Press Release

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During the Corona pandemic, schools in Germany must ventilate their classrooms regularly in order to reduce the risk of infection. Schools which are equipped with a heat recovery ventilation system, including Passive House schools, offer significant benefits for their users. © Pixabay

Ventilation systems strongly recommended

Passive House Institute about schools: ventilation systems offer major advantages

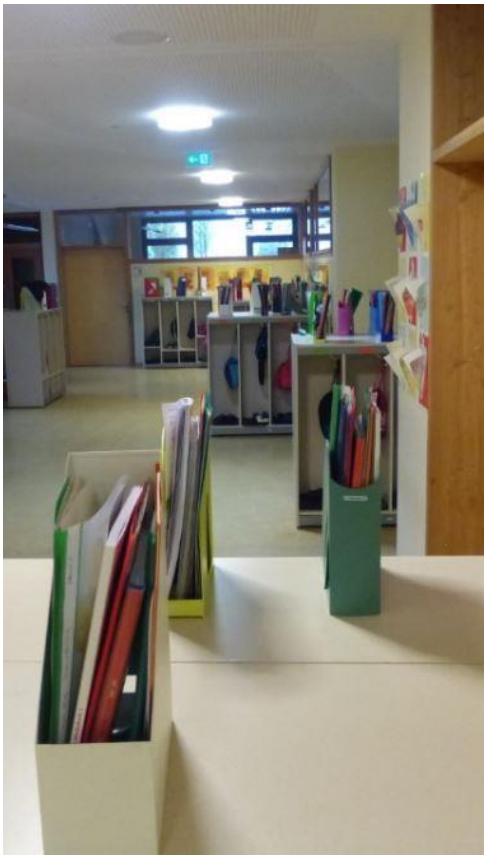
Darmstadt, Germany. **With the start of the cold season, attention is increasingly shifting to schools and the question of how the risk of infection with the Sars-CoV-2 virus in classrooms may be reduced. The German Environment Agency recommends frequent air replacement; in schools that do not have ventilation systems, this air exchange should be achieved by opening the windows. The German Environment Agency expressly advises against mobile air purification units as a substitute for ventilation with fresh air. These mobile appliances should only be used in addition to active ventilation. The Passive House Institute endorses this recommendation and draws attention to the advantages of a ventilation system with heat recovery.**

Fresh air mandatory

According to a recent publication from the German Environment Agency, the likelihood of high concentrations of infectious particles existing in classrooms is very high due to the rooms' low air volume in relation to the high number of individuals. "Because most schools in Germany are not equipped with a central ventilation system, air exchange via the windows is the best and often the only way to let fresh air into the classroom," explains the German Environment Agency (UBA).

Removing infectious particles

According to the recommendations of the UBA, in the cold season, the rooms should be aired every 20 minutes for 3 to 5 minutes, in the summer for 10 to 20 minutes. With this ventilation, not only infectious particles but also moisture, particulate matter and carbon dioxide (CO_2) will be removed.



As a Passive House school, the Schiller-schule in Walldorf, Germany, is equipped with a ventilation system with heat recovery: frequent ventilation via the windows is not necessary. © Passive House Institute

Air purifier no substitute for ventilation

In contrast, mobile air purification units usually are not able to quickly and reliably eliminate viral particles in the indoor air, especially in densely occupied classrooms, according to the German Environment Agency. In addition, they cannot remove CO_2 or moisture. Therefore mobile air purification units are only helpful in addition to active ventilation. The UBA goes even further and claims that if a room cannot be properly ventilated, it is unsuitable for school lessons.

Only additionally

The Passive House Institute shares the view of the German Environment Agency and, at the same time, draws attention to the advantages of a ventilation system with heat recovery. According to the Institute, in buildings which do not have a ventilation system with adequate supply air, the only other possible alternative is ventilation via the windows. Professor Wolfgang Feist also emphasises that mobile air recirculation units are no substitute for ventilation with fresh air. Although using these recirculating air purifiers may certainly reduce the risk of infection when used as an additional measure, since they reduce the number of suspended matter which can transport viruses. For this, however, they must be equipped with HEPA filters that only trained personnel with personal protection equipment can replace and dispose.

"Air purifiers do not supply fresh air"

Professor Wolfgang Feist has been studying the air quality and hygiene aspects of ventilation systems for over thirty years. © Peter Cook

In addition, air recirculation units cannot be a substitute for proper ventilation. The founder of the Passive House Institute explains: "Thorough airing of a classroom is still necessary even with a mobile air recirculation unit. Air purifiers simply recirculate the air; they do not supply any fresh air from the outside. Not all pollutants in the room are trapped by the filters of these air purifiers; CO_2 and radon gas are among these," emphasises Professor Wolfgang Feist. More than thirty years ago, the founder of the Passive House Institute developed the Passive House concept and, together with his family, he built the world's first Passive House building in Darmstadt. Ever since then, he has been studying the air quality and hygiene aspects of ventilation systems.

Ventilation systems reduce the risk

In schools which are equipped with a controlled ventilation system with heat recovery, including those schools built to the Passive House standard, the risk of infection is automatically minimised, according to Feist. "Due to the high-quality fresh air filters in these ventilation systems, as recommended by the Passive House Institute, the danger from dust particles and aerosols is greatly reduced," he explains. The ventilation system also ensures a constant supply of pure, fresh outdoor air. At the same time, the heat in the extracted air is used to preheat this fresh air which furthermore prevents unpleasant draughts.

