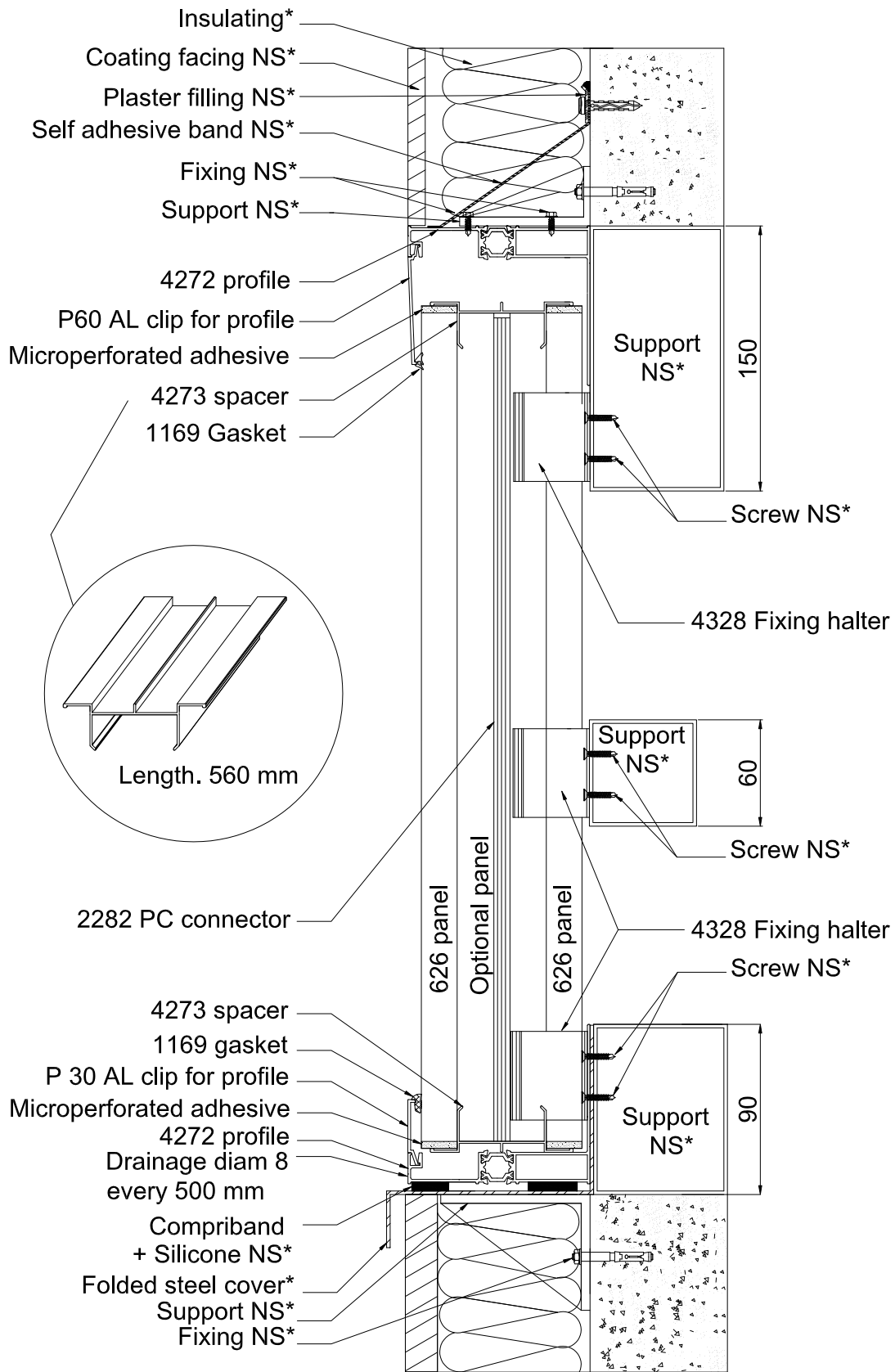


**Vertical section: Installation from 0 to 16 meters**



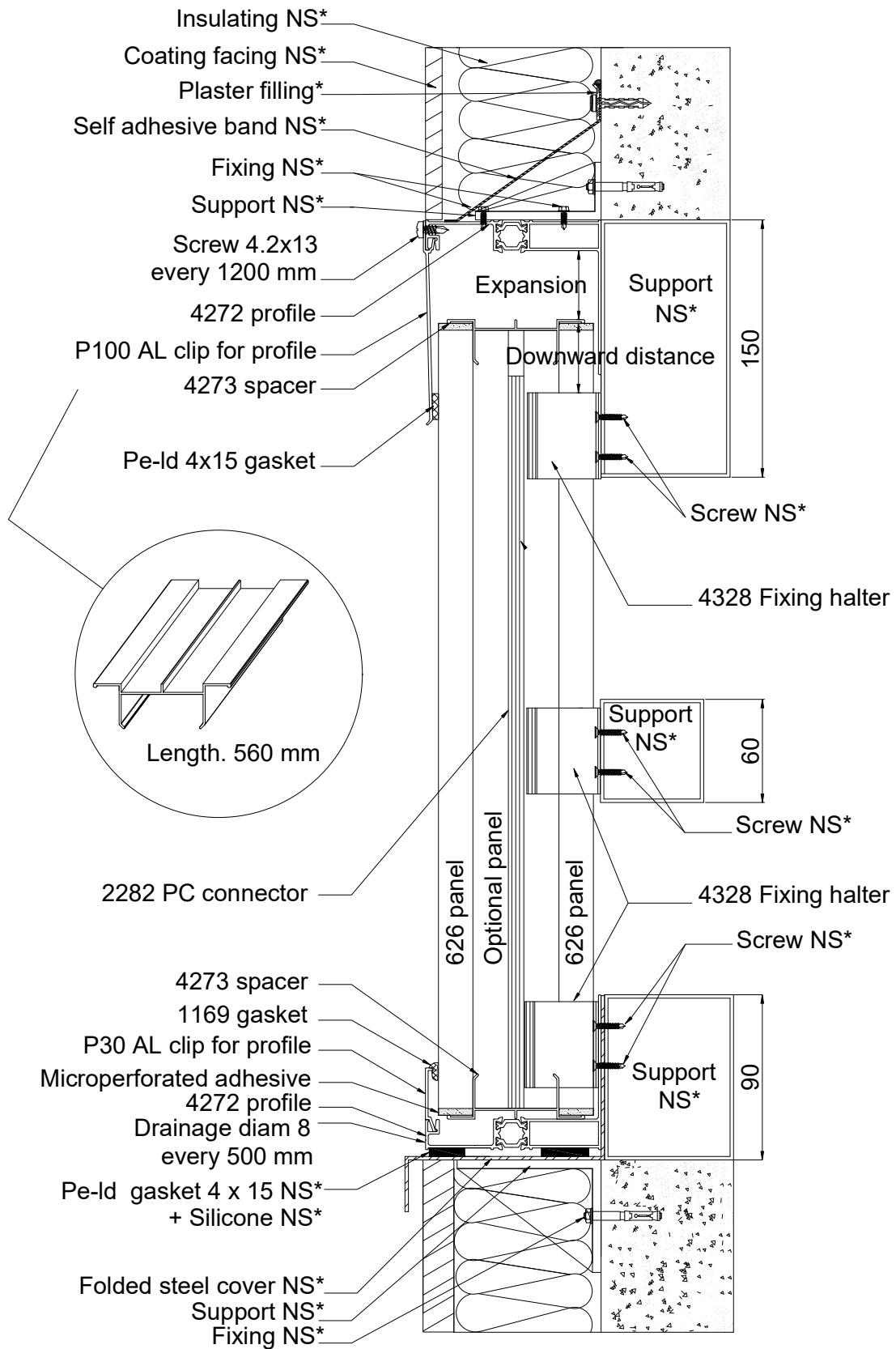
NS\* = Not supplied

