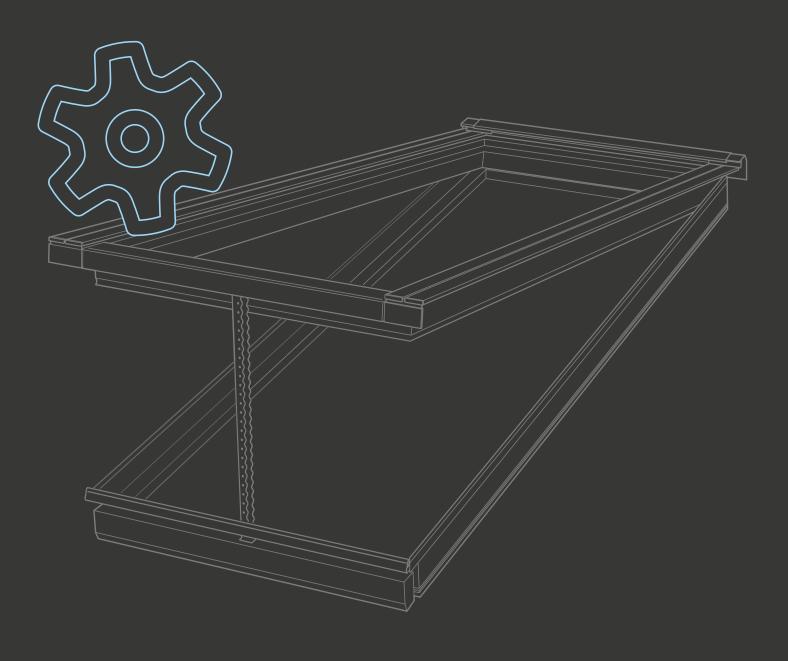


VELUX Modular Skylights

Technical Handbook

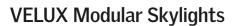


Version 6.3 veluxcommercial.com



Introduction





VELUX Modular Skylights are sash-frame constructed single roof windows with a high-insulating glazing unit. The modules are available as both fixed and venting skylights. All individual skylights are delivered as prefabricated modules with dedicated factory finished flashings to ensure watertightness in every solution.

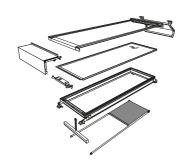
VELUX Modular Skylights roof windows are CE-marked in accordance with the harmonized standard EN 14351-1 – Windows and doors.

The self-supporting Ridgelights are CE-marked in accordance with the European Assessment Document EAD 220013-01-0401 of 2017-03 as relevant harmonized technical specification. The load bearing capacity performance of the self-supporting Ridgelights is expressed in the European Technical Assessment ETA 14/0476 of 2019-01-28.

In addition, the skylight modules have been tested and approved in accordance with EN 12101-2 – Smoke and heat control systems Part 2: Specification for natural smoke and heat exhaust ventilators.

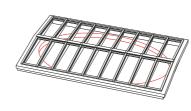
This technical handbook for VELUX Modular Skylights describes the product characteristics and performance of the skylight module together with sun screening and control system.

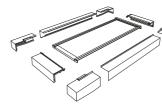
For real life case studies and inspiration, please refer to: veluxcommercial.com





	NSHEV (Notural West and Smoke Exhaus	: Wertibrium) - EW12301-2-200	3
Geometric area	EN 12155-2-2003	Av(m²)	0,42-1,29 depending on size
Aerodysanic area	DV12501-2:2003 Ameri B	As Roof [m/]	0,05-0,29 depending on size
Aerodynamic value	DN 12501-2-2003 Armes B	0.0	0,00-0,52 depending on size
Snow lead (SL)	EN 12301-2:2003 Annex E	2.[9/11]	750 N/m2
Wind load (WL)	EN 12301-2:2003 Annex F	WL[N/m/]	3000 N/m2
Low ambient temperature (T)	EN 12301-2-2003 Annex E	T (*C)	T (25)
Reliability (RE) (Dual purpose)	DN 12501-2:2003 Annex C	RE (Nr of opening)	1000+10000
Resistance to heat (E)	DN 12501-2-2003 Armes G	8[10]	8300
Reaction to fire for NSHEV	EN13501-1	Class	B-0,62 for IQU 55.2 But 40 for IQU 33.2





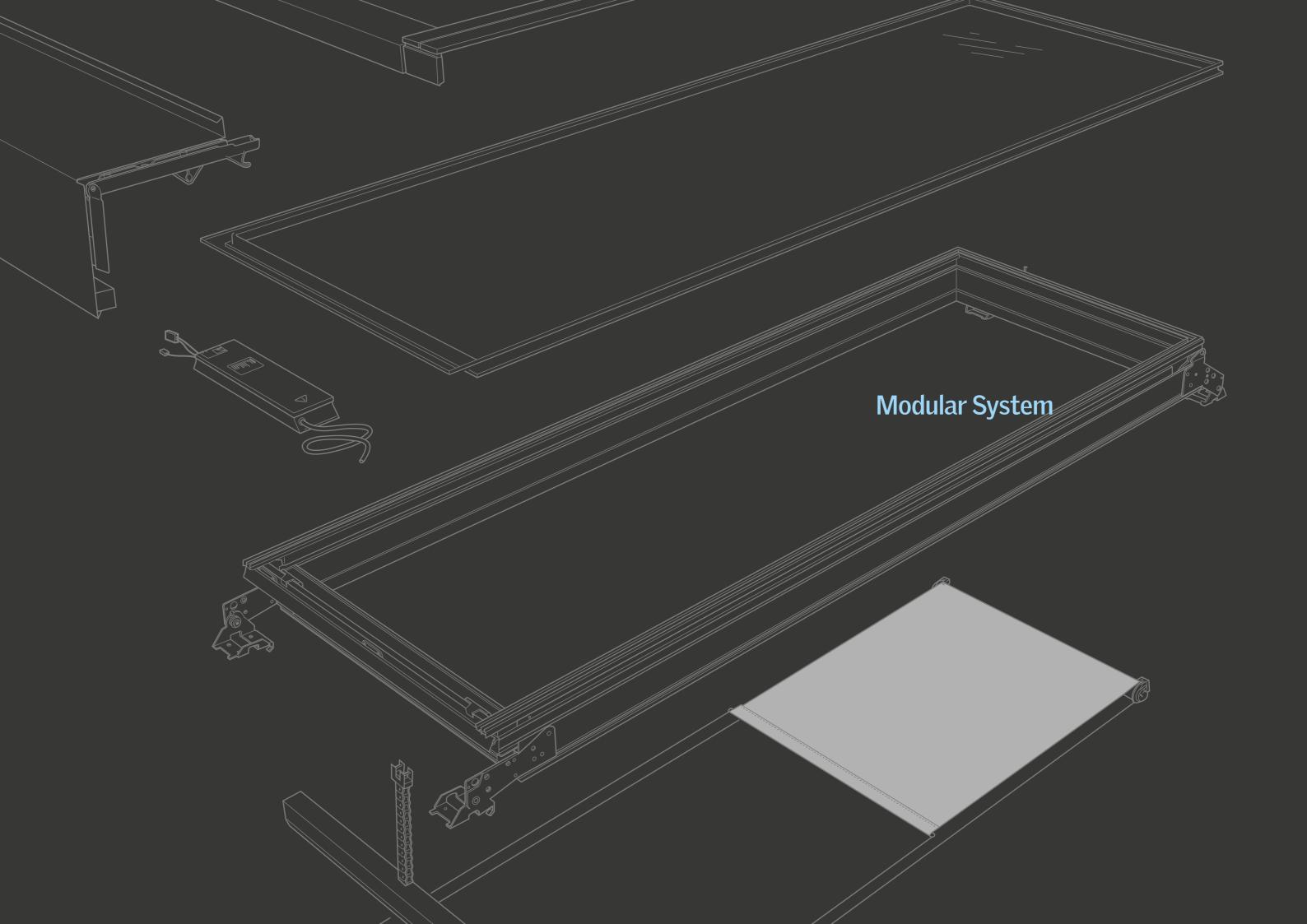
Modular System	7
Skylight module	8
Functions & sizes / Size grid	8
How to measure the modules	10
Solutions	12
Module – main components	14
Module – electrical components	
Frame & sash	16
Cladding & flashing	20
Glazing unit	22
Brackets & hinges	26
Module – assembled	28
Sub-construction	30
Vapour barrier connection strip / Products for swimming pool environments	
Chain actuator	34
Control systemRoller blind	35
Trong bing	36 38
Beam for Ridgelight at 5° Wind deflector for smoke ventilation modules	40
	40 41
Type sign	41

Solutions	43
Quick overview of skylight solutions vs. roof constructions	44 52
Longlight 5-30° Wall-mounted Longlight 5-45° Northlight 25-90°	52 54 56
Ridgelight 25-40° Ridgelight at 5° with Beams (Horizontal beam with rectangular profile)	58 60
Ridgelight at 5° with Beams (Parallel beam with curved profile) Step Longlight 5-25°	62 64
Step Ridgelight 25° Step Ridgelight 5-25° on Girder	66
Atrium Longlight	70
Atrium Ridgelight & Atrium Ridgelight at 5° with Beams	72

Product Data	75
Skylight module	76
Glazing unit	94
Frame & sash	97
Cladding & flashing	97
Interior colours frame & sash / Exterior colours cladding & flashing	98
Vapour barrier connection strip	100
Chain actuator	100
Control system	102
Roller blind	103
Beam for Ridgelight at 5°	106
Water pressure & drainage	107
Resistance to wind load	108
Reaction to fire	110
Resistance to fire	112
External fire performance	114
Watertightness	116
Air permeability	118

Additional Solutions	121
Shaped solution with adaption of lining Shaped solution with oval lining Asymmetric Ridgelight Ridgelight on Girder Infill panel Skylight modules with photovoltaic glazing units Sun screening – electrochrome glass Sun screening – external awning blinds	122 122 123 123 124 124 125 125

Product Codes	127
Modular Skylight – code structure Roller blinds – code structure Product label – code structure Flashings – code structure	128 129 129 130





Skylight module

CE-marked VELUX Modular Skylights can be used in any building where the national, local and individual building requirements allow the use of skylight modules. Given the aesthetics and advanced performance of the products, VELUX Modular Skylights are commonly used in heated buildings and primarily in projects that support light

commercial interests, e.g. hospitals, schools, shopping centres, offices, museums etc. However, all buildings that have a suitable structure and are large enough to host an installation, will support VELUX Modular Skylights.

Functions & sizes

VELUX Modular Skylights are available as fixed and venting modules. Due to a hidden chain actuator, the fixed and venting modules appear to be visually identical in closed position.

Venting modules are top-hung and can be used for comfort ventilation, and in addition, certain types are approved for smoke ventilation in accordance with EN 12101-2.



Fixed skylight module.



HVC-C

Motorized comfort venting skylight module. Actuator chain stroke 260 mm.



Motorized smoke venting skylight module. Actuator chain stroke up to 700 mm, which opens in less than 60 seconds. Only open system actuator available.

Size grid Fixed modules 675 750 800

* *

*

900

Semi-Standard, functional limitations may apply. Comfort ventilation 675 750 800 900 1400

Smoke ventilation

Non-Standard, available for certain projects.

mm	1				_/
	675	750	800	900	1000
009					
800	0	0	0	0	0
1000	0	0	0	0	0
1200	0	0	0	0	0
1400	0	0	0	0	0
1600	0	0	0	0	0
1800	0	0	0	О	0
2000	0	0	0	0	0
2200	0	0	Ο	0	0
2400	О	0	0	О	0
2600	* 0 Þ	* 0 Þ		2400 m with an o glazing u	height ab m is delive extra stro unit only.
				No roller available	е.
	*		0	Only ope actuator	en system r available
	Þ		‡		lable for
2800				Ridgelig	ht.

For size specific load capacity, please contact us. If roller blinds are requested for smoke venting modules, please refer to local fire authorities for permission. NB: Roller blinds are not available for sizes below 1200 mm.

Φ Roller blinds must be pre-mounted.

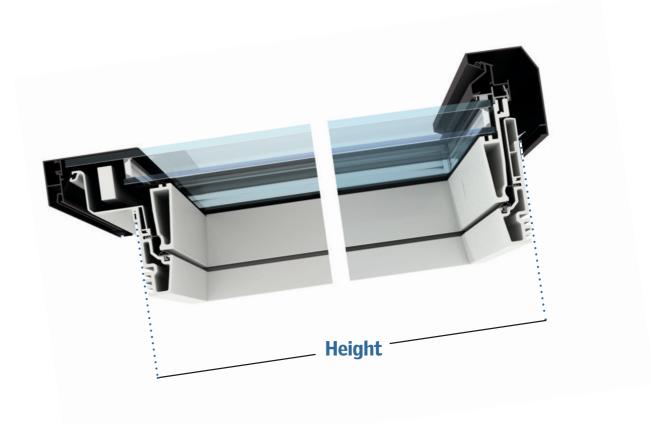
Wind deflector KCD 0080 is not available for sizes above 2400 mm.



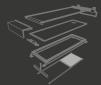
How to measure the module

Width and height of the modules are determined by the exterior dimensions of the frame – not the measurements of the cladding, flashing or brackets.









Solutions

VELUX Modular Skylights can be combined in a number of configurations to create perfect solutions for a wide variety of building types, from narrow corridors and internal courts to studios and

large circulation spaces. Each solution is delivered with a specially designed, prefabricated flashing ensuring a perfect system.



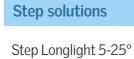
Mono pitched solutions

Longlight 5-30°



Ridgelight 25-40°

Page: **58**



Atrium solutions

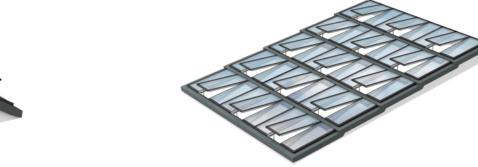
Page: 64

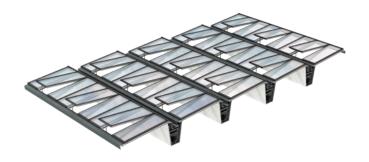
Atrium Longlight 5-30°

Page: **70**









Wall-mounted Longlight 5-45°

Page: 54

Page: **52**

Ridgelight at 5° with Beams

Page: 60

Step Ridgelight 25°

Page: 66

Atrium Ridgelight 25-40°

Page: 72









Northlight 25-90°

Page: **56**

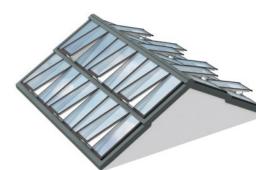
Step Ridgelight 5-25° on Girder

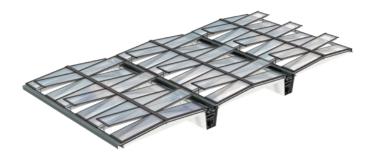
Page: 68

Atrium Ridgelight at 5° with Beams

Page: 72

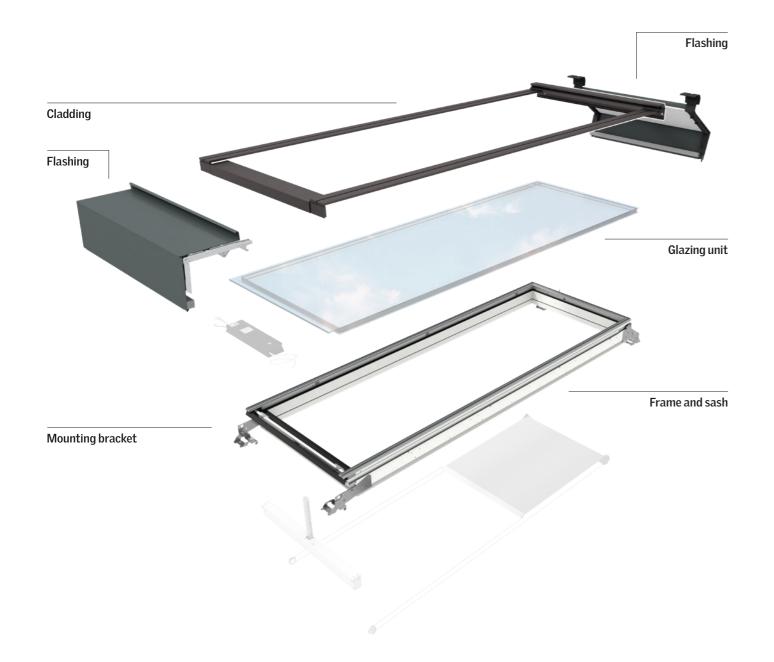




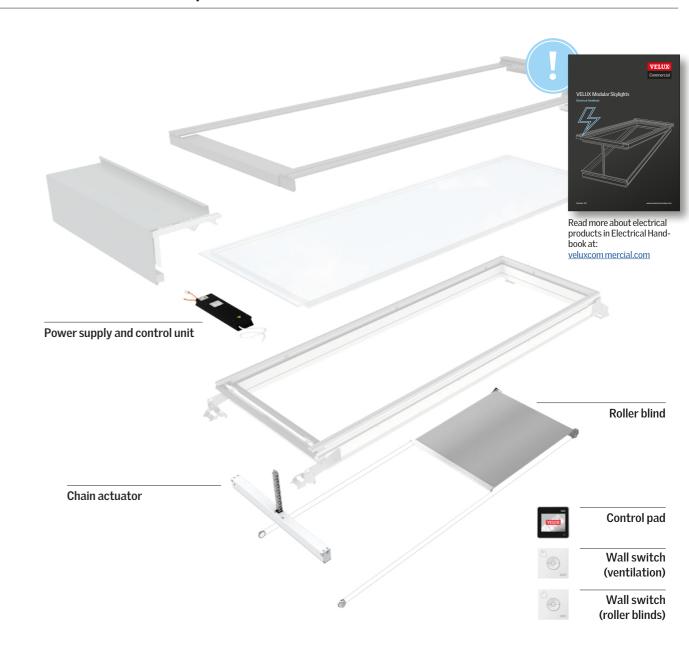




Module – main components



Module - electrical components



Power supply and control unit	Rain sensor	Rain and wind sensor set	Control pad	Wall switch	Switch interface (external wall switch)	Interface (external controls)
		0 110	VELUX:	For ventilation For roller blinds		
KLC 410	KLA 200	KLA S105	KLR 200	KLI 311/KLI 312	KLF 050	KLF 200



Frame & sash

The main structural profiles of VELUX Modular Skylights consist of pultruded composite, containing approximately 80% continuous fibreglass threads and 20% two-component polyurethane resin.

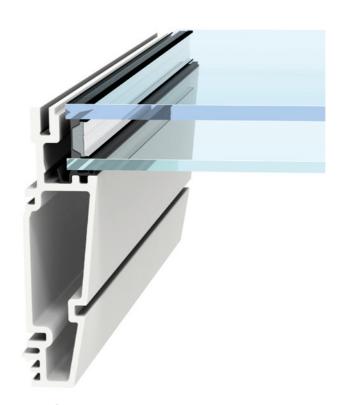
The composite guarantees a high heat insulating performance (page 18, graph 1) and thermal stability (page 18, graph 2), as well as, excellent profile stiffness (page 19, graph 3) and strength (page 19, graph 4). Combined, the characteristics of the VELUX composite give the slim profiles self-supporting strength and an ability to

support installations of considerable size. In addition, the material is maintenance-free, non-corrosive and electrically non-conductive.

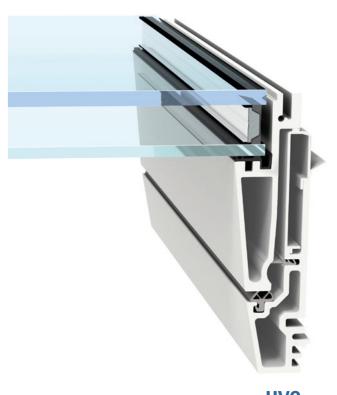
Combined with low-energy glazing units, VELUX Modular Skylights have one of the lowest overall U-values for frame and glazing assemblies on the skylight market. The inner surface is treated with white paint as standard. However, other colours are available, see page 98.



Frame & sash



HFCFrame for fixed skylight module



Frame and sash for venting skylight module



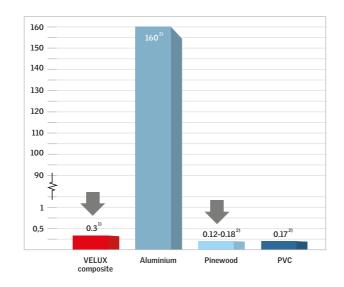
Frame & sash

Frame & sash

Thermal conductivity

- A low score means high insulating performance

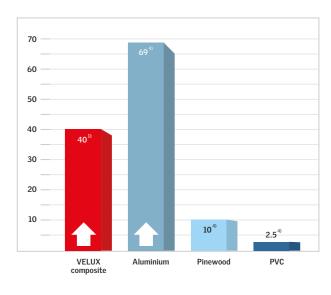
Profiles used for VELUX Modular Skylights consist of pultruded fibreglass and polyurethane composite, which result in a high insulating performance.



Flexural modulus (E-Modulus) (GPa)

- A high score means low deflection

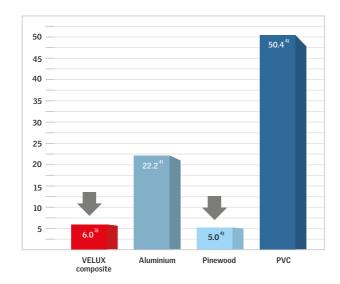
The high rigidity of the pultruded composite material results in a very stiff frame and sash, ensuring reliable performance with very little deflection of the profiles and better aesthetics of the skylight.



2 Linear expansion coefficient (10-6 m/mK)

- A low score means high thermal stability

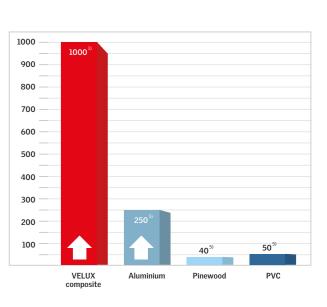
Whereas traditional skylight materials are bound to fluctuations in form due to thermal changes, the composite of VELUX Modular Skylights will maintain its dimensional properties, ensuring tightness of joints and prolonging the expected lifetime of the application.



Flexural strength (N/mm²)

- A high score means high strength

The very high strength of the pultruded composite material allows for design and production of longer and slimmer frame and sash profiles than traditional skylight materials allow. This enables design of large skylights with slim profiles resulting in better aesthetic performance.



Source: ¹⁾ Accredited external tests ²⁾ According to EN ISO 10077-2 ³⁾ Value identical to fibreglass ⁴⁾ www.engineeringtoolbox.com ⁵⁾ Internal VELUX test

Source: 1) Accredited external tests 2) According to EN ISO 10077-2 3) Value identical to fibreglass 4) www.engineeringtoolbox.com 5) Internal VELUX test



Cladding

Cladding

Each module has a specific set of claddings. Cladding components are attached on four sides of the skylight, ensuring a watertight connection between sash and frame for both fixed and ventilation

modules. The cladding is made of extruded aluminium with a scratch resistant, granite grey powder coating for added weather protection and aesthetics. Other colours are available, see page 99.



Flashing

Flashing

VELUX Modular Skylights come with factory-finished flashings. The prefabrication of flashings ensures a high quality solution providing a watertight connection between roof, sub-construction and module, with a safe and fast installation process. The flashing has a top, side and bottom section made from aluminium with a grey paint finish.

Other colours are available, see page 99.



Flashing

Standard flashing	Cross-section of the bottom flashing
Standard flashing Standard top, bottom and side flashing suitable for a 210 mm sub-construction (measured from inside edge of the steel). See page 30.	210 mm

Semi-standard flashing	Cross-section of the bottom flashing
Narrow flashing Narrow top, bottom and side flashing that is suitable for a 150 mm wide sub-construction. Available at additional cost. Can be used for instance, if the extra slim sub-construction is required.	150 mm
Wide flashing Wide top, bottom and side flashing that is suitable for a 350 mm wide sub-construction. Available at additional cost. Can be used for instance, if the sub-construction is made of concrete and space for insulation is needed.	350 mm

Glazing unit

VELUX Modular Skylights come with a low-energy double-glazing unit. Alternatively, the modules can be supplied with improved solar protection or an Argon or a Krypton filled triple-glazing unit for extra-low U-value. All glazing units include a toughened outer glass layer and a 3+3 or 5+5 mm inner safety glass layer with 2 x 0.38 mm interlayer PVB foil. For technical values on glazing units, please refer to the chapter about Product Data.

The triple-glazed units have a heat strengthened middle glass layer. For triple-glazed variants with a 5+5 mm inner pane, heat strengthened glass is used.

The cavity between the panes of the glazing units is filled with Argon or Krypton gas as a default.

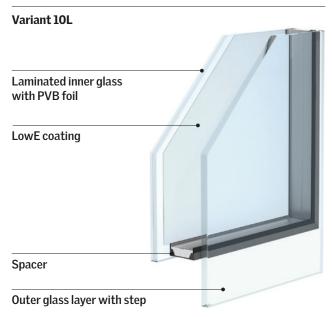
All glazing units have a warm edge spacer and are produced with warm edge technology to minimise the risk of condensation and to give the glazing units the most durable insulation capabilities.



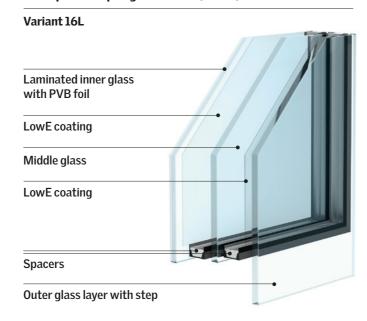


Glazing unit

Example of double-glazed unit (LowE)



Example of triple-glazed unit (LowE)



Note: Visual quality of glazing units. Interference effects and/or effects specific to multiple glazing and/or anisotropy may occur in the visible glass surface due to the physics of the material and its production technologies.

Differentiating parameters of the coating variants

Coating options		Coating	Solar gain	Solar protection	Light transmit- tance	Colour rendering index
Low emissivity	When the highest light transmittance is needed and you would like to let in the heat from the sun during heating season.	LowE	\$\$\$	\$	***	***
Sun protection	When sun protection is required to keep out the heat from the sun for increased comfort during summer periods.	Sun1	\$\$	\$\$	₩	\$\$
Enhanced sun protection	When extra sun protection is required for increased comfort during summer periods and a reduced light transmittance can be accepted.	Sun2	$\stackrel{\wedge}{\sim}$	***	$\stackrel{\wedge}{\sim}$	$\stackrel{\wedge}{\sim}$

Glazing unit

Colour renderings of double-glazed units

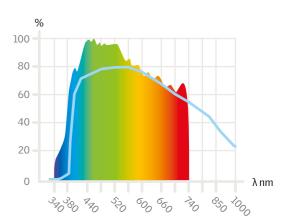
Additional glazing characteristics and glazing variants are shown on pages 94-96. All mentioned values are in accordance with EN 410.



Glazing with low emissivity coating (LowE)

Variant 10L

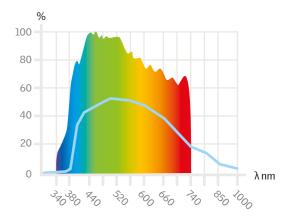
Light transmittance: τ_v -value = 80% Solar factor: g-value = 62% Colour rendering index: R_a = 96



Glazing with light sun protection coating (Sun1)

Variant 11L

Light transmittance: τ_v -value = 51% Solar factor: g-value = 28% Colour rendering index: Ra = 92

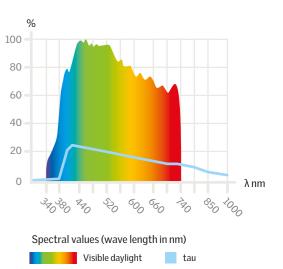




Glazing with enhanced sun protection coating (Sun2)

Variant 12T

Light transmittance: τ_v -value = 18% Solar factor: g-value Colour rendering index: R_a = 91





Glazing unit with low emissivity coating and roller blind RMM

Colour renderings of double-glazed units

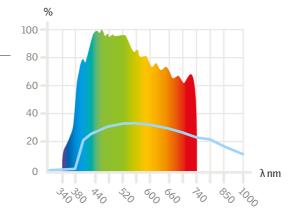
Additional glazing characteristics and glazing variants with roller blind are shown on pages 104 and 105. All mentioned values are in accordance with EN 410.



Glazing with low emissivity coating (LowE) and Roller Blind RMM 8806, White

Variant 10L

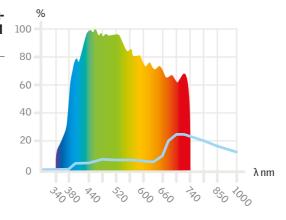
Light transmittance: τ_v -value = 30% Solar factor: g-value = 34% Colour rendering index: R_a = -

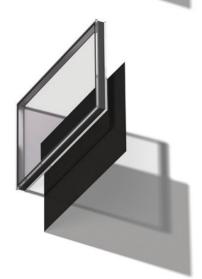


Glazing with low emissivity coating (LowE) and Roller Blind RMM 100 = 8805, Grey

Variant 10L

Light transmittance: τ_v -value = 8% Solar factor: g-value = 41% Colour rendering index: R_a = -

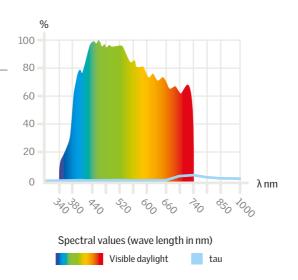




Glazing with low emissivity coating (LowE) and Roller Blind RMM 8807, Black

Variant 10L

Light transmittance: τ_v -value = 1% Solar factor: g-value = 35% Colour rendering index: R_a = -



Glazing unit with fritted or opal surface

Colour renderings of double-glazed units

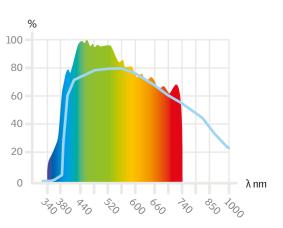
Additional glazing characteristics and glazing variants are shown on pages 94-96. All mentioned values are in accordance with EN 410.



