Low energy buildings - Case Study: # ISOPA Polyurethanes Passive House

Category / year	New construction: nearly zero energy building or better - Small residential (1-2 family houses) / 2013
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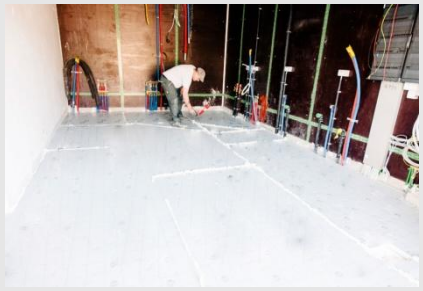
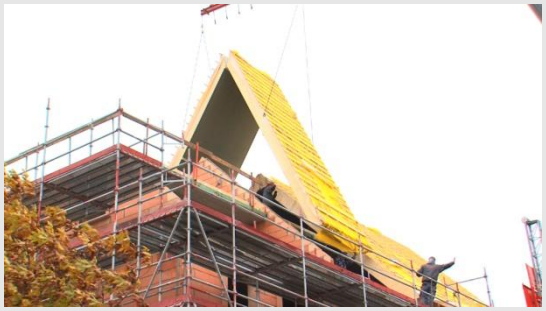
Contact details	**Constructor:** Bostoen NV Koninginnelaan 2-3, 9031 Drongen, Belgium **For further questions:** Jörg Palmersheim (ISOPA) Av. E. Van Nieuwenhuyse 6, 1160 Brussels (Belgium) joerg.palmersheim@isopa.org
Pictures	     

Description of the building

Detailed description:
The Polyurethanes Passive House project was undertaken by ISOPA with the help of Bostoen to demonstrate the advantages of PU insulation in very low energy buildings.

Total living surface: 235 m² (four floors).

Building envelope:

- *Ground floor:* two layers of PU insulation boards. In total, 180 mm on top of 70 mm chape to cover pipes on concrete slab (U-value: 0.124 W/(m²·K)).
- *First and upper floors:* on the first and second floors, PU spray foam (lambda 0.027 W/m·K) was applied between the concrete slab and floor finishing. As for the third floor, a special mortar made of 90 % recycled polyurethane granulates (lambda 0.046 W/m·K) was applied.
- *External walls:* in total, the brick walls are 450 mm thick with 180 mm thick PU boards in the cavity (U-value: 0.118 W/(m²·K)).
- *Partition walls:* to guarantee optimal acoustic separation between the PU Passive House tenants and their neighbours, the 40 mm cavity between the two houses was filled with open cell PU boards.
- *Pitched roof:* the wooden roof was prefabricated and includes PU boards of a total thickness of 400 mm (U-value: 0.073 W/(m²·K)).
- *Flat roof:* on the balcony above the room on the first floor, an insulation layer of 240 mm of PU boards (lambda 0.023 W/m·K; U-value of 0.093 W/(m²·K)) was installed on top of the slab.
- *Windows:* triple glazing (Ug-value: 0.5 W/(m²·K); g-value 50 %) and highly insulating PVC frame with PU core.

Energy efficient technologies:

- Ventilation system with heat recovery
- Modular bus-system for controlling building equipment

Renewables:

- Ground source heat pump feeding a floor climatisation system for heating/geothermal free cooling, and domestic hot water
- Photovoltaic panels: 15 panels of 250 Wp each, good for an estimated energy production of 3 187.5 kWh/year
- Thermal panels: 2 panels for the production of hot water

Energy consumption

Energy values:

- *Energy demand for heating/cooling and domestic hot water:* fully covered by renewables (zero energy building)
- *Airtightness:* below 0.6 at 50 Pa

Use of renewables:

- The combination of a ground source heat pump, the thermal and the photovoltaic solar panels makes this building a zero energy building according to Passive House standards.
  All energy needs for heating and hot water (and more) are produced on site.

Awards won

- Passive House Certification (pending)

Links

Websites illustrating the building

- http://www.polyurethanes.org/passivehouse/

Promotional material online:

- http://www.polyurethanes.org/passivehouse/media-room/news