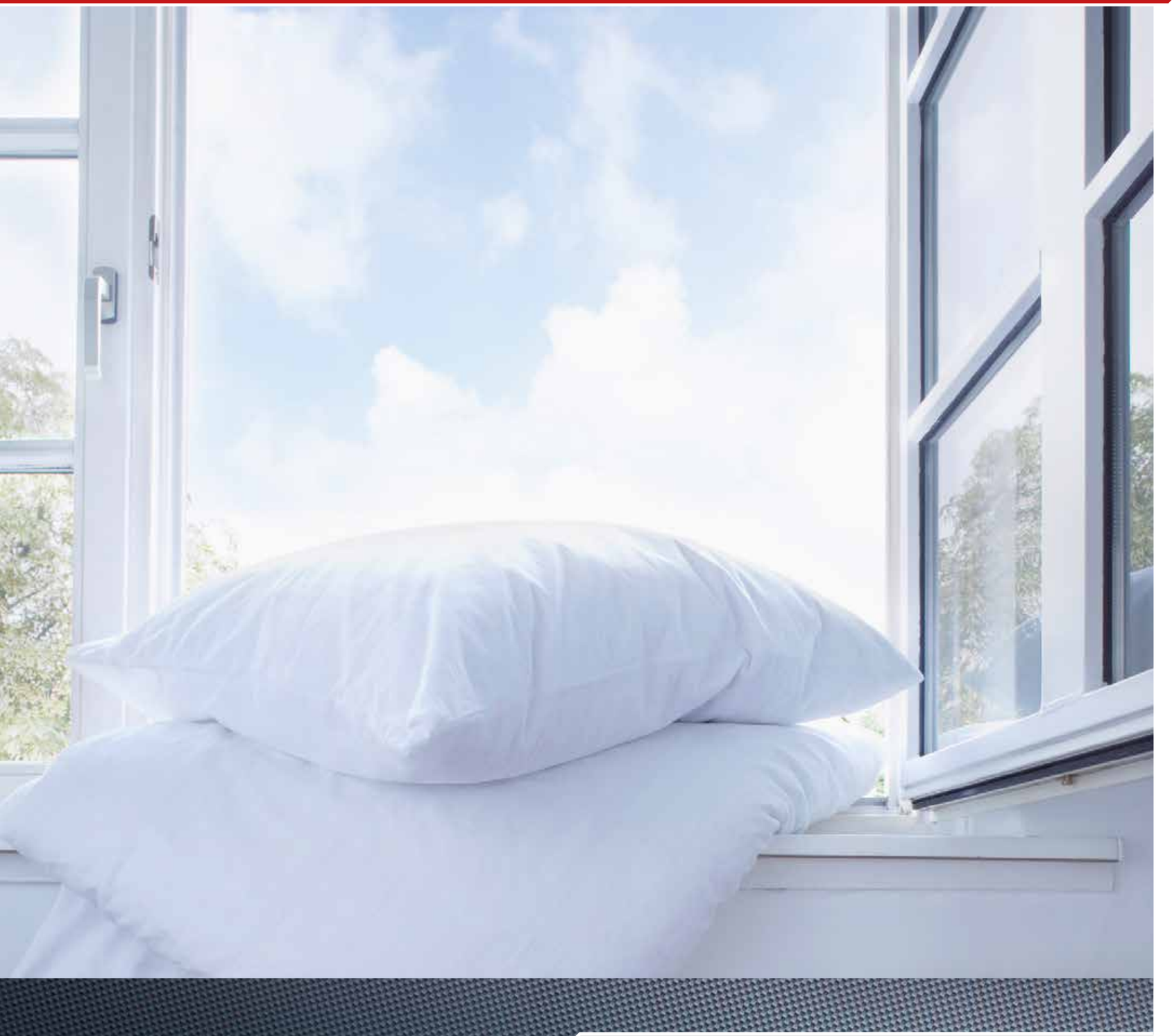
The indoor climate as a feel good factor