Ventilation systems make it easy

Ziehenschule in Frankfurt/Main, Germany: This Passive House school does not need to ventilate by opening the windows as recommended by the German Environmental Agency. Thanks to its heat recovery ventilation system, fresh air is supplied automatically by the ventilation system. © Passive House Institute

"To reduce the risk of infection, in Passive House schools only the air exchange rate of the ventilation system must be increased as far as possible. This will achieve at least the same effect as in schools without ventilation systems that use window ventilation, but without the interruption of lessons and temperature drops," explains Dr Berthold Kaufmann. Kaufmann is a scientific staff member of the Passive House Institute and father of school children, making him familiar with the current situation in schools. He also points out that the mobile air purification units that are now often being acquired by schools, give teachers, students and parents a false sense of security: these alone do not reduce the risk of infection significantly.

Retrofitting makes sense

Professor Rainer Pfluger of the University of Innsbruck, Austria, works closely with the Passive House Institute. Like the Institute in Darmstadt, he too regards the retrofitting of decentralised ventilation systems in schools as an appropriate measure: "There are solutions available in which the pipes for outdoor air and exhaust air pass through a window casement fitted with a panel. This eliminates the need to drill holes through the exterior wall," says Pfluger.

Masks essential

Regardless of whether schools are equipped with a ventilation system, ventilate via open windows or have a mobile air purifier, the Passive House Institute stresses that the wearing of **masks continues to be essential**: this reduces the risk posed by larger droplets which can directly affect others and which contain high viral loads.

Discussing air humidification

The Passive House Institute also draws attention to another important aspect: during ventilation in winter, the indoor air is diluted with cold and therefore dry outdoor air, resulting in dry indoor air. According to the Passive House Institute, the problem of low air humidity due to increased ventilation requires greater attention. This affects all classrooms irrespective of whether increased fresh air is supplied to these rooms via window ventilation or through a ventilation system. Ventilation systems with moisture recovery have already mitigated this problem, explains the Institute in Darmstadt. However, air humidification may constitute an essential aspect for school operations in winter, especially in current times with Covid-19. According to the Passive House Institute, this has not been discussed sufficiently yet.

General Information

Passive House buildings

With the Passive House concept the heat loss that typically takes place in buildings through the walls, roof and windows is drastically reduced. With the five basic principles – high-quality thermal insulation, windows with triple glazing, avoidance of thermal bridges, an airtight building envelope, and a ventilation system with heat recovery – a Passive House building needs very little energy. Passive House buildings can therefore dispense with *classic* building heating systems. Such buildings are called "passive houses" because a major part of their heating demand is met through "passive" sources such as solar radiation or the heat emitted by occupants and technical appliances.

In a Passive House building the heat is retained for 10 to 14 days because it escapes very slowly. For this reason, active heating is needed only during extremely cold days and only a small amount of energy is required for providing this remaining heating. A Passive House building also offers an advantage in the summer: the excellent level of insulation ensures that the heat stays outside, therefore active cooling usually isn't necessary in residential buildings. Due to the low energy costs in Passive House buildings, the utility costs are predictable - a fundamental principle for affordable homes and social housing. A Passive House building thus consumes about 90 percent less heating energy than an existing building and 75 percent less energy than an average new construction.

Passive House & NZEB

The Passive House Standard already meets the EU requirements for Nearly Zero Energy Buildings. According to the European Buildings Directive *EPBD*, all member states must specify requirements for so-called NZEBs in their national building regulations. These came into effect in January 2019 for public buildings and will apply for all other buildings from the year 2021.

Pioneer project

The first Passive House in the world was built in Darmstadt-Kranichstein (Germany) 29 years ago by four private homeowners. Dr Wolfgang Feist was one of them. Ever since the homeowners moved in with their families in 1991, these terraced houses have been regarded as a pioneer project for the Passive House Standard. With its newly installed photovoltaic system, this flagship Passive House now utilises renewable energy and received the Passive House Plus certificate for this reason.

The world's first Passive House building in Darmstadt. © Peter Cook

Passive House and renewable energy

The Passive House Standard can be combined well with on-site renewable energy generation. Since April 2015, the new building classes "Passive House Plus" and "Passive House Premium" have been available for this supply concept.

Passive Houses worldwide

Passive Houses buildings for all types of uses now exist everywhere. In addition to residential and office buildings there are also kindergartens and schools, sports halls, swimming pools and factories built as Passive House buildings. The first Passive House hospital in the world is currently being built in Frankfurt am Main. Interest in Passive House is growing. In view of the consumption of resources in industrialised countries and climate protection, municipalities, businesses and private people are increasingly implementing new constructions or retrofits to the Passive House Standard.

Passive House Institute

The Passive House Institute with its headquarters in Darmstadt (Germany) is an independent research institute for highly efficient use of energy in buildings. The Institute founded by Dr. Wolfgang Feist holds a leading position internationally with regard to research and development in the field of energy efficient construction. Among other things, Dr. Wolfgang Feist was awarded the DBU Environmental Prize in 2001 for developing the Passive House concept.

Prof. Wolfgang Feist © Peter Cook

International Passive House Conference

The 25. International Passive House Conference will take place in Autumn 2021 in Wuppertal. www.passivehouse-conference.org

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