

Adhesion Prime Portfolio

Insulation solutions for
windows, doors, and facades

Presentation

- Technoform is launching a new application to enhance the adhesion properties of polyamide strips for windows doors and facades.
- Technoform strips are known as a reliable solution for thermal and mechanical applications for profiles at the aluminum and steel building industry.
- A field in which strips could be improved and therefore their overall performance could be enhanced, was the adhesion between them and the surrounding elements that constitute a finished metallic frame unit.
- We are glad to announce that our new application, **Adhesion Prime**, can provide a high adhesion performance for gluing silicones and building glues on our strips.
- The current document is the first of a series of publications describing the application and willing to be an inspiration source of ideas for your future designs on facades and envelopes.

Benefits of gluing thermal insulation profiles

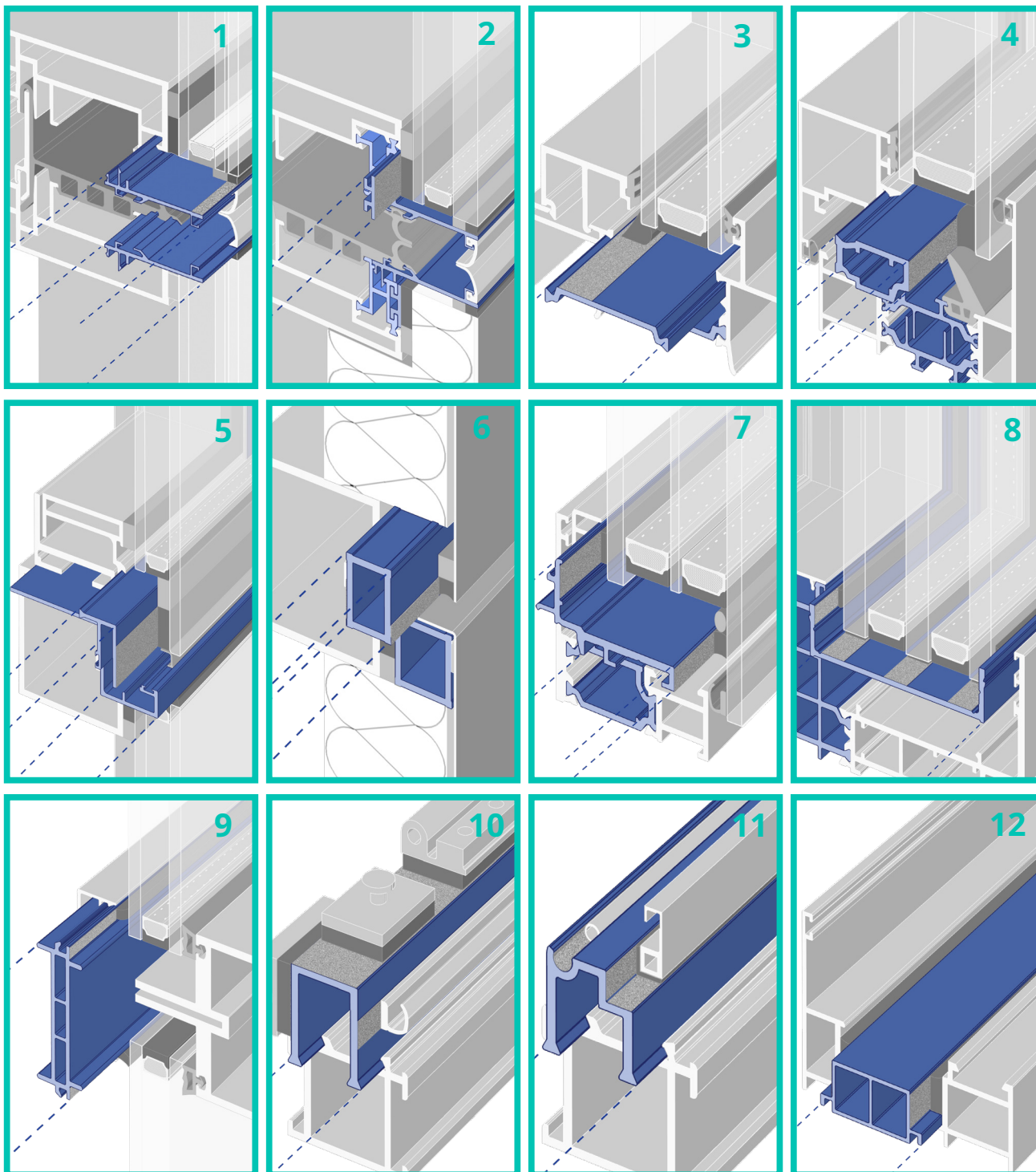
Improvement on thermal insulation of the aluminum frame:

- Reducing the thermal insulation gap between frames and glazing
- Avoiding indoor moisture condensation due to the dew point
- Allowing designs that could match the new or updated energy saving regulations

Improvement of the overall construction units:

- Reducing the weight of the structure, especially for curtain walls
- Reducing the quantity and cost of frame components and their assembly
- Facilitating subsequent reuse and recycling of materials

List of ideas

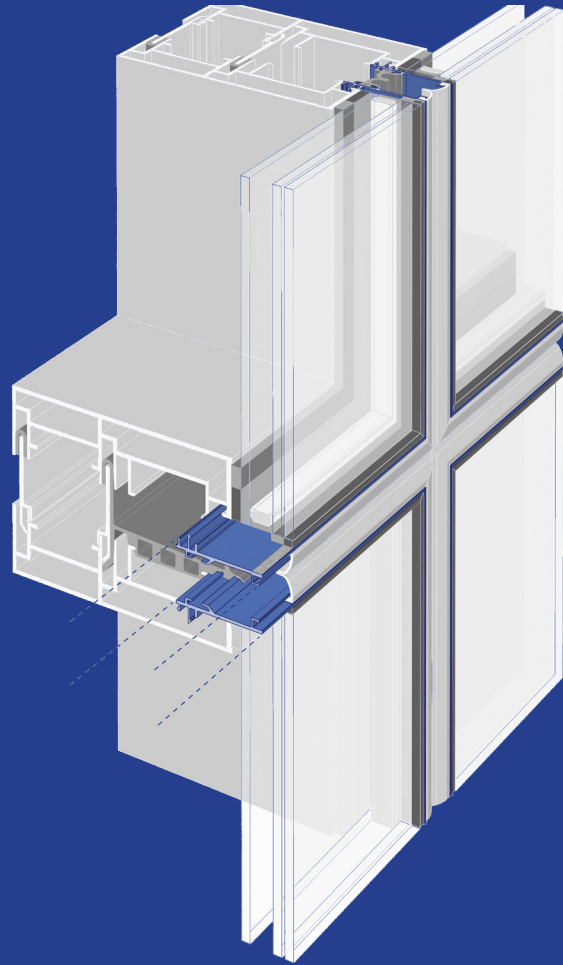


List of ideas

- 01** Glazing edge
- 02** Bonded glazing and panel
- 03** Heel bead
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- 06** Opaque facades
- 07** Freezer doors
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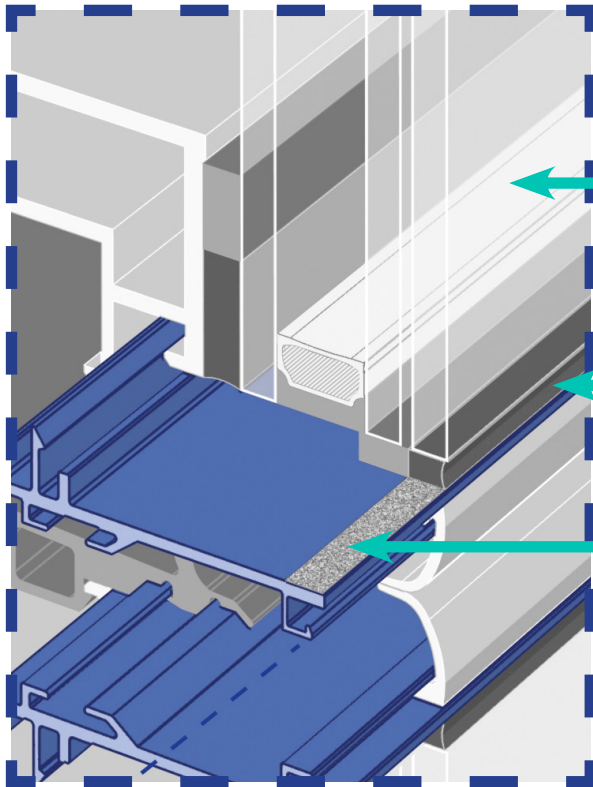
01

Glazing edge sealing



- 'Glazing Edge' means the solution of sealing with silicone the glazing unit from its edge to an adjacent element, commonly made of aluminium to assure the adhesion over it.
- Due to energy saving regulations, some profiles made of polyamide are currently used on these designs, by adding a micro indentation or by adding an external aluminum profile cap.
- In that applications the silicone manufacturer recommendations must be followed strict and carefully, or in other case could lead to leakages across the edges after a period of time.
- To assure a high level of reliability, Adhesion Prime is a great option to be considered.

Isometric view of a generic new curtain wall unitized system design



Glazing

Weather-proof
silicone

Adhesion Prime

Performance improvements for the end user

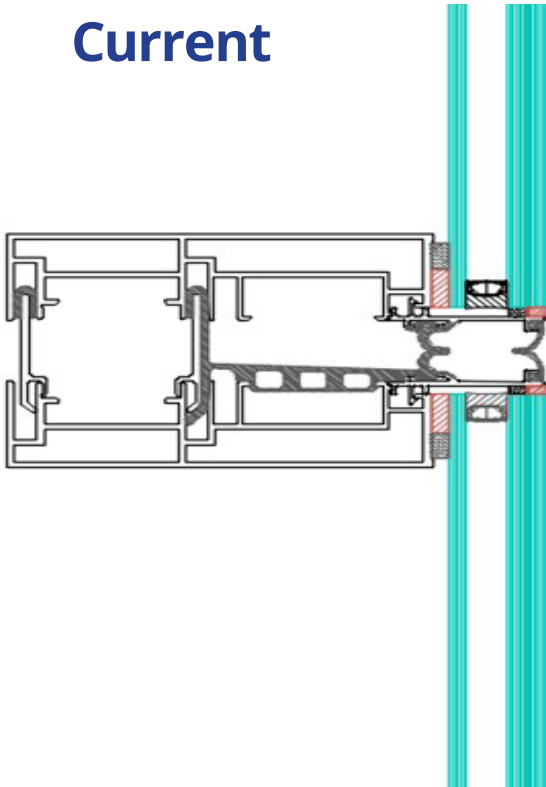
- Avoiding moisture condensation
- Comfort near façade
- Higher thermal insulation
- Improved acoustics

Performance improvements for the cladding unit

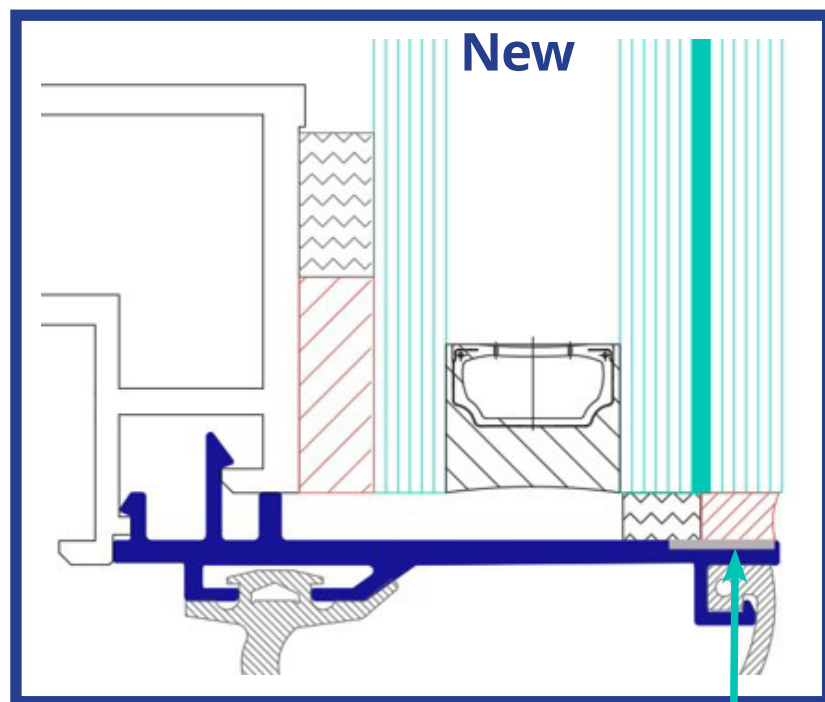
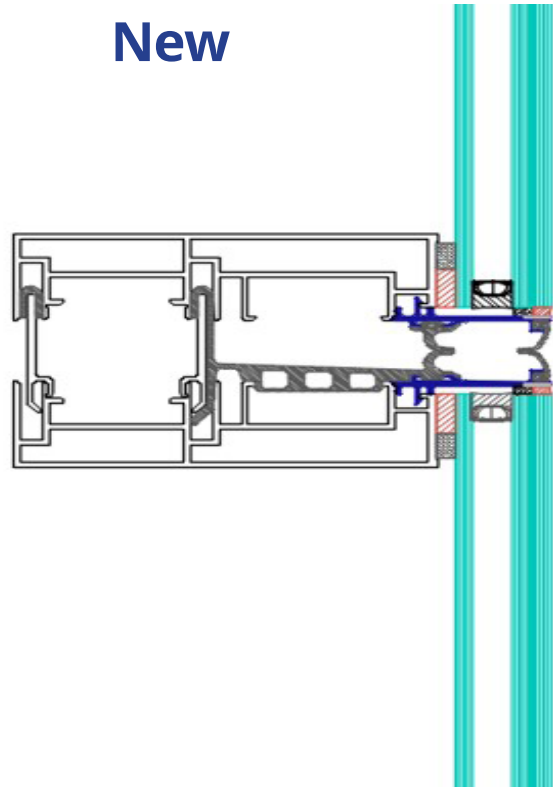
- Weather-proof sealing
- Weight reduction
- Simpler assembly

System cross section

Current

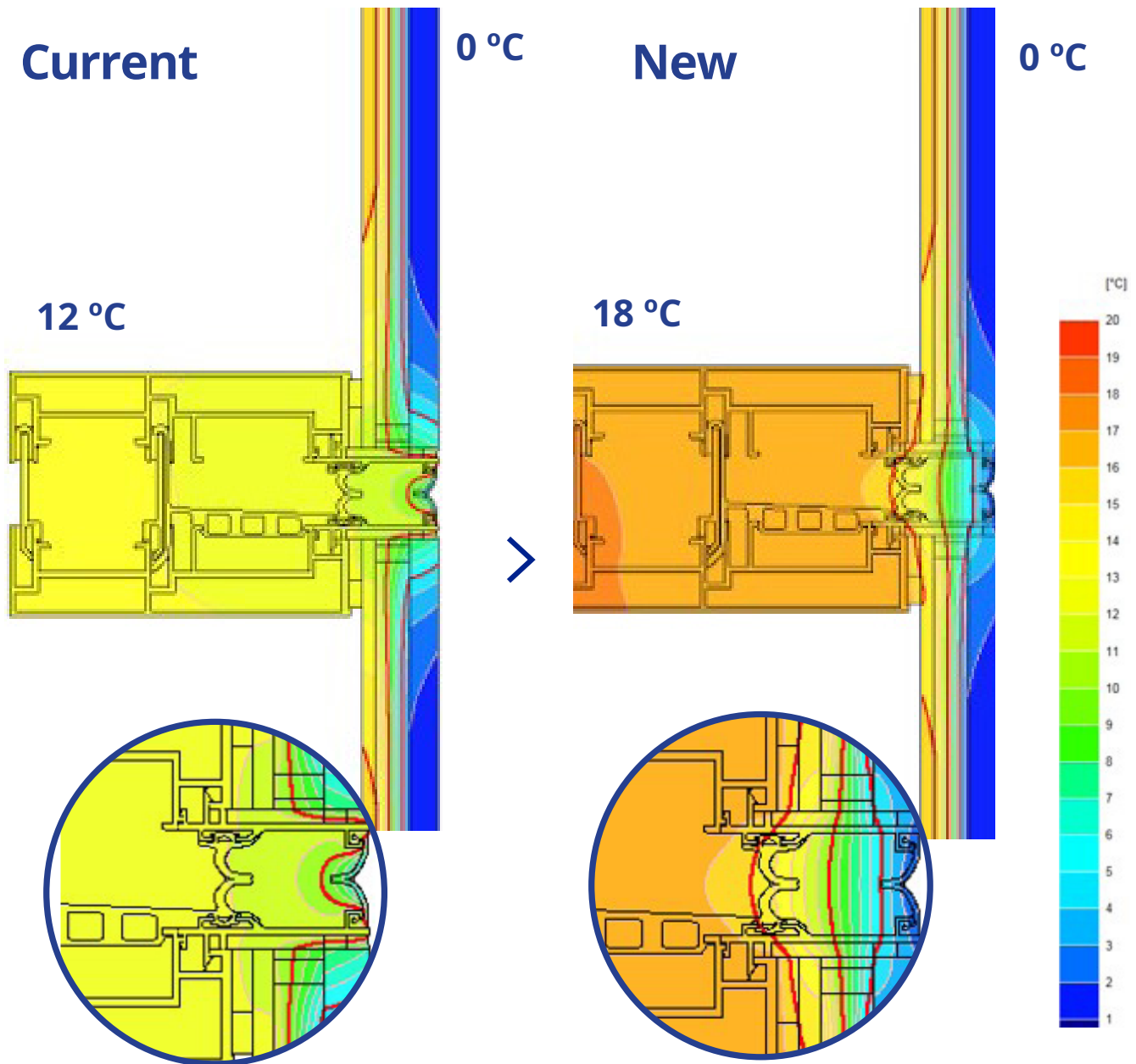


New



**Adhesion
Prime**

U_{tj} from 8.0 to 3.5 W/m²K (-56 %)

