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GET READY

HEATING AND VENTILATION



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INTRODUCTION

Heating is one of the largest expense factors for households, especially in colder climates with long winters and a large amount of heating days. Right heating and ventilation can help you creating a comfortable indoor climate and reduce unnecessary heat losses. This saves money and the environment.

ROOM TEMPERATURES

The room temperatures should be adjusted to the individual comfort. Adjust the temperature in each room separately, if possible. Rooms which you do not use most of the day do not need to be fully heated. Usually, a temperature of 20-21 °C in the living room and in the kitchen is comfortable also in winter. Think about wearing a pullover if you freeze at 20 °C. In the sleeping room, 17-18 °C should be enough. Remember: the more you heat, the more you pay. For each degree that you turn up the heating, you pay 6% more. The more you heat, the drier is the indoor air which can make inhabitants more illness-prone

| | |
|---------------------|----------|
| Living rooms | 20-21 °C |
| Kitchen | 19-21 °C |
| Sleeping rooms | 17-18 °C |
| Bathrooms | 20-22 °C |
| WCs | 18-19 °C |
| Floors and hallways | 15-17 °C |

It is advisable to keep the doors between differently heated rooms shut, to prevent humid air from warmer rooms to move into colder rooms. Do not heat rooms by leaving doors open. Use the radiator also in colder rooms, but put them on a lower temperature.

If you are away from home during the day or for a longer time, turn down the heating, but not below 15 degrees, otherwise the indoor air gets too humid and you increase the risk of mould. Be aware, that the colder the temperature in a room, the more often you need to ventilate the rooms to decrease the humidity of the air.



Fig. 1. Don't do it like shown here! Keep the radiators free from any furniture or curtains. | Image: © Philipp Engewald

Take care the air can ventilate freely around the radiator and do not put any furniture in front of the radiator. Curtains should not hang in

front of the radiators either. When you open the windows to ventilate the room, remember the position on the valve, close the valve on the heating fully and open it back to same position again after you have finished ventilating, otherwise you lose all the heat to the environment.

When you turn on the radiator keep in mind, that the numbers on modern radiator valves correspond to the temperature inside the room, not to the speed with which the radiator is being warmed. That means that you should set the radiator to your desired temperature once and not put it to the maximum when turning on the heating.

HUMIDITY AND VENTILATION

Principle of ventilation

Air can store water vapour up to a certain maximum amount. This maximum storage capacity is depending on the temperature. If the air is cold, e.g. 5°C , it can store little water vapour, approximately 7 grams per cubic meter. Warmer air can store much more water vapour. If the air has 20°C , it can already store almost 18 grams of water vapour per cubic meter. The relative humidity is a measure that tells you how many per cent of the maximum water vapour storage capacity you have reached. To come back to our example: 7 grams of water in 1 cubic meter of air, mean 100% relative humidity at 5°C , but only 40% at 20°C . The effect of ventilating rooms is a reduction of humidity inside the rooms based on the water storage capacity of air. If you open the window in winter, you exchange a part of your warm indoor air with colder outdoor air with a certain amount of water vapour. The colder outdoor air is being warmed up inside and the relative humidity of the air drops, leading to a lower relative humidity inside the room. On the other hand, this effect is vice-versa also responsible for humidity on colder walls or other construction parts. If the surface is

cold, the temperature of the surrounding air is reduced and the relative humidity increases. If the surface air at a wall, pipe or window reveal is permanently very humid (>80%), mould can occur. Constructions with organic materials such as paintings, wallpaper, and wood can be damaged or destroyed after longer times.



Fig. 2. Hygrometers help you to keep an eye on the indoor humidity. In this example it is more than 60%, time to open the windows for a couple of minutes. Image: © Philipp Engewald.

As a general rule of thumb, the relative humidity should not exceed 50% in the rooms when the outdoor temperature drops below zero. In spring and autumn the relative humidity may be up to 60%. If you like to find out, if you have problems with humidity, think about buying a hygrometer, analogue or digital (modern hygrometers can have a warning function, if humidity is too high and mould can grow). A hygrometer displays the relative humidity and reminds you to ventilate regularly if the 50% are exceeded.

Sources of humidity

There are many sources of humidity in the rooms. Each and every one of us transpires water vapor by aspiration and sweating. But also taking a shower, bathing, drying clothes or cooking are sources of humidity. Last but not least, plants and flowers transpire water vapor as well. All water with which you water your plants ends up in your indoor air as vapor eventually. Therefore, reduce the number of humidity sources.



Fig. 3. Keeping a lid on your pot reduces the humidity in the room.
Image: © Philipp Engewald

Remember: Exchange of air between the flat and the environment through windows requires a temperature gap between indoor and outdoor air or some wind outside. This means that on some warm, calm

days opening the windows does hardly exchange any air. On these days automatic ventilation systems are advantageous.



