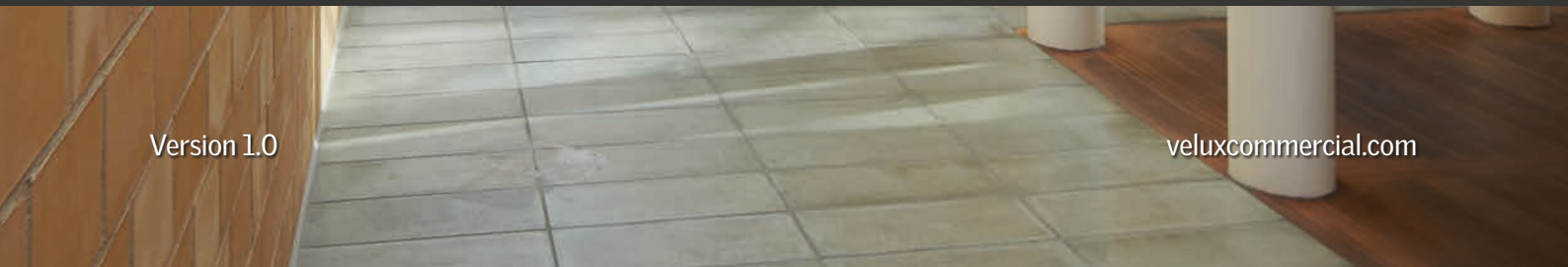
VELUX®

Commercial

VELUX Glazing Panels

Bespoke daylight solutions for public and commercial buildings



Version 1.0

veluxcommercial.com

Front cover and this page: Jakon Headquarters, Ballerup, Denmark.

Bespoke daylight solution in elegant design

VELUX Glazing Panels are a bespoke glass system with slim and shallow profiles for optimal daylight influx. As there are only limited restrictions, you can create almost anything from pyramids on a flat roof to flush installations in a pitched roof.

VELUX Glazing Panels are ideal for refurbishment projects of public and commercial buildings – for learning, working and recovering.

National College for Advanced Transport & Infrastructure, Doncaster, Great Britain.

MT Højgaard, Søborg, Denmark.

York Art Gallery, York, Great Britain.

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The benefits

Bespoke glass system with prefabricated panels

VELUX Glazing Panels are ideal for creating bespoke daylight solutions for public and commercial buildings as they are;

- **Flexible when designing**
- **Prefabricated yet bespoke**
- **Ideal for refurbishment**

VELUX Glazing Panels allow you to design almost anything, thereby creating your own bespoke glass system - ideal to create special corner solutions, glass gables and pyramids. The elegantly designed profiles in aluminium are thermally broken with a polyurethane core. The bespoke nature of panels makes them ideal for refurbishment projects as they can be designed to fit an already existing hole in the roof and if weight is a decisive factor.

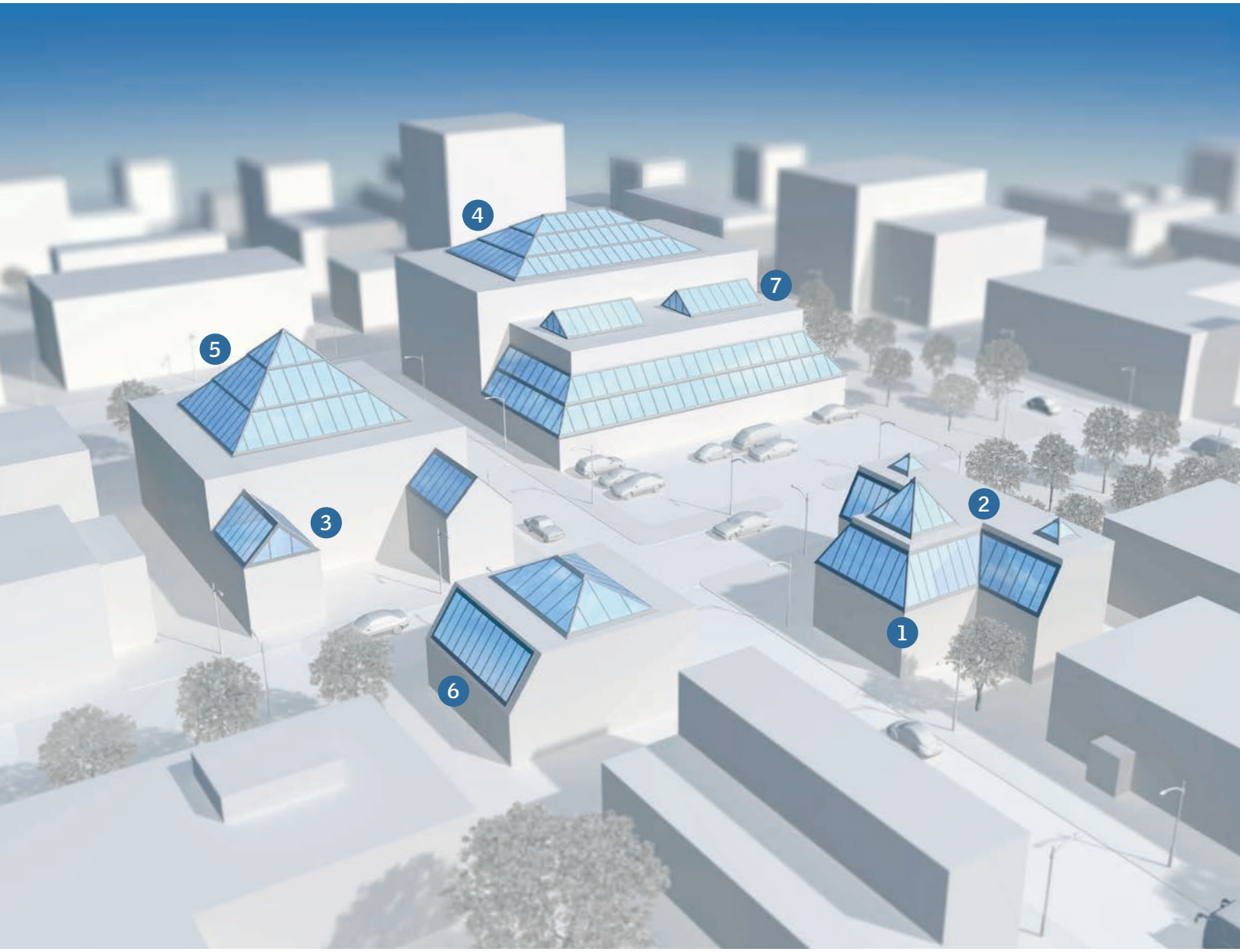
The individual panel is prefabricated off-site, it is delivered assembled with the glazing unit sealed into the frame, ready to be installed together with the accessories creating a high quality and weather-tight solution.

VELUX Glazing Panels are available as fixed and venting panels and can be configured with either double glazing or triple glazing providing various design opportunities. All venting panels are top-hung and are available in comfort and smoke ventilation versions. In closed position, there is no visible difference between a fixed and a venting panel from the outside. Additionally, a fixed panel can easily be converted to provide ventilation by post-installing an actuator and a crossbar.

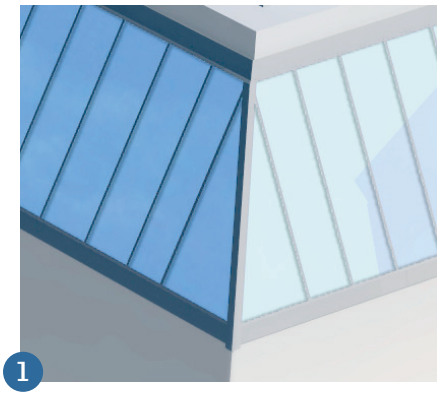
Solution descriptions

VELUX Glazing Panels can be configured in multiple solutions, by combining the various installation opportunities with gable and corner solutions.

Please note, for any given solution it is mandatory to perform static calculations. The following pages describes the various design options.

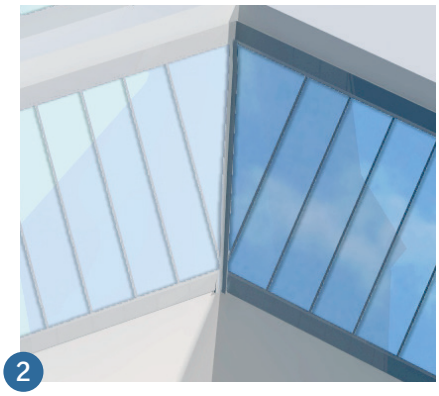


Solution descriptions



1

Hip
A hip is an outward going corner solution used to connect two sloped sides. It is commonly used for making hipped gables in dual pitched solutions.

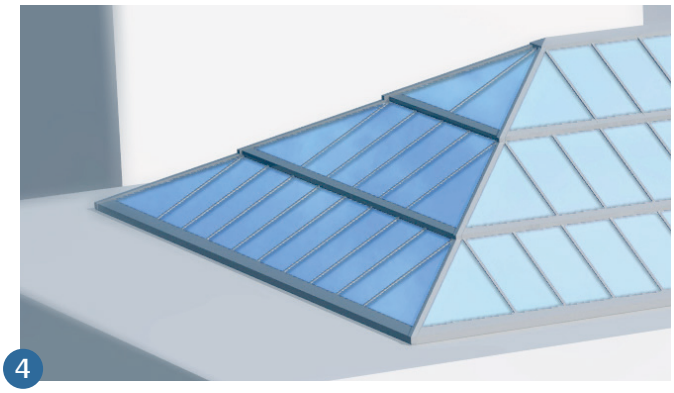


2

Valley
A valley is a an inward going corner solution used in the intersect between two individual glass solutions. Can be used when connecting two adjacent buildings.