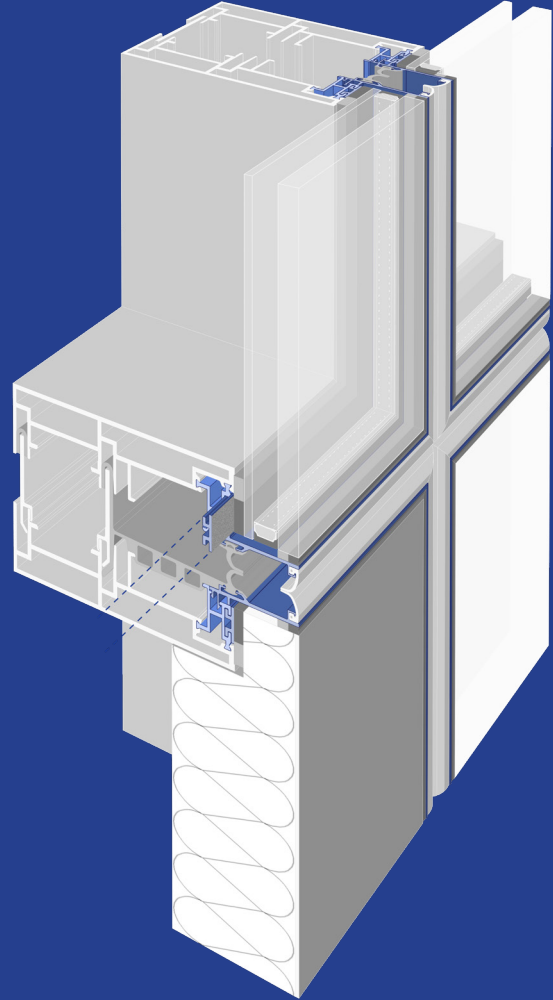


- Thermal bridge through aluminum

- Condensation located in the drainage cavity
- Straight thermal isolines

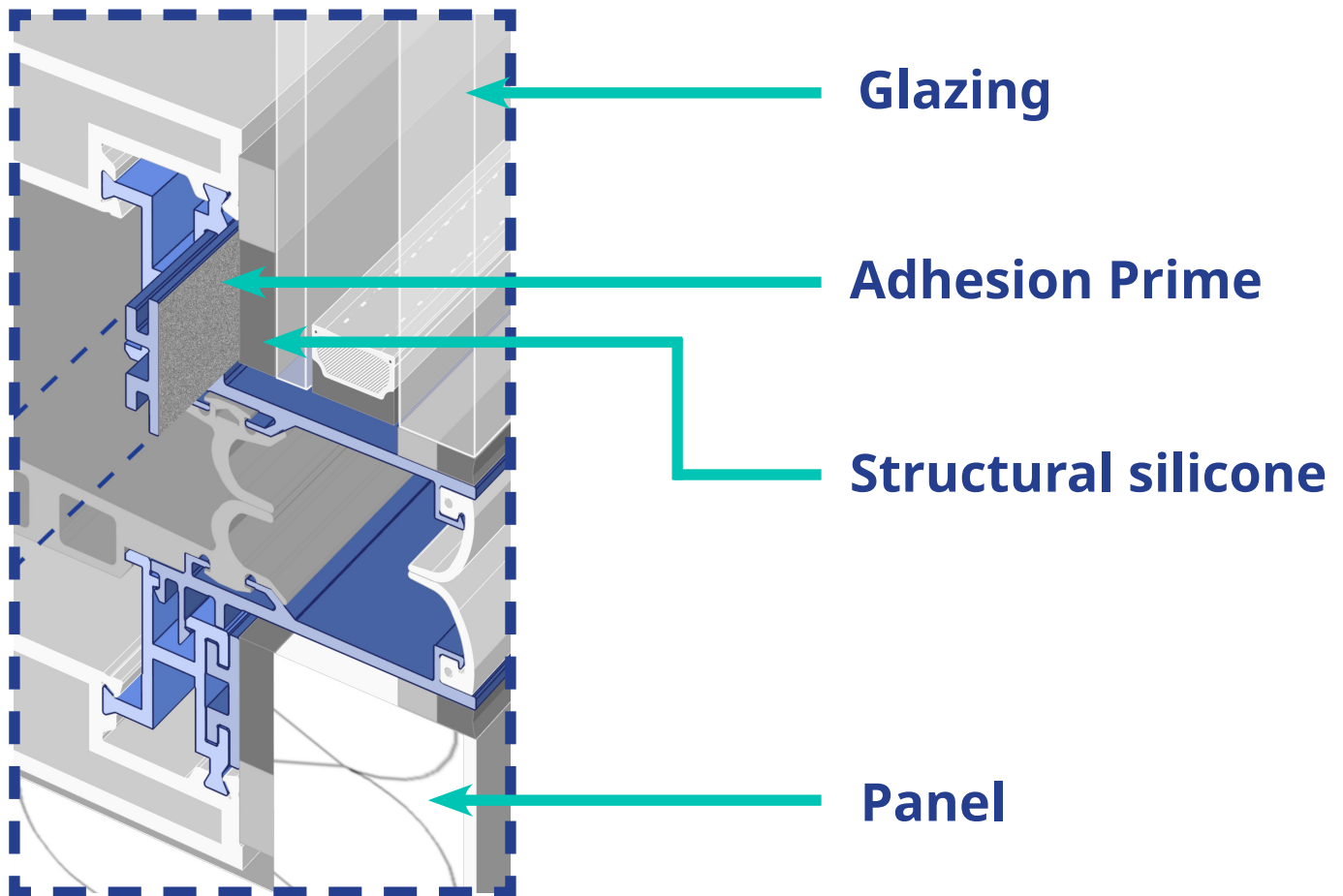
02

Structural bonding of glazing and panels



- 'Structural Sealing Glazing (SSG)', and also the new definition 'Bonded Glazing', means the solution where the glazing or panel unit is fixed from its inner perimetral border to withstand the external loads that are applied to the cladding. Those loads can be wind and thermal elongation.
- Adhesion Prime is designed to assure the bonding for the standard steady state loads of wind and thermal elongation differences. The dead load, snow, transient forces and others are out of the scope of the current solution, being responsibility of the project or system's owner to evaluate them.

Isometric view of a generic new curtain wall unitized system design



Performance improvements for cladding unit

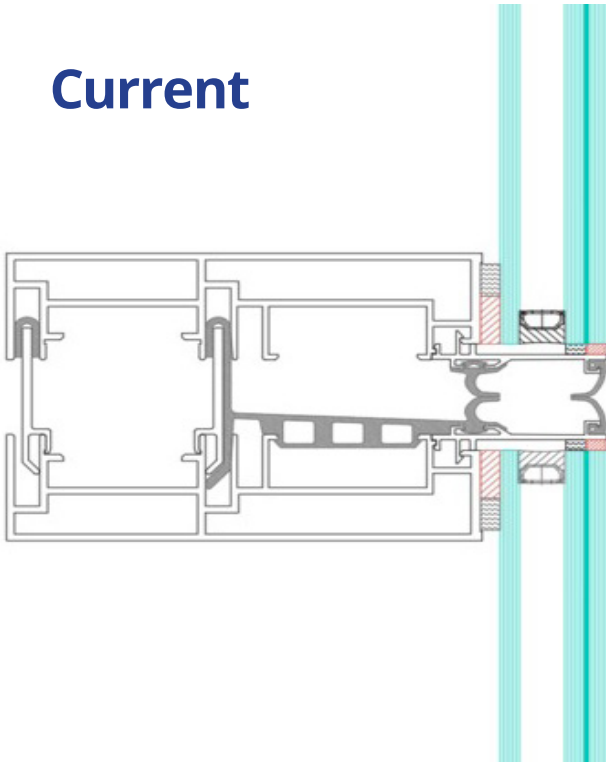
- Bonding to frame
- Weather-proof sealing
- Weight reduction
- Simpler assembly

Performance improvements for the end user

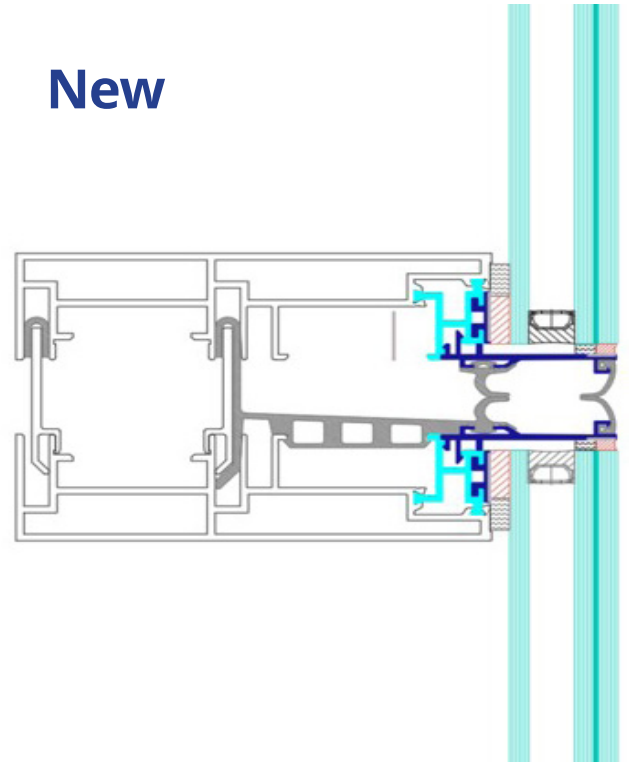
- Higher thermal insulation
- Avoiding moisture condensation
- Comfort near facade
- Improved acoustics

System cross section

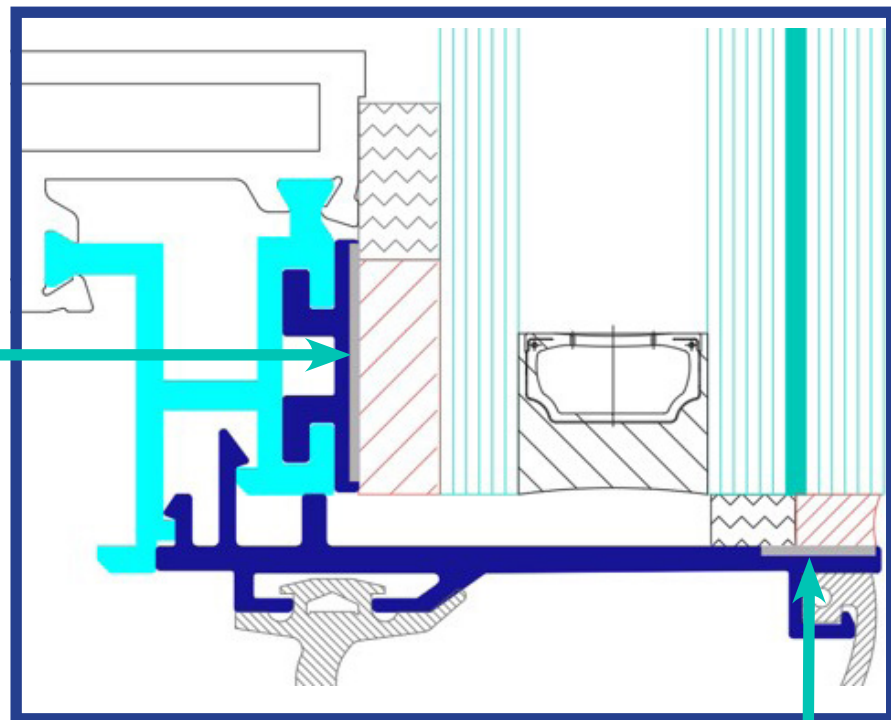
Current



New



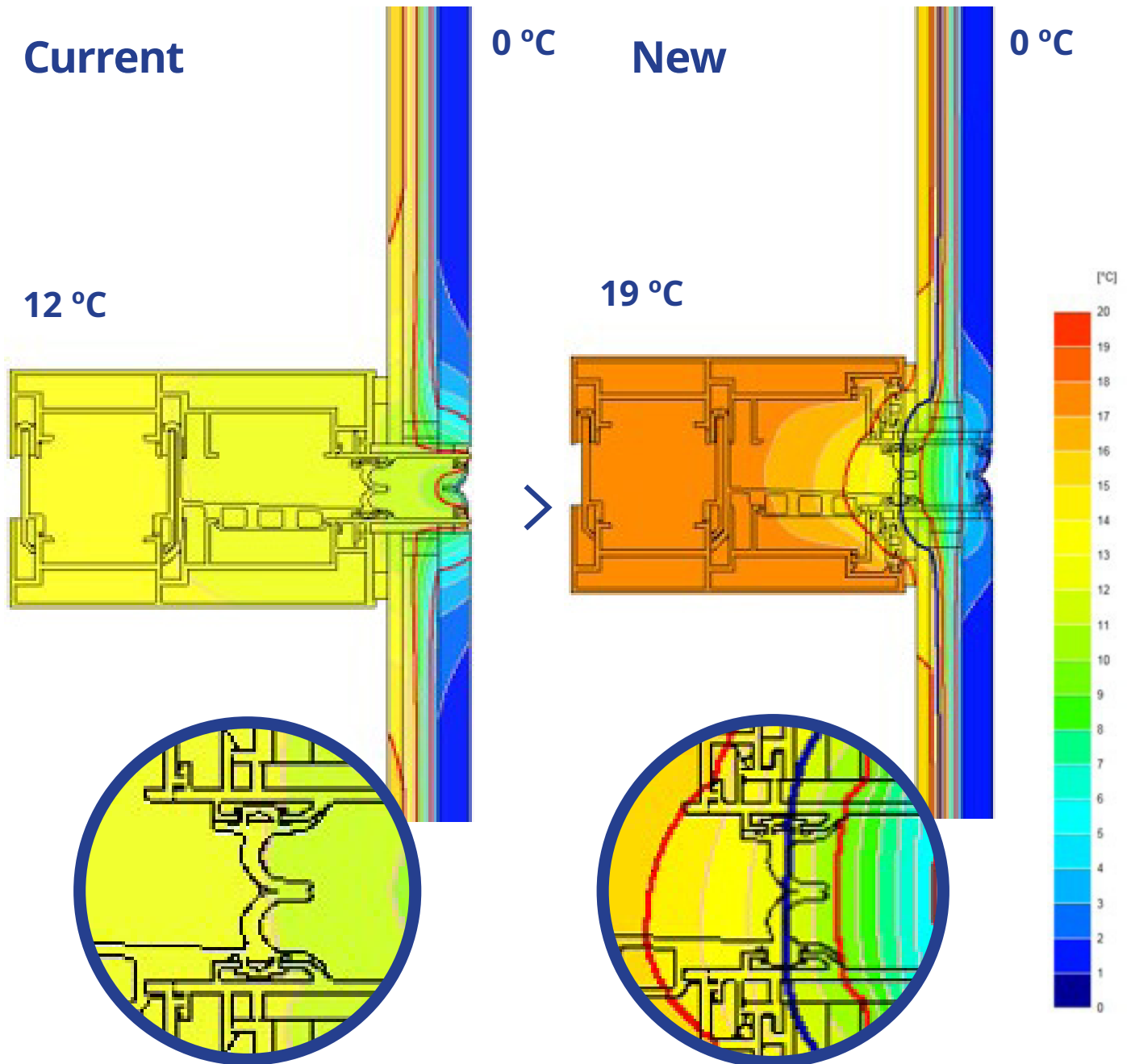
**Adhesion
Prime**



**Adhesion
Prime**



U_{tj} from 8.0 to 3.1 W/m²K (-61 %)

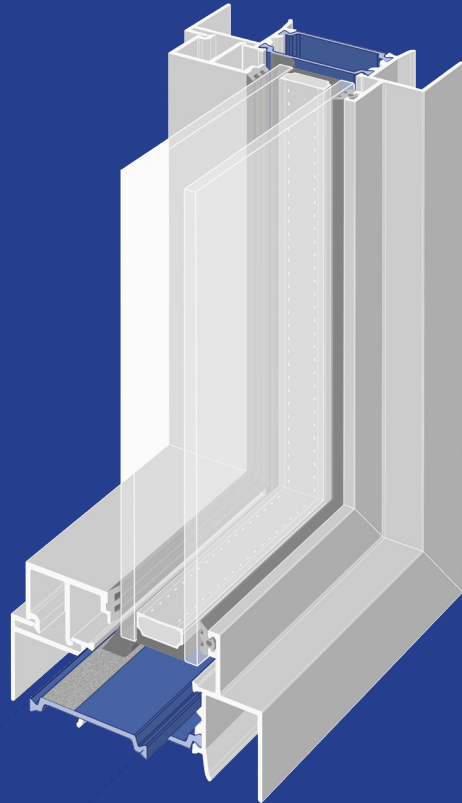


- Thermal bridge through aluminum

- Condensation located in the drainage cavity
- Straight thermal isolines

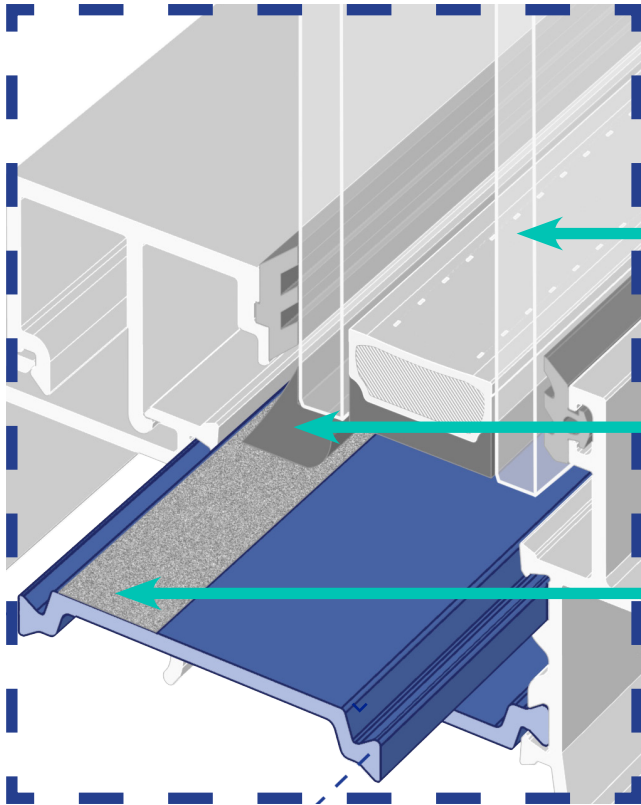
03

Heel bead



- 'Heel bead' is the sealing of the back edge of the glazing or panel to the inner side of the carrying frame (sash or frame) glued to Technoform polyamide strips.
- It is a system design solution for workshop pre-glazed or paneled window, door, window wall, and storefront units.
- This design provides a second barrier for water tightness and air leakage for the assembled units, for a better glazing to frame integration.
- Due to fixing the pane to the profile provides a high rigidity to transport the manufactured units across the country, but also to install them at the facade.
- The current design is gluing the glazing edge to the internal aluminum frame. Due to the new revisions of energy codes, the thermal break required is wider and the contact surface is polyamide instead.
- The silicones used have low adhesive affinity to the standard polyamide and Adhesion Prime provides a good surface to adhere them.