Fig. 4. Open windows widely more than two times a day for a few minutes to achieve proper ventilation of rooms. | Image: © Philipp Engewald

Rooms should be ventilated by opening the windows widely, depending on the humidity sources and the outside temperature. Generally you should ventilate more than two times a day for two to five minutes in winter. In the warmer seasons, you can also keep your window open for longer periods. Do not leave your windows on tilt for longer periods, otherwise you waste energy and cool down the walls next to the open window.

Sleeping rooms

If you like to sleep with an open window, reduce the opening to a minimum, turn down the heating during the night and close the sleeping room door. If you leave your window shut during the night, remember to ventilate the rooms with a wide open window the next morning after getting up.

Kitchen and bathrooms

In kitchens and bathrooms, cooking, taking a shower or bathing, drying clothes create a lot of humidity in the air which should be eliminated quickly. Open the window widely after cooking in the kitchen or taking a shower to get rid of the humidity. If possible, use lids on pots and pans to reduce the water vapour from cooking. If you dry your clothes inside your flat, remember to ventilate more often. Kitchens and bathrooms without windows should have an electronic ventilation system to transfer the humid air out of the room.

Humidity and furniture

If your outside walls are badly insulated, you should place furniture not directly at this wall. Move it 10 centimetres from the wall to allow the air to circulate behind the furniture. This will prevent a stronger temperature drop of the air at the wall surface. The resulting higher temperatures at the wall surface will reduce the risk of mould.



Fig. 5. A gap between furniture or larger appliances and the wall allows air circulation
Image: © Philipp Engewald

Retrofitting houses and flats

In older houses, untight windows, pipes going through walls, gaps under entrance doors and leakages in the roof construction (stair case to the attic) cause a permanent unnecessary air exchange that can make your indoor air very dry. In new houses such leakages are usually prevented to save energy. However, if you live in an older house and if you exchange for example your windows, doors or add new roof insulation, remember that you most likely have increased the air tightness of your flat. That means that you need to ventilate more often or more intensive than before to get rid of the humidity.

Ventilation in summer

Heat waves in summer can be a burden and can make it hard to sleep during the night. With two simple rules you can already increase your indoor comfort. Ventilate your rooms mostly during the night and in the early morning hours. Reduce the ventilation during the hot day to the minimum. Install shading elements outside of the windows and balcony doors. Indoor shading does not help to reduce the heat. Keep in mind that installing an air conditioning system is a costly thing. Even the most efficient appliances do still consume a lot of energy and air conditioning systems should be the last resort. Better switch on ceiling or desk ventilators first.



Fig. 6. Shades are keep out the heat.

Ventilation systems

Electronic ventilation systems allow constant ventilation without opening the windows. This can improve the indoor air quality and decrease the risk of mold. Nonetheless, after cooking, bathing or doing the dishes, you should still open the windows for a moment to allow the excess humidity in the air to leave the rooms. Modern ventilation systems are equipped with a heat recovery system. That means that the warmth of the exit air is used to heat the delivery air. Such devices contribute substantially to saving energy costs. If you have your flat equipped with ventilation systems, ensure that the filters are cleaned or hanged regularly as advised – usually 2-4 times a year. Furthermore, the ventilation device should be checked and maintained regularly to ensure that the air exchange rate is adequate.

Mold

Mould can grow if there is enough humidity around mould spores. The humidity comes from condensating indoor air (100% humidity) along colder construction parts, windows or pipes. However, scientists found out, that the relative humidity does not need to reach 100% to allow mould to grow. Already a relative humidity of 80% is enough for mould infestation. Typical places of mould are corners of outside walls, badly ventilated walls behind furniture or in window reveals and thermal bridges, which are 6-8 degrees colder than the indoor temperature. Thermal bridges are parts of the construction which are badly insulated or which conduct heat to the outside easily. They can be prevented only by proper insulation which also decreases the heating costs.

Therefore proper heating, low humidity in the indoor air (ventilation) as well as the removal of furniture from cold corners or cold outside walls can prevent mould in many cases. Mould infestation should be treated preferably by professionals to prevent new mould growth after elimination.

Preventing mould is possible by using certain paints and coatings, such as mineral wall colours, which are resistant to mould. Using such paints is in a good solution for environment in two ways: using environmentally-friendly natural materials and a healthier indoor climate.

| ASPECT | YES/NO |
|--|--------|
| Do you set heatings to one setting and keep the doors between rooms closed? | |
| Do you reduce the temperatures of your radiators when leaving the home? | |
| Do you close thermostat valves when opening the windows? | |
| Do you ventilate your rooms in the cold seasons by opening the windows 2-3 times a day for up to 10 minutes? | |
| Do you keep the space in front of the radiators free so that the warm air can circulate? | |
| Do you reduce the room temperature during the night? | |

Evaluation

If your result is:

5-6 YES: Congratulations! You are a real expert when it comes to ventilating and heating.

3-4 YES: You do a lot of aspects right when heating and ventilating. If you have the technical possibilities, you could still a bit more to save some energy and money.

0-2 YES: You should reconsider your ventilation and heating habits. Paying attention to a few simple things will decrease your energy consumption and your heating costs. If you have no technical possibility to regulate the heating, think about upgrading your heating system or talk to your landlord about that.

For your notes