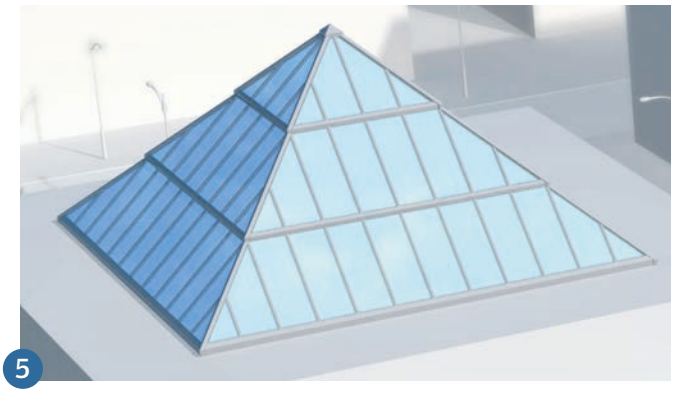
3

Vertical glass gable
Both mono and dual pitched solutions can be installed with vertical glass gables.



4

Step
VELUX Glazing Panels can be configured in a step by installing multiple rows of panels on top of each other using a structural beam to connect the rows.

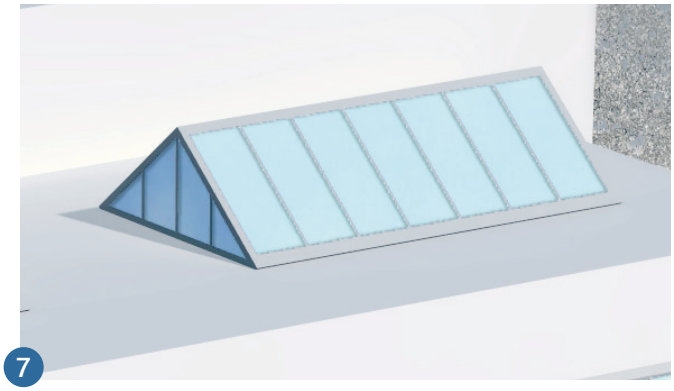


5

Pyramids
A pyramid is comprised by multiple sides of panels connected using hipped corner solutions. For smaller solution, it is possible to create a self-supporting pyramid and for bigger solution, a structural construction with hips and beams is required.

6

Mono pitched solutions
Mono pitched solutions are single rows of VELUX Glazing Panels installed between 15-90° on either an upstand (on a flat roof) or a non-protruding installation in a sloped roof. Solutions mounted against a vertical wall can be installed in pitches between 15-60°.

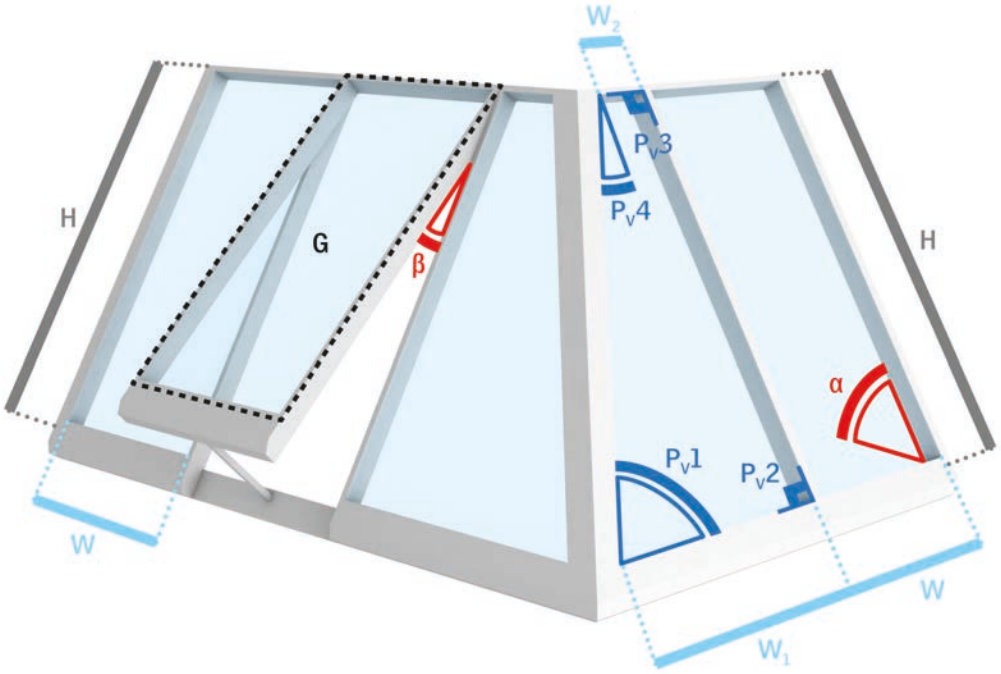


7

Dual pitched solutions
Dual pitched solutions are two rows of VELUX Glazing Panels connected at the top, creating a ridge. For self-supporting solutions, the installation pitch is between 25-60°. Furthermore, it is possible to install a dual pitched solution with a girder at the ridge.

Panel design options

The tables below describe the limitations such as the size of the panels and installation pitch. To confirm the size of the panel, a static calculation incorporating snow and wind loads is required for the specific project.



		Fixed and comfort venting panels	
		Double glazing	**Triple glazing**
W	Module width	264 mm – 1200 mm (fixed or crossbar solution)	256 mm – 1200 mm (fixed or crossbar solution) 651 mm – 1200 mm (hidden actuator)
	Panel width	Module width – 4 mm	Module width – 6 mm
H	Height	260 mm – 2900 mm	250 mm – 3500 mm
	Ratio	W/H: 1:6 or 6:1	W/H: 1:6 or 6:1
G	Panel area**	max. 2 m²	max. 3 m²
β	Opening angles	0° – 45° (max. opening to horizontal)	0° – 45° (max. opening to horizontal)
P_V	Corner angles***	25° – 155°	25° – 155°
α	Installation pitch	15° – 90° (ponding groove if pitch is under 25°)*	15° – 90° (ponding groove if pitch is under 25°)*

		Smoke venting panels, in accordance with EN 12101-2	
		Double glazing	**Triple glazing**
W	Module width	504 – 1200 mm (crossbar solution)	506 mm – 1200 mm (crossbar solution) 851 mm – 1200 mm (hidden actuator)
	Panel width	Module width – 4 mm	Module width – 6 mm
H	Height	600 mm – 2900 mm	500 mm – 3500 mm (crossbar solution) 500 mm – 2366 mm (hidden actuator)
	Ratio	W/H: 1:6 or 6:1	W/H: 1:6 or 6:1
G	Panel area**	max. 2 m²	max. 2 m²
β	Opening angle	0° – 45°	8° – 45°
α	Installation pitch	15° – 60° (ponding groove if pitch is under 25°)*	15° – 50° (ponding groove if pitch is under 25°)*
	Glazing weigth	max. 40 kg/m²	max. 50 kg/ m²

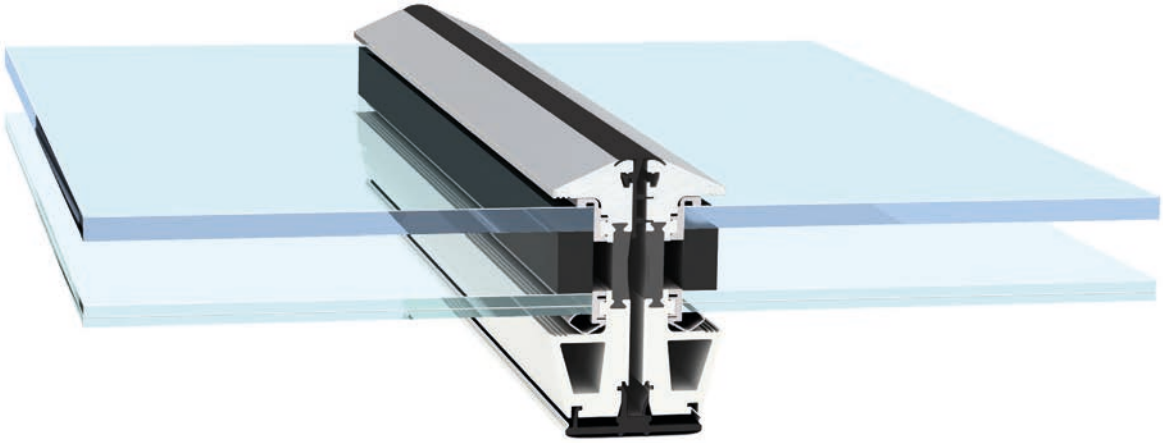
For more information regarding venting panels, see page 13.
* For more information regarding ponding groove, see page 12.
** Based on panel width x height.
*** For fixed panels only.