Glazing with low emissivity coating (LowE)

Variant 10L

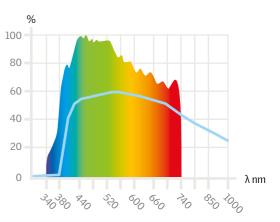
 $\begin{array}{lll} \mbox{Light transmittance:} \, \tau_v\mbox{-value} &= 80\% \\ \mbox{Solar factor:} \, g\mbox{-value} &= 62\% \\ \mbox{Colour rendering index:} \, R_a &= 96 \end{array}$



Glazing with low emissivity coating (LowE) and opal surface*

Variant 10 + opal

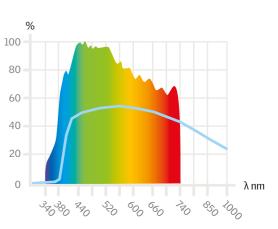
Light transmittance: τ_v -value = 57% Solar factor: g-value = 55% Colour rendering index: R_a = -



Glazing with low emissivity coating (LowE) and fritted surface*

Variant 10 + fritted

Light transmittance: τ_v -value = 53% Solar factor: g-value = 35% Colour rendering index: R_a = -



^{*} Glazing with opal or fritted surface are semi-standard variants. The above values (with opal or fritted surface) are based on examples and depend on covering degree and pattern.



Brackets & hinges

Material and surface treatment

Metal components in VELUX Modular Skylights are made of galvanized steel.

The majority of the steel components are electroplated according to European norm EN ISO 2081 table A1 – C: iridescent. Components fulfill corrosion resistance grade 4 in accordance with EN ISO 1670.

Based on these properties, VELUX Modular Skylights can be used where external weather conditions and indoor climate conditions are within the normal spectre of corrosiveness.

Note: VELUX Modular Skylights standard solutions must NOT be used in indoor environments where the risk of condensation on metal components can lead to extreme corrosive attacks. These environments include facilities that use highly corrosive substances, e.g. salt and/or chloride. Evaporation can lead to corrosive attacks on components, weaken the functionality and in the end compromise the structural integrity of the installation. For use of VELUX Modular Skylights in buildings with swimming pools, specific swimming pool products are available, see page 33.

Brackets

VELUX Modular Skylights are supplied with mounting brackets and clamps and are ready to be installed on any preferred sub-construction made of steel, concrete or wood finished with a steel profile at the top. Mounting brackets are fixed during installation with a clamping system holding the skylight in place.

Using a steel profile on top of the sub-construction is an advantage, as the clamps at any time during installation can be released to allow minor positional adjustment of the modules.

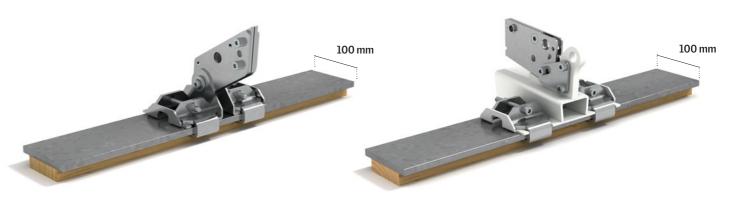
If the customer chooses not to use the mounting clamps, but to screw the mounting brackets directly into the wooden batten, please note that the screws are not included in the VELUX delivery, and therefore delivery and correct dimensioning must be ensured by the customer.

Hinges

The pre-fitted hinges of the venting modules are tested under the most severe conditions, by continuously opening and closing the largest and heaviest modules.

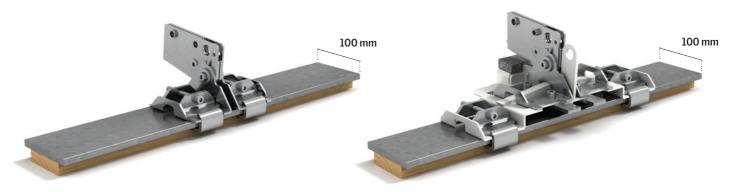


Examples of brackets & hinges



Top bracket for Longlight 5-30°

Bottom bracket for Ridgelight at 5° with Beams. Parallel beam with curved profile.



Bottom bracket for Longlight 5-30° and Ridgelight 25-40°

Bottom bracket for Ridgelight at 5° with Beams. Horizontal beam with rectangular profile.



Top bracket for Northlight 25-90°



Top bracket for Wall-mounted Longlight 5-45°



Top bracket for Ridgelight at 5° with Beams



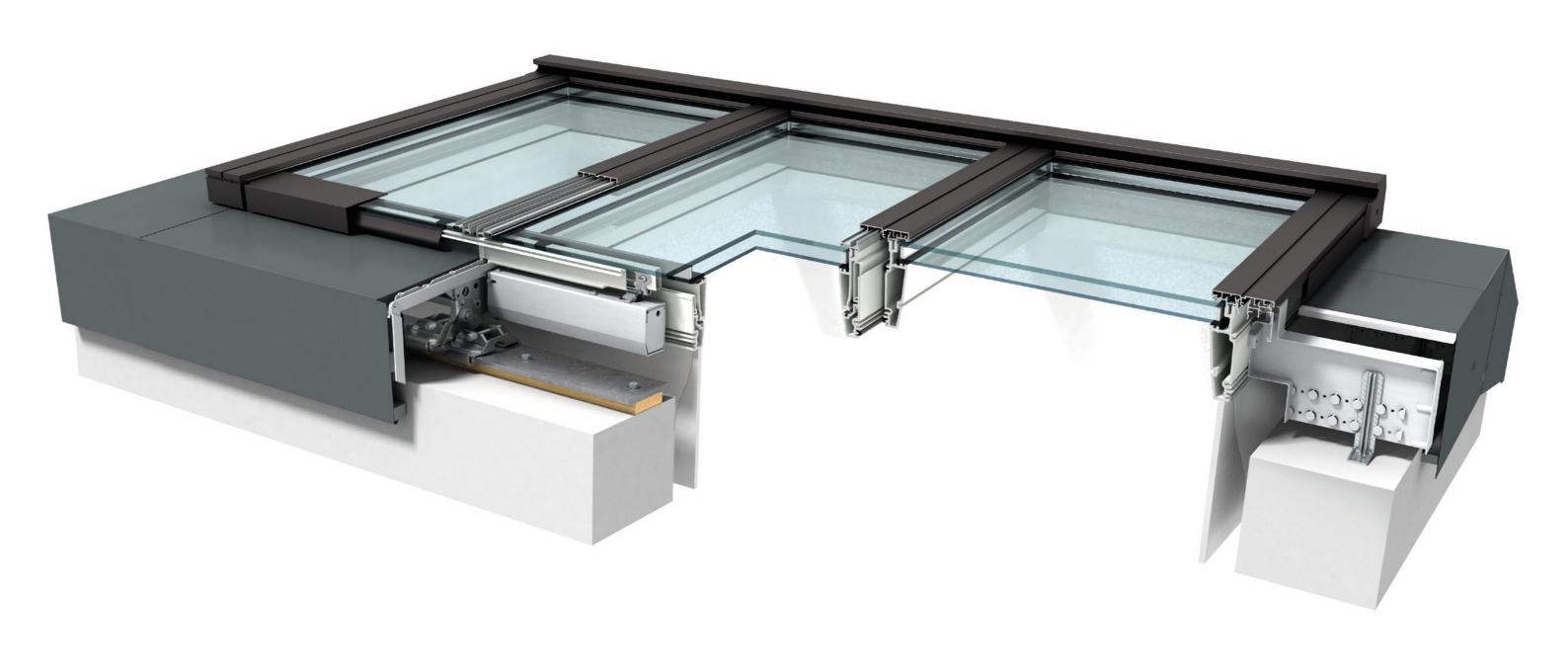
Top bracket for Ridgelight 25-40°



Clamp for fixing mounting bracket on steel profile



Module - assembled



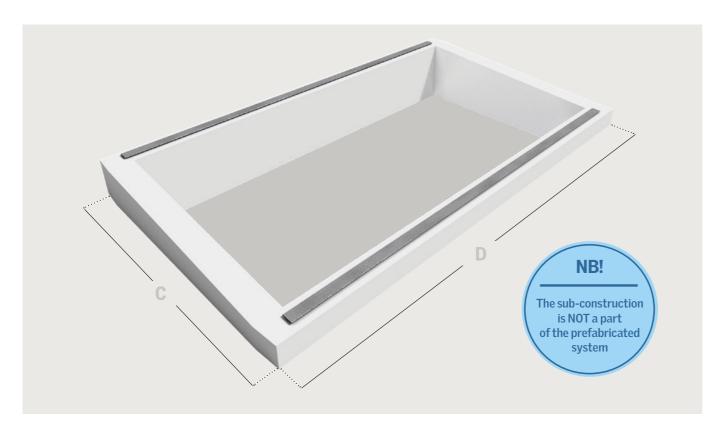


Sub-construction

Easy installation process

VELUX Modular Skylights 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.

In this way, the sub-construction is not a part of the prefabricated modular skylight system. The VELUX Group is not responsible for the sub-construction.

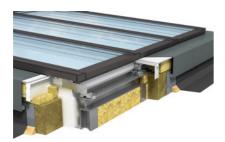


Wood sub-construction finished with a steel profile at the top



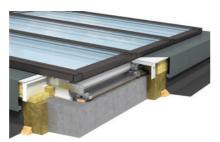
Wood is the most flexible choice for creating a light and economical subconstruction with maximum energy performance. However, it is not recommended for larger solutions and Ridgelight installations.

Steel sub-construction finished with a steel profile at the top



Steel offers flexibility in combination with great strength. Steel also allows a maximum amount of insulation to be used in the installation.

Concrete sub-construction finished with a steel profile at the top

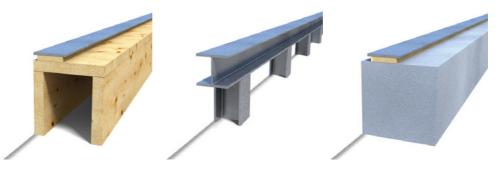


Concrete provides a strong, but heavy sub-construction and is mostly suited for concrete buildings. Concrete subconstuctions are usually cast on site.

The steel profile

A steel profile is the most important link when mounting the modules to the sub-construction. Please observe that the steel profile should cover the full opening length to allow minor

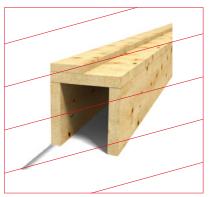
positional adjustment of the modules during installation. Please also observe that the top and bottom sub-construction and therefore also the steel profile must be horizontal.



Steel profile on timber

Steel profile on steel

Steel profile on concrete



Wood profile on timber is not recommended by VELUX Commercial.





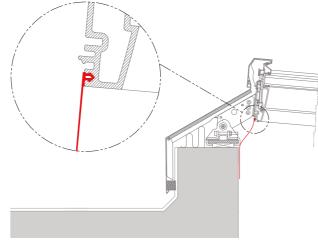
Vapour barrier connection strip

To ensure a high quality installation of VELUX Modular Skylights and to prevent condensation occurring within the sub-construction, it is highly recommended to install BCX vapour barrier connection strip.

The factory-finished BCX creates the perfect connection between the VELUX Modular Skylights and the vapour barrier of the building. BCX is CE-marked in accordance with EN 13984.

The vapour barrier connection strip BCX is made of a diffusion-tight polyethylene foil completed with a pre-fitted rubber gasket along one edge. With a perfect fit into the skylight frame rebate, installation is an easy job that guarantees a vapour-tight solution.







Position of BCX

Products for swimming pool environments

Swimming pool products are available from summer 2020

When using VELUX Modular Skylights in environments like swimming pools with high levels of humidity, salt or chloride, it is crucial to ensure a vapour tight installation to prevent condensation of highly corrosive substances like salt and/or chloride that can lead to corrosive attacks on metal components.

VELUX specially designed vapour barrier connection strip, vapour barrier adhesive and inner ridge cover must be used in environments with swimming pools. Please observe any national requirements in swimming pool areas.

Vapour barrier connection strip for swimming pools

The factory-finished vapour barrier connection strip BSX developed especially for use in swimming pool environments creates the perfect connection between the VELUX Modular Skylights and the vapour barrier of the building. BSX is CE-marked in accordance with EN 13984.

BSX is made of a multilayer foil including aluminium with a very high water vapour resistance completed with a pre-fitted rubber gasket along one edge. Vapour barrier adhesive ZZZ 255 to be used together with vapour barrier connection strip.

NOTE

Guarantee provided by VELUX for swimming pool projects is valid only when these dedicated swimming pool products are used correctly. Triple glazing is advised to minimise the risk of condensation. Roller blinds and Ridgelight with beams are not compatible for use in swimming pool environments. For use of Northlight solutions, it is important that the roof construction is sufficiently ventilated close to the modules. Fire resistant module HFS is not compatible for use in Ridgelight solutions above swimming pools.

Inner ridge cover for swimming pools

For use of Ridgelight solutions above swimming pools, a specially designed inner ridge cover ZZZ 254 must be used.

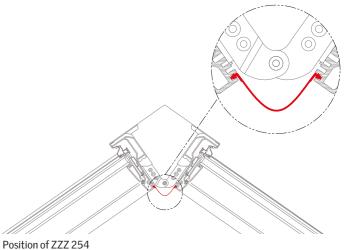
ZZZ 254 is made of 2 mm thick extruded white EPDM rubber.

Please observe that due to material properties, there is a colour difference between ZZZ 254 and the white skylight frame.

Vapour barrier adhesive ZZZ 255 to be used together with inner ridge cover.

Vapour barrier connection strip for swimming pools	Vapour barrier adhesive for swimming pools	Inner ridge cover for swimming pools
		Patent pending
BSX	ZZZ 255	ZZZ 254







Chain actuator

VELUX venting skylight modules are top-hung and have a hidden chain actuator integrated at the bottom profile.

For comfort ventilation there is one chain actuator variant which can be controlled with either VELUX INTEGRA® io-homecontrol technology and control pad KLR 200 for user friendly control or your preferred \pm 24 V DC open system. The chain actuator for smoke ventilation can only be controlled by a \pm 24 V DC open system.

The chain stroke on the open system actuator can be reprogrammed even after installation to suit specific needs.

The chain actuator is accessible from the roof. Therefore, maintenance requires no access from the inside of the building.





Comfort venting VELUX Modular Skylights meet the requirements of the harmonised standard EN 60335-2-103(2015) as to a max opening clearance of 200 mm (by means of physical limitation of the actuator) and as to the max closing speed of 15 mm/sec. Therefore, comfort venting skylights can be installed within reach, i.e. at installation heights below 2.5 m above floor level (inside) and ground level (outside). According to EN 60335-2-103 access levels are defined as e.g. stairs and terraces. Surfaces not normally used for standing on, such as windowsills, and movable equipment such as ladders, are not considered to be access level.

Please note that the venting skylights operate with high closing force, which can cause serious injury in case of entrapment. If VELUX roller blinds are installed in the skylight, please observe recommendations in the safety instructions provided with each VELUX roller blind RMM.

We recommend that you observe national regulations and consider if the planned specific use of the building requires additional safety measures that must be applied by the installer/user to prevent serious injury.

Smoke venting VELUX Modular Skylights and comfort venting VELUX Modular Skylights with a longer chain stroke than standard have a recommended minimum installation height of 2.5 m above floor level (inside) and ground level (outside). If they are installed below this 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 an 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 Modular Skylights

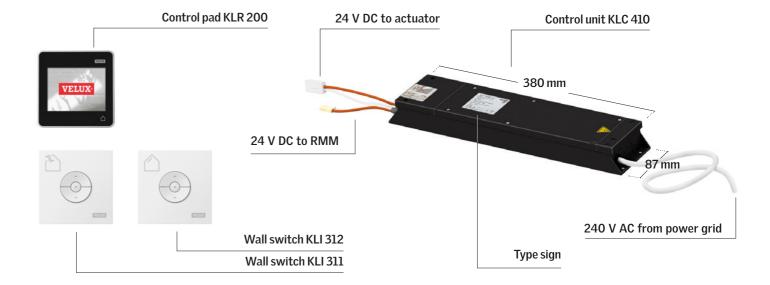
Control system

VELUX INTEGRA®

Venting modular skylights and roller blinds RMM can be powered and controlled from the VELUX INTEGRA® control unit KLC 410.

Each KLC 410 can power and operate one venting skylight module and up to four roller blinds individually, in groups or simultaneously.

Skylights and blinds installed with the VELUX INTEGRA® KLC 410 control unit can be operated with the VELUX INTEGRA® wall switches KLI 311/312 or control pad KLR 200.





Open system

Venting modular skylights and roller blinds controlled with the open system solution are connected to \pm 24 V DC. In addition to \pm 24 V DC, the open system skylights and roller blinds can be connected to and integrated in common building automation fieldbus systems, i.e. KNX, BACnet, LON and Modbus.

The connection to the skylight actuator is made through the integrated WindowMaster MotorLink™ technology that among other things enables exact position control and feedback.



Roller blind

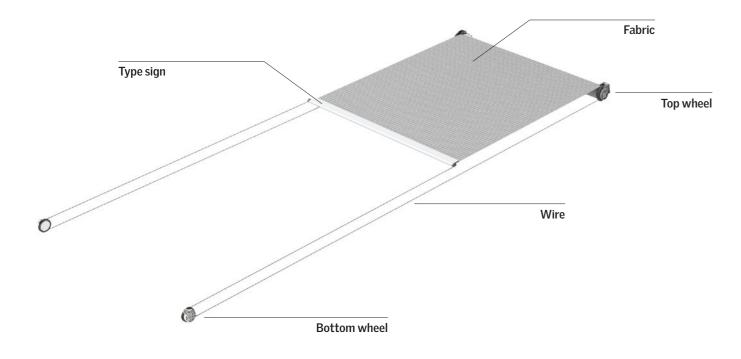
The internal roller blind RMM is designed for installation with VELUX Modular Skylights, and is available in all standard module sizes above 800 mm in height. The blind protects against heat and glare and helps to control the amount of light in the room.

The blind consists of four wheels, one in each corner of the skylight module and two steel wires, running along the module side frame. The two wires pull a lightweight polyester fabric available in three commonly used colours.

VELUX roller blinds are electrically operated and can be controlled using either VELUX INTEGRA® or open system.

To support fast and safe installation of VELUX Modular Skylights, it is possible to order roller blinds pre-mounted from the factory, except on smoke ventilation modules.

VELUX Modular Skylights can be pre-fitted with cables for internal roller blinds, making the installation and connection to the module and to the power supply quick and easy. For more information, see page 103-105.



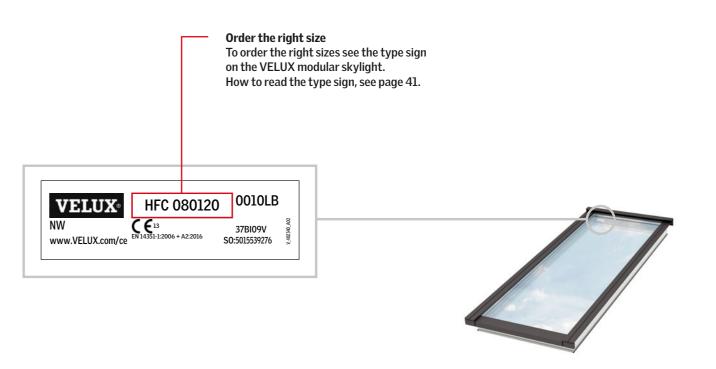


The blind cloth of VELUX roller blinds is pulled on two tension steel wires on pulley wheels, which are accessible, when the roller blinds are installed on skylights within reach and therefore can cause serious injury, if a person gets in contact with this during the electrical operation of the blind. VELUX roller blinds 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.

We recommend you to observe national regulations and consider if the planned specific use of the building requires that additional safety measures must be applied by the installer/user to prevent serious injury.

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 Modular Skylights.







Beam for Ridgelight at 5°

When installing VELUX Modular Skylights in a 5° Ridgelight solution, the modules are supported by a steel beam. There are two beam design options. You can choose either the horizontal beam with rectangular profile or the parallel beam with curved profile.

The beam is included in the VELUX delivery and is ready for fast and easy installation with no further preparation.

VELUX beams are treated with final coating, white RAL 9010, gloss 30 as standard and are available for modules from 800 to 3000 mm in height.

Fire resistance

If the beam is required to meet increased demands for fire resistance, for instance used together with a fire resistant skylight module HFS, it must be treated with fire paint. If such a demand occurs, please be advised:

For up to 30 minutes of fire resistance, clients will need to:

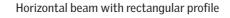
- a) purchase modules with fire resistant glazing units and intumescent strip (HFS).
- b) purchase the corresponding beam variant coated with fire resistant paint system providing 30 minutes of resistance to fire to the whole application.

Clients are advised to inform the local VELUX sales company of such demands prior to order, as standard beams are not coated with fire resistant paint system but with standard paint as default, and the applied standard paint system is not compatible for post application of fire protection paint systems. Please note that fire paint will change the visual appearance of the beams slightly.

If there are no specific fire rating demands for the modules, but specific demands for the beams, only point b) is relevant.

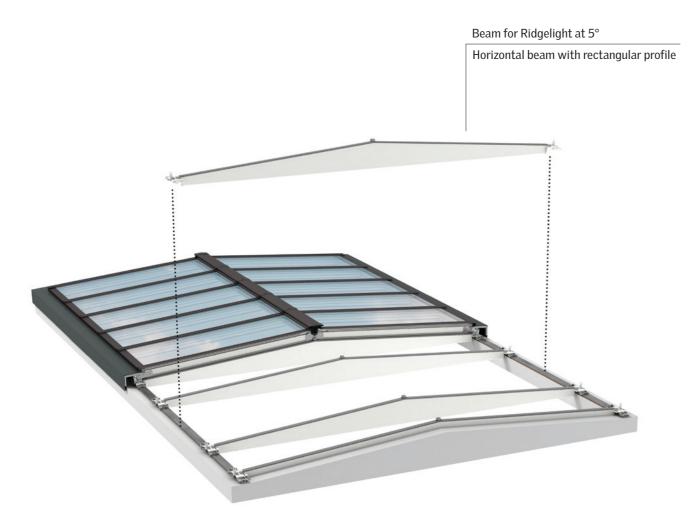
Always take into consideration that it is only possible to make beams fire rated for up to 30 minutes. If fire rating demands exceed 30 minutes, 5° Ridgelight configurations are not suited for this installation.

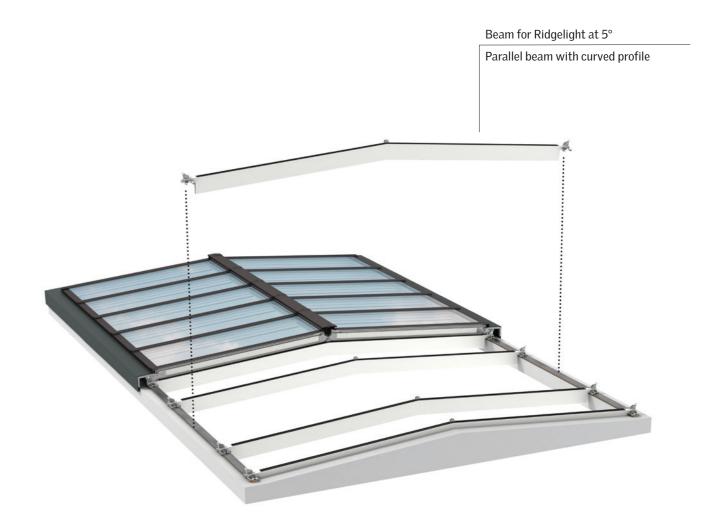






Parallel beam with curved profile







Wind deflector for smoke ventilation modules

The wind deflectors are intended for use with smoke ventilation modular skylights. The wind deflectors are designed to change the wind profile over the skylights in open position, in order to minimize the risk of air intake and allow outtake of smoke even under unfavorable wind conditions, and at the same time causing the least possible visual effect on the exterior of the skylight. The wind deflectors come in two variants: KCD W00H00 0040 that covers one smoke ventilation module and KCD 0080 that covers three modules, one smoke ventilating module in the middle of two fixed modules of the

The deflectors are tested together with VELUX Modular Skylights in accordance with EN 12101-2.

Wind deflector KCD 0040

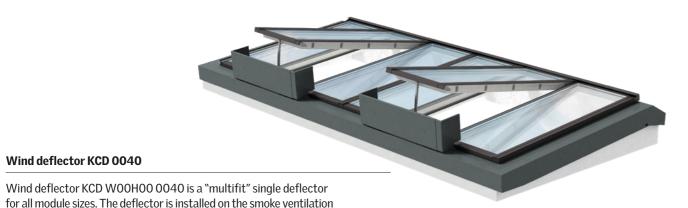
Wind deflector KCD 0080

installed on.

module, one deflector for each module.

The wind deflector can be purchased and installed at the same time as the smoke ventilator, or they can be installed subsequently, if the skylight configuration allows this. In any case, the aerodynamic free area of the smoke ventilators is declared both with and without wind deflectors and the influence of the deflectors on the performance must be respected.

For further information on the performance of smoke ventilation modular skylights, the influence of the deflector on the aerodynamic free area and the design possibilities, see pages 84-93.



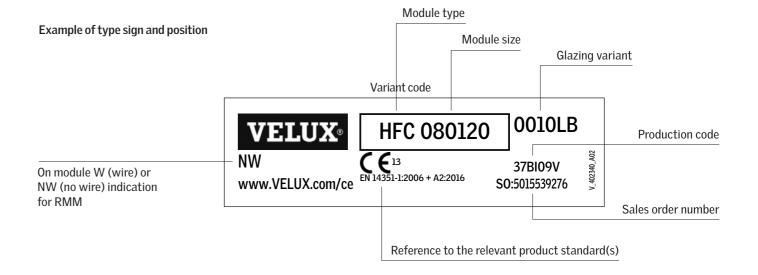


Wind deflector KCD 0080 must always be installed on a group of three skylight modules with identical width, where the middle module is the smoke ventilator and the two modules at the sides are fixed modules. This deflector is manufactured to fit the size of the three modules it is

Type sign

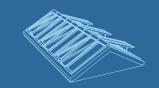
All VELUX Modular Skylights, electrical components and accessory products have a type sign sticker. The type sign helps to identify the product and must NOT be removed.

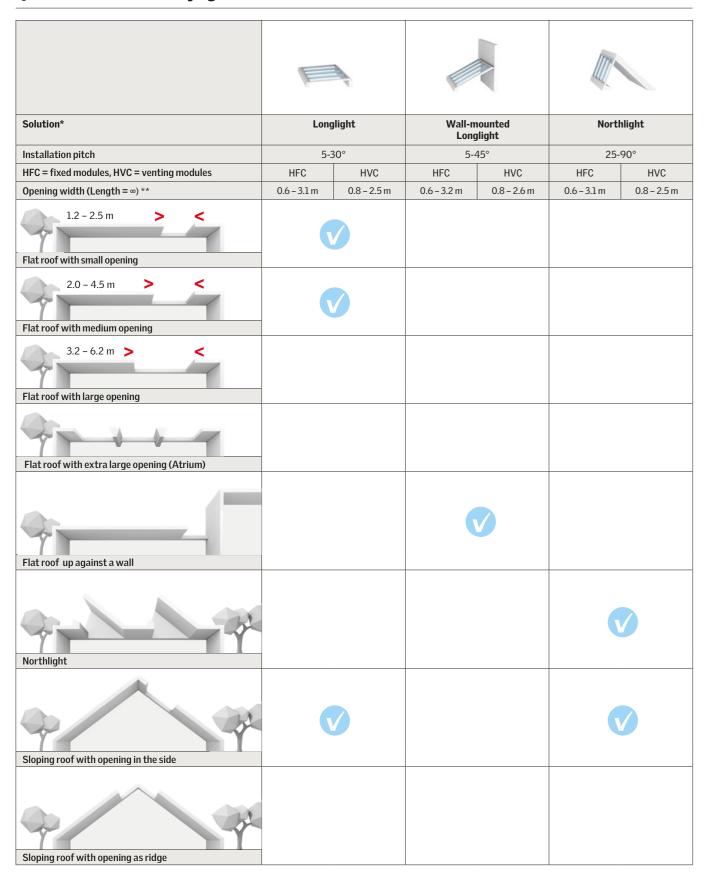
If a product is damaged or malfunctioning, the information on the type sign must be given to the VELUX sales company.





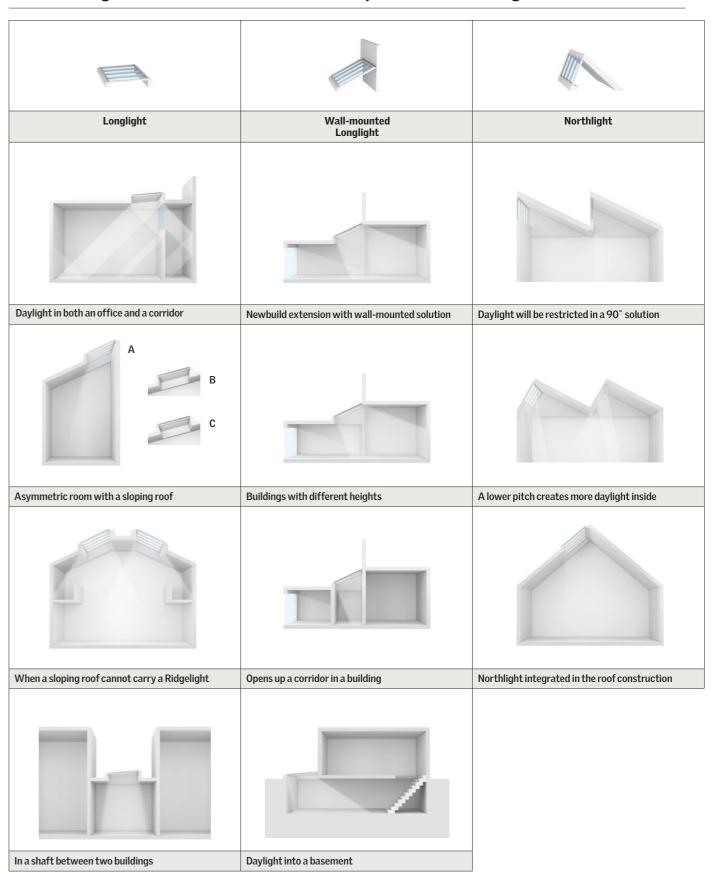




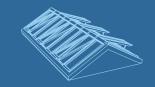


* Please note that all solutions, regardless of roof construction, require installation on a sub-construction designed according to instructions given by the VELUX Group.

