



Daylight Design Guide
Flat roofs



Intro



Discover



Develop



Deliver

A shared architectural dedication

With years of research and experience in daylight, we have developed services, initiatives, and expertise to empower architects in creating better spaces. Our quest for excellence drives us to provide the best solutions for sustainable building design.

This Design Guide focuses on maximising the potential of the space under the roof, providing detailed guidance, examples of different configurations, and solutions for every flat roof type.

Develop your next project with expert advice on optimising daylight and indoor climate, ensuring ergonomic and efficient use of space under the roof, while integrating roof solutions effectively. Rethink the power of daylight with inspirational content and expert design support tailored to your needs. Develop your project with the right solutions, fostering healthy and sustainable buildings.

We support you at every project stage.

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- 1.2 Daylight metrics and standards
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- 1.3 Design strategies for daylight

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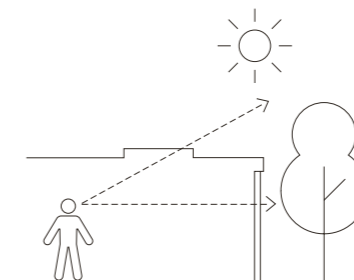
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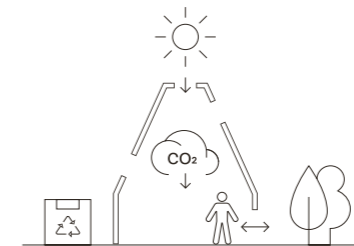
Importance of daylight Essentials in Building Design

Daylight entering a building is composed of direct sunlight, diffuse skylight, and light reflected from surrounding surfaces. Properly balancing these elements ensures good indoor daylighting, enhancing visual comfort, supporting circadian rhythms, and improving overall well-being.

Did you know?
In overcast weather, there is 3 times as much daylight coming from the top of the sky (zenith) as from the side (horizon).



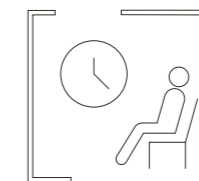
Make your design more energy-efficient
By incorporating daylight through the roof, you can reduce the reliance on artificial lighting for more hours each day. Flat roof windows make a significant difference, as they capture sunlight for longer than vertical windows.



Views to the outside
The inclusion of flat roof windows boosts daylight provision and offers views of the sky, enhancing occupants' connection to the outdoor environment. Wherever possible, views should incorporate 'layers' for the greatest visual interest, and preferably include a view of the sky, horizon, and ground.

66 %
Time we think we spend indoors

90 %
Actual time we spend indoors



Improve mental and physical well-being
We spend around 90 % of our time indoors. That's why it is essential to have a healthy indoor environment. Flat roof windows can help achieve a better night's sleep, improve productivity, and increase indoor air quality.



Up to three times more daylight
Flat roof windows bring 3 times more daylight than façade windows of the same size. They are the most effective solution for bringing natural light into the room.



Less orientation dependent
Flat roof windows can capture sunlight from any direction, maximizing daylight exposure throughout the day, regardless of the building's orientation.



Increase focus
Natural light improves concentration and productivity. Daylight boosts energy levels and mood, which is vital for performance in all settings, from schools and offices to dedicated home offices.



Bring the outside in
Integrating daylight from above has a transformative effect on spatial quality. It strengthens the connection to nature, creating a calm and balanced atmosphere in any room.



Less obstructions
Flat roof windows offer more light influx, better distribution of light and space illumination, especially in dense areas where adjacent buildings may limit the amount of daylight available.



Deeply lit rooms
When the building is deep, daylighting solely by façade windows has limitations. Daylight from flat roof windows can reach deeper into the room, providing higher levels and more uniform illumination.



Sleep better
Daylight is vital for mental and physical well-being. As our circadian rhythm follows the sun's path, consistent exposure to natural light ensures a better night's sleep.



Maximise your designs
Flat roof windows create a dynamic experience of moving light and patterns. Strategic placement can transform the perception and feel of any space.



Save energy and money
Using roof windows can reduce the need for artificial lighting by up to 20 % in homes and 60 % in office buildings.



Added value of flat roof windows
Quality windows are an investment that increases property value. Market research shows that people are willing to pay 4 % more for open, bright spaces.



Boost mental wellbeing
Research shows that just 30 minutes of daylight a day helps people manage stress and anxiety, improving overall mental health.



Increase space perception
For designs with low ceilings, using multiple light sources - including zenithal light - increases the perceived volume, making spaces feel larger and more open.



EN 17037 is the first Europe-wide standard to deal exclusively with the design for, and provision of, daylight in buildings.

To provide flexibility at the same time as making the standard useable and easy to understand, EN 17037 sets a minimum level of performance that must be achieved for each of these four areas. On top of that, there are two further performance levels: medium and high.

Daylight metrics and standards
European Standard for daylight in buildings EN 17037

The European Standard for daylight in buildings recommends that a certain amount of daylight (300, 500 or 750 lux) is available for 50 % of daylight hours during the year, over 50 % of the relevant work plane area.

These requirements can be evaluated with climate-based annual simulations (method 2), or daylight factor simulations (with daylight factor targets corresponding to illuminance values) (method 1).

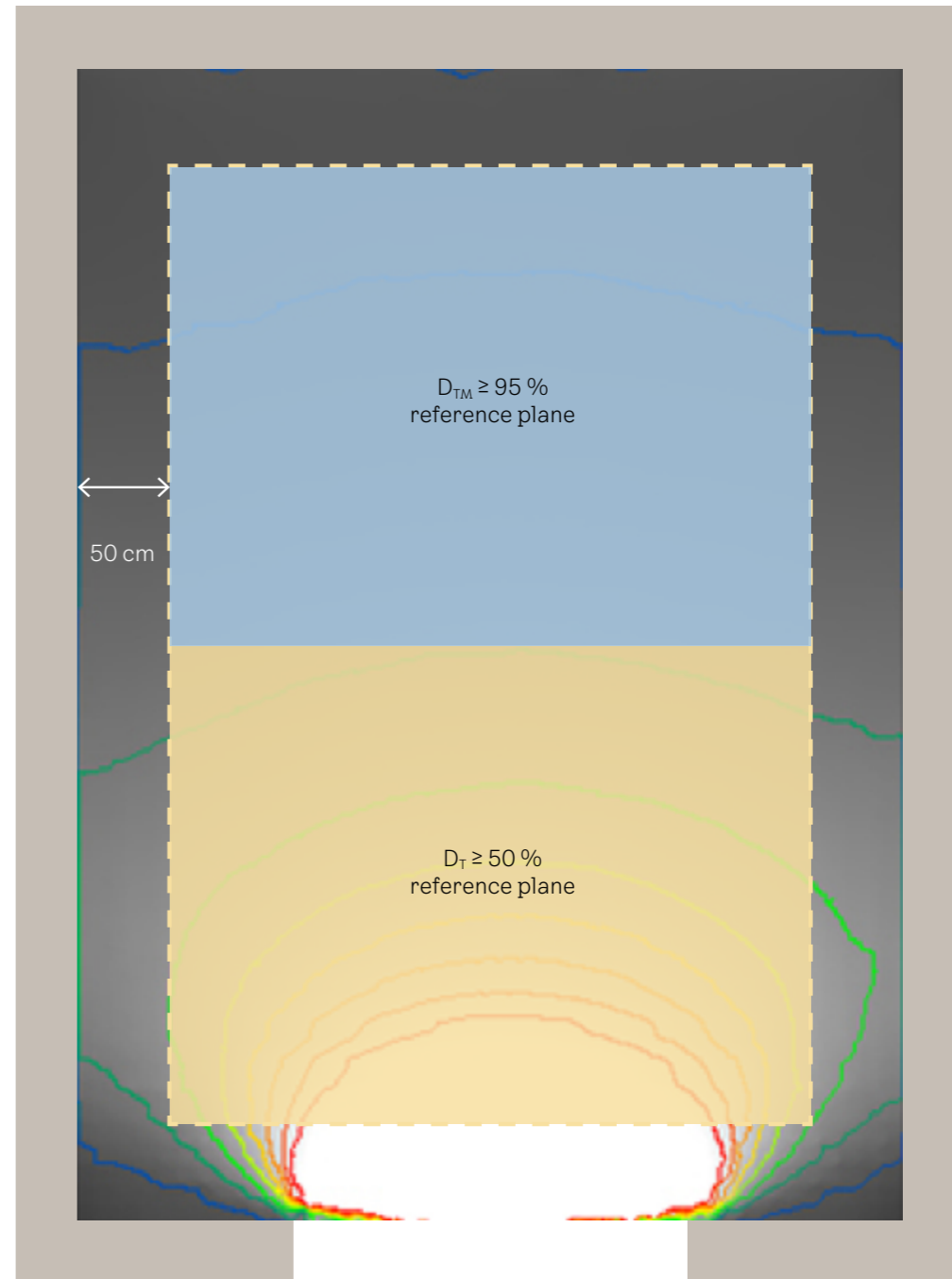
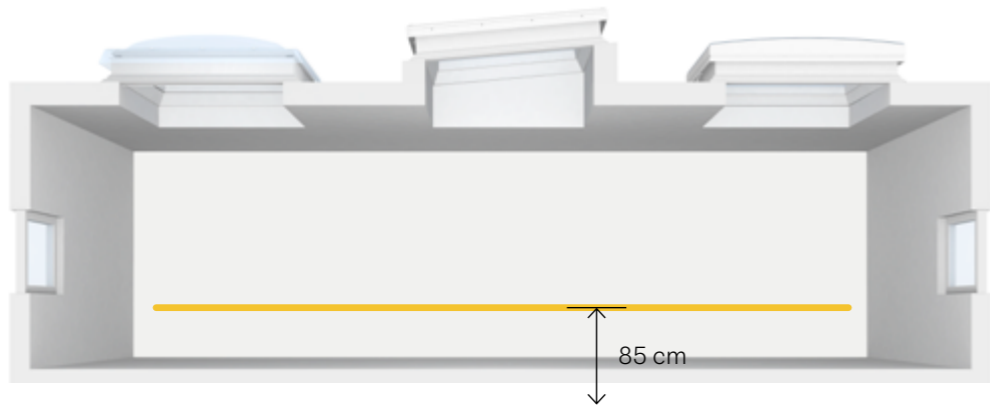
EN 17037 recommendations for daylight availability	Target illuminance (lux) or daylight factor levels	50 % of daylight hours during the year	50 % of the relevant work plane area
Method 1 Target daylight factor levels for daylight factor simulations	2.1 % United Kingdom (LOW)	3.5 % United Kingdom (MEDIUM)	5.3 % United Kingdom (HIGH)
Method 2 Target illuminance (lux) levels for climate-based annual simulations	300 lux (LOW)	500 lux (MEDIUM)	750 lux (HIGH)

The Median Daylight Factor (DF) is an important metric because it accounts for the spatial distribution of light. It ensures that required daylight levels are available across at least 50 % of the work plane, rather than just being concentrated near the window.

In practice, deep rooms with windows on a single façade often meet an average target but fail the median target. To reach the required levels across half the room, you typically need to increase the window height or introduce light from a second orientation - such as the roof.

According to EN 17037 a space is considered to provide adequate daylight if a target illuminance level is achieved across a fraction of the reference plane with space for at least half of the daylight hours.

The reference plane of the space is located 0.85 m above the floor, leaving a 0.5 m border from the walls around the perimeter of the work plane.



DT
Target daylight factor
≥ 50 % reference plane

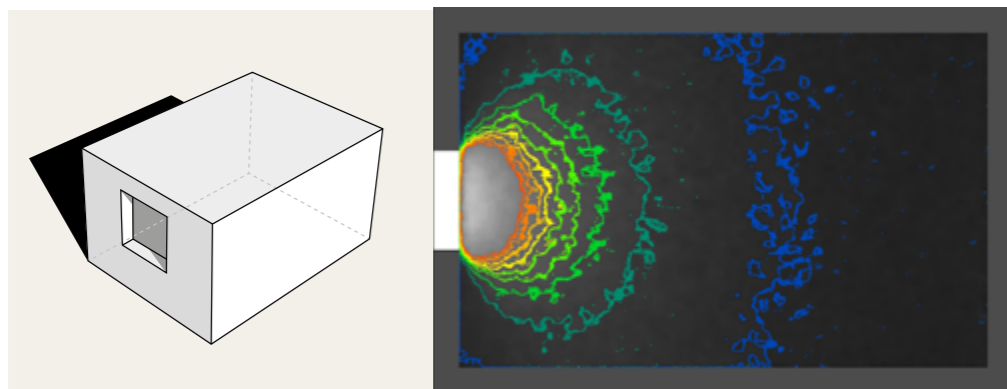
DTM
Minimum target daylight factor
≥ 95 % reference plane

Daylight metrics and standards
Daylight factor comparison for 6 rooms with 10 % glazing to floor area ratio

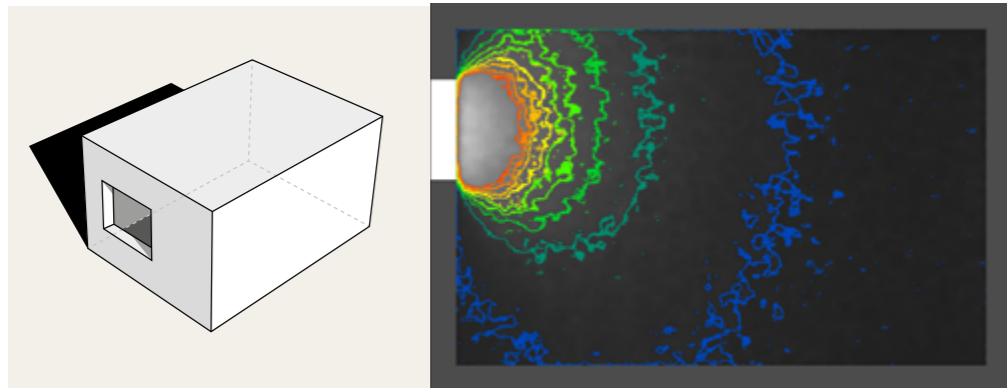
Comparing rooms with the same 10 % glass-to-floor ratio, but different opening positions shows:

- Single orientation: A single façade window limits daylight to one area of the room.
- Dual orientation: Splitting the glass across different orientations provides a higher amount of daylight and a more balanced distribution.
- Zenithal: As the most powerful daylight source, an opening from above provides the best distribution - delivering up to three times more daylight than a façade window.

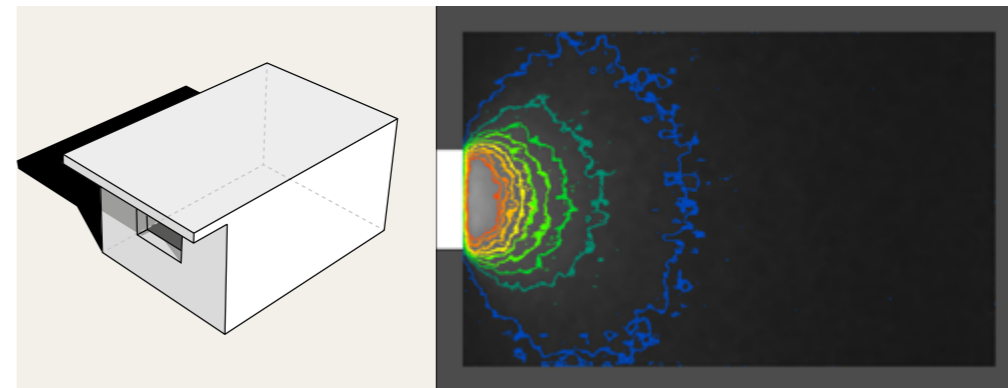
Median Daylight Factor 1.41 %
Equivalent lux 196 lux



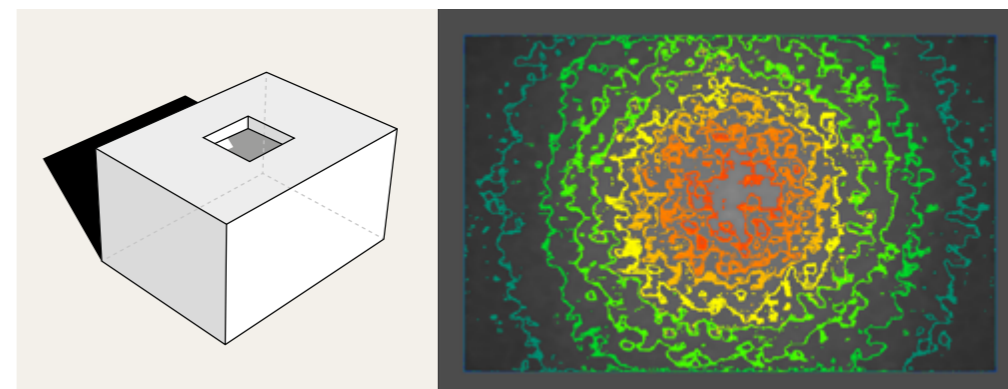
Median Daylight Factor 1.00 %
Equivalent lux 139 lux