***KBE** ventilation*

KBE®

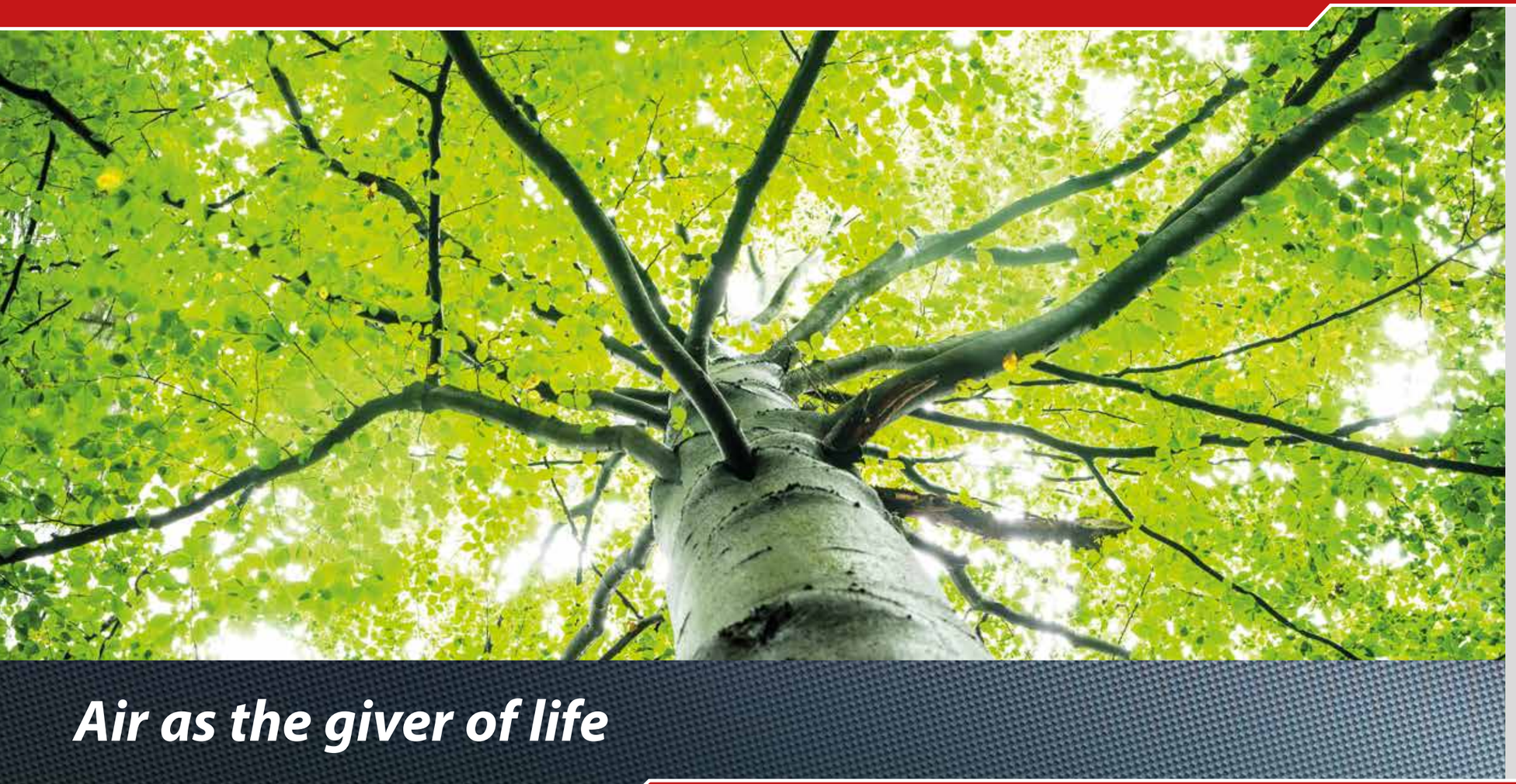


Bring fresh air into your life

Correct, regular airing is becoming more important than ever, especially in our better insulated living space. Whereas earlier draughty houses and loose windows provided a constant, although unintended ventilation, our houses today are well insulated and sealed for the minimum possible loss of heat.

We often forget though the importance of a sensible ventilation behaviour for a healthy indoor climate. When there is too little ventilation the relative air humidity rises constantly, quickly giving rise to a damp indoor climate that promotes the growth of mould. For this reason it is important that a healthy balance is reached between a sensible

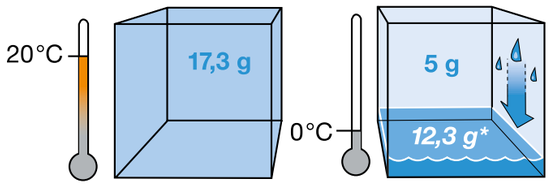
ventilation behaviour and the minimum heat loss. This safeguards on the one hand sustainable energy consumption, on the other the integrity of the building fabric that would otherwise suffer from the effects of moisture.



