

Sliding windows and fixed glass panels

Sky Frame®



Glass from floor to ceiling and from wall to wall, fixed or sliding windows – Sky-Frame, the high-tech frameless window makes it possible, opens areas up to four meters high, and fulfills the highest standards and all current building standards.

Sky-Frame eliminates boundaries between the indoors and outdoors, between living areas and nature with its slim mullions (20 mm) – and this at maximized heat insulation in accordance with the Swiss MINERGIE® standard.

For example, insulation values of up to U_w =0.7 W/m²K (SIA) and U_w =0.8 W/m²K (EN) can be achieved with insulation glass of U_a =0.5 W/m²K!

The aluminium system developed and in production in Switzerland is internationally renowned. With it, more than 1'500 projects were completed and various competitions were won to date.

Design and functionality



Sky-Frame is the synthesis of high technology, design and functionality.

The filigree mullions contain state-of-the-art technology, from the invisible lock with superior burglary protection to a maximized thermal separation up to a sophisticated, stabilizing design of the aluminum profiles. The latter is a prerequisite for optimal structural statics to prevent glass breakage and water penetration, even in extreme situations.

An invisibly integrated electric drive opens the moving elements by pressing a button when desired.

Sky-Frame stands for the highest standards of aesthetics in architecture and building physics.

More questions? – Sky-Frame specialists will advise you. More than 70 trained sales partners in Europe and the U.S. assist with technical advice.



Technology



y The Sky-Frame sliding window with its thermally completely separated panels moves extremely smoothly on running gears - made of stainless steel - on rollers in two to four easy-to-clean tracks.

The extruded aluminium multi-chamber profiles accommodate seals and additional profiles in special grooves.

Glass-fibre reinforced polyamide bars provide a perfect thermal insulation of the tracks.

All aluminum profiles can be anodized or powder coated at the customer's request.

Glass fibre reinforced epoxy resin profiles (GRP) surrounding the glass panel form the actual frame and simultaneously reinforce the glass edge seal.

Filigree aluminium mullions attached on the vertical GRP profiles secure the removal of the wind loads on even the largest surfaces. These will be reinforced by carbon fibre (CFK) or steel inserts, if necessary.

Tempered safety glass with a heat soak test (TSG-H) rules out the risk of glass breakage caused by heat and thermal shock.

The optional use of laminated safety glass (LSG) increases the burglary protection and provides anti-fall protection at the window.

The bottom track is generally installed threshold-free. It has an integrated drainage level, which leads to a recessed system gutter or drains under a wooden grate outside the building seal, even during the heaviest rainfall.

Tests

s Test certificates by various institutes (EMPA, ift Rosenheim, Biel University of Applied Sciences, Munich University of Applied Sciences) attest to Sky-Frame's compliance with important standards for thermal insulation, resistance to driving rain, wind resistance, anti-fall protection and burglary protection.





Sky-Frame 2 / Sky-Frame 3

System comparison

Sky-Frame 3

Glass 54 mm



Sky-Frame 2

Glass 30 mm

Sky-Frame is available in two product lines since early 2010 consisting of the successful product Sky-Frame 2 and the newly developed system Sky-Frame 3.

Sky-Frame 2 with double insulating glass (2-IG) already provides very good insulation values.

Sky-Frame 3 is characterized by an equally filigree design such as Sky-Frame 2. An even better thermal insulation is achieved by using triple-glazed panes of insulating glass (3-IG) with a U_a value up to 0.5 W/m²K.

Sky-Frame 3 sliding windows can therefore also be used in the passive house area and were certified as MINERGIE[®] module windows.

The new sliding window generation Sky Frame 3 is sustainable, in that it already covers future requirements of climatic and environmental protection today while maintaining the architectural effect.

Properties		Sky Frame 2		Sky Frame 3	
U _w calculation (WxH 4.6x3m) according to		(SIA 331)	(EN 10077)	(SIA 331)	(EN 10077)
Thermal transmittance (Glass Ug	=1.1) U _w =	1.26 W/m ² K	1.38 W/m ² K	-	-
Thermal transmittance (Glass Ug	=1.0) U _w =	1.17 W/m ² K	1.28 W/m ² K	-	-
Thermal transmittance (Glass Ug	=0.7) U _w =	-	-	0.91 W/m ² K	1.0 W/m ² K
Thermal transmittance (Glass Ug	=0.5) U _w =	-	-	0.71 W/m ² K	0.83 W/m ² K
Sliding panels (max. WxH)		2.3 x 4 m (up to 8m ²)		2.3 x 4 m (up to 8m ²)	
Fixed panels (max. WxH)		3.2 x 4 m / 4 x 3.2 m		3.2 x 4 m / 4 x 3.2 m	
Insulating glass		30 mm (2-IG)		54 mm (3-IG)	
Daylight / glass ratio		98%		98%	
Water tightness, class	(EN12208)	9	A	9	A
Air permeability, class (EN12207)		4		4	
Resistance to wind load (EN12210)		C3		B3	
Anti-fall protection, category	(TRAV/TRLV)	/	٩	ļ	ł
Increased burglary protection, cla	WK2		Test in preparation		
MINERGIE [®] module		-		certified	



Thermal separation



Building connections

nal The consistent thermal separation guarantees the higheston thermal insulation values.