Idea catalogue on alternative construction possibilities and light distribution



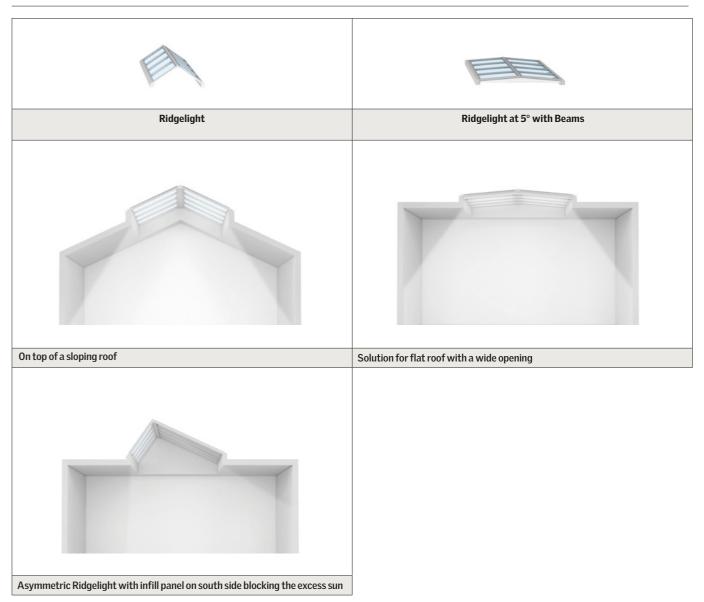
^{**} Measurements are guidelines only. Exact numbers will be supplied by your VELUX sales company.



Solution*	Ride	gelight	Ridgelight at 5° with Beams		
Installation pitch	25-40°		Ē	5°	
HFC = fixed modules, HVC = venting modules	HFC	HVC	HFC	HVC	
Opening width (Length = ∞) **	1.4 - 4.5 m	1.4 - 4.5 m	1.8 - 6.2 m	1.8 – 5.0 m	
1.2 - 2.5 m > < Flat roof with small opening					
2.0 – 4.5 m > C	V		V		
3.2 - 6.2 m >	V				
Flat roof with large opening					
Flat roof with extra large opening (Atrium)					
Flat roof up against a wall					
Northlight					
Sloping roof with opening in the side Sloping roof with opening as ridge					

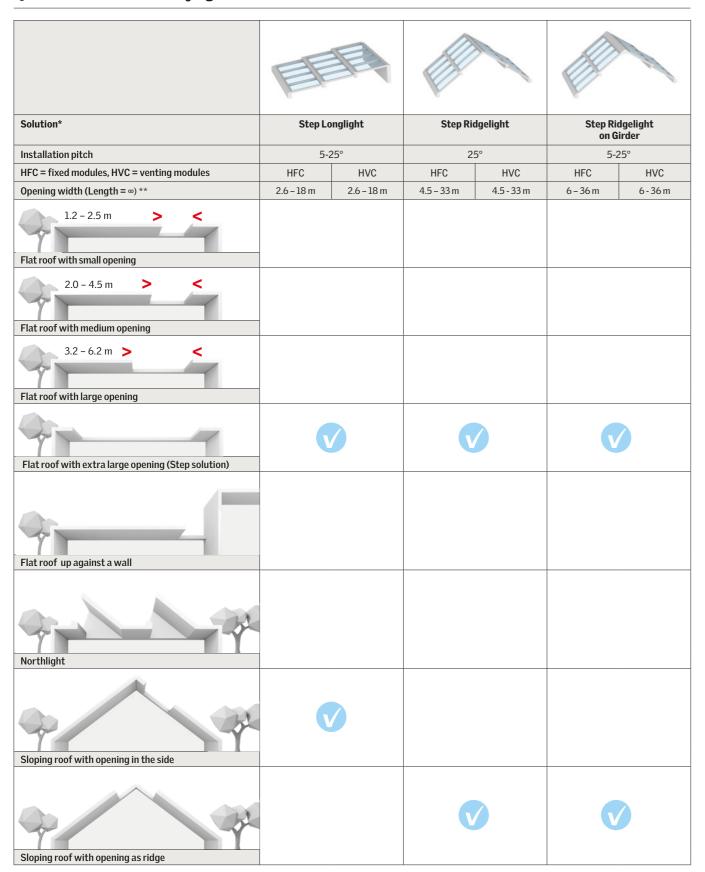
* Please note that all solutions, regardless of roof construction, require installation on a sub-construction designed according to instructions given by the VELUX Group. ** Measurements are guidelines only. Exact numbers will be supplied by your VELUX sales company.

Idea catalogue on alternative construction possibilities and light distribution



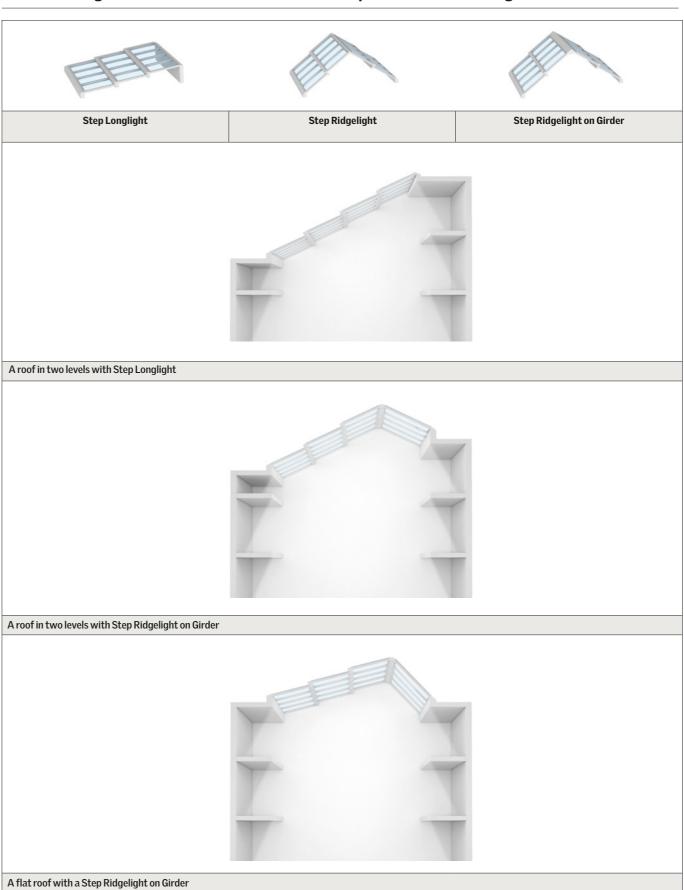
VELUX Commercial 47



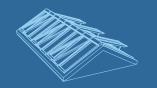


^{*} Please note that all solutions, regardless of roof construction, require installation on a sub-construction designed according to instructions given by the VELUX Group.

Idea catalogue on alternative construction possibilities and light distribution



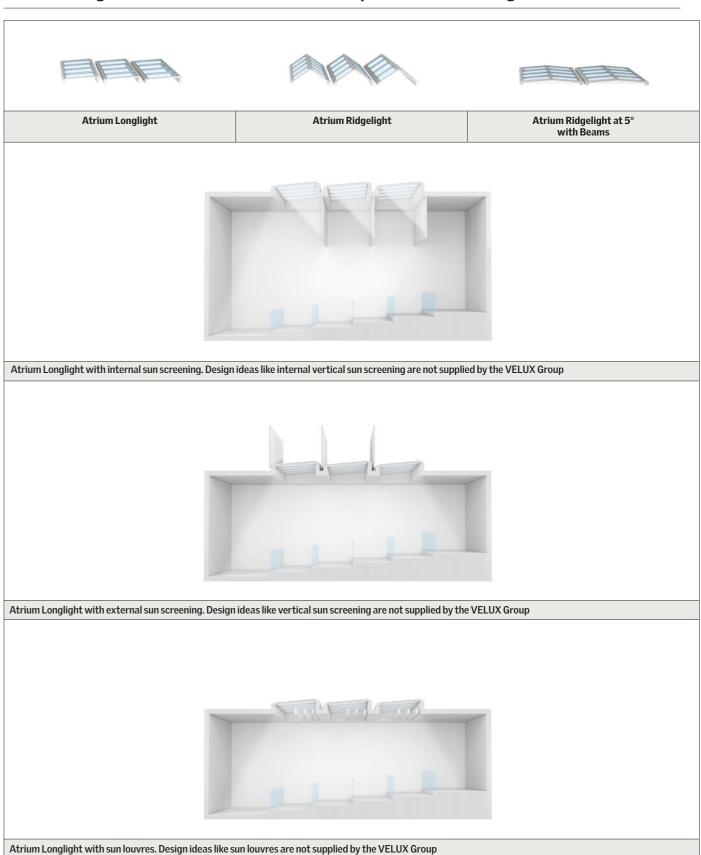
 $^{{}^{**} \, \}text{Measurements are guidelines only. Exact numbers will be supplied by your VELUX sales company.}$



Solution*	Atrium Longlight		Atrium Ridgelight		Atrium Ridgelight at 5° with Beams	
Installation pitch	5-30°		25-40°		5°	
HFC = fixed modules, HVC = venting modules	HFC	HVC	HFC	HVC	HFC	HVC
Opening width (Length = ∞) **	0.6 - 3.1 m	0.8 – 2.5 m	1.4 - 4.5 m	1.4 - 4.5 m	1.8 - 6.2 m	1.8 – 5.0 m
1.2 – 2.5 m Flat roof with small opening						
2.0 – 4.5 m > C						
3.2 - 6.2 m >						
Flat roof with large opening						
Flat roof with extra large opening (Atrium)	V		V		V	
Flat roof up against a wall						
Northlight						
Sloping roof with opening in the side Sloping roof with opening as ridge						

* Please note that all solutions, regardless of roof construction, require installation on a sub-construction designed according to instructions given by the VELUX Group.

Idea catalogue on alternative construction possibilities and light distribution



 $^{{}^{**} \, \}text{Measurements are guidelines only. Exact numbers will be supplied by your VELUX sales company.}$



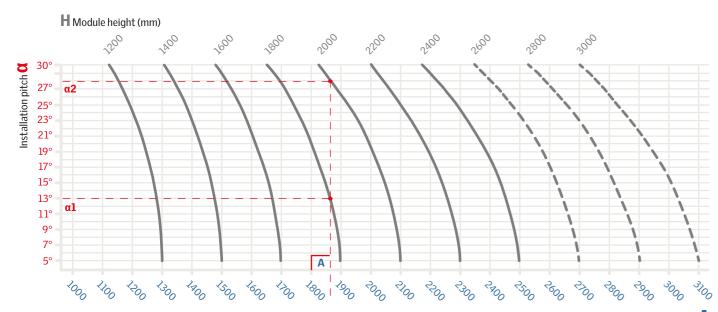
Longlight 5-30°

Longlights are bands of VELUX Modular Skylights, supplied with installation brackets and clamps that guarantee a fast and secure installation. The prefabricated flashing allows for configurations with a pitch of 5 to 30°.

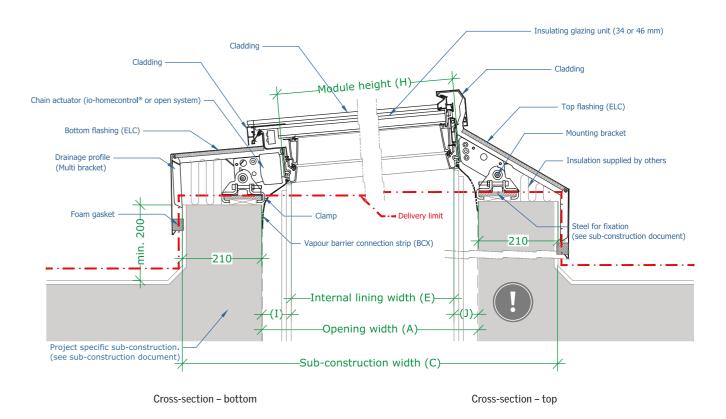
Longlights are mounted on a standard steel profile, 100 mm wide (not a VELUX component). The brackets are fixed with a clamping system holding the skylights in place. It is also possible to install the mounting brackets of a Longlight directly onto a wooden batten without using the clamps.

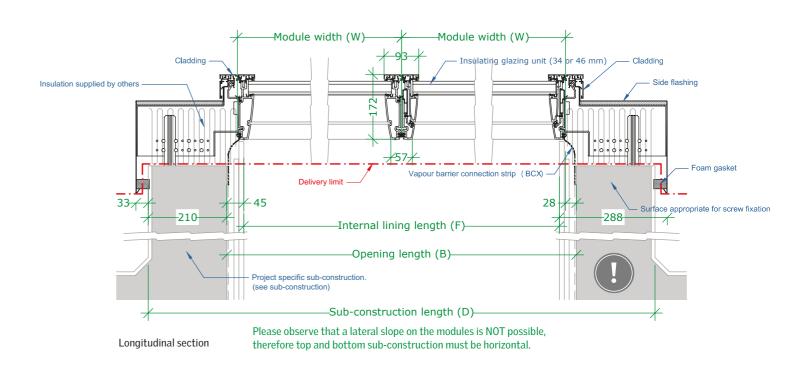






Sectional drawings







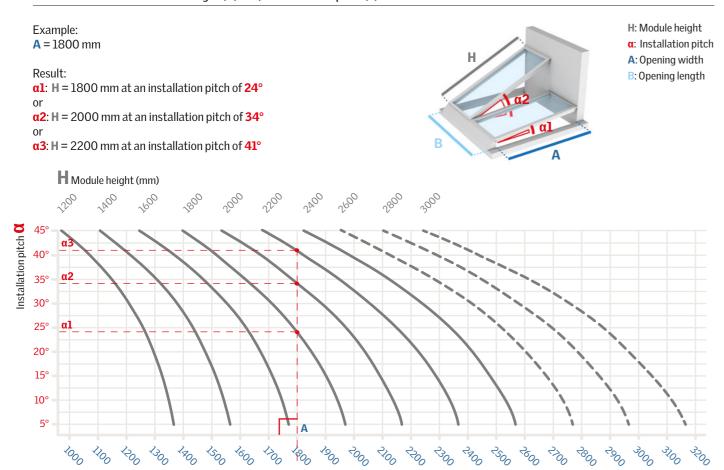
Wall-mounted Longlight 5-45°

Wall-mounted Longlights are bands of VELUX Modular Skylights mounted against a vertical wall. As the skylight modules are supplied with installation brackets and clamps, a fast and secure installation is guaranteed. The flashing allows for configurations with a pitch of 5° to 45°.

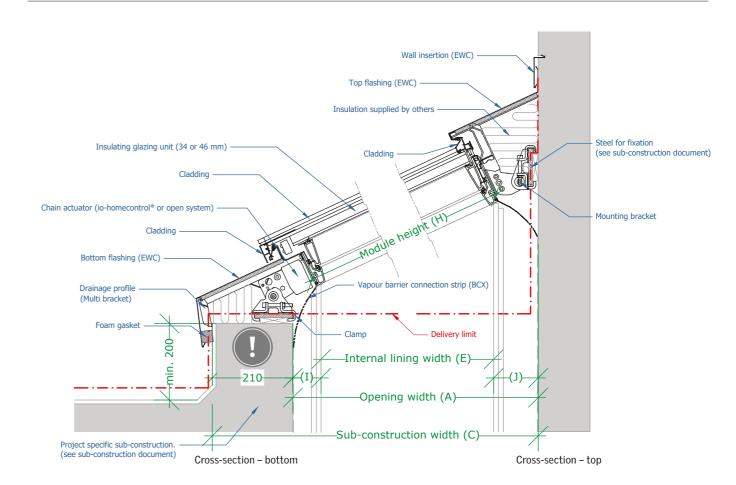
Wall-mounted Longlights are mounted on a standard steel profile, 100 mm wide at the wall. At the bottom, you can choose to mount the skylights on either a steel profile using the clamping system or directly onto a wooden batten without using the clamps. The steel profiles and wooden battens are not VELUX components. Please observe a max. 3 m wall height above skylight module.

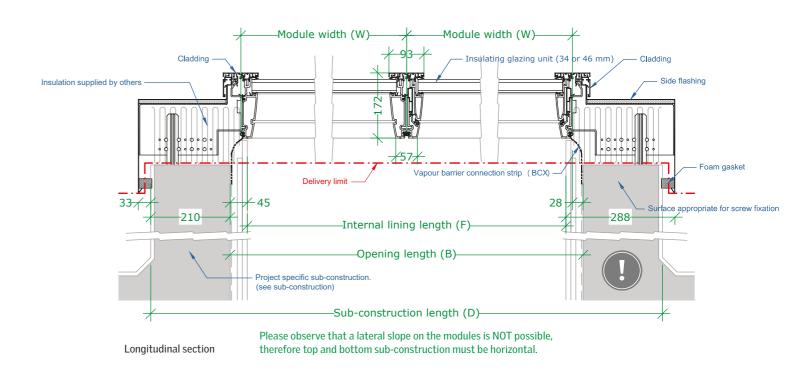


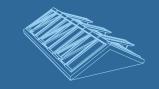
Use the table to define module height (H) and/or installation pitch (α) .



Sectional drawings







Northlight 25-90°

Similar to Longlights, Northlights are bands of VELUX Modular Skylights. The characteristic upright design is primarily for installations that are directed towards the northern hemisphere for soft and reflected lighting. Northlight installations are applicable for a pitch of $25 \text{ to } 90^{\circ}$.

At the bottom, Northlights are mounted on a standard steel profile, 100 mm wide (not a VELUX component) and fixed with clamps holding the skylight in place. At the top, the brackets are fixed to the sub-construction with screws meant for wood.

The prefabricated modular flashing ensures easy integration in the roof surface. All flashings are easily installed. The roof surface underneath the flashing must be appropriate for screw fixation.

Please observe a max. 10 m wall height above skylight module, when installed in a sloped roof. Take notice that the top flashing changes in size above and below 54° , see sectional drawing page 57.

Download CAD & BIM objects

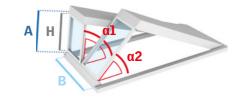


Defining module size to your project

Example:

α1: H = 1600 mm at an installation pitch of 50°

A_{max} = 1680 mm A_{min} = 1566 mm

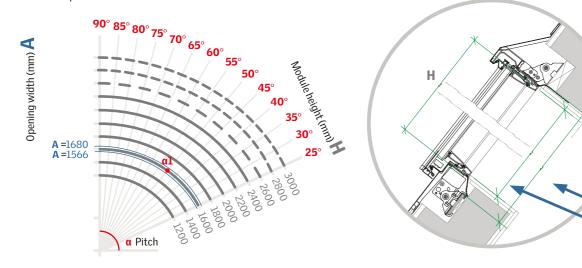


H: Module height

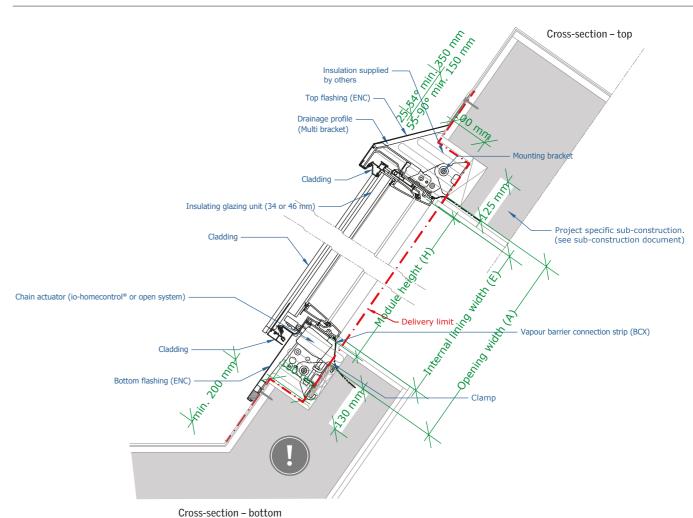
- α: Installation pitch
- A: Opening width
- B: Opening length

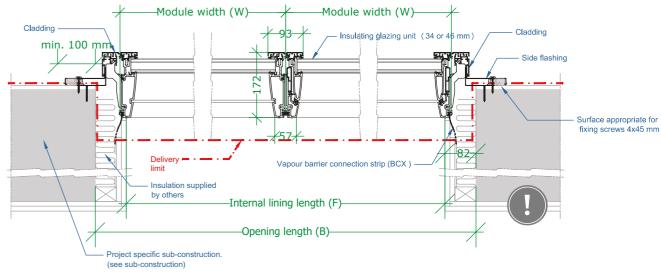
 $A_{\text{max}} \le H + 80 \text{ mm}$ $A_{\text{min}} \ge H - 34 \text{ mm}$

Installation pitch 🕻



Sectional drawings





Longitudinal section

Please observe that a lateral slope on the modules is NOT possible, therefore top and bottom sub-construction must be horizontal. $\frac{1}{2} \left(\frac{1}{2} \right) = \frac{1}{2} \left(\frac{1}{2} \right) \left(\frac{$



Ridgelight 25-40°

Ridgelight is a classic solution, consisting of two rows of skylights linked together at the ridge, creating a self-supporting structure. The flashing allows for installations with a pitch of 25 to 40°.

component). The brackets are fixed with a clamping system holding the skylights in place. It is not recommended to fasten the mounting brackets of a Ridgelight directly onto a wooden batten with screws. Please observe that it is the designers responsibility to calculate the correct number and size of fixing if a wooden batten is used. Sub-construction for Ridgelight at:

Use the table to define module height (H) and/or installation pitch (a).

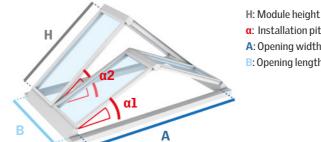
Example:

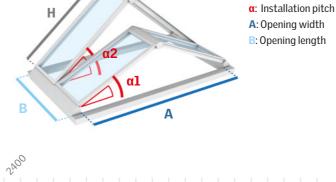
A = 3775 mm

Result:

α1: H = 2000 mm at an installation pitch of 26°

α2: H = 2200 mm at an installation pitch of 35.5°

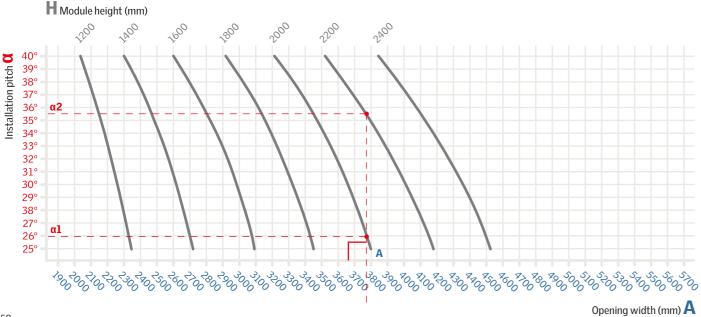




Due to horizontal forces, it is recommended to use a sub-construc-

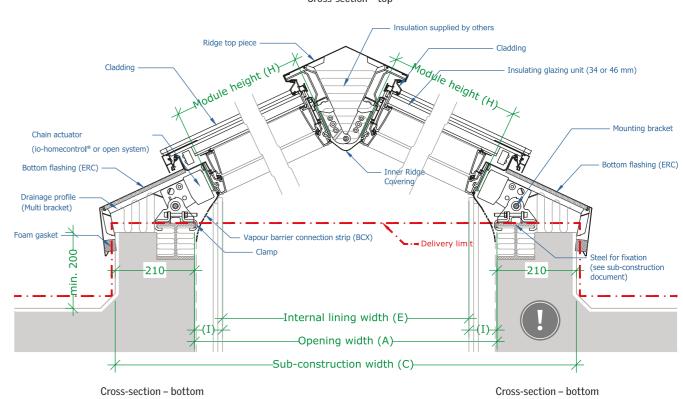
mounted on a standard steel profile, 100 mm wide (not a VELUX

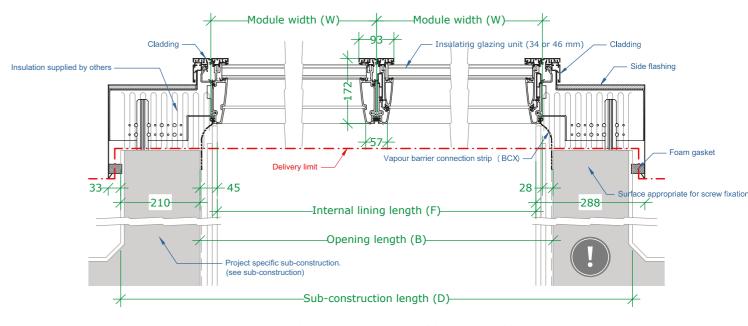
tion of steel or concrete when mounting a Ridgelight. Ridgelights are



Sectional drawings

Cross-section - top





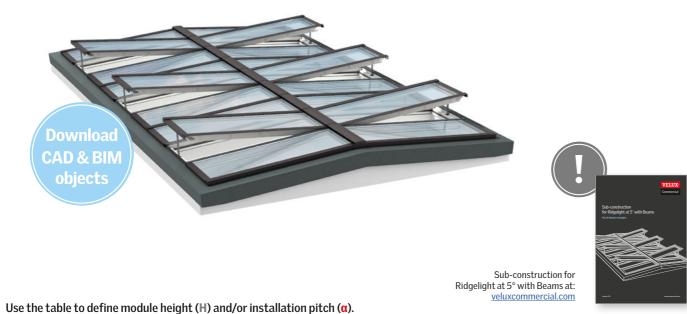
Longitudinal section

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



Ridgelight at 5° with Beams (Horizontal beam with rectangular profile)

Ridgelights at 5° pitch guarantee the illusion of a small glass roof with discreet transverse horizontal supporting beams. The prefabricated VELUX beam supports the skylights and creates the 5° pitch. The beams are mounted on a standard steel profile, 100 mm wide (not a VELUX component), on top of the sub-construction.

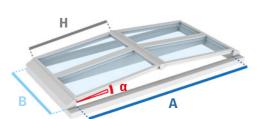


Example:

A = 4975 mm

Result:

α: H = 2400 mm at an installation pitch of 5°

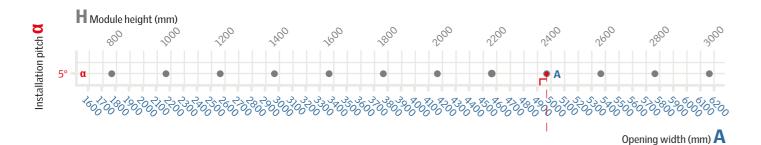


H: Module height

α: Installation pitch

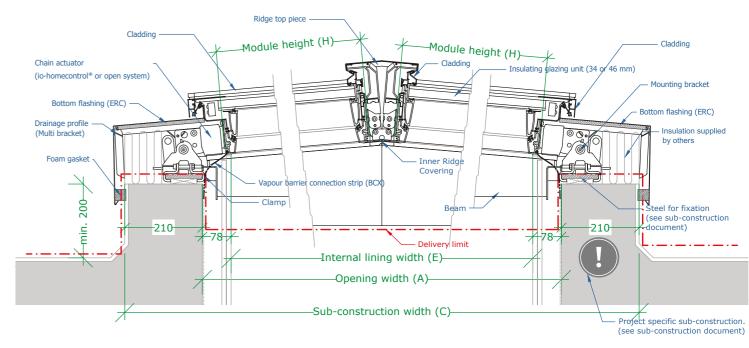
A: Opening width

B: Opening length

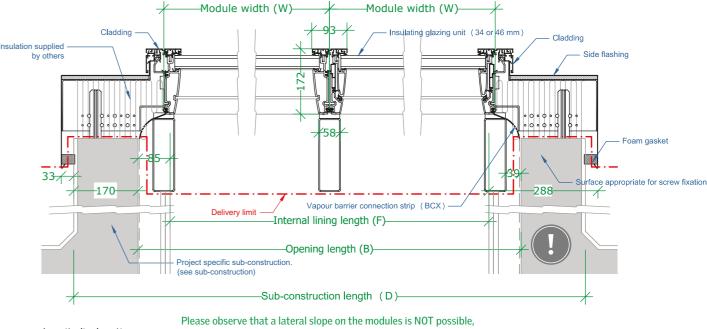


Sectional drawings

Cross-section - top



Cross-section - bottom Cross-section - bottom



Longitudinal section therefore top and bottom sub-construction must be horizontal.



Ridgelight at 5° with Beams (Parallel beam with curved profile)

Ridgelights at 5° pitch guarantee the illusion of a small glass roof with discreet transverse parallel supporting beams.

The prefabricated VELUX beam supports the skylights and creates

the 5° pitch. The beams are mounted on a standard steel profile, 100 mm wide (not a VELUX component), on top of the sub-construction.



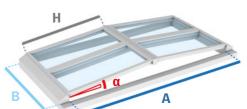
ose the table to define module neight (11) and, or installation pitch (4).