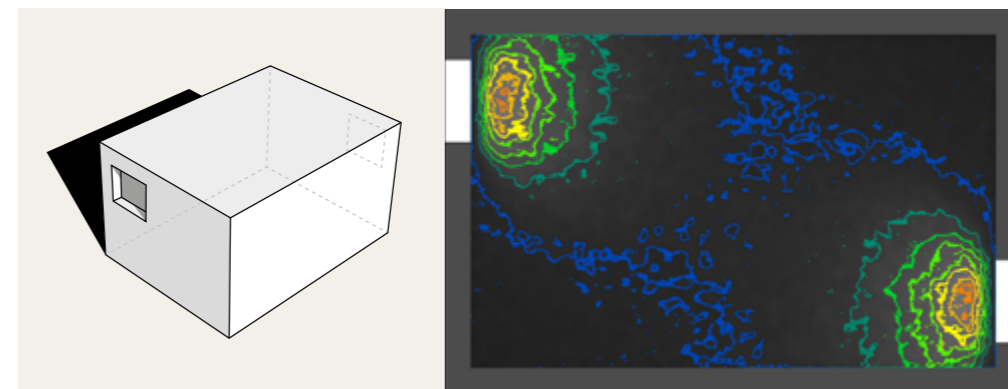
Median Daylight Factor 1.06 %
Equivalent lux 147 lux



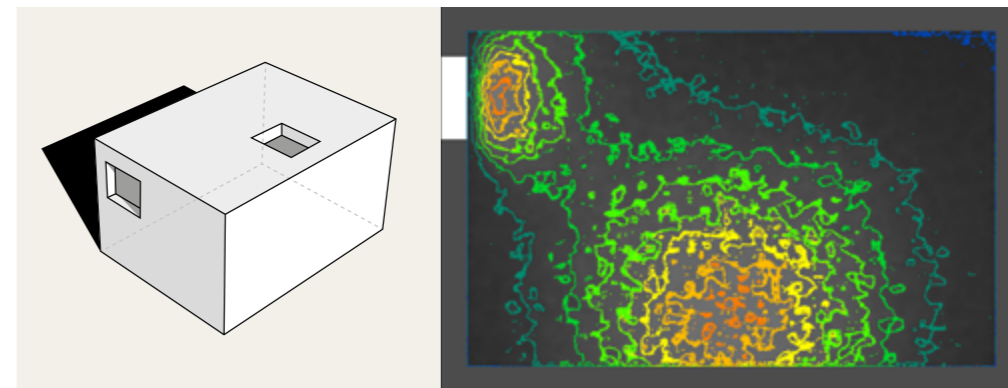
Median Daylight Factor 7.16 %
Equivalent lux 995 lux



Median Daylight Factor 1.48 %
Equivalent lux 205 lux



Median Daylight Factor 3.86 %
Equivalent lux 536 lux



Design strategies for daylight
Optimising daylight distribution through size and amount of roof windows

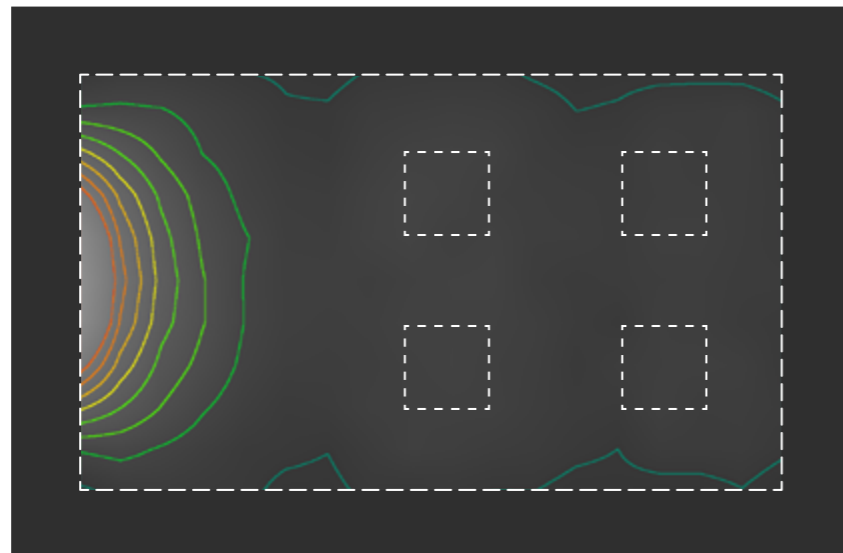
While multiple openings can improve distribution, a larger single unit maximises daylight yield by reducing framing and lining obstructions.

According to EN 17037 a space is considered to provide adequate daylight if a target illuminance level is achieved across a fraction of the reference plane with space for at least half of the daylight hours.



**4 × roof window
60/60 cm**

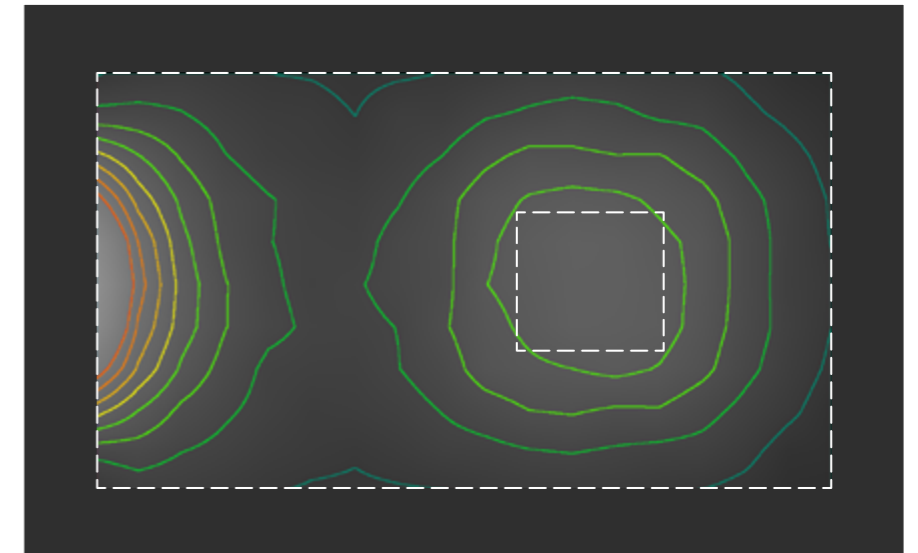
Median Daylight
Factor 2.16 %
Equivalent 322 lux



- DF %
- 7,11 ●
- 6,22 ●
- 5,33 ●
- 4,44 ●
- 3,56 ●
- 2,67 ●
- 1,78 ●
- 0,89 ●

**1 × roof window
100/100 cm**

Median Daylight
Factor 2.65 %
Equivalent 395 lux

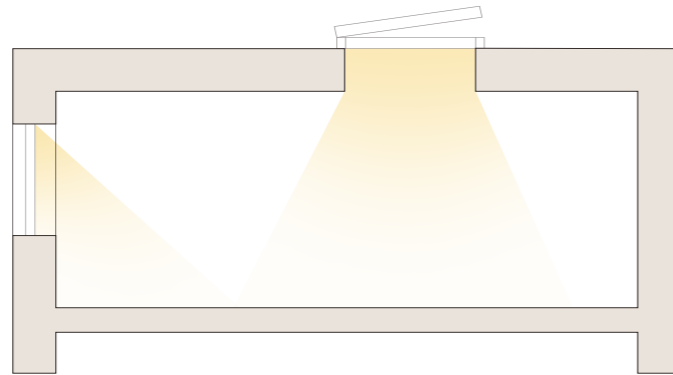


Design strategies for daylight Influence of lining shape on daylight intake

With a flat roof window on a central position, splaying the internal lining to 25° can increase the median daylight factor on the work plane by up to 52 %, significantly improving light penetration.

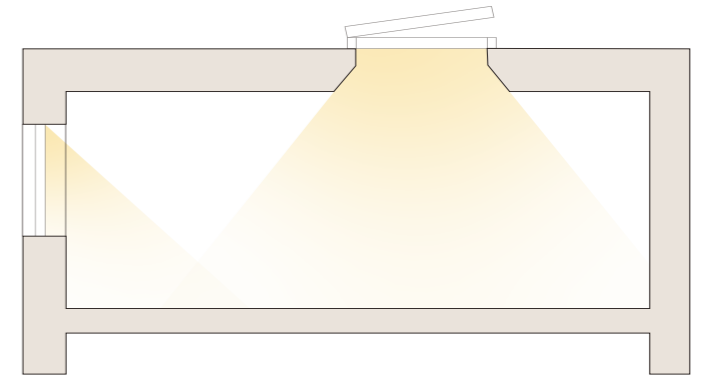
Vertical lining

Median Daylight
Factor 2.15%
Equivalent 321 lux

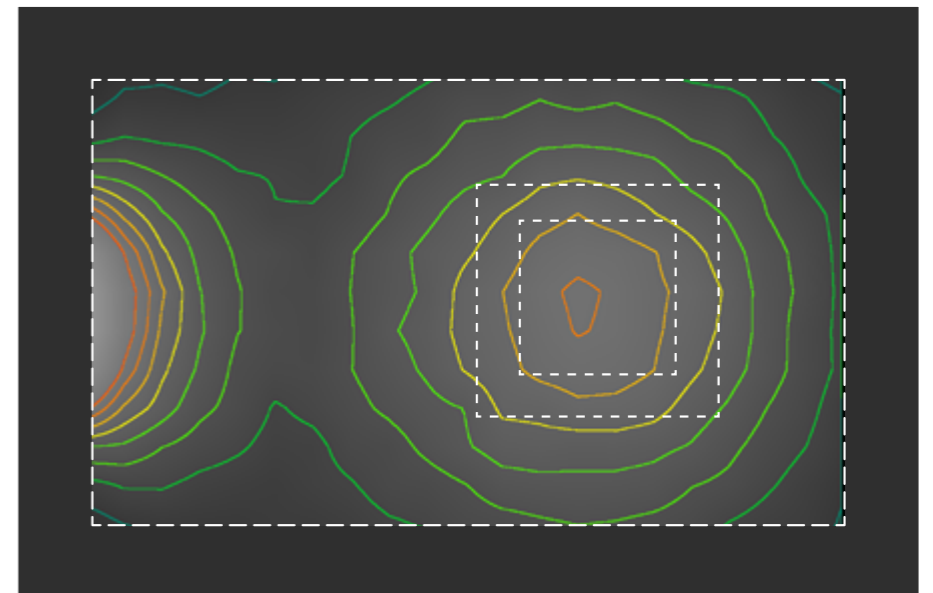
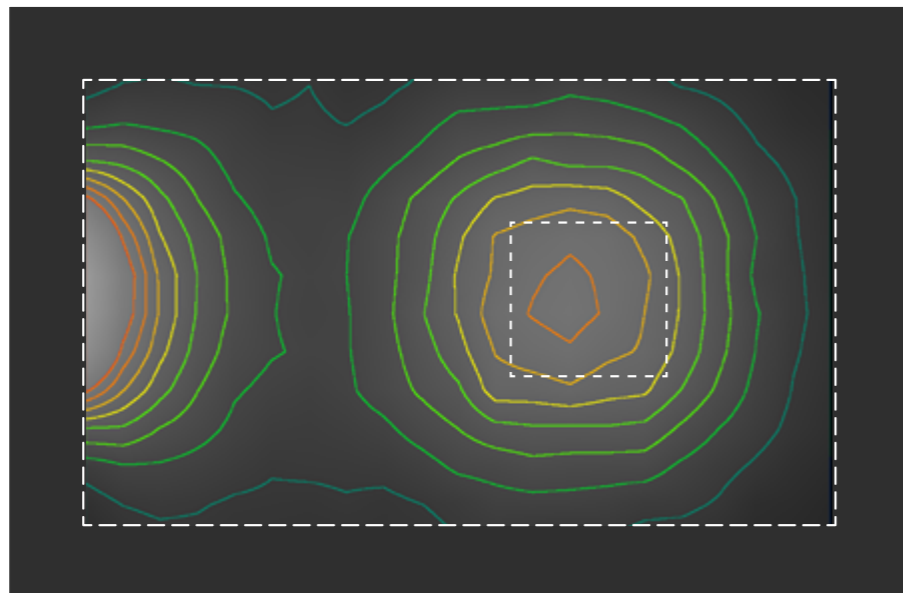


Splayed lining

Median Daylight
Factor 3.31 %
Equivalent 493 lux



- DF %
- 7,11 ●
- 6,22 ●
- 5,33 ●
- 4,44 ●
- 3,56 ●
- 2,67 ●
- 1,78 ●
- 0,89 ●



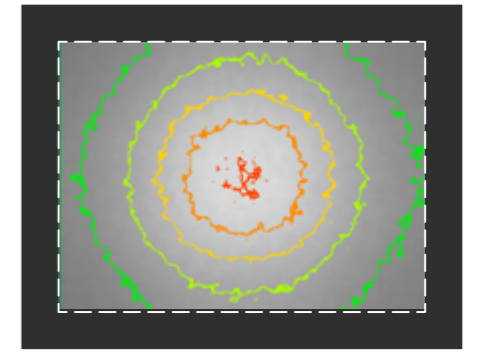
Design strategies for daylight Lining depth influences the amount of daylight

Thicker roof construction and deep shafts act as physical barriers that restrict daylight entry. As these depths increase, internal shadowing becomes more pronounced, meaning splayed lining or larger window size can be used to compensate.

50 cm deep lining



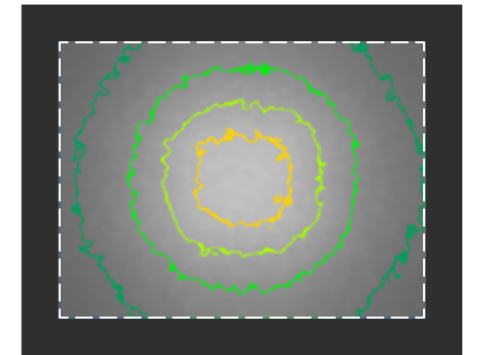
Median Daylight
Factor 4.5%
Equivalent 774 lux



100 cm deep lining



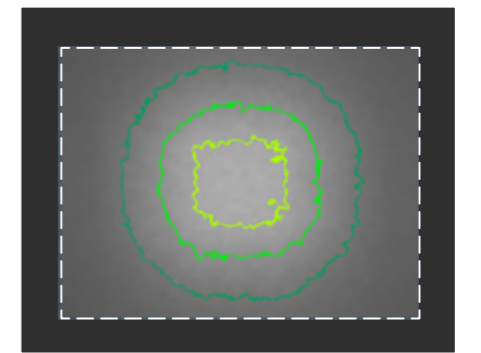
Median Daylight
Factor 3.39%
Equivalent 576 lux



150 cm deep lining



Median Daylight
Factor 2.54%
Equivalent 431 lux



- DF %
- 8,0 ●
- 7,0 ●
- 6,0 ●
- 5,0 ●
- 4,0 ●
- 3,0 ●
- 2,0 ●
- 1,0 ●



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Planning with flat roof windows

- 2.1 Basic daylight needs
- 2.2 Impact of flat roof windows
- 2.3 Optimal use of space
- 2.4 Roof window placement

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Basic daylight needs
Required illuminance values for task-specific daylight performance

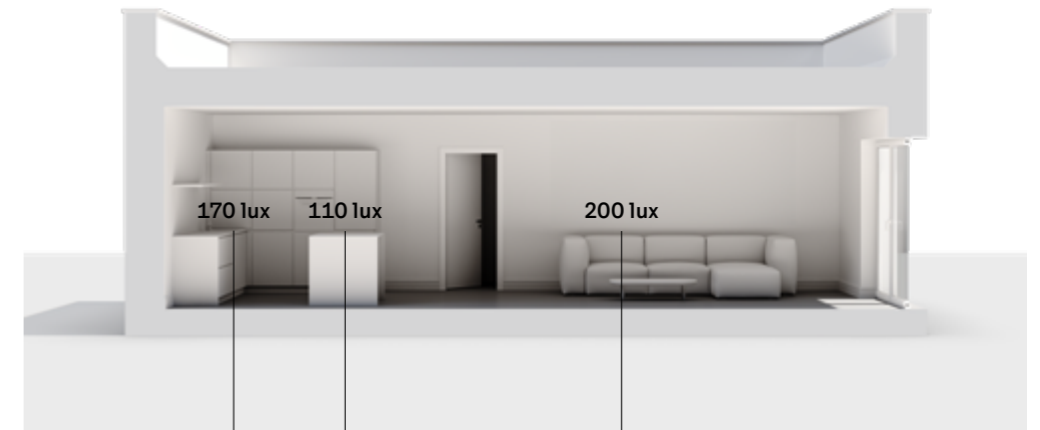
Daylight needs

Every activity in the home requires a certain amount of natural light to feel comfortable and functional. Tasks like cooking, reading, and working demand higher light levels, while dining and everyday living need less.

- Working desk / kitchen - 500 lux
- Dining / dining room - 300 lux
- Reading / living room - 500 lux.