Panels

The prefabricated panel consists of aluminium frame profiles with a glazing unit sealed in using a UV resistant sealant material. When the panels are joint together on-site, the outer gasket and an inside drainage profile must be mounted to secure drainage and a weather-tight solution.

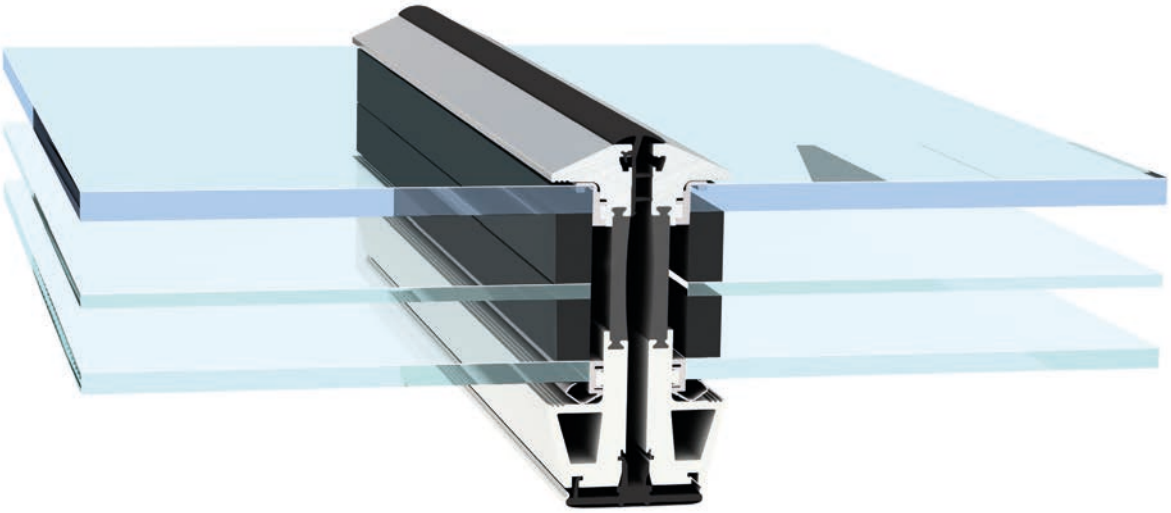
Double glazing

Frame profile height: 74 mm
Panel joint height: 82 mm
Panel joint width: 50 mm



Triple glazing

Frame profile height: 98 mm
Panel joint height: 106 mm
Panel joint width: 52 mm



Material descriptions for double glazing

Exterior view

Hinge

Frame profile*

Material: Aluminium & polyurethane core
Surface: Nature anodized or polyester powder coated
Exterior colour: RAL 9010/9005/7016, gloss 30
Interior colour: Same as exterior or wet coloured painted RAL 9010

Front cover cap* & rubber plug

Material: Aluminium (2 mm), EPDM rubber plug & polystyrene insulation
Surface: Nature anodized or polyester powder coated
Colour: RAL 9010/9005/7016, gloss 30

Installation profile

Material: Aluminium, PVC & EPDM rubber gasket

Flashing*

Material: Aluminium (1 mm)
Surface: Nature anodized or polyester powder coated
Colour: RAL 9010/9005/7016, gloss 30

Side gable + fixing angle profile

Material: Foamed PVC & aluminium, including a EPDM rubber plug.
NB: Can be delivered without a fixing angle profile depending on installation.

Cill gasket

Material: Black EPDM rubber

* Other RAL colours can be ordered at additional cost. Contact your local VELUX sales office for more information.

Material descriptions for triple glazing

Exterior view

Hinge

Frame profile*

Material: Aluminium & polyurethane core
Surface: Nature anodized or polyester powder coated
Exterior colour: RAL 9010/9005/7016, gloss 30
Interior colour: Same as exterior or wet coloured painted RAL 9010

Front cover cap* & rubber plug

Material: Aluminium (2 mm), EPDM rubber plug & polystyrene insulation
Surface: Nature anodized or polyester powder coated
Colour: RAL 9010/9005/7016, gloss 30

Installation profile

Material: Aluminium, PVC & EPDM rubber gasket

Flashing*

Material: Aluminium (1 mm)
Surface: Nature anodized or polyester powder coated
Colour: RAL 9010/9005/7016, gloss 30

Side gable + fixing angle profile

Material: Foamed PVC & aluminium.
NB: Can be delivered without a fixing angle profile depending on installation.

Cill gasket

Material: Black EPDM rubber

* Other RAL colours can be ordered at additional cost. Contact your local VELUX sales office for more information.

Additional material description

Cover cap*

Material: Steel (0.5mm)
Surface: Polyester powder coated
Colour: Same as interior frame profile
NB: Nature anodized frame surface will be matched with a similar colour coating

Drainage profile

Material: Hard PVC with soft PVC gasket lips

Mounting bracket

Material: Stainless steel (4 mm)

Top gasket

Material: Black EPDM rubber

Outer gasket

Material: 2 component TPE profile

Vapour barrier

Material: Bitumen-based membrane

Crossbar for double glazing panel

Material: Aluminium square pipe (reinforced with steel u-profile for panel width > 700 mm)
Surface: Nature anodized or polyester powder coated
Colour: Same as interior frame profile

Crossbar for triple glazing panel

Material: Steel square pipe with aluminium cover
Surface: Nature anodized or polyester powder coated
Colour: Same as interior frame profile

Installation profile – dual pitched for double glazing panel

Material: Aluminium, PVC, EPDM rubber gasket & steel bracket

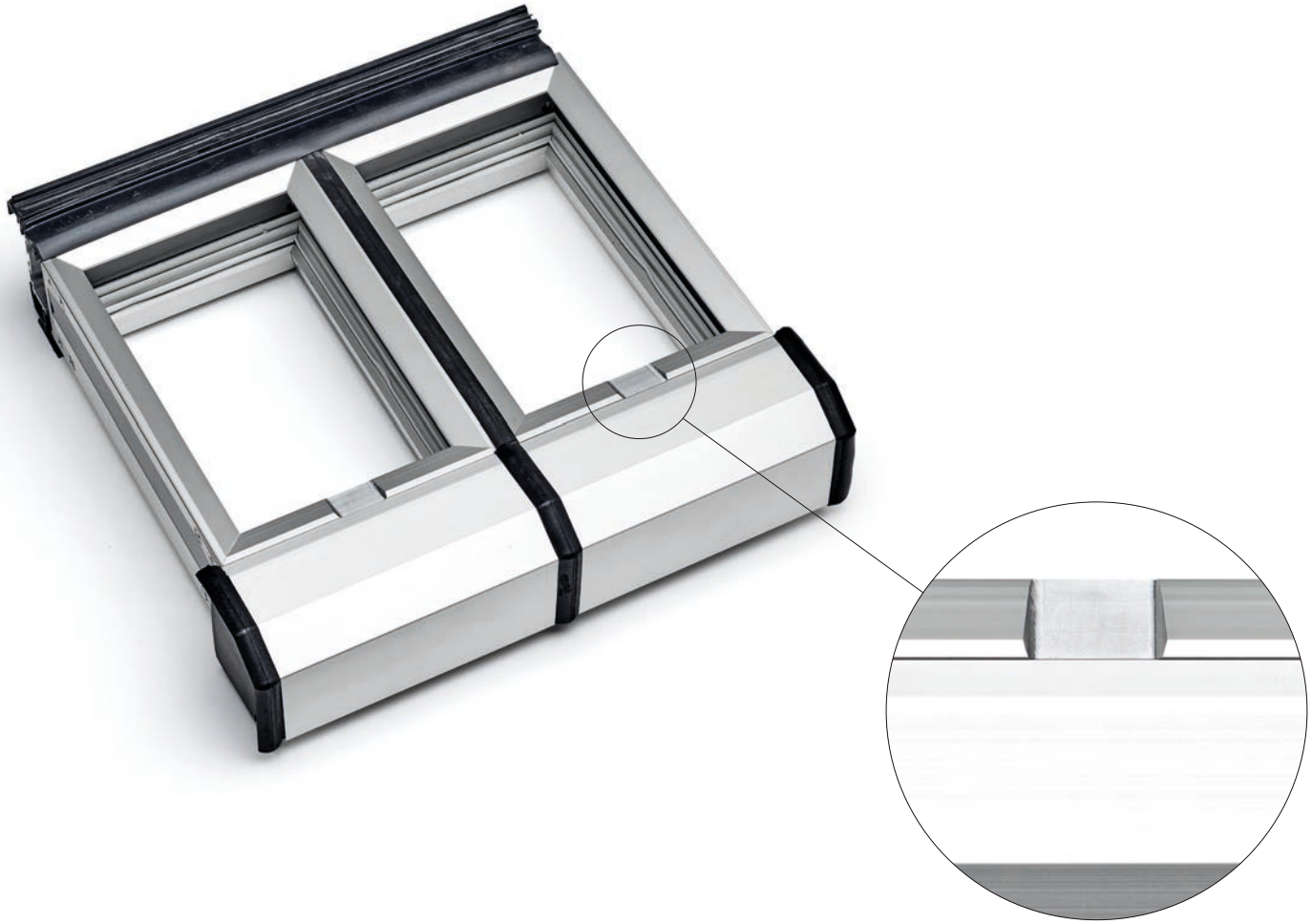
Installation profile – dual pitched for triple glazing panel

Material: Aluminium, PVC, EPDM rubber gasket & steel bracket

* Other RAL colours can be ordered at additional cost. Contact your local VELUX sales office for more information.

