



CertCraft ISO & ECVET - Future Certification of Crafts(wo)men for Lowest Energy Buildings following the Energy Efficiency Directive 2012/27/EU based on ISO 17024:2012 and ECVET

PHCC^{plus}

Niedrigstenergiegebäude-Handwerkerkurs
Neubau + Sanierung

www.certcraft.eu



TRAINING BROCHURE

Foreword

As part of the project CertCraft ISO & ECVET, a new concept of training, namely the PHCC - PassiveHouseCraftsmenCourse, previously developed as part of another project, has been revised and developed, in cooperation with project partners from Romania, Austria, Switzerland and Hungary, into a renovation module meant for craftsmen specialized in low energy, passive, respectively plus energy houses. During the revision, great emphasis was laid upon presentation oriented to learning results as well as upon the introduction of diverse teaching and learning methods.

First of all, a comprehensive textbook for craftsmen has been provided as the result of the transcription of literature previously meant only for passive house designers into craftsmen's language. This textbook, as core element, can be used both for continuing specialized training as well as initial training at higher technical educational establishments.

As the result of a cooperation between Minergie association and Campus Bildungszentrum Bau, the largest education centre for construction trades in Switzerland, the national characteristics and Swiss standards have been taken into account, supplemented by the documentation of built projects, in an own publication in Switzerland, namely the "Minergie" textbook.

On the other hand, a new training concept has been developed, structured into modules and adapted to the special needs of the performed trades, a concept that includes, besides classroom courses, the practice of course participants in on site trainings in workshops, on practice models and in model buildings, as well as the deepening of the acquired information through an e-learning module.

Additionally, it will be made possible the personnel certification based on ISO 17024 as well as the introduction of ECVET- „European Credit System for Vocational Education and Training“, thus laying the foundation for international credibility and for the importance of the course.

This brochure presents to you the contents and learning objectives of the course structured into modules. You find current course schedules at www.certcraft.eu.

Graz and Salzburg in July 2015

Herwig Hengsberger

Ronald Setznagel

Module 1 Planning Fundamentals

What to expect in module 1

In the meantime, the term „passive house“ became a popular one but whose meaning and technical bases are many times only superficially known. During planning, and especially during the execution, the result of each and every step to a passive or low energy house is an interplay between theory and practice: from clear and technically sound planning to details, and from the implementation of this plan, with a high demand on accuracy, to the carrying out. Therefore, it is important for the craftsmen who carry out the work as well to know about the fundamentals in order to achieve precision on the building site, precision that is essential for a passive or low energy house. Craftsmen are also challenged to ask for explanation in case of unclear statements in planning, in order to avoid possible execution errors.

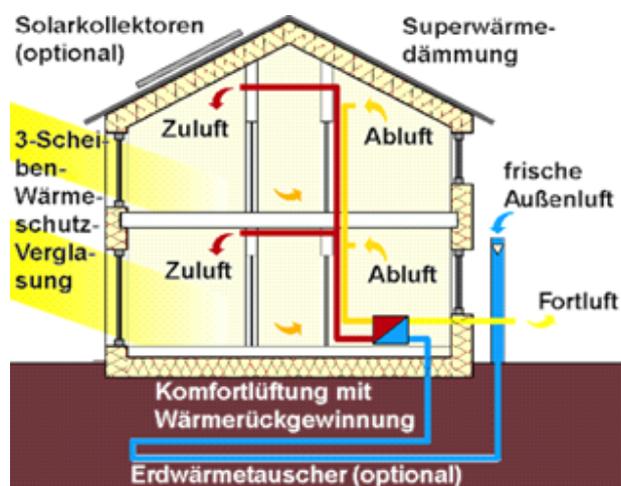


Illustration: Systematic presentation of essential components of a passive house (Source: PHI, Dr. Feist, Passivhaus Projektierungs Paket, Fachinformation PHI-2007/1)



Illustration 2: View of the gable walls of an energy-efficient house in Iceland; Back with sheathing with turf; Groundplan and front view (Source:www.skagdafjordur.is, 25.08.2012)

Learning objectives

At the end of the module, you should know, have understood and be able to apply:

which are the physical requirements of a building by realization in the details area.

that high demands are set on the realisation of an object based on the requirements of an energy performance certificate, respectively a calculation according to PHPP.

which are the essential features of thermal insulation and heat storage of building materials.

how can thermal bridges be avoided during the carrying out through the implementation of planned details.

what is needed for a tested, airtight building envelope.

what kind of requirements are established for windows of a passive or a low energy house.

how the required criteria of building materials can be checked on the building site.