Isometric view of a generic new heel bead system design



Glazing

Weather-proof
silicone

Adhesion Prime

Performance improvements for the end user

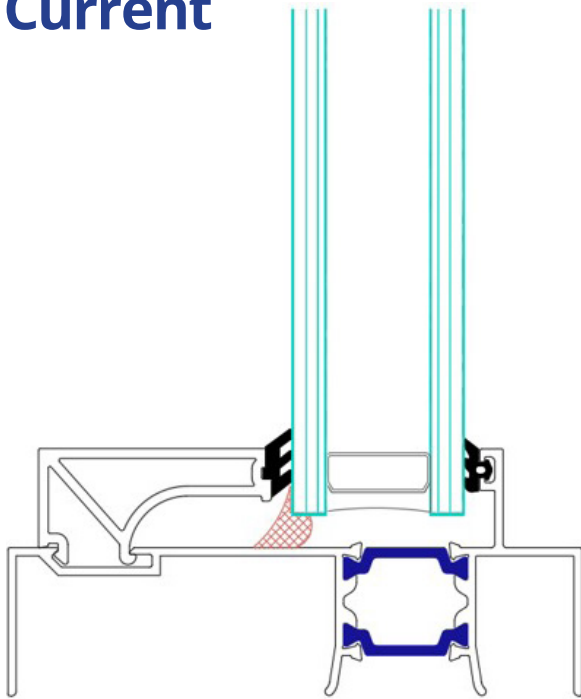
- High thermal insulation
- Avoiding moisture condensation

Performance improvements for the cladding unit

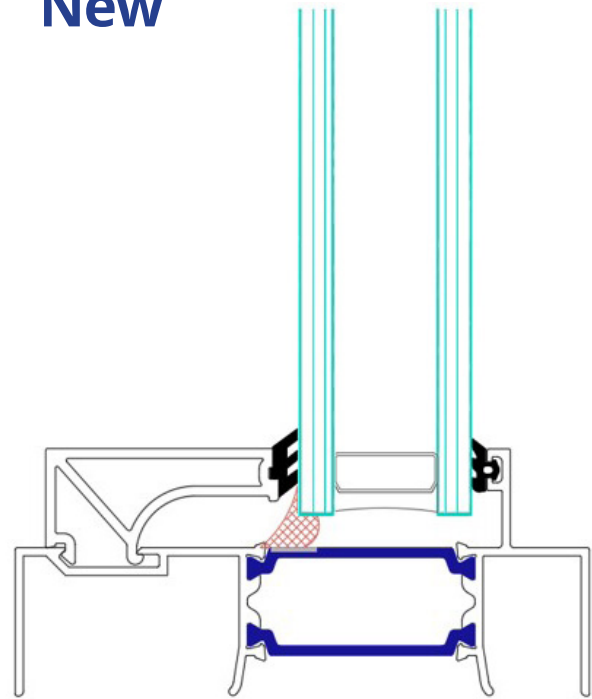
- Weather-proof sealing
- Second barrier
- Bonding to frame
- High rigidity unit bonding
- Weight reduction

System cross section

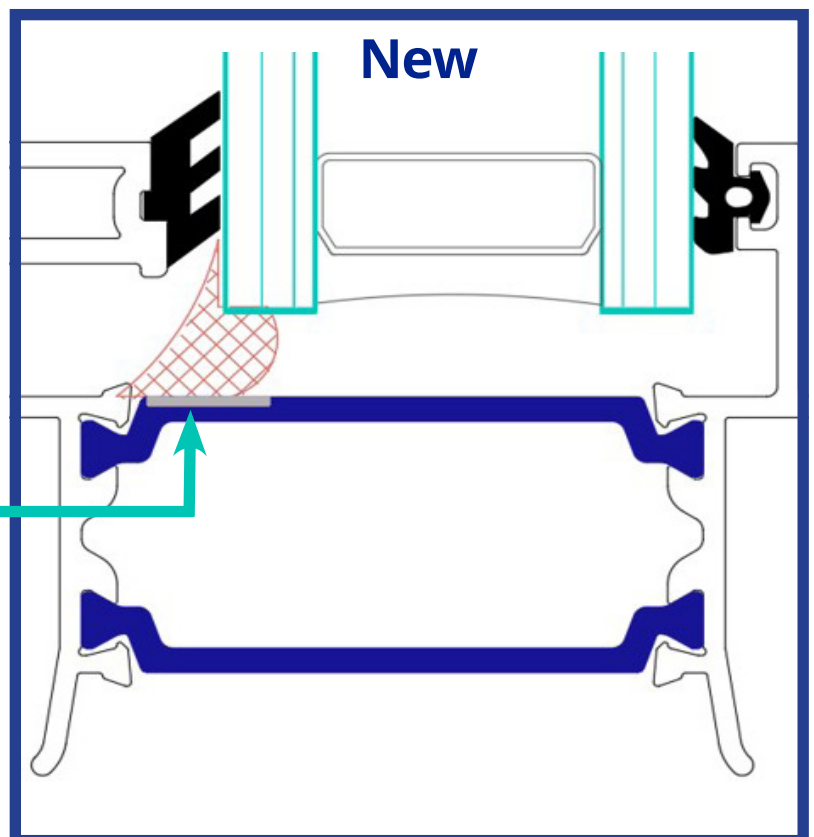
Current



New

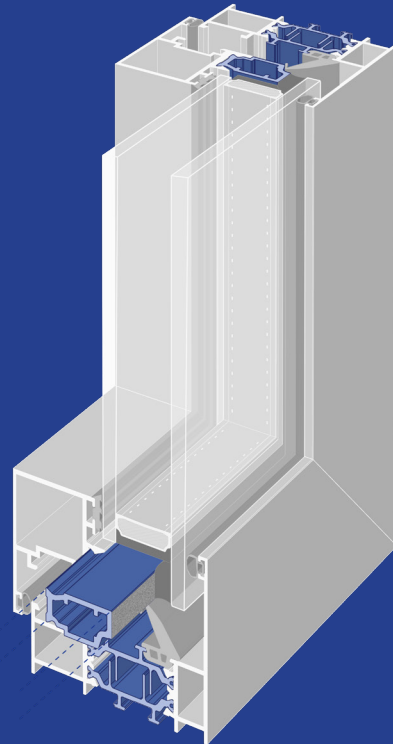


**Adhesion
Prime**



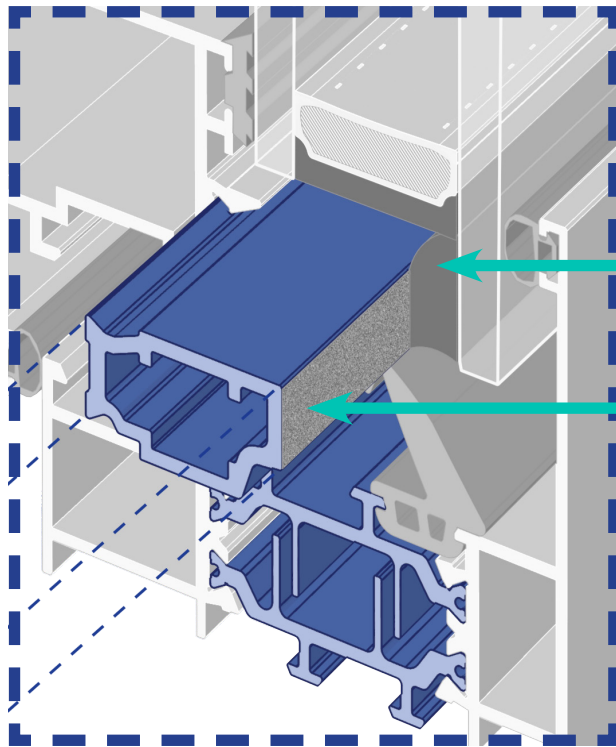
04

Hidden sash



- Hidden sash is the window design in which the outer frame hatch is seen homogeneous, without differences between fixed zones and opening panels.
- The effect is a uniform look for the entire facade, giving a stylish exterior which eliminates the appearance of bulky hardware.
- Adhesion Prime solution provides a bonded connection between the glazing or panel unit and the sash profile through the insulating strips, for a better glazing to frame integration.
- Glazing unit is proposed as stepped glass, which means that the external glass pane is bigger than the inner pane, but also can be a standard insulating glass design.
- It avoids the use of external glazing bead and sash gasket to keep in place the glazing unit, but also is increasing the rigidity of the sash compared with traditional designs.
- There are two inward opening options, casement and tilt and turn.
- The application is done in the window or glazing manufacturer factory, as part of the components installation, and any substitution of the glazing or panel unit can be done on site.

Isometric view of a generic new hidden sash system design



Structural silicone

Adhesion Prime

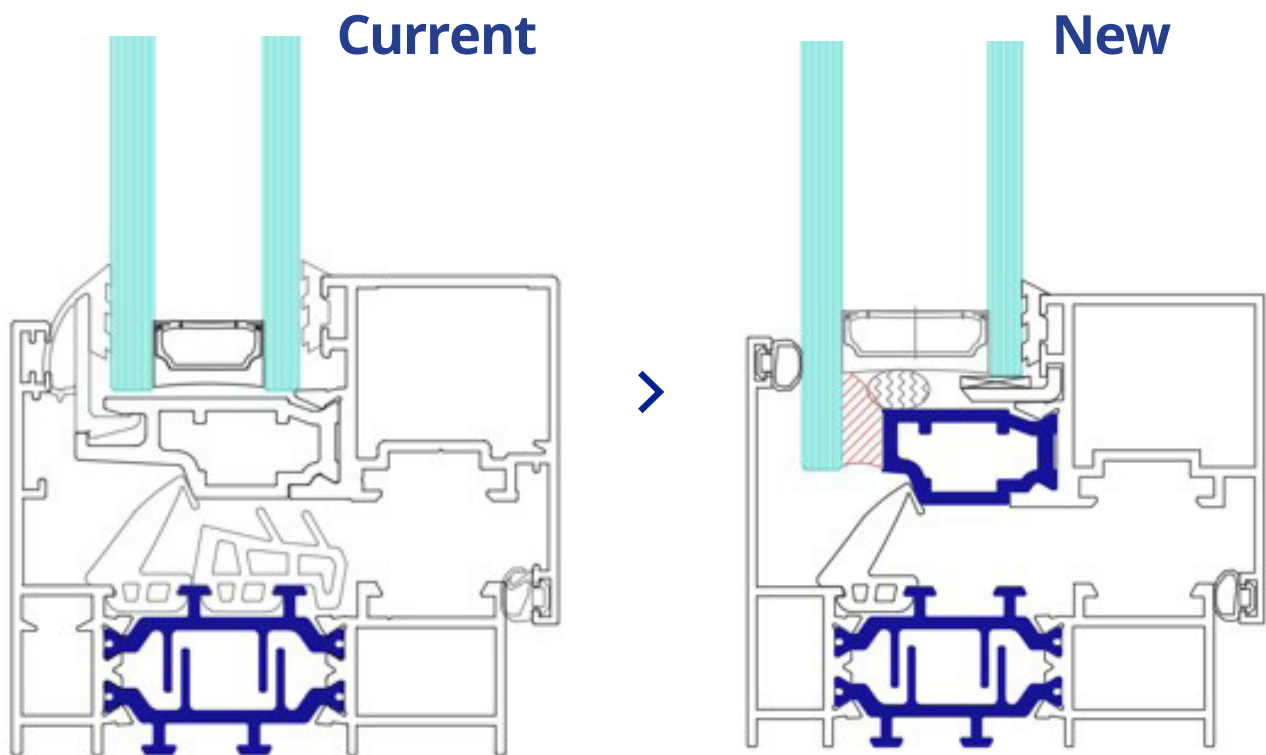
Performance improvements for the cladding unit

- Bonding to frame
- Weight reduction
- Simpler assembly

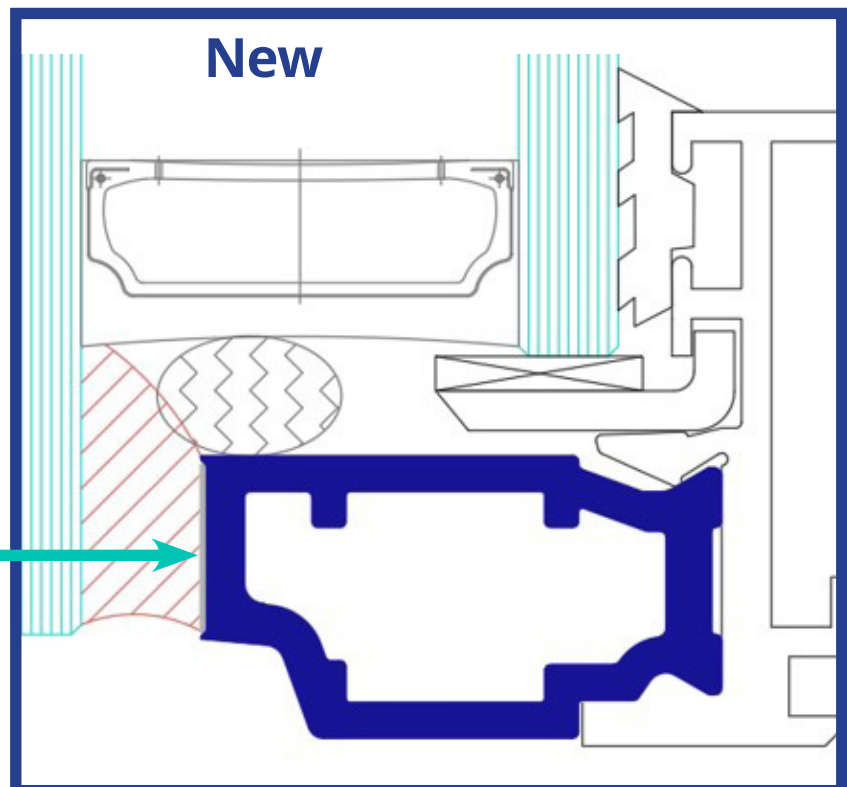
Performance improvements for the end user

- Higher thermal insulation
- Avoiding moisture condensation
- Comfort near façade
- Improved acoustics
- Hidden frame