**Vertical section: Front of building installation up from 0 to 6 meters**



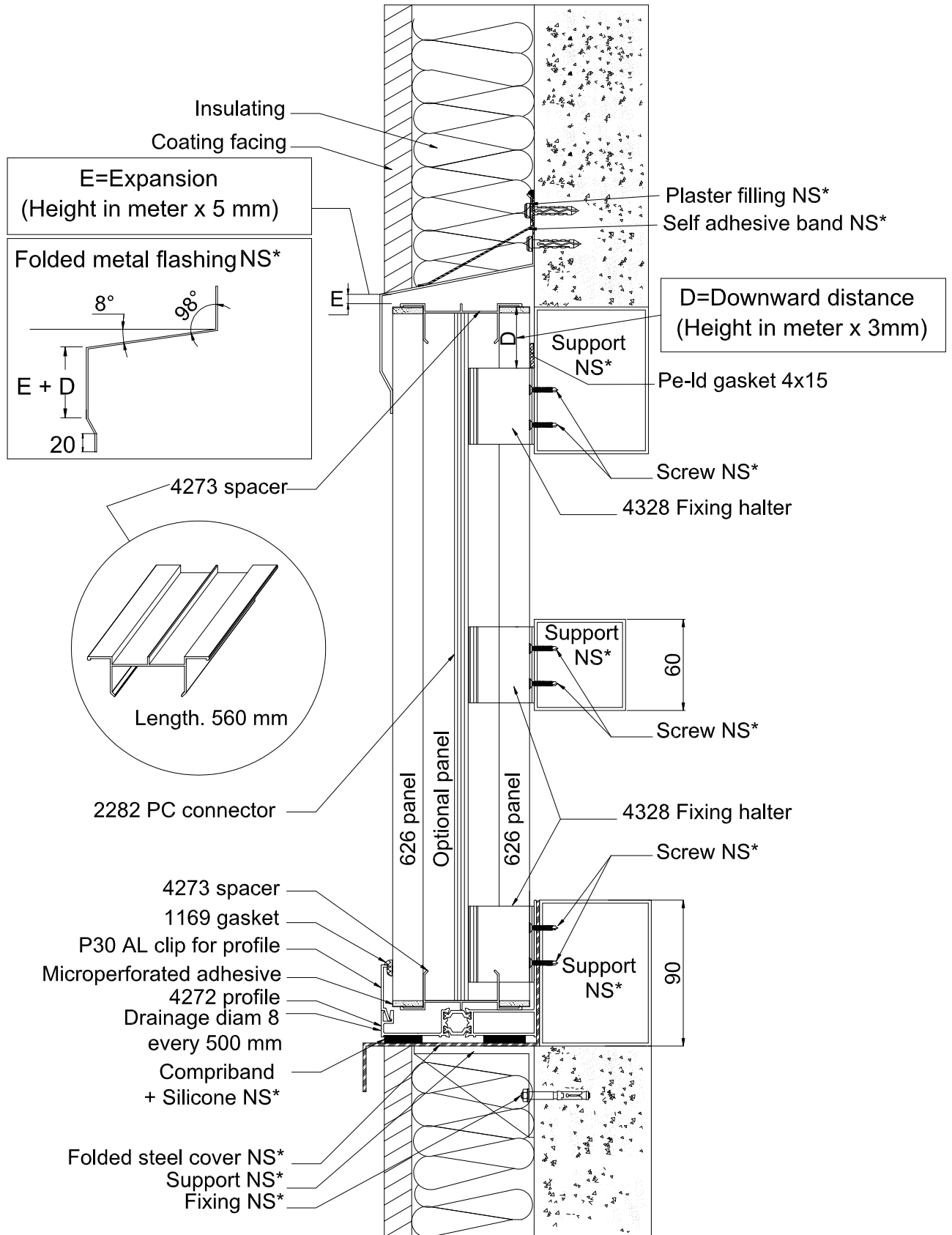
NS\* = Not supplied