Ponding groove

When installing VELUX Glazing Panels below 25°, both double and triple glazing variants, the panels will be manufactured with a ponding groove in the bottom of the panels to minimise ponding water on the glazing.



Venting panels

For venting panels there are several options of actuators when specifying the panels. Double glazing panels have one configuration option; a visible actuator operating by means of a crossbar (1, 2) installed in the panel in parallel with the bottom frame profile.

Triple glazing panels have two configuration options; a hidden chain actuator (3) only visible when the panel is open, or a visible actuator operating by means of a crossbar (1, 2) installed in the panel in parallel with the bottom frame profile.

For both double and triple glazing, the visible actuator is available as a spindle (1) or a chain (2) version. The chain stroke or spindle length depends on the size of the panel and installation pitch. In addition, it is possible to convert a rectangular fixed panel to a venting panel by post-installing a visible actuator and a crossbar. This will increase the ventilation flow in the building without opening up the building envelope again.

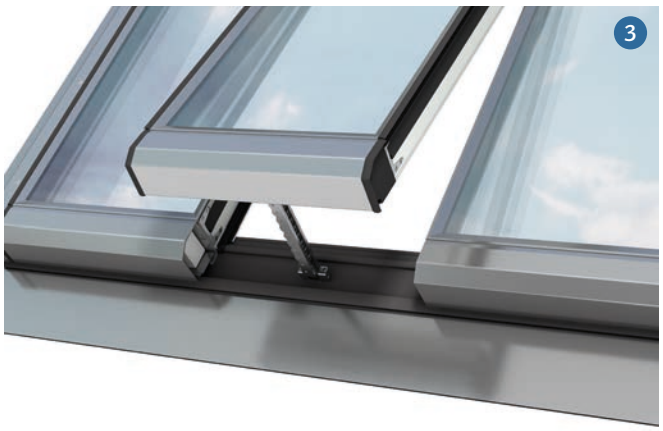
The venting panels must be controlled by a separate Open System ±24 V DC (OS ±24 V DC), which is not included in the VELUX delivery. Connection to a fieldbus system requires a separate control box between fieldbus system and actuator. For the OS ± 24 V DC, only the actuators are supplied by the VELUX Group.

Smoke ventilation
A selection of the actuators can be configured for smoke ventilation in accordance with EN 12101-2. A VELUX wind deflector is available for triple glazing solutions. The wind deflector is designed to change the wind profile over the glazing panels in open position, in order to minimise the risk of air intake and allow outtake of smoke even under unfavorable wind conditions.

When using a smoke venting panel for comfort ventilation, it must be ensured that the panel, in open position, does not get above horizontal.

The actuator stroke for comfort venting function must be limited accordingly by the control system time to maintain lifetime expectancy and guarantee of the actuator and for example can be done by limiting the drive time in most simple control setup. The maximum stroke length and drive time for comfort ventilation depend on the project specific panel size and installation pitch.

For more information, please contact your local VELUX sales office.



1. Spindle actuator with crossbar
2. Chain actuator with crossbar
3. Chain actuator hidden in front cover cap (only available for triple glazing)

VELUX Glazing Panels have a recommended minimum installation height of 2.5 m above floor level (inside) and ground level (outside). In case of installation below that level, safety measures must be applied by the installer/user to prevent serious injury. No instruction or measure can eliminate the inherent hazards resulting from installation heights below 2.5 m.

The VELUX Group will not accept responsibility for damages, injury or death resulting from such installation. The installer/user is ultimately responsible for own omissions and actions. Measures could for instance be to install a motion sensor that is able to disconnect power from the control unit in case of any movement in the immediate vicinity of the VELUX Glazing Panels.

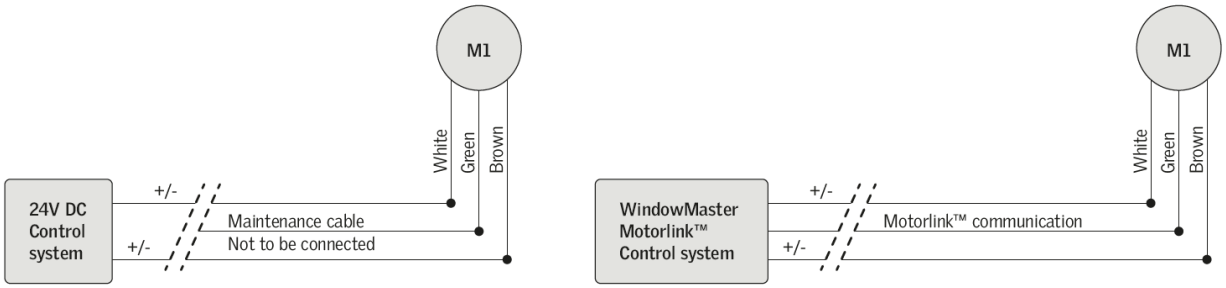
Electrical system

In the Open system ±24 V DC (OS ±24 V DC), the actuators are controlled by ±24 V DC. In addition, the actuator can be integrated in common building automation fieldbus systems, e.g. KNX, BACnet, LON and Modbus, through the integrated MotorLink™ technology.

Connection to a fieldbus system requires a separate control box between fieldbus system and actuator. For the OS ± 24 V DC, only the actuators are supplied by the VELUX Group.

Planning for the electrical system:

- Control system is not a part of the VELUX Glazing Panels venting panels, but can for small stand-alone comfort venting systems be purchased separately
- Wiring between the control system and the actuator is not part of the VELUX delivery
- The actuator can be controlled by either ±24 V DC or WindowMaster MotorLink™



Electrical control components

VELUX can provide following components for comfort venting panels.

Control unit*	Control unit*	Control switch
		
WUC 102	**WCC 310/320**	**WSK 102/103**
WUC 102 0103 EU (3 Amp) WUC 102 0403 UK (3 Amp)	WCC 310 S 0410 (10 Amp) WCC 320 S 0810 (20 Amp)	WSK 102 (Fuga) WSK 103 N101

* Choice of control unit depend on actuator type

Wind and rain sensor	Rain sensor	Control system – Inside and outside Rain, wind and temperature
		
WLA 330	**WLA 331**	**NV SOLO®**

Glazing Unit

Double Glazing = DG Triple Glazing = TG	Coating		Construction	Light transmittance	Solar factor	Thermal transmittance	Thermal transmittance of the entire window in accordance with EN 14351-1	
							area > 2.3 m²	area ≤ 2.3 m²
		IGU	Insulating Glass Unit (IGU)	τ_v	g	U_g	U_w	U_w
		code	(outside - inside)	%	%	W/m²K	W/m²K	W/m²K
DG	LowE	40LF	6F LowE - 18 Argon - 6.76F (33.2)	81	60	1.1	-	1.8
DG	LowE	40L	6H - 18 Argon - 6.76F LowE (33.2)	81	63	1.1	-	1.8
DG	LowE	40LS	6H + HST - 18 Argon - 6.76F LowE (33.2)	80	64	1.1	-	1.8
DG	LowE	40LT	6H - 16 Argon - 8.76F LowE (44.2)	81	63	1.1	-	1.8
DG	LowE	40LST	6H + HST - 16 Argon - 8.76F LowE (44.2)	80	64	1.1	-	1.8
DG	LowE	40T	8H - 14 Argon - 8.76F LowE (44.2)	80	61	1.1	-	1.8
DG	Sun1	41L	6H Sun1 - 18 Argon - 6.76F (33.2)	51	28	1.0	-	1.8
DG	Sun1	41LS	6H + HST Sun1 - 18 Argon - 6.76F (33.2)	51	28	1.0	-	1.8
DG	Sun1	41LT	6H Sun1 - 16 Argon - 8.76F (44.2)	51	28	1.0	-	1.8
DG	Sun1	41LST	6H + HST Sun1 - 16 Argon - 8.76F (44.2)	51	28	1.0	-	1.8
DG	Sun1	41T	8H Sun1 - 14 Argon - 8.76F (44.2)	51	28	1.1	-	1.8
TG	LowE	46LF	6F LowE - 20 Argon - 4F - 18 Argon - 6.76F LowE (33.2)	73	53	0.5	1.1	1.3
TG	LowE	46L	6H LowE - 20 Argon - 4H - 18 Argon - 6.76F LowE (33.2)	73	53	0.5	1.1	1.3
TG	LowE	46LS	6H + HST LowE - 20 Argon - 4H - 18 Argon - 6.76F LowE (33.2)	73	53	0.5	1.1	1.3
TG	LowE	46LT	6H LowE - 16 Argon - 6H - 18 Argon - 8.76F LowE (44.2)	72	52	0.5	1.1	1.3
TG	LowE	46LST	6H + HST LowE - 16 Argon - 6H - 18 Argon - 8.76F LowE (44.2)	72	53	0.5	1.1	1.3
TG	LowE	46T*	8H LowE - 16 Argon - 6H - 16 Argon - 8.76F LowE (44.2)	72	52	0.6	1.1	1.3
TG	Sun1	47L	6H Sun1 - 20 Argon - 4H - 18 Argon - 6.76F LowE (33.2)	47	26	0.5	1.1	1.3
TG	Sun1	47LS	6H + HST Sun1 - 20 Argon - 4H - 18 Argon - 6.76F LowE (33.2)	47	26	0.5	1.1	1.3
TG	Sun1	47LT	6H Sun1 - 16 Argon - 6H - 18 Argon - 8.76F LowE (44.2)	46	25	0.5	1.1	1.3
TG	Sun1	47LST	6H + HST Sun1 - 16 Argon - 6H - 18 Argon - 8.76F LowE (44.2)	46	25	0.5	1.1	1.3
TG	Sun1	47T*	8H Sun1 - 16 Argon - 6H - 16 Argon - 8.76F LowE (44.2)	46	25	0.5	1.1	1.3