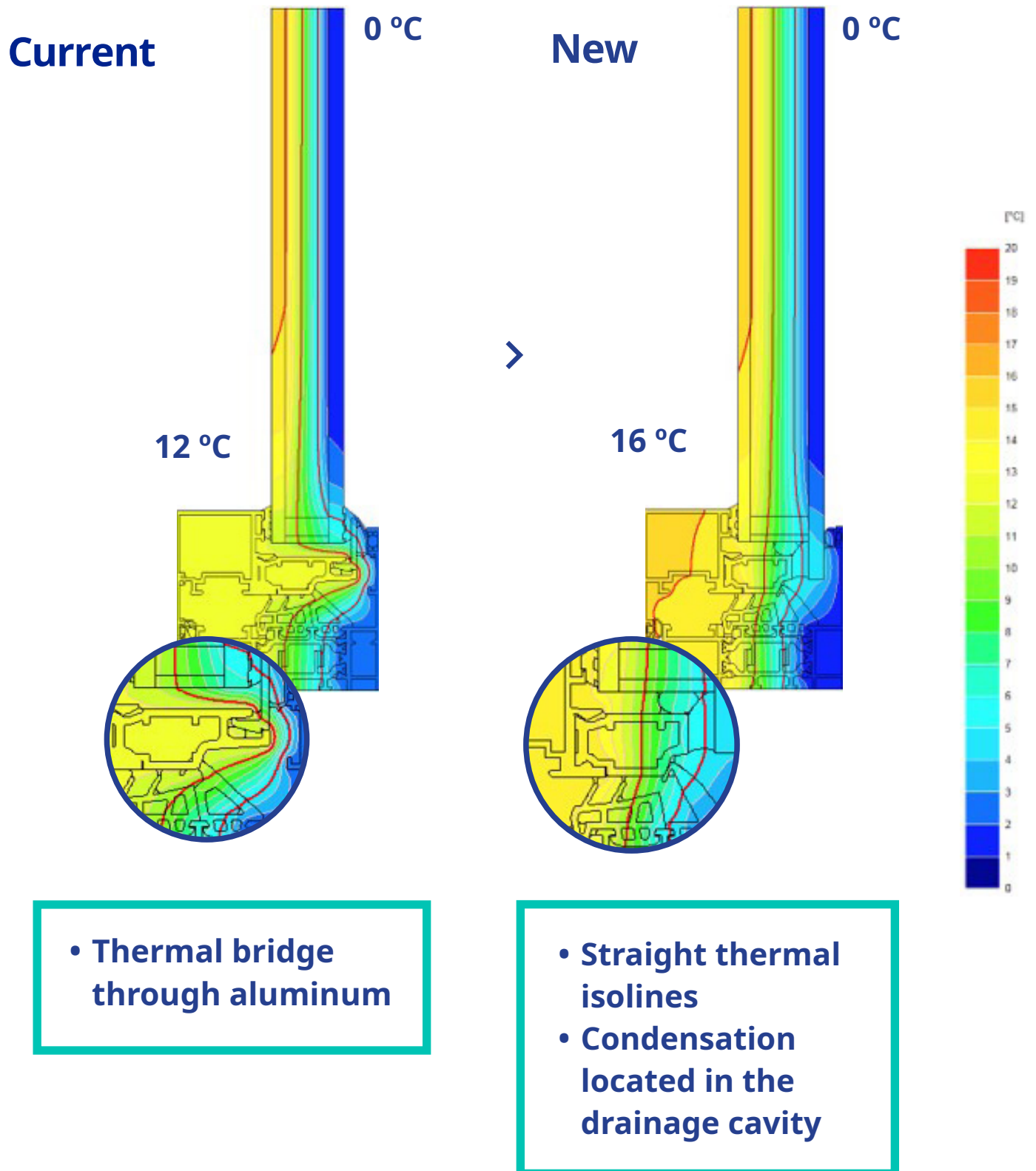
System cross section



**Adhesion
Prime**

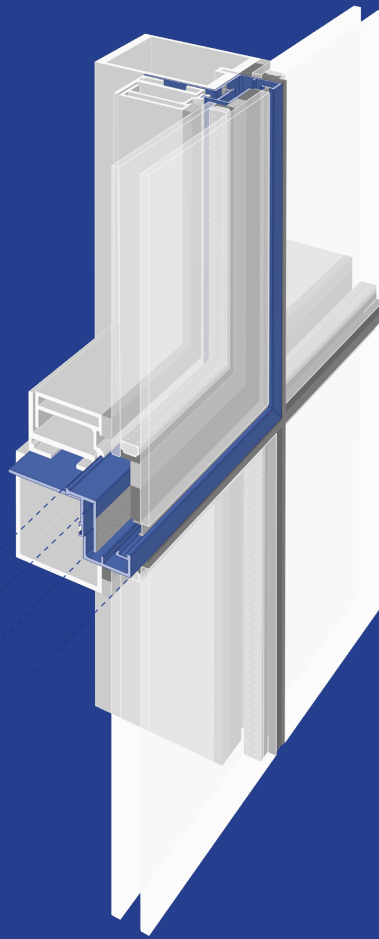


U_{tj} from 4.1 to 2.7 W/m²K (-34 %)



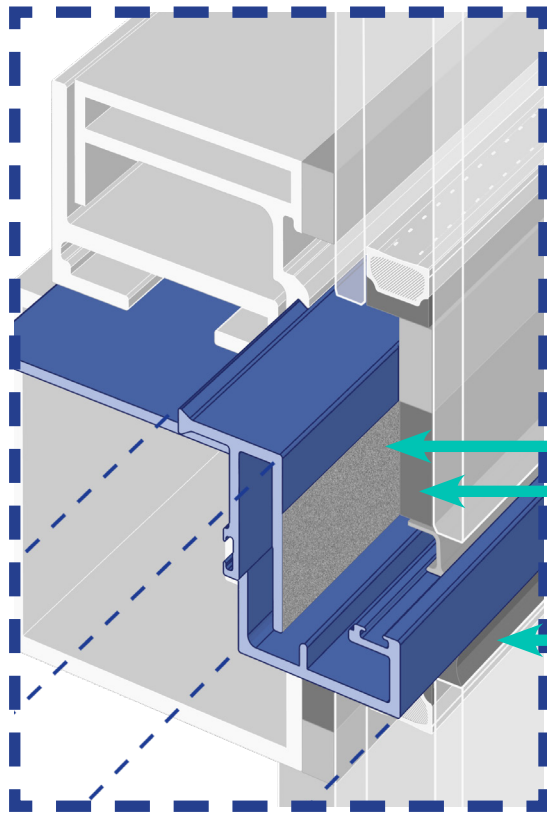
05

Facade openings



- Facade openings include specific window designs that connect to the main curtain wall frames, keeping all cladding requirements (water tightness, air leakage, thermal insulation and sun control, acoustic insulation, safety, and so on).
- Facade openings include bonding and or weatherproofing joints between external glazing and panels to the window profiles and their connection to the facade.
- The requirements of the joints depends on the opening system and type (indoor outdoor opening, hidden sash or frame, stepped glazing, balconies or doors, etc.), but also to keep the facade water and air tight.
- On the design must be considered the connection to main facade frame and how to keep the best properties, as thermal insulation, water tightness and air leakage, but also a smooth transition between framing to keep a good aesthetics integration over the entire cladding.
- Adhesion Prime for facade openings facilitates a good application of bonding and weather-proof sealings between polyamide strips and panes or frames.

Isometric view of a generic new opening facade system design



Adhesion Prime

Structural silicone

Weather-proof silicone

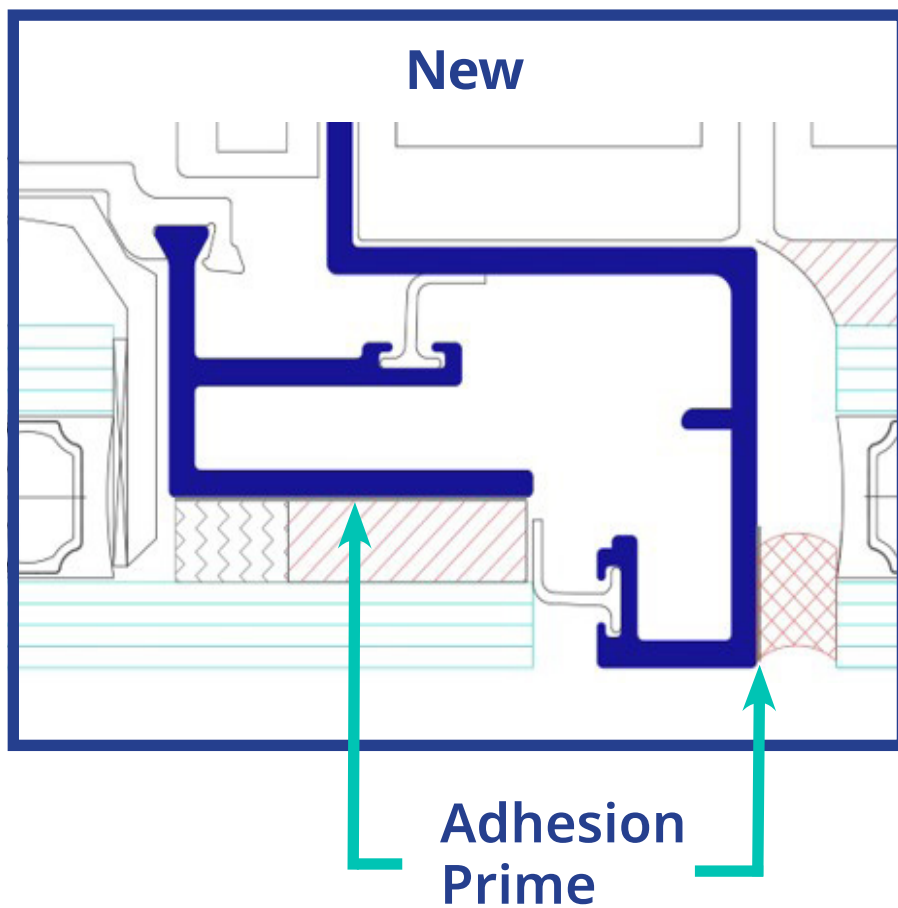
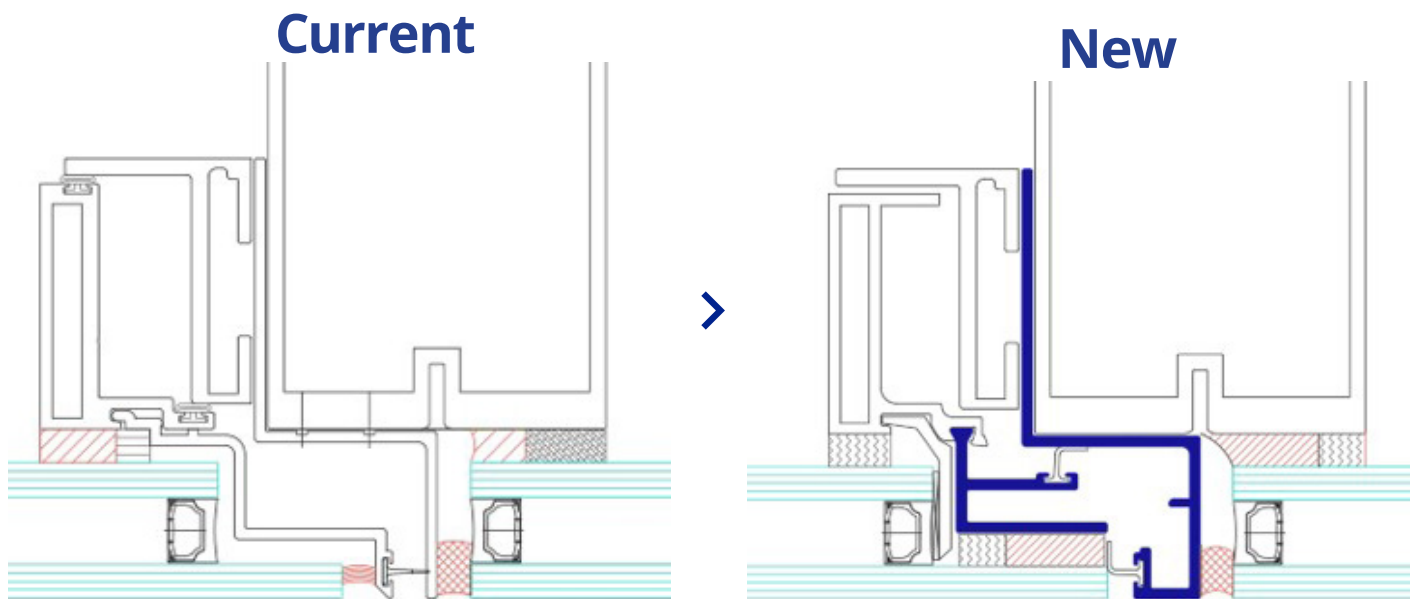
Performance improvements for the cladding unit

- Weather-proof sealing
- Bonding to frame
- Weight reduction
- Simpler assembly

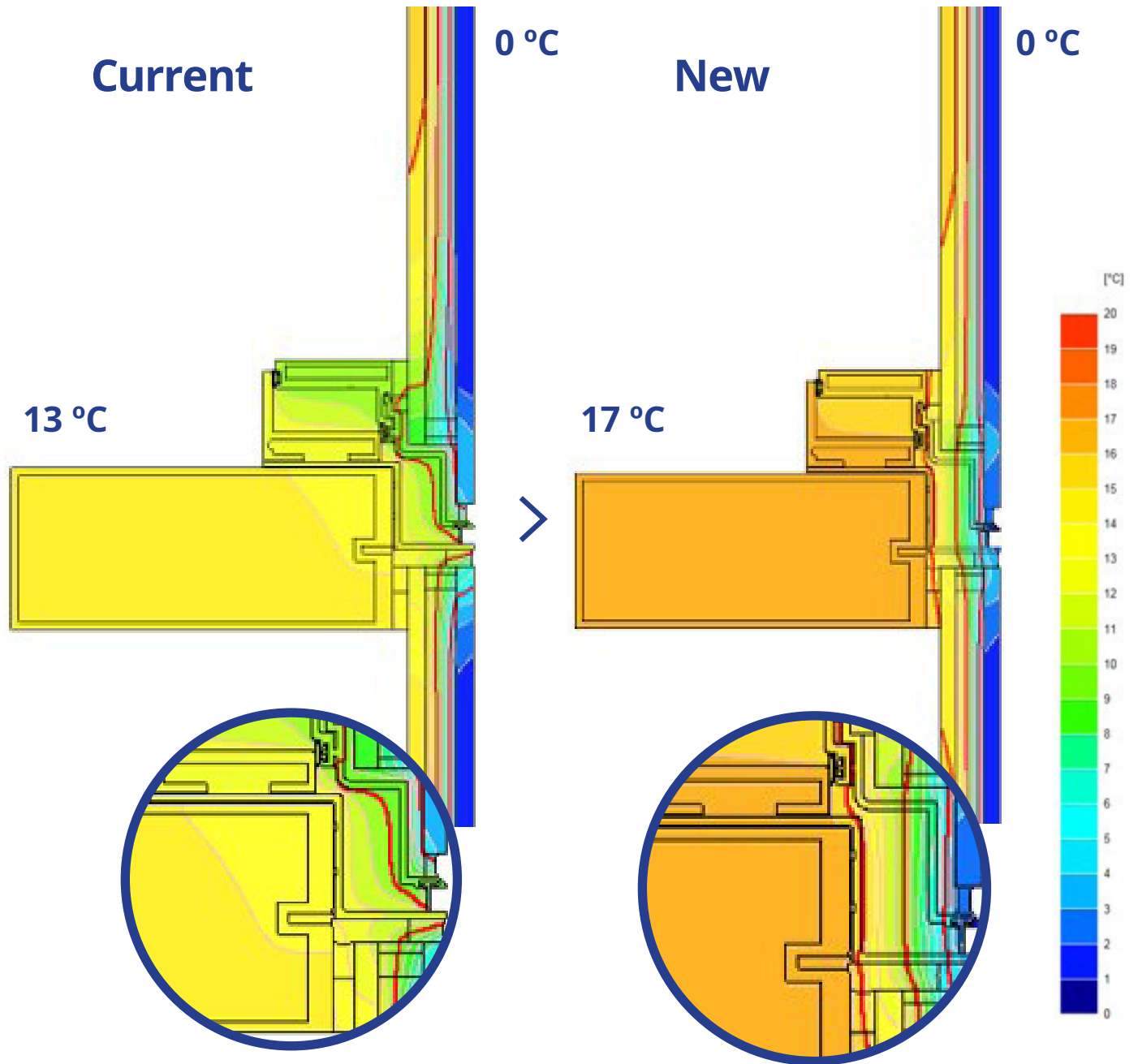
Performance improvements for the end user

- Higher thermal insulation
- Avoiding moisture condensation
- Comfort near facade
- Improved acoustics

System cross section



U_{tj} from 6.8 to 3.6 W/m²K (-47 %)



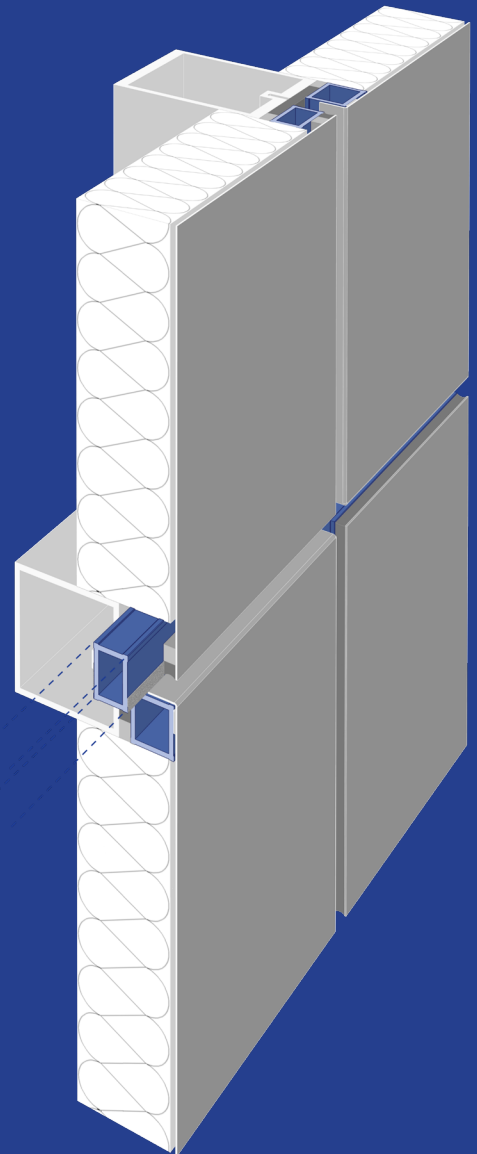
- Thermal bridge through aluminum

- Straight thermal isolines
- Condensation located in the drainage cavity

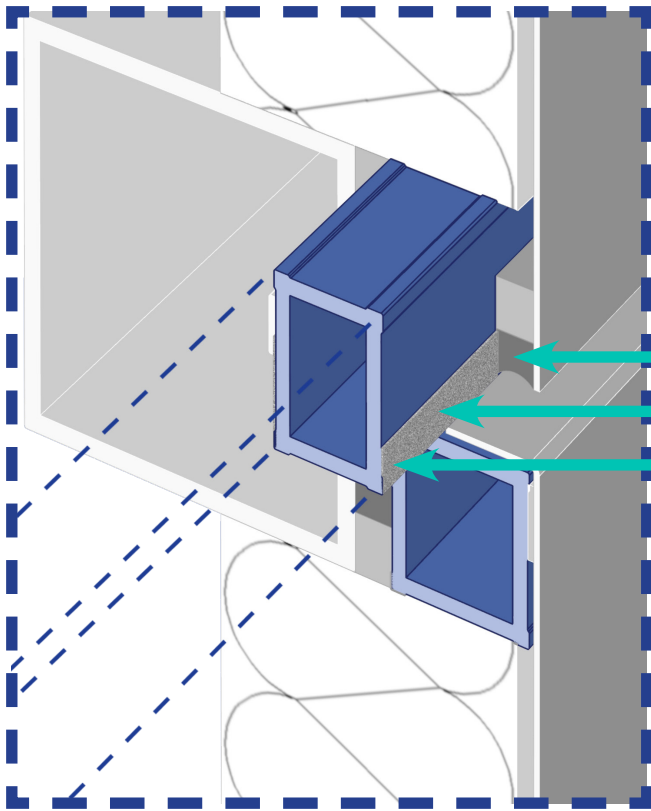
06

Opaque facades

- In many areas of a building the cladding is opaque, supported by frames based on curtain walling or rainscreen systems.
- The use of polyamide strips over the frames improve the thermal insulation, keeping good mechanical properties to fix together the panel components. This requires good gluing properties between them and the surrounding elements, as panes or frames.
- Opaque areas include bonding and weather-proof sealings between polyamide strips and panes or frames.
- Panel frames can be made of polyamide strips to keep the thermal insulation all along the insulating sandwich, avoiding thermal bridges and condensation issues around the edges.
- Adhesion Prime's opaque solution can be applied in different cladding types, as curtain walling stick or unitized, but also in rainscreen facades.