Example:

A = 4975 mm

Result:

 α : H = 2400 mm at an installation pitch of 5°

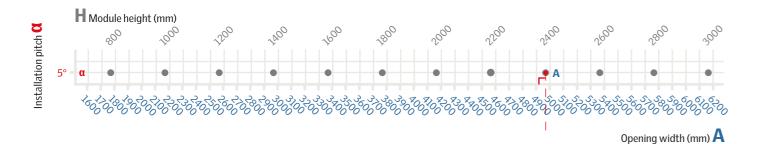


H: Module height α: Installation pitch

: Installation pitch

A: Opening width

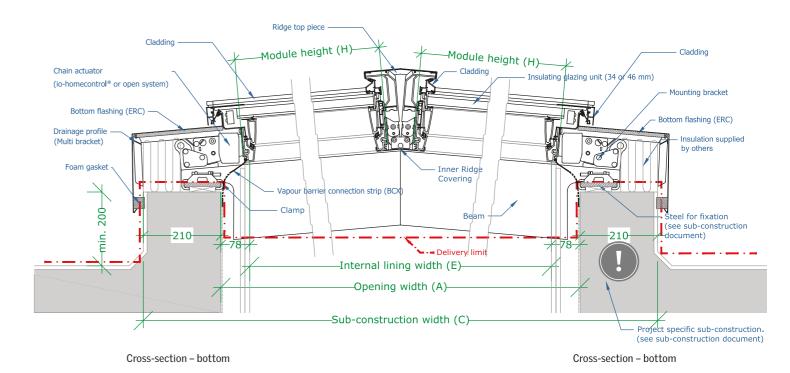
B: Opening length

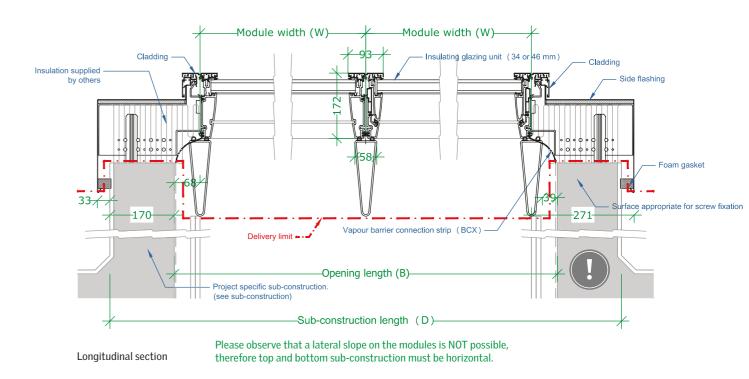


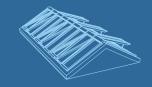
Measurements in the above example are quidelines only. Exact numbers will be supplied by your VELUX sales company.

Sectional drawings

Cross-section - top







Step Longlight 5-25°

Longlights in a Step solution are multiple rows of VELUX Modular Skylights installed close to each other using joint brackets and a clamping system that guarantee a fast and secure installation. The prefabricated flashing allows for configurations with a pitch of 5 to 25°.

The supporting beams between the rows are not included on the VELUX delivery. The support structure must be designed by a structural engineer.

The Longlight Step solution is mounted on 100 mm wide standard steel profiles (not a VELUX component). Please observe maximum number of rows, see page 107.

Download CAD & BIM objects

Sub-construction for Step Longlight 5-25° at: velux components.

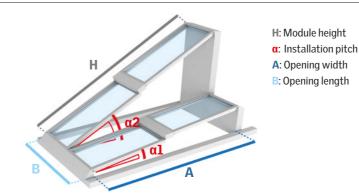
Use the table to define module height (H) and/or installation pitch (a).

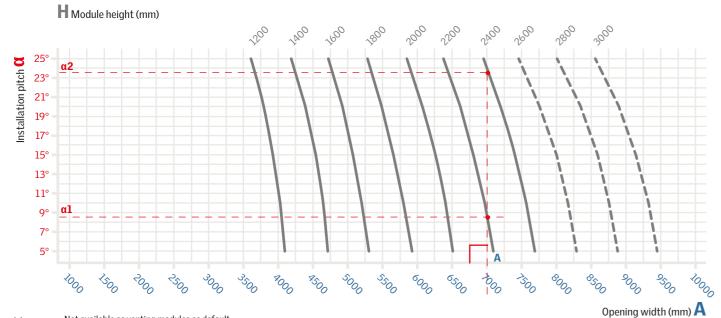
Example: **A** = 7000 mm

Result:

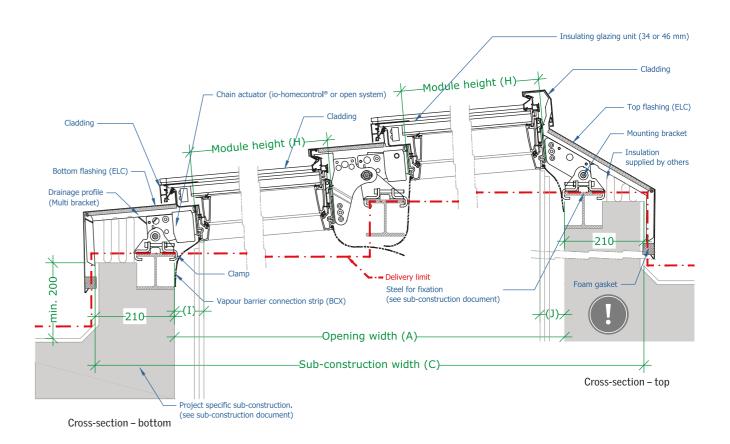
α1: H = 3 rows x 2200 mm at an installation pitch of 8.5°

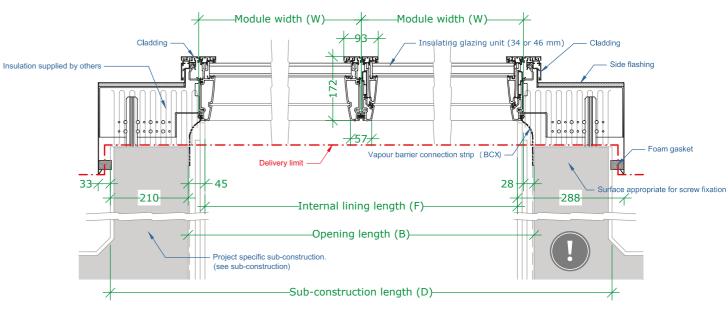
α2: H = 3 rows x 2400 mm at an installation pitch of 23.5°





Sectional drawings





Longitudinal section

Please observe that a lateral slope on the modules is NOT possible, therefore top and bottom sub-construction must be horizontal. $\label{eq:construction}$

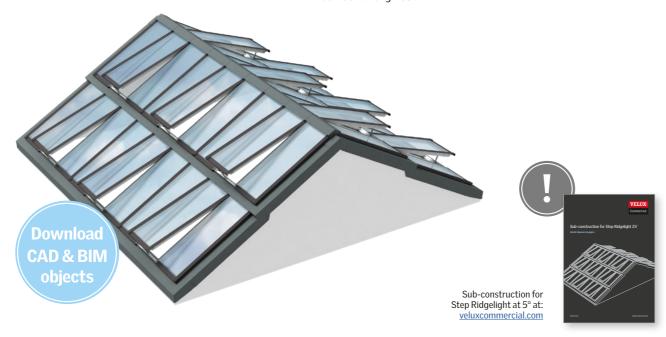


Step Ridgelight 25°

A Step Ridgelight 25° consist of a Ridgelight with one or more rows of modules below, on one or both sides, mounted close to each other using joint brackets and a clamping system that guarantee a fast and secure installation. The prefabricated flashing allows for configurations with a pitch of 25°

The Ridgelight Step solution is mounted on 100 mm wide standard steel profiles (not a VELUX component). Please observe maximum number of rows, see page 107.

The supporting beams between the rows are not included on the VELUX delivery. The support structure must be designed by a structural engineer.



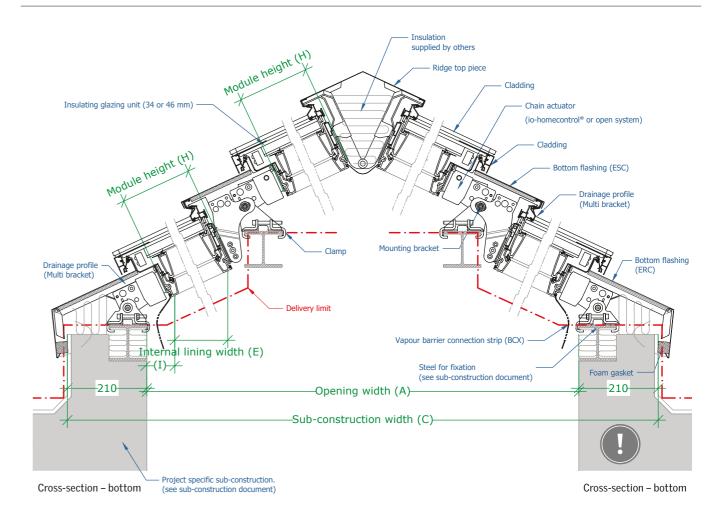
Design your own grand ideas - Create a magnificent skylight

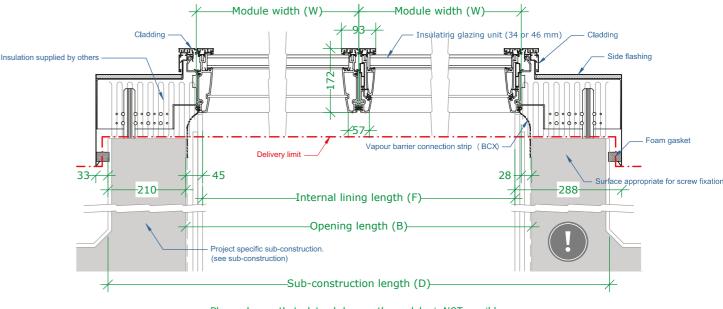
Ready to know if your ideas can become a reality? Let us calculate your possibilities and give a price estimate for your chosen solution. Contact your VELUX sales office for more details.



Sub-construction quality assurance (QA) document and specification document.

Sectional drawings





Longitudinal section

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

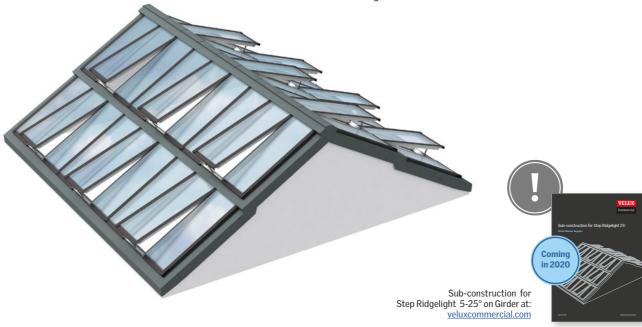


Step Ridgelight 5-25° on Girder

A Step Ridgelight 5-25° on Girder, consist of a Ridgelight with one or more rows of modules below, on one or both sides, mounted close to each other using joint brackets and a clamping system that guarantee a fast and secure installation. The prefabricated flashing allows for configurations with a pitch of 5° or 25°.

The Step Ridgelight 5-25° on Girder solutions are mounted on 100 mm wide standard steel profiles (not a VELUX component). Please observe maximum number of rows, see page 107.

The supporting beams between the rows are not included on the VELUX delivery. The support structure must be designed by a structural engineer.



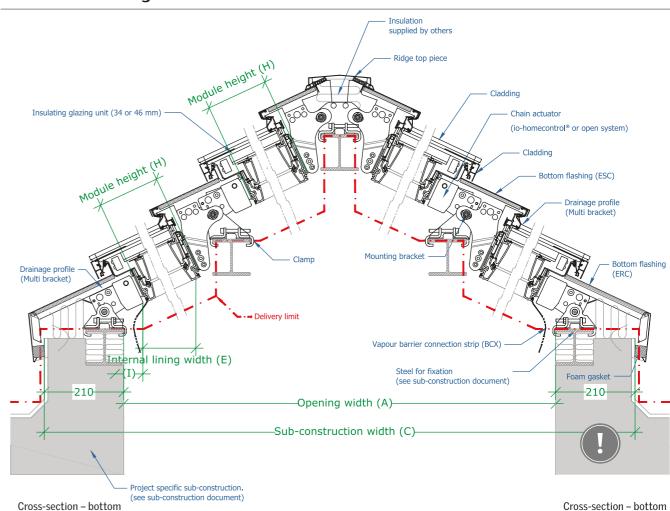
Design your own grand ideas - Create a magnificent skylight

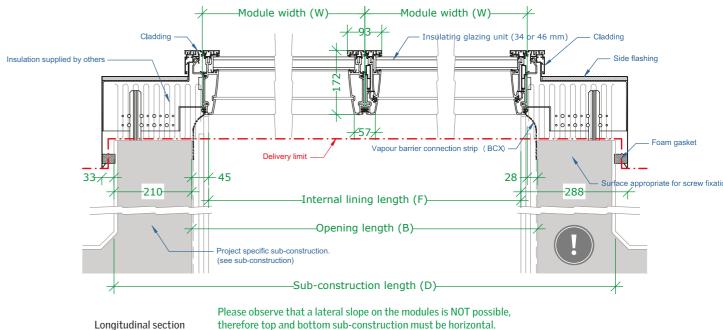
Ready to know if your ideas can become a reality? Let us calculate your possibilities and give a price estimate for your chosen solution. Contact your VELUX sales office for more details.



Sub-construction quality assurance (QA) document and specification document.

Sectional drawings





therefore top and bottom sub-construction must be horizontal.



Atrium Longlight

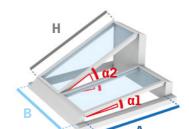
An Atrium solution consists of several Longlights attached to each other in the sub-construction. A drainage gutter separates each assembly.

The supporting beams are not included in the VELUX delivery. The support structure is part of the primary structure of the building and will have to be designed by a structural engineer.

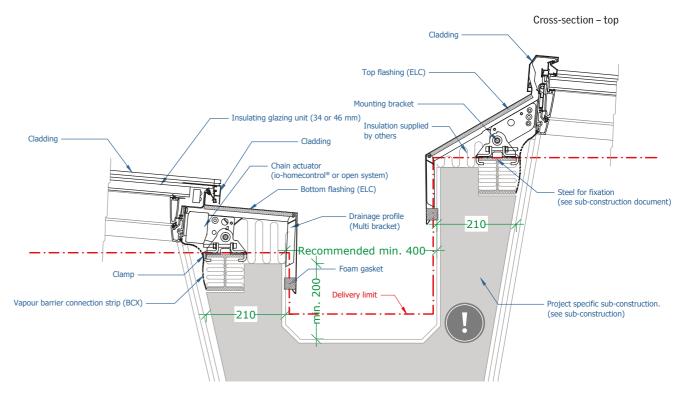
The distance between the skylights depends on thickness of insulation, width of drainage gutter and pitch of skylights. The shown example of an Atrium is designed with 100 mm insulation and a 400 mm wide drainage gutter in a 5° pitch, resulting in a distance between skylights of 820 mm.



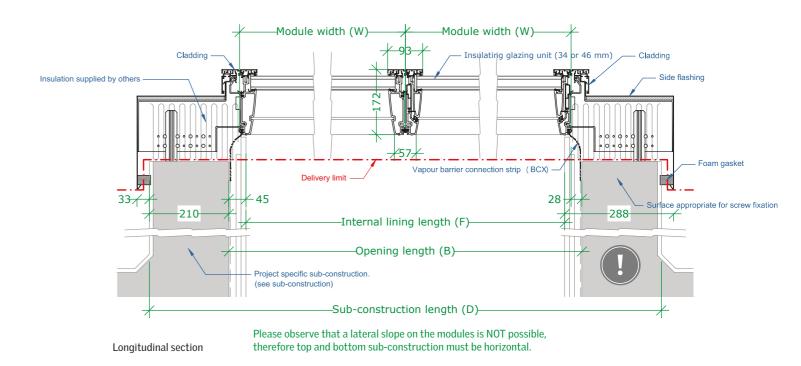
Example: A = 2870 mm Result: al: H = 2800 mm at an installation pitch of 10° or a2: H = 3000 mm at an installation pitch of 23°



Sectional drawings



Cross-section – bottom



Opening width (mm) 🗛

H: Module height

α: Installation pitch A: Opening width

B: Opening length

Not available as venting modules as default.

H Module height (mm)

25°

23°

19°

17° 15°

13°

11°



Atrium Ridgelight & Atrium Ridgelight at 5° with Beams

An Atrium Ridgelight solution consists of several Ridgelights attached to each other in the sub-construction. A drainage gutter separates each strip.

The supporting steel beams are not included in the VELUX delivery. The support structure is part of the primary structure of a building and must be designed by a structural engineer.

The distance between the skylights depends on thickness of insulation, width of drainage gutter and pitch of skylights. The shown example of an Atrium is designed with 100 mm insulation and a 400 mm wide drainage gutter in a 5° pitch, resulting in a distance between the skylights of 820 mm.



Example:

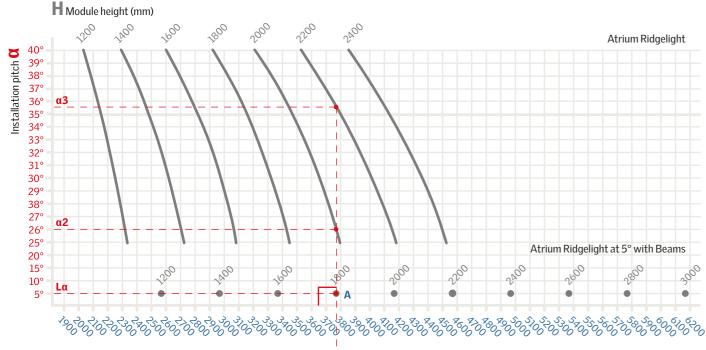
 $A = 3775 \, \text{mm}$

Result:

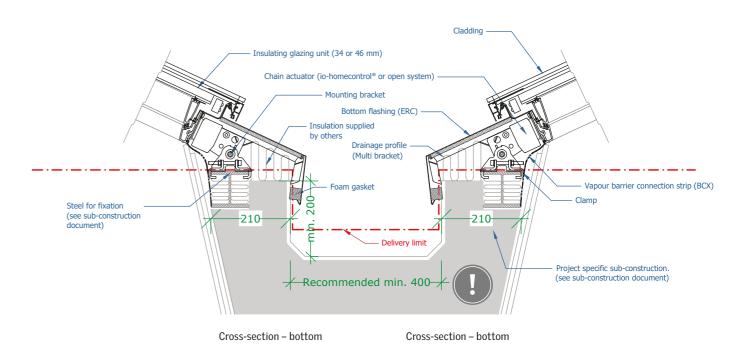
α1: H = 1800 mm at an installation pitch of 5°

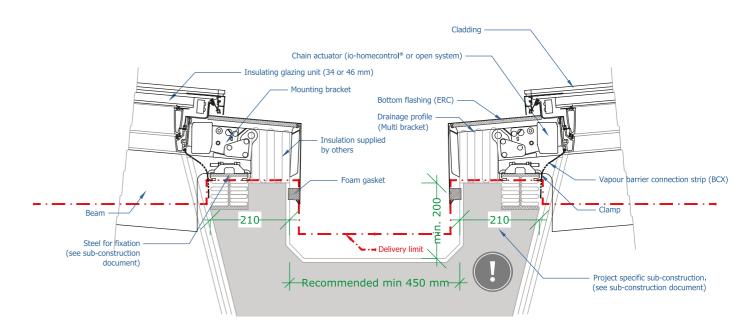
α2: H = 2000 mm at an installation pitch of 26°

α3: H = 2200 mm at an installation pitch of 35.5°



Sectional drawings



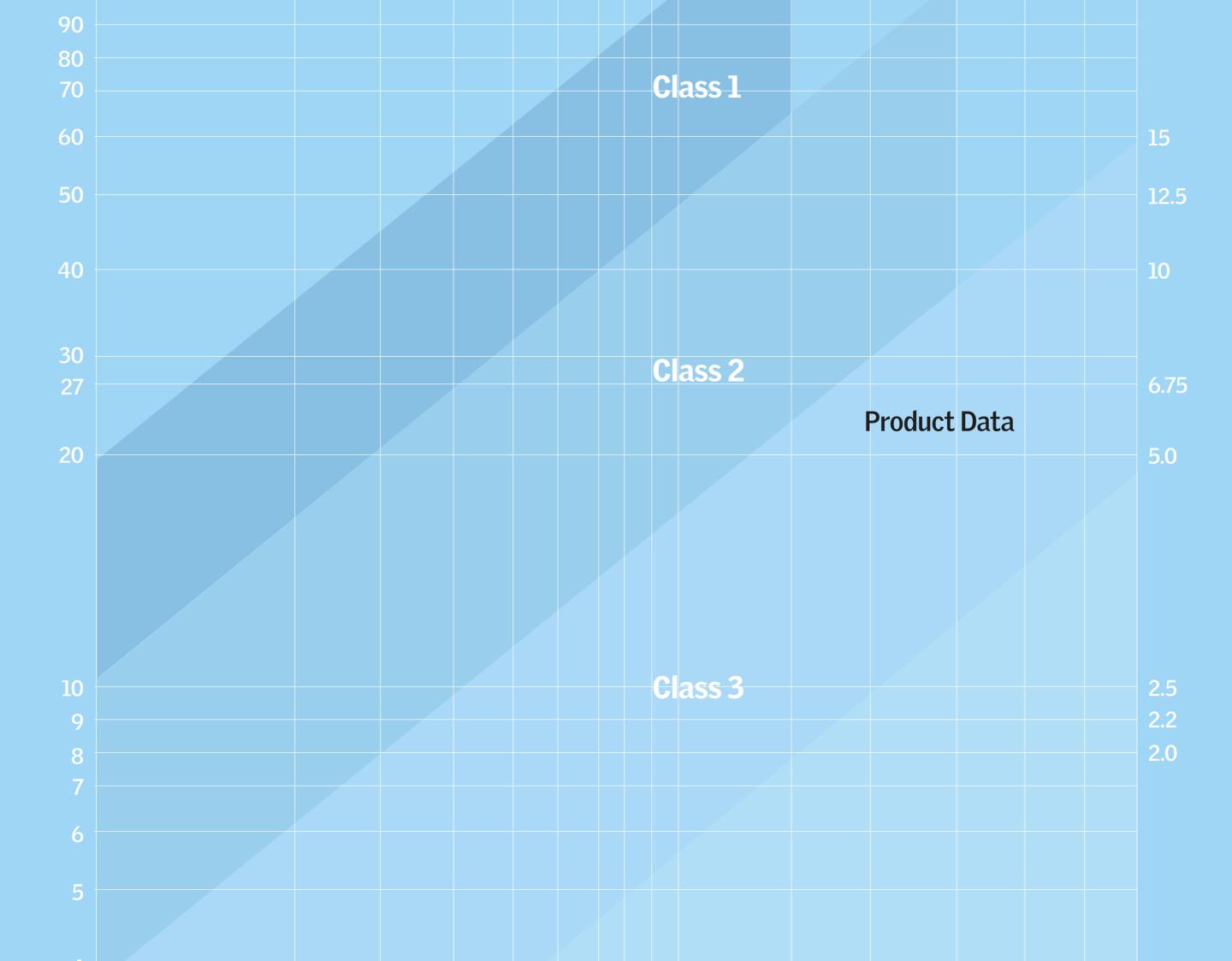


Cross-section - bottom

Cross-section - bottom

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

For longitudinal section drawings for Atrium Ridgelight and Atrium Ridgelight 5°, see pages 59, 61 and 63.







Essential characteristic performances for Cl	E-marked skylight modules (EN 14351-1)							
	H-C							
Essential characteristics	Perfor	mance						
Resistance to wind load	Class	s C5 ¹⁾						
Resistance to snow load	See glazing variant construction							
Reaction to Fire*	B-s1,d0 -	B-s1,d2 **						
External fire performance***	B _{ROOF} (t1); B _{ROOF} (t4)							
Watertightness****	E1200							
Impact resistance	Ni	PD						
Load-bearing capacity of safety devices	NP	(D ²⁾						
Acoustic performance	34 (-1; -5) - 3	8 (-1; -4) dB ³⁾						
Thermal transmittance	Double glazing 1.3-1.5 W/m ² K ³⁾	Triple glazing: 0.86-1.1 W/m ² K ³⁾						
Solar factor	0.62 -	0.143)						
Light transmittance	0.80 - 0.16 ³⁾							
Air permeability****	Clas	s 4 ⁴⁾						

¹⁾ For sizes up to 2400 mm height, except HVC 100240 with glazing variants 10L and 11L, which have Class B4. For skylight height > 2400 mm: NPD.

The performances in the above table and the attached notes to these are valid for the size grid shown on page 9. For sizes outside the size grid, altering performances may apply. The changes in performances depend on the actual size and are therefore to be identified individually.

Variants with inner pane of 33.2 and 44.2 lamination have a sub-class s1,d2

*** For explanation of test method and results, please refer to section on External fire performance

**** For explanation of test method and results, please refer to section on Watertightness

***** For explanation of test method and results, please refer to section on Air Permeability

Performance of fire resistant skylight module	Performance of fire resistant skylight modules (EN 13501-2 + A1)									
HFS										
Essential characteristics	Performance									
Resistace to Fire HFS (fixed)	REI30									

Note:
The fixed fire resistant modules HFS are tested in accordance with EN 1365-2. The classifications are expressed in accordance with EN 13501-2 + A1. The tests are carried out without roller blinds by default. If a customer wishes to install roller blinds on the fire resistant modules subsequently, the VELUX Group recommends that the customer obtains written approval from the local fire authorities. HFS has an intumescent seal strip between the fire resistant glazing and frame and between the modules. The strip expands when exposed to heat in order to contain the fire for a longer time. For more information on the performance characteristics of fire resistant skylight modules, see pages 96 and 113.

Skylight module



Essential characteristic performances for CE-market	d smoke ventilation skylight modules (EN 12101-2)
	Н-С АВ
Essential characteristics	Performance
Nominal activation system/sensitivity	passed
Response delay (response time)	< 60 s
Operational reliability	Re 1000 + 10 000
Aerodynamic free area (A _a) [m²]	See ventilation tables on pages 88, 89, 92 and 93
Resistance to heat	B300
Mechanical stability	passed
Opening under load	See tables on the next four pages (Opening under load)
Low ambient temperature	T(-15)
Stability under wind load	WL 3000
Resistance to wind-induced vibration (where included)	passed
Reaction to Fire*	Class B-s1,d0 - B-s1,d2 **

^{*} For explanation of test method and results, please refer to section of Reaction to Fire

Skylight module opening under load (Snow Load)

Smoke ventilation skylight modules can in production be configured with 5 different motor force levels enabling variable snow load performance (Opening under load) and electric current requirement (Amp requirement) per size and glazing thickness.

Choose motor force programme according to your project specific snow load need. The provided characteristics for Opening under load and related current consumptions on pages 78-81 are tested and valid for 24 V DC nominal voltage.

See tables on the next four pages.

²⁾ No safety device on VELUX Modular Skylights

³⁾ For specific types and sizes, see the table with glazing variants on page 96

⁴⁾ Except HVC 090220, HVC 090240, HVC 100220 and HVC 100240 with glazing variants 10L and 11L. For these classification is Class 3

^{*} For explanation of test method and results, please refer to section on Reaction to Fire ** Variants with inner pane of 55.2 lamination have a sub-class s1,d0

^{**} Variants with inner pane of 55.2 lamination have a sub-class s1,d0

Variants with inner pane of 33.2 and 44.2 lamination have a sub-class sl,d2





Opening under load

	onstruction	with a total g			m												
Product ID			HVC 06	7		HVC 07	5		HVC 08	30		HVC 09	0		HVC 10	0	
	Size [mm]	Width	675			750			800			900			1000		
	Height	Motor program	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]
		N0800		2.5	2023		2.5	1808		2.5	1685		2.5	1476		2.5	1305
		N1000	1	3.0	2643	1	3.0	2373	1	3.0	2218	1	3.0	1955	1	3.0	1740
HVC080	800	N1100	353	3.0	2952	353	3.0	2655	353	3.0	2484	353	3.0	2194	353	3.0	1958
		N1200		3.0	3262]	3.0	2937]	3.0	2751]	3.0	2434]	3.0	2175
		N1300		3.0	3572		3.0	3219		3.0	3017		3.0	2674		3.0	2393
		N0800		2.5	1573		2.5	1400		2.5	1300		2.5	1132		2.5	994
		N1000		3.0	2073		3.0	1856		3.0	1731		3.0	1519		3.0	1346
HVC100	1000	N1100	410	3.0	2323	410	3.5	2084	439	3.5	1946	439	3,5	1712	439	3.5	1521
		N1200		3.0	2574		3.5	2311]	3.5	2161		3.5	1906]	3.5	1697
		N1300		4.0	2824		3.5	2539		3.5	2376		3.5	2099		3.5	1873
		N0800	_	2.5	1268		3.0	1123		3.0	1040		3.0	899	_	3.0	783
		N1000	_	3.0	1687		3.0	1505		3.5	1401	ļ	3.5	1223		3.5	1078
HVC120	1200	N1100	410	3.0	1897	410	3.5	1696	526	3.5	1581	526	3.5	1386	526	3.5	1226
		N1200	-	3.0	2107		3.5	1888		4.0	1762		4.0	1548		4.0	1373
		N1300		4.0 2317		4.0	2079		4.0	1942		4.0	1710		4.0	152	
		N0800	-	2.5	1047		3.0	923		3.0	851		3.5	730		3.5	631
		N1000		3.0	1409		3.0	1252		3.5	1162		4.0	1010		4.0	885
HVC140	1400	N1100	410	3.0	1589	410	3.5	1417	530	3.5	1318	610	4.0	1150	610	4.0	1012
		N1200	-	3.0	1770		3.5	1581	-	4.0	1473		4.0	1289	-	4.0	1139
		N1300		4.0	1951		4.0	1746		4.0	1629		4.0	1429		4.0 3.5	1266
		N0800 N1000	2.5 88 3.0 119	1198	1	3.0	771 1061		3.0	709 982		3.5 4.0	603	-	4.0	516 739	
HVC160	1600	N1100	410	3.0	1357	410	3,5	1205	530	3.5	1119	610	4.0	848 971	700	4.0	851
UAC100	1000	N1200	410	3.0	1515	410	3.5	1350	330	4.0	1255	010	4.0	1094	700	4.5	962
		N1300	-	4.0	1674	-	4.0	1495	-	4.0	1392	-	4.0	1217	-	5.0	1074
		N0800		2.5	750		3.0	653		3.0	598		3.5	503		3.5	426
		N1000	1	3.0	1033	1	3.0	911	1	3.5	841	1	4.0	722	1	4.0	625
HVC180	1800	N1100	410	3.0	1174	410	3.5	1040	530	3.5	963	610	4.0	832	700	4.5	724
1100 100	1000	N1200	110	3.0	1316	110	3.5	1169	330	4.0	1084	010	4.0	941	1 700	4.5	824
		N1300	1	4.0	1457	1	4.0	1298	1	4.0	1206	1	4.0	1050	1	5.0	923
		N0800		2.5	645		3.0	558		3.0	508		3.5	423		3.5	354
		N1000	1	3.0	900	1	3.0	790	1	3.5	727	1	4.0	621	1	4.0	533
HVC200	2000	N1100	410	3.0	1028	410	3.5	907	530	3.5	837	610	4.0	719	700	4.5	623
		N1200	1	3.0	1156	1	3.5	1023	1	4.0	947	1	4.0	818	1	4.5	712
		N1300	1	4.0	1283	1	4.0	1139	1	4.0	1057	1	4.0	917	1	5.0	802
		N0800		2.5	559		3.0	480		3.0	434		3.5	357		3.5	294
		N1000	1	3.0	791	1	3.0	692	1	3.5	634	1	4.0	537	1	4.0	458
HVC220	2200	N1100	410	3.0	908	410	3.5	797	530	3.5	734	610	4.0	627	700	4.5	539
		N1200		3.0	1024]	3.5	903]	4.0	834]	4.0	717]	4.5	621
		N1300		4.0	1140		4.0	1009		4.0	934		4.0	807		5.0	703
		N800		2.5	487		3.0	414		3.0	373		3.5	302		3.5	245
		N1000	1	3.0	700	1	3.0	609	1	3.5	556	1	4.0	467	1	4.0	395
HVC240	2400	N1100	410	3.0	807	410	3,5	706	530	3.5	648	610		550	700	4.5	469
		N1200		3.0	914	914 3.5	3.5	803	3	4.0	740		4.0	632	1	4.5	544
		N1300	1	4.0	1020		4.0	900		4.0	832	1	4.0	715	1	5.0	619
		141300		7.0	1020		7.0	700	l .	4.0	032	L	7.0	,13	1	3.0	017

The tables illustrate the performance for modules opening under load in accordance with EN 12101-2. The provided performance is NOT equal to structural load bearing capacity of an actual application. The design of a roof light must therefore be dimensioned to fit the specific building project, local architectural style and practice.