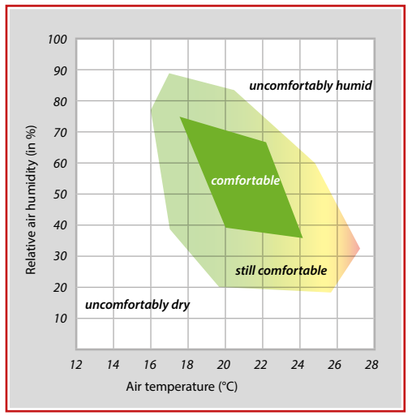
Air as the giver of life

The factors for high air humidity

A relative air humidity of 40 to 65% is generally felt to be a cosy indoor climate. However a large number of everyday activities cause the air humidity to rise constantly, e.g. as a result of water vapour from domestic appliances and body care or the natural emissions of moisture from humans, animals, and plants.



Water content of air per m³ at various indoor temperatures



Comfort space

When cooling becomes a problem

High air humidity becomes a problem in particular when temperatures drop during a heating period. When the radiators are turned down, for instance when there is nobody home, the indoor temperature falls – and therefore the quantity of water vapour that the ambient air can absorb. Earlier this was not a problem. Yet nowadays, because houses are very well sealed and moreover are fitted with modern energy saving windows and thermally insulating glazing, the excess moisture can no longer escape. Although a cubic metre of air at 20 °C can absorb up to 17.3 grams of water, the same quantity of air at 0 °C can absorb only 5 grams of water. So when humid air cools from 20 °C to 0 °C, 12.3 grams of water condense as droplets out of every cubic metre.

In other words, when old, draughty windows are replaced with modern airtight elements, the ventilation behaviour must be adapted accordingly. As a comparison: if the insulating values of a modern energy saving window with precision manufactured frame and thermally insulating glazing are to be reduced to those of an old window, you would have to cut a hole about the size of a tennis ball. This make clear the extent to which old windows lose heat and the significance of a regular supply of fresh air.

KBE ventilation tip

Active and passive ventilation

With the insulating and tightness values of today's buildings and windows correct ventilation is particularly important for supplying fresh air and reducing air humidity. However, if ventilation is not to waste energy unnecessarily, you will need to follow a few important rules or utilise innovative window technology.

The specific arrangement of window rebate ventilators draws out the humidity in the rooms in a controlled process: a clever way to save energy.

Integrated in the window frame the window rebate ventilators are invisible when the window is closed and ventilate without the user's intervention. So that there are no unpleasant draughts, they throttle automatically the air supply during strong gusts.

Fresh air
as a permanent guest

There is no magic formula for correct ventilation. On the one hand we have countless factors that affect the relative air humidity, including the need for ventilation, on the other we have homes and buildings in diverse shapes and sizes. Basically there are two kinds of ventilation systems: free ventilation and forced ventilation.

Free ventilation

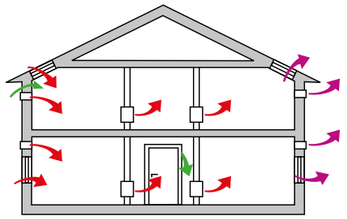
Free ventilation is the name given to all ventilation modes that operate without mechanical aids, e.g. windows are opened to let excess moisture escape. This utilises the pressure difference across the two sides of a building: the air flows in through open windows or ventilation elements on the one side of the building and flows out on the other. The humidity in the living space is therefore drawn out. Shaft ventilation reduces the pressure indoors so that fresh air is drawn in through ventilation elements and humid air drawn off through the shaft.

Forced ventilation

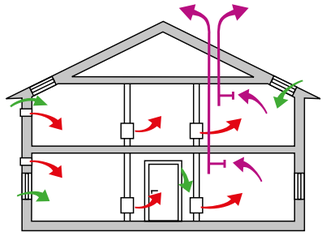
Forced ventilation systems extract the air from the indoor environment and so draw off moisture in a controlled process.
Ventilation elements integrated in the windows ensure that fresh air flows into the living space, balancing the pressure. In combination with high insulation windows and heat recovery systems they are instrumental in the design of passive houses.

