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SINCE 1990

A guide for choosing the right windows, doors and ventilation system

How can you improve your quality of living?

MIK windows, doors and local ventilation systems MIKrovent

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A guide for choosing the right windows, doors and ventilation system

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A guide for choosing the right windows, doors and ventilation system

How can you improve your quality of living?

By choosing your windows, doors and ventilation system wisely

Before purchasing windows, doors or a ventilation system, you need to know everything about its quality, durability, economy, saving, and price reductions.

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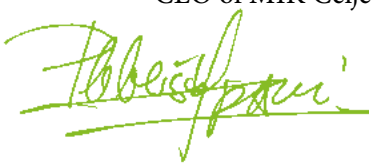
Foreword

Windows and doors are not purchased every day, so it is best to choose wisely. Therefore, gathering information helps you decide how to get the most for your money and, above all, get what you want.

Products that are almost identical in appearance can vary in their functionality, and are at the same time sold at different prices on the market. If you don't want to buy a pig in a poke that is nicely packaged only to encounter problems later on, we advise you to get to know the basics about windows and doors simply and quickly with the help of our guide, which will provide you basic knowledge about the windows and doors on the market. You can also give us a call and visit our showrooms across Slovenia and the world, where our salespeople will help you with expert advice.

Franci Pliberšek, Bachelor of Architecture
CEO of MIK Celje



Who is the guide intended for?

This guide is intended for anyone who is thinking of replacing or purchasing new builders' carpentry and joinery, particularly windows and doors.

It contains useful information for everyone, from those who want to replace just a window or two, to those who are furnishing their new building with builders' carpentry and joinery, and are thinking of its various purposes – from light, sealing, security to shading and ventilation. You will learn a lot about technology, quality, warranty, and maintenance in layman's terms.

All this will make your decision easier before making a purchase.

What does the guide contain?

The guide will take you through the chapters in a simple way to reveal secrets for choosing optimum builders' carpentry and joinery. You will be equipped with basic knowledge of the utility and most important features of certain window types. Thus you will opt for what's best for you more confidently.

We will familiarize you with the various types of builders' carpentry and joinery, what best suits your needs for insulation, the security of specific building elements, what elements can be combined, and what kind of installation is most appropriate. We will also talk about the importance of maintenance, warranty and reimbursement. We are further interested in how to best equip your home to make you feel satisfied for a long time and be sure that you have made the right choice. From experience we know that the most common choice is the winning combination of price, quantity, quality and customer's needs.

The guide therefore contains references to various materials from which nowadays frames, windows and other builders' carpentry and joinery are most often produced. All materials have their own unique characteristics, which are more important to some users than others. Furthermore, there are various functions of materials to consider, ranging from sealing to security as well as to various sizes and shapes, where materials for framing are important again. The guide also provides brief information on the possibilities of shading and ventilation, which ensure comfort and a better quality of living.

Equipped with basic knowledge, it will be easier for you to get your wishes across to your provider of services. An expert adviser will explain the details to you and make measurements, drawings and calculations for you. Thus, your order will be treated individually and tailored to your own preferences on all requirements. With the insight you will acquire through this guide, you can avoid a number of inconveniences and stop feeling like someone wrapped you around their finger.

Main chapters

Why do we want to advise you?

"The company MIK Celje has been present on the market with frames for paintings, windows and doors since 1990. Our goal is simple: to improve the quality of living in your home with high-quality products and services.

Tradition and experience since 1990

Why do we want to advise you?

During this period, we have driven the technology of windows, their installation and maintenance to the top of technological solutions of our time.

We are aware that your demands as customers have changed together with the desire for a healthy lifestyle and trends in architecture and construction. Therefore, we have incorporated these features since windows in modern times must have:

- **thermal insulation,**
- **sound insulation against noise,**
- **sealing and protection against external influences,**
- **security and safety,**
- **ventilation,**
- **optimal price.**

You might not need everything we can offer, and that is why we will advise you so you will be able to choose what you believe is important to you.

In this guide you will read the advice of our most experienced architects, engineers, economists and advisers. Then you are equipped with new knowledge and free to make an easier and more rational decision when purchasing.

The most important requirements when purchasing windows

Before making the decision to purchase consider the following important factors:

Price

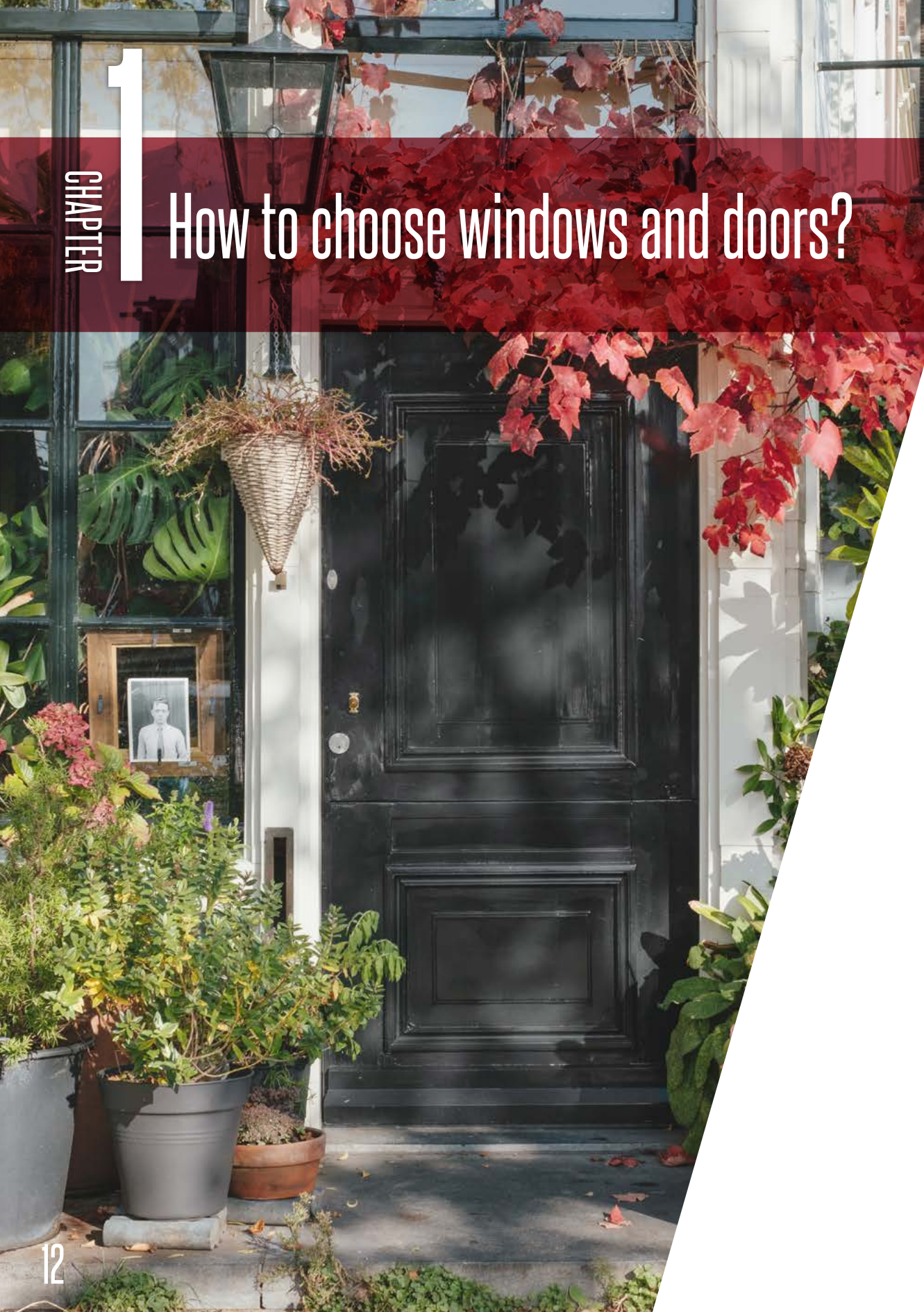
- What does it include?
- Does it include everything you need and have ordered? Compare the content of different quotations by individual items. Do not allow any provider to tempt you with a low price while not mentioning the disadvantages that could only be discovered after signing the contract.

Advantages

- How much energy will you save and thus improve your living conditions (regarding cold or heat)?
- How much noise will you reduce in your home/office?
- How can you improve the security of your home/office?
- What is the quality of the interior air you breathe like and what will it be after replacing the windows?

Long-term satisfaction

- Warranty, maintenance and after-sales activities? Do they provide everything?



CHAPTER 1

How to choose windows and doors?

How to choose?

"When purchasing windows, you need to pay attention to the properties of materials, the precision of window production, installation and maintenance. Only then can perfect quality be ensured.

What do you need to know first and foremost?

You can easily check the quality of the windows with the certificates that companies acquire for quality and with technical data that can be very different even if windows appear to be very similar, and yet they differ greatly in quality.

Do not feel tempted by extremely low prices because these products will quickly disappoint you.

Disadvantages of cheap windows

The most common disadvantages of cheap windows are:

- **coloring of frames** due to weather conditions, for example, yellowing of white frames,
- **inaccurate joints of frames** due to inaccurate production which results in poor sealing of windows,
- **weakened frames,** which is seen as lower weight in technical specifications,
- **saving on hardware** (which results in lower weight of the window);
- **saving on thickness of glass,**
- **poor quality installation** and
- **inability of the company** to **provide further maintenance and services.**

These are just some of the warnings you need to thoroughly check before buying a piece of builders' carpentry and joinery (i.e. windows and doors).

Then, within a certain price range, you can decide on the quality of products you need or desire.

What type of windows will you choose?