Standard size.	Special sizes, functional limitations may apply.

Skylight module



Opening under load

Glazing unit c	onstruction	with a total gl	ass thickn	ess of 14 m	m													
Product ID			HVC 06	7		HVC 07	5		HVC 08	0		HVC 09	0		HVC 100			
	Size [mm]	Width	675			750			800		1	900			1000	,		
	Height	Motor program	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	
		N0800		2.5	1984		2.5	1768		2.5	1644		2.5	1434		2.5	1263	
		N1000	1	3.0	2603	1	3.0	2332	1	3.0	2177	1	3.0	1913		3.0	1698	
HVC080	800	N1100	353	3.0	2913	353	3.0	2615	353	3.0	2444	353	3.0	2153	353	3.0	1916	
		N1200		3.0	3223		3.0	2897		3.0	2710		3.0	2393		3.0	2133	
		N1300		3.0	3533		3.0	3179		3.0	2976		3.0	2632		3.0	2351	
		N0800		2.5	1533		2.5	1359		2.5	1260		2.5	1090		2.5	952	
		N1000		3.0	2034		3.0	1815		3.0	1690		3.0	1477		3.0	1303	
HVC100	1000	N1100	410	3.0	2284	439	3.5	2043	439	3.5	1905	439	3.5	1671	439	3.5	1479	
		N1200 N1300	-	3.0 4.0	2534 2785		3.5	2271 2499	-	3.5	2120 2336	-	3.5 3.5	1864 2058		3.5	1655 1831	
		N0800		2.5	1228		3.0	1082		3.0	999		3.0	857		3,5 3.0	741	
		N1000	-	3.0	1648		3.0	1465	-	3.5	1360		3.5	1182		3.5	1036	
HVC120	1200	N1100	410	3.0	1858	460	3.5	1656	526	3.5	1540	526	3.5	1344	526	3.5	1184	
1170 120	1200	N1200	110	3.0	2068	100	3.5	1847	320	4.0	1721	320	4.0	1506	320	4.0	1331	
		N1300	1	4.0	2278		4.0	2039	1	4.0	1902	Ì	4.0	1669		4.0	1479	
		N0800		2.5	1008		3.0	882		3.0	811		3.5	689		3.5	589	
		N1000	1	3.0	1369	İ	3.0	1212	1	3.5	1122	İ	4.0	968		4.0	843	
HVC140	1400	N1100	410	3.0	1550	460	3.5	1377	530	3.5	1277	610	4.0	1108	610	4.0	970	
		N1200]	3.0	1731]	3.5	1541		4.0	1432]	4.0	1248		4.0	1097	
		N1300		4.0	1912		4.0	1706		4.0	1588		4.0	1388		4.0	1224	
		N0800		2.5	841		3.0	731		3.0	668		3.5	561		3.5	474	
		N1000		3.0	1159		3.0	1020	ļ	3.5	941		4.0	807		4.0	697	
HVC160	1600	N1100	410	3.0	1317	460	3.5	1165	530	3.5	1078	610	4.0	930	700	4.5	809	
		N1200		3.0	1476	ļ	3.5	1310		4.0	1214	ļ	4.0	1052		4.5	920	
		N1300		4.0	1635		4.0	1454		4.0	1351		4.0	1175		5.0	1032	
		N0800	-	2.5	711 994		3.0	613	-	3.0	557	-	3.5	462		3.5	384	
HVC180	1800	N1000 N1100	410	3.0	1135	460	3.0	871 1000	530	3.5	800 922	610	4.0	681 790	700	4.0 4.5	583 682	
HAC100	1000	N1200	410	3.0	1277	400	3.5	1128	330	4.0	1044	010	4.0	899	700	4.5	782	
		N1300	1	4.0	1418	ł	4.0	1257	1	4.0	1165	ł	4.0	1009		5.0	881	
		N0800		2.5	606		3.0	518		3.0	467		3.5	382		3.5	312	
		N1000	1	3.0	861	İ	3.0	750	1	3.5	687	İ	4.0	579		4.0	491	
HVC200	2000	N1100	410	3.0	989	460	3.5	866	530	3.5	796	610	4.0	678	700	4.5	581	
		N1200	1	3.0	1116	1	3.5	983	1	4.0	906	1	4.0	776		4.5	670	
		N1300	1	4.0	1244		4.0	1099]	4.0	1016		4.0	875		5.0	760	
		N0800		2.5	520		3.0	439		3.0	394		3.5	316		3.5	252	
		N1000		3.0	752		3.0	651		3.5	594		4.0	495		4.0	415	
HVC220	2200	N1100	410	3.0	868	460	3.5	757	530	3.5	693	610	4.0	585	700	4.5	497	
		N1200		3.0	984		3.5	863		4.0	793		4.0	675		4.5	579	
		N1300		4.0	1101		4.0	969		4.0	893		4.0	765		5.0	660	
		N800		2.5	447		3.0	374		3.0	332		3.5	261		3.5	202	
		N1000		3.0	661		3.0	569		3.5	516		4.0	426		4.0	352	
HVC240	2400	N1100	410	3,0	768	460	3.5	666	530	3.5	607	610	4.0	508	700	4.5	427	
		N1200		3.0	874	3.5	763		4.0	699		4.0	591		4.5	502		
	N1300		4.0	981	⊣ ⊦	4.0	860		4.0	791		4.0	673		5.0	577		

The tables illustrate the performance for modules opening under load in accordance with EN 12101-2. The provided performance is NOT equal to structural load bearing capacity of an actual application. The design of a roof light must therefore be dimensioned to fit the specific building project, local architectural style and practice.

 _	
Standard size.	Special sizes, functional limitations may apply





Opening under load

Product ID		with a total g	HVC 06			HVC 07	5		HVC 08	0		HVC 09	0		HVC 10	n	
. Todact ID	Size [mm]	Width	675			750			800			900			1000		
	Size [illili]	vviutii	0/3	Ι		750	1	1	300	Ι	Ι	700			1000		
	Height	Motor program	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	
		N0800		2.5	1911		2.5	1693		2.5	1569		2.5	1357		2.5	11
		N1000		3.0	2530		3.0	2258	1	3.0	2102		3.0	1836		3.0	16
HVC080	800	N1100	353	3.0	2840	353	3.0	2540	353	3.0	2368	353	3.0	2076	353	3.0	18
	_	N1200	-	3.0	3150	-	3.0	2822	-	3.0	2634		3.0	2316	-	3.0	20
		N1300 N0800		3.0 2.5	3460 1459		3.0 2.5	3105 1284		3.0 2.5	2901 1183		3.0 2.5	2555 1012		3.0 2.5	22 8
		N1000	1	3.0	1960	1	3.0	1740	1	3.0	1613		3.0	1399	1	3.0	12
HVC100	1000	N1100	410	3.0	2210	439	3.5	1968	439	3,5	1829	439	3.5	1593	439	3,5	14
	1000	N1200	1.20	3.0	2460	1.57	3.5	2196	1 .57	3.5	2044	,	3.5	1786	1 .57	3.5	15
		N1300	1	4.0	2710	1	3.5	2424	1	3.5	2259		3.5	1980	1	3.5	17
		N0800		2.5	1153		3.0	1006		3.0	921		3.0	778		3.0	6
		N1000	1	3.0	1573	1	3.0	1388	1	3.5	1282	1	3.5	1103	1	3.5	9
HVC120	1200	N1100	410	3.0	1783	460	3.5	1580	526	3.5	1463	526	3.5	1265	526	3.5	11
		N1200		3.0	1993		3.5	1771		4.0	1644		4.0	1427		4.0	12
		N1300		4.0	2203		4,0	1962		4.0	1824		4.0	1590		4.0	13
		N0800	_	2.5	932	-	3.0	805	-	3.0	733		3.5	609		3.5	5
111/0 140	1400	N1000	410	3.0	1294	440	3,0	1135	F20	3.5	1044	(10	4.0	889	(10	4.0	7 8
HVC140	1400	N1100 N1200	410	3.0	1475 1655	460	3.5	1299 1464	530	3.5 4.0	1199 1354	610	4.0	1028 1168	610	4.0	10
		N1300	-	4.0	1836	1	4.0	1629	1	4.0	1510		4.0	1308	1	4.0	11
		N0800		2.5	765		3.0	654		3.0	590		3.5	481		3.5	3
		N1000	1	3.0	1083	1	3.0	943	1	3.5	863		4.0	727	1	4.0	6
HVC160	1600	N1100	410	3.0	1241	460	3.5	1088	530	3.5	999	610	4.0	850	700	4.5	7
		N1200	1	3.0	1400	1	3.5	1232	1	4.0	1136	1	4.0	972	1	4.5	8
		N1300		4.0	1559	1	4.0	1377		4.0	1272		4.0	1095	1	5.0	9
		N0800		2.5	634		3.0	535		3.0	478		3.5	381		3.5	3
		N1000	_	3.0	917		3.0	793		3.5	721		4.0	600		4.0	5
HVC180	1800	N1100	410	3.0	1059	460	3.5	922	530	3.5	843	610	4.0	710	700	4.5	6
		N1200	-	3.0	1200	-	3.5	1051	-	4.0	965		4.0	819	-	4.5	7
		N1300 N0800		4.0 2.5	1342 529		4.0 3.0	1179 440		4.0 3.0	1086 388		4.0 3.5	928 301		5.0 3.5	2
		N1000	-	3.0	784	1	3.0	672	-	3.5	608	{	4.0	498	1	4.0	4
HVC200	2000	N1100	410	3.0	912	460	3.5	788	530	3.5	717	610	4.0	597	700	4.5	4
		N1200	1	3.0	1040	1	3.5	905	1	4.0	827		4.0	696	1	4.5	5
		N1300		4.0	1167		4.0	1021	1	4.0	937		4.0	794	1	5.0	6
		N0800		2.5	443		3.0	361		3.0	314		3.5	235		3.5	1
		N1000	1	3.0	675		3.0	573	-	3.5	514		4.0	415		4.0	3
HVC220	2200	N1100	410	3.0	792	460	3.5	679	530	3.5	614	610	4.0	504	700	4.5	4
		N1200	-	3.0	908	-	3.5 4.0	785	-	4.0	714		4.0	594	-	4.5	4
		N1300 N800		4.0 2.5	1024 371		3.0	891 296	-	3.0	814 253		4.0 3.5	684 180		5.0 3.5	5 1
		N1000	+	3.0	584	1	3.0	490	1	3.5	436		4.0	345	1	4.0	2
HVC240	2400	N1100	410	3.0	691	460	3.5	587	530	3.5	528	610	4.0	427	700	4.0	3
1100240	2400	N1200	410	3.0	797	400	3.5	684	1 330	4.0	620	010	4.0	510	1 700	4.5	4
		N1200	1	4.0	904	1	4.0	782	1	4.0	711		4.0	592	-	5.0	4
		N0800		2.5	309		3.0	240		4.0	1 '11		4.0	J72		1 3.0	_ 4
		N1000		3.0	507	-	3.0	420	Th	e tables il	lustrate t	he perfor	mance for	r modules	openina	under load	d in a
HVC260	2600	N1100	410	3.0	605	460	3.5	510								qual to str	
		N1200		3.0	704		3.5	599	I						-	oof light m	
		N1300		4.0	802		4.0	689	1			o fit the s	pecific bu	ilding pro	ject, loca	l architect	tural
		N0800		2.5	257				an	d practice	2.						
		N1000		3.0	440		_	_			Cncc	ial cizoc	functions		Only	annlicable	for
	2800	N1100	410	3.0	532			Sta	ndard size	2.			functiona ay apply.	1		applicable ng variant	
HVC280	2000	N1200	-	3.0	623						guzing variant						

Opening under load

N0800 N1000

N1100 N1200

N1300

HVC ---280

2800

2.5 180

3.0 455 3.0 547

364

3.0

Skylight module



Glazing unit construction with a total glass thickness of 22 mm																	
Product ID			HVC 06			HVC 07	5		HVC 08	80		HVC 09	0		HVC 100)	
	Size [mm]	Width	675			750			800			900			1000		
	Height	Motor program	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]	Chain stroke [mm]	Electric current requirement [AMP]	Snow Load [Pa]
HVC080	800	N0800 N1000 N1100 N1200 N1300	353	2.5 3.0 3.0 3.0 3.0	1850 2470 2780 3089 3399	353	2.5 3.0 3.0 3.0 3.0	1630 2194 2477 2759 3041	353	2.5 3.0 3.0 3.0 3.0	1504 2037 2303 2569 2836	353	2.5 3.0 3.0 3.0 3.0	1289 1769 2008 2248 2487	353	2.5 3.0 3.0 3.0 3.0	1114 1549 1767 1985 2203
HVC100	1000	N0800 N1000 N1100 N1200 N1300	410	2.5 3.0 3.0 3.0 4.0	1394 1895 2145 2395 2646	439	2.5 3.0 3.5 3.5 3.5	1216 1672 1900 2128 2356	439	2.5 3.0 3.5 3.5 3.5	1114 1544 1760 1975 2190	439	2.5 3.0 3.5 3.5 3.5	941 1328 1521 1715 1908	439	2.5 3.0 3.5 3.5 3.5	799 1150 1326 1502 1678
HVC120	1200	N0800 N1000 N1100 N1200 N1300	410	2.5 3.0 3.0 3.0 4.0	1086 1505 1715 1925 2135	460	3.0 3.0 3.5 3.5 4.0	936 1318 1510 1701 1892	526	3.0 3.5 3.5 4.0 4.0	850 1211 1392 1572 1753	526	3.0 3.5 3.5 4.0 4.0	704 1029 1191 1354 1516	526	3.0 3.5 3.5 4.0 4.0	585 880 1028 1175 1323
HVC140	1400	N0800 N1000 N1100 N1200 N1300	410	2.5 3.0 3.0 3.0 4.0	862 1224 1405 1586 1766	460	3.0 3.0 3.5 3.5 4.0	733 1063 1227 1392 1557	530	3.0 3.5 3.5 4.0 4.0	659 970 1126 1281 1437	610	3.5 4.0 4.0 4.0 4.0	533 813 953 1093 1233	610	3.5 4.0 4.0 4.0 4.0	431 685 812 939 1066
HVC160	1600	N0800 N1000 N1100 N1200 N1300	410	2.5 3.0 3.0 3.0 4.0	694 1011 1170 1329 1487	460	3.0 3.0 3.5 3.5 4.0	580 869 1014 1159 1303	530	3.0 3.5 3.5 4.0 4.0	515 788 925 1061 1198	610	3.5 4.0 4.0 4.0 4.0	404 650 773 895 1018	700	3.5 4.0 4.5 4.5 5.0	314 537 649 760 872
HVC180	1800	N0800 N1000 N1100 N1200 N1300	410	2.5 3.0 3.0 3.0 4.0	562 845 986 1128 1269	460	3.0 3.0 3.5 3.5 4.0	460 718 847 976 1105	530	3.0 3.5 3.5 4.0 4.0	402 645 767 889 1011	610	3.5 4.0 4.0 4.0 4.0	303 522 632 741 850	700	3.5 4.0 4.5 4.5	223 422 521 620 720
HVC200	2000	N0800 N1000 N1100 N1200 N1300	410	2.5 3.0 3.0 3.0 4.0	456 711 838 966 1094	460	3.0 3.0 3.5 3.5 4.0	364 596 713 829 945	530	3.0 3.5 3.5 4.0 4.0	311 531 641 750 860	610	3.5 4.0 4.0 4.0 4.0	222 420 518 617 716	700	3.5 4.0 4.5 4.5 5.0	149 329 418 508 598
HVC220	2200	N0800 N1000 N1100 N1200 N1300	410	2.5 3.0 3.0 3.0 4.0	368 601 717 833 950	460	3.0 3.0 3.5 3.5 4.0	285 497 602 708 814	530	3.0 3.5 3.5 4.0 4.0	237 437 537 637 737	610	3.5 4.0 4.0 4.0 4.0	155 335 425 515 605	700	3.5 4.0 4.5 4.5 5.0	89 252 334 416 497
HVC240	2400	N800 N1000 N1100 N1200 N1300	410	2.5 3.0 3.0 3.0 4.0	295 509 616 722 829	460	3.0 3.0 3.5 3.5 4.0	219 413 510 607 705	530	3.0 3.5 3.5 4.0 4.0	174 358 450 542 633	610	3.5 4.0 4.0 4.0 4.0	100 265 347 430 512	700	3.5 4.0 4.5 4.5 5.0	38 188 263 338 413
HVC260	2600	N0800 N1000 N1100 N1200 N1300	410	2.5 3.0 3.0 3.0 4.0	234 431 529 628 727	460	3.0 3.0 3.5 3.5 4.0	162 342 432 522 612	an be for	e tables il ce with EN aring capa re be dime	lustrate to N 12101-2 acity of arensioned t	. The prov	mance for vided perf oplication	modules ormance . The desi	is NOT eq ign of a ro	under load ual to stri of light m	l in accord- uctural load ust there-
		N0800		2.5	180				fore be dimensioned to fit the specific building project, local architectural style and practice.								

Special sizes, functional limitations may apply.



Smoke ventilation systems

A smoke ventilation system always has a building specific design, incorporating smoke ventilators, controls, air inlets and mechanical ventilation.

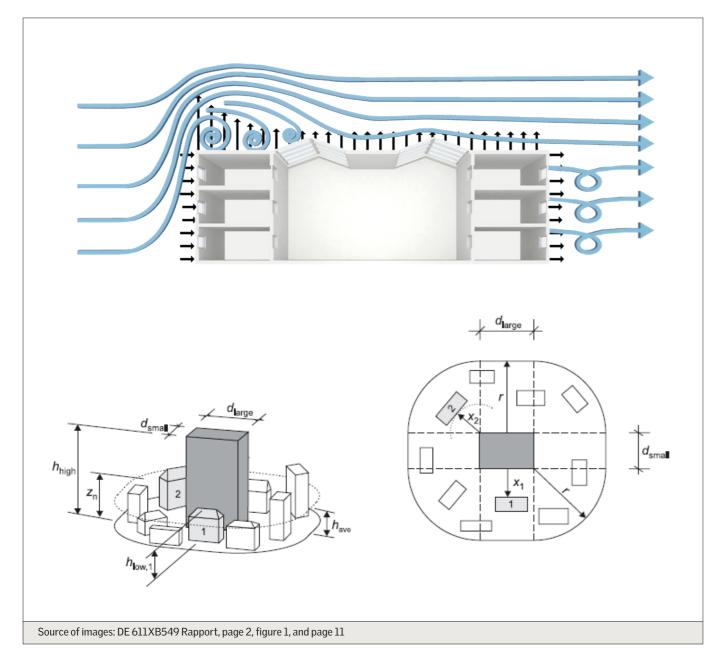
Designing a smoke ventilation system is therefore a rather complex matter, which must be addressed by skilled and authorized fire engineers in order to obtain an adequate level of performance and safety.

The design covers all relevant parameters such as the location of the building, height and shape of the roof, position of ventilators on the



roof, relative position to each other, facades and doors providing air intake, mechanical ventilation, evacuation plan and escape routes, and the natural and artificial wind obstacles in the surroundings of the building.

The VELUX Group provides the essential performance characteristics of each individual CE-marked VELUX Modular Skylight in accordance with EN 12101-2, but cannot validate the functionality and safety of the complete system.



Skylight module

VELUX wind deflector for smoke ventilation modules

Whenever it is required to obtain an Aerodynamic free area (Aa) which is accountable in any wind condition, i.e. considering the possible side wind effect, a possible solution is to install smoke ventilators with prefabricated VELUX wind deflector KCD. The wind deflector KCD is specifically designed to change the wind profile in any wind direction and to ensure that negative pressure i.e. wind suction occurs in the direct surroundings of the opening of the modular skylight. This enables smoke exhaust even in adverse wind conditions, provided that the entire building and smoke ventilation system is designed appropriately by authorized fire engineers.

The wind deflector comes in two variants: KCD W00H00 0040 that covers one smoke ventilation module and KCD 0080 that covers three skylight modules, one smoke ventilating module in the middle of two fixed modules of the same width. A skylight configuration with six modules can thus contain two smoke ventilation modules with KCD 0080 and four fixed modules. Please contact VELUX for detailed design advice.

The aerodynamic performance of the modular skylights with and without deflectors in accordance with EN 12101-2 is expressed on pages 88 and 89.

VELUX smoke ventilation modular skylights can be used without wind deflector in roof mounted applications, when local regulations and design conditions are allowing to do so.



VELUX smoke ventilation modular skylights installed in roof mounted applications i.e. up to 60° inclination are wind sensitive, which means that negative discharge i.e. air intake may occur in unfavourable wind conditions. This must be regarded and addressed by the building owner when designing the building and planning with wind sensitive smoke ventilators. To prevent negative discharge, the building owner must take steps to incorporate the product as a part of the total solution that can be approved by the local authorities. The solution could, for instance, be a VELUX KCD wind deflector, or a wind direction sensor in connection with multi-direction placement of smoke ventilators, or another device/roof integrated solution that ensures a sufficient aerodynamic free area.

VELUX wind deflector KCD is not applicable above 60° installation pitch, on so-called wall-mounted smoke ventilators. Smoke ventilators installed in this range are to be considered wind sensitive by default in accordance with EN 12101-2. When a smoke ventilator is used in wall-mounted applications i.e. above 60° installation inclination the aerodynamic area must be by default expressed without influence of side wind, therefore the use of a smoke deflector is meaningless in such applications. Wind deflector KCD is furthermore not compatible with narrow bottom flashing, Northlight flashings and Step solution





Wind deflector KCD W00H00 0040										
Material	Aluminium									
Material thickness	3 mm									
Surface treatment	Powder coated (60 - 120µ)									
Colour	NCS S7500-N, gloss 30									

Skylight module



Wind deflector KCD 0080	
Material	Aluminium
Material thickness	3 mm
Surface treatment	Anodized
Colour	Nature anodized Optional – coloured powder coating







Definitions

In accordance with EN 12101-2:

C_v [-] Coefficient of discharge that states the ratio between A_a and A_v ($C_v = A_a/A_v$). For roof-mounted smoke and heat exhaust ventilators the value of C_v is the lower of C_{v0} and C_{vw} .

For wall-mounted smoke and heat exhaust ventilators, C_v is not to be tested with wind influence i.e. $C_v = C_{v0}$.

- **Cvo** [-] Coefficient of discharge calculated based on pressure testing without side wind influence.
- **C**_{VW} [-] Coefficient of discharge calculated based on pressure testing with side wind influence.
- A_a [m²] A_a [m²] Aerodynamic free area (A_a = A_v x C_v). May be described as the effective area of the ventilator taking into account reductions in air flow along edges and around the openable panel as well as motors etc.
- A_V [m²] Geometric area, corresponds to frame aperture area.

Roof-mounted:

Smoke ventilators installed from 0° up to and including 60°. VELUX Modular Skylights installed from 5° to 60° are proven wind sensitive. This must be considered when planning the smoke ventilation of the building.

Wall-mounted:

Smoke ventilators installed above 60° up to 90° . Wall-mounted smoke ventilators are, as per definition, wind sensitive regardless of the design.

In accordance with EN 13141-1

A_c [m²] Geometric free area corresponds to the minimum unobstructed opening of the openable modular skylights in natural comfort ventilation position.

The area is calculated using the total opening area of the ventilator, in case of modular skylight top-hung ventilators from the front opening and the side triangles. Not identical to A_g [m^2], which is calculated in smoke ventilation opening position.

Used to define natural ventilation performance of comfort ventilation modular skylights and dual purpose smoke ventilation modular skylights in comfort ventilation use.

Skylight module





Geometric free area: A_c [m²]

In accordance with EN 13141-1



Geometric area: A_v [m²] Aerodynamic free area: $A_a = A_v \times C_v$

In accordance with EN 12101-2

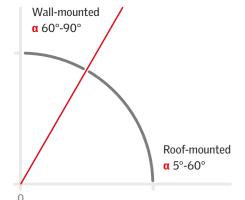






Table for European values

Ventilation	n chai	rateris	tics fo	or HVC	(Europ	ean va	lues)																		
						;	Smoke ve	ntilation cl	haracteris	stics HVC	АВ					fort vent EN13141									
	[mu]		[2]		Discharge	e coefficie	nt (C _v) (EN	l 12101-2)			Aerodynamic free area (A _a) [m²] (EN 12101-2)						CB and -AB in ction								
Size of Skylights	Actuator chain stroke [mm]	Opening angle	Geometric area: Av [m²]	Witl defle		With de	eflector D 0080		deflector CCD 0040 Without deflector		Without deflector		Without deflector		Without deflector		Without deflector		Without deflector		With deflector type KCD 0080	With deflector type KCD 0040	mm]	gle	area:
	uator chai	Openin	eometric a	without side wind	with side wind	without side wind	with side wind	without side wind	with side wind				5° ≤ Installation inclination < 60°		5° ≤ Installation inclination		inclination (60° Inclination		5° ≤ installation inclination ≤ 60°	5° ≤ installation inclination ≤ 60°	Actuator chain stroke [mm]	Opening angle	Geometric free area: Ac [m²]		
	Act		ğ	Cvo	Cvw	Cvo	Cvw	Cvo	Cvw	A _{a Roof} 1) Without side with side wind 2) A _{a Roof} with side wind		A _{a Wall} ³⁾	A _{a Roof} ⁴⁾	A _{a Roof} ⁴⁾	cha	0	Geor								
675 x 800	353	25.0°	0.48	0.42	0.00	0.49	0.59	0.40	0.26	0.20	0.00	0.20	0.24	0.13	260	18.5°	0.16								
675 x 1000	410	23.0°	0.61	0.44	0.00	0.46	0.60	0.40	0.24	0.27	0.00	0.27	0.28	0.15	260	14.5°	0.17								
675 x 1200	410	19.5°	0.74	0.40	0.00	0.43	0.57	0.38	0.22	0.30	0.00	0.30	0.32	0.16	260	12.5°	0.19								
675 x 1400	410	16.5°	0.87	0.36	0.00	0.40	0.54	0.35	0.20	0.31	0.00	0.31	0.35	0.17	260	10.5°	0.20								
675 x 1600	410	14.5°	1.00	0.33	0.00	0.38	0.52	0.33	0.19	0.33	0.00	0.33	0.38	0.19	260	9.0°	0.22								
675 x 1800	410	13.0°	1.12	0.34	0.00	0.36	0.49	0.34	0.19	0.38	0.00	0.38	0.40	0.21	260	8.0°	0.23								
675 x 2000	410	11.5°	1.25	0.32	0.00	0.33	0.45	0.33	0.16	0.40	0.00	0.40	0.41	0.20	260	7.5°	0.25								
675 x 2200	410	10.5°	1.38	0.31	0.00	0.32	0.43	0.32	0.17	0.43	0.00	0.43	0.44	0.23	260	6.5°	0.26								
675 x 2400	410	9.5°	1.51	0.29	0.00	0.30	0.41	0.30	0.16	0.44	0.00	0.44	0.45	0.24	260	6.0°	0.28								
675 x 2600	410	9.0°	1.64	0.31	0.00	-	-	0.32	0.17	0.50	0.00	0.50	-	0.28	260	5.5°	0.29								
675 x 2800	410	8.0°	1.76	0.28	0.00	-	-	0.31	0.18	0.49	0.00	0.49	-	0.32	260	5.5°	0.31								
750 x 800	353	25.0°	0.54	0.41	0.00	0.47	0.56	0.38	0.26	0.22	0.00	0.22	0.25	0.14	260	18.5°	0.17								
750 x 1000	439	25.0°	0.68	0.46	0.00	0.49	0.61	0.40	0.24	0.31	0.00	0.31	0.33	0.16	260	14.5°	0.19								
750 x 1200	460	21.5°	0.83	0.44	0.00	0.44	0.57	0.41	0.23	0.36	0.00	0.36	0.36	0.19	260	12.5°	0.20								
750 x 1400	460	18.5°	0.97	0.39	0.00	0.41	0.54	0.38	0.22	0.38	0.00	0.38	0.40	0.21	260	10.5°	0.22								
750 x 1600	460	16.0°	1.11	0.37	0.00	0.39	0.51	0.36	0.21	0.41	0.00	0.41	0.43	0.23	260	9.0°	0.23								
750 x 1800	460	14.5°	1.25	0.36	0.00	0.37	0.50	0.35	0.19	0.45	0.00	0.45	0.46	0.24	260	8.0°	0.25								
750 x 2000	460	13.0°	1.40	0.37	0.00	0.36	0.48	0.35	0.19	0.52	0.00	0.52	0.50	0.27	260	7.5°	0.26								
750 x 2200	460	12.0°	1.54	0.37	0.00	0.34	0.46	0.36	0.19	0.57	0.00	0.57	0,52	0.29	260	6.5°	0.27								
750 x 2400	460	11.0°	1.68	0.35	0.00	0.33	0.44	0.35	0.15	0.59	0.00	0.59	0.56	0.25	260	6.0°	0.29								
750 x 2600	460	10.0°	1.83	0.33	0.00	-	-	0.33	0.16	0.60	0.00	0.60	-	0.29	260	5.5°	0.30								

¹⁾ External building surfaces with inclination of 60° or less relative to the horizontal; shed roofs and continuous roof-lights, independent of inclination angle, are considered to be part of the roofs.