**Vertical section: Front to building installation from 0 to 10 meters**



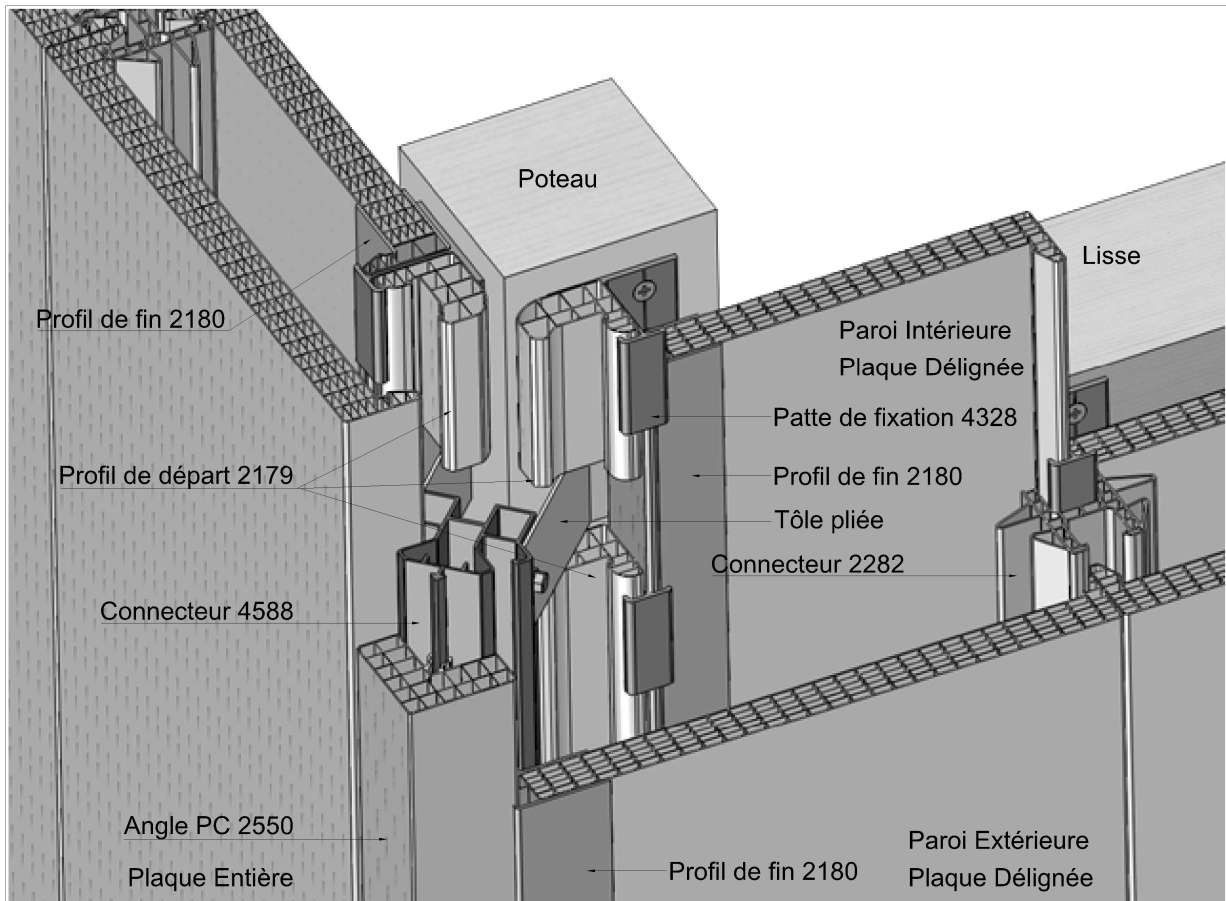
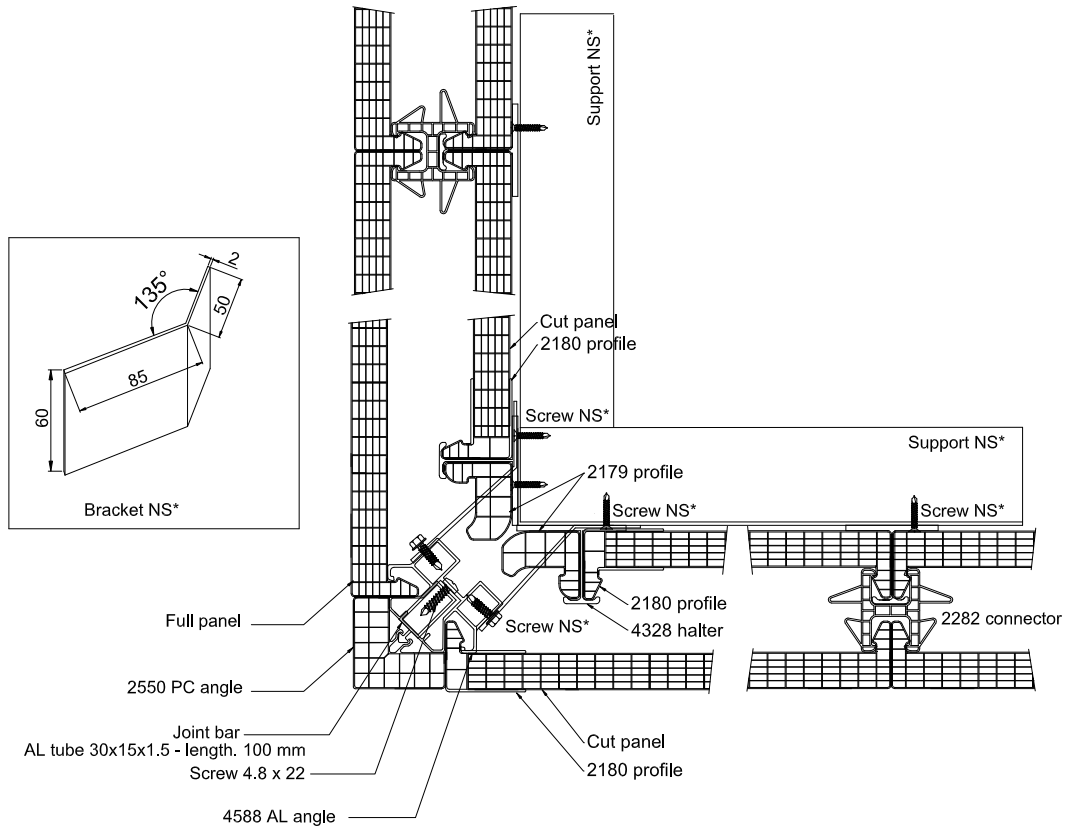
NS\* = Not supplied