The market is flooded with various offers, yet what is the most optimal type for you? Firstly, when purchasing windows decide what means most to you, what your wishes are and what may not be important to you.

Secondly, carefully assess the **quality** and **compare prices.** We strongly advise you not to deviate from quality, since you may be disappointed right after your purchase. Value the **time you** may spend on trying to **resolve a complaint,** as well as the **work** and **cleaning** associated with additional repairs.

Window quality

When you decide to buy windows, buy quality instead of saving money, but choose the optimal solutions for your needs. You can determine the quality of windows with the help of manufacturing excellence indicators, which include **computer precision, perfect machine finishing and quality of basic materials.** Plan your purchase carefully, and purchase a **quality product with a contract and warranty.** This includes **expert advice, a quotation, measurements, production, installation and maintenance** of windows, whereas you need to carefully check if all above are provided for by the manufacturer. If only one of these services is missing, the offer is incomplete. The offer should explicitly describe all above mentioned items in much detail. It is also important to know how many windows are produced by the manufacturer on a yearly basis and of what quality.

Sealing and conserving energy for heating and cooling

With new windows, whether UPVC, wooden, aluminum, composites, double glazed or triple glazed, we will certainly conserve the energy invested in heating your home/office in the late autumn and winter. The quality and price of the windows increase your saving; however, the windows need to be adapted to your wishes and needs, since in small windows the wishes are different than in glass walls.

The heat (in the winter) or cold air (in the summer) can also be conserved in the room with efficient accessories to windows and doors. When we have successfully selected the most suitable windows, doors and shading systems, we can also choose a ventilation device. The ventilation device will provide an energy efficient installation of new windows the final touch in maintaining the temperature in the living or business areas.

When considering ventilation, there are several devices with similar effects on the market, so you will be given detailed information by a trained adviser. Particularly important are: the efficiency of the device, how many cubic meters of space it is suitable for, energy loss from the interior, the design of the device, and, last but not least, the price. In addition, you should also find out about the warranty period and maintenance.

In order to maintain thermal energy in your home, it is important to:

- Choose efficient and high quality windows.
- Install these windows flawlessly.
- Be provided a warranty and maintenance by the manufacturer.
- Install a ventilation system for maximum efficiency.
- Properly insulate external walls of the building.

Energy renovation of buildings

An integral part of managing energy and saving is also to carry out an **energy renovation of old buildings**, which nowadays use more energy than recommended in the EU per year (more than 56 kWh/m2). Moreover, very old buildings in urban centers use more than 120 kWh/m2 of energy per year. It is not enough to replace only builders' carpentry and joinery, it is also necessary to insulate the walls of the building, especially old buildings in urban centers, which nowadays require higher energy consumption for heating than recommended in the EU. As this involves excessive energy consumption from fossil fuels and consequently greater CO2 emissions into the environment, window replacement and insulation of external walls will also reduce air pollution.

There are many approaches to carrying out a renovation. Above all, ask an e**xperienced construction company** to make you an **offer** for renovation with high quality **insulation materials** and t**ailor-made solutions, price comparison, warranty** and expert **maintenance.**

After a complete renovation of the building and the replacement of windows and doors you will benefit from an increased feeling of well-being and the saving in heating and cooling!

€ $ £

Get your money's worth

MAKE A SMART DECISION

You can save money on unnecessary accessories or in the long run with saving on heating/cooling and ventilation with high quality and highly insulating windows and doors.

COMPREHENSIVE APPROACH

Only a comprehensive approach to renovating your home will maximise your energy saving from indoors (whether it's warm air in the winter or cool air in the summer) and contribute to reducing pollution in the environment.

How and when do we decide to replace windows?

Most often windows are replaced in new buildings or in cases where old windows are already decrepit, but also for aesthetic and functional reasons.

What will we gain by replacing windows?

"

We usually emphasize energy saving, greater security and noise protection. At the same time, the benefits are also aesthetic and minor functional improvements, such as better user experience, better looks, easy cleaning and maintenance.

When to start window replacement?

When you are thinking about a complete renovation of your home, from the floor to the roof, is it hard to decide what to do first? The windows must be properly installed by experts, and the installation itself must not cause additional problems, such as loss of warm air or moisture penetrating into your home/office. Therefore, decide on a provider with many years of experience and quality services.

Of course, you are aware of what is most urgent in your home due to wear and tear. It is known that only by **replacing windows** we save so much in heating that in winter we can raise the indoor temperature by 2 to 5 degrees **without additional costs.** Just to mention, raising the temperature by 1 degree can increase the heating costs by 6 percent!

You can also save with a local ventilation system

You can save with the local **ventilation system MIKrovent®**, which **channels heat back** to the room while ventilating it. In the winter you will conserve heat, which will not be lost when opening windows to regularly ventilate the space, and in the summer you will retain cooled air from your air conditioner indoors so it will not unnecessarily cool the warm air outdoors.

Choosing windows for new buildings

The first rule is to select windows and doors before starting the renovation to thus anticipate all the details in time. Hence, we can avoid any additional costs that might arise from any potential changes in the openings. At the same time, we can also decide on blinds or air inlets, which can be installed so they are not visible outward and do not affect the general exterior appearance of the building.

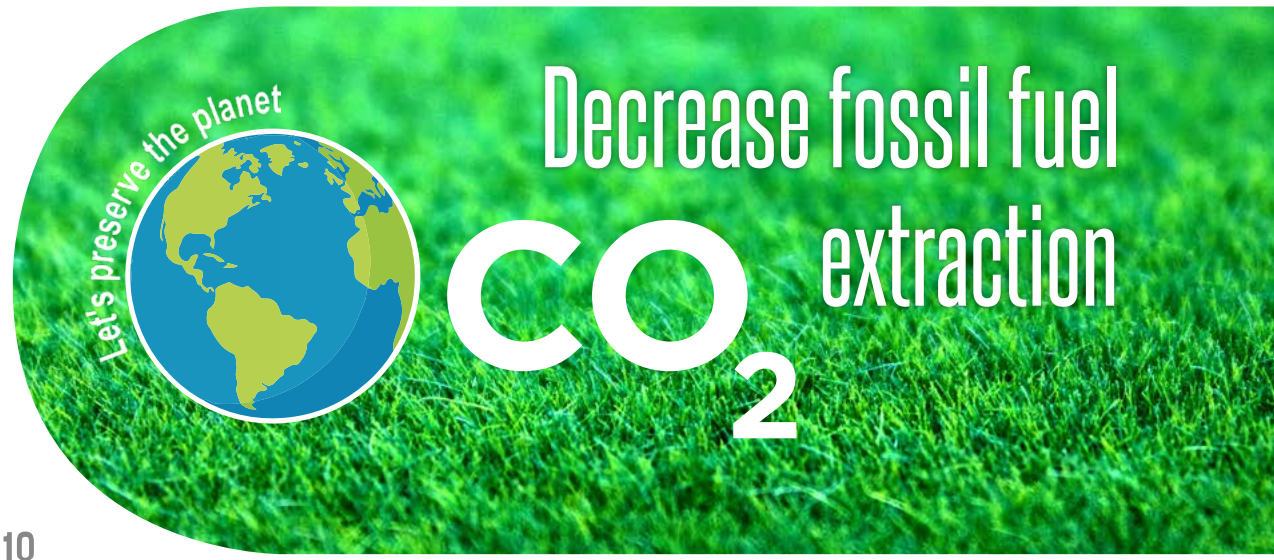
With a building or architectural plan in your hands, you can contact an adviser already at the decision-making stage to find the right windows and doors as well as installation method. The adviser will advise you, present you with various options, calculate your energy saving, and ultimately draw up a precise installation plan with a pro forma invoice. With such advice and quality installation, no errors can occur and you will be fully satisfied with the end result.

Replacing old windows

Once you find your old windows are getting drafty, are sagging or are otherwise damaged, it's time to replace them. This will save your nerves and energy costs, while at the same time you will be more protected from noise, and the replacement will increase your security against burglary. Your investment will soon pay off. Today's technology and the production of windows, as well as the materials which the windows are made of are much better than in the past. Therefore, proper maintenance gives them an extremely long service life. **It is thus important you purchase windows from the manufacturer who will in addition to warranty** also provide you with maintenance. It especially comes in handy for example in cases where glass is physically damaged and only the maintenance man is able to seal the new glass with the same quality as it was done originally. The same applies to other potential damages that the original manufacturer can repair best. Before purchasing builders' carpentry and joinery always make sure the manufacturer or supplier also provides maintenance and other services.

Carbon footprint to the environment

In a thermally insulated building with well-insulated windows and doors, the carbon footprint to the surroundings is also reduced by cutting down energy consumption from fossil fuels and CO_2 emissions.



