

## Press Release

14 August 2020



The progress made in the construction of the new building for the Klinikum Frankfurt Höchst is becoming more and more apparent: the scaffolding has been removed, and the interior finishing of this pilot project is progressing at full speed. All those involved are pleased with the good results of the airtightness test, which is essential for the certification of the building. © Klinikum Frankfurt Höchst

# Hospital a step closer to certification

**The pressure test for the world's first Passive House hospital was successful**

***Darmstadt/Frankfurt/Main, Germany.*** The world's first Passive House hospital, currently being built in Frankfurt, Germany, is a step closer to certification: an airtightness test for the building, which spans 78,000 square metres of gross floor area, was extremely successful. The Passive House Institute in Darmstadt has been consulting on this pilot project right from the start, including the initial planning phase. It has now been tasked with the certification of the project. A baseline study on the implementation of the Passive House standard in hospitals was carried out in advance by the Passive House Institute on behalf of the German Federal State of Hesse.

It is clear that the highly anticipated hospital in Frankfurt's Höchst district has already progressed to the final stages. The scaffolding has been dismantled completely and the bright, white façade of the new build can now be seen. The interior finishing is currently being carried out. The certification of this Passive House new build included a pressure test to measure the building's airtightness. The differential pressure measurement method is used to detect any leaks, so-called thermal bridges, in the building envelope that might lead to uncontrolled heat losses. The pressure test for the Klinikum Frankfurt Höchst delivered excellent results, which is not only good for the energy balance of the building but will also help to prevent structural damage in the long term.

## Excellent result

The measurement results confirm that the building achieves an airtightness value  $n_{50}$  of  $0,13 \text{ h}^{-1}$ . This is a fantastic achievement and well below the Passive House requirement which allows an  $n_{50}$  value of up to  $0.6 \text{ h}^{-1}$ . Oliver Kah was present on-site during the pressure test on behalf of the Passive House Institute. "The test in the eight-storey building went very well. The new build is outstandingly airtight, and is now a little closer to certification", explained Kah. Together with colleagues, Kah prepared a **baseline study** on the Passive House concept in hospitals prior to the new construction.



The pressure test inside the Passive House hospital in Frankfurt, Germany: more than 2000 rooms on eight storeys had to be inspected in advance, including making sure that more than 1000 windows were shut. © Passive House Institute

## Excellent preparation

Kah also praised the companies involved in the construction and the company contracted to carry out the pressure test for their work preparing the building for the test. After all, over 1000 windows had to be closed for the airtightness test, and the dampers of more than 50 units connected to the ventilation and air conditioning system had to be checked. Other technical systems also had to be tested, including numerous elevators whose motorised dampers have to open towards the outside in case of fire. "The prior inspection of the more than 2000 rooms alone was a huge task. However, because everything was well-prepared, the test for the entire new build could be completed in a single day", says Kah.

## Monitoring is planned

The Passive House Institute has been accompanying the new construction of the Klinikum Frankfurt Höchst since the initial planning phase and has been tasked with the certification of the building. Furthermore, monitoring has been requested. In this way, the energy-relevant target values calculated in the context of scientific monitoring for Passive House hospitals will be tested in practice. As a result, recommendations for the planning and operation of further Passive House hospitals can be derived from the monitoring data.

## Completion in 2021

The new hospital building in Frankfurt-Höchst, with 664 beds, ten operating theatres and a hybrid operating room is to be completed in 2021. The costs for the replacement building are estimated at around 263 million euros. The Federal State of Hesse is investing around 55 million in the energy efficient new build, while the city of Frankfurt is contributing around 208 million euros. Two existing buildings dating back to the 1960s will be demolished after the Passive House hospital is put into operation. Two further construction projects are planned on the hospital premises after that.

# **24<sup>TH</sup> INTERNATIONAL PASSIVE HOUSE CONFERENCE 2020**

## **24<sup>th</sup> International Passive House Conference**

Further impressive Passive House projects will be presented during the 24<sup>th</sup> International Passive House Conference. The conference will be offered as an online event and begins on 20 September 2020. During the opening plenary, the renowned climate scientist Professor Stefan Rahmstorf will give a speech. Over the subsequent three weeks, expert talks will be held online each Wednesday and Thursday until the closure on 8 October 2020. In the 16 different lecture series presentations on Passive House new builds and refurbishments from all over the world will be presented. Additionally, virtual excursions highlighting inspiring Passive House projects, the specialist exhibition and networking opportunities will be available. The latest information on the 24<sup>th</sup> International Passive House Conference can be found at <https://passivehouseconference.org/en/>

## **Klinikum Frankfurt Höchst**

The Klinikum Frankfurt Höchst is a hospital and care provider in the largest communal network of medical centres in the region, the Kliniken Frankfurt Main-Taunus GmbH. At the Frankfurt-Höchst location alone, over 36,000 in-patients and 80,000 out-patients receive treatment each year in the 22 clinics, institutes and specialist departments. The Klinikum is also considered the largest pediatric centre in the region. More than 2000 employees work at the Klinikum Frankfurt-Höchst. Professional training for nursing professions, as well as for non-physician healthcare professions are provided in its five different schools.

## **Pressure test**

The pressure test makes it possible to measure the level of airtightness of a building. It is used to detect leaks in the building envelope so they can be eliminated. A non-airtight building requires more heating energy than an airtight building on account of the uncontrolled air exchange. Airtight building envelopes also help to prevent structural damage.

During a pressure test, air is forced into or sucked out of the building using a fan that is installed in a building opening (such as a door). A measuring device compares the difference in the pressure on the inside and the outside. The rotational speed of the fan is adjusted until a difference of 50 Pascal between the inside and the outside is reached. The volumetric flow that is then measured represents the  $n_{50}$  value of the building in relation to the building volume. This value indicates how often the air volume of the rested building is exchanged in an hour at a differential pressure of 50 Pascal.

## 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 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) 28 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-Kranichstein.  
© 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 Prof Wolfgang Feist holds a leading position internationally with regard to research and development in the field of energy efficient construction. Among other things, Prof Wolfgang Feist was awarded the DBU Environmental Prize in 2001 for developing the Passive House concept.



Prof Wolfgang Feist.  
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### International Passive House Conference

The 24<sup>th</sup> International Passive House Conference will take place from 20 September till 8 October 2020 in the form of an online event. [www.passivhaustagung.org/en/](http://www.passivhaustagung.org/en/).

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