**Vertical section: Front to building installation from 0 to 16 meters**

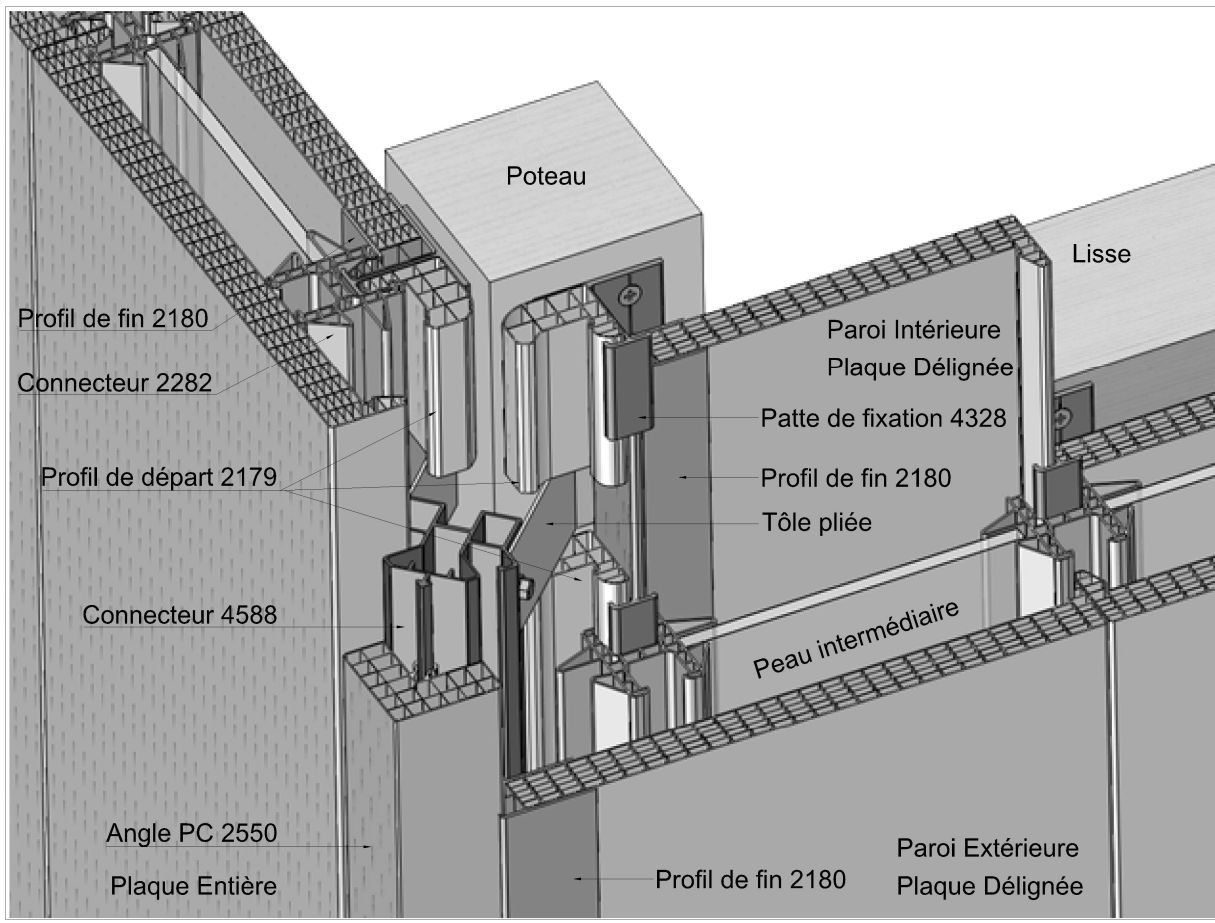
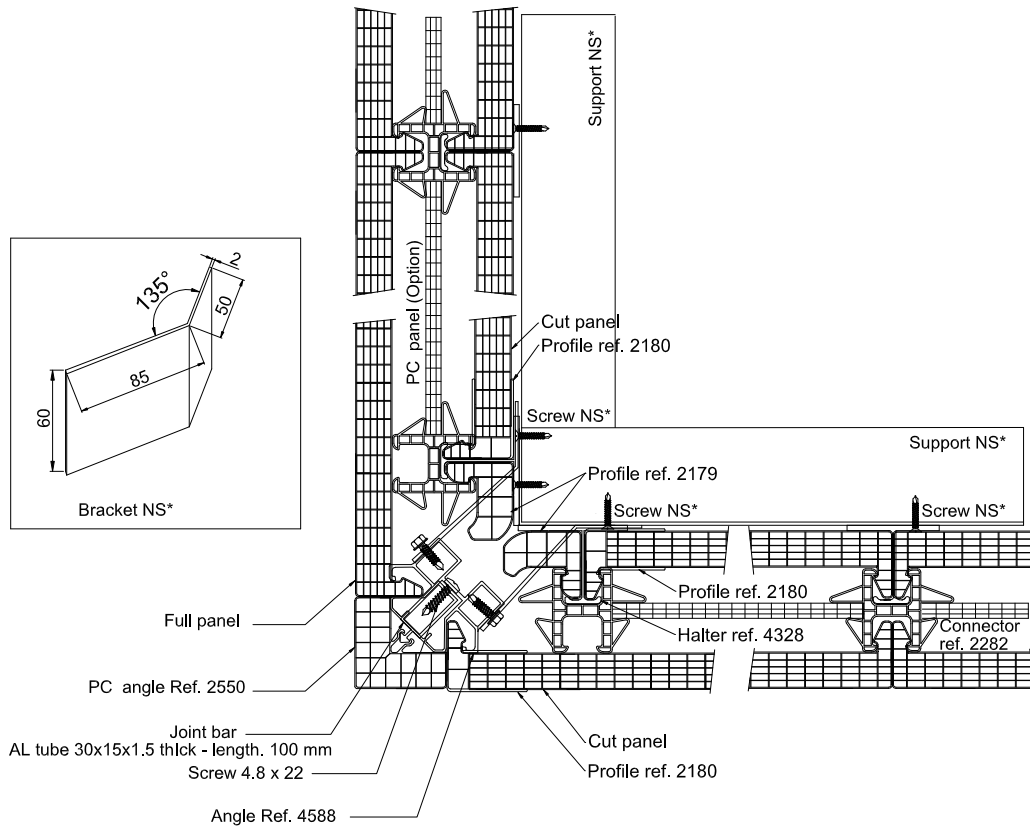


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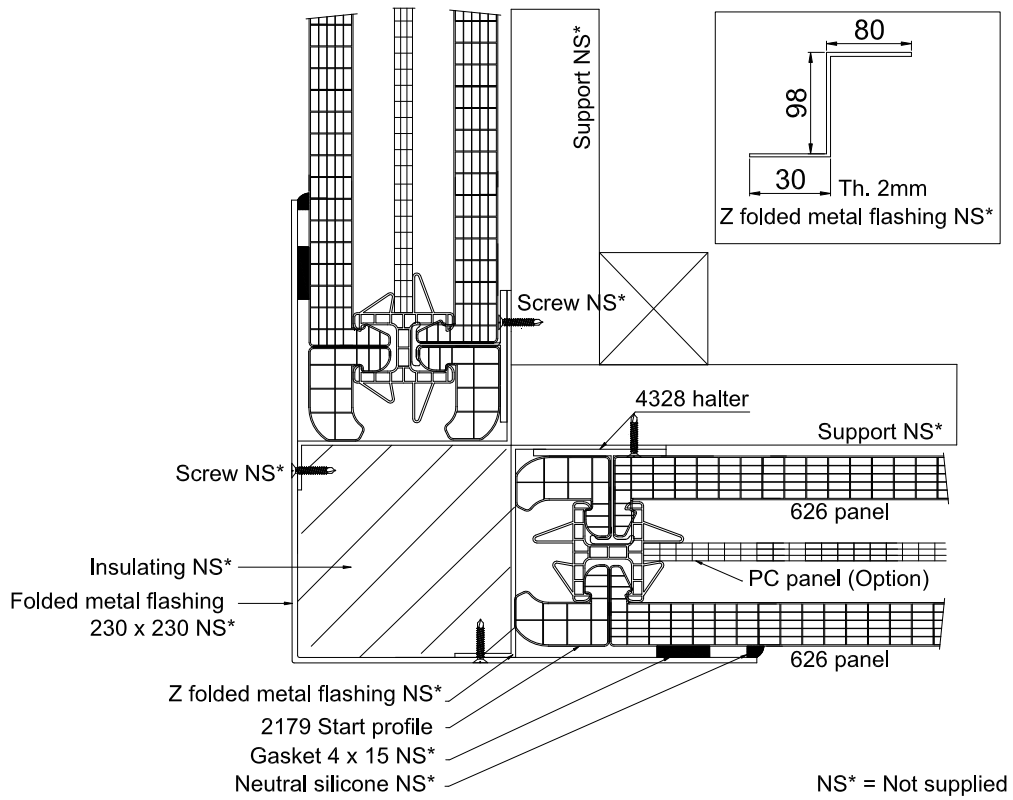
**Twin skin: Angle at 90° with Profiles ref. 2550 et 4588**