It is the responsibility of the building owner – together with the local fire authorities, if necessary – to ensure the system is specified, installed and operated in accordance with current national legislation and requirements.

Skylight module



Table for European values

Ventilation										IN:2					Com	fort vent	ilation				
			1				Smoke ve	ntilation c	haracteri	stics HVC	АВ				(EN13141-1)						
	星				Discharg	e coefficiei	nt (Cv) (EN	N 12101-2)			Aerodyna	mic free area	(A _a) [m ²] (EN 1210	1-2)	HVC	hfort fun	-AB in				
Size of Skylights	Actuator chain stroke [mm] Opening angle		ea: Av [m	rea: Av [m	rea: Av [m	Opening angle Geometric area: Av [m²]	rea: Av [n		Without deflector		With deflector type KCD 0080		eflector D 0040	Wit	Without deflector		With deflector type KCD 0080	With deflector type KCD 0040	mm]	gle	area:
	uator chai	Opening angle	sometric a	without side wind	with side wind	without side wind	with side wind	without side wind	with side wind	5° ≤ insta inclination		installation inclination > 60°	5° ≤ installation inclination ≤ 60°	5° ≤ installation inclination ≤ 60°	Actuator chain stroke [mm]	Opening angle	Geometric free area: Ac [m²]				
	Act		ğ	Cvo	Cvw	Cvo	C _{vw}	Cvo	Cvw	A _{a Roof} 1) without side wind 2)	A _{a Roof} with side wind	A _{a Wall} ³⁾	A _{a Roof} ⁴⁾	A _{a Roof} ⁴⁾	cha	chai Or Geom					
800 x 800	353	25.0°	0.58	0.40	0.00	0.46	0.54	0.37	0.25	0.23	0.00	0.23	0.27	0.14	260	18.5°	0.18				
800 x 1000	439	25.0°	0.73	0.45	0.00	0.48	0.59	0.41	0.24	0.33	0.00	0.33	0.35	0.18	260	14.5°	0.19				
800 x 1200	526	25.0°	0.88	0.48	0.00	0.49	0.63	0.44	0.22	0.42	0.00	0.42	0.43	0.19	260	12.5°	0.21				
800 x 1400	530	21.5°	1.04	0.45	0.00	0.45	0.59	0.41	0.22	0.47	0.00	0.47	0.47	0.23	260	10.5°	0.22				
800 x 1600	530	19.0°	1.19	0.42	0.00	0.43	0.57	0.39	0.22	0.50	0.00	0.50	0.51	0.26	260	9.0°	0.24				
800 x 1800	530	16.5°	1.34	0.39	0.00	0.40	0.54	0.38	0.21	0.52	0.00	0.52	0.54	0.28	260	8.0°	0.25				
800 x 2000	530	15.0°	1.50	0.40	0.00	0.39	0.52	0.39	0.19	0.60	0.00	0.60	0.58	0.28	260	7.5°	0.27				
800 x 2200	530	13.5°	1.65	0.38	0.00	0.37	0.50	0.37	0.18	0.63	0.00	0.63	0.61	0.30	260	6.5°	0.28				
800 x 2400	530	12.5°	1.80	0.37	0.00	0.35	0.47	0.36	0.14	0.67	0.00	0.67	0.63	0.25	260	6.0°	0.30				
900 x 800	353	25.0°	0.65	0.39	0.00	0.43	0.50	0.35	0.25	0.25	0.00	0.25	0.28	0.16	260	18.5°	0.20				
900 x 1000	439	25.0°	0.83	0.44	0.00	0.45	0.57	0.39	0.23	0.36	0.00	0.36	0.37	0.19	260	14.5°	0.21				
900 x 1200	526	25.0°	1.00	0.46	0.00	0.47	0.60	0.42	0.20	0.46	0.00	0.46	0.47	0.20	260	12.5°	0.23				
900 x 1400	610	24.5°	1.17	0.47	0.00	0.47	0.62	0.42	0.18	0.55	0.00	0.55	0.55	0.21	260	10.5°	0.24				
900 x 1600	610	21.5°	1.35	0.45	0.00	0.44	0.58	0.41	0.21	0.61	0.00	0.61	0.59	0.28	260	9.0°	0.25				
900 x 1800	610	19.0°	1.52	0.43	0.00	0.42	0.55	0.41	0.20	0.65	0.00	0.65	0.64	0.30	260	8.0°	0.27				
900 x 2000	610	17.0°	1.69	0.41	0.00	0.40	0.53	0.40	0.18	0.69	0.00	0.69	0.68	0.30	260	7.5°	0.28				
900 x 2200	610	16.0°	1.86	0.40	0.00	0.40	0.52	0.40	0.16	0.75	0.00	0.75	0.75	0.30	260	6.5°	0.30				
900 x 2400	610	14.5°	2.04	0.38	0.00	0.38	0.49	0.38	0.14	0.77	0.00	0.77	0.77	0.29	260	6.0°	0.33				
1000 x 800	353	25.0°	0.73	0.37	0.00	0.40	0.47	0.33	0.25	0,27	0.00	0.27	0.29	0.18	260	18.0°	0.21				
1000 x 1000	439	25.0°	0.92	0.41	0.00	0.43	0.54	0.37	0.21	0,38	0.00	0.38	0.40	0.19	260	14.5°	0.23				
1000 x 1200	526	25.0°	1.11	0.44	0.00	0.45	0.58	0.40	0.18	0,49	0.00	0.49	0.50	0.20	260	12.5°	0.24				
1000 x 1400	610	25.0°	1.31	0.46	0.00	0.46	0.61	0.42	0.16	0,60	0.00	0.60	0.60	0.21	260	10.5°	0.26				
1000 x 1600	700	24.0°	1.50	0.47	0.00	0.46	0.60	0.44	0.17	0,71	0.00	0.71	0.69	0.26	260	9.0°	0.27				
1000 x 1800	700	22.0°	1.69	0.47	0.00	0.44	0.58	0.42	0.17	0,80	0.00	0.80	0.75	0.29	260	8.0°	0.29				
1000 x 2000	700	20.0°	1.89	0.44	0.00	0.43	0.55	0.42	0.16	0,83	0.00	0.83	0.81	0.30	260	7.5°	0.30				
1000 x 2200	700	18.0°	2.08	0.42	0.00	0.42	0.52	0.41	0.15	0,87	0.00	0.87	0.87	0.31	260	6.5°	0.31				
1000 x 2400	700	16.5°	2.27	0.39	0.00	0.40	0.51	0.39	0.13	0,89	0.00	0.89	0.91	0.30	260	6.0°	0.33				

¹⁾ External building surfaces with inclination of 60° or less relative to the horizontal; shed roofs and continuous roof-lights, independent of inclination angle, are considered to be part of the roofs.

²⁾ The aerodynamic area has been declared in accordance with EN 12101-2, which means the products have been tested with and without side wind. The aerodynamic area expressed without deflector is wind sensitive which therefore, in connection with the design of the smoke ventilation system, means that steps must be taken to incorporate the products as part of a total solution that can be approved by the local fire authorities. This solution could consist of, for instance, a wind direction sensor, a wind deflector or another device that ensures a sufficient aerodynamic area at all times.

³⁾ External building surfaces with an inclination of more than 60° relative to the horizontal.

⁴⁾ Aerodynamic tests as outlined in EN 12101-2:2003 were conducted both with wind (C_{vv}) and without influence of wind (C_{v0}). In any case, the lower of C_{v0} and C_{vw} is used.

²⁾ The aerodynamic area has been declared in accordance with EN 12101-2, which means the products have been tested with and without side wind. The aerodynamic area expressed without deflector is wind sensitive which therefore, in connection with the design of the smoke ventilation system, means that steps must be taken to incorporate the products as part of a total solution that can be approved by the local fire authorities. This solution could consist of, for instance, a wind direction sensor, a wind deflector or another device that ensures a sufficient aerodynamic area at all times.

It is the responsibility of the building owner – together with the local fire authorities, if necessary – to ensure the system is specified, installed and operated in accordance with current national legislation and requirements.

³⁾ External building surfaces with an inclination of more than 60° relative to the horizontal.

⁴⁾ Aerodynamic tests as outlined in EN 12101-2:2003 were conducted both with wind (C_{vw}) and without influence of wind (C_{vo}). In any case, the lower of C_{vo} and C_{vw} is used.





The aerodynamic areas below are outside of the scope of EN 12101-2.

They are however used nationally and referred to in national regulations and/or practical guides.

1) A_g [m²] Geometric free area, corresponds to the minimum unobstructed opening area of the smoke ventilators.

The typical use of this parameter is to define the ventilation area of smoke ventilators when they are used as so called cold smoke exhaust ventilators, assuming that the outtake pressure is generated by mechanical extract fans or generated by a chimney stack effect. A typical use of this area is when smoke ventilators are used over staircases. National and local regulations may differ and wherever they exist, they must be followed.

Definition of the geometric free area:

Figure 1.a:

Germany: In accordance with DIN 18232

The area is calculated in relation to the use of the total unobstructed opening area of the ventilator. In case of modular skylight top-hung ventilators it equals to the front opening (A) and the side triangles (B+C).

Not identical to $A_{\rm c}\, [m^2],$ which is calculated in comfort opening position.

Figure 1.b:

Austria: In accordance with the Guideline TRVB S 111 + addendum 3.3.2018 to point 5.4

The area is calculated in relation to the use of the total unobstructed opening area of the ventilator with some limitations depending on the size and installation inclination and the relation of the opening angle to the installation inclination.

In case of modular skylight top-hung ventilators the value is equal to

- The front opening (A) when the $A_v \le 1m^2$
- The front opening (A) when the $A_v > 1m^2$ and the sash remains below or raises maximum up to horizontal open position
- The front opening (A) plus one of the two side triangles (B)

Figure 1.c:

Belgium: In accordance with NBN S21-208-3

The area is calculated in relation to the use of the total unobstructed opening area of the ventilator. In case of modular skylight top-hung ventilators it equals to the front opening (A).



Figure 2: Great Britain: Free area of smoke ventilators

• Great Britain: In accordance with Approved Document B, Volume 2, Appendix C, Section 5.b, Diagram C7, figure a

The area is usable as an alternative to the first place cited Aerodynamic Free (Aa) in accordance with BS EN 12101-2 under Section 5.a. whenever it is specified in the requirements.

Skylight module



1.a:



Geometric free area: A_q [m²] in Germany

In accordance with DIN 18232

Geometric free area: A_a [m²] in Denmark

In accordance with DBI 027

1.b:



Geometric area: A_g [m²] in Austria

In accordance with Guideline TRVB S 111 + addendum 3.3.2018 to point 5.4.

1.c:



Geometric area: A [m²] in Belgium

In accordance with NBN S21-208-3



Free area of smoke ventilators: A in Great Britain

In accordance with Approved Document B, Volume 2, Appendix C, Section 5.b, Diagram C7, figure a





Table for country specific values

	Basic geome	etry data			Additio	onal national smoke ve	entilation characteristic	s HVCAB		
				Germany	Denmark	Belgium	Aus	stria	Great Britain	
				DIN 18232	DBI 027	NBN S21-208- 3:2018	Guideline TRVB S 3.3.2018 t	5 111 + addendum to point 5.4.		
Size of Skylights	Actuator chain stroke [mm]	Opening angle	Geometric area: Av [m²] (EN 12101-2)	Geometric free area: A _g [m²]	Cold smoke exhaust area: A ₉ [m ²]	Geometric free area (A) in accordance with NBN S21-208-3:2018	The installation inclination of the module is smaller than the opening angle of the sash relative to horizontal, i.e the sash raises above horizontal in fully opened position.	The installation inclination of the module is larger than the opening angle of the sash relative to horizontal, i.e the sash remains below or raises maximum up to horizontal in fully opened position	The Free Area Smoke Ventilator in accordance with Approved Document I Volume 2, Appendix C, Section 5.b, Diagram C7, figure a.	
								area: A _g [m²]	Area (A) [m²] *	
675 x 800	353	25.0°	0.48	0.28	0.28	0.16	0.16	0.16	0.14	
675 x 1000	410	23.0°	0.61	0.39	0.39	0.20	0.20	0.20	0.18	
675 x 1200	410	19.5°	0.74	0.44	0.44	0.20	0.20	0.20	0.17	
675 x 1600	410	16.5° 14.5°	1.00	0.48	0.48	0.20	0.20	0.20	0.17	
675 x 1800	410	14.5°	1.12	0.56	0.52	0.20	0.20	0.20	0.17	
675 x 2000	410	11.5°	1.25	0.60	0.60	0.20	0.40	0.20	0.16	
675 x 2200	410	10.5°	1.38	0.64	0.64	0.20	0.42	0.20	0.16	
675 x 2400	410	9.5°	1.51	0.68	0.68	0.20	0.44	0.20	0.16	
675 x 2600	410	9.0°	1.64	0.72	0.72	0.20	0.46	0.20	0.16	
675 x 2800	410	8.0°	1.76	0.76	0.76	0.20	0.48	0.20	0.16	
750 x 800	353	25.0°	0.54	0.30	0.30	0.18	0.18	0.18	0.16	
750 x 1000	439	25.0°	0.68	0.46	0.46	0.24	0.24	0.24	0.22	
750 x 1200	460	21.5°	0.83	0.55	0.55	0.26	0.26	0.26	0.23	
750 x 1400	460	18.5°	0.97	0.60	0.60	0.26	0.26	0.26	0.23	
750 x 1600	460	16.0°	1.11	0.65	0.65	0.26	0.45	0.26	0.22	
750 x 1800	460	14.5°	1.25	0.70	0.70	0.26	0.48	0.26	0.22	
750 x 2000	460	13.0°	1.40	0.75	0.75	0.26	0.50	0.26	0.22	
750 x 2200	460	12.0°	1.54	0.80	0.80	0.26	0.53	0.26	0.22	
750 x 2400	460	11.0°	1.68	0.85	0.85	0.26	0.55	0.26	0.22	
750 x 2600	460	10.0°	1.83	0.90	0.90	0.26	0.58	0.26	0.22	
800 x 800	353	25.0°	0.58	0.31	0.31	0.20	0.20	0.20	0.17	
800 x 1000	439	25.0°	0.73	0.48	0.48	0.26	0.26	0.26	0.24	
800 x 1200	526	25.0°	0.88	0.69	0.69	0.33	0.33	0.33	0.31	
800 x 1400	530	21.5°	1.04	0.76	0.76	0.33	0.54	0.33	0.30	
800 x 1600	530	19.0°	1.19	0.82	0.82	0.33	0.58	0.33	0.30	
800 x 1800	530	16.5°	1.34	0.89	0.89	0.33	0.61	0.33	0.29	
800 x 2000	530	15.0°	1.50	0.95	0.95	0.33	0.64	0.33	0.29	
800 x 2200	530	13.5°	1.65	1.01	1.01	0.33	0.67	0.33	0.29	
800 x 2400	530	12.5°	1.80	1.08	1.08	0.33	0.70	0.33	0.29	

^{*} Note that this particular calculation of the The Free Area Smoke Ventilator in accordance with Approved Document B, Volume 2, Appendix C, Section 5.b, Diagram C7, figure a. is only a secondary alternative to the in the first place cited Aerodynamic Free (Aa) in accordance with BS EN 12101-2 under Section 5.a. Furthermore, the calculation in accordance to 5.d diagram C7, figure a. cannot take into consideration individual lining depths used in specific interior design cases, which may give further limitations to the values presented above.

Skylight module



Table for country specific values

Additional	ventilati	on charat	teristics H	IVC					
	Basic geome	etry data			Addit	ional national smoke ve	ntilation characteristic	s HVCAB	
				Germany	Denmark	Belgium	Aus	stria	Great Britain
				DIN 18232	DBI 027	NBN S21-208- 3:2018		5 111 + addendum co point 5.4.	
Size of Skylights	Actuator chain stroke [mm]	Opening angle	Geometric area: Av [m²] (EN 12101-2)	Geometric free area: A, [m²]	Cold smoke exhaust area: Aु [m²]	Geometric free area (A) in accordance with NBN S21-208-3:2018	The installation inclination of the module is smaller than the opening angle of the sash relative to horizontal, i.e the sash raises above horizontal in fully opened position.	The installation inclination of the module is larger than the opening angle of the sash relative to horizontal, i.e the sash remains below or raises maximum up to horizontal in fully opened position	The Free Area Smoke Ventilator in accordance with Approved Document E Volume 2, Appendix C, Section 5.b, Diagram C7, figure a.
	acc		ac	Geometric a	area: A _g [m²]	Area (A) [m²] *			
900 x 800	353	25.0°	0.65	0.34	0.34	0.22	0.22	0.22	0.20
900 x 1000	439	25.0°	0.83	0.52	0.52	0.30	0.30	0.30	0.27
900 x 1200	526	25.0°	1.00	0.73	0.73	0.37	0.37	0.37	0.35
900 x 1400	610	24.5°	1.17	0.98	0.98	0.44	0.71	0.44	0.42
900 x 1600	610	21.5°	1.35	1.05	1.05	0.44	0.75	0.44	0.41
900 x 1800	610	19.0°	1.52	1.13	1.13	0.44	0.79	0.44	0.41
900 x 2000	610	17.0°	1.69	1.21	1.21	0.44	0.83	0.44	0.40
900 x 2200	610	16.0°	1.86	1.29	1.29	0.44	0.87	0.44	0.40
900 x 2400	610	14.5°	2.04	1.37	1.37	0.44	0.91	0.44	0.40
1000 x 800	353	25.0°	0.73	0.36	0.36	0.25	0.25	0.25	0.22
1000 x 1000	439	25.0°	0.92	0.55	0.55	0.33	0.33	0.33	0.30
1000 x 1200	526	25.0°	1.11	0.77	0.77	0.41	0.59	0.41	0.39
1000 x 1400	610	25.0°	1.31	1.02	1.02	0.49	0.76	0.49	0.47
1000 x 1600	700	24.0°	1.50	1.32	1.32	0.58	0.95	0.58	0.56
1000 x 1800	700	22.0°	1.69	1.42	1.42	0.58	1.00	0.58	0.55
1000 x 2000	700	20.0°	1.89	1.51	1.51	0.58	1.05	0.58	0.55
1000 x 2200	700	18.0°	2.08	1.61	1.61	0.58	1.10	0.58	0.54
1000 x 2400	700	16.5°	2.27	1.71	1.71	0.58	1.14	0.58	0.54

^{*} Note that this particular calculation of the The Free Area Smoke Ventilator in accordance with Approved Document B, Volume 2, Appendix C, Section 5.b, Diagram C7, figure a. is only a secondary alternative to the in the first place cited Aerodynamic Free (Aa) in accordance with BS EN 12101-2 under Section 5.a. Furthermore, the calculation in accordance to 5.d diagram C7, figure a. cannot take into consideration individual lining depths used in specific interior design cases, which may give further limitations to the values presented above.



Glazing unit



Coating options	Colour code	Explanation
LowE		Low-emissivity coating
Sun1		Light sun protection coating
Sun2		Enhanced sun protection coating

Glazing description	Colour code	Explanation	Characteristic bending strength
F		Float	45.0 N/mm²
Н		Toughened	120.0 N/mm²
HS		Heat Strengthened	70.0 N/mm²
Int		Fire protection gel	-

Gas description	Colour code
Argon	
Krypton	

Foil	Colour code	Explanation
Polyvinyl butyral (PVB)		Lamination foil between the sheets of the laminated glass

Example of glazing unit co	onstruction	
	Description, from outside - inside	
Glazing variant	IGU 16L	
Construction	6H LowE-14 Argon-6HS-14 Argon-33.2F LowE	

	Description	Visual colour description
6H	6 mm pane with toughened glass	
LowE	Low-emissivity coating	
14 Argon	14 mm Argon filled cavity	
6HS	6 mm pane with heat strengthened glass	
14 Argon	14 mm Argon filled cavity	
33.2F	Laminated glass, 3 mm float – 2 x 0.38 PVB foil – 3 mm float	
LowE	Low-emissivity coating	

	Description, from outside - inside	Visual colour description, from outside - inside				
Construction colour code	6H LowE-14 Argon-6HS-14 Argon-33.2F LowE					

Glazing Unit



Double Glazing = **DG** Triple Glazing = **TG**

TG/	Coating		Construction	Glass thickness	Visual colour description		
DG		IGU	Insulating Glass Unit (IGU)		Insulating Glass Unit (IGU)		
		code	(outside - inside)	mm	(outside - inside)		
DG	LowE	10L	6H-22 Argon-33.2F LowE	12			
DG	LowE	10T	8H-16 Argon-55.2F LowE	18			
TG	LowE	16L	6H LowE-14 Argon-6HS-14 Argon-33.2F LowE	18			
TG	LowE	16K	8H LowE-12 Krypton-4HS-12 Krypton-55.2HS LowE	22			
TG	LowE	16T	8H LowE-12 Argon-4HS-12 Argon-55.2HS LowE	22			
DG	Sunl	11L	6H Sun1-22 Argon-33.2F	12			
DG	Sun1	11T	8H Sun1-16 Argon-55.2F	18			
TG	Sunl	17L	6H Sun1-14 Argon-6HS-14 Argon-33.2F LowE	18			
TG	Sun1	17K	8H Sun1-12 Krypton-4HS-12 Krypton-55.2HS LowE	22			
TG	Sun1	17T	8H Sun1-12 Argon-4HS-12 Argon-55.2HS LowE	22			
DG	Sun2	12T	8H Sun2-16 Argon-55.2F	18			
TG	Sun2	18T	8H Sun2-12 Argon-4HS-12 Argon-55.2HS LowE	22			

Fire	Fire resistant glazing units used in fire resistant modules HFS							
TG/	Coating		Construction	Visual colour description				
DG	Joanning	IGU	Insulating Glass Unit (IGU)	Insulating Glass Unit (IGU)				
		code	(outside - inside)	(outside - inside)				
DG	LowE	10U	6H LowE-9Krypton - 5H - Int.6 - 44.2F					
DG	Sunl	11U	6H Sun1-9Krypton - 5H - Int.6 - 44.2F					
DG	Sun2	12U	6H Sun2-9Krypton - 5H - Int.6- 44.2F					



Glazing unit





Double glazing = DG / Triple glazing = TG	Coating		Thermal transmittance	Psi value	Thermal tra of the enti in accorda EN 14	re window ance with	ittance		ttance	ering index	Direct airborn sound reduction IGU	Acoustic performance window ^{1), 2)}		Total solar energy direct absorbtion	Resistance to pendulum body impact	burglary
Double glazin					area > 2.3 m²	area ≤ 2.3 m²	Light transmittance	Solar factor	UV transmittance	Colour rendering index	Direct airbo	Acoustic per	Rain noise	Total solar e	Resistance t	Resistance to burglary
		IGU	U g	ψ	Uw	U _w	τ_{v}	g	τιιν	Ra	R _w (C, C _{tr})	R _w (C, C _{tr})	Lia	a	Class	Class
		code	W/m²K	W/mK	W/m²K	W/m²K	%	%	%		dB	dB	dB	%	Outside/Inside	Inside
DG	LowE	10L	1.1	0.059	1.4	1.4	80	62	0.3	96	35 (-3;-7)	35 (-1;-5)	52	24	1C1/1B1	P2A
DG	LowE	10T	1.0	0.066	1.3	1.4	73	51	0.4	95	41 (-1;-4)	38 (-1;-4)	49	30	1C1/1B1	P2A
TG	LowE	16L	0.4													
TC			0.6	0.060	0.89	0.98	72	51	0.2	95	37 (-2;-6)	36 (-1;-4)	49	35	1C1/NPD/1B1	P2A
TG	LowE	16K	0.6	0.060	0.89 0.86/0.87 ³⁾	0.98 0.96/0.99 ³⁾	72 71	51 50	0.2	95 94	37 (-2;-6) 42 (-2;-6)	36 (-1;-4) 38 (-1;-4)	49 48	35 38	1C1/NPD/1B1 1C1/NPD/1B1	P2A P2A
TG	LowE LowE											. , .				
		16K	0.5	0.080	0.86/0.87 3)	0.96/0.99 3)	71	50	0.2	94	42 (-2;-6)	38 (-1;-4)	48	38	1C1/NPD/1B1	P2A
TG	LowE	16K 16T	0.5	0.080	0.86/0.87 3)	0.96/0.99 ³⁾	71 71	50 50	0.2	94 94	42 (-2;-6) 42 (-2;-6)	38 (-1;-4) 38 (-1;-4)	48 48	38 38	1C1/NPD/1B1 1C1/NPD/1B1	P2A P2A
TG DG	LowE Sun1	16K 16T	0.5 0.7	0.080 0.080 0.059	0.86/0.87 ³⁾ 1.0 1.4	0.96/0.99 ³⁾ 1.1 1.4	71 71 51	50 50 28	0.2	94 94 92	42 (-2;-6) 42 (-2;-6) 35 (-3;-7)	38 (-1;-4) 38 (-1;-4) 35 (-1;-5)	48 48 52	38 38 39	1C1/NPD/1B1 1C1/NPD/1B1 1C1/1B1	P2A P2A P2A
TG DG DG	LowE Sun1 Sun1	16K 16T 11L 11T	0.5 0.7 1.1 1.0	0.080 0.080 0.059 0.066	0.86/0.87 ³⁾ 1.0 1.4 1.3	0.96/0.99 ³⁾ 1.1 1.4 1.4	71 71 51 49	50 50 28 28	0.2 0.2 0.2 0.3	94 94 92 90	42 (-2;-6) 42 (-2;-6) 35 (-3;-7) 41 (-1;-4)	38 (-1;-4) 38 (-1;-4) 35 (-1;-5) 38 (-1;-4)	48 48 52 49	38 38 39 42	1C1/NPD/1B1 1C1/NPD/1B1 1C1/1B1 1C1/1B1	P2A P2A P2A P2A
TG DG DG TG	Sun1 Sun1 Sun1	16K 16T 11L 11T 17L	0.5 0.7 1.1 1.0 0.6	0.080 0.080 0.059 0.066 0.060	1.0 1.4 1.3 0.89	0.96/0.99 ³⁾ 1.1 1.4 1.4 0.98	71 71 51 49 46	50 50 28 28 26	0.2 0.2 0.2 0.3 0.1	94 94 92 90 90	42 (-2;-6) 42 (-2;-6) 35 (-3;-7) 41 (-1;-4) 37 (-2;-6)	38 (-1;-4) 38 (-1;-4) 35 (-1;-5) 38 (-1;-4) 36 (-1;-4)	48 48 52 49 49	38 38 39 42 42	1C1/NPD/1B1 1C1/NPD/1B1 1C1/1B1 1C1/1B1 1C1/NPD/1B1	P2A P2A P2A P2A P2A
TG DG DG TG	Sun1 Sun1 Sun1 Sun1	16K 16T 11L 11T 17L 17K	0.5 0.7 1.1 1.0 0.6 0.5	0.080 0.080 0.059 0.066 0.060 0.080	1.0 1.4 1.3 0.89 0.86/0.87 3)	0.96/0.99 ³⁾ 1.1 1.4 1.4 0.98 0.96/0.99 ³⁾	71 71 51 49 46 45	50 50 28 28 26 26	0.2 0.2 0.3 0.1	94 94 92 90 90 89	42 (-2;-6) 42 (-2;-6) 35 (-3;-7) 41 (-1;-4) 37 (-2;-6) 42 (-2;-6)	38 (-1;-4) 38 (-1;-4) 35 (-1;-5) 38 (-1;-4) 36 (-1;-4) 38 (-1;-4)	48 48 52 49 49	38 38 39 42 42 44	1C1/NPD/1B1 1C1/NPD/1B1 1C1/1B1 1C1/NPD/1B1 1C1/NPD/1B1	P2A P2A P2A P2A P2A P2A

Fire	Fire resistant glazing units used in fire resistant modules HFS										
	Coating	IGU	Ug	ψ	U _W Area > 2.3m ²	U _W Area ≤ 2.3m²	τν	g	των	Ra	a
		code	W/m²K	W/mK	W/m²K	W/m²K	%	%	%		%
DG	LowE	10U	1.0	0.083	1.3	1.4	76	60	_	96	29
DG	Sunl	110	1.0	0.083	1.3	1.4	65	40	-	92	37
DG	Sun2	12U	1.0	0.083	1.3	1.4	57	33	-	90	40

- 1) For product sizes A </= 2.7 m². For product sizes of 2.7m² < A <3.6 m², the sound insulation values must be deducted by 1 dB
 2) The R_w-value indicates the number of decibels by which a window will reduce apparent noise.
 R_w+C is an adjustment factor to account for high frequency noise sources e.g. living activities (talking, music, radio, TV), railway traffic at medium to high speed, road traffic exceeding 80 km/h or a jet aircraft.
 R_w+Ctr is an adjustment factor to account for low frequency noise sources e.g. urban road traffic or railway traffic at low speeds.