The various ventilation modes

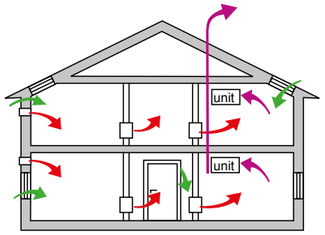
Free ventilation, opening windows



Free ventilation, shaft ventilation



Exhaust air system, single fan ventilation system



KBE ventilation tip

Four ventilation stages for buildings

The new residential ventilation standard DIN 1946-6 distinguishes between a total of four ventilation stages that safeguard a permanent high quality of air in buildings and the regulation of air humidity.

"Ventilation for moisture protection" is a user independent ventilation mode that serves to prevent moisture from damaging the building, e.g. during temporary absences like holidays, and so maintain the integrity of the building fabric.

"Minimum ventilation" is understood to be a ventilation mode that safeguards the minimum hygiene requirements and the protection of the building (damp) under the usual conditions of use with partially reduced moisture levels and concentrations of substances.

"Basic ventilation" is the name given to the ventilation mode needed to maintain the hygienic requirements and integrity of the building fabric during the absence of users.

"Intensive ventilation" is the name given to the ventilation mode that operates at peak load times, e.g. after a party with many guests.

Principles of the new DIN standard 1946-6

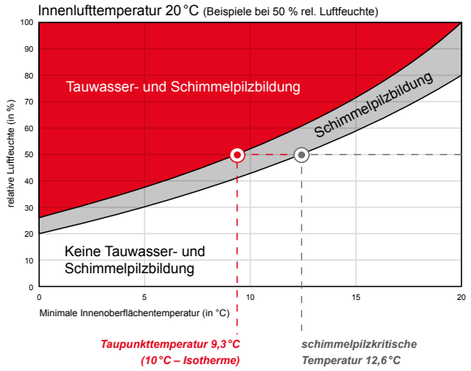
The new standard DIN 1946-6 applies to the free and forced ventilation of homes and sets of rooms used for similar purposes, so called working units.

Whether the maintenance or modernisation of a building has ventilation relevance under DIN 1946-6 depends on the number of windows that must be replaced and the sealed roof area. Based on an n50 value of 4.5 per hour assessed for the buildings a ventilation concept must be drawn up when:

- in a multifamily home more than a third of the installed windows are replaced
- in a single-family house more than a third of the installed windows are replaced or more than a third of the roof area is sealed.

In addition the DIN standard 18017-3 applies to the ventilation of windowless rooms that come under the supervising authority's guidelines for the ventilation of windowless kitchens, bathrooms, and toilet rooms in homes.

Prevention of condensation and mould



Important info on the subject of ventilation!

Dew point temperature

Because air humidity cannot exceed 100% there is a point at which air can no longer absorb moisture and moisture condenses out of the air. This point depends on the temperature and its value is called the dew point temperature, or the temperature of the air at which the relative air humidity is 100% and water starts to condense out.

For instance the dew point temperature of air at 20 °C and with a relative humidity of 50% is 9.3 °C. In other words, if the air cools below 12.6 °C the air humidity exceeds 80%, and there is a danger of mould formation.

More than air and water

Of course it is not only the air's moisture content, i.e. the relative air humidity, that is responsible for a healthy indoor climate. Also the air's other constituents like carbon dioxide, carbon monoxide, odours, and suspended particles are contributory factors if we are to satisfy our body's need for fresh air.

Important **info** on the subject of ventilation!

Carbon dioxide

The most important reference value for indoor ventilation is the carbon dioxide content. Although the CO_2 content of indoor air rises when people are present, no ventilation is needed to reduce the CO_2 values when the room is used normally.

Carbon monoxide

The carbon monoxide content is relevant only in rooms with an open hearth because CO gases are generated only when combustion does not take place as planned. The reasons can be improperly extracted flue gases or an inadequate supply of combustion air. Because carbon monoxide is an odourless gas it mostly goes unnoticed by residents and is therefore particularly dangerous.