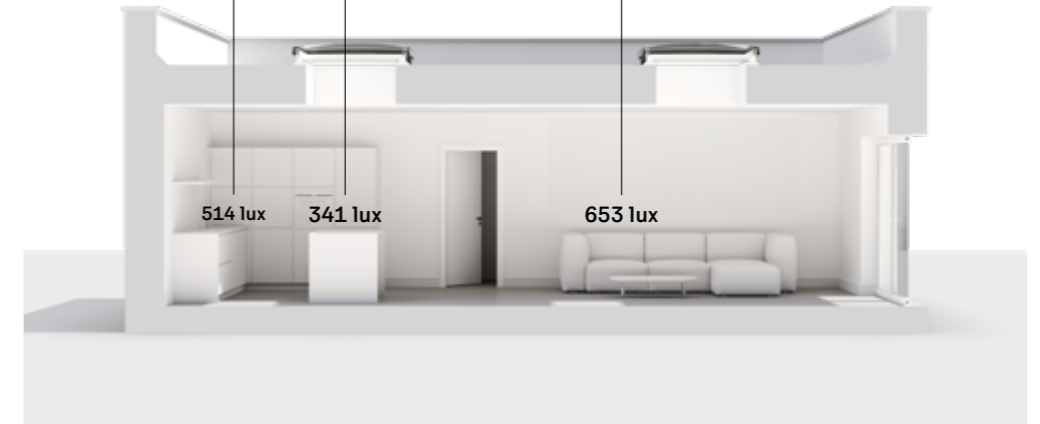
The scenarios illustrate how these requirements are met in practice. The first one relies only on a glass door, resulting in uneven light distribution and several areas falling below the required lux levels. The second room adds two roof windows, bringing daylight deeper into the space and ensuring that the cooking, dining, and reading zones all reach their recommended light levels.

Daylight needs not fulfilled



Working Eating Reading

Daylight needs solved by roof windows



Impact of flat roof windows Less obstructions

Frequently, façade windows alone cannot provide sufficient daylight to interior spaces. This is often due to the depth of the room or external obstructions, such as neighbouring buildings and trees, which block incoming daylight.

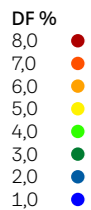
The following Daylight Analysis demonstrates how daylight is affected by external obstructions and how adding a flat roof window can improve light levels and distribution. The results highlight how significantly obstructions reduce interior daylight levels and how an unobstructed roof opening can dramatically restore daylight provision.

Dmin/Dav (uniformity ratio) shows how evenly daylight is distributed inside the room.

Dmin = minimum daylight factor in the space

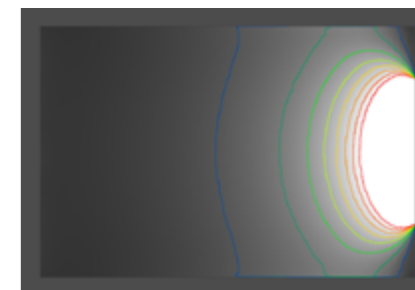
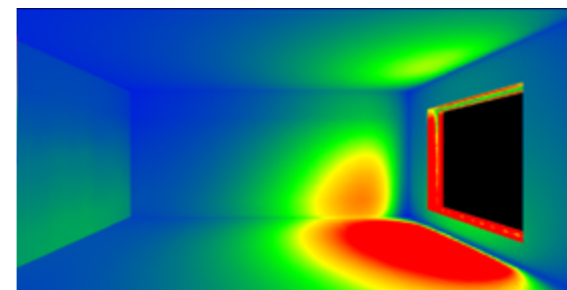
Dav = average daylight factor

A higher value means daylight is more evenly spread across the room.



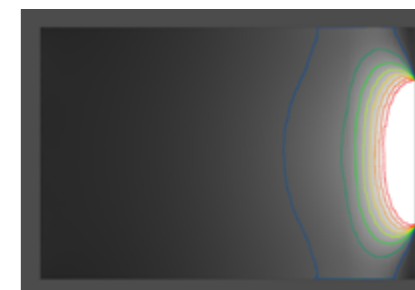
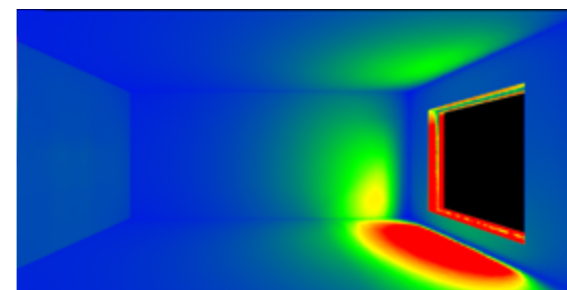
Without obstruction
Median DF 1.05 %
Dmin/Dav 0.18

Daylight reaches the room but is concentrated near the window.



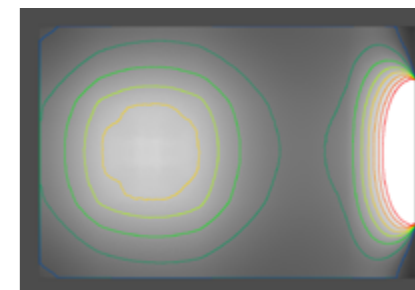
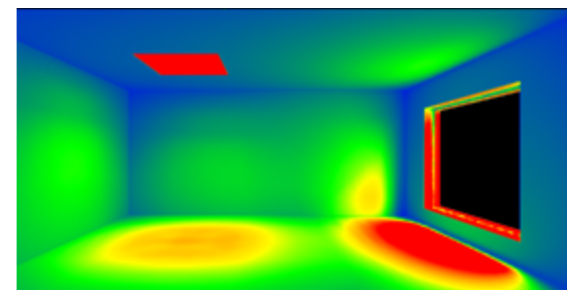
With external obstruction
Median DF 0.58 %
Dmin/Dav 0.22

Nearby buildings or trees reduce daylight significantly; deeper areas of the room are darker.



With external obstruction + flat roof window
Median DF 2.96 %
Dmin/Dav 0.41

Daylight level and depth penetration are significantly improved by adding a roof window.





2.2

Impact of flat roof windows
Better daylight distribution



Removing contrast

For good visibility, a degree of daylight uniformity is desirable. Poor visibility and visual discomfort, such as glare, may occur if the eye is forced to adapt too quickly to a wide range of daylight levels. The more even daylight distribution provided by flat roof windows reduces the contrast between bright spots and shaded areas, contributing to a more visually comfortable space.

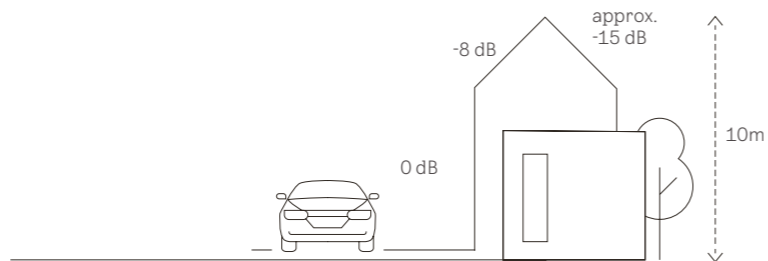
In the event of glare, the eye adapts to the high level of the glare source, which

makes it hard to perceive details in the now too dark work area. Daylight sourced from more than one side (e.g. from the side and above) improves visual comfort, softening dark corners created through contrast and enhancing the distribution of daylight.

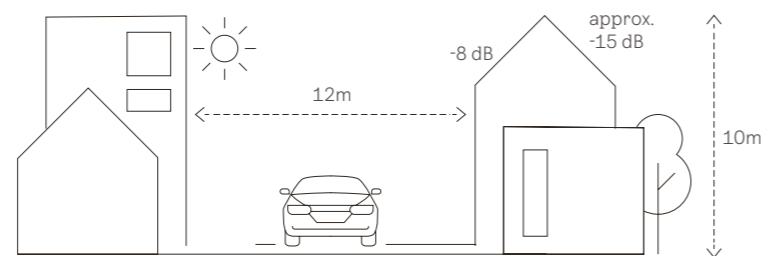
Flat roof windows have been shown to provide significant luminance to surrounding surfaces, resulting in less glare due to a softer transition between the pane and the interior finish.

Impact of flat roof windows Excellent sound insulation

1. Shows the reduction of the outdoor noise level on the building envelope when there are no buildings opposite.



2. Shows the reduction of the outdoor noise level on the building envelope when there are buildings opposite.



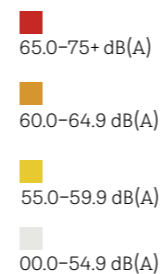
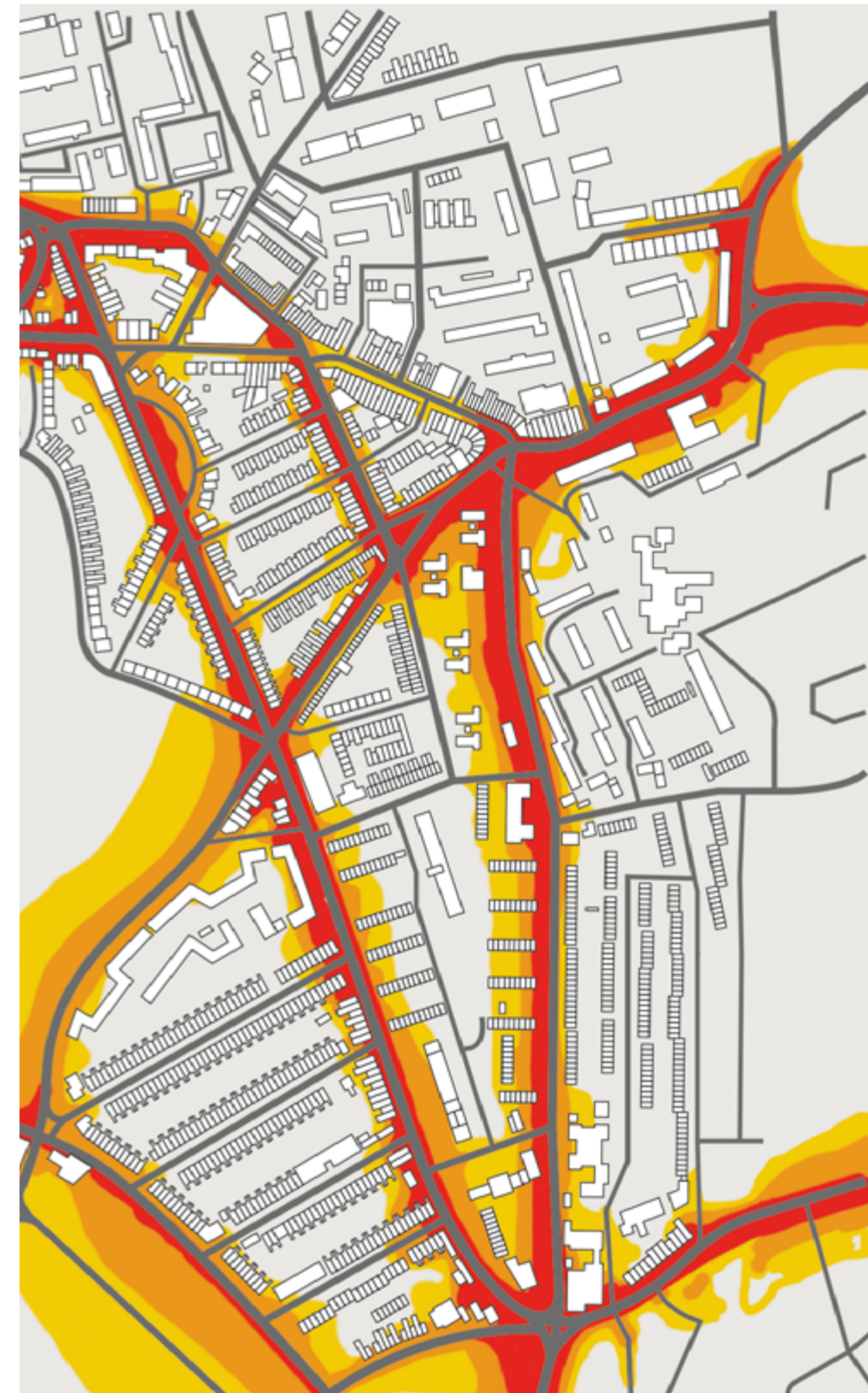
Street noise reduction

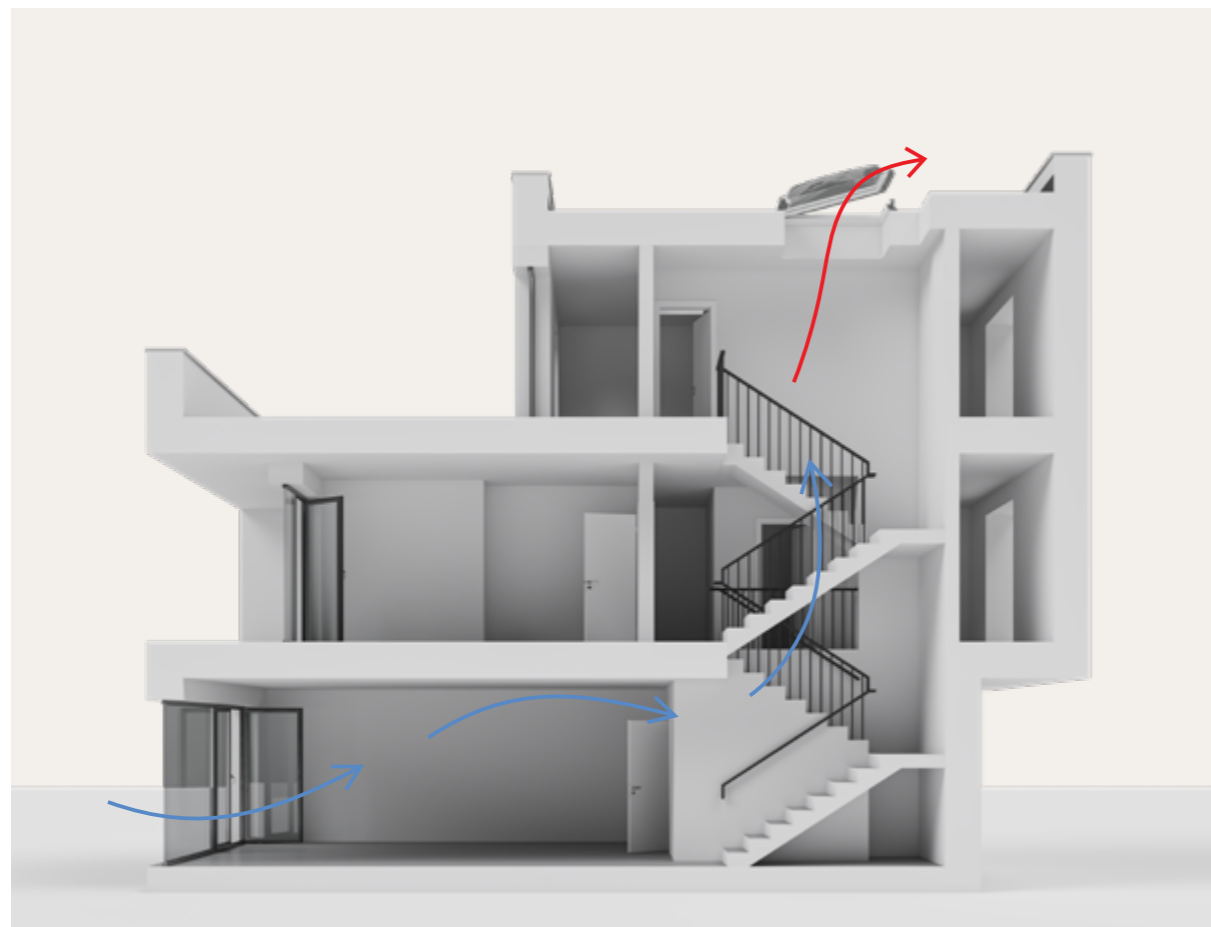
High traffic noise levels indoors can cause significant stress and discomfort. Indeed, 13 % of the European population is highly disturbed by road traffic noise (WHO, 2009).

When a building is situated in proximity to a street, its occupants often experience elevated noise levels. In such situations, flat roof windows are significantly less

exposed to street noise than façade windows. Therefore, when ventilation or daylight is required without compromising acoustic comfort, a flat roof window may represent the optimal solution.

Furthermore, flat roof windows can provide access to natural sounds, such as bird-song, while remaining less exposed to urban noise pollution.





Energy efficiency

By harnessing wind and buoyancy (the stack effect), natural ventilation reduces reliance on energy-intensive mechanical systems. This translates to cost savings and a smaller environmental footprint, allowing buildings to stay cool without excessive energy consumption. Ultimately, this can minimise operational carbon and energy usage, aligning with sustainable design principles without compromising thermal comfort.

Improved indoor air quality

Fresh air is vital for occupants' health and comfort. Natural ventilation introduces outdoor air to dilute pollutants and remove odours, maintaining a healthy indoor environment. Flat roof windows are ideally positioned to facilitate this exchange, enhancing well-being by effectively venting stale air from the highest point of a room.

Humidity control

Effective ventilation is essential for regulating moisture levels and protecting occupant health. Excess humidity can lead to mould growth and the proliferation of dust mites, both of which are primary triggers for asthma and respiratory issues. Natural ventilation through roof openings provides a direct path for moisture-laden air to escape, ensuring a drier, healthier atmosphere while protecting the building fabric.

Night cooling

This strategy utilises lower nocturnal temperatures to replace warm, stale indoor air with cooler air from outside. During warm days, the building structure absorbs heat; at night, as this heat is released, opening a flat roof window allows the rising warm air to escape. This creates a pressure difference that draws cooler air into the building through lower openings, lowering the indoor temperature for the following day.

Impact of flat roof windows Benefits of natural ventilation

Adding a flat roof window to a room with a façade window can more than double the ventilation rate during summer.