The middle bar, which essentially consists of polyamide, connects the inner and the outer aluminum shell torsion free and keeps them thermally separated at the same time.

The aluminum cover of the middle bar is interrupted in the area of the mullions and is thermally separated and sealed by a special insert.

The U-profiles made from glass-fibre reinforced epoxy resin, which are attached all around the glass, optimally insulate the glass edge.

Sky-Frame can fully utilize its advantages due to perfect building physical solutions for the integration in the construction.

A selective mounting system that does not impair the insulation, is therefore used instead of a continuous substructure in the base area. This reliably prevents the development of condensation at this point.





Thermal insulation and climate protection

Thermal insulation and climate protection



Creating comfort and providing a lasting contribution to climate protection – both must be considered in the era of climate change.

The heat loss is extremely reduced even in winter temperatures by using highly insulating glass.

An additional reduction in the heating costs is simultanely achieved by the passive use of solar energy.

Sky-Frame therefore closes the gap between comfort and environmental awareness.



The new, highly insulated system Sky-Frame 3 meets the requirements as **MINERGIE**[®] **module window** and received the certificate as the first metal sliding window.

The excellent thermal insulation and air tightness values are thereby officially confirmed.

Energy efficient refurbishment

With the replacement of an old window front $(U_g = 3.3 \text{ W/m}^2\text{K})$ by a Sky-Frame 3 sliding window $(U_g = 0.7 \text{ W/m}^2\text{K})$, about 1'000 liters of fuel oil, or more than 3 tons of CO₂ per year are saved (reference = 40m²).





Sound insulation



Sound insulation

Noise has become an omnipresent health-hazard, particularly in urban locations or in the proximity of railways, roads and airports.

Sound can only be stopped by special soundproof glass and sealed frame structures. The sound energy can be reduced by a factor of 1'000 at a reduction of 30 dB.

Sky-Frame 2 is equipped with special seals in the noise protection version.

The sound insulation values of various glass were tested in the laboratory of EMPA Dübendorf according to standards EN ISO 140-3 and EN ISO 717-1.

Sound Glossary R_{w,P,Glass} = Test value of the pane in standard format in the laboratory R = rated sound reduction, measured in the EMPA

 R_w = rated sound reduction, measured in the EMPA laboratory using a window with a standard measurement (1.23x1.48m)

C = Spectrum adjustment value for the following sound sources: Residential activities, rail traffic, motor-way, children's games

 C_{tr} = Spectrum adjustment value (increased requirement) for the following sound sources: Aircraft noise, disco music, urban road traffic

The assessed sound reduction measurement will be reduced by one of the two spectrum adjustment values depending on the situation.

Selection table Glass Type:	Sky Frame 2 Execution:	Glass R _{w,P,Glass}	EMPA test R _w (C, C _{tr})
ESG 6 / SZR 18 / ESG 6	Standard	33 dB	28 (0; -1) dB
ESG 6 / SZR 18 / ESG 6	Sound insulation	33 dB	32 (-2; -4) dB
ESG 6 / SZR 16 / ESG 8	Sound insulation	37 dB	33 (-1; -3) dB
ESG 6 / SZR 14 / ESG 10	Sound insulation	39 dB	36 (-1; -3) dB
ESG 8 / SZR 12 / VSG 8-2P	Sound insulation	40 dB	35 (-1; -4) dB
ESG 10 / SZR 10 / VSG 8-2P	Sound insulation	40 dB	35 (0; -3) dB

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SRJ-FRAME Frameless insulated sliding doors | Swiss Made

Properties

Burglary protection

Burglary protection



Sky-Frame offers the following options to increase the burglary protection:

Electronic measures

Three security-related information items can be electronically retrieved and transferred to a burglar alarm with the Sky-Frame alarm sensors, which are invisibly integrated in the frame:

- Position monitoring (slider open/closed)
- Deadbolt monitoring (lock open/locked)
- Glass breakage sensor (alarm loop)

Mechanical measures

Even the standard model of Sky-Frame offers excellent burglary protection - including the system-based bonding of the GRP profiles with insulating glass and multipoint locking.

In order to further increase the burglary protection, Sky-Frame uses special laminated glass, reinforced frame profiles and additional fittings for the multi-point locking integrated in the slim profile.

It is operated by the same shapely handles, into which an additional locking cylinder is installed.

The ift-Rosenheim certifies Sky-Frame 2 as having an approved burglary protection up to 4m with these additional components:

Resistance class WK2 (RC2) (EN 356 and EN V 1627-1630)

All fittings and components used to increase the burglary protection adjust to the filigree design without affecting the aesthetics.







Anti-fall protection

Anti-fall protection



Unlike balustrade windows, floor to ceiling glass windows on the upper floors must guarantee the anti-fall protection.

Sky-Frame uses an anti-fall insulating glass combination of laminated safety glass and tempered safety glass with heat soak test, starting on the first floor.