Isometric view of a generic new opaque curtain wall stick system design



Structural silicone

Adhesion Prime

Double side tape

Performance improvements for the end user

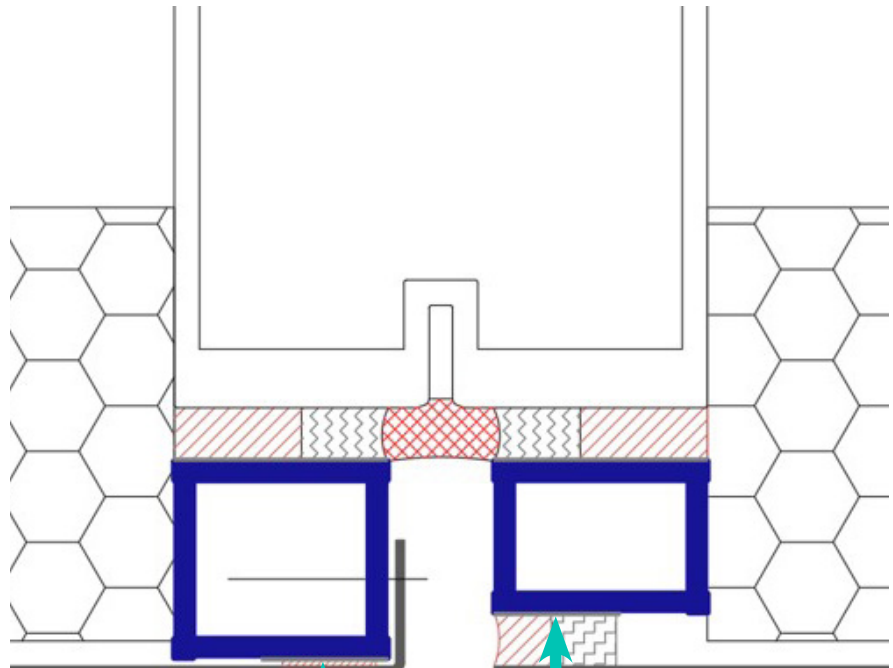
- Higher thermal insulation
- Avoiding moisture condensation
- Comfort near facade
- Improved acoustics

Performance improvements for the cladding unit

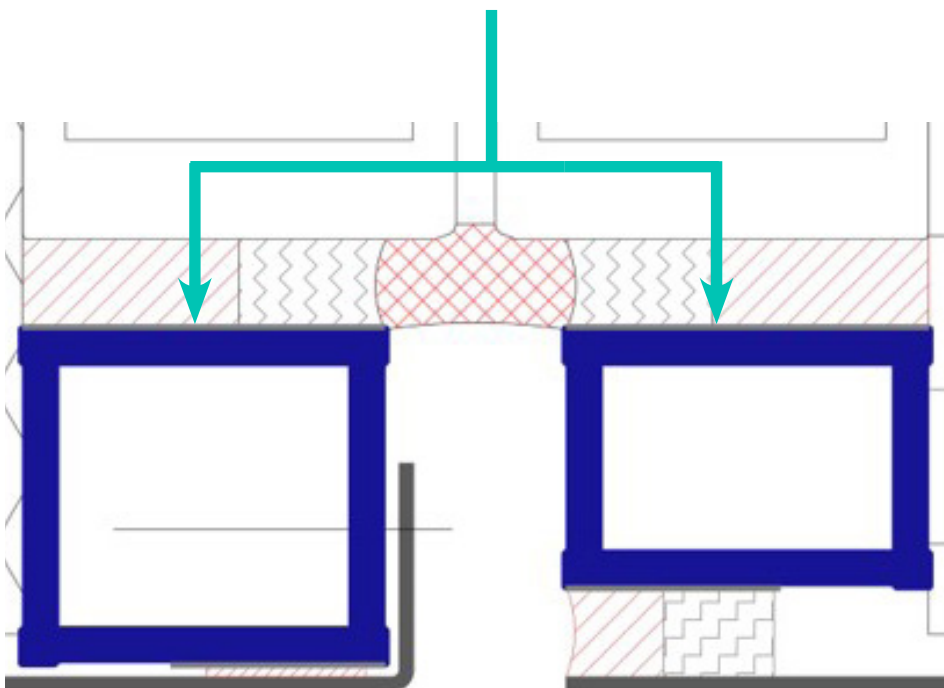
- Weather-proof sealing
- Bonding to frame
- High rigidity unit bonding
- Assembly adaptable
- Weight reduction
- Simpler assembly

System cross section

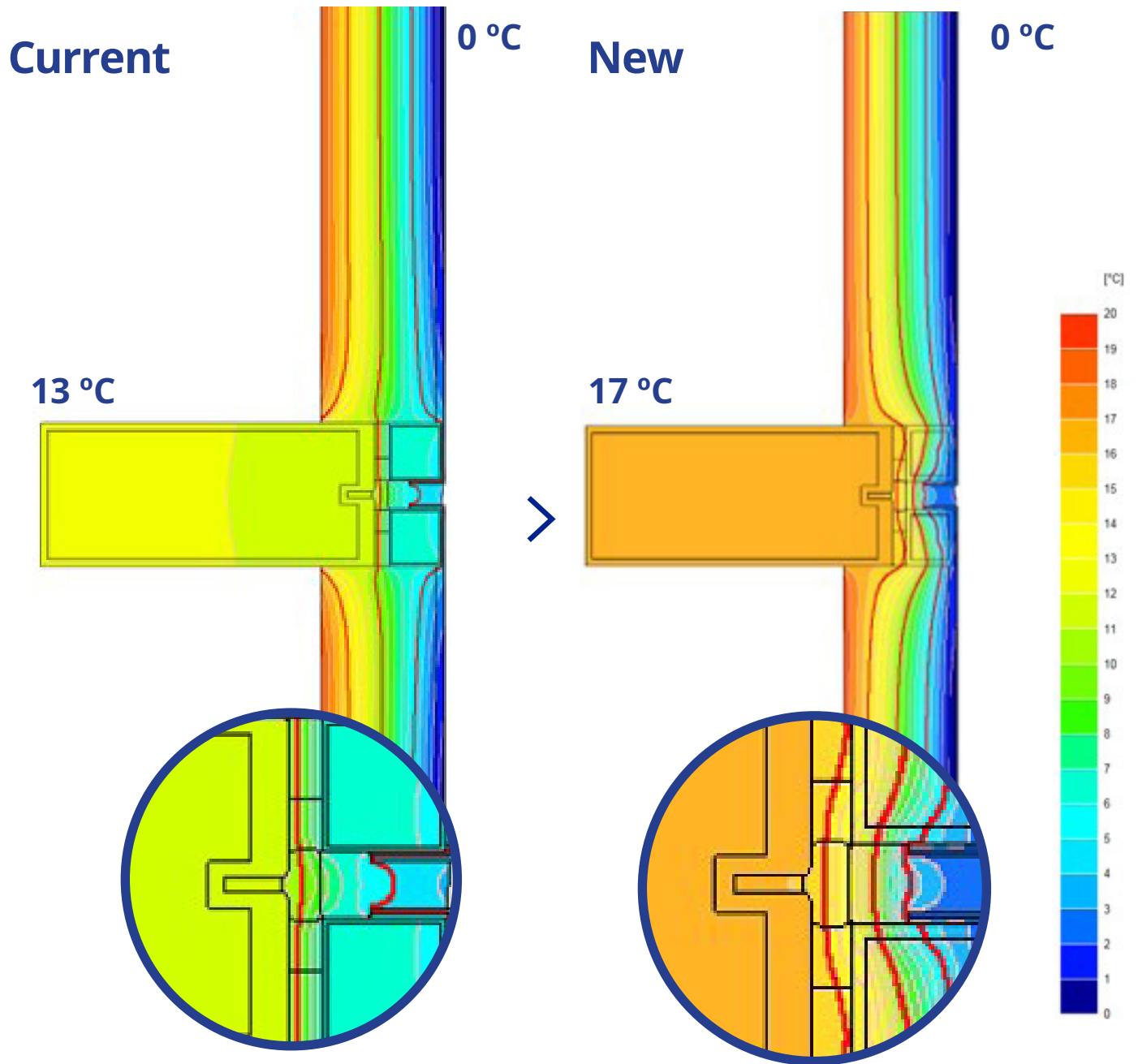
New



Adhesion
Prime



U_{tj} from 10.8 to 4.7 W/m²K (-56 %)

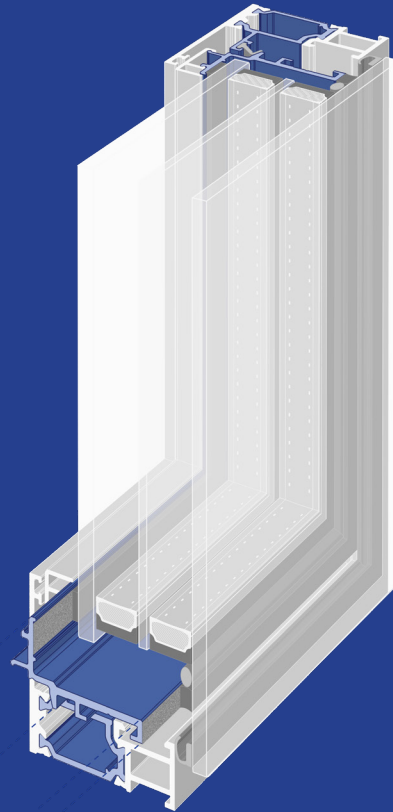


- Thermal bridge through aluminum

- Straight thermal isolines
- Condensation located into the drainage cavity

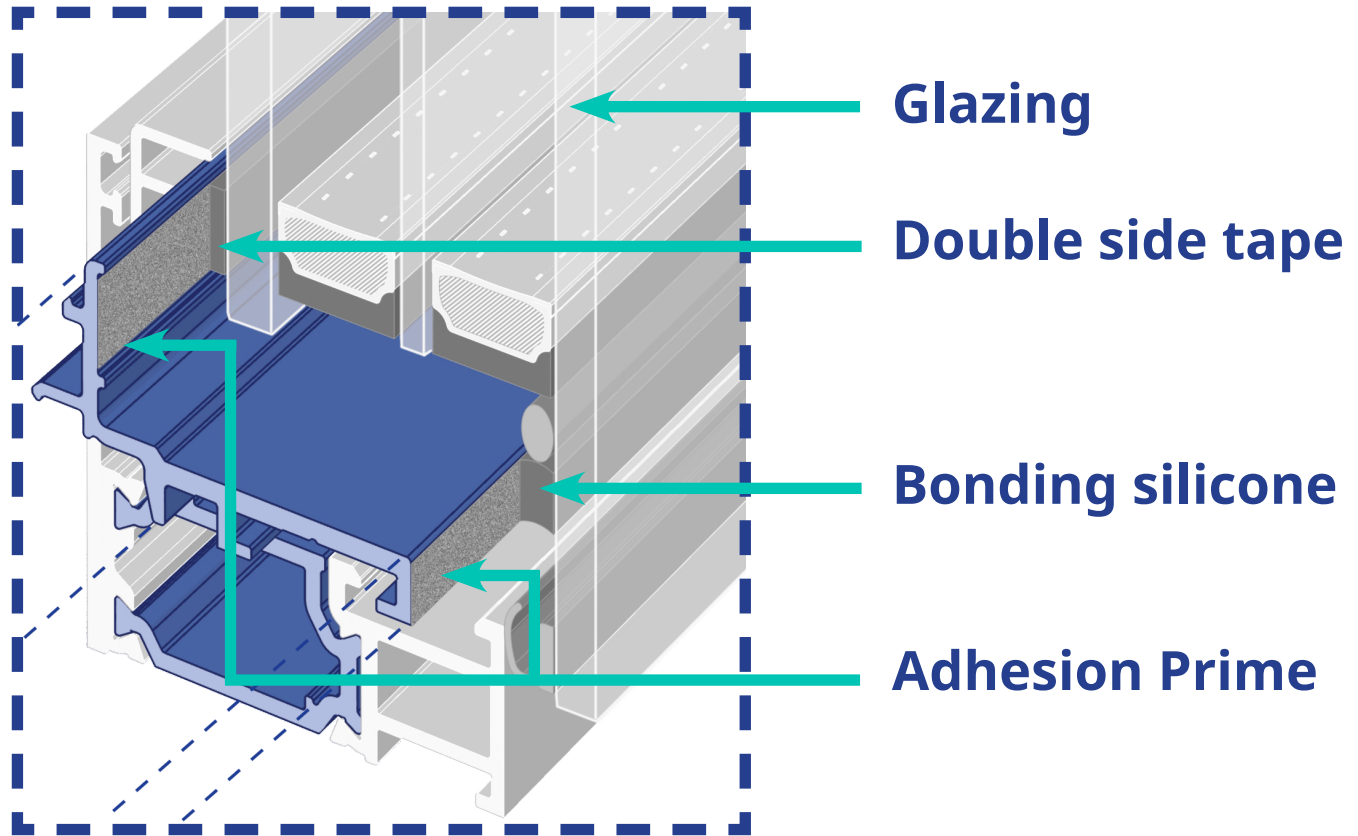
07

Freezer doors



- Frozen storage needs a high insulated glazing, but also a high thermal insulated frame.
- Adhesion Prime solution provides a bonded connection between the glazing or panel unit and the sash profile through the insulating strips, for a better glazing to frame integration.
- The frame insulation avoids the moisture condensation by the side of the room, but also avoids the ice formation by the inner side of the freezer when the door is open and closed.
- The main need is to keep the insulation whilst the glazing is clear to show the products for the users.
- Both polyamide strips, and glues or tapes, are good materials at very low temperatures, down to $-20\text{ }^{\circ}\text{C}$ ($-4\text{ }^{\circ}\text{F}$), by keeping physical and thermal properties.
- The sash has a high rigidity thanks to the strong bonding between polyamide and glazing, that provides a long service life withstanding the solicitation of a public shop.

Isometric view of a generic new freezer door system design



Performance improvements for the end user

- Food and goods shown
- Hidden frame design
- Higher thermal insulation
- Avoiding moisture condensation

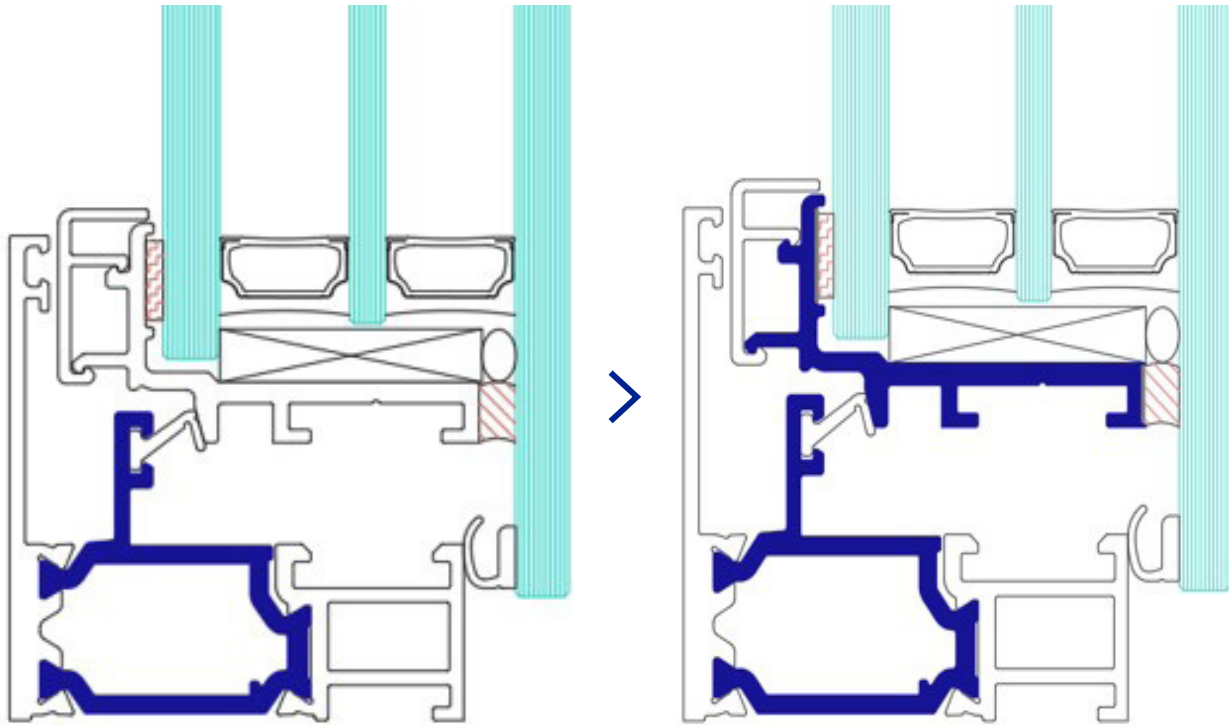
Performance improvements for the cladding unit