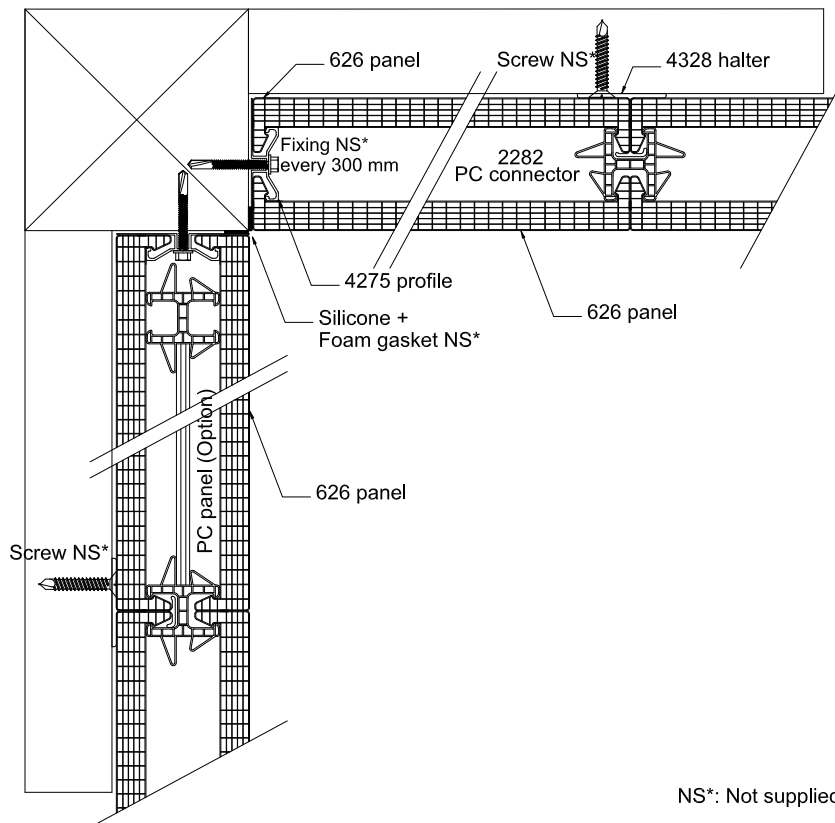
**Triple skin: Angle at 90° with Profiles ref. 2550 et 4588**



**Angle with covering metal flashing**

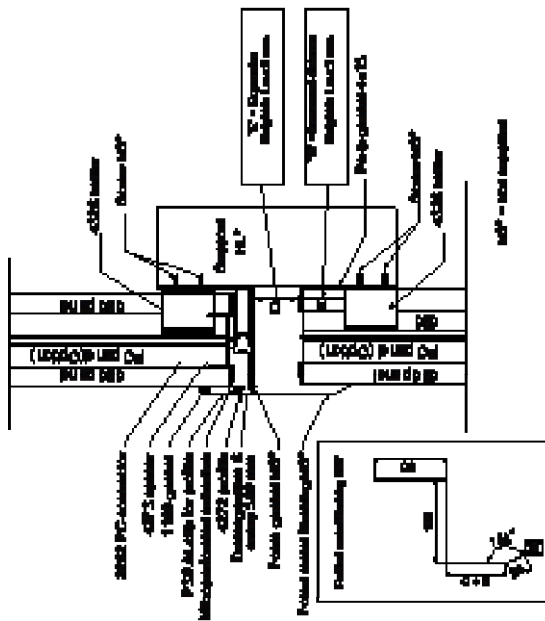


**Internal angle**

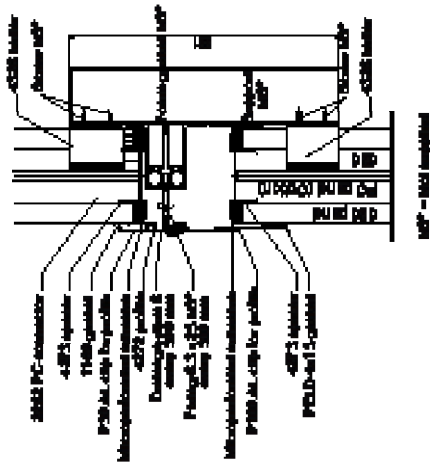




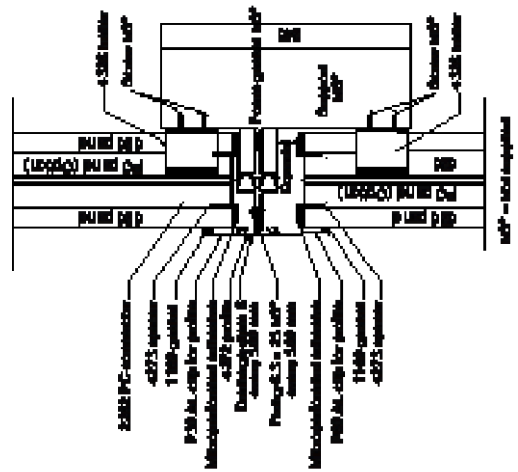
**Principle of intermediary frame profile – Vertical Expansion joint**