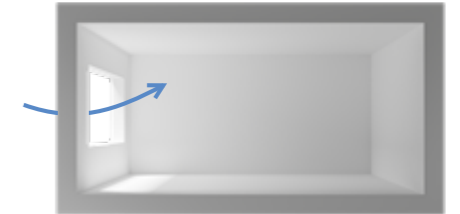
When utilizing the stack effect combined with cross ventilation through flat roof windows and façade windows, the ventilation rate can be over ten times more efficient than background mechanical ventilation alone.

The graphics illustrate background ventilation rates compared to the combination of mechanical and natural ventilation through façade and flat roof windows.

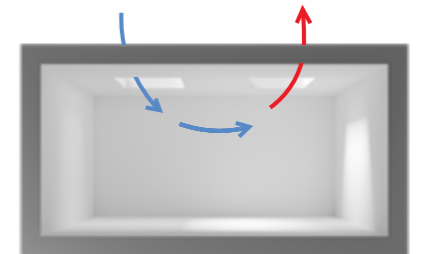
~0,5 ACH
2 hours
Minimum ventilation rate according to building regulations. Typical level for European homes



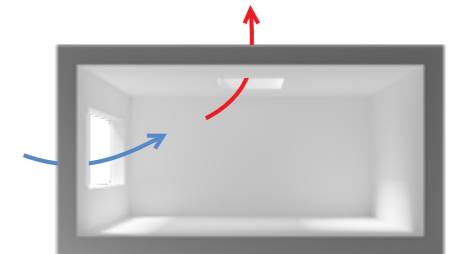
~1,8 ACH
30 minutes
Single sided façade window opening.



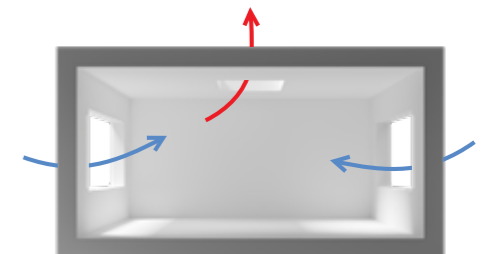
~1,5 ACH
40 minutes
Cross ventilation with two flat roof windows.



~3,8 ACH
15 minutes
Stack effect with one single-sided façade window and one flat roof window.



~5,4 ACH
11 minutes
Stack effect and cross ventilation with two façade windows and one flat roof window.

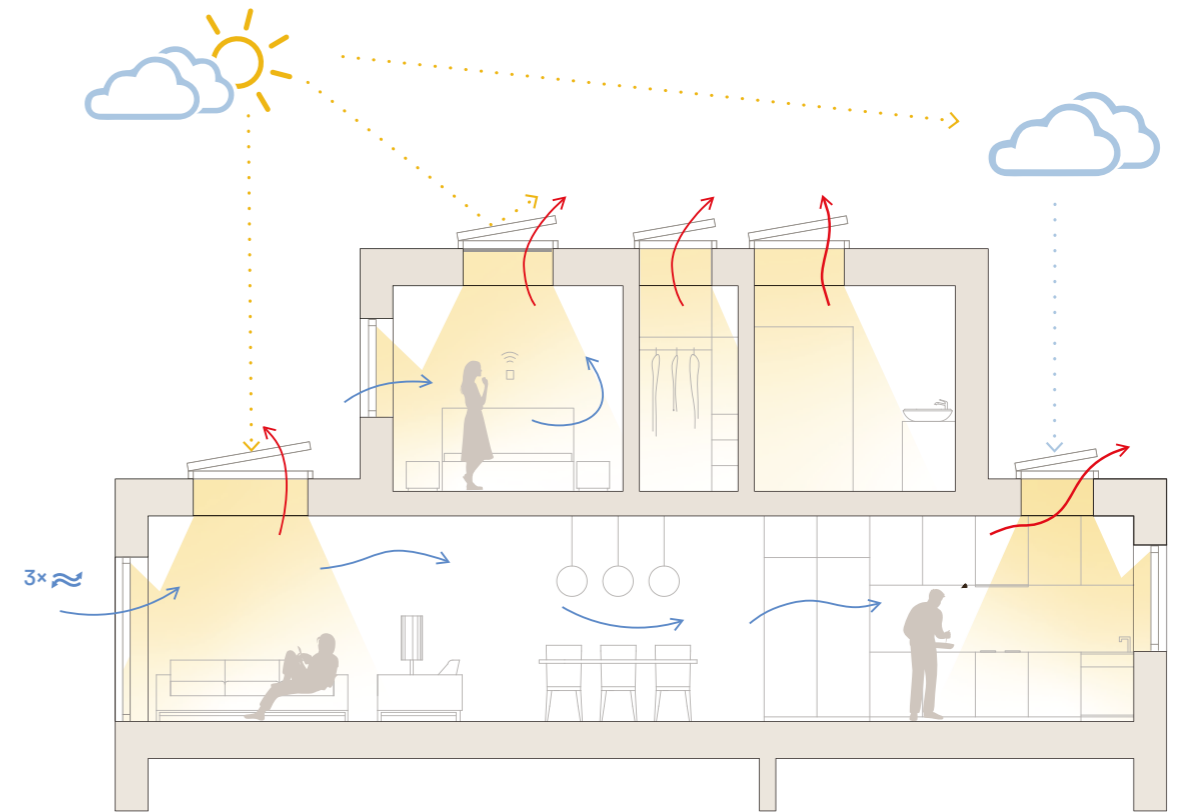


ACH stands for Air Changes per Hour or Air Change rate – the number of times that the total air volume in a defined space is completely removed and replaced in an hour.

Optimal use of space
Requirements and recommendations for achieving comfortable indoor climate

Daylight is a fundamental component of a healthy indoor environment, influencing visual comfort, circadian rhythm, energy levels, and overall well-being. In buildings with flat roofs, the roof surface becomes a powerful daylighting asset, often the most effective way to bring balanced, high-quality light deep into the floor plan.

A well-designed daylight strategy does more than brighten a room. It helps regulate indoor temperature, reduces reliance on artificial lighting, and supports a stable, comfortable indoor climate throughout the day. The way daylight enters determines how evenly it spreads, how it interacts with heat gain, and how the space is ultimately experienced.

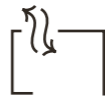


Optimal use of space
Requirements and recommendations for achieving comfortable indoor climate



Daylight

To minimize the use of artificial lighting during the day, three parameters are considered: the amount of daylight / the degree of sunlight / the measures taken to reduce glare. Evaluating three levels of daylight in interiors: minimum, medium, and large. The recommended minimum level is reached when 50 % of the reference plane (DT) achieves 300 lux, and at the same time 95 % of the plane (DTM) reaches 0.7 % (100 lux).



Indoor air quality

During occupation, a minimum outdoor air exchange of 25 m³/h per person must be provided, with a minimum ventilation intensity of 0.5 l/h. The key indicator of indoor environmental quality is CO₂ concentration. Indoor CO₂ levels must not exceed 1500 ppm, while values up to 1000 ppm are considered indicative of a healthy indoor environment. Controlled ventilation is recommended— for example, automatic window opening. Cross ventilation and the chimney effect help accelerate natural ventilation, and a larger room volume further supports good air quality. Tip: Do not close the space above the tie beams, as this helps maintain effective air flow.



View

Daylight in buildings supports a visual connection with the environment, providing information about local conditions.

We consider:

- Horizontal angle of view (minimum 14°)
- Length of view (minimum 6 m)
- Number of landscape layers—sky, landscape, terrain (at least 1)

We define three levels of view to categorize visual quality



Temperature

To allow thermal stability through the design the main recommendations are:

- Orienting rooms with larger air volume to allow effective air exchange.
- Using cross ventilation and stack effect.
- Designing all window openings with external shading and, if possible, automatic shading control.

Additional measures include:

- Using construction materials with heat/cold accumulation.
- Applying thermal insulation according to current standards.

Tip: External shading can reduce room temperature differences by up to 7°C.



Room acoustics

Reduction of noise in buildings can be achieved through several strategies:

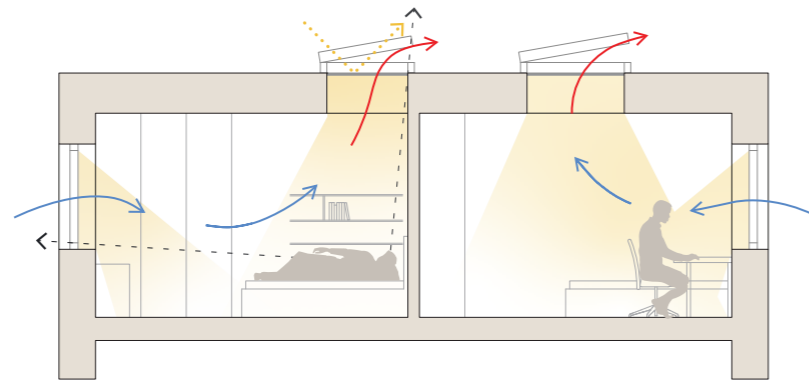
- Reduce outdoor noise using noise-absorbing structures.
- Minimize internal noise by selecting materials with good sound attenuation.
- Design the room layout to support clear listening.

For reference: on the street side, a flat roof window reduces noise by about 8 dB compared to a façade window, while a roof window facing the yard can achieve a reduction of approximately 15dB.

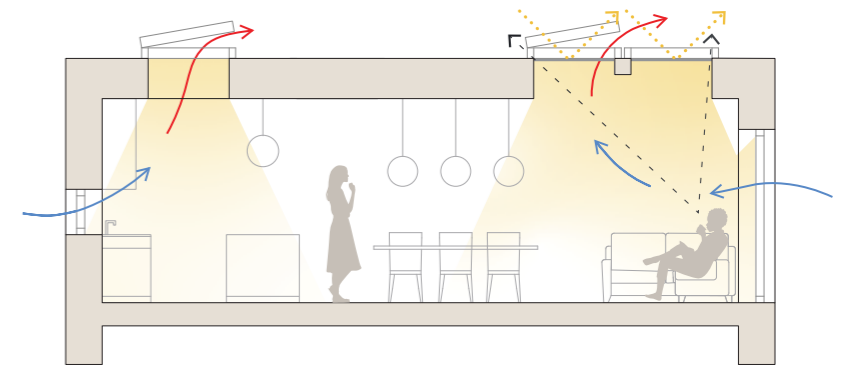
Optimal use of space
Requirements and recommendations for
achieving comfortable indoor climate

Flat roofs offer unique opportunities to shape interior spaces with daylight. The way roof windows are positioned, combined, or integrated into the building envelope directly influences how rooms are used, how they feel, and how comfortable they remain throughout the day. Beyond simply bringing in light, roof-based daylighting can define circulation zones, highlight key functions, and make deeper areas of the floor plan both usable and inviting.

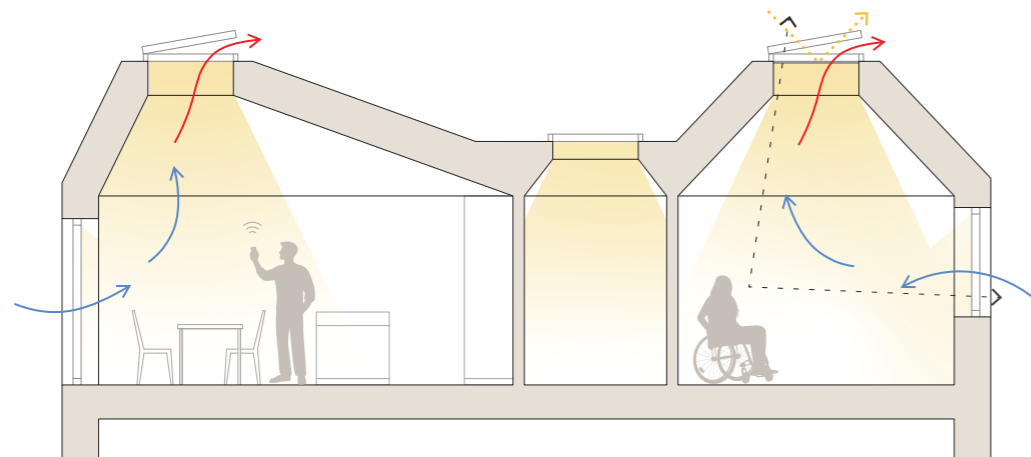
Small rooms / cross ventilation / night cooling / electrical or solar control of windows and shading / sky view.



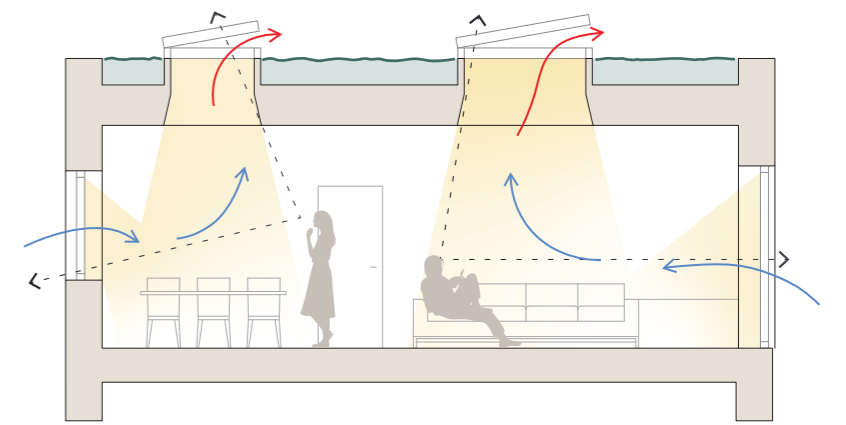
Larger room / cross ventilation / electrical or solar control of windows and shading / sky view.



Lighting of the entire depth of the room / open ceiling for a larger volume of air in the room / electrical or solar control of windows and shading / sky view.

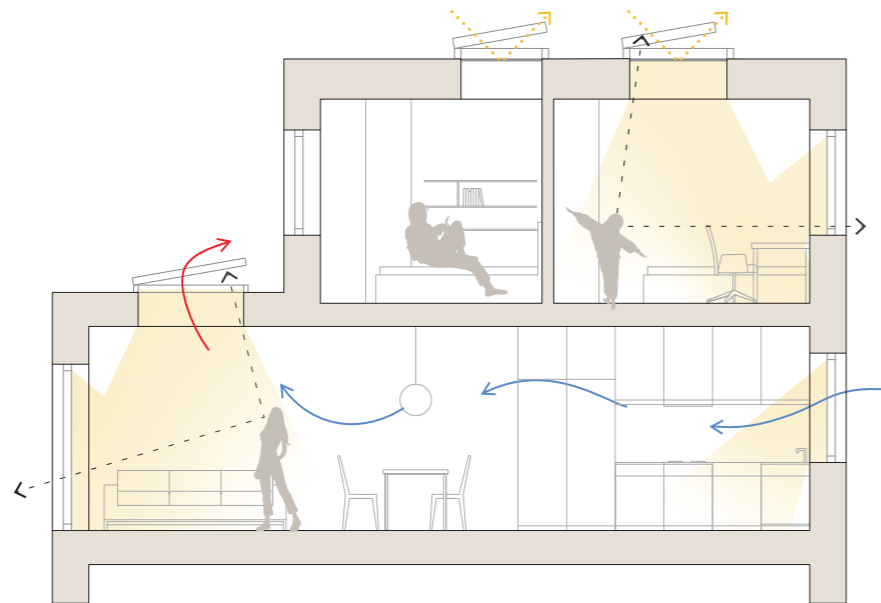


Green roof solution / daylight and nature synergy / angled lining / electrical or solar control of windows and shading / sky view.

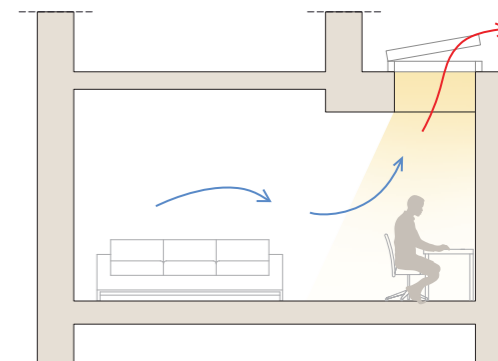


Optimal use of space
Requirements and recommendations for
achieving comfortable indoor climate

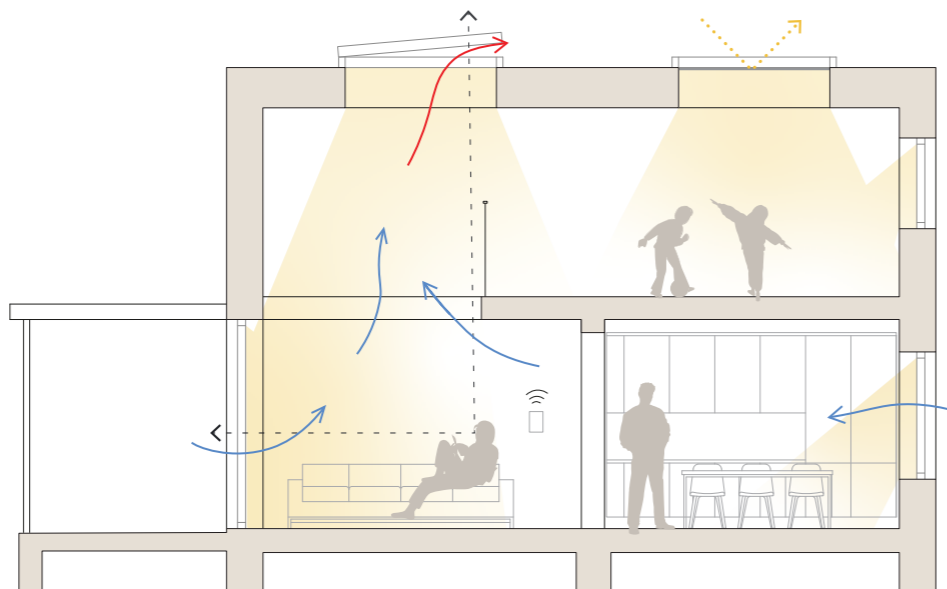
Ground floor extension provide daylight deeper in the layout / efficient ventilation / design element / unique atmosphere.