Window replacement is an investment*

into a healthy, economical and quality future

25-year saving*

46.150 €

Fuel oil/gas prices

0,98 €
liter/m³

Annual saving

882 €/year

60.750
kg/25 let

Reduction of CO2 emission

95 %

The efficiency of the furnace for heating

Eco Fund

-1.800 €

Possibility of partial cost reimbursement **

Saving on energy consumption

40 %

in case of heat recovery of the ventilation system for heating or cooling

10.000 €
Window investment value

3.450 €
Local ventilation system investment value***

40 m²

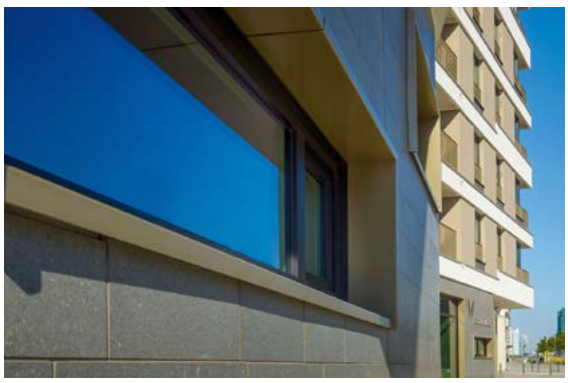
Glass surfaces

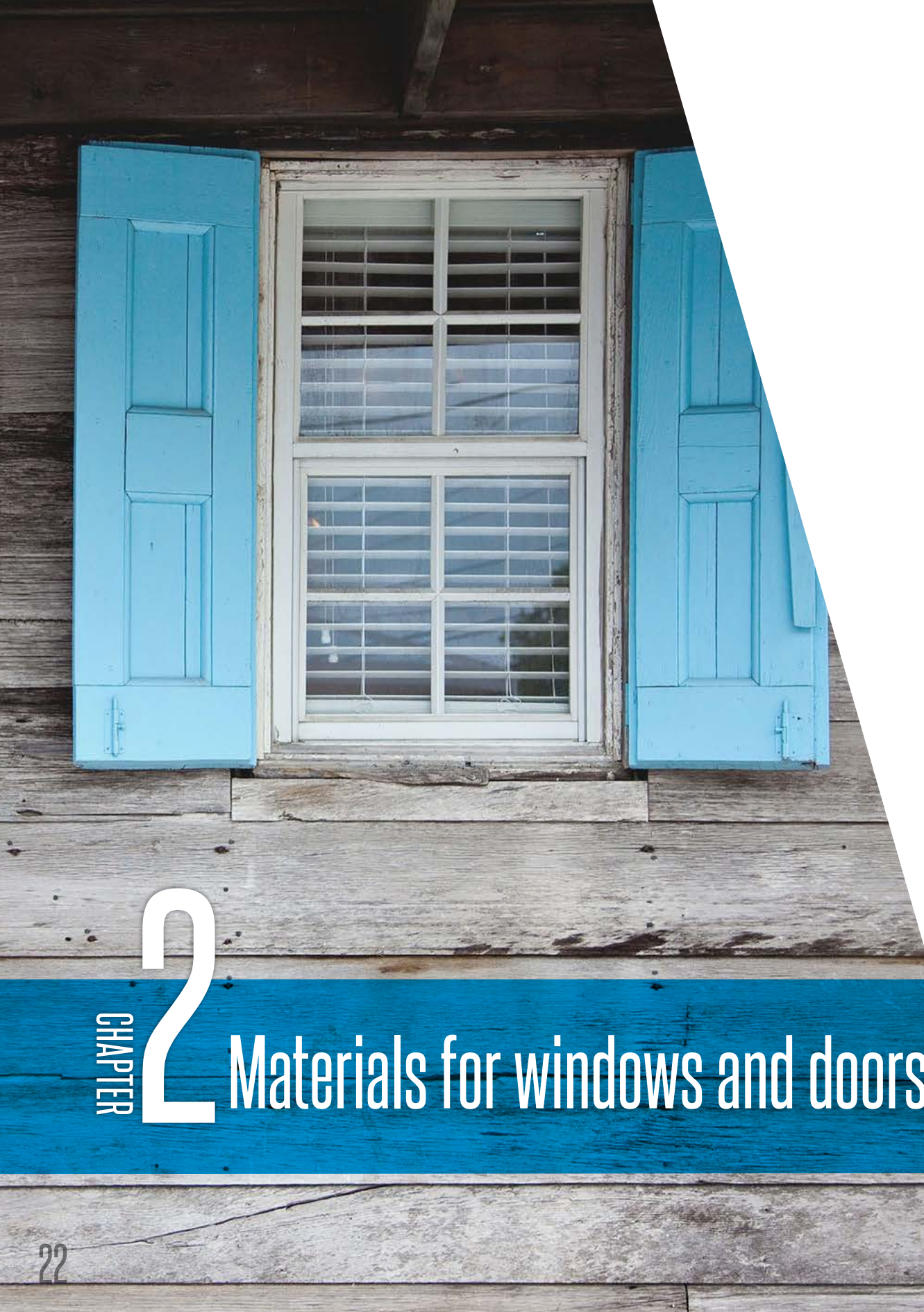
* Renovated old 200 m² house with an initial consumption of 130 kWh/m² per year to a reduced consumption of 40 kWh/m² per year if considering a 3% inflation.

** Reimbursement for windows, ventilation, façades etc. from the Eco Fund (Slovenian Environmental Public Fund) varies from year to year.

*** 5 units of the local ventilation system MIKrovent® 30


my room
Café





CHAPTER 2

Materials for windows and doors

What materials are available?

For both windows and doors, there are a number of materials that are used for profiles. We would first and foremost like to familiarize you with the properties of individual materials, so you can better make an informed decision yourself.

Selection of materials

All materials: UPVC, wood, aluminum and wood-aluminum are nowadays **exceptionally high-quality processed, durable,** of various shapes, sizes and insulation rates, with modern glass, window hardware, and **suitable** for **various purposes** and **tastes**. That is why you can choose them according to your wishes and needs.

Your investment value

If we compare a house with windows, shading systems and the materials selected:

- **UPVC windows are worth 100 units,**
- **wooden windows are worth 135 units,**
- **aluminum windows are worth from 160 to 170 units**
- **and wood-aluminum windows are worth from 180 to 200 units.**

So from the above investment value you can decide what suits you best according to your financing structure.

UPVC

Wood

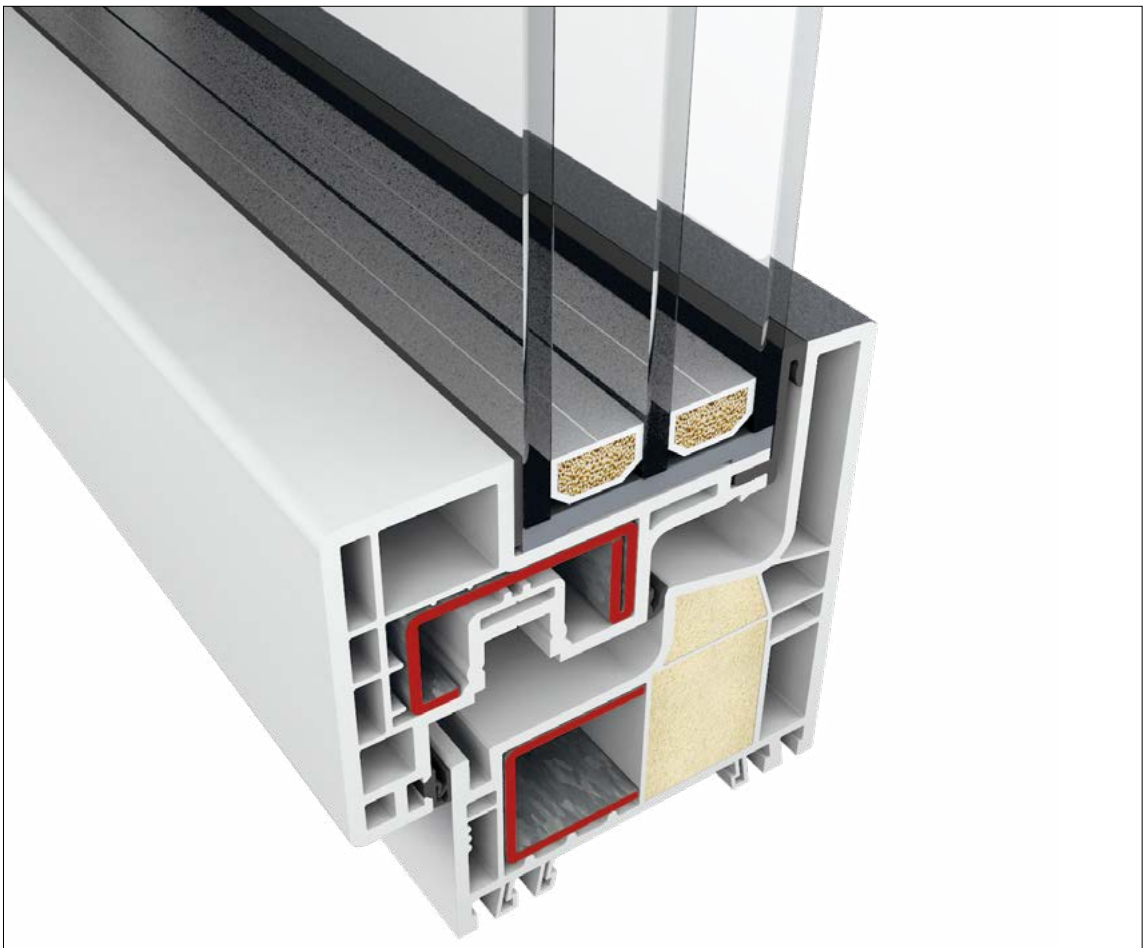
Wood-Aluminum

Aluminum

UPVC

UPVC windows are stable, durable, safe and easy to maintain. The **financial investment** in these windows is **returned the fastest** as the windows, despite a slightly lower price than the price of wood and aluminum windows, are of high quality, well thermally and sound insulated, and available in a number of **very durable acrylic colors**, decors and **forms**. We need to be careful about the **precise manufacturing of frames, sashes, seals, window hardware and glass.** Numerous ways of manufacturing frames with static metal reinforcements (standard dimensions: 900 x 2300 mm) and bonding glass also allow for **large frame dimensions** without risking sagging the window when used properly (but only up to a size of **1200 x 2500** mm).

With UPVC windows you get **high quality windows with excellent sound insulation and the highest energy saving** at a relatively **affordable price.** They also allow you to choose between various aesthetic shapes and colors.