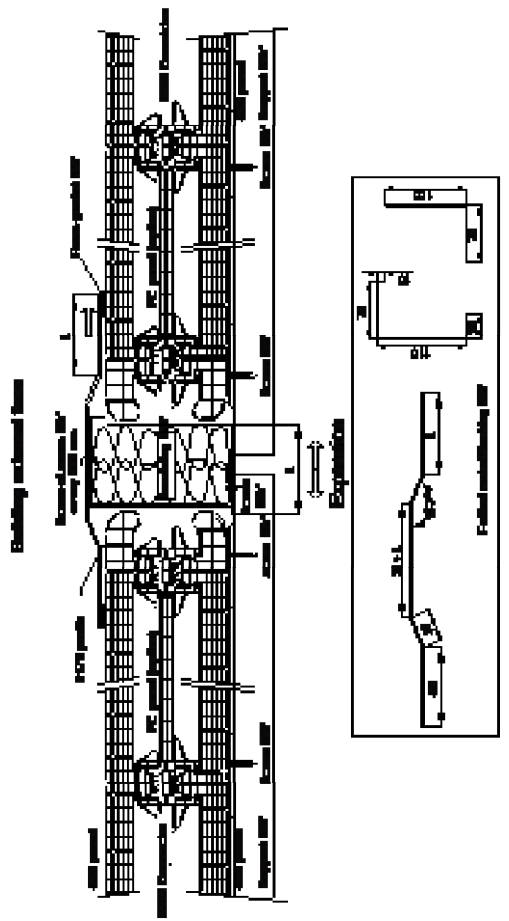
Cladding height: 15 modules



12M - total height

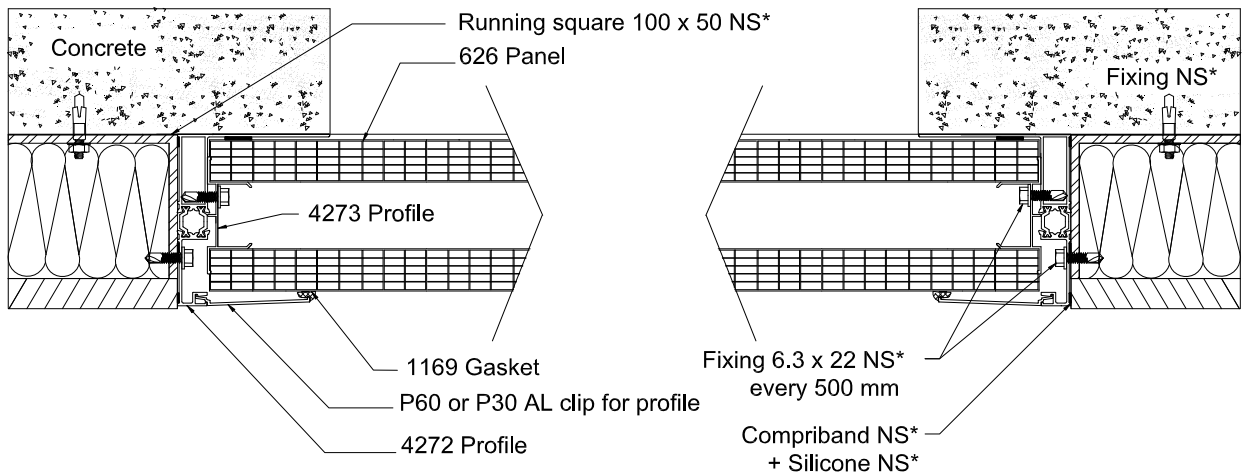


Cladding height: 6 modules



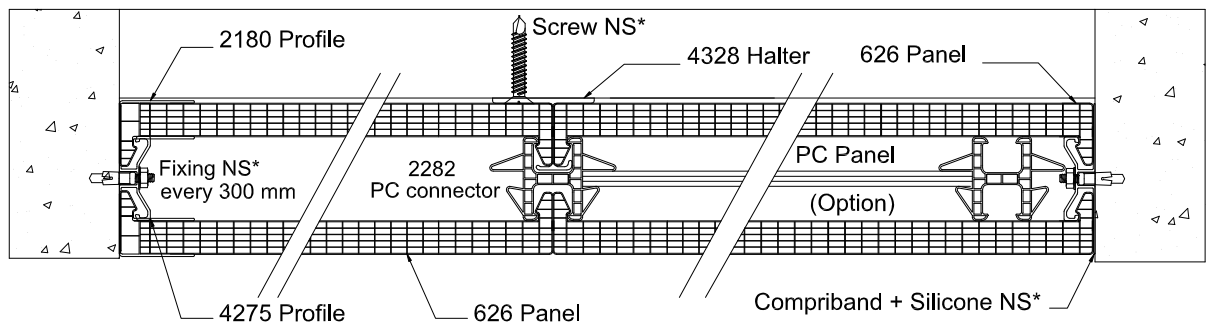
15M - total height

**Lateral completion**



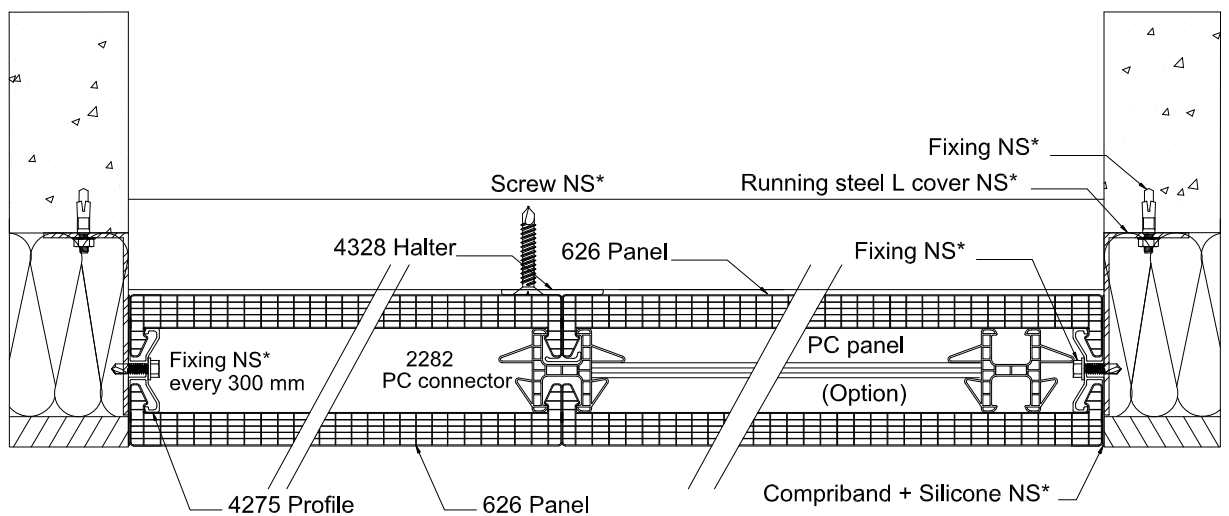