- It is up to the customer to verify the chosen fire reststant glazing unit against the project specific conditions following the national requirement.
 Production height for calculation of climatic load is from 0 to 300 metre above sea level.
 Modules higher than 2400 mm will be delivered with a T-pane.

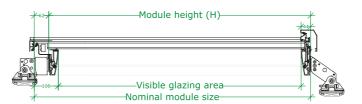
- Other insulating glass units are available, contact your VELUX sales office for more details.

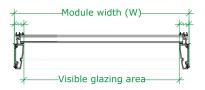
Glazing area

Calculation of glazing area

Nominal module size: $W \times (H + 62 \text{ mm}) \text{ m}^2$

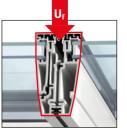
Visible glazing area: $(W - (2 \times 44 \text{ mm})) \times (H - (2 \times 44 \text{ mm})) \text{ m}^2$





Frame & sash

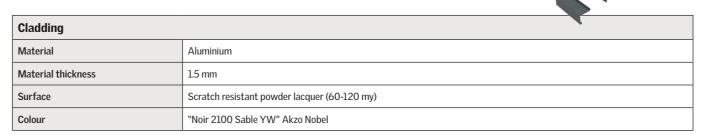
Frame and Sash	
Material	Pultruded composite (approx. 80% fibreglass and 20% polyurethane)
Material thickness	3-4 mm
Surface coating	Waterbased white coating
Colour	RAL 9010, gloss 30



: .	: 111
Thermal tran the frame p	smittance of profiles (U _f)
U _f 1) [V	V/m²K]
Double-glazed	Triple-glazed
1.40	1.25

¹⁾ Calculated in accordance to EN ISO 10077-2:2012 and refers to the joint profiles when modules are

Cladding & flashing



Flashing				
Flashing material	Aluminium			
Material thickness	1 mm			
Surface	Front: PVdf lacquer	Back: polyamid polyester lacquer		
Colour	Front: NCS standard colour: S 7500-N (RAL 7043)			
Insulation material	EPS			
Material thickness	10 mm			
Wind and snow stop	Polyurethane foam			

Under normal conditions the free vision trough the glass in a HFS module will not be adversely affected.

The term normal conditions implies that the gel layer may not be allowed to reach temperatures below -10°C or above + 45°C.



Frame & sash - interior colours



Standard colours



FRAME AND SASH WHITE

Material: Pultruded composite (approx. 80% fibreglass and 20% polyurethane) Surface: Waterbased white coating Colour: RAL 9010, gloss 30

Semi-standard colours (Available at additional cost)



FRAME AND SASH LIGHT GREY

Material: Pultruded composite (approx. 80% fibreglass and 20% polyurethane) Surface: Waterbased light grey coating Colour: RAL 7037, gloss 30



FRAME AND SASH DARK GREY

Material: Pultruded composite (approx. 80% fibreglass and 20% polyurethane) Surface: Waterbased dark grey coating Colour: RAL 7021, gloss 30



FRAME AND SASH BLACK

Material: Pultruded composite (approx. 80% fibreglass and 20% polyurethane) Surface: Waterbased black coating Colour: RAL 9005, gloss 30

Special colours

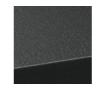


SPECIAL COLOURS

All other colours can be ordered at additional cost. Contact our sales team for more details.

Cladding and flashing - exterior colours

Standard colours



CLADDING DARK GREY

Material: Aluminium (1.5 mm) Surface: Scratch resistant powder lacquer Colour: "Noir 2100 Sable YW" Akzo Nobel (Granite 60)



FLASHING GREY

Material: Aluminium (1 mm)
Surface: PVdf lacquer
Colour: NCS standard colour: S 7500-N (RAL 7043), gloss 30

Semi-standard colours (Available at additional cost)



CLADDING WHITE

Material: Aluminium (1.5 mm) Surface: Scratch resistant powder lacquer Colour: AA10F Sable (Granite 01)



FLASHING WHITE

Material: Aluminium (1 mm) Surface: PVdf lacquer Colour: RAL 9010, gloss 30



CLADDING LIGHT GREY

Material: Aluminium (1.5 mm) Surface: Scratch resistant powder lacquer Colour: Gris 400 Sable (Granite 20)



FLASHING LIGHT GREY

Material: Aluminium (1 mm) Surface: PVdf lacquer Colour: RAL 7037, gloss 30



CLADDING DARK GREY

Not a semi-standard colour Same as our standard colour cladding



FLASHING DARK GREY

Material: Aluminium (1 mm) Surface: PVdf lacquer Colour: RAL 7021, gloss 30



CLADDING BLACK

Material: Aluminium (1.5 mm) Surface: Scratch resistant powder lacquer Colour: Noire 900 Sable (Granite 80)



FLASHING BLACK

Material: Aluminium (1 mm) Surface: PVdf lacquer Colour: RAL 9005, gloss 30

Special colours



SPECIAL COLOURS

All other colours can be ordered at additional cost. Contact our sales team for more details.



Vapour barrier connection strip



	всх	BSX
Membrane	Polyethylene (PE-LD) 150 μm	Multilayer foil containing polyethylene and aluminium, 0.15 mm thick
Gasket	Welded EPDM rubber seal gasket	Welded EPDM rubber seal gasket
Height	200 mm	200 mm
Length	10,000 mm (10 m)	10,000 mm (10 m)
Classification	BCX is CE-marked in accordance with EN 13984	BSX is CE-marked in accordance with EN 13984
Resistance	Water vapour resistance Sd = 80 m	Water vapour resistance Sd = >1500 m
Reaction to fire	Class E	Class E

Chain actuator

Venting modular skylights and roller blinds can be powered and controlled from either a VELUX INTEGRA® or an Open system control system.

With VELUX INTEGRA® the actuator is powered and controlled with control unit KLC 410 and operated with a VELUX control pad. With Open system the actuator can be powered and controlled with either a ±24 V DC or a MotorLink TM control system.

VELUX INTEGRA® / Open	system
Material	Anodised aluminium housing with zinc cromate passivated steel chain
Weight	Max 5.5 kg
Control system	VELUX INTEGRA®, MotorLink™ or ±24 V DC*
Supply cable	1.2 m grey silicone cable, 3 cord, 0.75 mm ² (white brown green**)
Chain stroke	HVCCB (comfort) 260 mm
	HVCAB (smoke and comfort) up to 700 mm (depending on module size)
Opening speed	HVCCB (comfort) 7 mm/s
	HVCAB (smoke and comfort) up to 13 mm/s
Sound level	32 dB (min speed)***
Holding force (tractive)	5000 N (burglary strength) min
Pressure force	1000 Newton* (smoke ventilation: 1300 Newton)
Tractive force	300-1000 Newton
IP rating	IPX4
Operation conditions	-15°C - +76°C, max. 90% relative humidity (not condensing)
Nominal voltage	24 V DC (max 10% ripple) ****
Voltage	19-32 V DC
Max voltage	32 V DC
Switch-on-duration	ED max 20% (2 minutes per 10 minutes)
Current consumption	HVCCB (comfort) max. 2A
	HVCAB (smoke and comfort) 2.5 - 5.5A depending on module size, glazing variant and required snow load
Service	It is recommended to carry out a function test of the actuator at least once a year and to make sure that the skylight opens correctly.
CE marking	The product is tested with the original WindowMaster control units and complies with the EMC directive's requirements for use in residential, commercial and light commercial buildings.
Reservation	The VELUX Group reserves the right to make to technical changes.

Chain actuator



 ${}^{\star}\!At\,standard\,{}^{\pm}\,24\,V\,DC\,connection\,maximum\,distances\,from\,venting\,skylight\,to\,power\,supply\,in\,accordance\,to\,calculation:$

Max cable length =

(admissible voltage drop (UL) x conductivity of copper (56) x cable cross-section (a))

(total max. actuator current (I) in amps x 2)

 $At \, Motor Link TM \, (3 \, cord) \, connection \, maximum \, distances \, from \, roller \, blind \, to \, motor \, controller \, (power \, supply) \, is \, 50 \, m.$

**Green = communication wire

*** The sound level can vary depending on the opening speed and building conditions

**** The provided characteristics for Opening under load and related current consumptions on pages 78-81 are tested and valid for 24 V DC nominal voltage.

Preconditions for drive time for comfort ventilation with a smoke venting module

When using a smoke ventilation skylight module HVC AB for comfort ventilation, it must be ensured that the comfort opening is in accordance with the tables on pages 88-89 of the

The chain stroke for comfort opening function must be limited accordingly by the control system time to maintain lifetime expectancy and guarantee of the modules, and for example can be done by limiting the drive time in most simple control setup.

The provided drive times to the right are examples valid for the default strongest motor

When a lower power consumption motor variant is configured and used, the chain will travel at a lower speed depending in the size of the module. Therefore, in these situations the appropriate drive time to reach the comfort opening must be established by the installer of the control system and set accordingly.

The actuator is lifetime tested for comfort ventilation with a chain stroke up to 410 mm.

Maximum drive time	for comfort ventilatio	n (HVCAB)
Module height	Chain stroke [mm]	Drive time [sec]
800	260	20
1000	260	20
1200	260	20
1400	260	20
1600	260	20
1800	260	20
2000	260	20
2200	260	20
2400	260	20
2600	260	20
2800	260	20



Control system



Power supply and control u	nit KLC 410
Material and colour	Black fire resistant polycarbonate
Size and weight	Product including packaging: 587 mm x 80 mm x 166 mm (W x H x D) 2.0 kg Control unit: 380 mm x 36 mm x 87 mm (W x H x D) 1.5 kg
Installation	24 V DC SELV class III construction output. The control unit is for use in small/medium installations with VELUX Modular Skylights. The control unit can be installed under the flashing of VELUX Modular Skylights or inside the building, at a maximum cable distance of 20 m from the chain actuator. The control unit functions at temperatures between -15°C and +50°C. ta=40°C The control unit is equipped with a 2.2 m 2-core cable (2 x 1.5 mm² H05VV-F) and plug for connection to the mains supply. Radio frequency range: 300 m range open field. Depending on the building construction, the indoor range is approximately 30 m.
IP rating	IPX4
Power supply characteristics	Primary side: 230/240 V AC - 50 Hz / 250W Secondary side: 24 V DC - 10 A class III construction output.
Connection	The control unit is only to be used with VELUX Modular Skylights and VELUX roller blinds RMM. The control unit can supply power to one venting skylight module and/or up to four roller blinds RMM. The connection wires are pre-fitted with wire-to-wire connectors. The connection wires to the chain actuator and the roller blinds RMM can be extended up to 20 m with a $2 \times 1.5 \text{ mm}^2$ cable.
Compatibility	KLC 410 is based on radio frequency (RF) technology and signals are transmitted in the 868 MHz range. It can be used with VELUX Modular Skylights chain actuator and roller blinds RMM. VELUX electrical products connected to KLC 410 can be operated by io-homecontrol® compatible activation controls.
CE marking	CE-marked to indicate that it is in accordance with the following EU directives: CPR, LVD, MD, RoHS, WEEE, R&TTE, Packaging waste directive and EMC for household, trade and light industry. Combinations of VELUX electrical products meet the requirements of above-mentioned directives.
Note	The VELUX Group reserves the right to make technical changes.



Control pad KLR 200	
Material and colour	ABS, white (NCS S 1000-N), black (RAL 9005) and metallic grey
Size and weight	Product including packaging: 235 x 153 x 48 mm (W x H x D), 250 g Control pad: 95 x 95 x 23 mm (W x H x D), 180 g
Use	For indoor use, maximum ambient temperature 50°C Radio frequency range: 200 m range open field. Depending on the building construction, the indoor range is approximately 20 m Maximum number of products is 200*
Battery requirement	3 x Alkaline AA (1.5 V) batteries Expected battery lifetime: Approximately 1 year
Compatibility	Based on radio frequency (RF) technology, transmitted in 868 MHz range. Compatible with products with the io-homecontrol® logo. Can be used with all VELUX INTEGRA® and VELUX INTEGRA® Solar products.
CE marking	CE-marked to indicate that it is in accordance with the following EU directives: CPR, LVD, MD, RoHS, WEEE, R&TTE, Packaging waste directive and EMC for household, trade and light industry. Combinations of VELUX electrical products meet the requirements of above-mentioned directives.
Note	This product has been designed for use with genuine VELUX products. The connection to other products may cause damage or malfunction. The VELUX Group reserves the right to make technical changes.

^{*} Maximum recommended number of products is 100 and for daily use it is 50.

Roller blind



VELUX INTEGRA® and Open Sy	stem			
Materials (visible parts)	Fabric	Polyester		
	Wire	Stainless steel		
	Bottom rail	Anodized aluminium		
	Top pulley wheels	Stainless steel		
Colours (cloth)	Grey, white and black (silver on the backside of the black)			
Weight	Max 3.4 kg			
Installation	Please see installation instructions			
Combability	All VELUX Modular Skylights with VELUX INTEGRA® control	ol system and ±24 V DC control systems		
Control system	VELUX INTEGRA® or ±24 V DC			
Supply cable	0.2 m cable, 2-core, 0.75 mm² (white)			
RMM cable on skylight module*, ***	0.35 - 1.35 m cable, 3-core, 0.75 mm ² (white, brown, green*	*)		
Running speed	70 mm/sec.			
IP rating	IPX0			
Sound level	< 70 dB			
Operating conditions	-5°C - +75°C, max. 90% relative humidity (not condensing)			
Nominal voltage	24 V DC (max 10% ripple)			
Voltage	19-24 V DC			
Switch-on-duration	ED max 20% (2 minutes per 10 minutes)			
Electric current requirement	Max 1A			
Service	It is recommended to carry out a function test of the roller b blind runs correctly.	olind at least once a year and to make sure that the roller		
CE marking	The product is tested with genuine VELUX control units and directive's requirements for use in residential, commercial ar			
UL approval	VELUX roller blind RMM is approved in accordance to UL 32 Systems.	5, Door, Drapery, Gate, Louver, and Window Operators and		
Reservation	The VELUX Group reserves the right to make to technical changes.			

 $[\]star$ For Open system \pm 24 V DC connection, the maximum distance from roller blind to power supply is in accordance to the following calculation:

admissible voltage drop (UL) x conductivity of copper (56) x cable cross-section (a) Max. cable length = total max. actuator current (I) in amps x 2

^{**} Green cable has no function *** Only valid for pre-wired modules



Roller blind



Roller blind cloth properties					
Colour	White (8806)	Grey (8805)	Black (8807)		
Radiation properties without glazing unit (%)					
Light transmittance in visible light spectrum (tau, v)	36%	10%	1%		
Light transmittance in full light spectrum (tau, e)	35%	22%	3%		
Light reflectance in full light spectrum (rho, e)	59%	45%	53%		
Light absorption in full light spectrum (alpha, e)	6%	33%	44%		
Reaction to Fire					
Norm		Class			
EN 13501-1 + A1	B, s1-d0				
DIN 4202-1		B1			
NF P 92 503 -507		M1			

Roller blind effects on double-glazing unit (%)						
Glazing variant		10L			11L	
	g-value	τ _v -value	Fc-value	g-value	τ _v -value	Fc-value
Without RMM	62%	80%	100%	28%	51%	100%
With RMM						
White (8806)	34%	30%	58%	17%	20%	61%
Grey (8805)	41%	8%	69%	21%	5%	75%
Black (8807)	35%	1%	59%	18%	1%	64%

Roller blind effects on double-	glazing unit	t (%)							
Glazing variant		10T			11T			12T	
	g-value	τ _v -value	Fc-value	g-value	τ _v -value	Fc-value	g-value	τ _v -value	Fc-value
Without RMM	51%	73%	100%	28%	49%	100%	17%	18%	100%
With RMM									
White (8806)	31%	27%	63%	17%	20%	61%	12%	8%	75%
Grey (8805)	37%	7%	76%	21%	5%	75%	14%	2%	88%
Black (8807)	32%	1%	65%	18%	1%	64%	12%	1%	75%

Roller blind



Roller blind effects on triple-glazing unit (%)						
Glazing variant	variant 16L 17L					
	g-value	τ _v -value	Fc-value	g-value	τ _v -value	Fc-value
Without RMM	51%	72%	100%	26%	46%	100%
With RMM						
White (8806)	31%	27%	62%	16%	18%	64%
Grey (8805)	37%	7%	74%	20%	5%	80%
Black (8807)	33%	1%	66%	17%	1%	68%

Roller blind effects on triple-g	lazing unit	(%)							
Glazing variant		16T / 16K			17T / 17K			18T	
	g-value	τ _v -value	Fc-value	g-value	τ _v -value	Fc-value	g-value	τ _v -value	Fc-value
Without RMM	50%	71%	100%	26%	45%	100%	14%	16%	100%
With RMM									
White (8806)	32%	28%	64%	16%	19%	64%	11%	7%	79%
Grey (8805)	38%	7%	76%	20%	5%	80%	12%	2%	86%
Black (8807)	33%	1%	66%	17%	1%	68%	11%	1%	79%

g-value:

"The total transmitted fraction of the incident solar radiation consisting of direct transmitted solar radiation and the part of the absorbed solar radiation transferred by convection and thermal radiation to the internal environment." (EN 13363-2)

"The fraction of the incident solar radiation that is totally transmitted by the glass." (EN 410)

The g-value (total solar energy transmittance) is a measure of how much solar energy is transmitted through the construction in the cooling period.

The g-value is defined as the ratio between the solar energy transmitted through the glazing and the incident solar factor on the glazing.

τ_v -value:

"The transmitted fraction of the incident solar radiation in the visible part of the solar spectrum, see EN 410." (EN 13363-2)

"The fraction of incident light that is transmitted by the glass." (EN 410) $\,$

Fc-value:

"The shading factor, F_C -value, is the ratio of the solar factor of the combined glazing and solar protection device, g_{tot} , to that of the glazing alone, $g. F_C = g_{tot}/g$.

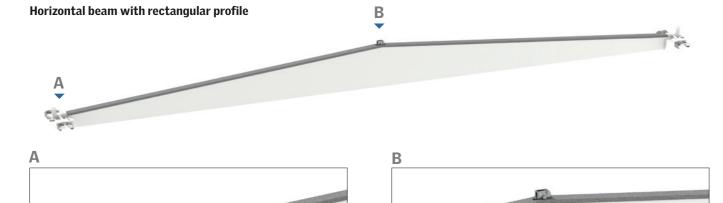
Note: in some countries, F_c is known as z." (EN 14501)

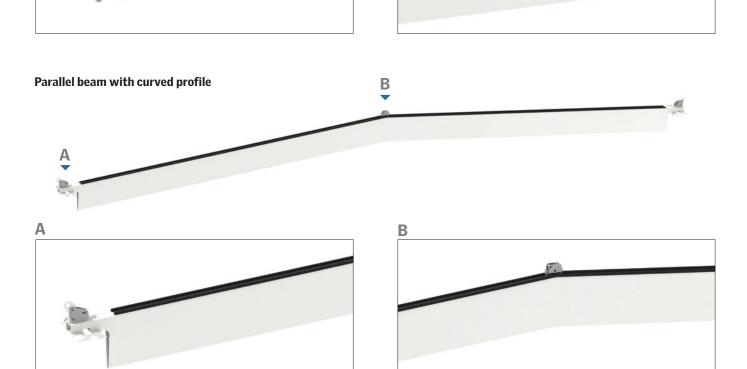


Beam for Ridgelight at 5°



Beam for Ridgelight at 5°	Horizontal beam with rectangular profile	Parallel beam with curved profile
Material	Steel	Steel
Material thickness	3 mm	4 mm
Construction	Hollow beam	Hollow beam
Surface	Powder coating, white RAL 9010, gloss 30	Powder coating, white RAL 9010, gloss 30
Foam gasket on beam	Grey 15 mm	Black 6 mm



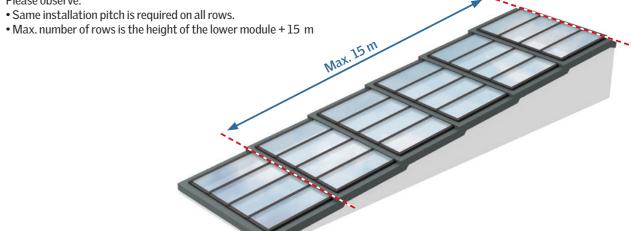


Water pressure & drainage



Additional information on water pressure and drainage on a Step solution

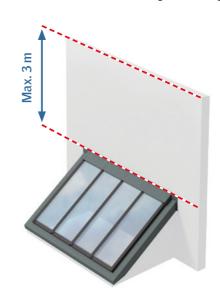
Please observe:

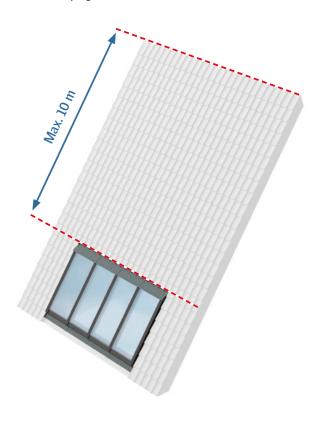


Additional information on water pressure and drainage on a Northlight

Please observe max. 10 m distance above the skylight module, when installed in a sloping roof.

$\label{lem:conditional} \textbf{Additional information on water pressure and drainage}$ on a Wall-mounted Longlight Please observe a max. 3 m wall height above skylight module.



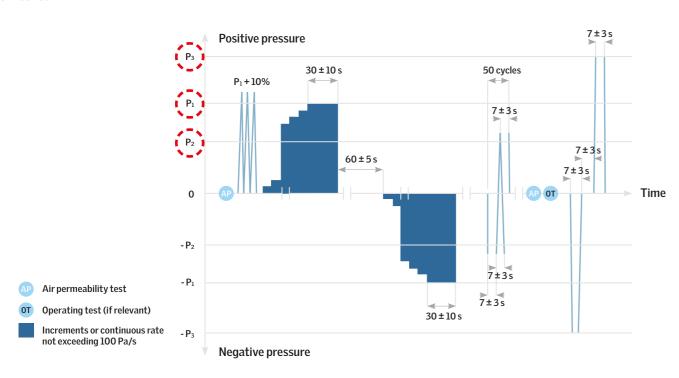




Resistance to wind load



Test method: EN 12211

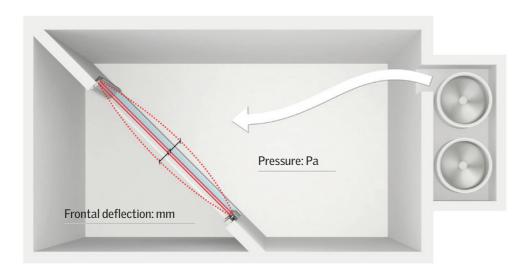




VELUX Modular Skylights: Class C5*

P₁: 2000 Pa P₂: 1000 Pa

P₃:3000 Pa



^{*} Valid for sizes up to 1000 mm width and up to 2400 mm height, except HVC 100240 0010L/11L variants which has a classification of B4. Above these sizes the applicable performance is NPD.

Resistance to wind load



Classification: EN 12210

Classification of wind load					
Class	P1	P2 ¹⁾	Р3		
0		not tested			
1	400	200	600		
2	800	400	1200		
3	1200	600	1800		
4	1600	800	2400		
5	2000	1000	3000		
Exxxx ²⁾	xxxx				

¹⁾ Pressure repeated 50 times.

²⁾ Specimen tested with wind load above class 5, classified Exxxx – where xxxx is the actual test pressure P1 (e.g. 2350 etc.)

Relative frontal deflection
< 1/150
< I/200
< 1/300

¹⁾ Pressure repeated 50 times

 $^{^{2)}}$ Specimen tested with wind load above class 5, classified Exxxx – where xxxx is the actual test pressure P1 (e.g. 2350 etc.)

Classification of resistance to wind l	Classification of resistance to wind load				
Wind load class	A	В	С		
1	Al	B1	C1		
2	A2	B2	C2		
3	А3	В3	C3		
4	A4	B4	C4		
5	A5	B5	C5		
Exxxx	Aexxxx	Bexxxx	Cexxxx		

Note: In resistance to wind load classification, the number refers to the wind load class, see table 1 and the letter to the relative frontal deflection, see table 2



VELUX Modular Skylights: Class C5 *

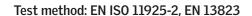
- Frontal deflection measured at P1: 2000 Pa is less than L/300.
- 50 cycle pressure test P2: 1000 Pa
- After that repeated air permeability test passed

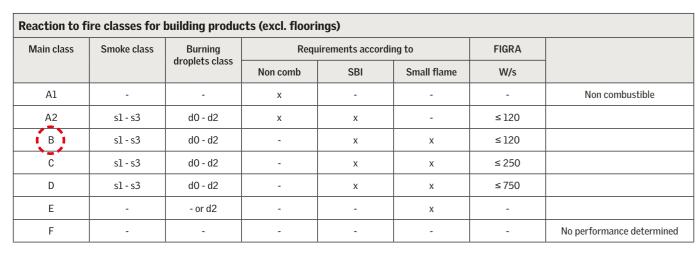
Safety test done at P3: 3000 Pa passed with no released part

 $^{^*}$ Valid for sizes up to 1000 mm width and up to 2400 mm height, except HVC 100240 0010L/11L variants which have Class B4. Above these sizes the applicable performance is NPD.



Reaction to fire





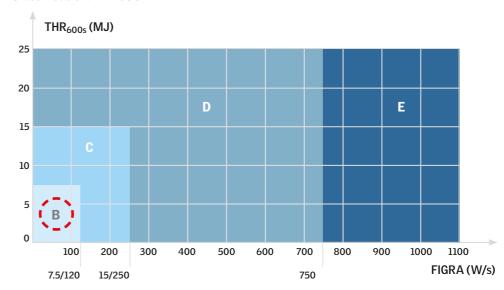
¹⁾ The test is a corner basket test, which shows how much the product contributes to the development of fire.

Internal fire spread and smoke contribution.

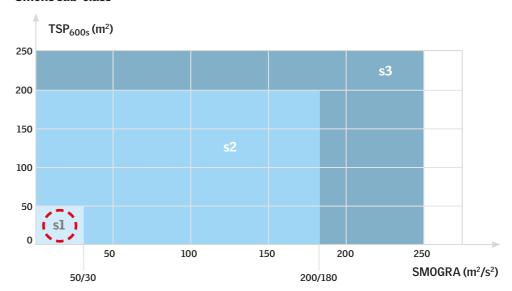


Reaction to fire

Classification: EN 13501-1 + A1



Smoke sub-class



CLASSIFICATION
A1, A2, B: Non-combustable and not very combustable product. Over 20 minutes to flashover.
C: Moderate combustable products. Between 10 and 20 minutes to flashover.

Moderate combustable products. Between 2 and 10 minutes to flashover.

Moderate combustable products.

Highly combustable products (or products whose reaction to fire has not been assessed).

SUB-CLASS sl: L Low smoke production.

s2: s3: Medium smoke production. High smoke production.

FLAMING DROBLETS SUB-CLASSIFICATION

d0: d1. No flaming droplets. Flaming droplets that persist for less than 10 s. Flaming droplets.

d2:



VELUX Modular Skylights:

Class B, s1-d0 or d2

B: Very low combustibility (A: Incumbustable eg steel and concrete)

s1: Lowest smoke volume

d0: No droplets in T-pane variants

d2: Droplets in standard pane variant

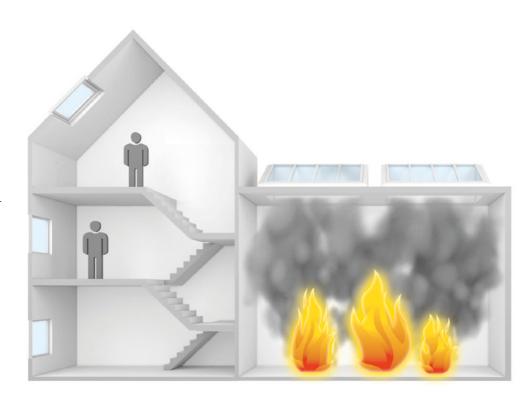


Resistance to fire

Test method: EN 1365-2

Fixed modules: EN 1365-2 Fire resistance tests for loadbearing elements - Part 2: Floors and roofs*

* In accordance with EN 1365-2, 1, which is the relevant standard for fixed modular skylights, roofs can be roof constructions incorporating glazed elements.

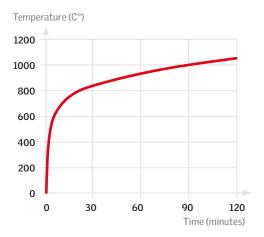


Under fire conditions, certain elements and windows can be required to remain satisfactory fire barriers depending on national and local requirements.

The tests assess how satisfactory fire barriers the modules are in the defined test conditions.

More simply, the tests assess the length of time the modules can effectively keep the fire inside the burning compartment.

Temperature in the furnace



Modules on the furnace



Resistance to fire

Classification: EN 13501-2 + A1

Presentation of classification

Performance Characteristics – Designatory letters and pass criteria The classification shall be presented according to the following template

Presentation of classification				
Load bearing capacity	Integrity	Insulation		
R	E	1		

R- Load bearing capacity (not applicable on venting modules, only on fixed) Withstanding fire exposure without loss of mechanical stability

E- Integrity

No cracks or openings in excess of given dimension No ignition of a cotton pad on the unexposed side No flames sustained on the unexposed side

I- Insulation

Maximum temperature rise on unexposed side not exceeding 180° Mean temperature rise on unexposed side not exceeding 140°C

Please note that there are further characteristics that are defined in the standard, however these are not relevant for VELUX Modular Skylights.