- Low temperature service life
- Weight reduction
- Simpler assembly
- Bonding to frame

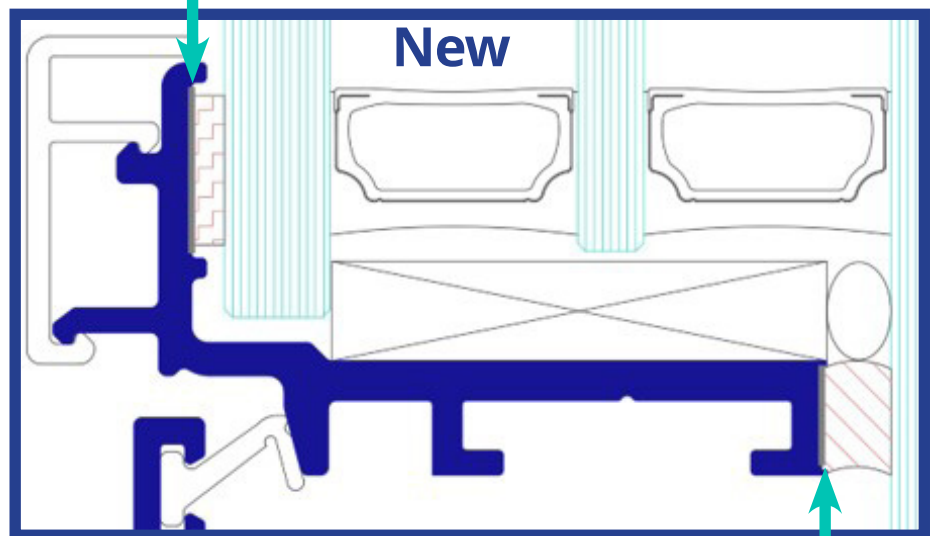
System cross section

Current

New



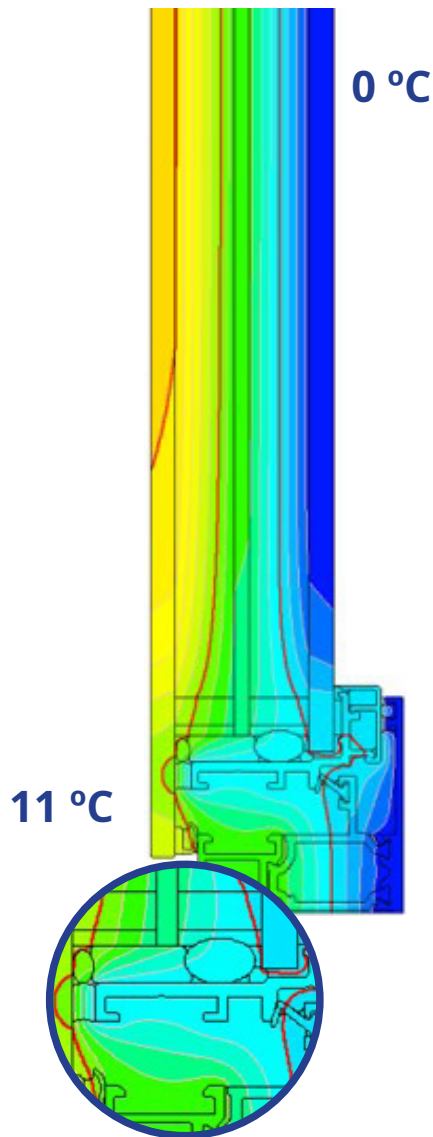
**Adhesion
Prime**



**Adhesion
Prime**

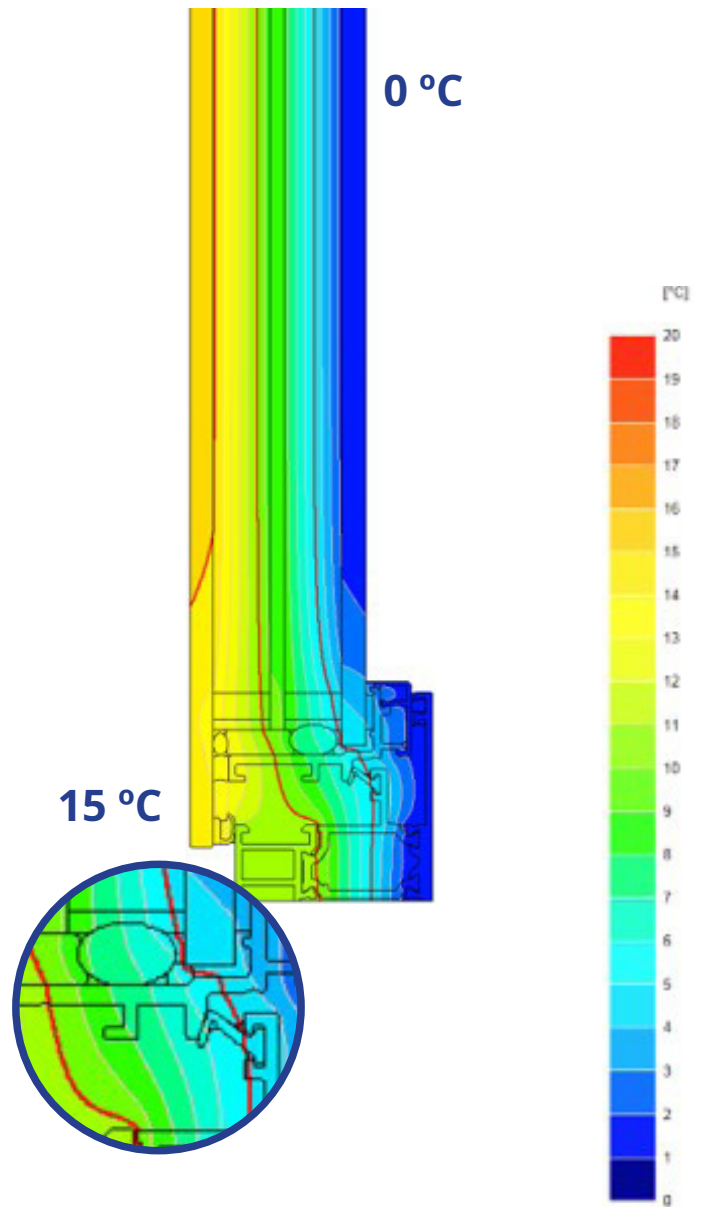
U_{tj} from 4.1 to 2.7 W/m²K (-34 %)

Current



- Thermal bridge through aluminum

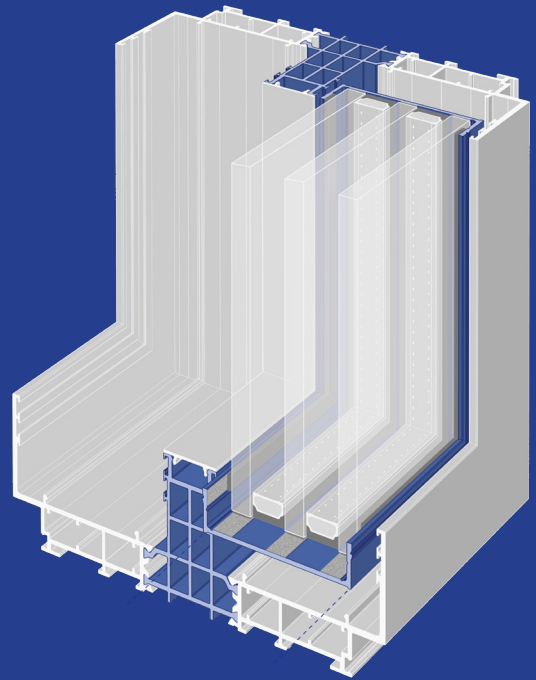
New



- Straight thermal isolines
- Condensation located in the drainage cavity

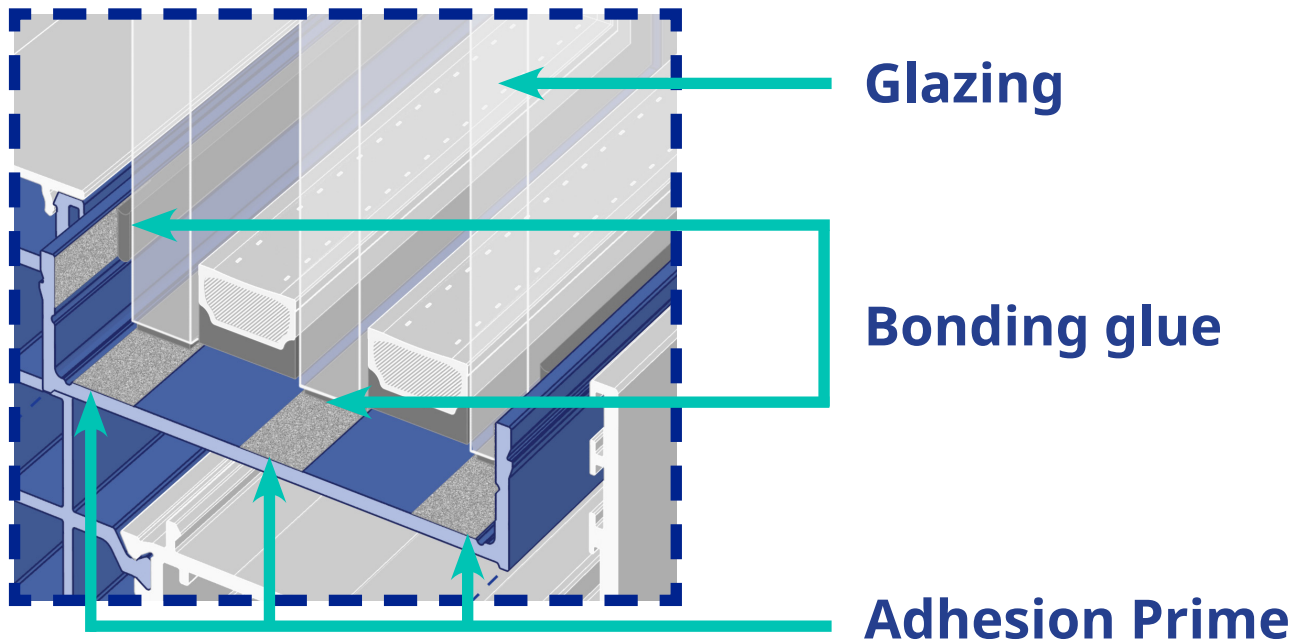
08

Minimalist sash



- Minimalist sash system type is a sliding window in which the sash frame is reduced at its minimum expression, maximizing the facade transparency.
- Due to these requirements, the sash loses the mechanical strength with the aim to decrease the sight sides, but keeping the edge thermal insulating properties.
- Due to that requirements, as part of the glazing composition, the sash frame is usually made with polyamide (PA) in order to obtain the best performance for the whole window.
- Every unit is combined with a double or triple insulating glazing unit (IGU), usually in big dimensions to increase the feeling of high transparency opening.
- At this moment, it is realized that the IGU will carry the loads instead of the frame.
- Best solution to fix the minimal frame to the glazing is to glue the PA to the IGU, becoming a composite unit that slides over a rail frame profile.
- In many systems the gluing to PA is challenging, so Adhesion Prime provides a fully adhesive surface treatment that results into a strong bonding.

Isometric view of a generic new minimalist sliding system design



Performance improvements for the end user

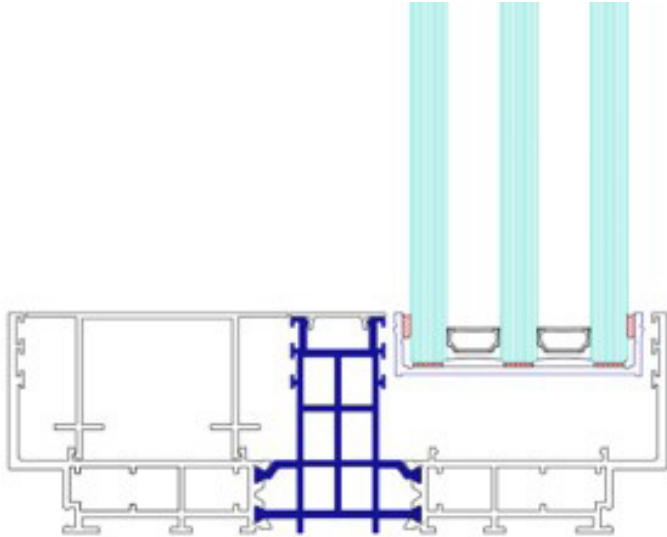
- Hidden frame design
- Higher thermal insulation
- Avoiding moisture condensation
- Improved acoustics

Performance improvements for the cladding unit

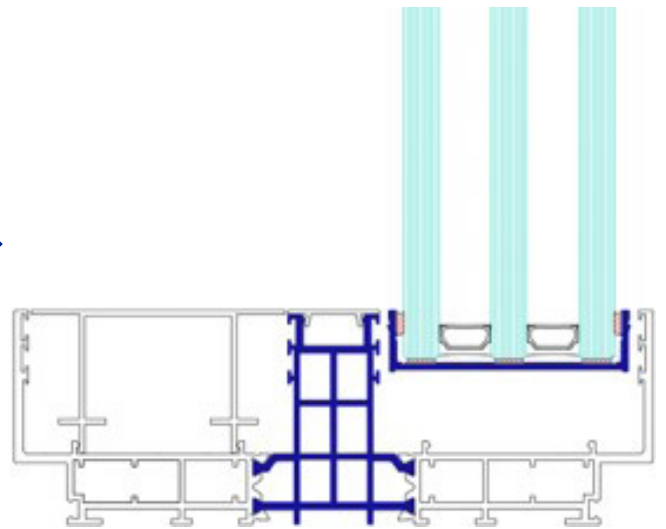
- Bonding to frame
- Weather-proof sealing
- High rigidity unit bonding
- Weight reduction