Oxygen

The normal oxygen content of air is about 20%, yet also lower values are not detrimental to health. However, because acute oxygen deficiency can lead to lack of concentration and fatigue symptoms, rush ventilation is recommended at regular intervals for the required supply of fresh air

Odours and suspended particles

Unlike carbon monoxide, carbon dioxide, and oxygen, people can detect odours and suspended particles like e.g. cigarette smoke in the air. Pollutants of this kind are the most obvious indicators of stuffiness and arouse the desire for fresh air.

Meteorology

One of the most important factors for an effective ventilation behaviour is the position of the opened windows. When the wind flows around a building a stagnation pressure is generated on the side facing the wind and a partial vacuum on the side facing away. In addition the direction of ventilation is affected by the temperatures of the indoor and outside air. Correctly utilising the pressure difference safeguards a faster and more effective exchange of air.

Open hearth

There must be an adequate supply of combustion air to an open hearth. Accordingly open hearths must be laid out in compliance with all of the legal provisions issued by the supreme construction supervising authority in the affected federal state.

KBE ventilation tip

How to use the wind

Whoever wants fast ventilation should get help from the wind. Depending on where you live you can utilise the stagnation pressure on the side of the building facing the wind for a supply of fresh air in your home. Or you can utilise the suction effect on the side facing away from the wind to extract the used air out of your rooms. Optimally you can combine both by opening two windows opposite each other.

ClimaTec 76

Healthy indoor climate

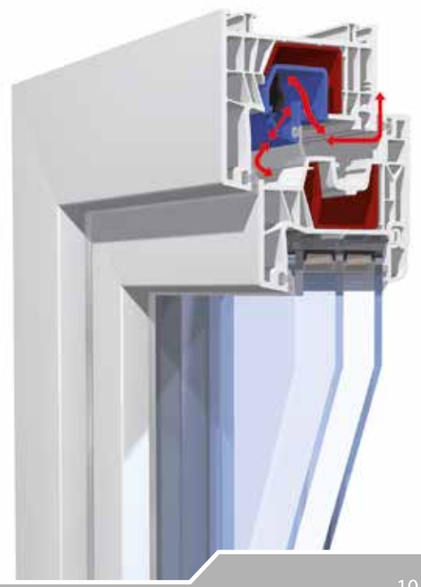
Correct, regular airing is becoming more important than ever, especially in face of the growing effectiveness provided by insulation in living space. When there is too little ventilation the relative air humidity rises constantly, giving rise to a damp indoor climate that promotes the growth of mould. For this reason it is important that a healthy balance is reached between a sensible ventilation behaviour and the minimum heat loss. This safeguards on the one hand sustainable energy consumption, on the other the integrity of the building fabric that would otherwise suffer from the effects of moisture. ClimaTec 76 from KBE is your ventilation solution for a regulated supply of fresh air – and that fully automated, even without active ventilation.

Wellness with ClimaTec 76

The ventilation mechanism of ClimaTec 76 lies concealed in the outer frame rebate and is practically invisible – but the more effective for that. It provides for a controlled supply of fresh air without manual ventilation and does not need a power supply. ClimaTec 76 can also regulate indoor air humidity. The risk of mould formation is therefore greatly minimised.

Moreover the ventilation system ClimaTec 70 features automatic wind pressure regulation and of course complies with the requirements under EnEV (German Energy Savings Act) as well as the DIN and EU standards on tightness against driving rain, sound insulation, and residential ventilation.

- Self regulating, easy to clean ventilation system
- Minimises high air humidity and the risk of mould
- Promotes the controlled supply of fresh air
- Ventilator screen protects against insects
- Concealed in the frame, so practically invisible from the inside and outside
- Automatic wind pressure regulation
- Complies with EnEV (German Energy Savings Act)
- Tested sound insulation up to 43 dB (STC 4)
- Tightness against driving rain and air passage in accordance with DIN and EU standards
- Ventilation in accordance with DIN 1946-6



Fresh air supply, systematically:

REGEL-air® 76

Correct, regular airing is becoming more important than ever, especially in face of the growing effectiveness provided by insulation in living space. When there is too little ventilation the relative air humidity rises constantly, quickly giving rise to a damp indoor climate that promotes the growth of mould.

For this reason it is important that a healthy balance is reached between a sensible ventilation behaviour and the minimum heat loss. This safeguards on the one hand sustainable energy consumption, on the other the integrity of the building fabric that would otherwise suffer from the effects of moisture. REGEL-air® 76 from KBE is your ventilation solution that provides a uniform supply of fresh air. REGEL-air® 76 is therefore also ideal for those who spend only some of the time in the building, for instance their weekend or holiday home.