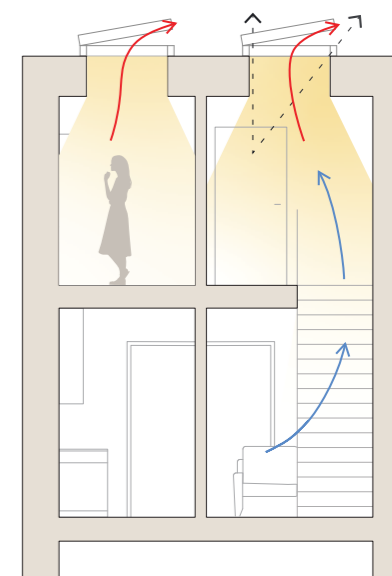
Extension of the basement with the flat roof window / daylight and ventilation in all spaces in the house / transforming spaces.



Combination of windows in the double height living space / cross & stack ventilation / view to the sky from the living room and mezzanine.

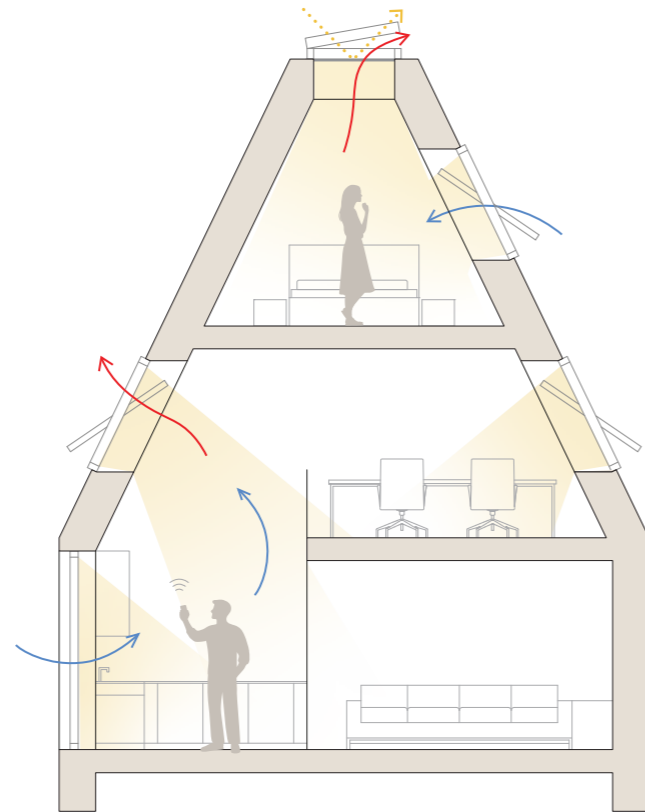


Staircase area filled with daylight & bathroom / enhanced ventilation with stack effect / night cooling // remote control of high windows.

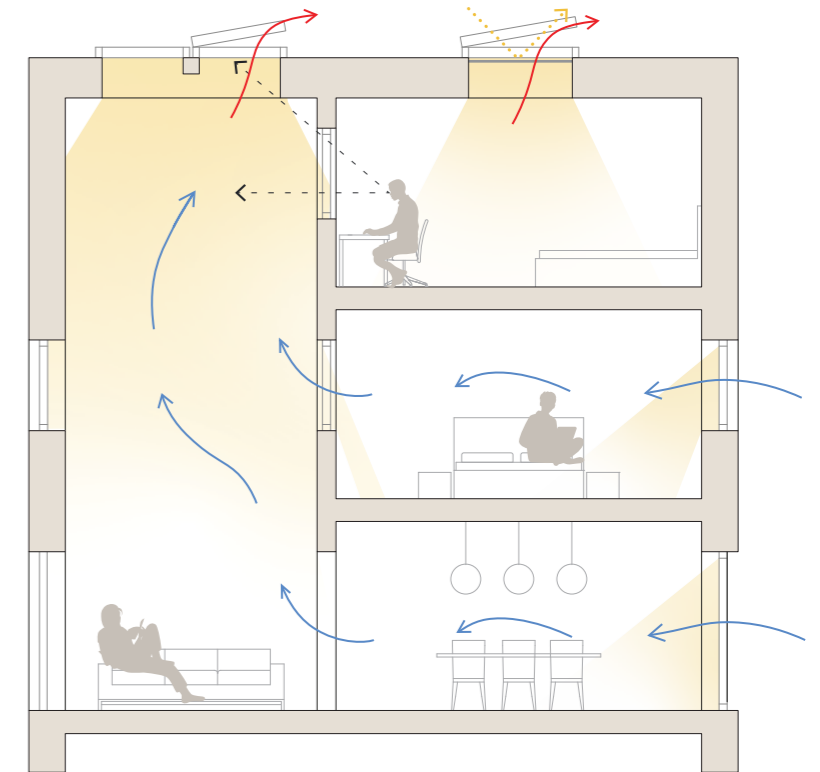


Optimal use of space
Requirements and recommendations for
achieving comfortable indoor climate

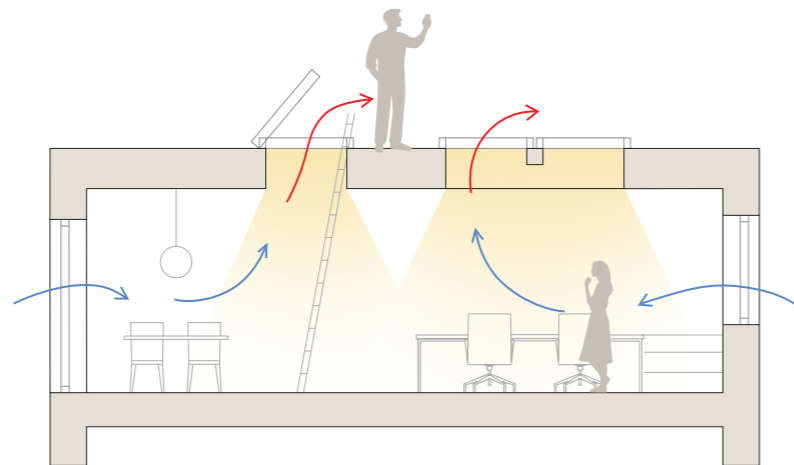
Multistorey house
filled with daylight
at all floors / cross
ventilation & stack
effect / electrical or
solar control of
windows and
shading /
connection to
outdoors



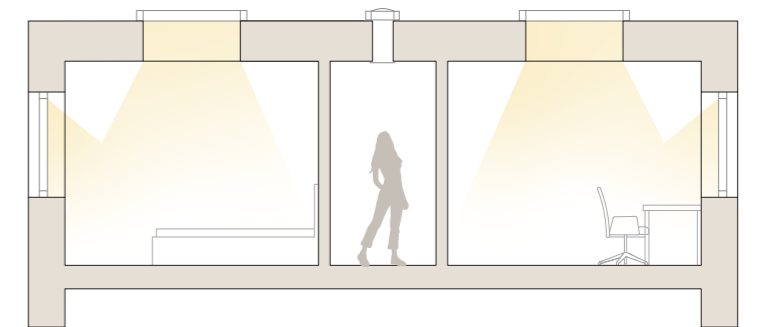
Providing daylight
and ventilation
through interior
atrium space /
privacy /
electrical or solar
control of windows
and shading



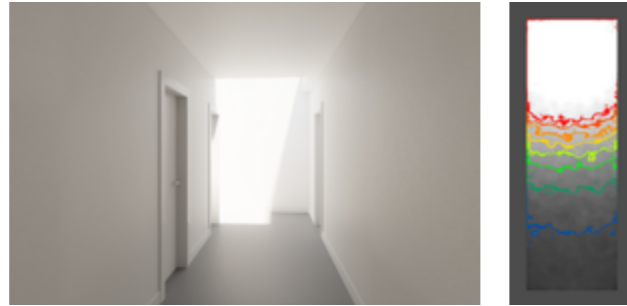
Electric exit for
professionals /
safety & ventilation
switch kit



Daylight in all
spaces / light where
windows cannot
reach / safety &
ventilation switch
kit for windows out
of reach / natural
daylight



Space size: 1,6 × 5 m
Size of the flat roof window
1 × 150 × 150 cm



Size of the flat roof window
2 × 100 × 100 cm



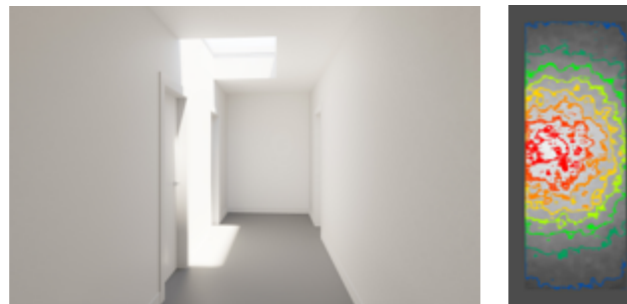
Size of the flat roof window
2 × 100 × 100 cm



Size of the flat roof window
3 × 80 × 80 cm



Size of the flat roof window
1 × 100 × 200 cm



Roof window placement
Number and positioning

Impact on indoor atmosphere and daylight distribution. Positioning of flat roof windows can vastly influence the indoor atmosphere and daylight distribution. Purposefully chosen location of the windows can determine how sunlight interfaces with the interior, thereby affecting the appeal and functionality of the space.

Walls and linings significantly contribute to the light delivery and its diffusion. Together, the thoughtful consideration of flat roof window placement and the selection of appropriate lining and wall materials or colors can transform an ordinary space into one that feels open, airy and well-daylit.



Roof window placement
Number and positioning

Optimizing room's functionality

The positioning and number of flat roof windows in a room is driven by the need for optimizing the room's functionality and the activities performed there, so creating lighting conditions that are suitable for the visual tasks in a room and that simultaneously meet individual needs. Attention needs to be given to both our central vision (illumination of the object) and our peripheral vision (illumination of the surroundings). Peripheral vision contributes to an impression of the surroundings in which we find ourselves – space dimensions and shape, ambiance, materials and light distribution. In the design phases this is supported by appropriate placement and sizing of windows to achieve an intelligent balance between the intensity of light, its location and direction.

Windows can also help define different zones within the room and make the most effective use of them. For example, a well-lit corner can be designated as a workspace, while a softer-lit area can be used for relaxation.

In the design phase we need to analyse and visualize not only the daylight provisions for space itself but also include the human interference with the space. People working at the kitchen desk themselves create shadows, which we can eliminate by sourcing light from various directions, especially from above.





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Room inspiration

- 3.1 Living room
- 3.2 Kitchen
- 3.3 Bedroom
- 3.4 Bathroom/Toilet
- 3.5 Study/Home office
- 3.6 Corridor
- 3.7 Staircase
- 3.8 Flat roof extensions
- 3.9 Public and commercial

3

Living Room

A well-daylit living room should reach about 500 lux of daylight, roughly equivalent to 5% Daylight Factor.

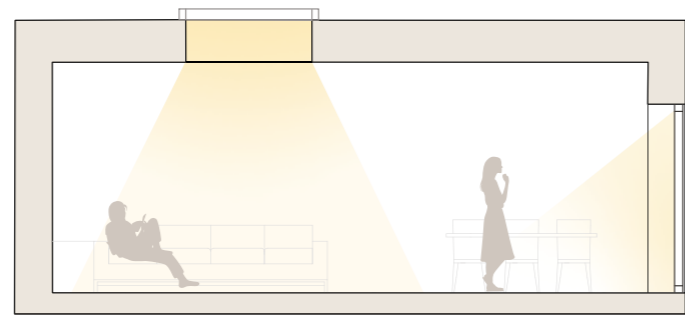
Architect: Elkiær + Ebbeskov
Arkitekter APS,
Lotte Elkiær and
Ane Ebbeskov
Photographer:
STAMERS KONTOR



Living room
**Roof windows in central position
for daylight autonomy**

Daylight autonomy indicates how effectively natural light can maintain comfortable brightness levels in the room during daytime hours.

Roof windows in a central position help daylight reach deeper into the living room, supporting daylight performance aligned with the recommendations of EN 17037.

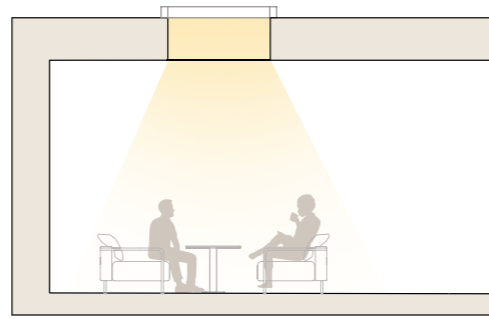


maximum daylight reach 3500 mm



Living room
Roof windows above sitting area

Abundant daylight and outside views make spaces feel more spacious, improving mood and reducing fatigue. Because roof windows capture light from the open sky, they provide usable natural light for longer during dawn and dusk. This delays the need for artificial lighting and creates a better connection to the natural day.

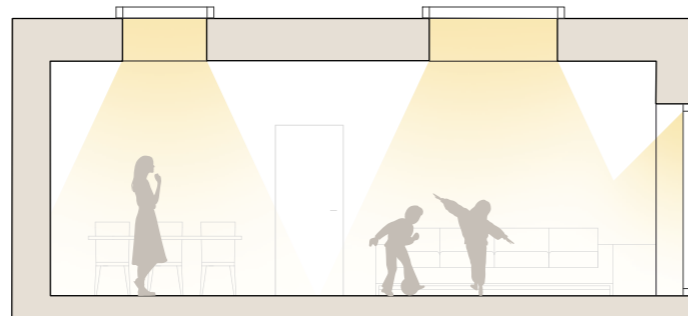


Photographer:
Miran Kambič



Living room
Roof windows in depth of the room

High-quality natural light significantly enhances a property's desirability and perceived value. Market research suggests that well-lit interiors are a key factor in buyer appeal, often distinguishing a premium home in a competitive market.





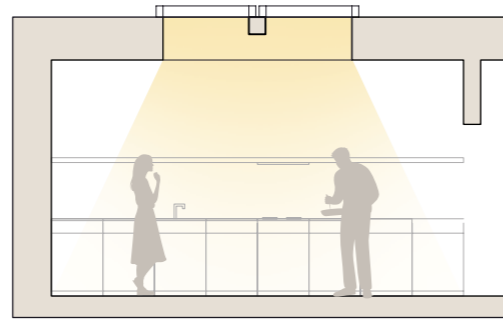
Kitchen

The lighting recommendation for food preparation areas is 500 lux (approximately 5% Daylight Factor), while for dining areas 300 lux (approximately 3% Daylight Factor) is recommended.

Photographer: Jesper Jørgen

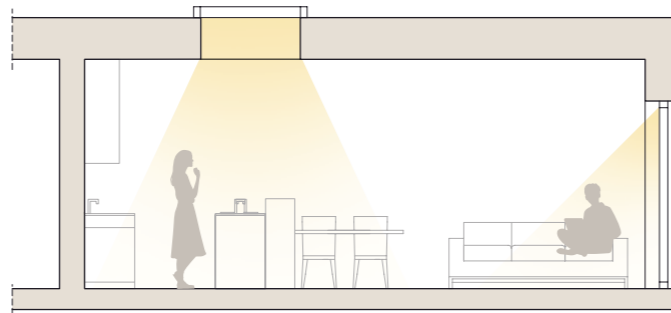
Kitchen
Roof windows above kitchen bench

Top lighting provides an ideal solution for kitchens, using the stack effect to effectively exhaust the humidity and particles that mechanical rangehoods often miss. This natural ventilation clears pollutants quickly, significantly improving indoor air quality and occupant health.



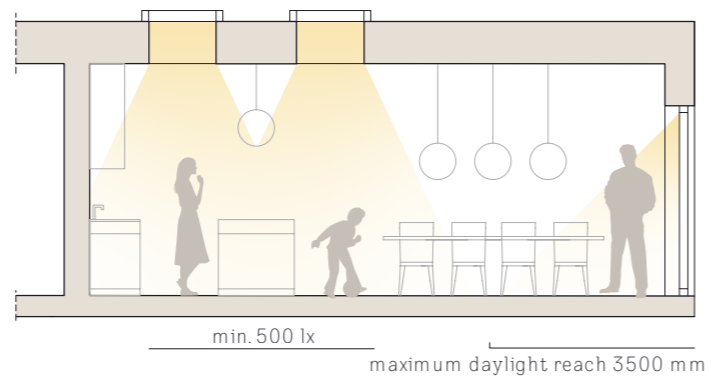
Kitchen
Roof windows above kitchen island

Placing roof windows above the kitchen island provides focused daylight on the main preparation zone. This improves visual comfort during detailed kitchen tasks and supports everyday activities such as cooking, cutting, and arranging food.