System cross section

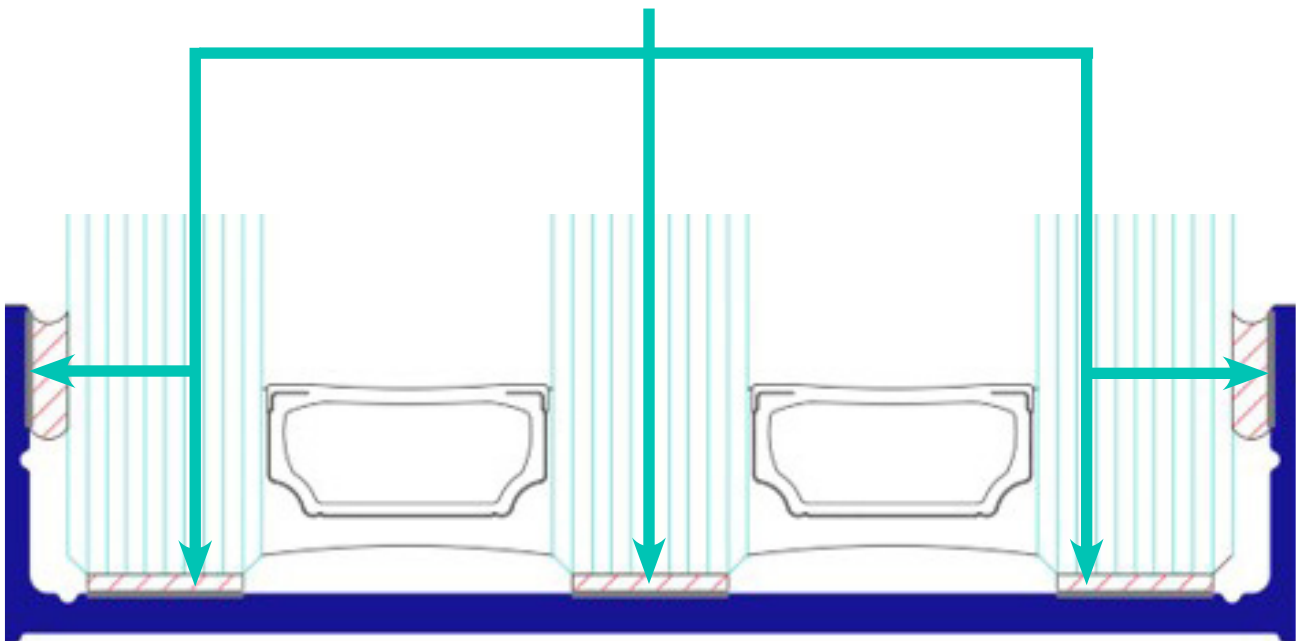
Current



New

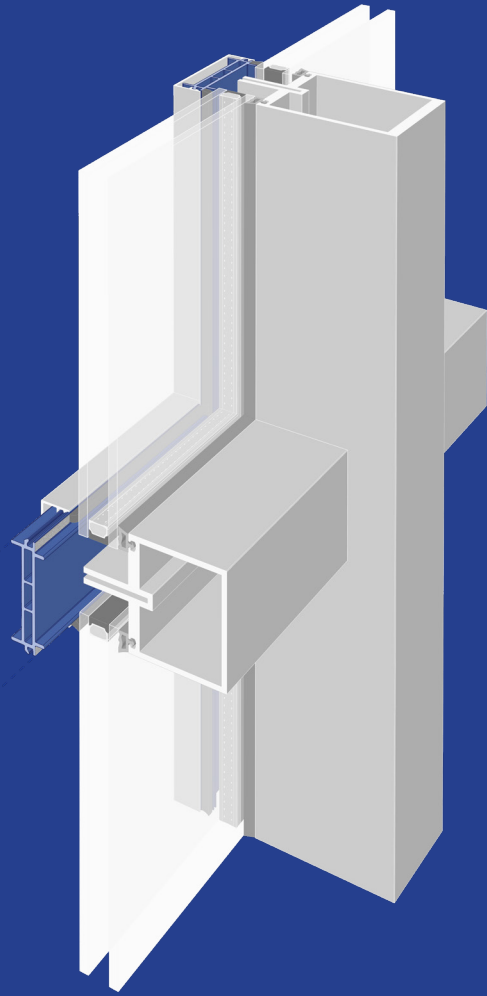


Adhesion Prime



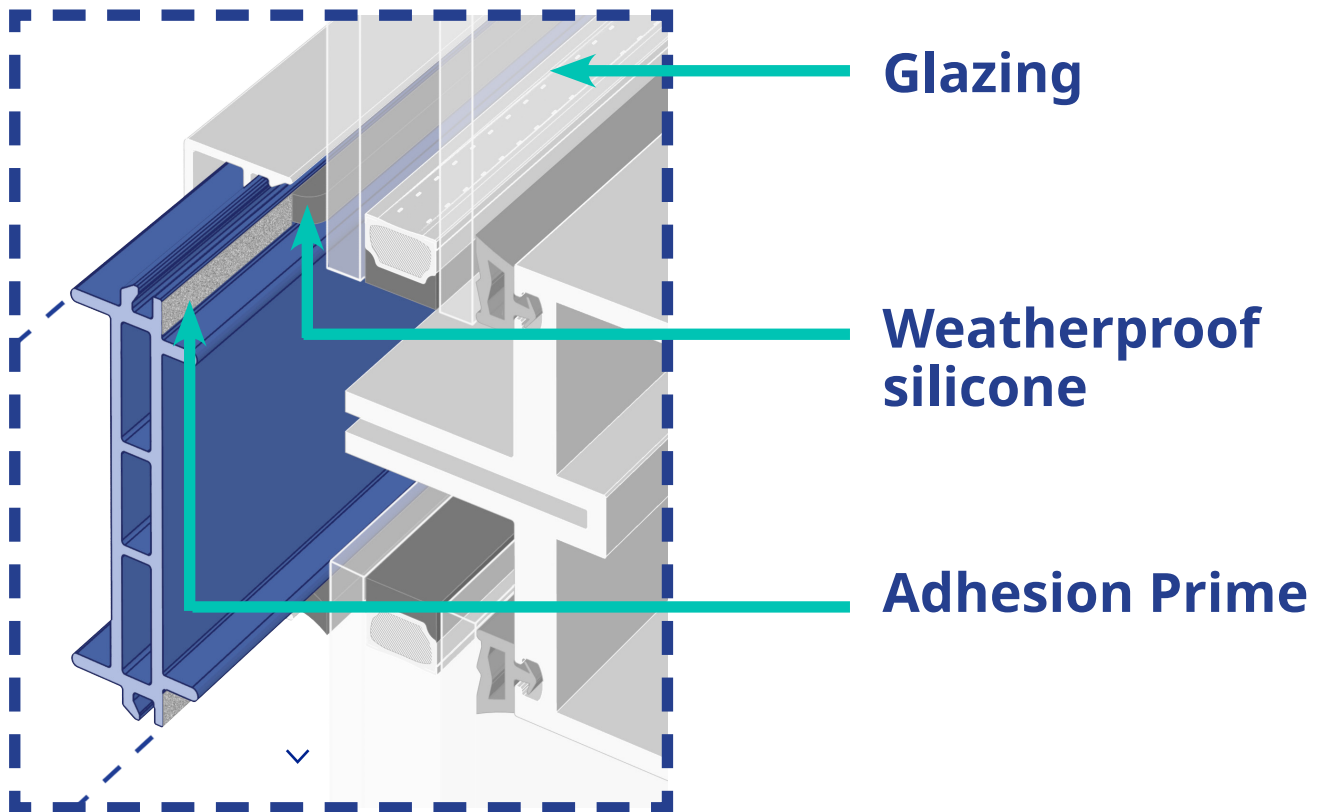
09

Wet pressure plate



- The pressure plate is the profile that holds the glazing unit in a stick facade.
- It is required the use of wet sealing, usually silicone, between pressure plate and glazing or panel units, to avoid leakages on facades located at rainy or stormy regions, but also for facade restoration or renovation.
- Usually it's made of aluminum, and now Technoform offers this profile made in polyamide in order to improve the thermal behavior of the joint.
- Due to its functionality, the pressure plate profile need a high mechanical resistance. For this reason, some strips have more percentage of glass fiber than the standard mixture.
- Pressure plate made of polyamide with high adhesive surfaces can be bonded to glazing units in wet facade designs.
- Wet facade designs include vertical and sloped facades, in climate areas where it rains and or suffer storms.

Isometric view of a generic new sealed pressure plate system design



Performance improvements for the end user

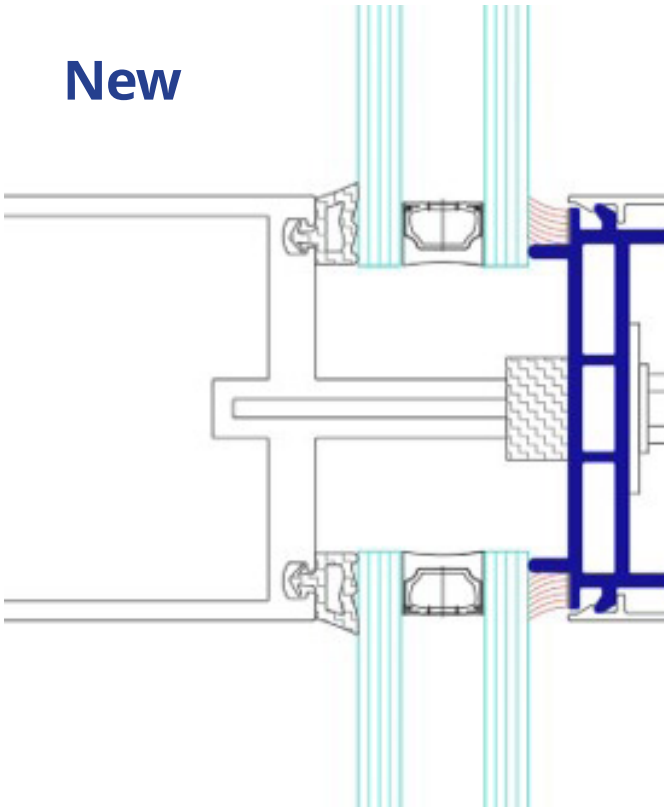
- Higher thermal insulation

Performance improvements for the cladding unit

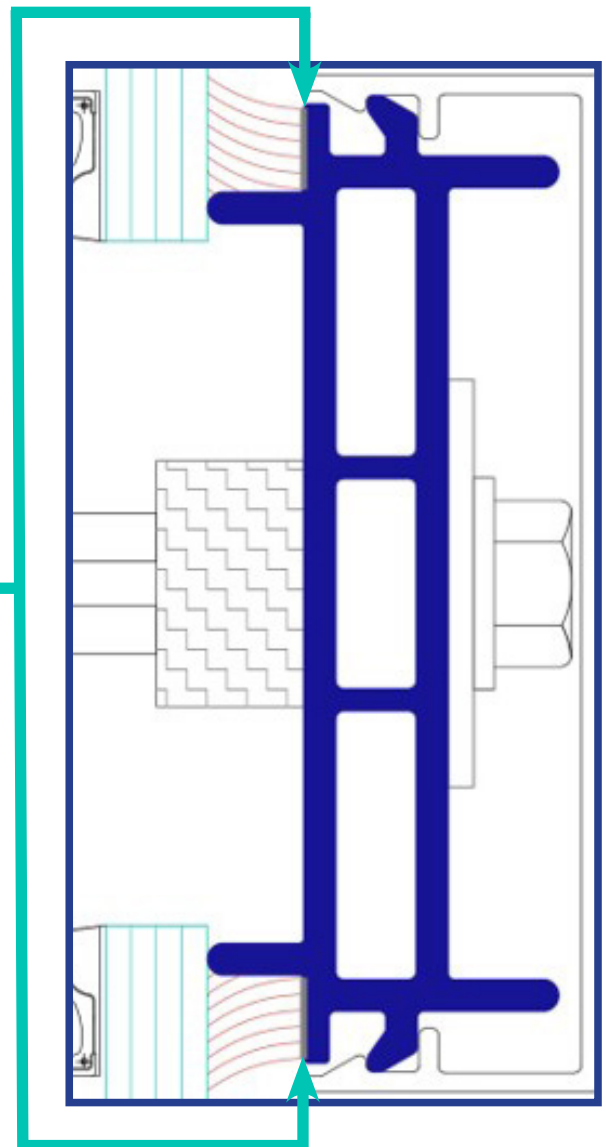
- Weather-proof sealing
- Weight reduction

System cross section

New

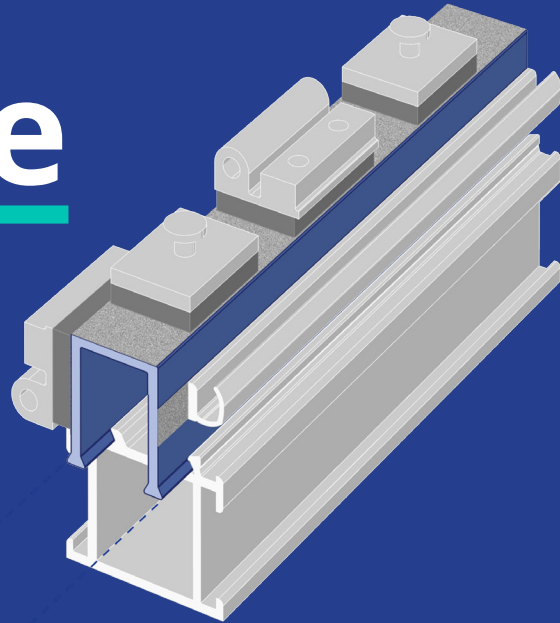


Adhesion Prime



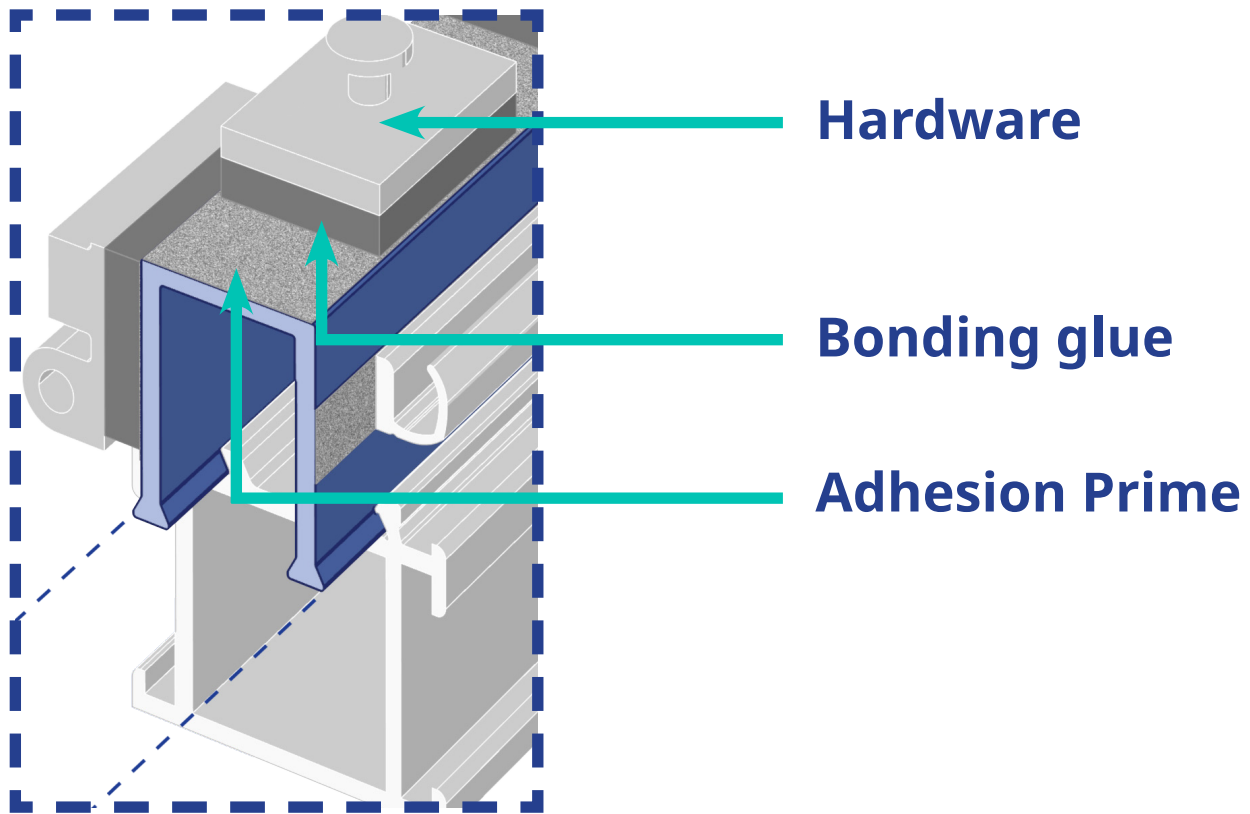
10

Hardware & gaskets



- Adhesion Prime functionalizes the polyamide (PA) strip surface where to bond hardware and gasket components.
- Polyamide (PA) surfaces treated with Adhesion Prime can provide a ready for glue lanes, in which later on the constructor can fix with glues or tapes, many hardware elements.
- The hardware elements can be punctual or bar type, fixed along or across the PA treated surfaces.
- All designs must be reviewed by Technoform and the glue manufacturer to assure their feasibility, and is responsibility of the system owner to assure the whole product specifications.
- The designer has now a performance on Technoform strips that merges thermal insulation and mechanical connection, the imagination is welcome!

Isometric view of a generic new functionalized surface design



Performance improvements for the end user

- Higher thermal insulation

Performance improvements for the cladding unit

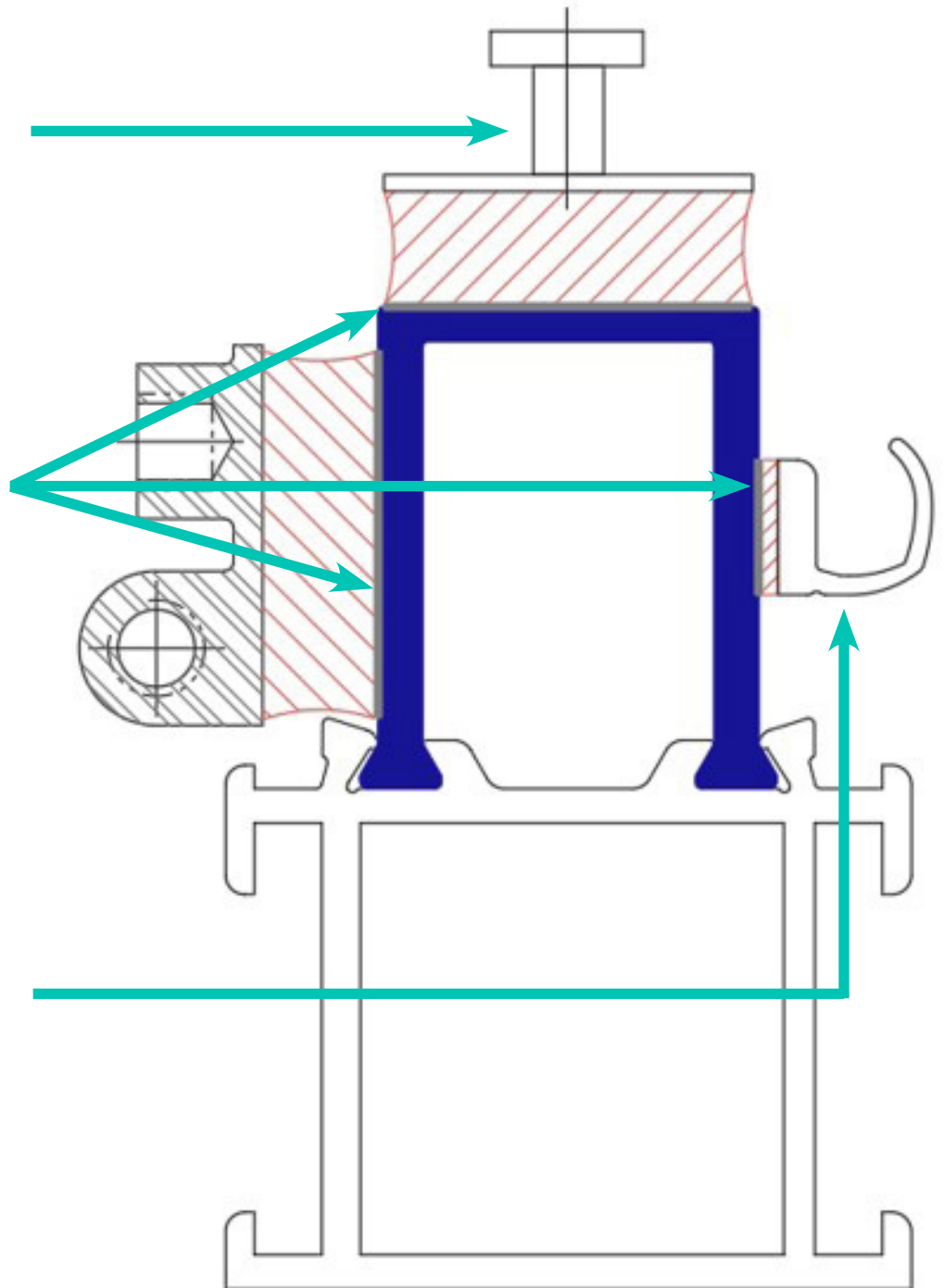
- Multiple surface attachments
- Second barrier
- Bonding to frame
- Weight reduction
- Simpler assembly