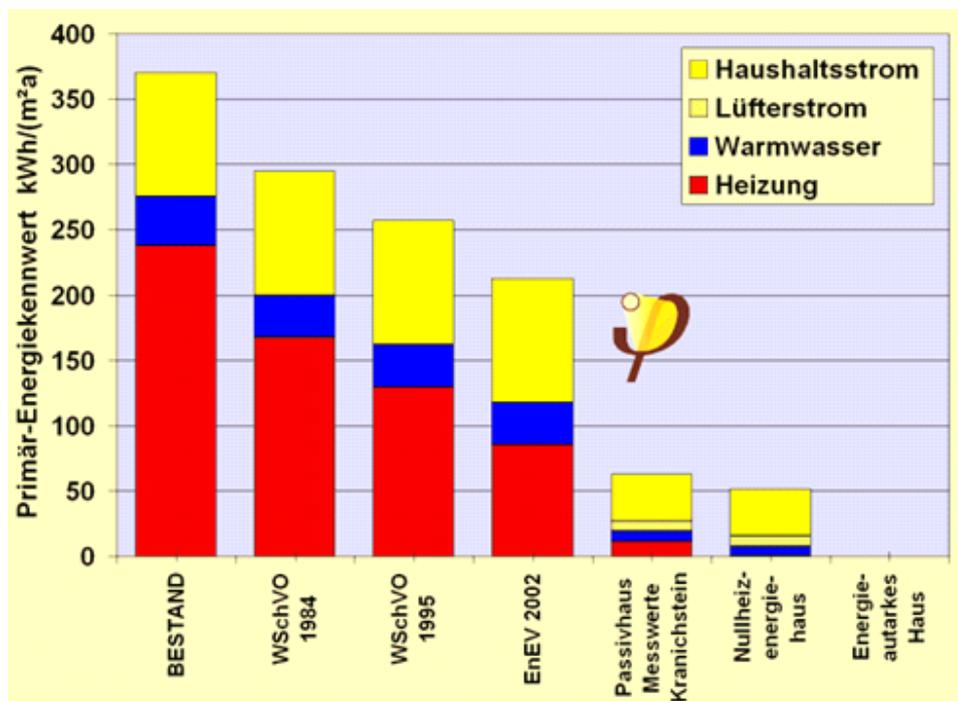


Illustration 3 : Presentation of primary energy parameters in relation to energy standards (Source: PHI, Dr. Feist, Passivhaus Projektierungs Paket, Fachinformation PHI-2007/1)

Module 2 Ecology and materials

What to expect in module 2

In order to evaluate a product from an ecological point of view, it, so to say, has to be taken apart into its components and observed:

- where the raw materials come from,
- what the product will be used for,
- how far the product was transported from, and
- how it can be disposed of.

So their entire life cycle must be observed.

There are several terms for that: life-cycle-thinking or „cradle to grave“, so to say, the observation of product from its "birth" until its "death". Sometimes it is also said: „cradle to cradle“ and this term includes the "rebirth", that is the recycling of a product.

This concept of life-cycle-thinking is used in different ecological assessments:

- Ecological footprint
- Ecological rucksack
- Ecological balance
- Ecological assessment of buildings



Illustration 4 and 5: Passive house S-HOUSE, (Source: <http://www.e-genius.at/bilderpool>, 9.07.2015, GRAT)



Learning objectives

To understand and to be able to explain the term "ecological balance"

To know and to evaluate the ecological criteria of the eco-index 3

To know the ecological characteristics and the use of wood and wood materials

To know the ecological characteristics and the use of straw and clay

To know the ecological characteristics and the use of mineral building materials

To know and to evaluate the use and the characteristics of insulation materials of plant, animal and mineral origin

To know and to evaluate the use and the characteristics of synthetic insulation material

To know and to evaluate the general criteria for environmentally conscious and sustainable building

Module 3 Implementation 1 – selected construction details

What to expect in module 3



Based on the technical knowledge of the course participants and on the contents of Part 1, Basic principles of planning, this part will deal with the deepening and broadening of knowledge with the help of the chosen examples. The executions are limited to the particularly delicate building components and their junctions like floor - wall, wall - ceiling and wall - windows. It will be dealt with the physical relationship of buildings and these, together with other indications important for execution, will be summarized into a list of rules.

Learning objectives

To broaden and to deepen the participants' knowledge in their own field as well as in related fields.

To acquire the ability to classify, to interpret and to use relevant requirements for passive or low energy houses in own field.