* Cannot be used for smoke venting panels

Glazing unit construction	
IGU example (40LS)	6H + HST - 18 Argon - 6.76F LowE (33.2)
F	Float
H	Toughened
HST	Heat soak tested
33.2	Laminated glass, 3 mm float - 2 x 0.38 PVB foil - 3 mm float
LowE	Low-emissivity coating
Sun1	Light sun protection coating

Classifications

Essential characteristic performances according to EN 14351-1		
Essential characteristics	**Performance**	
Resistance to windload, EN12210	Class C4 [1]	
Watertightness, EN12208	Class E1200 [2]	
Thermal transmittance, EN ISO 10077-1, EN ISO 10077-2	Double glazing 1.8 W/(m²K)	Triple glazing 1.1 / 1.3 W/(m²K)
Air permeability, EN12207	Class 4 [2]	
Reaction to fire, EN13501-1	Class B, s1-d0	
Acoustic performance, EN ISO 140-3, EN ISO 717-1	NPD	

1) For panel width > 800 mm: NPD, for panel height > 2100 mm: NPD
2) For triple glazing panel > 2.52 m²: NPD

Essential characteristic performances according to EN 12101-2		
Essential characteristics	**Performance (double glazing) ****	**Performance (triple glazing)**
Operational reliability	Re 50	Re 1000
Aerodynamic free area (A_a) [m²]	*	*
Resistance to heat	B 300	B 300
Opening under load	SL 800	SL 1000
Low ambient temperature	T(-05)	T(-15)
Stability under wind load	WL 1500	WL 3000 (hidden actuator) WL 2200 (crossbar)
Reaction to Fire	B-s1,d0	B-s1,d0

* A_a is project specific and must be calculated for each project.
** A VELUX wind deflector is not available for double glazing smoke venting panels.
NB: For smoke venting solutions, please consult with your local VELUX sales office.

Attachment to the roof

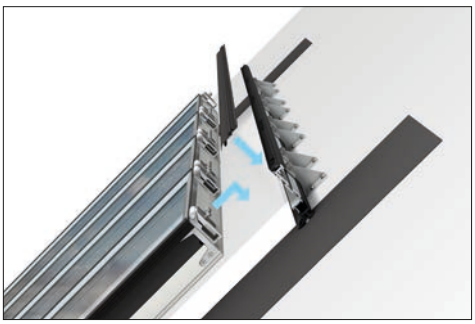
VELUX Glazing Panels are, regardless of solution type, installed using an installation profile in the top connecting the panels together. The panels and parts of the accessories are prefabricated off-site, making the installation easier on-site. Due to the bespoke nature of the panels, the installation must be carried out by a trained installer or with support from a VELUX technician. Only a general installation guide can be provided up front.

The panels are attached to the roof in the top and the bottom of the panels. In the bottom, the panel is attached using a pre-mounted mounting bracket which must be screwed into the sub-construction. For venting panels, the mounting bracket must not be screwed into the sub-construction. At the top, the panel is installed using an installation profile which must be fastened to the sub-construction or wall in wall-mounted solutions.

At the ends, the panel is finished against a side gable which is screwed into the sub-construction or a wall. The installation is completed with gaskets and flashings, ensuring a weathertight solution.

Double glazing

Triple glazing



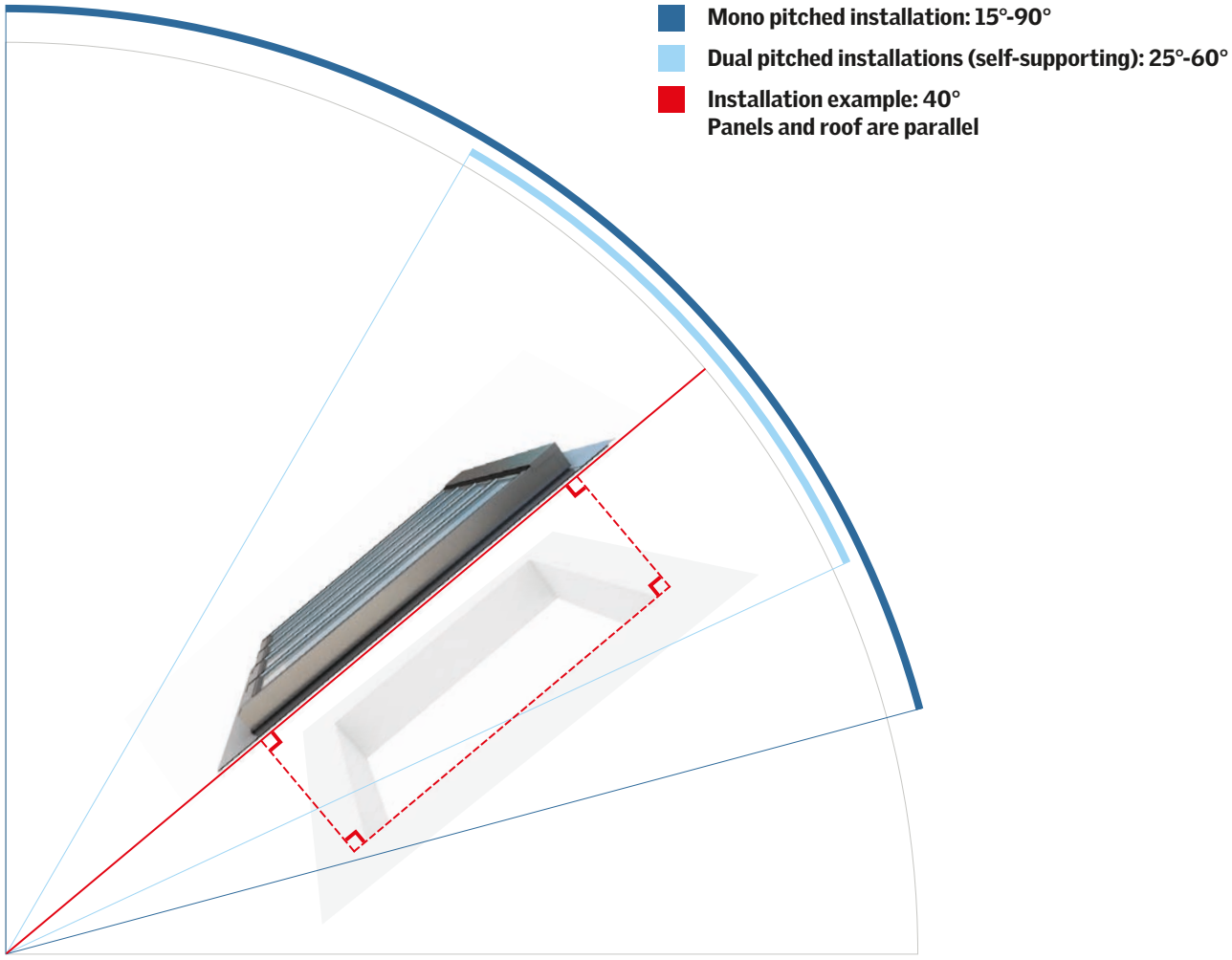
Sub-construction

VELUX Glazing Panels require an accurate, fixed and dimensioned sub-construction. The strength of the sub-construction must also be calculated for the individual project, based on the building design and application size. It is the responsibility of the customer to have a static calculation of the sub-construction done by a static engineer.

Consequently, the sub-construction is not a part of the bespoke panel system. The VELUX Group is not responsible for the sub-construction. All solutions are project specific, thus a general sub-construction document cannot be provided. For each project, a project specific sub-construction drawing will be prepared with measurements for the outer geometry of the sub-construction. Please note that there will be no indication or description for the composition of the sub-construction.