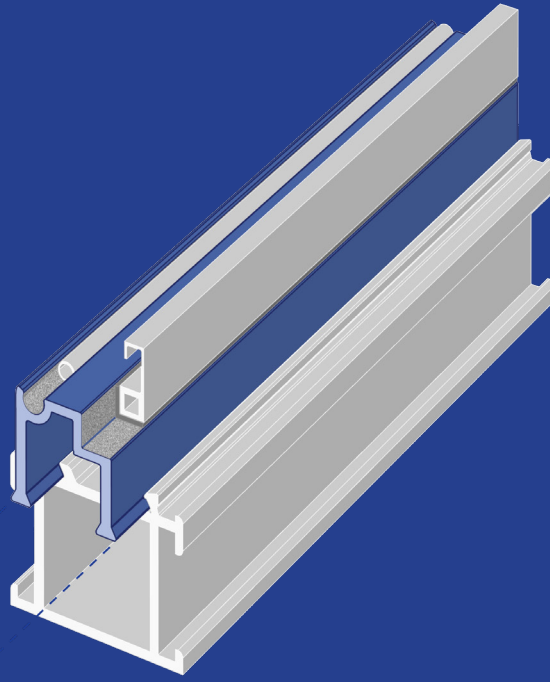
System cross section

Hardware

**Adhesion
Prime**

Gasket

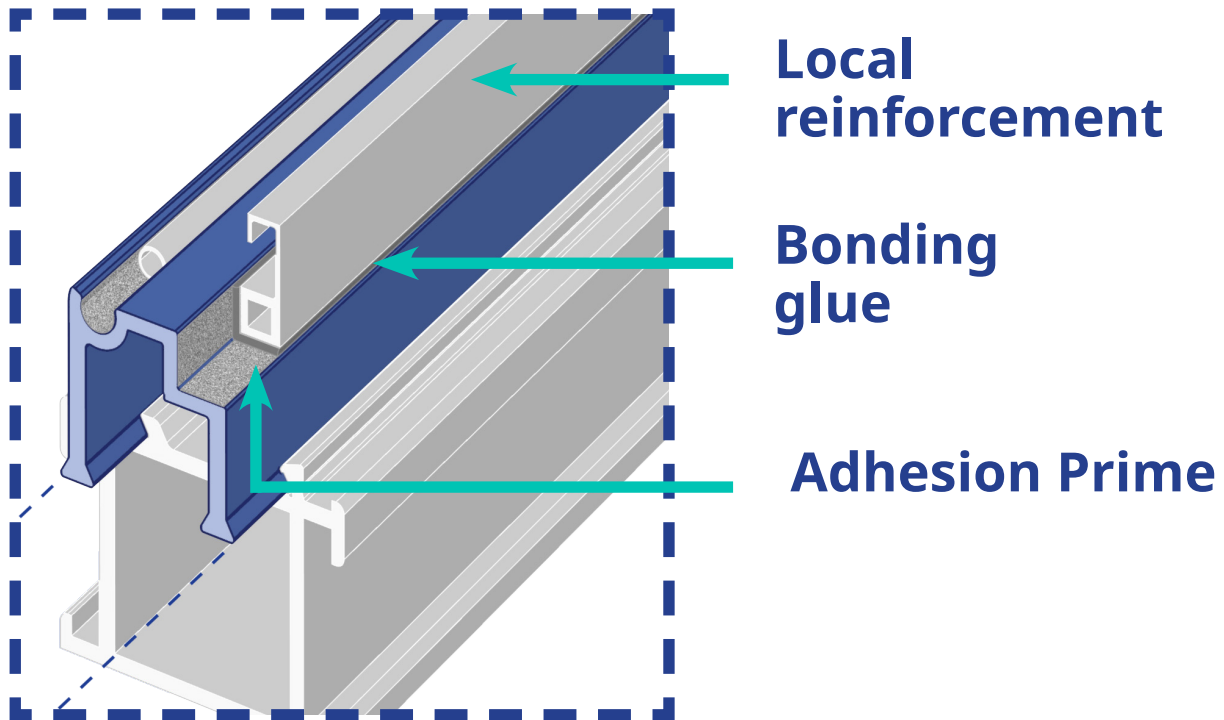




Local reinforcement

- Local reinforcement is the design in which is needed a punctual higher strength increase.
- The reinforcement can be longitudinal or transversal to the polyamide (PA) strips.
- Loads are transferred to inner frames in longitudinal flow through the polyamide matrix.
- Adhesion Prime treatment brings the adhesive functionality between the PA and the reinforcements, in order to transmit the loads from one to the other component.
- All designs must be reviewed by Technoform and the glue manufacturer to assure their feasibility, and is responsibility of the system owner to assure the whole product specifications.

Isometric view of a generic new reinforced strip system design



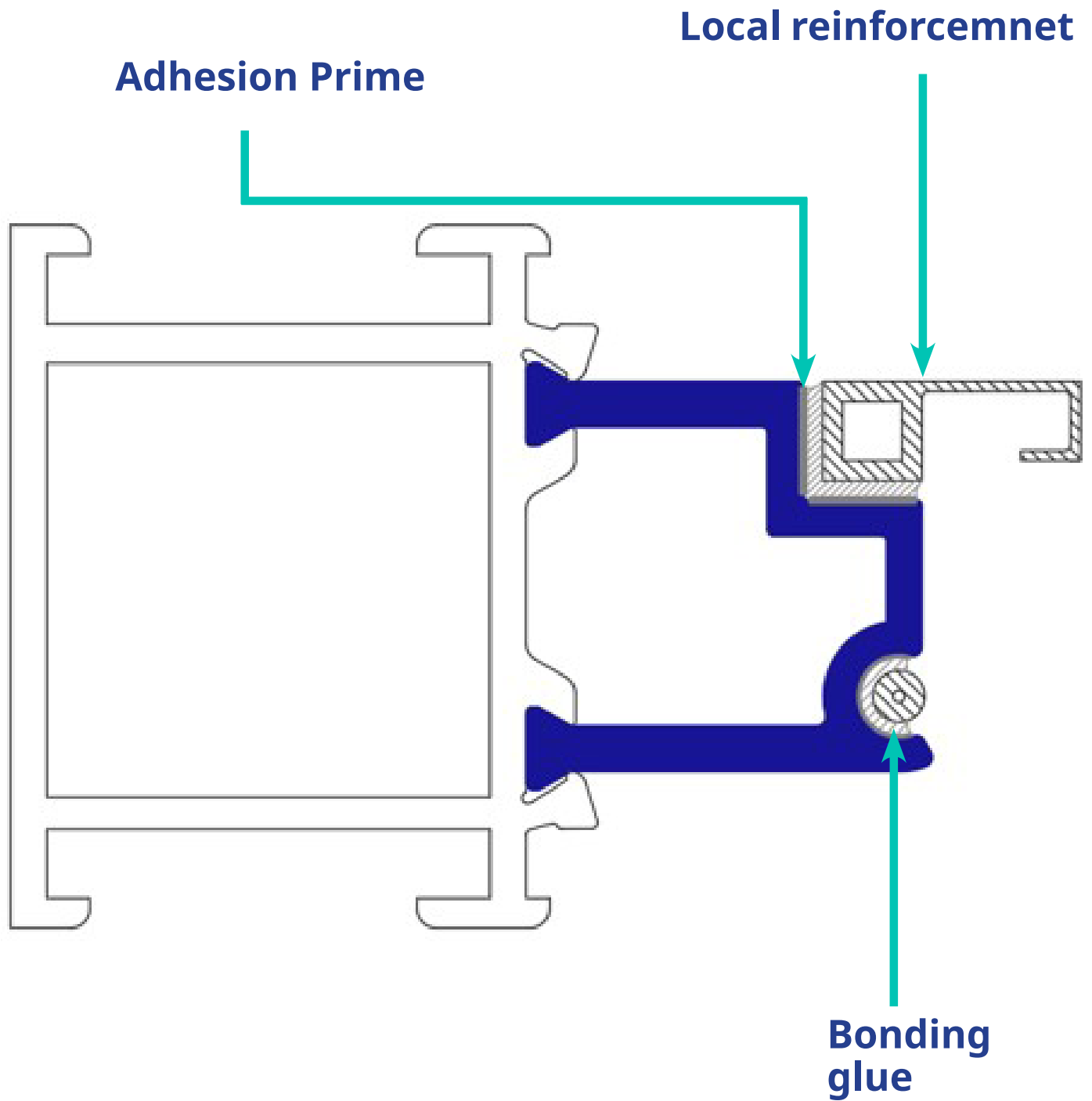
Performance improvements for the end user

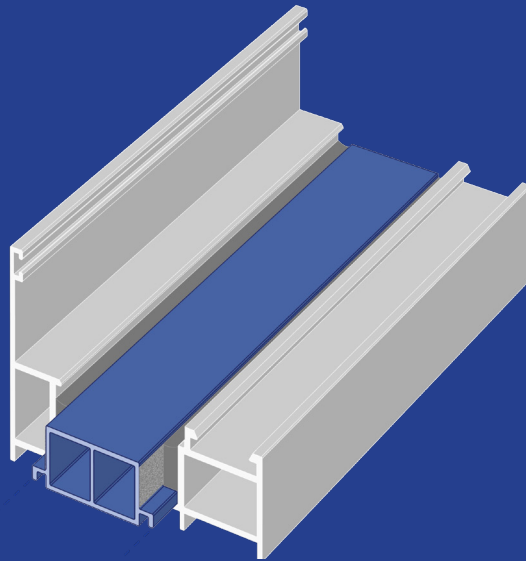
- Higher thermal insulation

Performance improvements for the cladding unit

- Local reinforcement
- Bonding to frame
- Weight reduction
- Simpler assembly
- Multiple surface attachments

System cross section

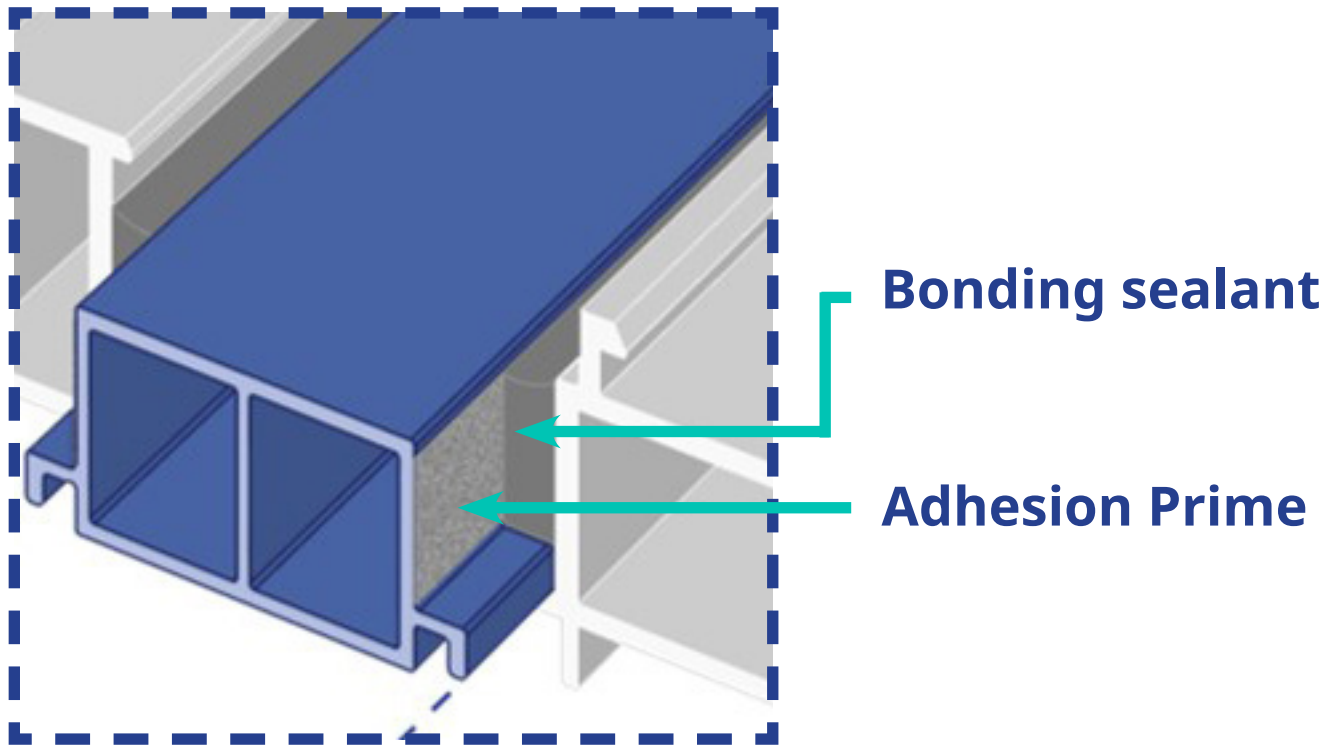




Bonded frame composite

- Bonded frame composite designs can be, for certain uses with low load requirements, an alternative to the standard mechanical connection between aluminum and polyamide (PA) profiles.
- Surface preparations are the key to achieve the requirements, being responsibility of the applicant.
- The connection performance depends on the glue, the different connection geometries and the surfaces' preparation; and must be evaluated case by case.
- The glue can be Polyurethane (Pour & Debridge systems) without debridging afterwards, structural double side tape, glue or silicone.
- Bonded systems with P&D can be windows, doors, and storefront systems.
- All designs must be reviewed by Technoform and the glue manufacturer to assure their feasibility, and is responsibility of the system owner to assure the whole product specifications.

Isometric view of a generic new composite frame system design



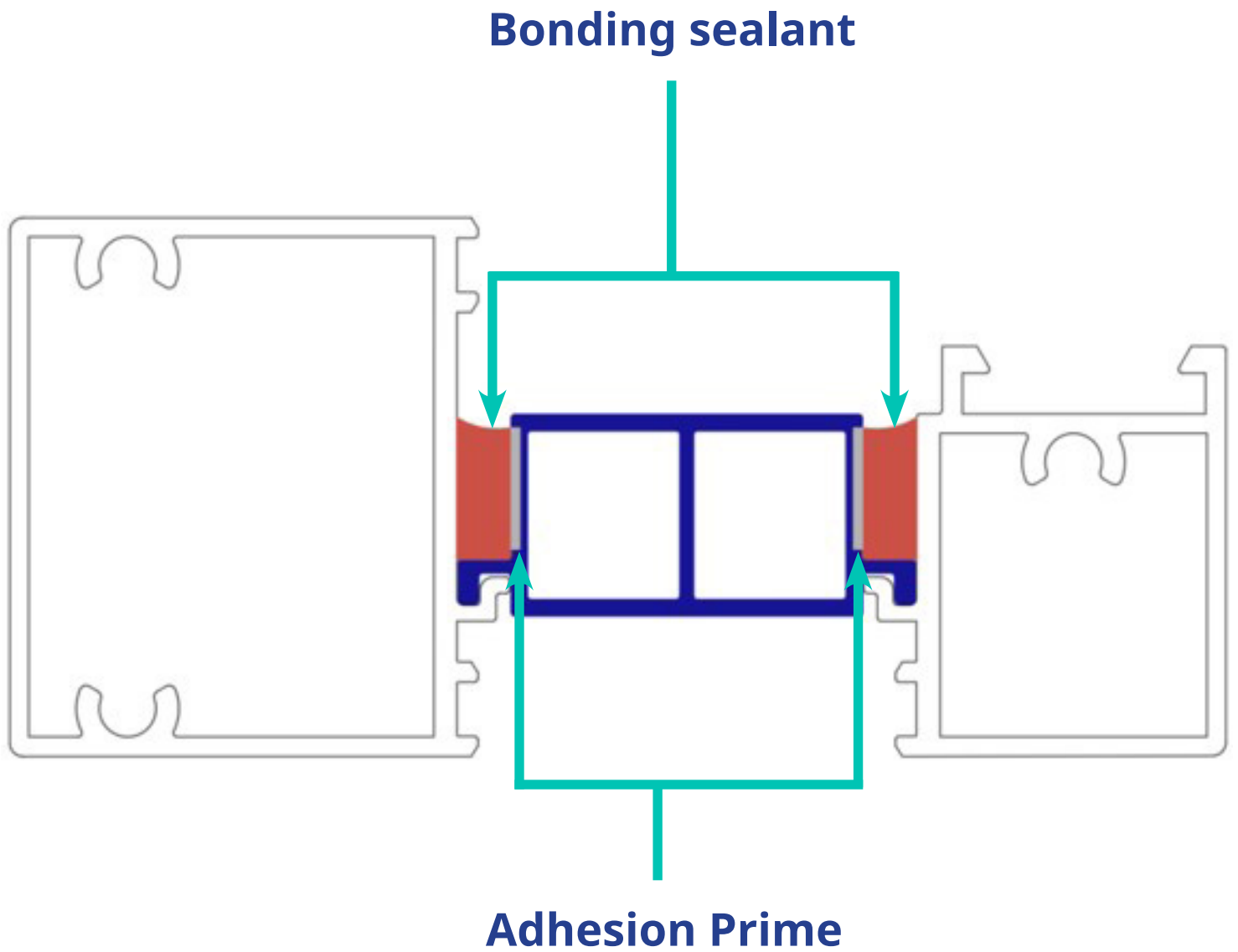
Performance improvements for the end user

- Higher thermal insulation

Performance improvements for the cladding unit

- Bonding to frame
- Weight reduction
- Simpler assembly
- High rigidity unit bonding

System cross section



Note

- Adhesion Prime is the result of a worldwide development within Technoform teams, and also resulted in two granted patents: US11142942B2 (USA) and EP3631135B1 (Europe).
- Technoform is confident that this is a game-changer application for the building industry and is working on strengthening a high-end service to support the designers and system providers interested in using it.
- All designs must be reviewed by Technoform and the glue manufacturer to assure their feasibility, and is responsibility of the system owner to assure the whole product specifications.
- Version released August 2nd 2022

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