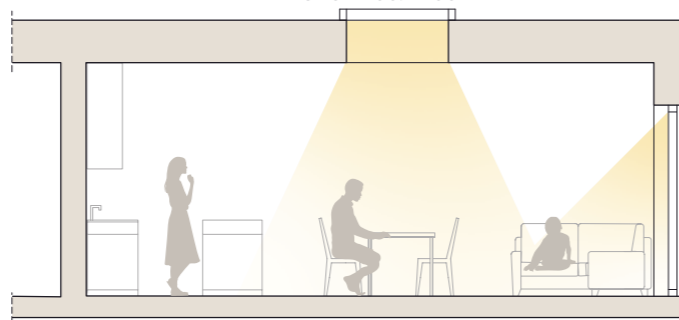
**Kitchen
Roof windows between kitchen
and dining table**

Roof windows positioned between the kitchen and dining area help create a visual and daylight connection between spaces. This placement supports flexible living by distributing natural light across both cooking and dining activities.



Kitchen
Roof windows above dining table

Roof windows above the dining area help create a comfortable atmosphere for everyday meals and social interaction. Natural daylight improves visual comfort during morning and daytime use.



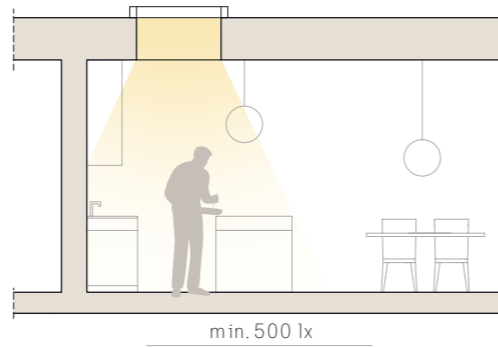
Photographer:
STAMERS KONTOR



Kitchen
**Roof windows between kitchen
and kitchen island**

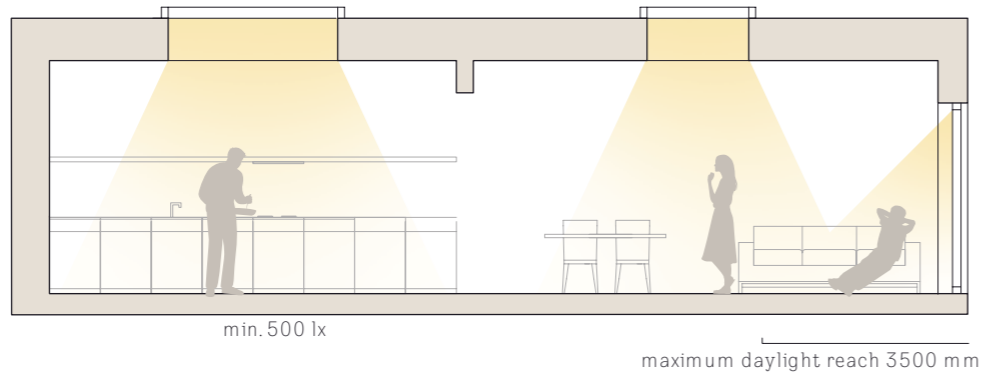
Roof windows placed between the kitchen workspace and the island combine daylight and natural ventilation.

The stack effect created by vertical air-flow helps remove heat, humidity, and cooking particles, supporting a healthier indoor environment.



Kitchen
Roof windows in central position

Roof windows in a central position help distribute daylight more evenly across the kitchen space, Supporting overall brightness and improving daytime visual comfort during kitchen activities.

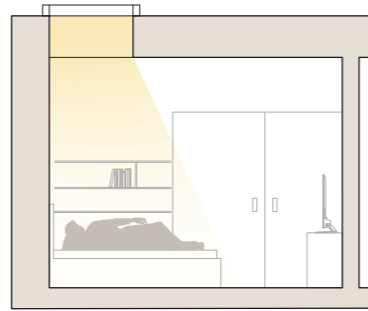




Bedroom
The lighting recommendation for bedrooms is 300 lux, roughly equivalent to 3% Daylight Factor.

Bedroom
Roof windows above the bed

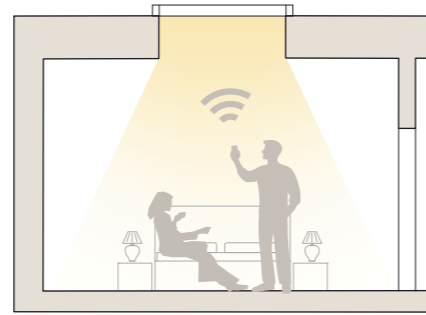
Roof windows positioned above the bed introduce natural daylight into the resting area while preserving overall room brightness. Morning daylight helps support natural wake-up conditions and contributes to comfortable daytime visual perception within the bedroom environment.



Bedroom
Roof windows in central position

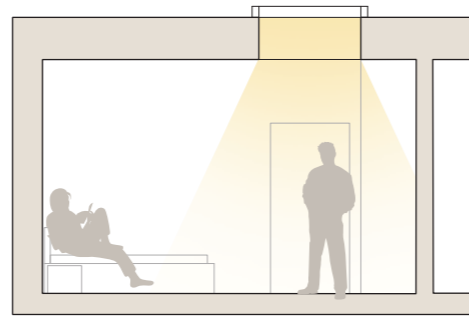
Healthy light exposure is closely linked to maintaining periods of darkness for quality sleep. During daytime, higher light intensity supports alertness, while a darker environment at night supports recovery.

Exposure to bright light shortly after waking is particularly beneficial, as it helps regulate the body's internal rhythm and supports daytime activity and concentration.



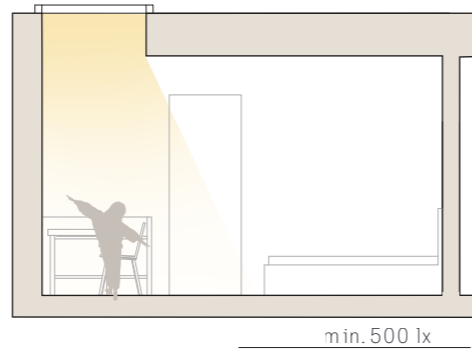
Bedroom
Roof windows in the depth of the room

Bedroom design should provide daylight at appropriate intensity and timing. Daylight penetration into the deeper part of the room helps maintain visual comfort and supports the body's natural 24-hour biological cycle, even when direct window exposure is limited.



Kids' room
Roof windows above the desk

The children's room is used for work, study, play and sleep. Research indicates that children in daylit learning environments with larger windows and higher daylight access can score up to 15% higher on academic performance measures compared with less-daylit spaces*. In the early evening, natural daylight reduces the feeling of fatigue and prolongs the day.



* Heschong et al., 1999



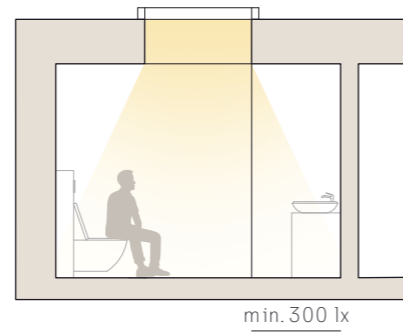
Bathroom

The lighting recommendation for bathrooms is 300 lux, roughly equivalent to 3% Daylight Factor

Bathroom daylight design should balance privacy, visual comfort, and effective ventilation to support healthy indoor environments.

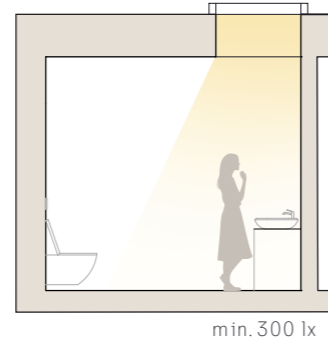
Bathroom/Toilet
Roof windows in central position

Roof windows in a central position help distribute natural light evenly across the bathroom space. Balanced daylight improves visibility for everyday routines such as grooming and hygiene, while contributing to overall visual comfort.



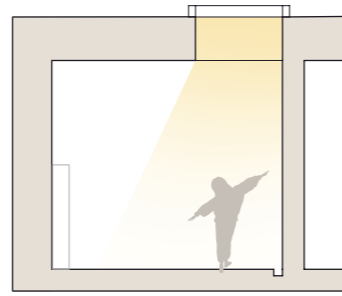
Bathroom/Toilet
Roof windows above the sink

Morning daylight plays an important role in supporting the body's natural rhythm. Exposure to bright light shortly after waking helps regulate alertness and supports daytime activity. Placing roof windows above the sink provides higher light intensity during morning routines, contributing to comfortable visual conditions aligned with daylight quality principles of EN 17037.



Bathroom/Toilet
Roof windows above the shower

Roof windows above the shower area help combine daylight provision with natural moisture control. Automatically operated roof windows can support ventilation by allowing humid air to escape, helping maintain a more comfortable indoor environment.



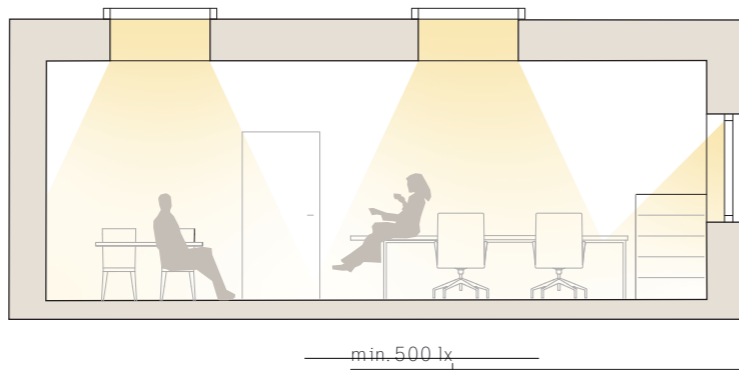


**Study /
Home Office**
The lighting
recommendation
is 500 lux, roughly
equivalent to 5%
Daylight Factor.

Study/Home office
Roof windows above the workplace

Roof windows above the workspace help bring natural daylight directly to the working area, supporting visual comfort during detailed tasks.

Studies suggest that better daylight quality can contribute to improved concentration and reduced visual fatigue during daytime work.



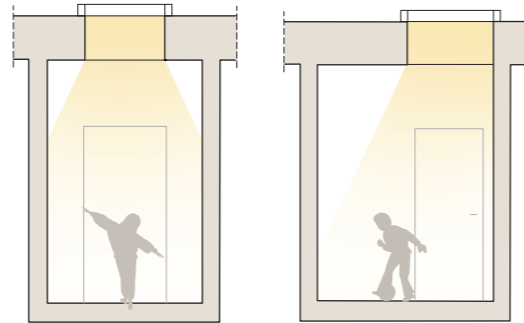


Corridor
Daylight need for corridors is 100 lux, which corresponds approximately to 1% Daylight Factor

Photographer:
Andrea Segliani

Corridor
Functional light

Corridors are transition spaces where daylight is often overlooked. Introducing roof windows helps bring functional daylight into circulation areas, improving orientation and reducing reliance on artificial lighting.





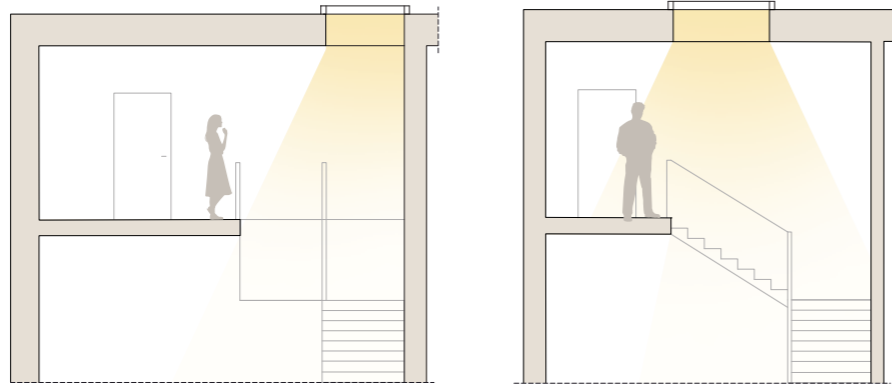
Staircase

Daylight need for staircases is 100 lux, roughly equivalent to 1% Daylight Factor.

Photographer:
Niklas Hart

Staircase
Functional light

Placing a roof window above the staircase introduces zenithal daylight that can naturally reach multiple levels of the building. In addition to improving visibility and spatial orientation, roof windows can also support ventilation by allowing warm and humid air to rise and quickly escape.



Photographer:
Andrea Segliani



Flat roof extensions

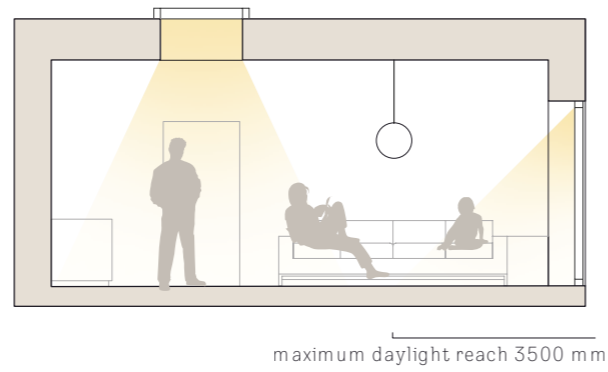
Daylight requirements vary depending on the function of the space and the type of activity performed.

As a design guidance reference, higher visual task areas such as cooking or reading benefit from around 500 lux (approximately 5% Daylight Factor), while spaces used for general activities can function well with around 300 lux (approximately 3% Daylight Factor).



Flat roof extensions
Roof windows in extension area

Roof windows are especially valuable in building extensions where daylight penetration from façades may be limited. Top-lighting helps support balanced illumination in areas far from external walls, complementing façade windows.



Daylight from above can bring up to three times more daylight compared to a vertical window of the same size*, making it an effective way to introduce natural light deeper into the space.

*Roy, et al., 2004

Photographer:
Tony Elis
Photography





Public and commercial
Design optimal light conditions

Photographer:
Patricia Weisskirchner

Public and commercial
Kindergarten

Kindergarten Fulnek, Czech Republic
Daylight is essential in school buildings, supporting wellbeing, comfort, and stimulating learning and play. In Fulnek Kindergarten, the design uses roof windows and large south-facing glazing to fill classrooms and circulation areas with natural light, while carefully framing views toward the surrounding landscape and the town's historic buildings. In the upper multi-purpose room, roof windows animate the ceiling and provide even, diffuse daylight, creating a bright, flexible space for communal activities that connects children to the outdoors while maintaining visual comfort indoors.



Architect:
Xtopix

Photographer:
Miro Pochyba



Pool and Spa in Mallorca

In a facility where wellbeing, relaxation, and visual comfort are central to the user experience, daylight from above reinforces the connection to the Mediterranean light and elevates the atmosphere of the leisure and wellness spaces.

A series of square roof openings bring daylight directly into the main swimming area, transforming what could be an enclosed interior into a bright, dynamic space filled with natural light.



Architect:
A2arquitectos

Photographer:
Torben Eskerod



Public and commercial
Office building

Baumit office building, Slovenia

In the renovated Baumit office building in Trzin, the design transforms a former industrial structure into a modern workspace by strategically incorporating roof windows that bring daylight deep into the plan. For the building's interior, daylight from above was prioritized through a "fifth façade" strategy, where zenithal light enhances the indoor environment—reducing reliance on artificial lighting, supporting natural ventilation through the stack effect, and strengthening the connection between interior spaces and the surrounding landscape.



Architect:
Studio a+v

Photographer:
Rok Deželak





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VELUX technical solutions

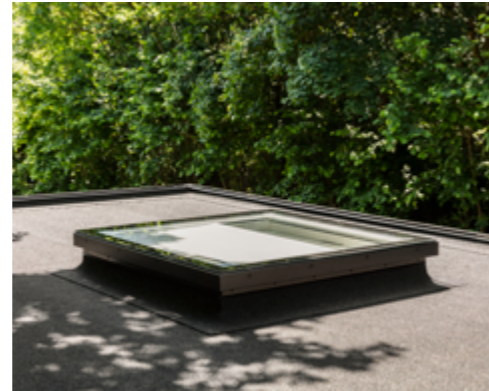
- 4.1 Product overview
- 4.2 Technical parameters
- 4.3 Design tips
- 4.4 Lining and lining shapes
- 4.5 Technical drawings
- 4.6 Tools and services

4

Standard products



Curved glass rooflight
Top performer with CurveTech
New Generation



Flat glass rooflight
Daylight, design and aesthetics.
New Generation



Dome with glazing
Advanced dome solution
Classic design



Dome
Basic solution without glazing for
uninhabited rooms and buildings

Special function



Standard glass rooflight
The modern and economical solution
New Generation



Smoke ventilation
Dome with glazing
Classic design



Roof exit
Curved/Flat glass rooflight
New Generation



Roof exit
Dome with glazing
Classic design

Explore more
about VELUX
Flat Roof
windows



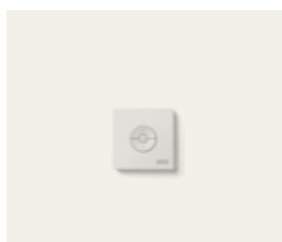
TCR rigid suntunnel
35 cm. diameter, rigid aluminium tunnel. Length from 0,9 to 1,7 m. Available extensions (ZTR) for tunnel length up to 6 m.