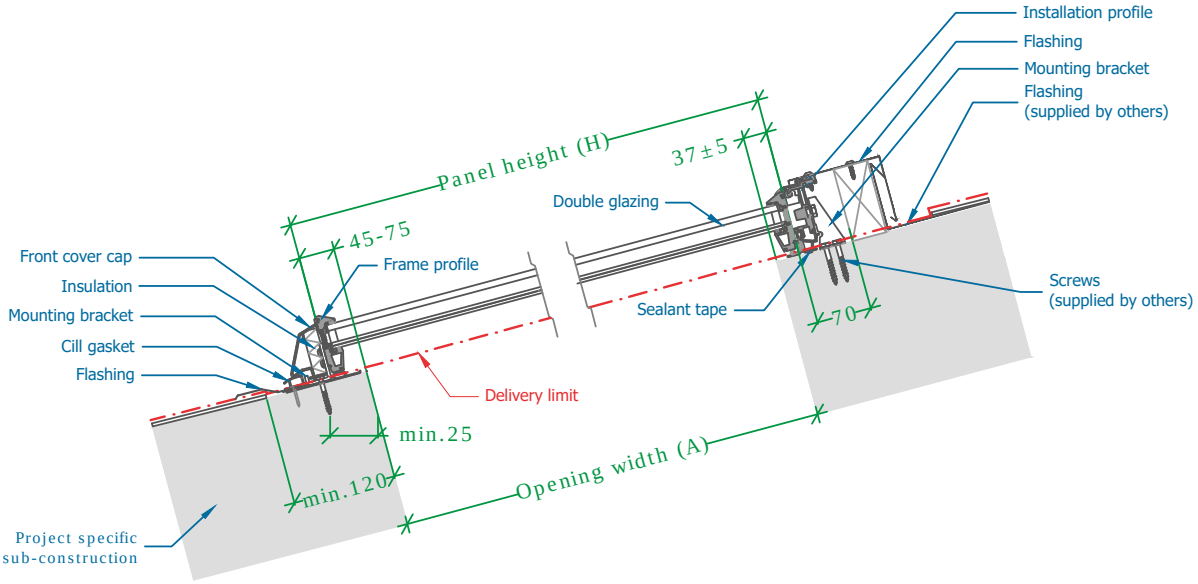
To be able to correctly install VELUX Glazing Panels, the sub-construction must be parallel to the panel itself.

Please observe that a lateral slope on the panels is NOT possible, therefore top and bottom sub-construction must be horizontal.

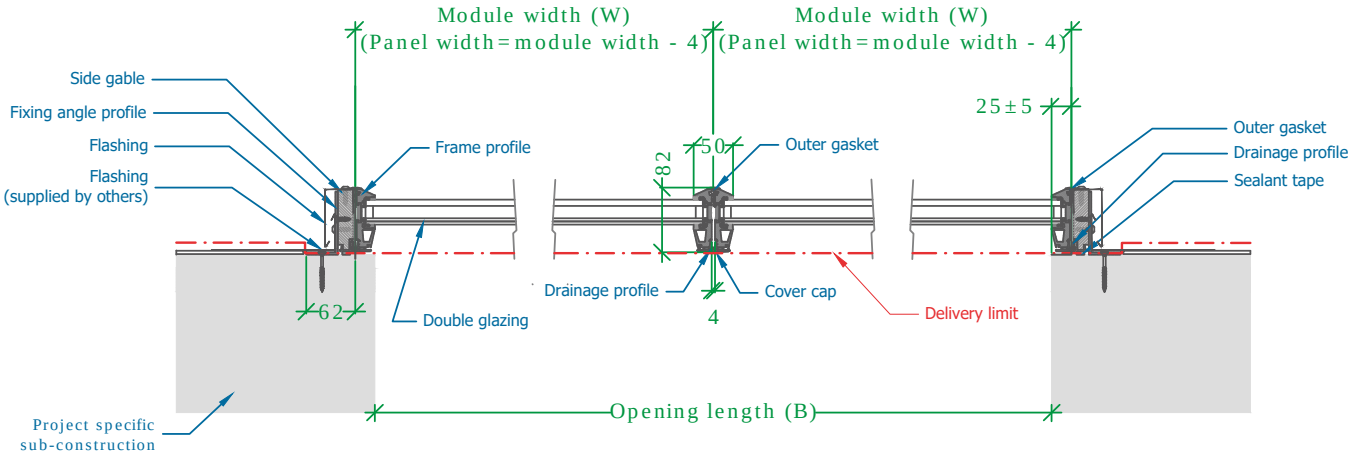


Sectional drawings – mono pitched

Double glazing



Cross-section

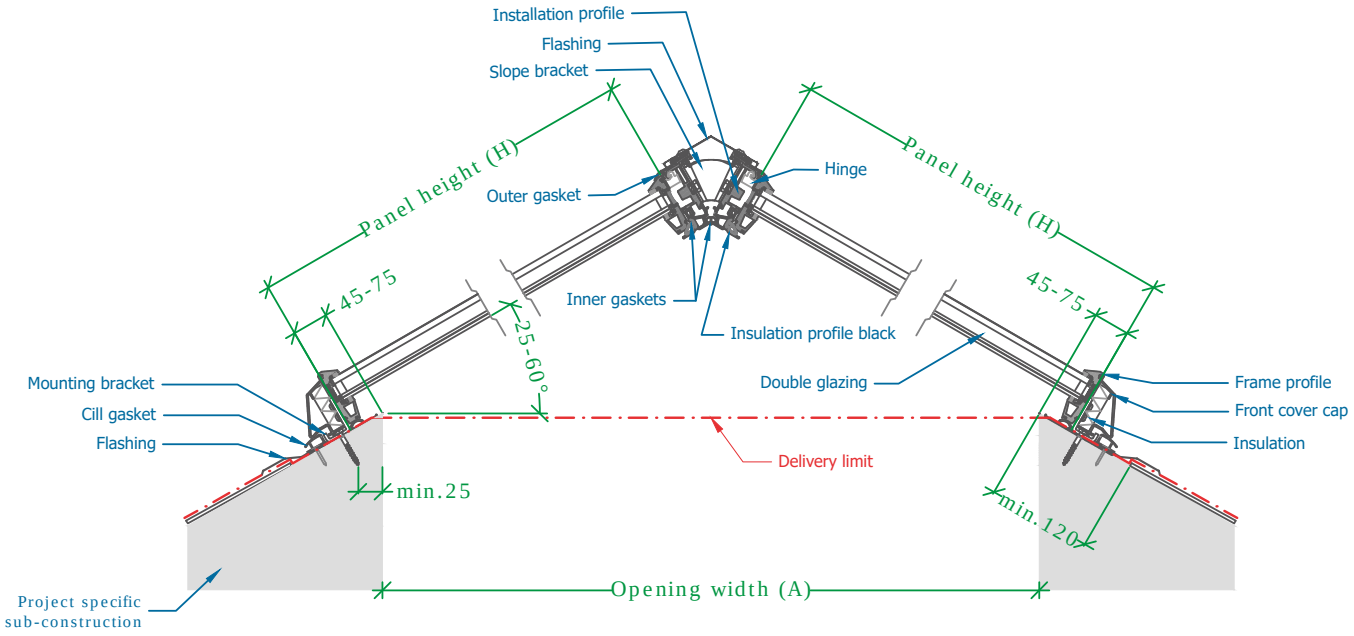


Longitudinal section

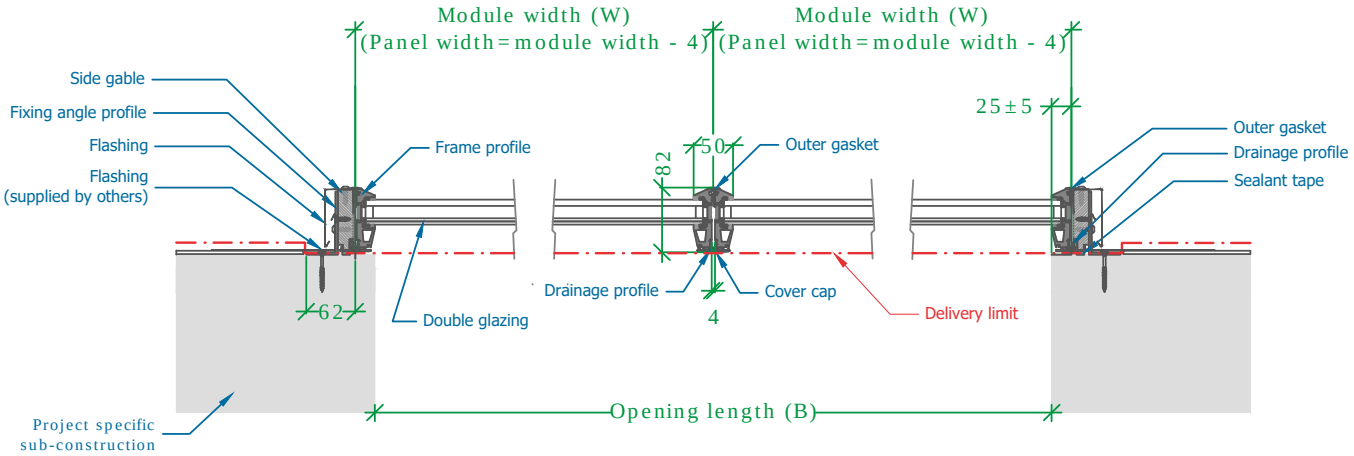
Please observe that a lateral slope on the panels is NOT possible, therefore top and bottom sub-construction must be horizontal.