NS\* = Not supplied

Cladding external face



NS\* = Not supplied

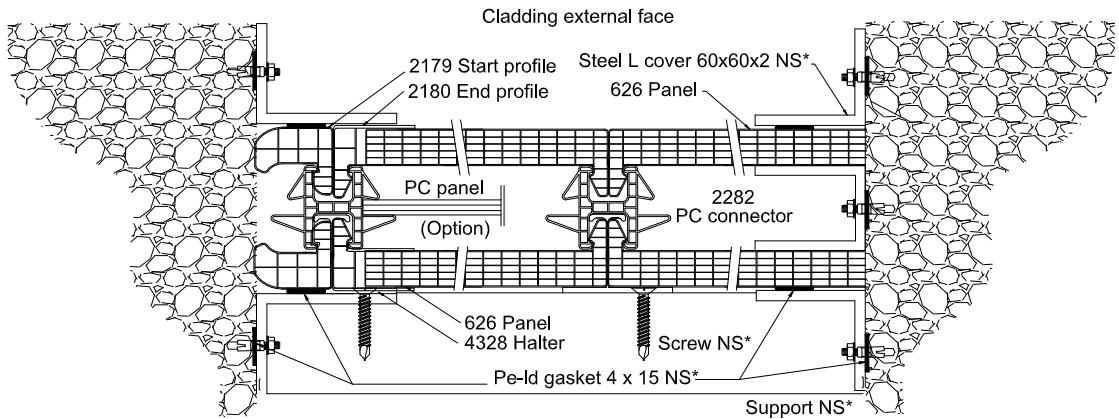
Cladding external face



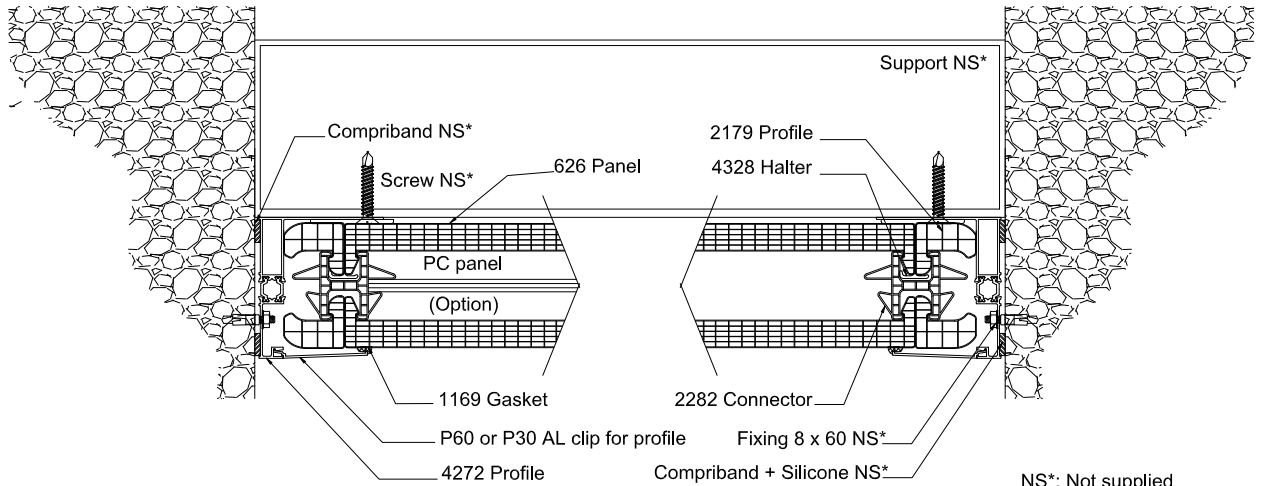
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Cladding external face