Cross-section of the modern UPVC profile MIK Kubus line, maximum thermal insulation of the window up to 0.65 W/m^{2}K

Aluminum

Windows with an aluminum frame are of exceptional **quality** and also suitable for installation in harsh climate environments. They are also recommended for **glazing larger areas** because they are extremely **stable** and **safe**, but at the same time **easy to use** and maintain. They are often used in **commercial buildings** as well as in **new-build private houses** where **large glass surfaces** were planned. These windows provide e**xceptionally good sealing, glazing of large surfaces, safety when opening or sliding**, and **reducing heat losses** even in cases where glass surfaces cover most of the wall.

Aluminum windows are extremely durable, aesthetic and of high quality. They offer high energy saving and provide extremely good load-bearing capacity.

Despite a slightly higher price, they are the only recommended solution for large glass surfaces.

Cross-section of the aluminum profile MIK Schuco 75, maximum thermal insulation of the window up to 0.96 W/m²K

Wood

It is a naturally durable material, which arouses the feeling of **warmth** and **being home** in many people. Today, wooden windows are made differently than in the past, and are often **refined** with **other materials**. Due to the precision of production and the use of quality materials, these windows are also very **stable**, and **provide optimal thermal** and **sound insulation.** Their **service life** is much **longer** than in the past. Often they also have a water drainage system, which is located in the cladding of the sash with permanently elastic caps. The best effect on wooden windows can be achieved with **high-quality transparent water-borne coats,** which protect the wood from **aging**, **embellish** it and give it the desired tone, while accentuating the wood grain structure.

Wooden windows were windows of the past. Nevertheless, in modern times they are a contemporary choice due to a **smart combination of a natural material,** durable surface and deep **impregnation,** as well as **excellent insulation.** When looking at natural wood, it gives you the feeling of warmth, though saving is as high as for other types of windows.

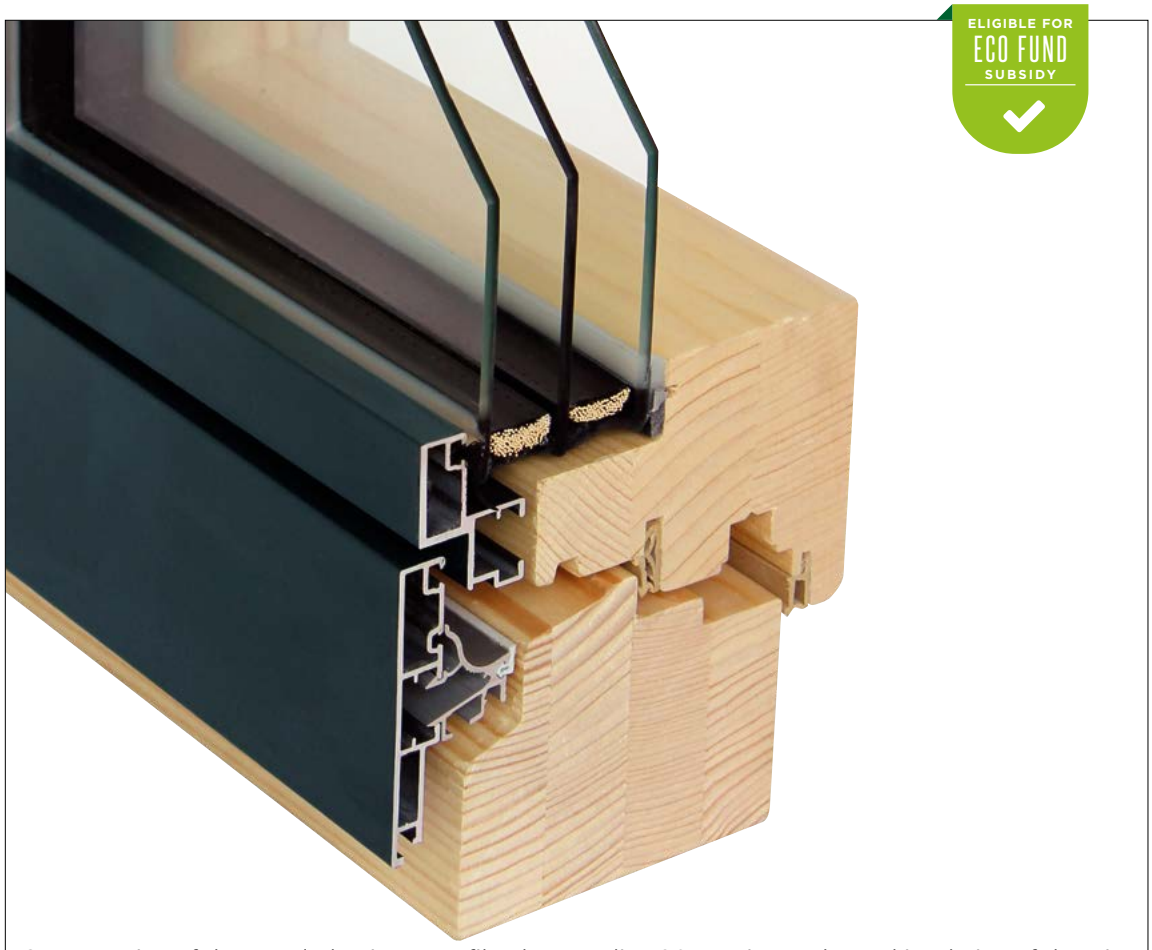
Cross-section of the wooden profile WOOD Comfort line 90, maximum thermal insulation of the window up to 0.77 W/m²K

Eligible for Eco Fund Subsidy of The Slovenian Eco Fund only, look at page 50. Check for your country's ECO fund subsidy yourself.

Wood-Aluminum

Modern technology allows for combinations of several materials that deliver excellent results in terms of **aesthetics, durability and functionality.** Wood and aluminum are an excellent combination that offers the **warmth of wood** and **the durability of aluminum**. These are wooden windows with an aluminum cladding, which protects the window on the outside of the building, and perfectly absorbs favourable weathering influences and reflects off unfavourable ones.

Window frames made of wood and aluminum offer the best balance between room temperature and protection on the outside of the building. They are aesthetically adapted to the interior and exterior.



Cross-section of the wood-aluminum profile Elegance line 90, maximum thermal insulation of the window up to 0.73 W/m^{2}K

Eligible for Eco Fund Subsidy of The Slovenian Eco Fund only, look at page 50. Check for your country's ECO fund subsidy yourself.

Choosing window shapes

Windows come in various shapes and can be opened in various ways. You can choose between rectangular, round, triangular and combined window shapes.

Choosing colors

UPVC windows are colored according to an acrylic scale. Aluminum windows and aluminum claddings are available in colors from the RAL color scale. Furthermore, you can also choose colors with surface fine-structure patterns. UPVC windows can also be ordered with wood decors that mimic surface patterns of wood.

Accessories

Windows and doors are not complete unless they contain accessories such as shading systems, window sills, door handles, insect screens and other elements that upgrade the functionality of quality windows.

Security

For the glazing of large openings especially for easily accessible and less secure places, we recommend **additional anti-burglary protection of the hardware** and glass of your windows and doors with higher security protection against damage and burglary up to the highest RC2 level. We recommend the highest level of security on the ground floor, the middle level on the first floor and the basic level on higher floors.

Some companies install security hardware with a mushroom cam and a door handle with additional security features for a higher level of protection already into basic or standard windows.

An example of proper anti-burglary protection

Further information

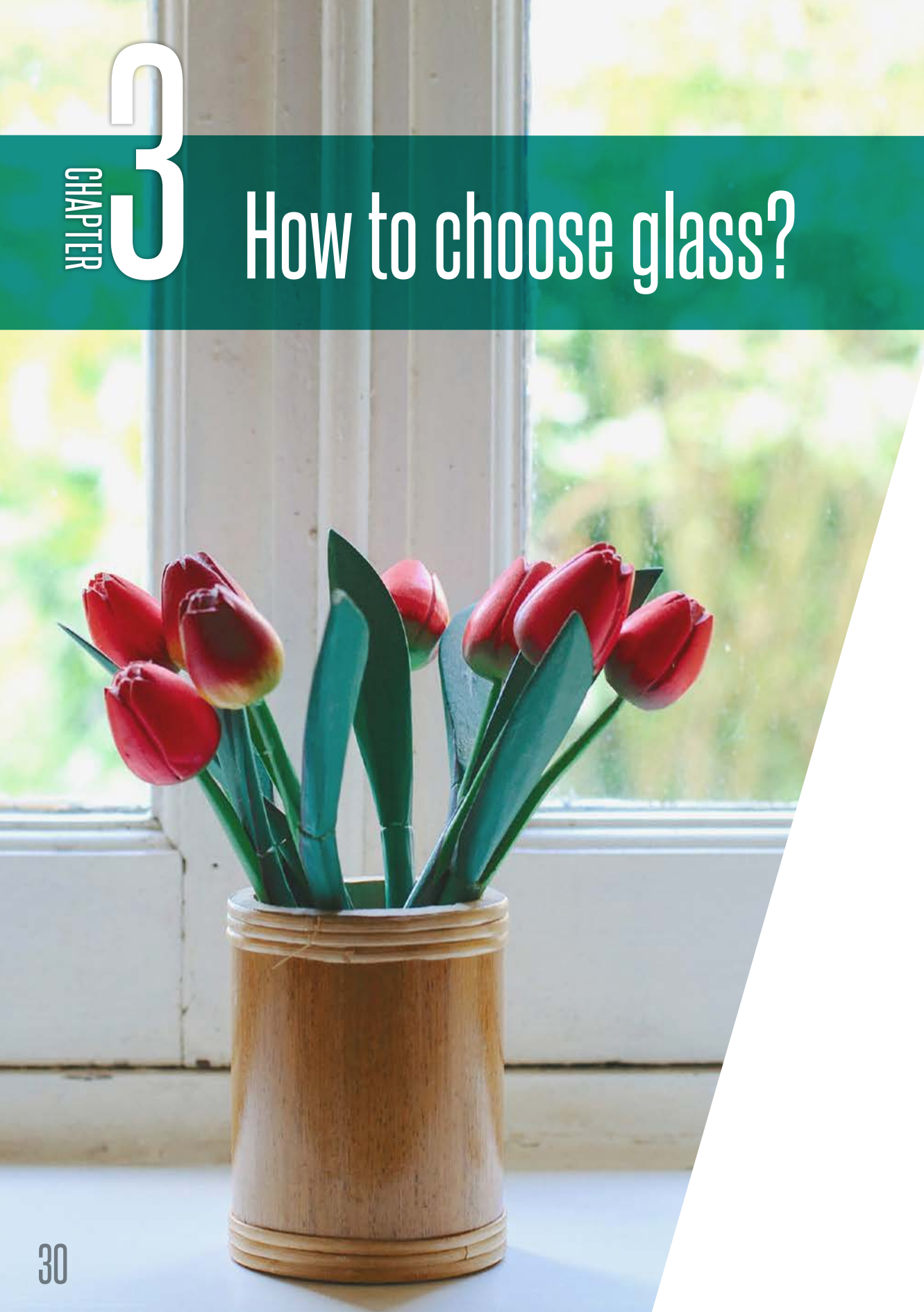
In case you need further information on individual types of window or window materials, please send us your questions to mik@mik-ce.si or visit our website http://en.mik-ce.si/ where you will find digital versions of publications with more technical details.