Module 4 Implementation 2 – Built examples

What to expect in module 4



Based on the technical knowledge of the course participants and on those elaborated up to this moment, this part will deal with the deepening and broadening of knowledge with the help of executed examples. The executions include all components relevant to a passive house, including home technology, and try to present the projects as complete as possible and to deal with particularities specific to the project.



Abb. 1-3a; b; c; d; e; f; g; h: Sauberkeitsschicht mit Randabschalung; Winkelblech; Zweilagige Dämmung; Schachtfutter beim Kanalaufstand; Bewehrungseinbau; Fu-Platte betoniert; Vertikale Sockelabdichtung; Perimeterdämmung bei Sockel

Illustration 5 and 6 : Passive house Kneissl, (Source: Herbert Kneissl)

Learning objectives

Continuous broadening and deepening of the participants' knowledge in their own field as well as in related fields

The use of own knowledge and of those acquired until this moment in the examples

Understanding the details used in the examples and possible difficulties

Ability to assess the applied solutions comparatively

Understanding of the importance of connections



Illustration 7 a; b; c; d; e and f: Leveling mortar for first brickwall; Setting up the first brick wall; Thin bed mortar in truck mixer; Tool for applying mortar and the laying of bricks; Wall anchors for integrating the interior walls into the exterior ones (Source: DI Thomas Eder, Bmstr. Herbert Kasbauer)

Module 5 - Building technology

What to expect in module 5

Based on the previous chapters, this module will deal with the building technology of a passive or low energy house. The particularly high standard of quality established for the building envelope of a passive or low energy house must be adopted also in the field of building technology.

As for introduction, general requirements for building technology will be described. Based on this general presentation, the peculiarities of a passive, respectively a low energy house will be dealt with. Then, heat generators, heat dissipation systems and hot water production will be described in separate paragraphs. After that, areas of residential ventilation will be discussed. Finally, sanitary and electrical installations will be dealt with.

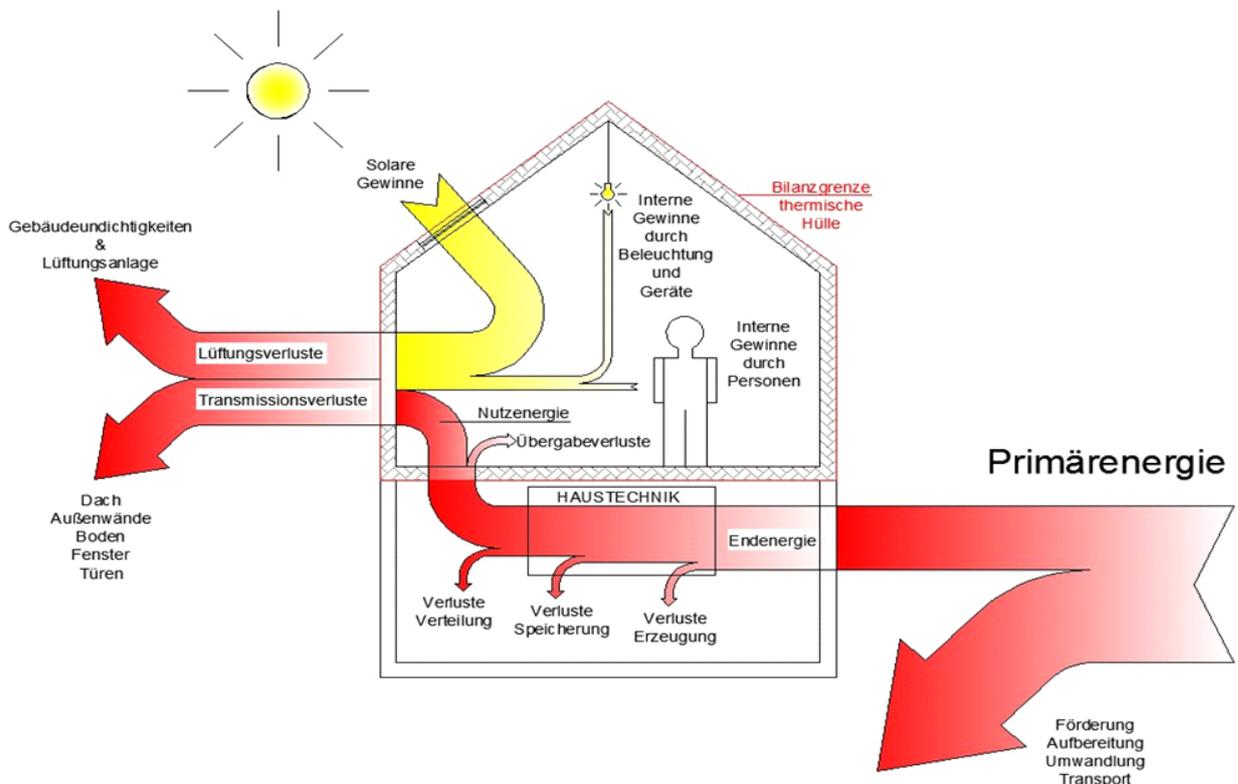


Illustration 8: Schematic presentation of the primary energy demand of a building (Source: Siegfried Stark)