- Constant, uniform supply of fresh air
- Minimises high air humidity and the risk of mould
- Simple retrofit
- Integrated in the outer frame rebate, so invisible from the inside and outside when the window is closed
- Easy to clean
- Tested sound insulation up to 43 dB (STC 4)
- Tightness against driving rain and air passage in accordance with DIN and EU standards
- Ventilation in accordance with DIN 1946-6

Flexible installation options.

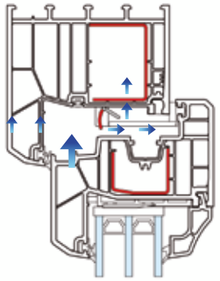
Fitted with a double-stage wind pressure regulator, REGEL-air® 76 contributes to healthy indoor air inside closed windows and is easy to clean.

The new REGEL-air® 76 fan features an innovative return spring and does not need a power supply. It can be installed either horizontally or vertically in the window. The system is therefore ideal as a retrofit on small windows as well (windows with 70 mm, 76 mm, and 88 mm installation depth).

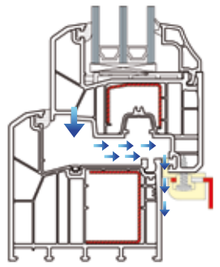
Fan installation	Test values in dB*			Air flow rate in m³/h				
REGEL-air®	A	B	C	2 Pa	4 Pa	5 Pa	7 Pa	8 Pa
1 along the horizontal top, 1 along the vertical side	39	43	43	3	4	5	5	6
2 along the horizontal top, 1 along the vertical side	38	42	43	3	4	5	6	7
2 along the horizontal top, 2 along the vertical side	38	42	42	4	5	6	7	8

*Pane structure: A) 6/16/4/14/4 (36–37 dB), B) 8 CSG SI/12/6/12/8 CSG SI (45 dB), C) 12 CSG SI/20/8/20 CSG SI (48 dB)

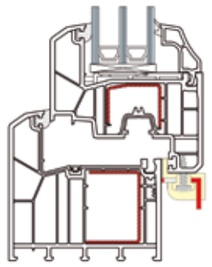
The pleasures of ventilation



WV self regulating



LV open



LV closed

There are a large number of cases where the conventional ventilation methods are inadequate, e.g. when somebody is home only rarely. Here the KBE ventilation system REGEL-air® provides for fresh air – also without active ventilation.

REGEL-air® (FL) – Simple retrofit

The REGEL-air® systems can be retrofitted easily on a large number of installed windows – with 76 mm or 88 mm installation depths. Thanks to its two stage wind pressure regulation the ventilation system also provides healthy indoor air when you are not at home.

REGEL-air® (RF)

The REGEL-air (FR) window rebate ventilator features an innovative and unique return spring that allows the ventilator to be installed in the vertical position. This means that also smaller window units can be fitted with ventilators in future, with equal performance.

REGEL-air® PLUS – Flexible and effective

A further option is provided by the KBE ventilation system REGEL-air® PLUS. Thanks to its continuous manual volume flow regulation, this system provides precise, needs based, and boosted ventilation in all rooms:

REGEL-air® window rebate ventilator (FL) or with return spring (RF) in combination with the REGEL-air® PLUS leg ventilator (LV)

Differential pressure according to DIN 1946-6 in [Pa],
air volume flow in [m^3/h]
* Tested according to DIN EN 13141 by the company Enbema

Differential pressure	2	4	5	7	8
1 FL + 1 RF	3.0	3.7	4.0	4.7	5.0
2 FL + 1 LV	5.4	6.3	6.6	7.8	8.4
1 FL + 1 RF + 1 LV	6.0	7.6	8.2	10.0	10.5
2 FL + 1 RF	3.6	4.5	5.0	5.8	6.2
2 FL + 1 RF + 1 LV	6.5	8.6	8.8	11.0	11.5
2 FL + 2 RF	4.4	5.6	6.2	7.4	7.8
2 FL + 2 RF + 1 LV	7.8	10.9	11.3	13.8	14.5