Showrooms across Slovenia and the world

You are invited to visit us in our showrooms across Slovenia and the world, where you will personally have a chat with expert salespeople, who will provide you with free advice.

CHAPTER 3

How to choose glass?



When choosing materials for the frame and sash – the supporting parts of any window – it is also important to select the appropriate glass, which can be distinguished by thickness, quality and coloring. Accordingly, they also have different functions. Glass thickness affects sealing from the thermal, sound and security perspective. Therefore, for each of these factors, specific glass is recommended. First and foremost, the quality of glass manufacturing in a computer-controlled production is important. Windows nowadays can be double or triple glazed.

The range of glass includes: thermal insulating glass, sound insulating glass, security glass and various types of tinted glass.

Glass thickness

Thicker glass is certainly more suitable for thermal insulation than thinner glass, regardless of glazing. For temperate climates, we usually use a 4 mm trick glass, and customers choose between double or triple glazing, depending on the size of the windows and their need to save thermal energy.

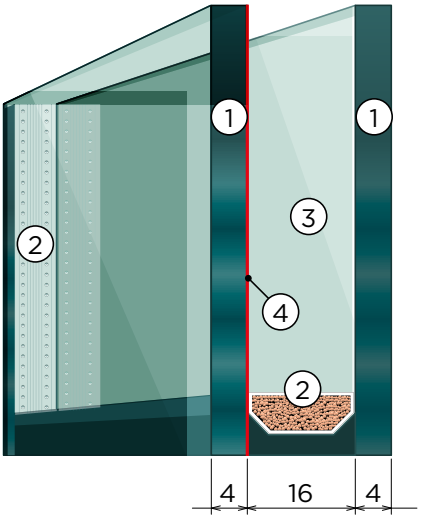
We also use combined glazing, where one glass is thinner and the other thicker, which contributes to better sound insulation.
Usually a combination of a 4 mm and an 8 mm glass is used. In exceptionally strong sound insulation, an 8 mm glass is used in combination with two panes of 4 mm glass separated by a two-layer insulating film and joined together in a 9 mm thick glass surface. Another option is to use two panes of 4 mm glass separated by a sound insulation film, and we get 2 glass surfaces of 8 mm.

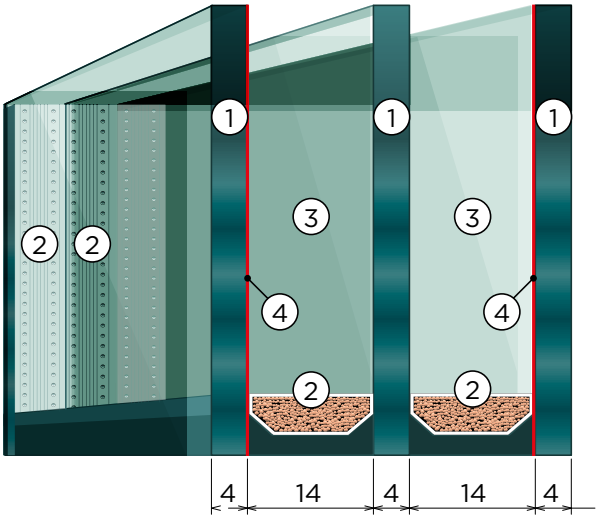
Double and triple glazing

It is immediately clear that triple glazing is more energy efficient than double glazing, and MIK sells about 98 percent of triple glazed windows each year. Nowadays, windows are technologically speaking of such high-quality, we strongly recommend triple glazing, which provides more efficient thermal and sound insulation. You should consider triple glazing especially in places where there is a need for more efficient sealing due to exposure to harsh weather conditions and a larger glass surface or where you want to save energy efficiently and in the long term with a quality new construction.
What's best for you? Why? There is not much difference in price, but opinions differ. Some people place great confidence in double glazed windows, especially south-facing ones, where the windows ought to better absorb the heat in winter. However, the same feature can become a scourge in summer months, since it warms up our homes above pleasant temperatures, and we end up using energy for air conditioning. A hint – in such cases we can protect our homes with shading systems. On the other hand, some swear by triple glazed windows on the north side. MIK recommends triple glazing everywhere, except in warm coastal regions, where triple insulating glass is not needed in the winter, and in the summer months we can protect our homes from the sun with shading systems.

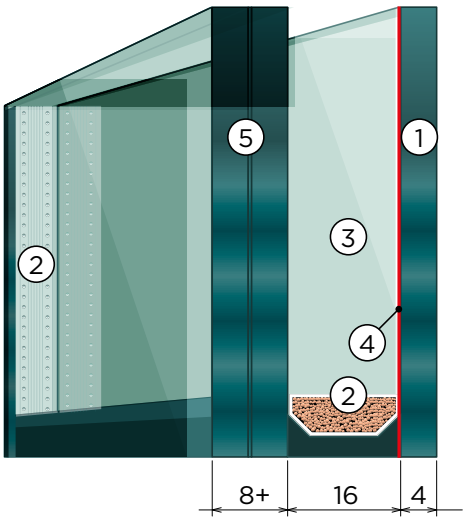
Sealing and conserving energy in an enclosed space is more than 2 times more efficient with triple glazed, properly insulated windows, and it makes sense to install them primarily where glass surfaces are really large. The glass panes you can choose from differ in thermal and sound insulation.

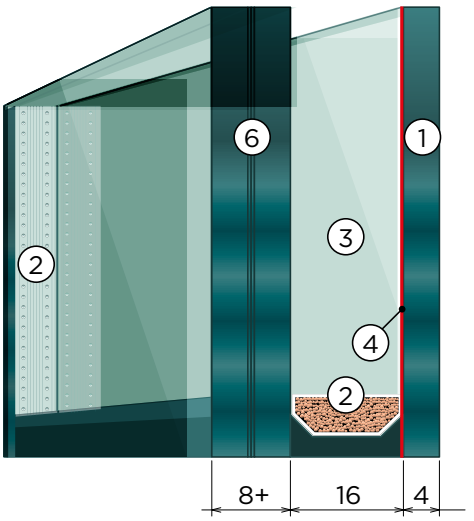
Examples of double and triple thermal insulating glass



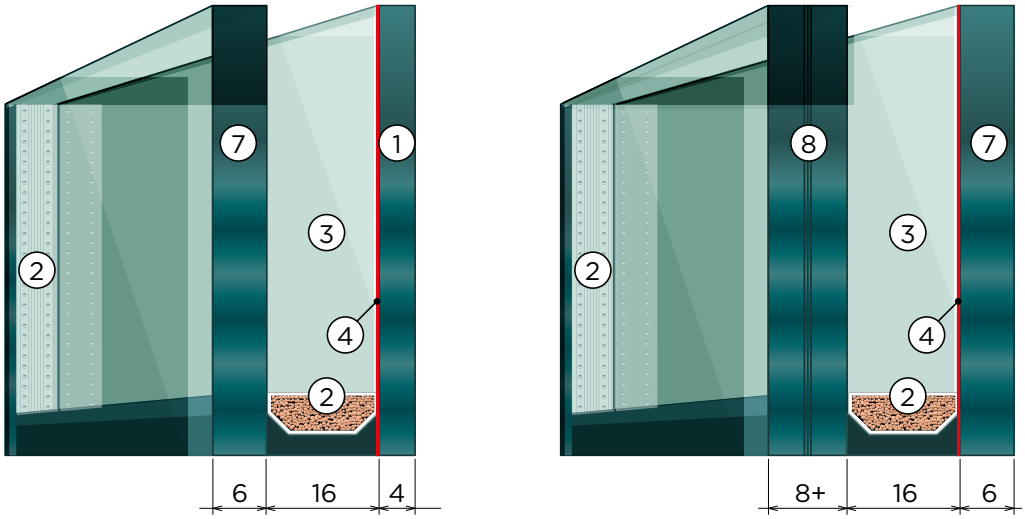


Examples of security insulating glass with glued panes





Examples of sound insulating glass



Technical features:

(1) Glass thickness: 4 mm

(2) TGI spacer

(3) Filled with argon

(4) Low-energy coating

(5) Thickness of two panes 4 + 4 mm separated by a single-layer 0.38 mm thick security film

(6) Thickness of two panes 4 + 4 mm separated by a double-layer or a multilayer security film

(7) Glass thickness: 6 mm – sound-insulating glass

(8) Thickness of two panes 4 + 4 mm separated by a multilayer sound-insulating film

Special glass

Colored glass is to be considered when we want to avoid curious glances from the street, soften the strong sun rays on exposed southern walls or for aesthetic reasons.