TCF flexible suntunnel
35 cm. diameter, flexible fibreglass tunnel, with reflective inner coating. Recommended length between 0.2m and 0.9m.



Basic wall switch (KLI 311-313)
Pre-paired for easy control.



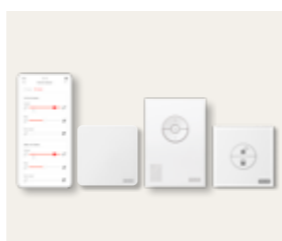
VELUX Touch (KLR 300)
Multiple product switch



VELUX App Control (KIG 300)
Control your indoors from anywhere.



VELUX ACTIVE with NETATMO (KIX 300)
VELUX App with sensor



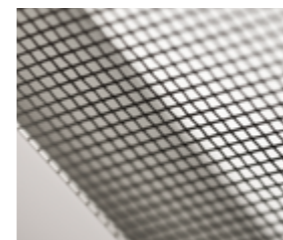
Anti-heat blind (MSU)
Reduces overheating.



Blackout blind (DSU)
Perfect sleep - day or night.



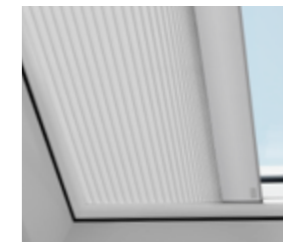
Insect screen (ZIU)
Fresh air and 100% insect-proof.



Anti-heat blind (MSG)
Reduces solar heating.



Blackout energy pleated blind (FSK/FMK)
Blackout and insulating effect.



Translucent pleated blind (FMG)
Soft lighting



More information about Flat Roof Sun Tunnels



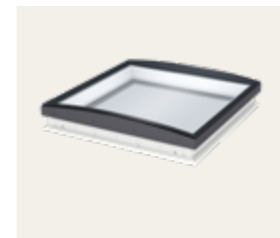
More information about blinds for Flat Roof Windows



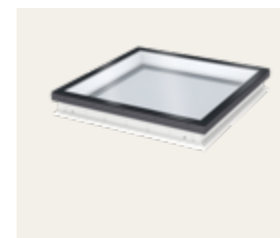
Always install flat roof windows with the short side following the direction of the roof pitch. For vented sizes, the opening mechanism is located on the short side.

		height (mm)							
		600	800	900	1000	1200	1500	2000	
width (mm)	600	CFU CVU CFP CVP 060060		CFU CVU 090060				CFU CVU 200060	
	800		CFU CVU CFP CVP 080080				CFU CVU 150080		
	900	CFP CVP 060090		CFU CVU CFP CVP 090090		CFU CVU 120090		CFJ CVJ 150090	
	1000				CFU CVU CXU CFP CVP 100100	CFJ CVJ CSP CXP		CFU CVU CXU 150100	CFJ CVJ 200100
	1200			CFU CVP 090120		CXP	CFU CVU CXU CFP CVP 120120	CFJ CVJ CSP CXP 150120	
	1500				CFP CVP 100150			CFU CVU CFP CVP 150150	CFJ CVJ

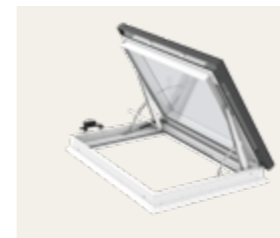
CFU/CVU
Curved glass roof window



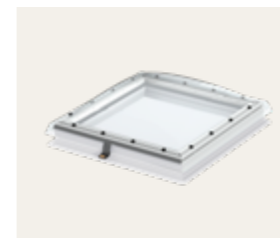
CFU/CVU
Flat glass roof window



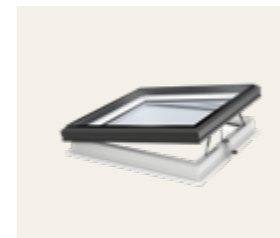
CXU
Roof exit with curved/flat glass roof window



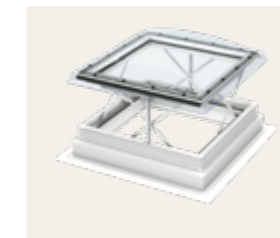
CFP/CVP
Dome with glazing



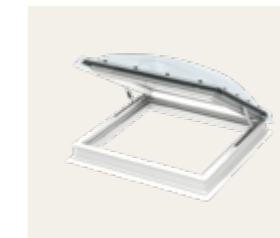
CFP/CVP
Standard glass



CSP
Smoke vent dome with glazing



CXP
Roof exit dome with glazing



CFJ/CVJ
Dome



Technical parameters
Flat Roof Windows

*Daylight area stated as per method in EAD 220062-00-0401 (CE marking). Numbers mentioned are for a size 100 × 100 cm.

** Thermal transmittances and areas are calculated for window size 120 × 120 cm, with a curb height of 300 mm in 0° roof pitch in accordance with method in EN 1873:2014+A1:2016.

*** Valid for CVP model

	Curved glass CFU/CVU	Flat glass CFU/CVU	Curved/Flat glass roof exit CXU	Standard glass rooflight
Room	Inhabited/heated room			
Roof pitch	0°-15°	0°-15° / 2°-15°	0°-15° / 2°-15°	2°-15°
Daylight area (m ²)	0,88*	0,88*	0,88*	0,70*
Cover top	Curved glass top (5-8 mm toughened glass)	Flat glass top (5-8 mm toughened glass)	Curved/flat glass top (5-6 mm toughened glass)	Flat glass top (aluminium frame)
Glazing options	2-layer glass (20Q) 3-layer glass (25Q)	2-layer glass (20Q) 3-layer glass (25Q)	2-layer glass (20Q) 3-layer glass (25Q)	2-layer glass (73QV)
Thermal transmittance (W/m ² K)	Urc, ref 300: 0,65** Urc, ref 300: 0,55**	Urc, ref 300: 0,75** Urc, ref 300: 0,60**	Urc, ref 300: 0,75/0,8** Urc, ref 300: 0,65/0,7**	Urc, ref 300: 0,75** Urc, ref 300: 0,82**
Thermal transmittance area (m ²)	Arc, ref 300: 4,4**	Arc, ref 300: 4,1**	Arc, ref 300: 4,4/4,1**	Arc, ref 300: 3,72**
Total solar energy transmittance (g)	0,52 0,49	0,52 0,49	0,52 0,49	0,51
Light transmittance (Tv)	0,69 0,63	0,69 0,63	0,69 0,63	0,72
Sound insulation Rw (dB)	39 dB 42 dB	39 dB 41 dB	39 dB 42/41 dB	36 dB 30 dB

Clear dome with glazing CFP/CVP	Opaque dome with glazing CFP/CVP	Roof exit CXP	Smoke ventilation window CSP	Fixed Dome CFJ	Ventilated dome CVJ
Inhabited/heated room					
0°-15°	0°-15°	0°-15°	0°-15°	0°-15°	0°-15°
0,70*	0,70*	0,70*	0,70	0,64*	0,64
Clear dome (Acrylic/Polycarbonate)	Opaque dome (Acrylic/Polycarbonate)	Clear/opaque dome (Acrylic/Polycarbonate)	Clear/opaque dome (Acrylic/Polycarbonate)	Opaque dome (Acrylic/Polycarbonate)	Opaque dome (Acrylic/Polycarbonate)
2-layer glass (73UT) 2-layer glass (73QV)	2-layer glass (73UT) 2-layer glass (73QV)	2-layer glass (73QV)	2-layer glass (73QV)	2-layer glass (20Q) 3-layer glass (25Q)	2-layer glass (73UT) 2-layer glass (73QV)
U-value: 0,87** U-value: 0,80**	U-value 0,87** U-value 0,80**	U-value 0,86**	U-value 0,99**	U-value 2,2** U-value 1,7**	U-value 2,0** U-value 1,6**
Area: 3,4**	Area: 3,4**	Area: 3,4**	Area: 3,4**	Area: 2,6**	Area: 3,1**
0,54/0,52 0,53/0,50	0,19/0,20 0,20/0,23	0,53/0,50 0,20/0,23	0,53/0,50 0,20	0,75/0,52 0,69/0,47	0,70/0,52 0,69/0,47
0,72/0,70 0,72/0,70	0,23/0,21 0,25/0,26	0,72/0,70 0,25/0,26	0,72/0,70 0,25/0,26	0,80/0,52 0,75/0,46	0,80/0,52 0,75/0,46
36 dB (30 dB***) 36 dB	36 dB (30 dB***)	36 dB	33 dB	20 dB 22 dB	20 dB 22 dB

Correct installation level

When installing a flat roof window, it is necessary to ensure that the window installation level is at least in line with the final layer of the roof covering (e.g. gravel, waterproofing foil, tiles...). In case of installation in a green roof, the substrate level becomes the reference level for installing the window. This ensures that the upper edge of the window frame is at least 15 cm above the final roof covering.

Appropriate distances

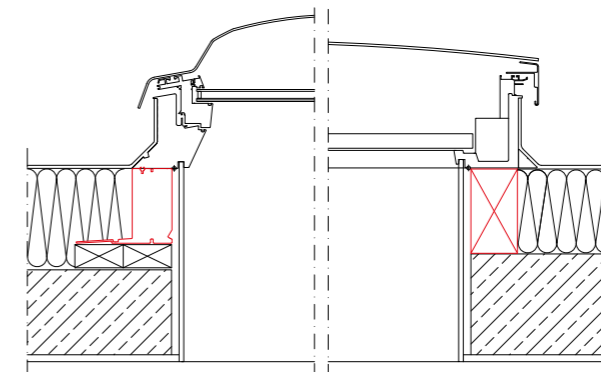
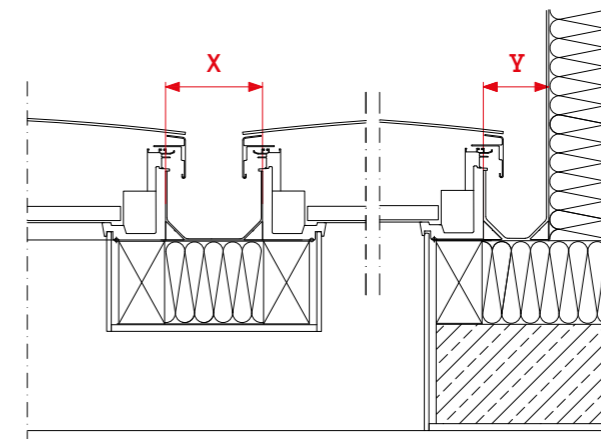
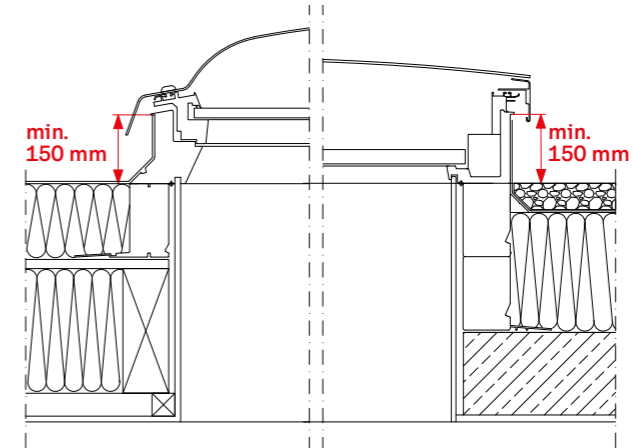
Maintain minimum separation distances to ensure unobstructed window operation and sufficient access for secure flashing installation:

Distance X: Minimum spacing between adjacent units.

Distance Y: Minimum clearance from fixed obstructions (e.g., walls, chimneys, or vents). Required distances are model-specific.

Suitable subconstruction

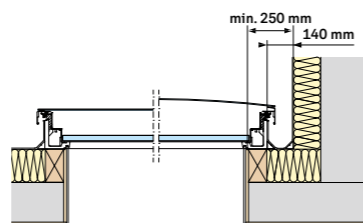
The window must be mounted on a rigid, load-bearing curb - using either VELUX standard frame extensions or site-built options (timber, masonry, or concrete) - to ensure the unit is elevated to the required height above the finished roofing layer.



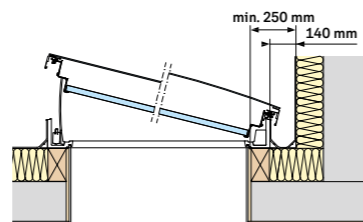
Design tips
Installation orientation and clearances

- For Curved/Flat glass rooflights
- Windows must be installed the long side “down” with rain-sensor down the slope and hinges up the slope.
 - All rectangular sizes open on the long side.
 - For fixed windows orientation is not predetermined.
 - If blinds are being installed, the orientation must be according to installation manual.
 - Minimum installation distance for CFU/ CVU windows is 250 mm. Minimum installation distance for CXU is 260 cm.

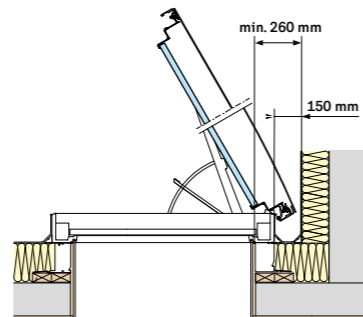
Minimum installation distances for fixed window (CFU)



Minimum installation distances for electrically operated window (CVU)

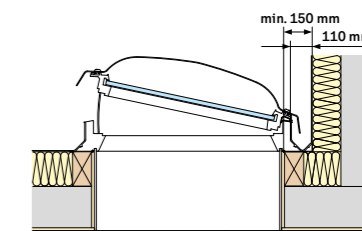


Minimum installation distances for electrically operated roof exit window (CXU)

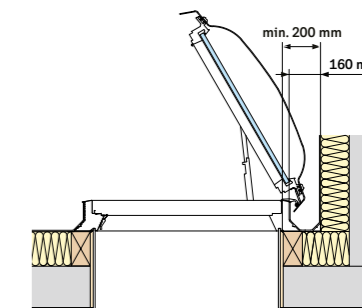


- For Domes with glazing
- Windows must be installed the short side “down” with rain-sensor down the slope and hinges up the slope.
 - All rectangular sizes open on the short side.
 - For fixed windows orientation is not predetermined.
 - If blinds are being installed, the orientation must be according to installation manual.
 - Minimum installation distance for CFP/ CVP windows is 150 mm. Minimum installation distance for CXP and CSP windows is 200 mm.

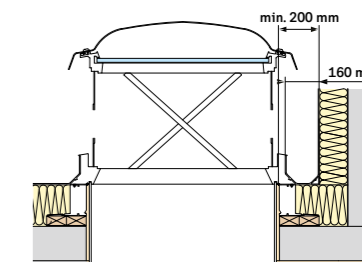
Minimum installation distances for electrically operated window (CVP) or fixed window (CFP)



Minimum installation distances for manually operated roof exit window (CXP)



Minimum installation distances for smoke ventilation window (CSP)



Generate project-specific installation details



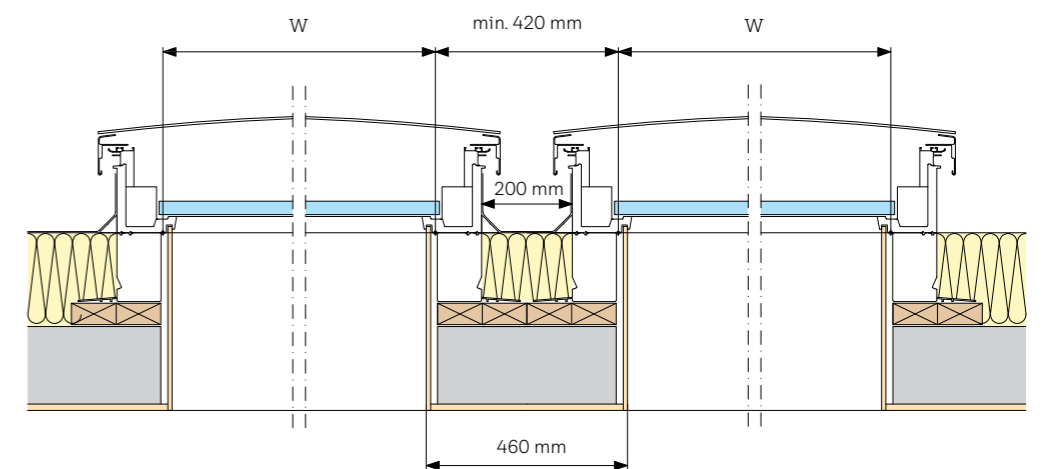


4.3

Design tips
Window combinations

Combination of Curved/Flat glass roof window with extension frame ZCU
When installing a combination of two or more flat roof windows CFU/CVU with extension frames (ZCU), minimum distance between the construction openings in the roof should be 420 mm. That ensures 200 mm distance between the window frames, which allows opening and proper installation of the window and its components.