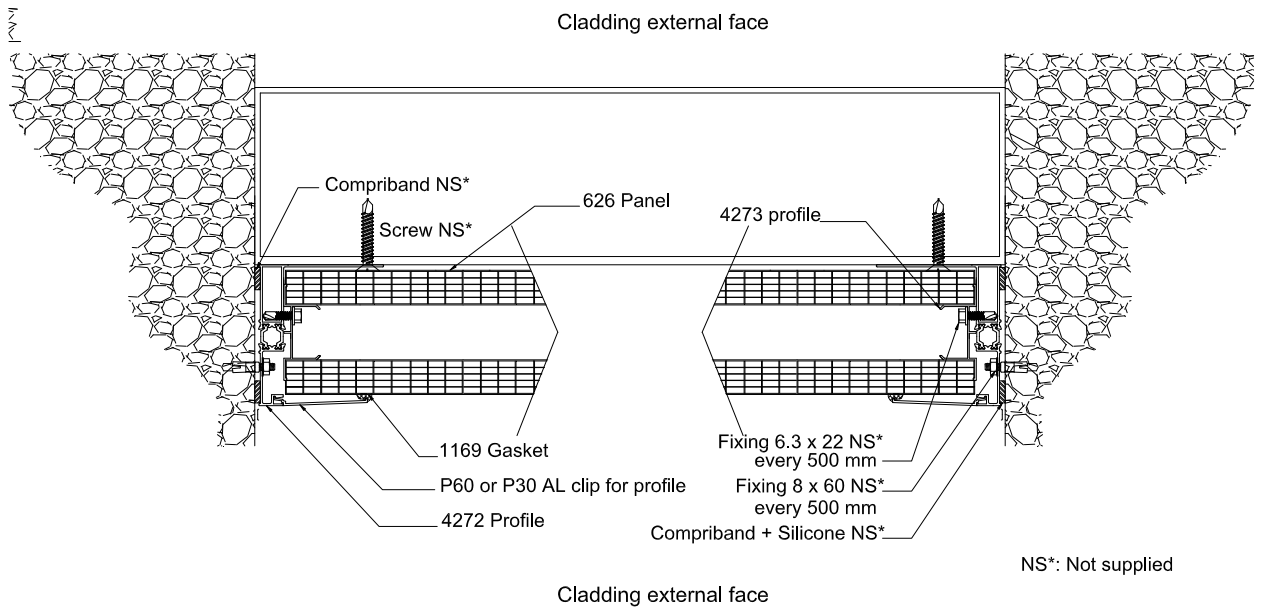
**Lateral completion**



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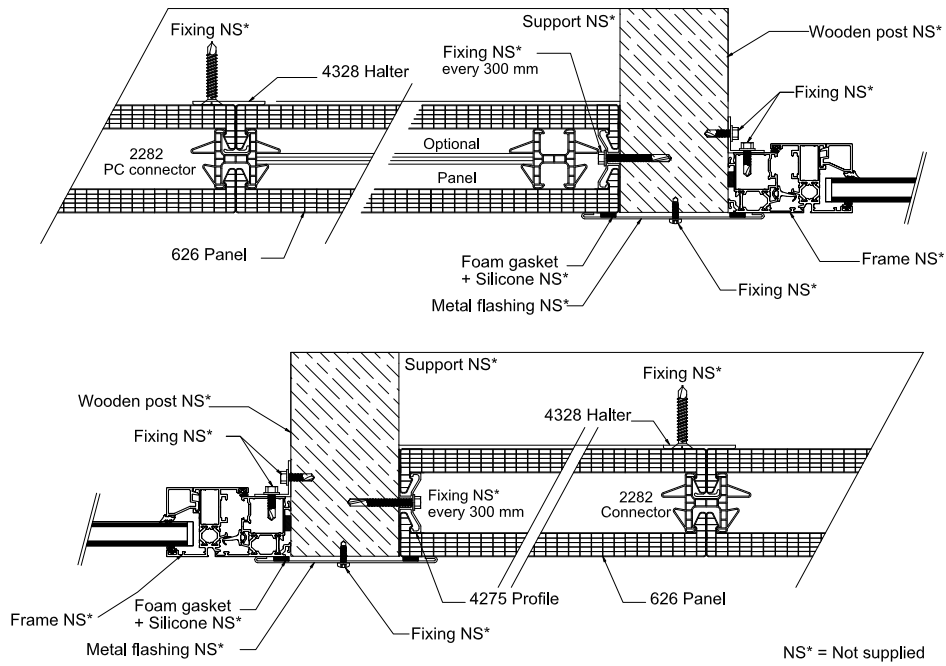


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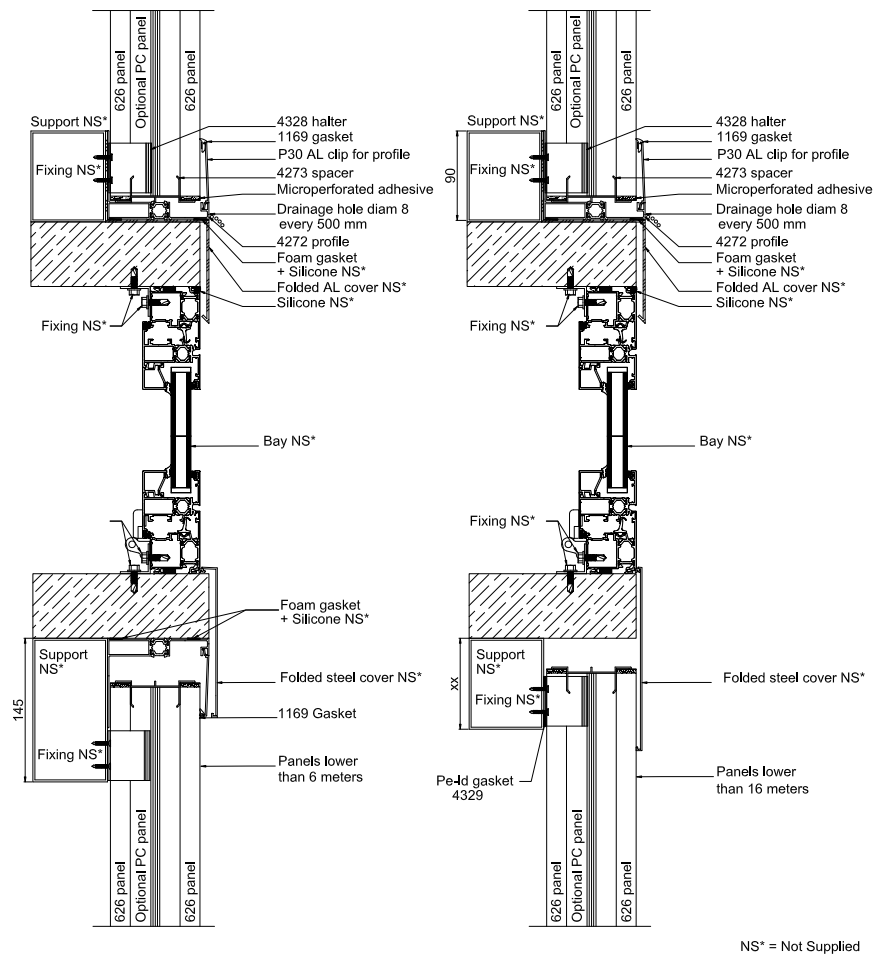


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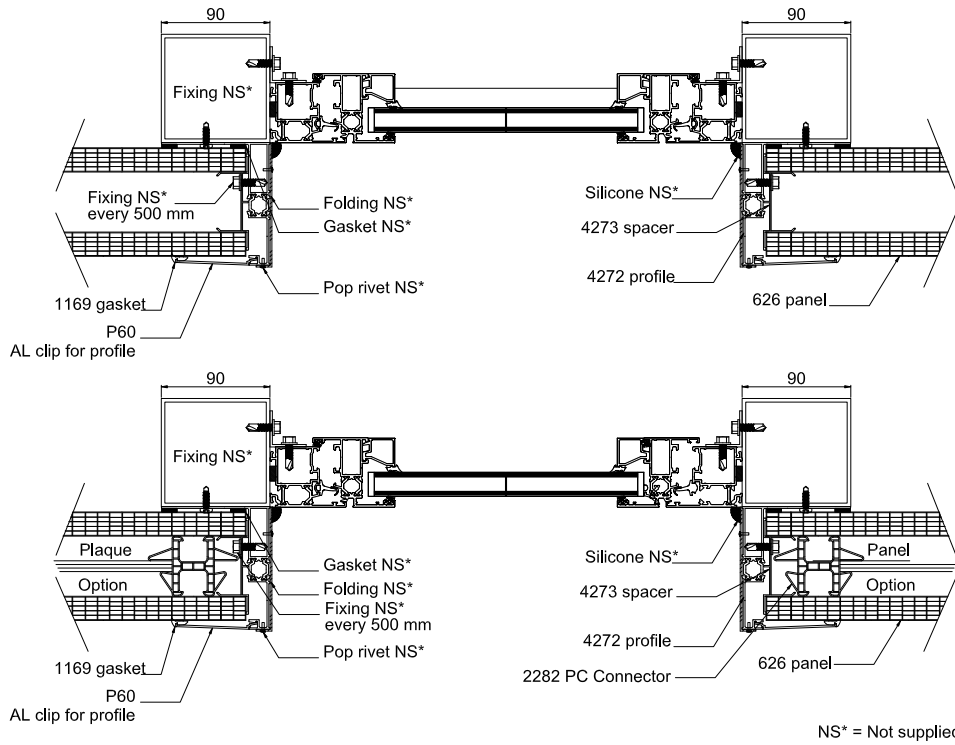
### Horizontal section - Principle of installation on structural opening



### Vertical section - Principle of installation on structural opening



**Horizontal section - Principle of installation on structural opening**



**Vertical section - Principle of installation on structural opening**