Using this anti-fall glass, Sky-Frame 2 was tested by the Munich University of Applied Sciences and has been certified the anti-fall protection in compliance with TRAV/TRLV to the overall system (category A).

This test also covers partially open systems. A wing can therefore also be opened 11 cm without any anti-fall components for ventilation purposes (with included opening limiter).

Sky-Frame all-glass balustrades

A prerequisite for the anti-fall protection on terraces and balconies is a balustrade.

The Sky-Frame all-glass balustrade meets this requirement and uses a heavy-duty, anti-fall glass without an interrupting handrail (without a handrail only permitted in Switzerland).



The Munich University of Applied Sciences confirms the compliance with the requirements according to TRAV/TRLV (category B) for the all-glass balustrade with a 2 cm thin handrail attachment profile.





No threshold

No threshold



Measures necessary for proper building physical construction of a threshold-free detail are implemented in the sophisticated Sky-Frame bottom detail without compromise.

The drainage level with a reliable outward water drainage is integrated in the profile.

The bottom profile provides a large surface for a safe application of sealing sheets.

This detail, which is met by the Swiss standard SIA 271, secures the rapid and controlled drainage of even the heaviest rain volume.

Consistent thermal separation of warm/cold shells by the optimal placement and development of the polyamide middle bar.

Various system gutters with stainless steel covers.

Easy to clean, without deep ditches or tracks.



Barrier-free construction

Smooth transitions and barrier-free accessibility are nonage related characteristics in the construction.

The barrier-free accessibility standard in the building according to standard DIN 18040-1+2 has an increasing significance alone in view of the increasing proportion of elderly in the population.

A single sliding wing already provides a passage width of up to 2.3 meters, and therefore also provides sufficient room to move for accompanied wheelchair users.

The electric drive is an additional convenience feature for this target group. It is used in retirement and nursing homes with great success.

Be it wheelchair or pram - threshold-free details provide maximum mobility.



Electric drive

Electric drive



Sky-frame sliding windows can be equipped with an invisible built-in electric drive in the top profile upon request.

The wings are moved using a special gear-belt drive integrated in the frame. The wings are automatically unlocked when opened and re-locked when closed.

The start-up and maintenance of the drive module are carried out directly through the frame profile. Maintenance openings with ugly covers in the ceiling are not required.

The powered sliding windows are generally positioned on the inner tracks.

Operation The entire system and corners open up variably by pressing a button – providing unique operating convenience.

This is provided by a so called "dead man's switch", which means that the wing moves only while the button is pressed. Controlling via a remote control with an active infrared monitoring system is also possible as an option. Depending on the pressure sequence, the wings can be opened and closed individually or all at once.

Manual operation is possible irrespective of the drive. The opening option is thereby guaranteed at any time, even at power failures.

Opening possibilities



In addition to the classic single wing opening, it is also possible to move several wings together.

Middle or corner openings can be made, also as telescopic corner opening with 2+2 wings.

A length of more than 9 metres can therefore be opened at once, with the push of only one button!

Ventilation and insect protection

Ventilation and insect protection

Trickle vent



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Night ventilation



The trickle vent is already integrated as a standard function.

The sliding elements are locked in place at a second locking position where continuous exchange of air is provided.

The still interlocking profiles ensure that neither rain nor unwanted visitors can enter.

In order to safely ventilate on facades without balustrades, there is a night ventilation gap with an integrated opening limiter.

The opening of the sliding window is limited to 11 cm in order to guarantee the anti-fall protection and prevent unwanted access.

This version is ideal for the airing of children's rooms or bedrooms and is provided with an additional insect screen, upon request.

Insect screens



The latest development is an insect screen that can be pulled out sidewards of the wall.

It offers the possibility to use a sliding element hidden in the wall as a large-scale, insect-free vent opening.

When closed, it is invisible due to the recessed mounting in the wall.

The insect screen can be used up to a height of 2.75 m and a passage width up to 2 m, is continuously extendable and does not require a bottom track.

The flowing space and the barrier-free accessibility therefore are maintained.

It is the perfect insect screen, also for patio doors.



Sustainability

Quality

Maintenance Sky-frame sliding windows are maintenance free.



The functionality remains for a long time due to the stainless steel guide track and the dirt-repellent running gear.

Commercial glass cleaning products can be used for cleaning the glass.

Due to the centralised production with externally monitored quality assurance and our continuously trained sales partners a consistently top quality of all products will be guaranteed.

Within the scope of the approval for CE labeling, numerous tests were performed in accordance with applicable product and testing standards.

This ensures that Sky-Frame complies with the applicable European Directives and national product standards.

Every Sky-Frame system is supplied with detailed documentation including usage and care instructions according to the international CE standard from Sky-Frame.

Sales Please contact one of our over 70 distributors in Europe and the USA for more information and personal consultation.

Your regional contact, news, CAD data and references can be found at: <u>www.sky-frame.ch</u>

Awards Sky-Frame is a multiple award-winning product that complies with both the aesthetic and functional state of the art.