Classification periods

All classification periods against any of the characteristics must be declared in minutes, using one of the periods: 10, 15, 20, 30, 45, 60, 90, 120, 180, 240 or 360. Note that not all the periods apply to all elements.

Declaration of performance

Combination of the designatory letters as appropriate shall be used as a part of the classification of performance. They shall be supplemented by time in the elapsed completed minutes of the nearest lowest class during which the functional requirements are satisfied.

VELUX Modular Skylights:

Fixed module (HFS): REI301

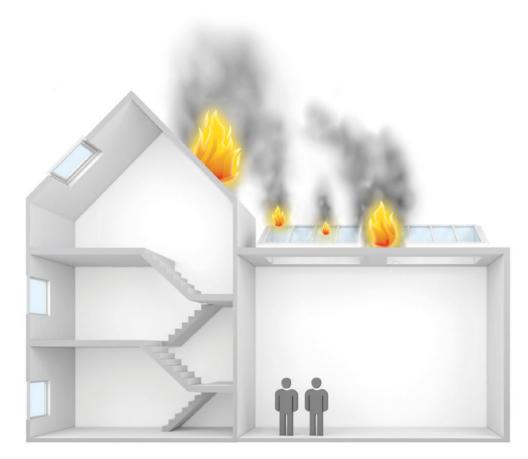
For more information on fire resistant skylight module HFS, see pages 76 and 96.



External fire performance

Test method: TS 1187 - External fire exposure to roofs*

 * In accordance with EN 14351-1, TS1187 test methods T1 and T4 must be used to determine the external fire performance of roof windows.

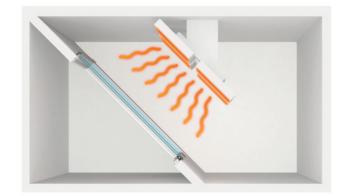


The tests assess the fire spread across the external surface of the roof*, the fire spread within the roof*, the fire penetration and the production of falling droplets or debris falling from the underside of the roof*.





Test 4 - two stages incorporating burning brands, wind and supplementary radiant heat



External fire performance



Classification: EN 13501-5 + A1

Test 1

Class •	Classification criteria
B _{ROOF} (t1)	All of the following conditions must be satisfied for all tests: - external and internal fire spread upwards < 0.700 m - external and internal fire spread downwards < 0.600 m - maximum burned length external and internal < 0.800 m - no burning material (droplets or debris) falling from exposed side - no burning/glowing particles penetrate the roof construction - no single through opening > 25 mm² - sum of all spreed opening < 4500 mm² - lateral fire spread does not reach the edges of the meassuring zone - no internal glowing combustion - maximum radius of fire spread on flat roofs, external and internal < 0.200 m
F _{ROOF} (t1)	No performance determined.

Test 4

Class	Classification criteria
B _{ROOF} (t4)	 No penetration of roof system within 1 h. In preliminary test, after withdrawal of the test flame, specimens burn for < 5 min. In preliminary test, flame spread < 0.38 m across region of burning.
C _{ROOF} (t4)	 No penetration of roof system within 30 min. In preliminary test, after withdrawal of the test flame, specimens burn for < 5 min. In preliminary test, flame spread < 0.38 m across region of burning.
D _{ROOF} (t4)	 Roof system is penetrated within 30 min but is not penetrated in the preliminary test. In preliminary test, after withdrawal of the test flame, specimens burn for < 5 min. In preliminary test, flame spread < 0.38 m across region of burning.
E _{ROOF} (t4)	- Roof system is penetrated within 30 min but is not penetrated in the preliminary test Flame spread is not controlled.
F _{R00F} (t1)	No performance determined.



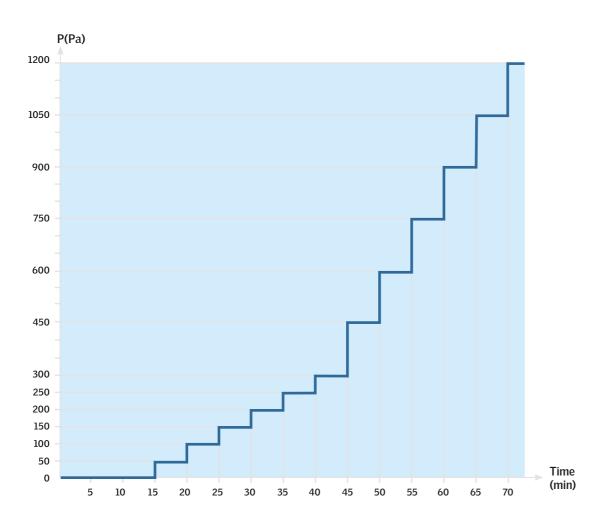
B_{ROOF} (t4)

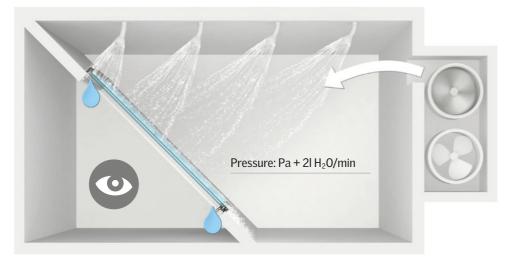


Watertightness

Test method: EN 1027







Watertightness

Classification: EN 12208



tightness		
Classification	Presure (Pa)	Wind (Km/h)
1A	0	0
2 A	50	32
3 A	100	45
4 A	150	55*
5 A	200	63
6 A	250	71
7 A	300	78
8 A	450	95
9 A	600	110
E750	750	123**
E900	900	134
E1 <u>0</u> 50	1050	145
[E1200]	1200	155

^{*} Equal to depression ** Equal to tropical storm

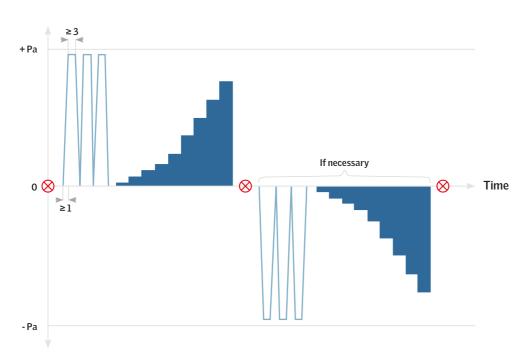


VELUX Modular Skylights: E1200 No water penetration up to 1200 Pa. 1200 Pa equals 155 Km/h.



Air permeability

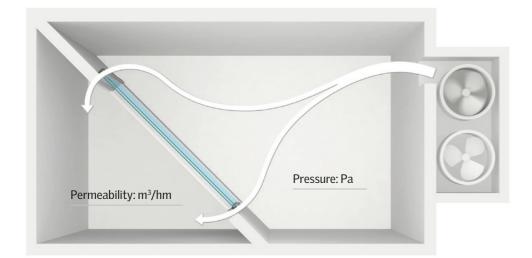
Test method: EN 1026



Opening and closing

150 Pa - Class 1 300 Pa - Class 2 600 Pa - Class 3, 4

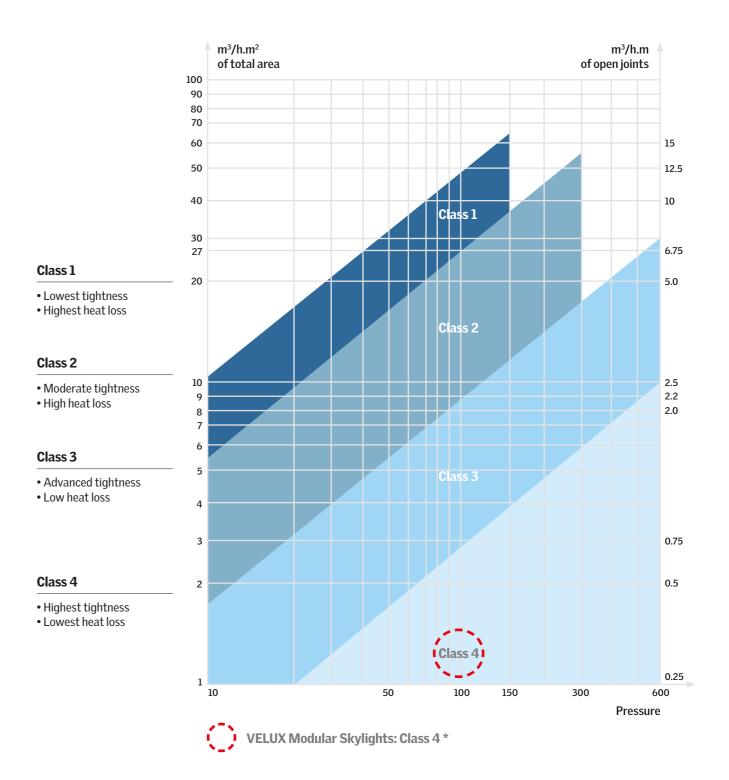
Test pressure



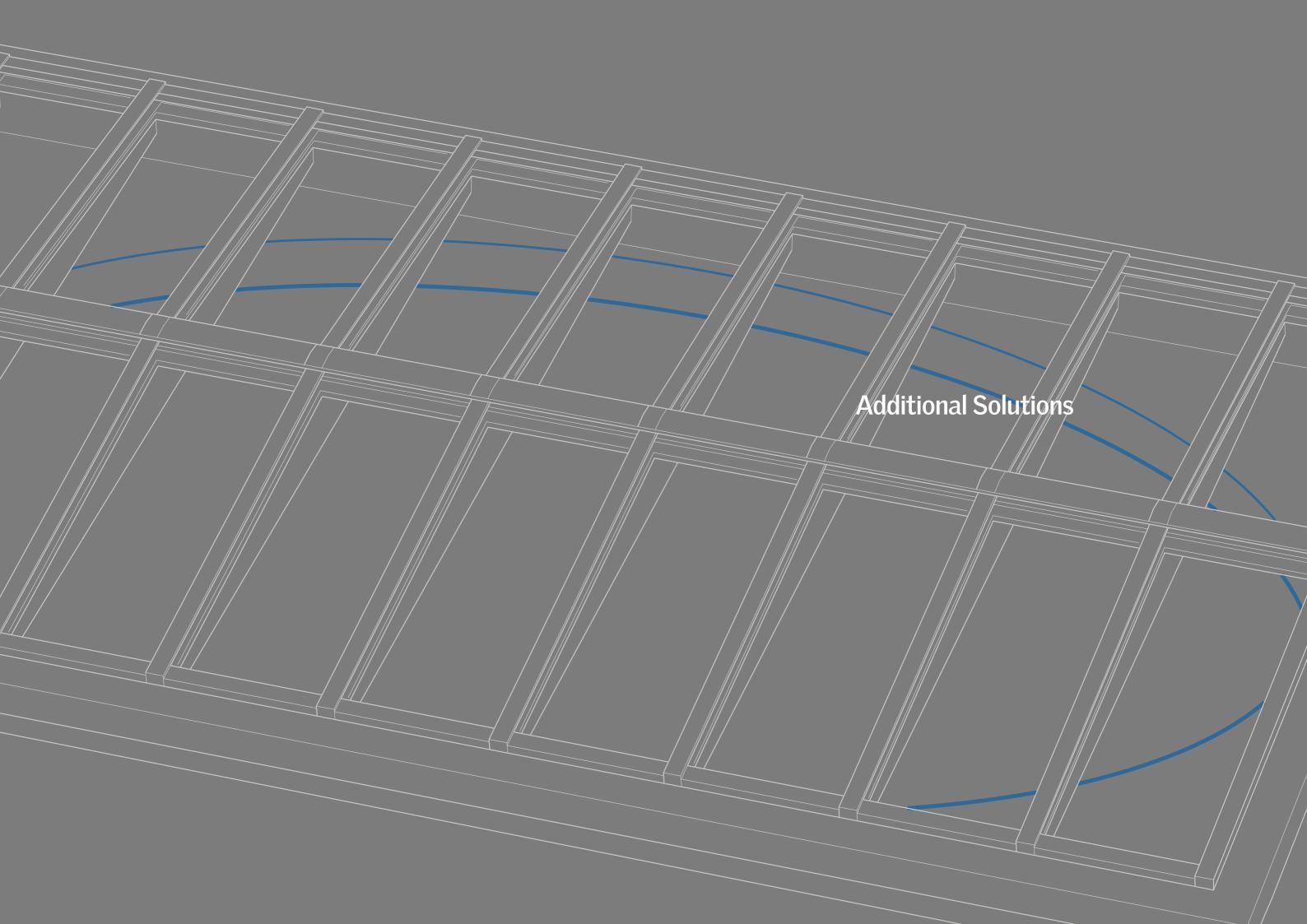
Air permeability

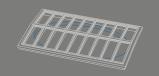
Classification: EN 12207





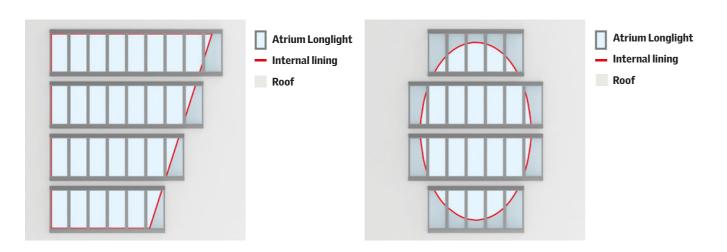
 $^{{}^{\}star}\mathsf{Except}\,\mathsf{HVC}\,\mathsf{090220}, \mathsf{HVC}\,\mathsf{090240}, \mathsf{HVC}\,\mathsf{100220}\,\mathsf{and}\,\mathsf{HVC}\,\mathsf{100240}\,\mathsf{with}\,\mathsf{glazing}\,\mathsf{variants}\,\mathsf{10L}\,\mathsf{and}\,\mathsf{11L}.\,\mathsf{For}\,\mathsf{these}\,\mathsf{classification}\,\mathsf{is}\,\mathsf{Class}\,\mathsf{3}.$





The following shown solutions for other types of skylight projects is project specific

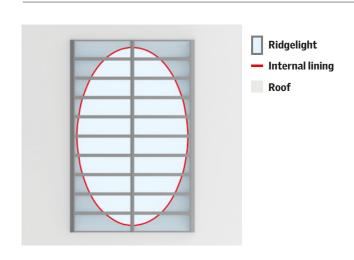
Shaped solution with adaption of lining



Feature	Advantage	Benefit
By adapting the internal lining, it is possible to build a shaped skylight with standard skylight modules. *	By using standard skylight modules on non-square roof designs, the architects will not have to compromise the wishes for the interior design. The solution can be combined with venting modules and internal roller blinds.	Using standard products with standard installation principles gives high security in the design and building process. Installing venting modules and roller blinds gives a better indoor climate.

 $[\]mbox{{\tt *}}$ If the modules are fitted with RMM, access from outside is mandatory.

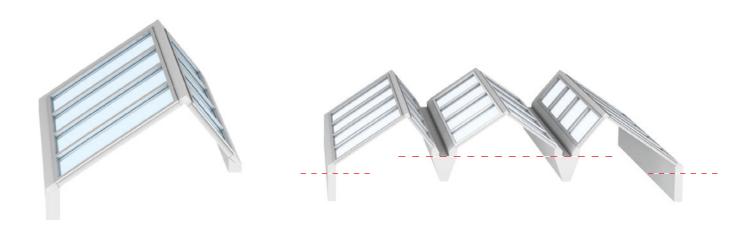
Shaped solution with oval lining



Feature	Advantage	Benefit
By adapting the internal lining, it is possible to build a shaped skylight with standard skylight modules. *	By using standard skylight modules on non-square roof designs, the architects will not have to compromise the wishes for the interior design.	Using standard products with standard installation principles gives high security in the design and building process. The solution can be combined with internal roller blinds.

^{*} If the modules are fitted with RMM, access from outside is mandatory.

Asymmetric Ridgelight



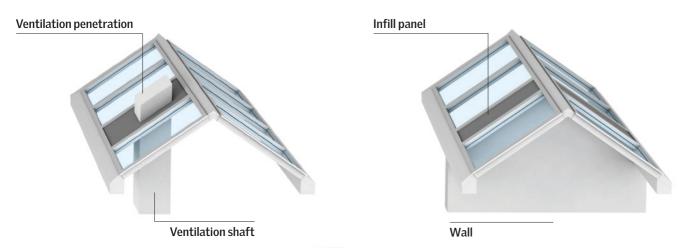
Feature	Advantage	Benefit
By constructing an asymmetric Ridgelight, it is possible to combine modules of different lengths in an installation.	The solution allows for installation between two roofs of different heights or of modules in different slopes. By combining panes with different characteristics on each side of the Ridgelight, it is possible to maximize daylight and minimize heat gain.	The asymmetric Ridgelight offers more flexibility in installations between buildings or sections of buildings.

Ridgelight on Girder



Feature	Advantage	Benefit
A Ridgelight solution that consists of two rows of VELUX Modular Skylights installed on one supporting horizontal girder at the ridge. The solution is delivered with a factory finished flashing designed for installation in pitches between 5-40°, either on a flat roof construction or at the top of a sloped roof. Girder and inner girder cover is not part of VELUX delivery.	 The girder supports the installation and thus allows for increased installation pitch possibilities of the modules. Possibilities of vented modules on both sides. Possibilities of different glazing types on each side. 	Additional design options. Low pitch allows maximum daylight in the room. The large opening gives an illusion of a small glass roof.

Infill panel



Feature	Advantage	Benefit
Ventilation shaft: Use an infill panel when penetrating the skylight with e.g. ventilation.	Continuous modular skylight installations instead of disrupted installations.	Cheaper product solution and better design.
Wall: Use infill panels when covering a wall in the building.		

Note:

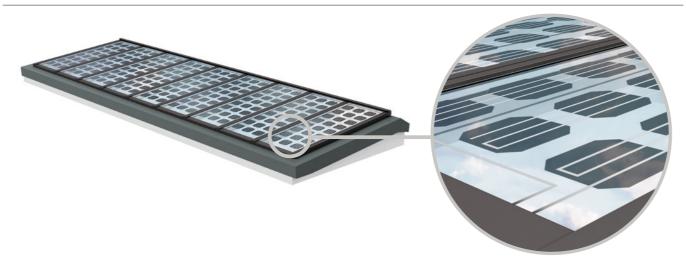
Products with a fixed, opaque insulating infill panel are out of the scope of the harmonised product standard EN 14351-1 used for CE marking of windows.

No harmonised product standard is available/applicable for these products; they are not and cannot be CE-marked.

The VELUX Group can deliver the above-mentioned products and provide product specifications on the relevant general performance characteristics for thermal transmittance,

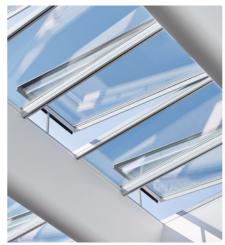
The VELUX Group can deliver the above-mentioned products and provide product specifications on the relevant general performance characteristics for thermal transmittance, air permeability, watertightness, resistance to wind load and reaction to fire on request. The VELUX Group is not responsible for the specific application of the product with fixed, opaque insulating infill panel. It is the responsibility of the customer to verify the fitness of the product for specific use with

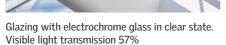
Skylight modules with photovoltaic glazing units



Feature Advantage		Benefit
VELUX Modular Skylights can be delivered with photovoltaic glazing units in both a fully covered or partly covered variant (illustration shows partly covered variant).	The solution offers a built-in solution where photovoltaic panels are combined with skylight installations.	The solution will optimize the utilization of space on the roof. Furthermore, the photovoltaic panels create a shadow effect in the building that reduces heat gain and glare.

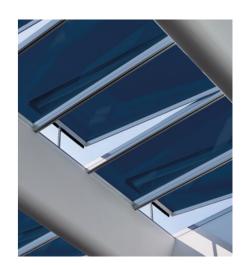
Sun screening - electrochrome glass







Glazing with electrochrome glass in intermediate state. Visible light transmission 15%



Glazing with electrochrome glass in fully tinted state. Visible light transmission 1%

VELUX Modular Skylights are available with electrochromic panes. The electrochromic pane is an insulated glazing unit with electronic, tintable coating. The coating can be darkened on demand by applying a low voltage of electricity. The dynamic changing in tint provides exceptional control of daylight, glare and energy use

without blinds or shades. An easy-to-use control system allows anyone to operate the electrochromic panes with wall switches, a mobile app or with a building management system. A combination of the three is also possible.

Sun screening - external awning blinds

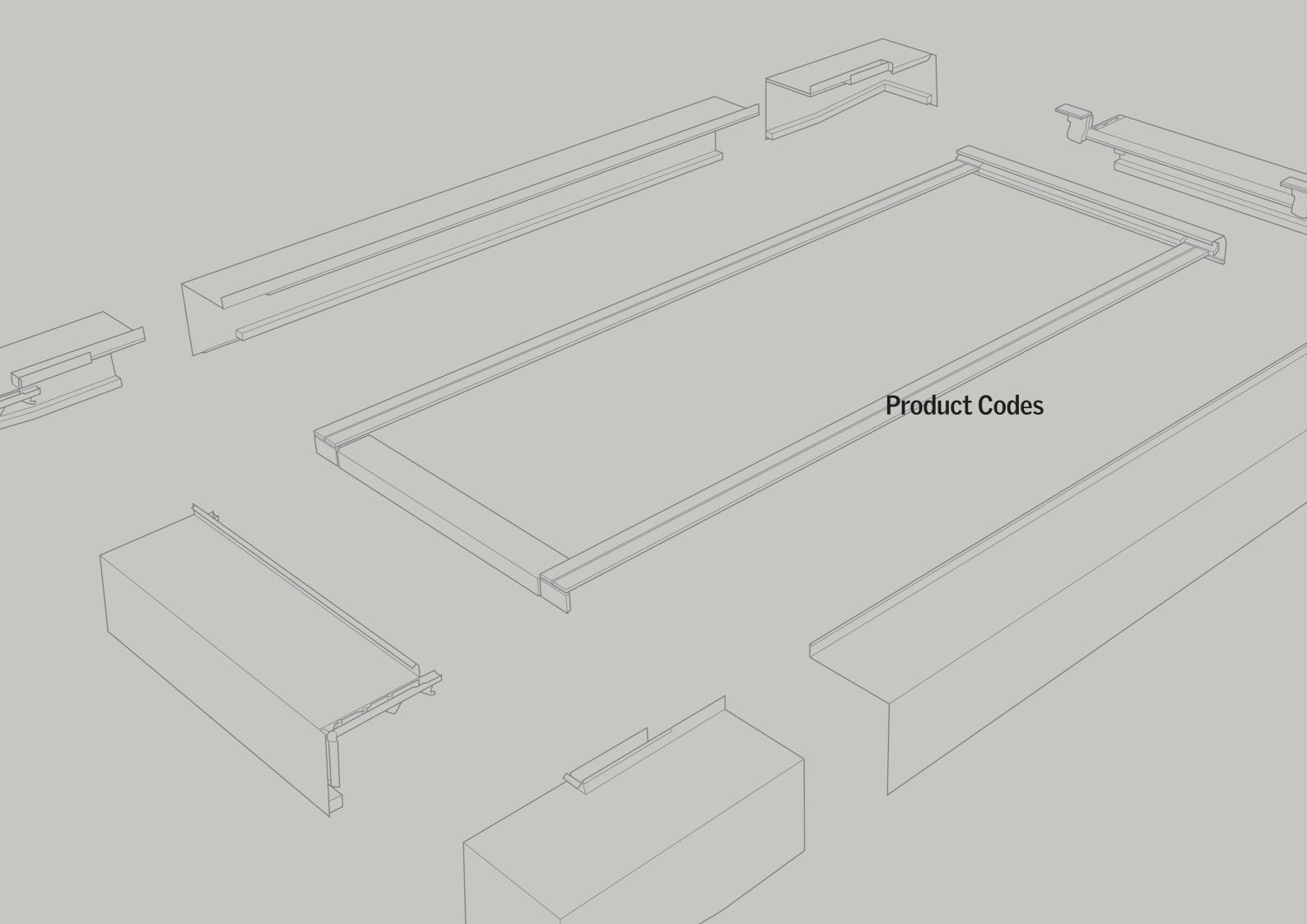
Maintain a pleasant thermal indoor environment

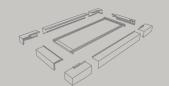
The Topfix® VMS external awning blind by Renson protects the interior from excessive solar heating. The product is optimized for VELUX Modular Skylights and is applicable to both fixed and vent-

ing modules. Topfix® VMS operates on mounting feet that fits perfectly onto the external surface of the modular profiles. The blinds features a VELUX compatible operation system and can endure wind loads up to 120 km/h.









Modular Skylights - code structure

Example

HVC	067	160	0	0	10	Т	C	B	
Туре	Module width	Module height	Interior colour	Exterior colour	Glazing type	Glazing variant	Electric variant	Genera- tion	
H = VMS	067 = 675 mm	120 = 1200 mm	0 = std.	0 = std.	10 =	L=			
	075 = 750 mm	140 = 1400 mm	RAL	"Noir 2100	DGU/LowE	3+3 mm	A = Open- system/		
F = Fixed	080 = 800 mm	160 = 1600 mm	9010,	Sable	11 =	glass	Smoke		
V = Venting	090 = 900 mm	180 = 1800 mm	gloss 30	YW" Akzo	DGU/Sun1				
	100 = 1000 mm	200 = 2000 mm		Nobel	12 =	T =	C = Open-		
C = Commercial market		220 = 2200 mm			DGU/Sun2	5+5 mm inner	system/ Comfort		
		240 = 2400 mm	8 =	8 = special 8 = special	special 16 =	16 =	glass K =		
		260 = 2600 mm	Special			TGU/LowE			
		280 = 2800 mm					Krypton gas		
S = Fire-resistant variant. With fire resistant glazing unit and intumescent strip		300 = 3000 mm			17 = TGU/Sun1	instead of the stand- ard Argon gas, 5 + 5 mm inner glass.			
					18 = TGU/Sun2	U = Fire resist- ant			

Roller blinds – code structure



Example

RMM	
------------	--

067

Module width

067 = 675 mm

160

8805

Type

R = Roller blind

M = Electrical

M = For VELUX Modular
Skylights

075 = 750 mm 080 = 800 mm 090 = 900 mm 100 = 1000 mm Module height

120 = 1200 mm

140 = 1400 mm

160 = 1600 mm

180 = 1800 mm

200 = 2000 mm

220 = 2200 mm

240 = 2400 mm

260 = 2600 mm

280 = 2800 mm

300 = 3000 mm

Fabric variant

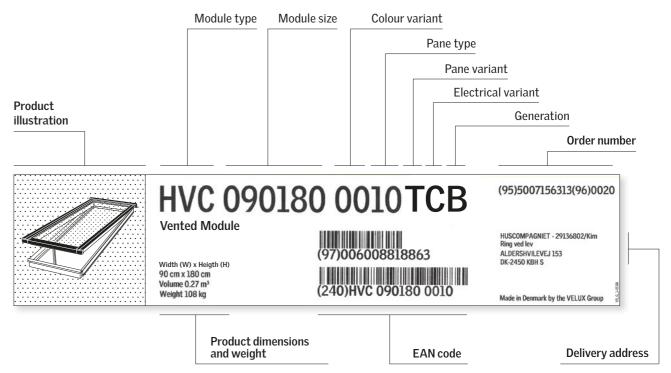
8805 = Grey, fire retardant

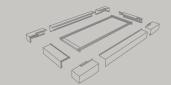
8806 = White, fire retardant

8807 = Black, fire retardant

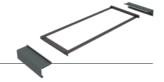
Product label - code structure



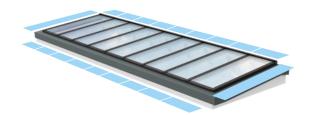




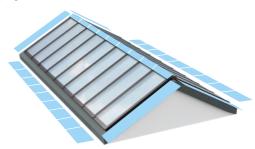
Flashings – code structure



Longlight 5-30°



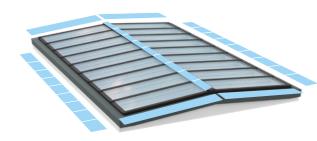
Ridgelight 25-40°



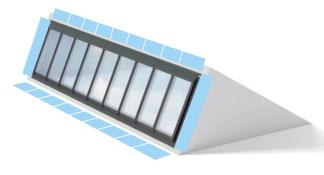
Wall-mounted Longlight 5-45°



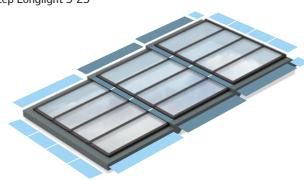
Ridgelight at 5° with Beams



Northlight 25-90°



Step Longlight 5-25°



Code structure	
Flashing configuration	Step solution extension flashing

Flashing configuration – code structure





ERC 080 160

E = Flashing

L = Longlight

R = Ridgelight

N = Northlight

W = Wall-mounted

Longlight

C = Commercial Market

Module width

067 = 675 mm

075 = 750 mm

080 = 800 mm

090 = 900 mm

100 = 1000 mm

Module height

120 = 1200 mm

140 = 1400 mm

160 = 1600 mm

180 = 1800 mm

200 = 2000 mm

220 = 2200 mm

240 = 2400 mm

260 = 2600 mm

280 = 2800 mm

300 = 3000 mm

Interior

0 = std.

Only relevant

on ERC:

Beams

and

Inner

ridge

cover-

ing

RAL

colour 9010,

gloss 30

8 = special

Exterior

cladding

0 = std.

"Noir 2100

YW"

Akzo

special

Exterior

flashing

0 = std.

NCS

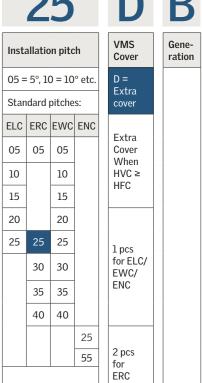
standard

S 7500-N

colour:

7043)

special



VELUX Group VELUX Commercial Ådalsvej 99 2970 Hørsholm Denmark

Email: vms@velux.com Web: <u>veluxcommercial.com</u> Blog: <u>vms.velux.com</u>

