

THE CARITAS-HOUSE IN MOENCHENGLADBACH-NEUWERK THE FIRST ELDERLY CARE CENTER IN EUROPE BUILT IN PASSIVE HOUSE STANDARD

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SUMMARY

The new Caritas – elderly care centre in Moenchengladbach-Neuwerk combines a modern group-living concept with advanced environmental technology. Not only does the passive house require extremely little active heating energy, it also provides a much higher than average quality of room air and thus more improved quality of living.

The “Caritas House Neuwerk” is especially intended to provide the demented sick with living accommodation appropriate to their illness and dignity. After all, the desire was to have a house identified by key concepts such as: security, esteem, self-determination, freedom, closeness and a homely atmosphere.

Finally a house was built, which guarantees highest quality of living to the residents and therefore annual heating costs about 760.-- €.



Picture 1: Main entrance



Picture 2: Gable

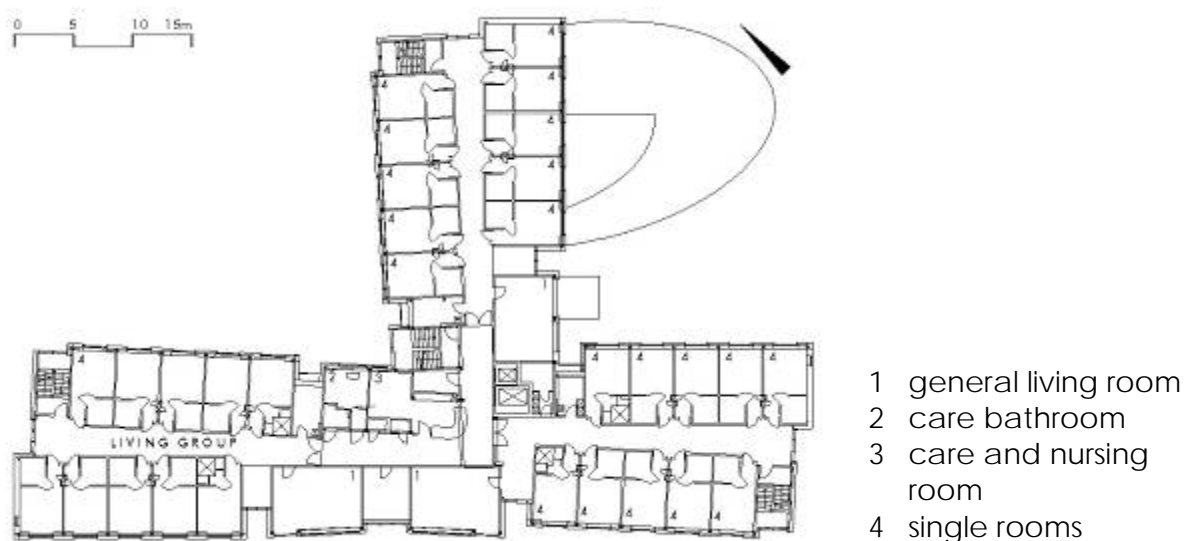
THE DRAFT OF THE CARITAS-HOUSE NEUWERK

Living structure and nursing conception

The new elderly care centre can accommodate a total of 80 residents and is divided in 8 apartments each with 10 residents. This living structure allows each group of 10

residents to establish a family-type way of life. All fundamental activities of a structural daily nature are carried out within the protected bounds of this stable family-group. In each case there is one direct care and nursing area for two groups, in some cases for three, which includes a care room, a duty room, a care bathroom and other complementary rooms.

Due to the high standard of sanitary facilities and equipment - all rooms are single rooms with their own shower - it can be assumed that the ward bathroom with its lift-assisted bath tub will be little frequented during normal daily routine. Its main function is - in accordance with the care concept - to be used as a pleasant care and bathing experience. The offer of such opportunities leads to a clear gain in the quality of life - especially for the increasing number of geronto-psychiatric people. It is ensured that basic care and treatment has priority over individual showers and baths.



Picture 3: Standard floor

The manageable size of the groups assists the therapeutic concept. The positioning of the entrances to each of the group apartments in the general living room / rest room area is also intended to "bring this zone to life". Due to the restricted number of residents in each group, the frequency of contacts and movement remains take manageable and family-like for the demented sick residents.