REGEL-air® PLUS with FL + RF

KBE REGEL-air®
for 70 CL, 70 EL, and System_88mm

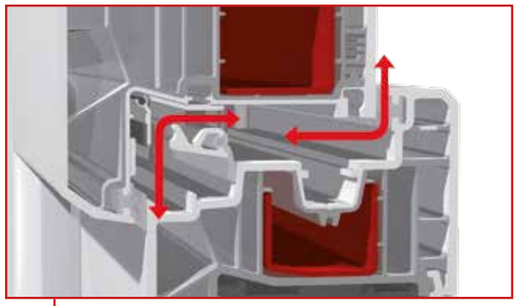
- Constant, uniform supply of fresh air
- Minimises high air humidity and the risk of mould
- Simple retrofit
- Integrated in the outer frame rebate, so invisible from the inside and outside when the window is closed
- Easy to clean
- Tested sound insulation up to 43 dB (STC 4)
- Tightness against driving rain and air passage in accordance with DIN and EU standards
- Ventilation in accordance with DIN 1946-6

ClimaMatic®

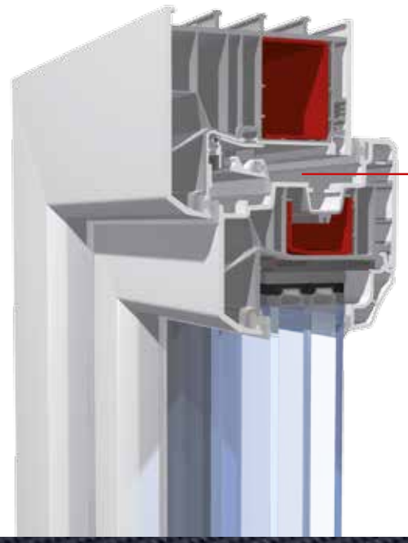
The new, self regulating window ventilation system ClimaMatic has been designed for the 88 mm system from KBE. Concealed in the outer frame and therefore virtually invisible, it has been developed specifically for the centre seal variant and presents a convincing range of performance characteristics.

ClimaMatic balances the wind pressure automatically for a permanent feel good climate. The risk of mould is reduced to a minimum, indoor humidity is now a thing of the past, and on top it complies with the DIN and EU standards as well, including the requirements for tightness against driving rain and the passage of air. In this respect a perfectly engineered and intelligent ventilation solution for a balanced indoor climate.

When the wind picks up – the flap closes



When the wind dies down – the flap opens



- Self regulating ventilation system for the KBE System_88mm in conjunction with the centre seal
- Regulates indoor humidity and reduces the risk of harmful mould
- Concealed in the frame so scarcely visible from the inside and outside

KBE as your partner

With such a complex subject like indoor climate it proves very difficult to recommend standard solutions, so varied are the initial situations. What is important is that you decide for a needs based, practical solution – and choose a ventilation mode that fulfils all of your local and personal demands. KBE will be pleased to assist you in choosing the ventilation mode best suited to your requirements.

KBE ventilation tip

Many and diverse solutions
You can find out quickly which window system is recommended for which ventilation behaviour.

Should you have any further questions on the subject of ventilation, simply complete the form on the right and send it to the profine Competence Centre.

Templates for verifying ventilation requirements under DIN 1946-6

1. Building project details

Name .....
Street .....
Postal code/city .....
Phone .....
Fax .....
Email .....

2. Building developer details

Name .....
Street .....
Postal code/city .....
Phone .....
Fax .....
Email .....

3. Architect/planner details

Name .....
Street .....
Postal code/city .....
Phone .....
Fax .....
Email .....

kompetenzCenter
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Email: kompetenzcenter@profine-group.com

Date: .....

Remarks

4. Working unit (WU) details

☐ WU area in m^2
☐ WU ceiling height in m
☐ Number of windows

5. Building details

☐ Number of floors
☐ Overall height of building in m
☐ New building
☐ Old building / restoration before 1995*
☐ Old building / restoration after 1995*
☐ Is the working unit single storey (as in multifamily home)?
☐ Is the working unit multistorey (as in single family home)?

6. What kind of ventilation is there?

☐ Free ventilation (without fan)**
☐ Windows opened throughout building
☐ Shaft ventilation
☐ Forced ventilation (exhaust air only)
☐ with service shaft
☐ without service shaft
☐ Fan air volume in m^2/h under DIN 18017-35

* the year the building being restored was built / ** In the case of free ventilation/opened windows, please enclose a ground plan

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