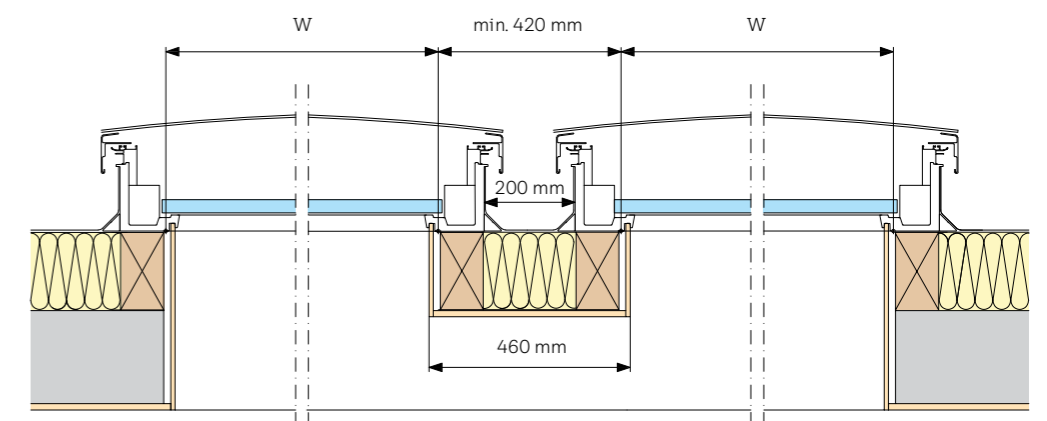
When using extension frames ZCU, the window lining between the windows is usually made flush with the ceiling. The width of the window lining between the windows is 460 mm.



**Combination of Curved/Flat glass roof window with extension frame made on site**

When installing a combination of two or more flat roof windows CFU/CVU with extension frame made on site, minimum distance between the construction openings in the roof should be 420 mm. That ensures 200 mm distance between the window frames, which allows opening and proper installation of the window and its components.

When making extension frames on site the window lining between the windows can be made higher than the ceiling line. The width of the window lining between the windows is 460 mm.





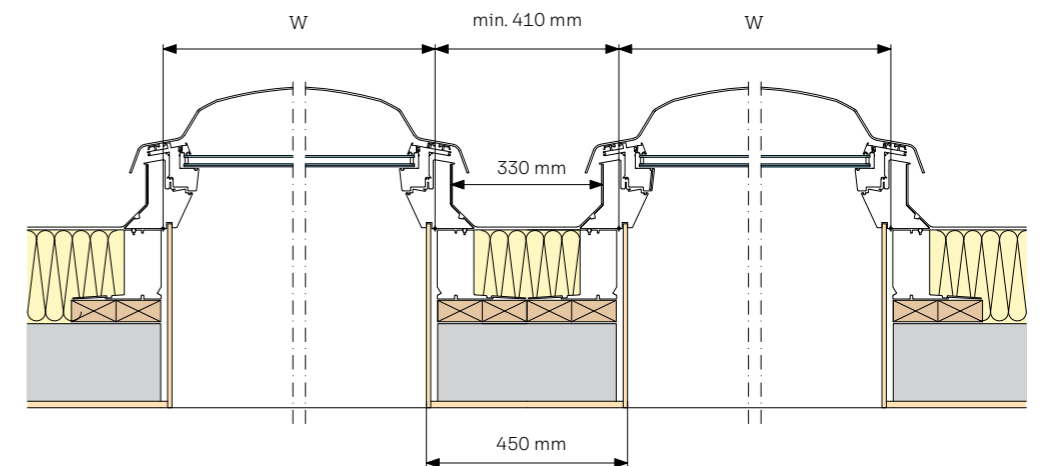
4.3

Design tips
Window combinations

Combination of Dome with glass roof window with extension frame ZCE

When installing a combination of two or more flat roof windows CFP/CVP with extension frames (ZCE), minimum distance between the construction openings in the roof should be 410 mm. That ensures 330 mm distance between the window frames, which allows opening and proper installation of the window and its components.

When using extension frames ZCE, the window lining between the windows is usually made flush with the ceiling. The width of the window lining between the windows is 450 mm.





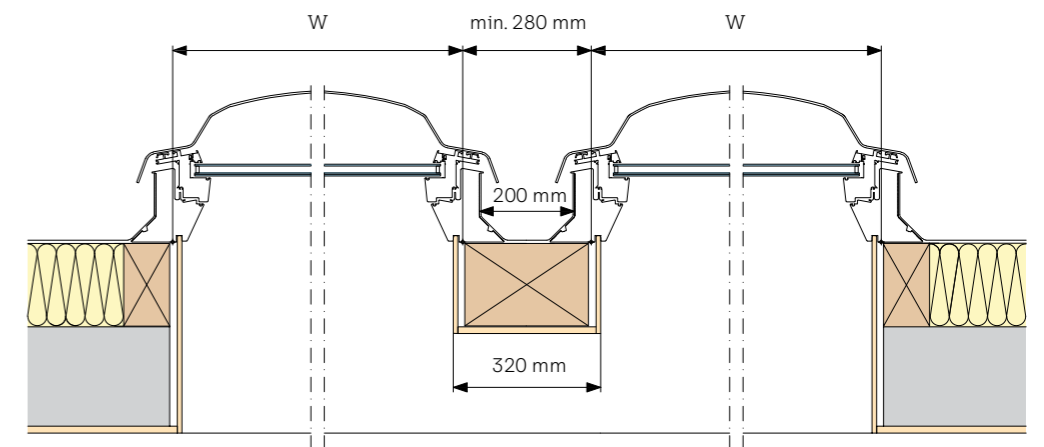
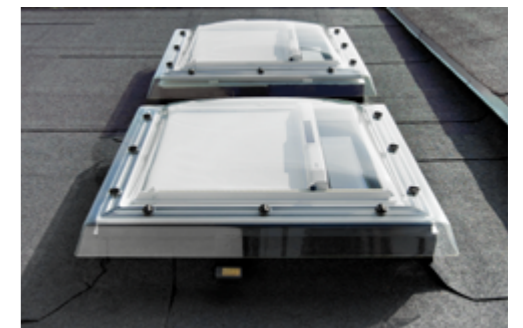
4.3

Design tips
Window combinations

Combination of Dome with glass roof window with extension frame made on site

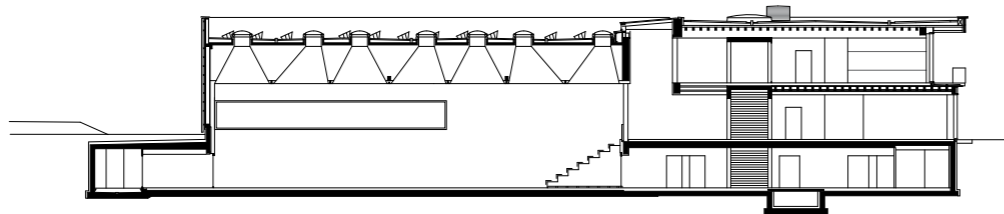
When installing a combination of two or more flat roof windows CFP/CVP with extension frame made on site, minimum distance between the construction openings in the roof should be 280 mm. That ensures 200 mm distance between the window frames, which allows opening and proper installation of the window and its components.

When making extension frames on site the window lining between the windows can be made higher than the ceiling line. The width of the window lining between the windows is 320 mm.

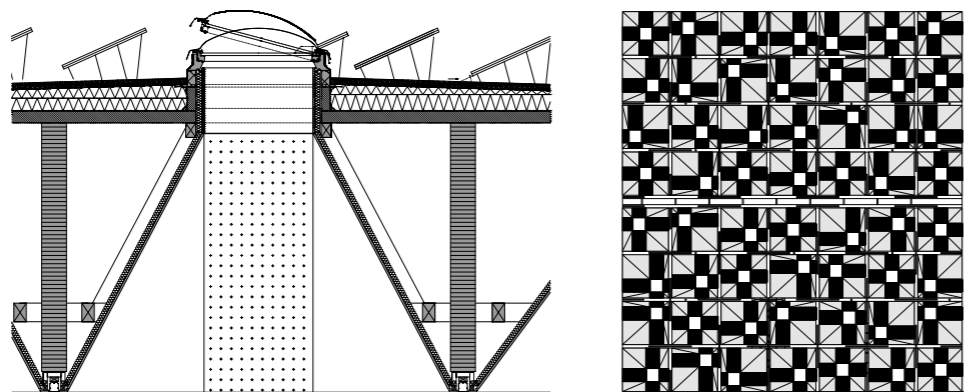


Multi-Purpose Hall in Klaus, Austria.
 The design combines roof openings with a carefully detailed light-shaft system so that, from the interior, only the glazing is visible, creating a clean ceiling expression while distributing light softly into the space. The interior linings of the light shafts were clad with acoustic panels, improving sound quality while guiding daylight into the hall. This strategy allows the walls to remain largely closed, supporting sports functions and avoiding external distractions; while the roof windows deliver comfortable, uniform daylight and a visually dynamic pattern of sunlight within the space.

Prefabricated open light shafts



Detail of a light shaft.
Overview plan of the ceiling



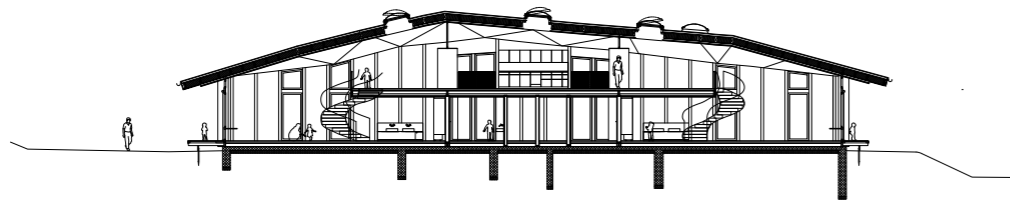
Architect: Dietrich | Untertifaller Architekten, Austria.

Photographer: Patricia Weisskirchner.



Lining and lining shapes
Suspended ceiling solutions

Kindergarten in Rotkreuz, Switzerland.
In the kindergarten, the design of the ceiling is an important part of the spatial experience for children, because kids often perceive spaces by looking upward. The architect designed the roof and interior linings to create playful ceiling landscapes where daylight enters through roof openings. The combination of soft surfaces, sloping forms and roof windows transforms the ceiling into an engaging element, bringing daylight deep into the room while allowing children to observe the sky, clouds and changing weather.



Architect: Melk Nigg Architects, Switzerland

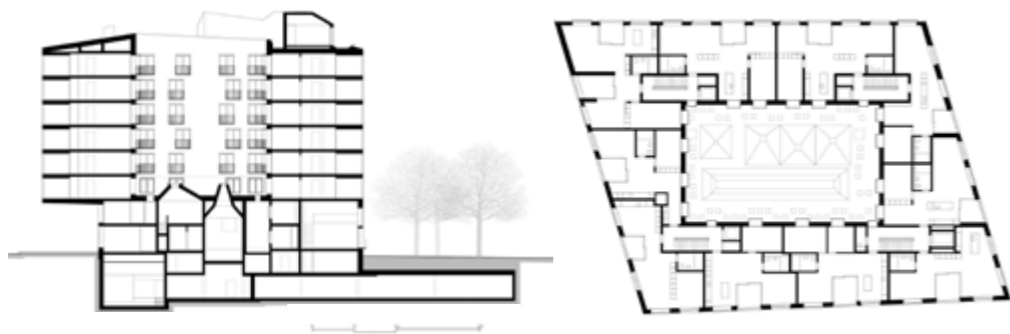
Photographers: Melk Nigg, Kasia Jackowska.



Lining and lining shapes
Open ceiling solution

Apartment building in Kloten, Switzerland

In the Kloten-Milano project, the ceiling design plays a central role in shaping the atmosphere of the shared interior spaces. The architects used a series of flat-roof windows arranged in a staggered pattern to create a lively overhead landscape that brings daylight deep into corridors, fitness areas and reading zones.



Architect Züst
Gübeli Bambetti

Photographer:
Roger Frei



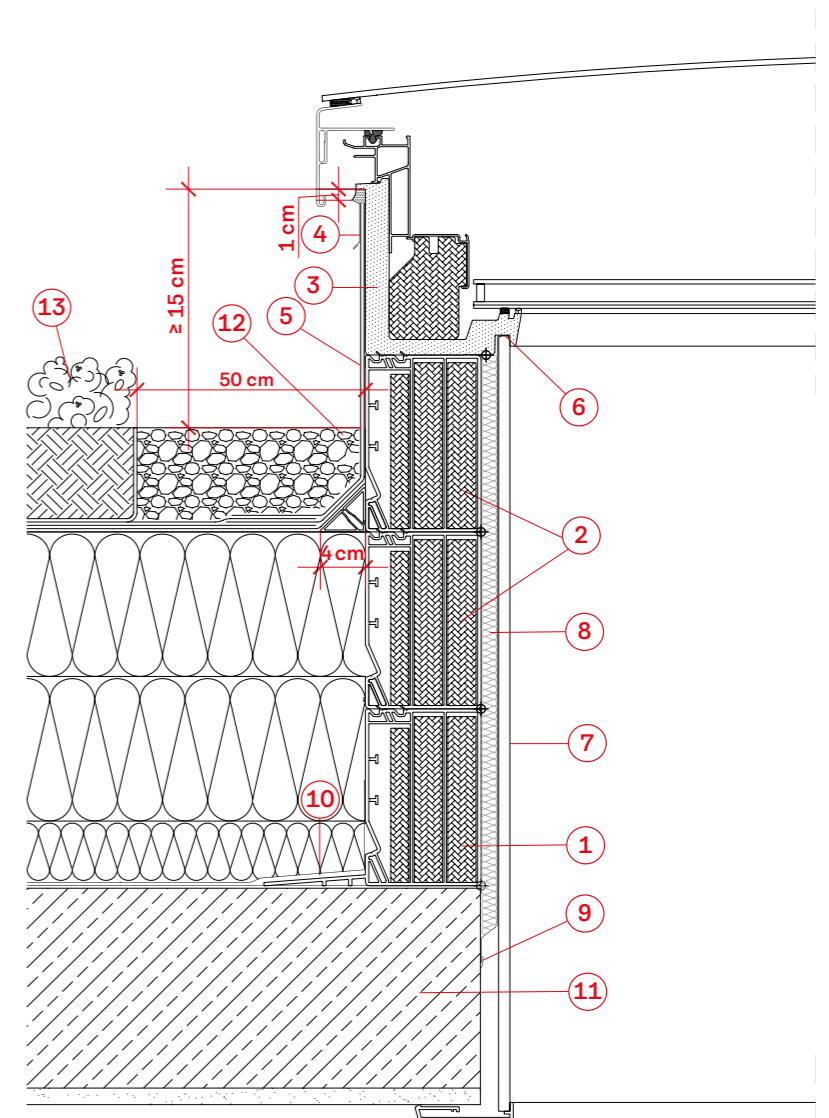
Technical drawings
Curved glass roof window installed with three extension frames on concrete slab, with green roof

Technical drawings play a crucial role in understanding how daylight is guided, shaped and protected as it enters a building.

Section details reveal the quiet decisions hidden within the roof build-up: how the window sits in the structure, how the lining meets the frame, how insulation, vapour control and interior finishes work together to create both performance and visual clarity. These drawings make visible the craft behind good daylighting—showing how small adjustments in placement, depth or lining geometry can transform the quality of light in a room.



Generate project specific technical drawings



- 1 Extension frame with flange ZCU 0015
- 2 Extension frame ZCU 1015 - max. 3 above each other
- 3 Non-opening rooflight base CFU with curved glass
- 4 Securing kit ZZZ 210U
- 5 Waterproof insulation
- 6 Slot for lining
- 7 Lining LSF 2000
- 8 Thermal insulation collar
- 9 BBX vapour barrier collar connected to the concrete slab.
- 10 Vapour barrier collar connected to the extension frame
- 11 Concrete slab
- 12 Sand layer
- 13 Green roof



Every project presents a unique opportunity to balance architectural vision with technical excellence. We believe that creating healthy buildings for people and the planet requires a collaborative, holistic approach that extends beyond the details in this guide.

To support your workflow, we offer a curated suite of services tailored to three key stages: Discover, Develop, and Deliver. We are here to help you navigate from initial atmospheric inspiration to fully-realized, high-performance architecture.

Tools and services
Support for all project phases

Discover inspiration

- Architectural case studies
- Demonstration buildings
- D/A Daylight & Architecture
- Searching for daylight series
- Build for Life
- Living Places concept
- Light of Tomorrow international award

Develop your projects

- Project design support
- Product specifications
- Architectural visualization service
- Daylight Visualizer
- Design Booklet
- Design Guides

Deliver in details

- VELUX CAD
- 3D BIM objects
- 2D configurator
- Section drawings and details.in.dwg
- Product compliance documentation
- Evaluate compliance with EN 17037

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offer





Architect:
Melk Nigg
Architects,
Switzerland

Photographer:
Melk Nigg, Kasia
Jackowska

Design with Daylight

Daylight is a fundamental architectural material. When designed carefully, natural light shapes spatial quality, visual comfort, and the way people experience interior environments throughout the day.

The design guidance in this book follows daylight quality principles aligned with EN 17037.

Place light where life happens

Flat roof windows help bring daylight deeper into the building plan, especially in spaces where façade openings are limited.

Central, task-oriented, and deep-space placements each support different activities and spatial experiences.

Combining façade and roof daylight sources often provides the most balanced solution.

Architecture is shaped by natural light.

Roof windows are not only technical elements. They are design tools that help connect architecture, natural light, and human comfort.

Early daylight integration supports spaces that feel naturally brighter, healthier, and more connected to daily life, productivity, and increase indoor air quality.

Rethink the power of daylight.

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