The realised plan provides for an administrative area of the house on the ground floor. A room for worship and meditation provides the opportunity for mutual prayer as well as communication. It is also a room in which to withdraw and be alone with oneself. The dining room, which is in the immediate neighbourhood of the main entrance and the meditation room, opens up towards the entrance to the building and to the Engelbecker Straße - which means there is lot to see and watch.

Before proceeding with all of the single rooms, one room was completed so as to provide an "example of a typical room". This provided room for the constructor and the architect to design or change items before things had been created which could only have been changed at high expense.

The single rooms have been built in such a way that two single rooms can be adapted to a double room (married couples). The double room can easily be converted back into single rooms with no rebuilding necessary. Therefore, should one

of the partners die, the resident remaining alone can remain in the old familiar group and does not need to move into another new group.

CONSTRUCTION AND DESIGN

The supporting construction of the Caritas House Neuwerk is a partly-cellared, reinforced concrete, skeleton construction.

The exterior walls are mainly of prefabricated sandwiched panel elements made of wooden materials and, on the ground floor and on the gable walls, they have a front-shell of bricks.

Although built in the passive house standard, the overall building is highly structured which makes it easy to comprehend and understand. It is not an anonymous accommodation machine. The partly protruding lean-to roofs impart the building with a certain lightness of appearance which, up until now, passive houses often lacked.

THE DECISION TO BUILD THIS HOUSE IN PASSIVE HOUSE STANDARD

Both, the constructor and the architect didn't simply want the latest knowledge and experience in care and nursing to be considered in the concept for the new elderly care centre. Up to date technical progress should also play its part in the implementation of the building concept.

A problem which occurs regularly in old people's homes and which had not yet been solved was repeatedly brought to our attention the smell of urine which is typical for such establishments. That is why we came up with the idea of proposing a version with "controlled permanent ventilation". From there on, the distance to the "passive house" was not very far. The "controlled permanent ventilation" reduces the problem of "urine smell" considerably and will perhaps even dispose of it entirely. The permanent and comfortable quality of room air is ensured additionally because whenever humidity gets too high the excess moisture is withdrawn.

According to our calculations, because of their compactness and because they are continuously occupied elderly care homes are particularly suitable for the passive house. The Caritas House Neuwerk achieves a calculated annual energy consumption for room heating of just 4.1 kWh/m², not least because of the 80 residents. This is equivalent to 1800 litres of heating oil for a house with 80 residents, a dining hall, a meditation room, an administration area and other infrastructure. The utilized space in the building requiring heating is 4000 m².

For the client, and especially for the residents too who in the end have to bear the costs, the very low heating costs are not the only decisive argument to build such an establishment in the passive house standard.

The particularly high level of living quality weighs much more in favour of such a decision. Especially for elderly people, who wish to take part from "inside" on life "outside" and are therefore often found close to the window, it is of great benefit to no longer have draughts being caused (thermal).

The permanently high quality of air, containing an extremely low concentration of carbon-dioxide (CO₂) is also beneficial to the residents.

It is hardly possible for disturbed and confused elderly people, who have difficulty with their own orientation, to get used to "airing properly"; quite apart from that, it is a well known problem within younger generations as well which is proven by statistical

information on preventable and therefore unnecessary waste of energy and damage to buildings (moulds).

AIR CONDITION / REST HEATING

The airtight ($n_{50} < 0,4 \text{ h}^{-1}$) passive house shell enables to reduce the heating power of under 60 kW. One small sized wall-fixed boiler (50 x 80 x 30 cm) for the heating and two additional for worm water are necessary. Radiators in the apartments are not necessary. Radiators under the windows are not necessary because of the high insulated windows. The glazing from floor to ceiling leads to gain of extra space. Minimum sized air heaters (80 mm) which are placed into the hung down ceilings, ensure the individual controlling of the air condition. The permanent float of fresh air guarantees a remove of smelling in the bathroom.



Picture 4: Minimum sized air heaters (80 mm)

Earth-Heat-Exchanger EHE



Picture 5: EHE in balance

Horizontally placed EHE **without drain-system** heats the air in winter and cools it in summer. Because of the exact horizontal position of the tube a large surface vaporisation is possible. Multi-level filter systems beware of dust, pollen and bacteria.

Decentralised air-flow systems simplify fire-protection

One big air-condition system is replaced by 24 small systems. The air floats through outside fixed tubes directly to the 24 small systems which are placed into the separate fire-protection-zones.