Learning objectives

To acquire knowledge about general requirements in building technology

To know the most important parameters for coziness and comfort as well as their range

To be able to recognize and evaluate the most important heat generation systems

To understand the operation of heat pumps

To obtain basic knowledge about solar systems for heat recovery

- To know the functioning and basic conditions of biomass heating**
- To be able to recognize and evaluate the most important systems for heat input**
- To understand the difference between different heating media**
- To obtain basic knowledge about auxiliary heating with air**
- To be able to estimate the scale of demand for hot water correctly**
- To know the advantages and disadvantages of central and decentralized hot water production**
- To know the functioning and basic conditions of the use of heaters**
- To know and to explain the importance of a ventilation system with regard to hygiene and energy efficiency**
- To know the basic principles for the proper planning and execution of ventilation systems**
- To know the most important components of ventilation systems**
- To know the importance of connections in relation to ventilation**
- To know the basic rules regarding the functioning and cleaning of ventilation systems**
- To know the possibilities for minimizing hot water distribution losses**
- To be able to estimate the impact of sanitary installations upon the airtightness of the building envelope**
- To be able to estimate the impact of electric installations upon the airtightness of the building envelope**
- To know and to apply measures correctly in order to avoid air leaks and thermal bridges caused by e-installations**

Module 6 Renovation

What to expect in module 6

This module provides a general introduction to the subject "thermal and energetic renovation of buildings". It will also be explained what a comprehensive thermal renovation actually means, when it can be performed, what kind of advantages it offers and how much energy can be saved through separate and combined measures of renovation.

The building condition assessment and evaluation of an old building is an important step before the planning of a renovation. During the building condition assessment, existing documents of the building are gathered, the situation of the construction is recorded and documented (inspection, analysis of masonry, ceilings, windows, home technology, etc., analysis of damages and building physics calculations). Based on the analysis, it can finally be assessed what kind of renovation measures are needed and possible.

The highly efficient renovation of old buildings leads to lower energy consumption and higher comfort. Therefore, it is necessary to elaborate a comprehensive planning of the measures with the help of an integrative planning team consisting of different experts. This module explains each and every renovation measure in details: the building envelope (walls, ceiling, top floor ceiling, basement ceiling/floor, windows and doors) will be insulated as efficiently as possible and executed as airtightly as possible, and thermal bridges will be avoided. In order to do that, high quality technologies are to be used for architectural technology (ventilation, heating, cooling, hot water production and electricity). The planning can be followed, and finally the quality of renovation will be evaluated, by an energy calculation as well as different assessment systems.



Illustration 9: Detailed presentation of building components before/ after renovation, residential building Makartstraße, Linz (Source: First multifamily passive house from an old building. Domenig-Meisinger/Willensdorfer 2007 Berichte aus Energie- und Umweltforschung 21/2007)

During the renovation at passive house standards, a facade insulation system has been developed in the multifamily residential building in Linz, which facade has been placed in front of the existing facade. In addition, solutions have been found in order to eliminate thermal bridges resulted from building (balcony, overhanging ceiling elements, etc.)

Learning objectives

To list the advantages of thermal and energetic renovation from public and private point of view

To describe the different measures of thermal and energetic renovation

To argue for and against a renovation at passive house standards

To comment on separate assessment systems for thermal and energetic renovation of old buildings

To evaluate example renovations with regard to renovation concepts

To name the most important steps in analysing the situation of a building

To describe the procedure of an analysis of the state of a building

To explain why an analysis of the state of a building is an important condition for a comprehensive renovation

To evaluate the state of a building with the help of a checklist and to assess each and every aspect

To evaluate the analysis of the state of a building with regard to significance and completeness

To name the basic principles of a highly efficient renovation

To explain measures of architectural technology for ventilation, heating and hot water production.

To choose proper insulation measures for different building components

To recognize possible thermal bridges and to make suggestions for their solution

To draft the planning steps for a comprehensive renovation of a building

To evaluate renovation measures

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This project has been funded with support from the European Commission.
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A - 5020 Salzburg
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