CHAPTER 4

Why do you need shading systems?

Although at first glance you might think you don't need shading systems, stop and think of hot summer days when the sun beat down into the interior on the southern side, while the bright sun's rays were glaring right into your eyes and further heated the room. Or think of the moment you wanted privacy, yet the windows did not have any shading system. Not to mention the burglary attempt, where roller shutters actually prevented the burglar from breaking in.

So, what are the main factors that encourage people to purchase suitable blinds, roller shutters or other shading systems? Primarily, they are: **shading, preventing strong light and heat entering the room, ensuring privacy, sound and thermal insulation, and anti-burglary protection.**

Blinds

Interior blinds are made from thinner aluminum sheets, which are mostly assembled in the room to both prevent the penetration of the sun's rays into the room and ensure privacy – i.e. protect against curious glances. **External blinds** are made from thicker aluminum sheets and are recommended for shading the part of the building exposed to direct sunlight, and for shading large glass surfaces.

The blinds' primary function is to adjust the sunlight in the room, which gives the interior light a special charm, as it penetrates into the room through variously wide openings or slots.

Due to the wide variety of materials and colors, they are often used by architects and enthusiasts who, in addition to their functional characteristics, want to highlight their aesthetic effects.

Interior blinds

Exterior blinds

Roller shutters

Roller shutters can be made of UPVC and aluminum, and provide privacy, protection against weather, and with special security hardware even protection against burglary. Roller shutters can completely block out the sunlight, protect us from noise and help us save on heating costs. In the summer, they also keep the air in the room cool. According to some data, by using roller shutters we can save up to 80 percent of the energy needed to cool the room if they are closed. They are located on the exterior of the building, and require very little care and maintenance.

Roller shutters controlled by an electric motor and operated remotely contain anti-burglary clamp locks that prevent the violent lifting of shutters when they are lowered. We can also add some anti-burglary elements such as clamp locks or cylinders to manually controlled roller shutters. In addition to providing shading, sound and thermal insulation, security should be among one of the most important functions when installing roller shutters.

Built-on roller shutters

Built-on roller shutters with a rondo box

Shutters

can be made of wood, UPVC and aluminum. They provide shading, privacy, partial sound and termal insulation. Due to the diverse materials used and their colors, they can create numerous aesthetic effects, while adapting to the building's exterior or interior.

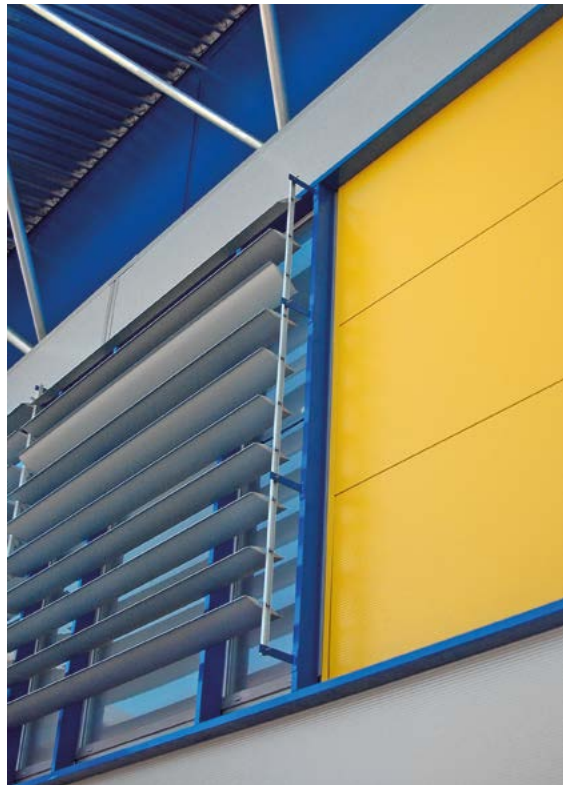
Due to the variety of the material itself and the possibility of different colour choices, ALU shutters allow for a number of aesthetic effects, adjusting to the exterior of buildings and interiors.

Aluminum shutters

When making the final decision regarding shading systems, you will probably consider what is more important to you and what less. The above descriptions merely outline the basic characteristics of the shading systems currently on the market. For all details and additional options turn to an adviser for free advice. The adviser will take your wishes into account and try to incorporate them into the most appropriate offer for you.

Pleated blinds

Interior roller blinds



Brise soleil

External blinds – under plaster system

Zunanji screen roloji

External blinds – under plaster system

External blinds – under plaster system

CHAPTER 5

How to choose the right door?

Doors, like windows, are an important part of builders' carpentry and joinery. From architecture history we know that portals – entrances to buildings – have always been prominent parts of buildings. Internal passages between rooms are equally important since they contribute to comfort and privacy in your home or business premises. You can choose between front doors, interior doors, garage doors and fire doors.

Depending on your needs, you can choose between many types of doors that are specific in their characteristics.

Therefore it's a good idea to have at least some preferences before purchasing a product. Don't worry, advisers will help you with details. When buying a front door, you will perhaps be primarily interested in security, but also in material, appearance and design, functionality, door closing method, sealing, resistance and durability as well as quality and longevity. When buying interior doors, you may be looking for a suitable aesthetic design in the first place; later on you might be interested in material, closing method, perhaps also sound insulation and so on.
There are a number of basic designs, solutions for sashes and frames for solid doors on the market.

Materials for doors

- UPVC,
- aluminum,
- wood and
- wood-aluminum

For sashes you can also choose between different door panels and glass for different aesthetic effects, different thickness, structures and functionalities.

Fireproof doors can be made of:
steel, aluminum, other refractory metals or special wood.

Doors can be standard or custom-made.

When choosing a door, it is most important to know your expectations. In addition to the preferred design, you can also choose between different characteristics and quality levels.

Beside the aesthetic factor, functional features are important:
- fire resistance from 30, 60 to 120 minutes,
- thermal and sound insulation,
- security,
- resistance to weather,
- warranty and
- maintenance

In this respect, a quality manufacturer can offer you a wide range of combinations with top-notch performance and installation as well as warranty and maintenance.

CHAPTER 6

How to choose the right ventilation system?

Why do we ventilate?

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A well-ventilated room is one of the most important factors for pleasant and healthy living indoors. Many users as well as providers of builders' carpentry and joinery pay too much attention to thermal insulation without underlining the importance of ventilation. Fresh air indoors is indispensable for our health; whereas we would still like to save energy too.

The video **»Airless Era«,** which you can see on web page **http://airlessera.com/** or Youtube at **https://youtu.be/UE7ach2n3n0**, **perfectly displays the problems of today's time** since people s**pend most of their time indoors** and **indoor air is up to six times more polluted than outside**. People are nowadays facing increasing health problems such as **respiratory diseases (asthma, bronchitis, lung cancer, etc.), allergies, strokes and cancer.**

In 2018, the World Health Organization (WHO) noted with concern in study findings that there are dangerously high levels of contaminated air in many regions around the world. New data reveal that **9 out of 10 people breathe air containing high concentrations of contaminated particles** such as black carbon that penetrate deeply into the lungs and into the human cardiovascular system. WHO estimates that around **7 million people die each year from exposure to fine particles in polluted air** causing diseases including stroke, heart disease, lung cancer, chronic pulmonary diseases and respiratory infections, including pneumonia.

WHO also notes with concern that **91 percent of the world's population live in places** where poor quality air exceeds the air quality limit recommended by the WHO.

Moreover, owners of windows and doors that are very tightly sealed should be aware that they have saved on heating or cooling costs, **yet they must not forget about fresh air that needs to be regularly supplied to the indoors.**

In order to save energy even when ventilating and thus bring the much needed fresh air into the room, we offer a range of ventilation devices that will surely provide a healthier atmosphere indoors. **Furthermore, you will prevent occasional drafts** that are conventionally needed for the exchange of indoor air, and also **save** as our devices ventilate the room efficiently and reduce outside noise levels, **cold air intake in the winter and hot air expulsion in the summer.**

We are talking about local ventilation devices, which unlike central ventilation devices can be retrofitted into buildings, i.e. when renovating buildings, because they do not require large-scale construction work. Installation is possible with little cost and even less complications. Nonetheless, they are also suitable for new buildings.

There are several types of local ventilation devices available and they can be almost invisibly installed in the room to provide a high-quality exchange of indoor and outdoor air. Moreover, better devices also heat the air and thus contribute to minimum energy losses.

This process is known as heat recovery of warm air in the winter and cold air in the summer.

The importance of ventilation and heat recovery

Fresh air indoors is indispensable for our health; whereas we would still like to save energy too. Therefore, in addition to fast and efficient ventilation with a draft, which should take about 3-5 minutes, we can also purchase window accessories. **Aesthetically designed accessories with aluminum housing can be installed above windows, and ensure regular and economical ventilation of the room with a closed window,** which prevents the accumulation of condensation and unpleasant odors in the room. The investment into a ventilation device may soon pay off. Learn more on the following pages. **Good air contains a large amount of oxygen with negative ions.**

Is fresh air really so healthy?

Yes, it is. Good air is vital to our health. Results of studies even show fresh air can prevent the onset of cancer.

Fresh air can be defined as cold, unpolluted air in the natural environment, which is rich in oxygen and negative ions.,... evertheless, fresh air shouldn't be taken for granted, because it is not found everywhere. With increasing urbanization and industrialization in cities, air is getting increasingly polluted. In China, for example, air in some cities is so polluted that fresh air is brought in bags to help people breathe better air. Moreover, some people buy ventilation devices to filter the contaminated outdoor air and remove even the smallest PM2.5 carcinogen particles to bring clean air indoors.