Low levels

The diameters of 315 mm from the incoming tubes are spreaded into two small tubes to the equipment. Directly after the equipment the tubes are spreaded into 80 mm tubes so that the needed space of the hung down ceiling is max. 150 mm. Because of that we have managed a standard level high of 2.75 m, **so three levels could be build instead of two (building law).**

Quality protection

- Definition of maximum and minimum room temperatures for preventing higher intern loss of energy between the rooms and outside.
- Definition of maximum leakage – value of each inhabitant room of maximum
- 1.0 h^{-1} by n_{50} – pressure.
- Calculation of needed ex- and infiltration for each room (air-heaters) and for the whole building in context of the local wind-pressure (weather).
- A tolerance of the constant-flow fans of max. 10 % is included in the calculation. This tolerance is guaranteed by the producer.
- Possibility of cleaning the air ducts net as well as the equipment is being planned.
- Optimising filters for minimising cost of services.

Photovoltaic

The 25 kW_{peak} photovoltaics – system has to be financed totally through a sponsorship of soft loan, subsidy and high prizes for selling the energy, supported by the government of Germany.

The investment

Investment costs for the heating and ventilation systems are about 100 Euro/m² net.

Economics / Profitability

As we applied for the building approval in autumn 2000 - long before the last Energy Saving Regulations were in effect - the building project could just as well have been carried out according to regulation WSchVO 1995. Accordingly, the annual heating energy requirement should not have exceeded 100 kWh/m².

The Caritas House Neuwerk has an annual energy consumption for room heating of approx. 16,400 kWh (based on 4.1 kWh/m² x a) and therefore annual heating costs of approx. 760.—Euro.

The building investment costs for the passive house (additional expenditure when compared to the WSchVO 1995 standard, based on 100 kWh/m²xa, which was regulation in German up to 01/02/2002) can be described quality wise as follows:

Since 01/02/2002 NEH-Standard, based on 75 kWh/ m²xa, is regulation in Germany.

ADDITIONAL EXPENSE – SHELL

Complete Exterior Elements

approx. 5100 m² x 7.70 Euro/m² (on average) approx. 39,300.—Euro

Windows

approx. 900 m² x 112.50 Euro/m² (on average) approx. 101,300.—Euro

Additional Expense – Ventilation System

approx. 200,000.-- Euro

(excluding kitchen / dining room)

Decrease in Expense – Heating System

./ approx. 100,000.-- Euro

Additional Investment

approx. 240,600.-- Euro

The additional investment of 240,600.-- Euro for the Caritas House Neuwerk emanating from the passive house is set off against an annual saving on heating costs of 14,087.--Euro. Between 1998 and 2002, the price of oil has doubled! And, energy prices will continue to rise!

Over and above that, under certain conditions living accommodation in North Rhine - Westphalia is promoted by the county and in principle it is possible to obtain financial support for the additional costs incurred with the passive house standard.

The decision makers, therefore, obviously recognised long ago that realised projects and proven success create much more initiation and follow through effects than any scientifically founded papers and research reports. The Caritas House Neuwerk was granted a non-repayable subsidy of 182,000.-- Euro for building in the passive house standard (shell / ventilation).

When the subsidy granted is considered, then the investment costs for the Caritas House Neuwerk carried out in the passive house standard are only slightly higher than for the WSchVO 1995 and much lower than a building carried out according to the NEH standard which is absolutely compulsory in Germany today.

Comparison of WSchVO 1995 Standard with Passive House Standard

Additional investment for the passive house standard

not covered by subsidy approx. 59,000.—Euro

Cost of Capital for financing the total additional investment

5.5 % interest, 1.0 % repayment approx. 3,835.-- Euro

This has to be set against savings on heating costs approx. 14,087.-- Euro

As a result this means:

Had the investment in the passive house standard been completely financed through the usual finance institutions (banks, etc.) there would have been a saving in operating costs of 10,252.-- Euro/a when compared to a building carried out to WSchVO 1995 standards which would have been possible in this case.

Especially in respect of NEH Standard, the following is valid:

The most economical solution for the Caritas House Neuwerk was the Passive House Standard selected!

In addition to economic points, taking a look at ecological effects and the aspects of living hygiene and the much higher quality of living, then there are synergetic effects of the passive house standard which should not be underestimated.