

ALL GOOD THINGS come in sevens

Residential and commercial building in Munich was redeveloped to EnerPHit standard - In total, seven air tightness tests were performed

The building is located at 7 Baaderstraße, Munich. Before the renovation the building consisted of seventeen apartments and four commercial units. The layout, size and amenities no longer met the current requirements, with some of the apartments having shared bathroom facilities. So a complete overhaul was required. Despite today's stringent regulations in relation to static and fire protection it was possible to retain most of the timber beam ceilings and old brick walls. In some cases it was necessary to replicate old building elements.

The new Passive House elements such as the Timber Alu clad windows and the comfort ventilation system blend perfectly together with the old building elements. All new components of the building envelope and all building services installed were Passive House compliant. Despite the existing construction of neighboring buildings and existing basement, the EnerPHit standard was still achieved with an overall heating demand of 24 kWh / (m² a). The complex now consists of 13 residential units, six office units and a retail zone. Despite the increased energy consumption for the non-residential zones the Passive House criteria for primary energy is still achieved with <120 kWh / (m² a) for the whole complex.

There are also plans in place to construct a four to seven story block building on the plot at Baaderstrasse 7. The three renovated and extended buildings on the property are northwest-southeast orientated. The buildings were originally constructed in 1890 and have been added to time and time again, sometimes with no regard to the historical architecture. The original character of the building has been altered so much that they are now not listed, nor is there any worth in protecting facade elements.



Photos: Herz & Lang

The Baaderstrasse project in Munich before and after extensive renovation to EnerPHit standard.

Pilot EnerPHit Project

The energy renovation concept is based on Passive House principles with a highly insulated and airtight building envelope. This in combination with the building services serves to reduce the final energy demand and utilize the passive heat gain to a maximum. >>



Photo: Herz & Lang

During the planning phase of the project a pilot project from the Passive House Institute was launched: EnerPHit, energy efficient renovation with Passive House components. The Baaderstraße project was taken up as a pilot project with precertification in 2011 and final certification in 2013. By going through the certification process there was a higher demand for accuracy in both planning and construction management. By using the four eye principle it was assured that the calculated energy values matched the real life values. One such example of the necessary control measures that was carried out is the air tightness test. There were ten such tests carried out to meet the ambitious air tightness target.

The Building Services

To reduce the ventilation heat losses four semi-central ventilation systems were provided. All of the systems have been certified in their heat recovery rate and minimized power consumption by the Passive House Institute. Through the building envelope and the ventilation systems the final energy demand for heating and hot water is reduced. This demand is further reduced through support from a solar unit. The remaining heat demand is covered by a pellet heating system. The heat distribution takes place mainly through radiators and a certain amount of surface heating. To reduce distribution losses, distribution systems were perfectly insulated. Where cable channels and distribution losses were too high, decentralized hot water generators have been used in a few taps in the non-residential area. For the building to be operated efficiently the users/residents have been provided with user manuals with tips on energy saving and household appliances.

INFO BOX EnerPHit



Achieving the Passive House Standard in refurbishments of existing buildings is not always a realistic goal, one of the reasons being that basement walls remain as barely avoidable thermal bridges even after refurbishment. For such buildings, the Passive House Institute has developed EnerPHit for certified energy retrofits with Passive House Components. This requires either a maximum heating demand of 25 kWh/(m²a) or alternatively the consistent use of Passive House components in accordance with the requirements for PHI certification of components. The heating demand calculated by the PHPP, and the quality of thermal protection of the individual components are indicated in the certificate. Detailed information about this topic can be found here: "EnerPHit Planners Handbook" (in German) or at www.passiv.de

Location: Munich, Bavaria

Usage: apartments, offices, commercial

Construction: Exterior walls: Full-brick, 26cm thermal insulation, $U = 0.11 \text{ W/m}^2\text{K}$; Roofs: wood, 38-40 cm insulation, $U = 0.09$ to $0.12 \text{ W/m}^2\text{K}$; Baseplate: 16 cm polyurethane insulation, $U = 0.16 \text{ W/m}^2\text{K}$; Exterior basement walls 20 cm Insulation, $U = 0.17 \text{ W/m}^2\text{K}$; Wood-aluminum windows, U_w (installed) = $0.76 \text{ W/m}^2\text{K}$

Building Services: pellet boiler, solar panels, Buffer, radiators, four central comfort ventilation systems with heat recovery

Construction period: 2009-2012

Energy reference area: 2,370 m² (PHPP)

Heat demand: 24 kWh/(m²a) (PHPP)

Primary energy requirement: 117 kWh/(m²a) (PHPP)

Air tightness: $n_{50} = 0.86 \text{ 1/h}$ average

Architect, construction management: Peter Fink Architekten GmbH, Munich

Passive House Planning: Herz & Lang GmbH, Weitnau, building physics, Passive House consulting, quality assurance, air tightness testing

Structural design: Brandl + Eltschig Consulting Engineers Structural Engineering GmbH