We are often told to go outside and get some fresh air. Oxygen levels drop quickly indoors. **When you sit at your desk, you breathe shallow and unnatural, which results in fatigue and lack of concentration.** Exercising outdoors, on the other hand, enables deep breathing. We inhale more oxygen and exhale exhaust air, which results in more energy and a better mood.

In a study, Korean doctors asked 43 adult women to walk in the forest for one hour and 19 women to walk around the city. The results of the comparative analysis – before and after – have revealed that the **blood pressure of women who walked in the forest has decreased considerably**. In addition, the elasticity of their arteries has improved. No changes have been seen in those women who walked around the city.

A study in Japan has also shown that **a walk in the forest lowers your blood pressure, heartbeat rate and stress hormone levels.** Moreover, Nippon Medical School from Tokyo has detected that signs of natural killer cells, which are an integral part of the immune system in the body to fight cancer, are activated by walking in the forest.

How to improve the quality of air indoors?

9 out of 10 people in the world breathe polluted air

In 2018, the WHO reported their research findings and showed great concern in the high level of air pollution in many areas around the world. New data reveal that **9 out of 10 people breathe air containing a dangerously high concentration of contaminated particles,** such as **black carbon**, which penetrate deep into the lungs and into the cardiovascular system. WHO predicts that about **7 million people die each year due to exposure to fine particles** in polluted air that lead to diseases such as **stroke, heart disease, lung cancer, chronic respiratory diseases and respiratory infections, including pneumonia.**

Did you know?

That a WHO study attributes 4.2 million deaths each year to polluted outdoor air.

That a WHO study attributes 3.8 million deaths each year to exposure to smoke in the household due to food preparation.

91 percent of the world's population lives in spaces where poor air quality exceeds the WHO recommended air quality limit.

Polluted air also in Slovenian homes

The Slovenian newspaper Dnevnik reported in an extensive article in 2015 that according to some data more than 50,000 homes or accommodation units in Slovenia are unsuitable for living due to inadequate air quality in the spaces. If there is no adequate air exchange, indoor air becomes saturated and can no longer absorb moisture. Consequently, black spots accumulate on the walls of the living areas, and even more concerning in our lungs and respiratory system.

Polluted air as the main cause of deaths by non-communicable chronic diseases

According to WHO studies, numerous deaths caused by contaminated air are attributed to diagnoses of non-communicable chronic diseases. Globally speaking, polluted air causes more than **one-third of deaths due to stroke, lung cancer, chronic respiratory diseases, and as much as a quarter of deaths due to ischemic heart disease.**

Lungs and polluted air

WHO studies attribute 4**3 percent of all lung diseases** and deaths due to **lung cancer to polluted air**. Polluted air causes about **1.8 million deaths** due to **lung disease and lung cancer each year.**

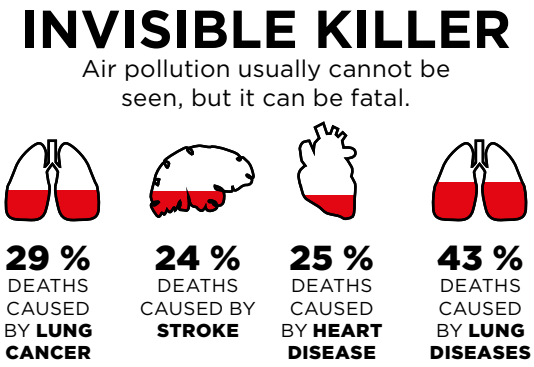

Figure 1: WHO studies, 2018

Heart and polluted air

WHO studies attribute **25 percent of all deaths caused by heart disease to polluted air,** which means that polluted air causes **2.4 million deaths due to heart disease each year.**

Brain and polluted air

WHO studies attribute **24 percent of all stroke deaths to polluted air.** Polluted air therefore causes **1.4 million deaths due to stroke each year.**

Invisible killers – polluted air and radon

Polluted air may not always be visible, but it can be fatal, which is also true for the **gas radon.** Most diseases attributed to polluted air each year are lung diseases and cancer.

What is radon and how it affects our health?

Radon is a colorless and odorless radioactive gas that is emitted in the decay of uranium. It is present in virtually all types of soil, and low concentrations of radon are also found in the air we breathe every day. **Radon problems arise when it enters your home and remains there. Long-term exposure to high concentrations of radon in fact causes lung cancer.**

How dangerous is radioactive radon in fact?

Based on the studies carried out by EPA, the US Environmental Protection Agency, radon is the primary cause of deaths compared to the death rate due to exposure to certain dangers. The study has revealed **radon to be a greater cause of deaths** than deaths due to **drunk driving, indoor falls, drowning or fires.**

The study results also confirmed that the concentration of radon is higher in spaces closer to the ground. The highest concentrations of radon are in basement spaces and in buildings made of slag brick. When properly ventilating spaces, radon concentration can be significantly reduced and maintained on a level harmless for our health.

EPA United States Environmental Protection Agency

SOLUTION:
With good ventilation **devices with built--in radon sensors** we are able to take control over ventilation of spaces to ensure that we are no longer exposured to this dangerous gas.

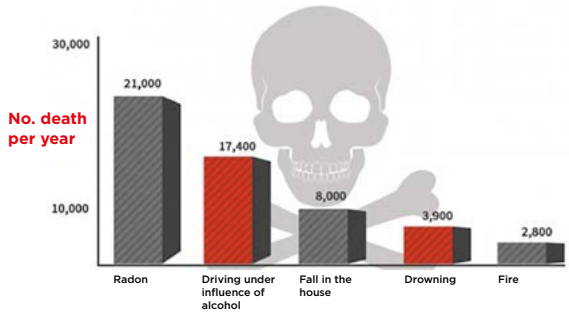

Figure 2: Number of fatalities per year according to EPA study.

Figure 3: Average radon levels in buildings in Germany, 2018 Source: Menzler et. al

Figure 4: Average radon levels in Slovenia. Source: dr. Damijan Škrk from the Radiation Protection Administration of the Republic of Slovenia.

How to properly ventilate?

By opening a window a little or even opening a window just until it is in tilt open position, we will just cool the indoor walls in the winter or additionally heat the indoor walls in the summer. Therefore, fresh air entering the space will merely be additionally cooled by cold walls in the winter and vice versa in the summer.

If you want to properly ventilate the room, you should provide transverse ventilation, i.e. by completely opening the windows or making drafts for at least three to five minutes (several times a day). Nowadays when installing modern windows, an installation of a ventilation system is already mandatory in many EU countries. Moreover, a large number of homes and other existing properties, such as kindergartens, schools, hospitals, hotels and other facilities, are waiting for a ventilation system to be installed. **As from 1 January 2018, a mandatory ventilation regulation came into effect in Germany, Poland, the Czech Republic, Switzerland, Denmark and Sweden, therefore the purchase of modern windows is conditional upon the purchase of an appropriate ventilation system.**

What is heat recovery?

When designing new and the most efficient renewable energy technologies, it is not just about exploiting the sun or the wind and the use of such technologies in our homes or offices. It takes a lot of brain power to make the most of what is given to us in nature and thus help reduce our collective impact on the environment. This also includes the amount of energy we lose into the environment on daily basis. Heat recovery systems heat or cool inlet fresh air by utilizing the energy of exhaust air released from the room.

I probably don't need to heat the building if I use a heat recovery system, do I?

No, that's not true. It is true however, that you significantly reduce energy consumption – the energy for heating and cooling devices by approx. 40 percent. Heat recovery systems do not replace the need for heating furnaces, boilers or other technologies used for floor or radiator heating, but only help to make more rational use of a particular heating system. Heat recovery systems work together with the heating system and enable us to make the most of recovery of warm air. **By using renewable ventilation systems you can save on heating bills, have a positive impact on your health and promote your well-being** – and at the same time make your house warmer despite ventilating it in the winter months. It is easy to lose heat in our homes. We simply open the windows and let warm air into the atmosphere, but by doing so we inflict double damage – damage to the environment and economic damage due to irrational use of energy provided by heating. On the one hand, the ventilation system will provide you with fresh, warm air, which will constantly circulate round your home. On the other hand, you will save on heating as natural ventilation with a direct release of air into the atmosphere will no longer be necessary.

How does heat recovery work?

Ventilation has become a key element and at the same time the biggest problem of construction in recent years. The new EU directive, which entered into force on 1 January 2018, lays out the proportion between unidirectional (single duct) and bidirectional (double duct) ventilation systems. Due to at least three disadvantages of unidirectional systems, which are: intrusion of external noise, lower average heat recovery, the same air flow channels – a risk of creating overpressure/pressure depression in the room; **the EU is inclined towards bidirectional ventilation systems.**

15% of European ventilation systems, among them also MIKrovent, employ the technology of a bidirectional heat recovery system.
MIKrovent heat recovery systems transfer heat from the air, which is otherwise emitted into the environment, to the fresh, filtered air, which is supplied to the room.

In the heat recovery process, exhaust air moves through hundreds of tiny chambers towards the discharge port into the environment and, at the same time, cool air moves through hundreds of tiny chambers from the intake port. **Both flows of fresh and exhaust air meet, but without the possibility of physically mixing.** Since there is no physical contact, it is only possible to transfer heat from the exhaust air to the fresh air. The heat of the exhaust air is transferred to the cold input air, which thus becomes warm and passes into the room. Only exhaust air is released into the athosphere without its heat energy, which is retained in the room.

It is recommended to use bidirectional systems that allow separate airways of fresh and exhaust air during heat recovery. A bidirectional heat recovery system is also used by all MIKrovent models.