Sectional drawings – dual pitched

Double glazing



Cross-section

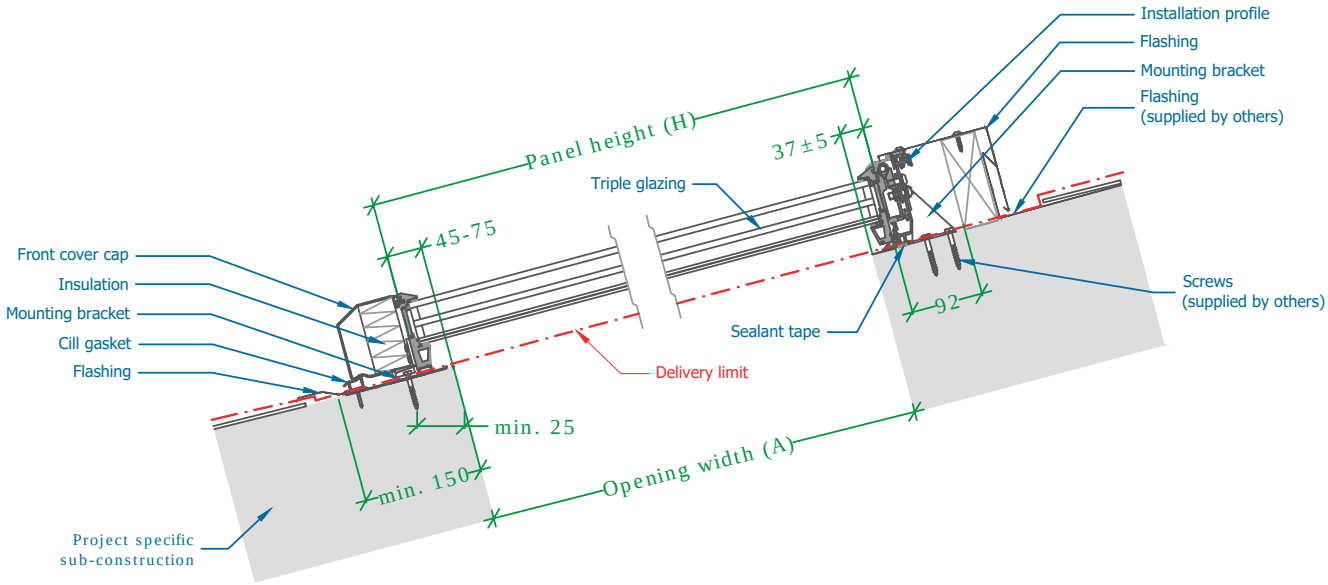


Longitudinal section

Please observe that a lateral slope on the panels is NOT possible, therefore top and bottom sub-construction must be horizontal.

Sectional drawings – mono pitched

Triple glazing



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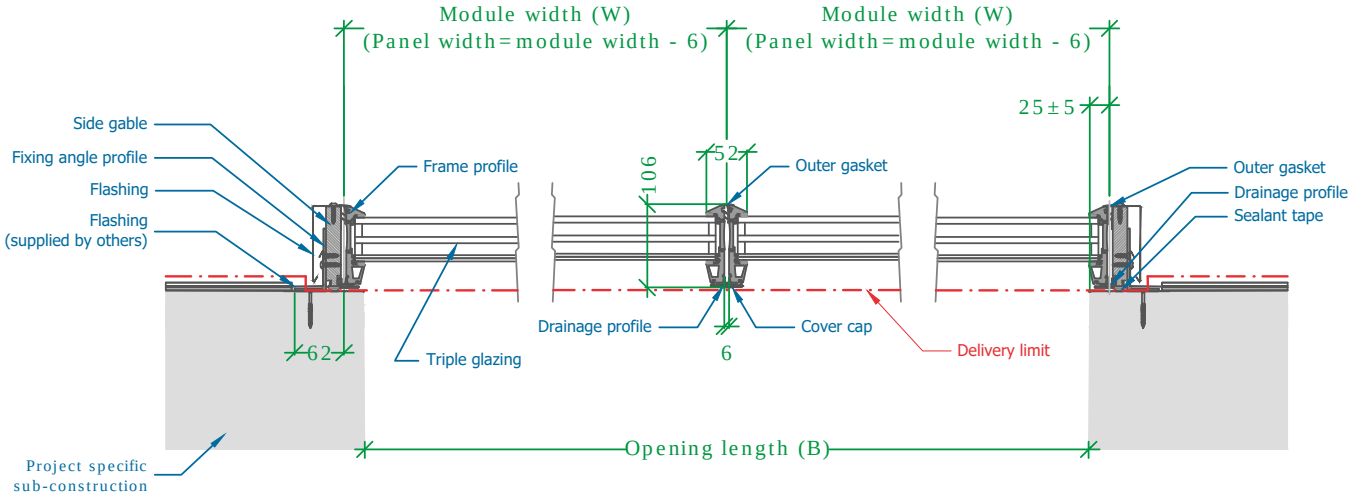
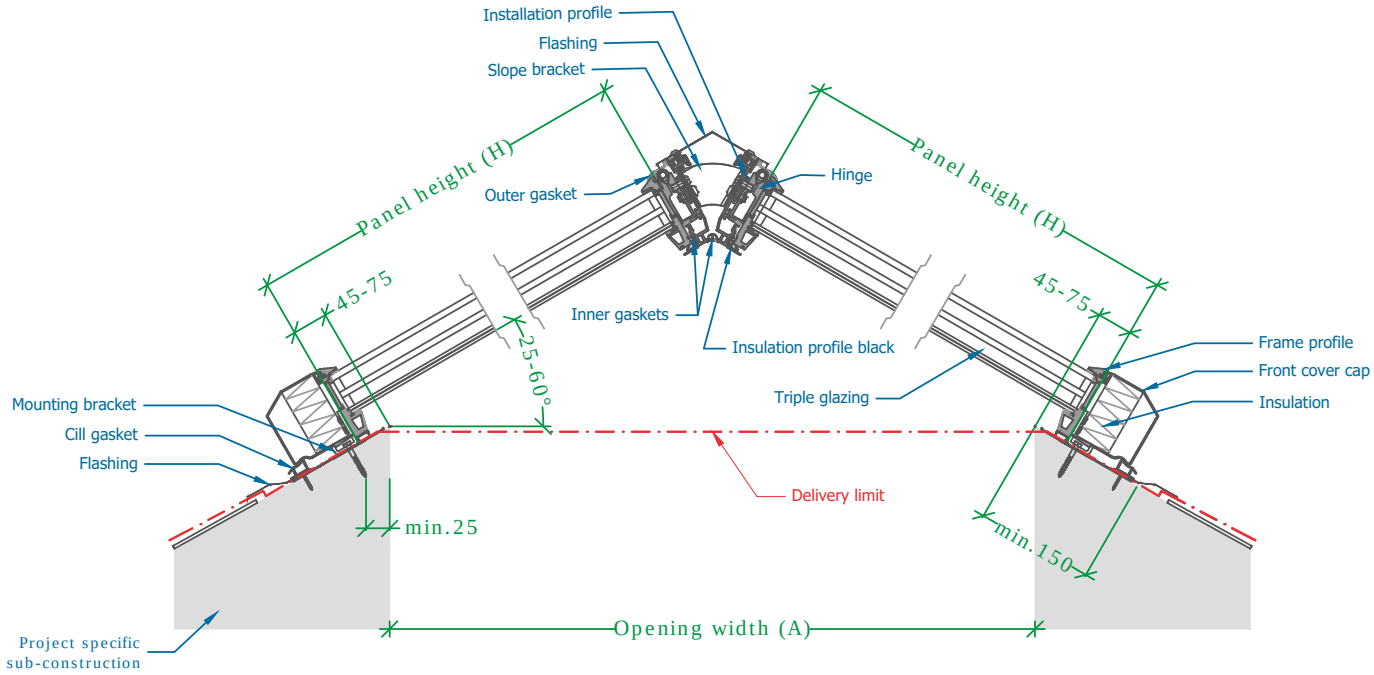


Longitudinal section

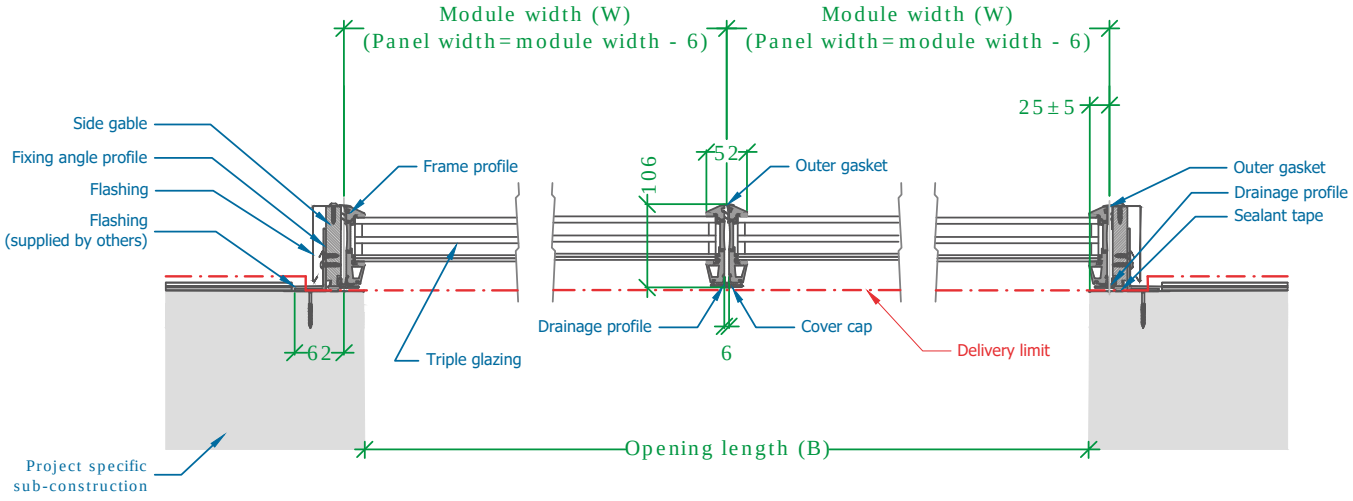
Please observe that a lateral slope on the panels is NOT possible, therefore top and bottom sub-construction must be horizontal.