The advantage of MIKrovent is also that it allows for cooling walls in the summer months.

Do I need to think about heat recovery already when I'm buying a heating system?

YES, definitely, since with heat recovery you re-use the energy of warm air and bring it back into the room. **Heat recovery ventilation operates independently of our conventional heating system.** There are heat recovery system units or heat recovery systems installed in individual rooms, which act as separate air inlets and outlets into the room.

How expensive is actually ventilation with heat recovery?

Due to low voltage of the device components (12 or 24 V), the annual electricity consumption is very low and amounts to approximately 10 euro (operation cost of the ventilation system MIKrovent 30). Ventilation systems with heat recovery are extremely low electricity consumers and when transferring heat to the air they do not need to operate a special electric heater since the process takes place independently – due to scientific laws of thermodynamics and heat transfer.
The technology for thermal renewable systems has remarkably improved in recent years, and today there are systems that allow heat recovery of up to 95 percent (MIKrovent devices). So, up to 95 percent of heat can be conserved when exhaust air is released into the environment and fresh air enters the room.

What kind of ventilation system do you need?

There are two options:
- **a central ventilation device** (in new buildings) or
- **a local ventilation device** (suitable for both new and old buildings).

Central systems

Central systems have good heat recovery, require more space for the device and ducts, are usually quieter yet more demanding for maintenance, because we have to take into account the costs of regular cleaning of the ducts. In buildings with high ceilings, it is possible to install the ducts above the double ceiling or into screed in new buildings. **Due to these major construction interventions,** which must be added to the ventilation cost, **the cost of a central system is ultimately higher.**

Local systems

Local systems have several advantages: they do not require large-scale construction and installation work in accommodation spaces, there are no ducts, no additional space for the device is needed, and there is no need to clean the ducts. Only one or two openings need to be made in the façade. Due to short tubes for air, the energy consumption for transferring fresh air through the ducts to the rooms is considerably lower.

Filters

All modern ventilation systems have fresh air filters, but when considering the quality of filtration it is also important to consider the type of filter in use. Before purchasing a ventilation system, it is crucial to obtain information about the type of filters used for the selected ventilation system. Low quality filters retain fewer particles and vice versa. We distinguish between simple filters, such as G4 (PM10), and more complex ones, such as F7 (PM2.5). The latter can also retain the finest particles that are recognized as carcinogens. Special filters can also retain pollen. All MIKrovent ventilation systems use the highest quality outdoor air filters of type F7 (PM2.5).

Operation of ventilation systems at low temperatures (below 0 °C)

Most ventilation devices are tested for operation according to the EN308 standard, which requires the operation to be tested at a temperature of 5 °C. What happens when the outdoor temperature drops to 0 °C? In such cases, most ventilation systems have trouble with inactivity due to the occurrence of condensation and condensate. When outdoor temperatures are above the freezing point, the condensate runs down the façade and thus destroys the outer appearance of your property. On the other hand, when outdoor temperatures are below 0 °C and the condensate can no longer flow freely, icicles can form on the outside of the façade. If you live in a climate where winter temperatures can also drop below freezing, we advise you to obtain information from your ventilation provider on how **the ventilation system functions at temperatures below 5 °C and in the case of temperatures below freezing before actually purchasing a ventilation system.**

An important component of MIKrovent ventilation systems with a high recovery rate is an external air heater that prevents the formation of moisture condensation at the outlet of warm indoor air from the heat exchanger. Most devices on the market do not have such a heat-

er, and therefore, heat recovery at low outdoor temperatures decreases (the data in brochures apply to outdoor temperatures of +5 °C – regulation EN308, testing at 5 °C). The most modern systems for building ventilation nowadays are equipped with all the elements once only installed in demanding air conditioning systems: continuous flow control, humidity and CO2 control sensors, control of the radioactive gas radon and of organic (VOC) concentrations. They boast relatively low noise levels and a reasonable price.

Fan

The key element of the device is a fan that must have a guaranteed service life (no change in performance quality) for at least 50,000 to 70,000 hours. Many standard fans do not meet this condition (due to poor bearings).

MIKrovent

MIK products for local ventilation meet the latest requirements and contain all the elements for their operation in the **most unfavorable** conditions. The buyer can order versions that contain all the elements listed or only a few of them.

Local ventilation MIKrovent

Its main function is to prevent heat loss. It is known that natural ventilation techniques create drafts which we are exposed to for at least a few minutes, while at the same time we lose the generated heat in the air.

A ventilation device when evenly exchanging indoor and outdoor air ensures efficient ventilation with minimal, almost negligible heat loss in the winter, and in the summer it is connected to the air conditioner and ensures efficient circulation of cold air.

- possibility of connection to the central control system,
- making life of allergy prone people easier (clean inlet air),
- can be part of a window extension,
- can be adapted to different window dimensions,
- complies with requirements of new EU standards,
- ideal for both energy renovations of old buildings and new constructions.

By installing such a device, fresh air is provided in the room throughout the day, without sustaining a noticeable loss of heat in the winter or of cold air in the summer. Moreover, you avoid drafts and at the same time provide for a better quality of life. By using ventilation systems, we will also reduce the penetration of outside noise by 100%. **Local ventilation systems are suitable for residential premises, houses, apartmants as well as for business premises, such as hospitals, retirement homes, kindergartens, schools, hotels and offices, in short everywhere, where the quality of indoor living is important.**

Local ventilation devices are an excellent investment since they provide **2-4 times lower initial investment costs than a central ventilation system.** They are the ideal solution for a low financial input and a major contribution to health, especially in places where people spend a lot of time indoors. **It is known that fresh air contributes to productivity and better well-being and at the same time reduces infections.**

Benefits of MIKrovent:

- ventilating the space when windows are closed,
- handling devices manually, remotely or according to a weekly program,
- guaranteed safety system in case of strong wind,
- Eco Fund subsidy (Slovenian Environmental Public Fund),
- supporting the anti-burglary function,
- maintaining thermal insulation,
- preventing drafts,
- and ease of use.

CHAPTER 7

Incentives of the Slovenian Eco Fund and other European Eco Funds

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The Slovenian Eco Fund (Environmental Public Fund) also recognized the value of ventilation with a ventilation system. For several years now, it has subsidized between 20 and 25 percent of the purchase price and installation of central and local ventilation systems with heat recovery in its annual call for subsidies to natural persons.

Years ago, only central ventilation systems were promoted with a subsidy, though. The growing demand for and the increasing popularity of local ventilation systems has caused local ventilation systems to become equivalent to central ones in recent years. **Moreover, due to simple installation** (also possible in case of renovation), **easy maintenance and cleaning, as well as suitability for different sizes of homes and business premises, local ventilation systems are nowadays becoming even more popular than central ventilation systems.**

Which products can be granted a subsidy?

A subsidy can be granted for ventilation systems that have a high heat recovery rate and low energy consumption. It is important to check the current calls for subsidies each year, since calls are limited in time and budget.

By granting products a subsidy, the Eco Fund further acknowledges the best quality ventilation systems on the market. In order to obtain a subsidy, the product of the producer must meet strict technical and technological requirements of the Eco Fund. All relevant documentation must be provided to prove that the product complies with the high standard requirements. Only the best quality ventilation systems get the approval of the Fund and are eligible for a subsidized purchase. We are proud to announce that MIKrovent meets all the conditions for the purchase with a subsidy.

How to obtain a subsidy?

In order to buy a device with a subsidy, a natural person must submit certain documentation to the Eco Fund before the purchase. The natural person must obtain an offer from the manufacturer, take a picture showing the actual situation, and fill in a subsidy form available on the website of the Fund.

After completing the installation, the buyer sends the invoice and a picture of the completed installation and the Fund reimburses the buyer part of the investment made available in the Fund's call within a specified period.

It is practical to choose a ventilation system manufacturer that has technically and professionally qualified salespeople so they can provide advice and professional assistance in the proper consulting, filling in and submission of documentation to obtain a subsidy from the Eco Fund, as incomplete or incorrectly prepared documentation may mean that the customer is not granted a reimbursement.

If you are not certain if you are able to prepare the entire documentation for obtaining the subsidy yourself, do not hesitate. Enjoy professional guidance for completing the documentation to obtain an Eco Fund subsidy by the competent MIK Celje team.

MIK Celje, d.o.o. is a manufacturer of UPVC, aluminum and wooden builders' carpentry and joinery, and offers comprehensive solutions for the modernization of glazing or new glazing of buildings. In the 30 years of its existence, the company under the CEO Franci Pliberšek has grown and developed into a socially responsible company with 200 employees, which can boast the European award Recognized for Excellence (EFQM). The vision and goals for the future are clearly set out and in line with our slogan 'Challenges turned into success'.

A guide for choosing the right windows, doors and ventilation system

How can you improve your quality of living?

When choosing to replace old windows or buying windows for a new construction, you are interested in which windows will be most suitable for your needs. Different window types made of different materials give different results and you want them to meet your requirements. Some prioritize thermal insulation, others require sound insulation, security and sustainability, and the most demanding ones all of these combined. In addition, you also have the desire for aesthetic consistency, general functionality as well as guaranteed and easy maintenance. Let us not forget the desire for proper shading of space and energy efficient ventilation.

In the end, we all try to find the right balance between price and quality and decide what is best for us.

The guide will give you the most important information in a simple way to help you decide when buying windows, doors and ventilation systems.

Contact us

If you let us know about your problem, our experts will respond and advise you by email or phone. You are also welcome to visit our showrooms across Slovenia and the world. Any questions and answers will be included in the following versions of the guide, so do not hesitate – we are at your disposal and our tips are free of charge.

Your questions and opinions mean a lot to us! Thank you.

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