Sectional drawings – dual pitched

Triple glazing



Cross-section



Longitudinal section

Please observe that a lateral slope on the panels is NOT possible, therefore top and bottom sub-construction must be horizontal.

Project support

DESIGN PHASE

Consultancy
To help you get started, we offer expert guidance even before your project gets approved.

Technical documentation
For further technical information, contact your local VELUX sales office.

Specification
Our experienced building consultants stand ready to help you specify your projects.

DAILY OPERATION

User guidance
To maximise performance output, we are there to guide you on the different components of the solutions and we offer training.

Product service
Should the system, for some reason, require professional service, our team of VELUX service technicians will do all they can to solve the problem to everyone's satisfaction.

Guarantee

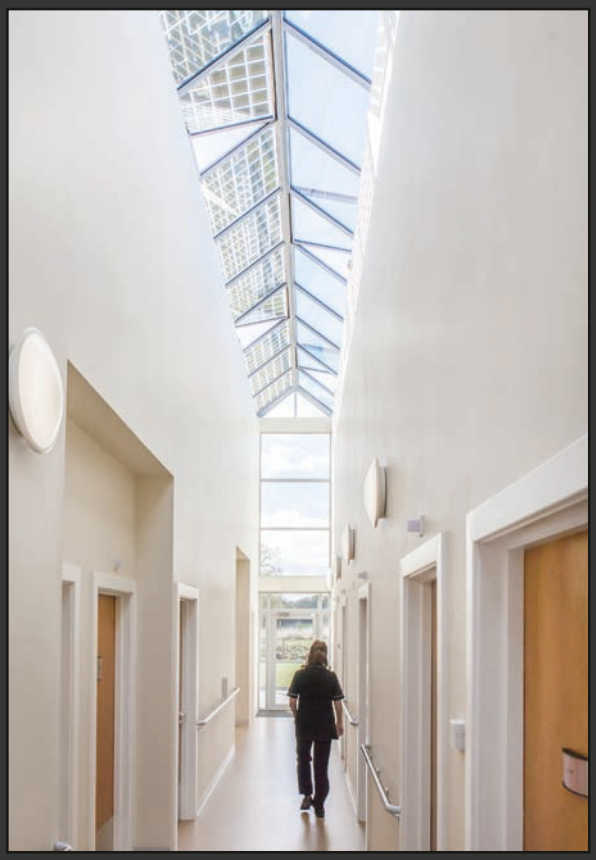
10 years on the glazing panels

3 years on the actuators and electrical components

Our glazing panels and flashings are supported by a 10-year guarantee. Actuators and electrical components that are a part of the glazing panel system come with a 3-year guarantee.

The guarantee is subject to correct installation and usage.

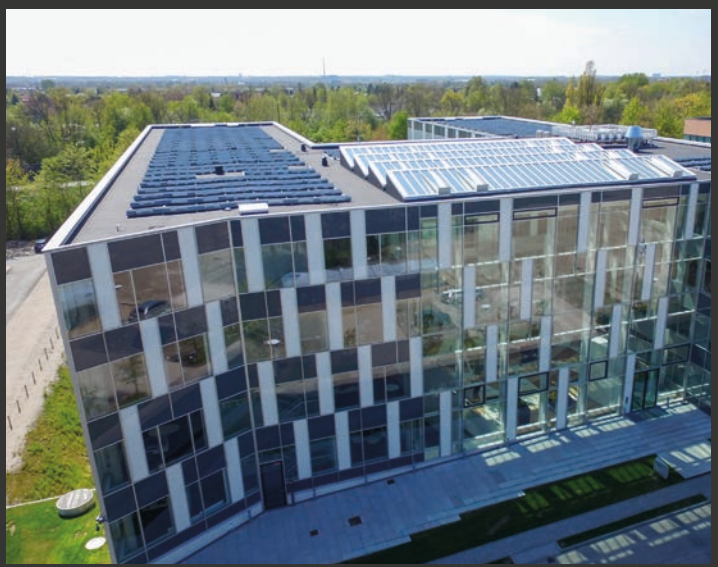
Reference cases



Dual pitched solution with photovoltaic panels, Ormiston, Great Britain

DGNB

Atrium mono pitched solution, MT Højgaard, Søborg, Denmark
Certificate: DGNB Gold



Reference cases

ACCREDITED PROFESSIONAL

Saw-Tooth solution, National College for Advanced Transport & Infrastructure, Doncaster, Great Britain
Certificate: BREEAM Excellent

Reference cases

Dual pitched solution with vertical glazed gables,
Jakon Headquarters, Ballerup, Denmark.

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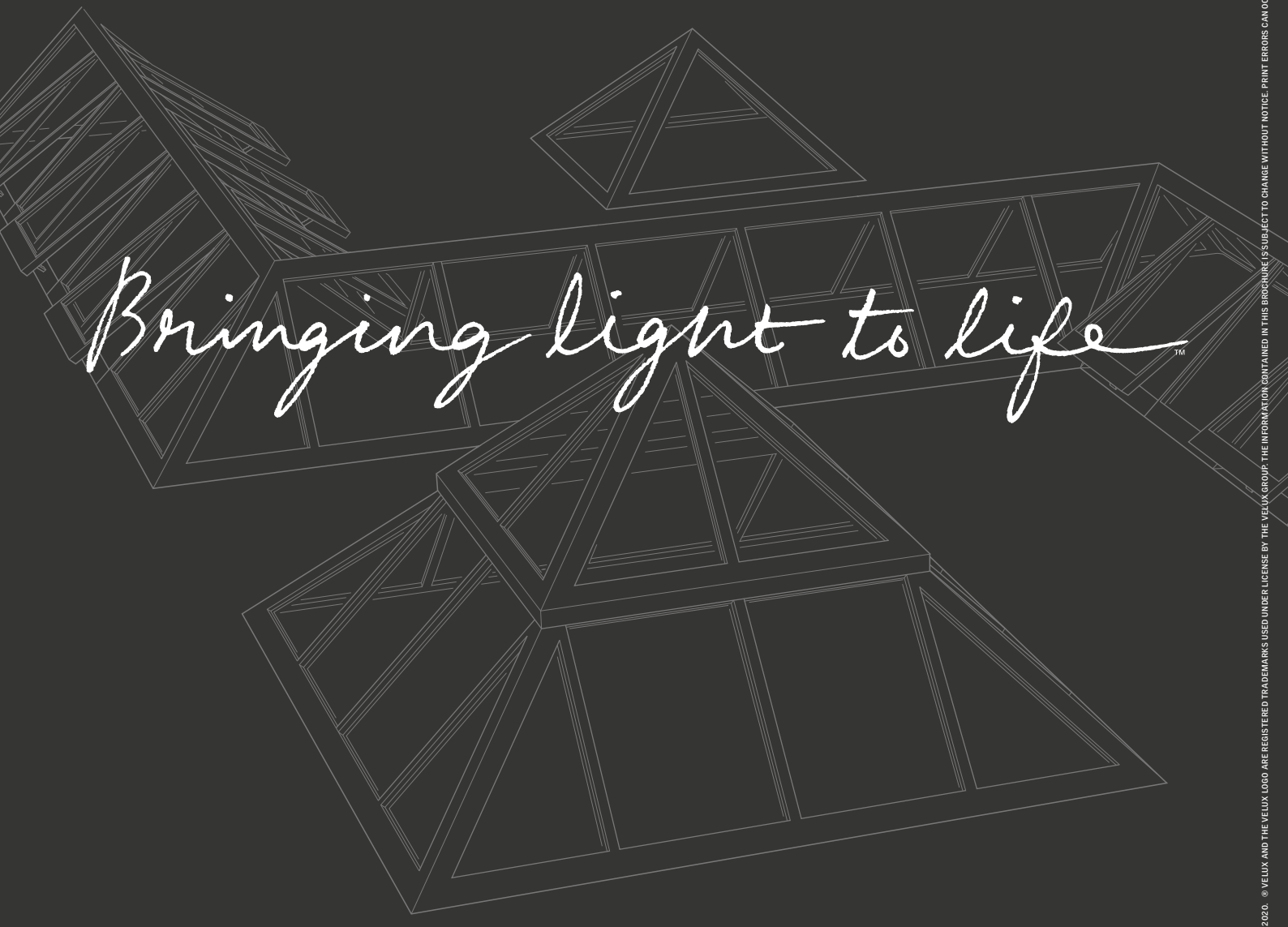

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