Row Kroeven in Roosendaal NL

PROJECT SUMMARY
First large-scale Passive House renovation project in Holland. Innovative building technology and process.

SPECIAL FEATURES
Tenants occupying houses during renovation.

ARCHITECT
Franke Architekten
www.frankearchitekten.nl

OWNER
Housing Corporation Aramis
AlleeWonen, www.alleewonen.nl

IEA – SHC Task 37
Advanced Housing Renovation with Solar & Conservation
BACKGROUND

De Kroeven district is a typical Dutch social housing project in the city of Roosendaal, built in 1967. Because of rising energy prices the goal was to keep social housing affordable by reducing energy costs. Earlier renovations in the district were done by Aramis AlleeWonen to improve insulation, but never this radical. Three test houses with Passive House quality have already now been renovated. Lessons learned from these 3 houses should ensure a smooth ride for all those involved when in April 2010 the renovation of the other 246 houses will start.

SUMMARY OF THE RENOVATION

• Insulation underneath the ground floor.

• Single pane glazing replaced by triple pane glazing in Passive House quality frames.

• Complete new roof installed in four sections.

• Walls insulated with 200 mm XPS.

• New ventilation system with heat recovery.

• Optional solar system (2.73 m² collectors + 110 litre storage tank).
CONSTRUCTION

Roof construction  
U-value: 0.111 W/(m²·K)  
( top to bottom )  
Roof tiles 65 mm  
Battening 60 mm  
Roof underlay 15 mm  
Cellulose insulation 360 mm  
OSB plate 15 mm  
Total 485 mm

Wall construction  
U-value: 0.116 W/(m²·K)  
(interior to exterior)  
Sand-lime stone 100 mm  
Insulation Rockwool 70 mm  
Masonry 100 mm  
XPS insulation 120 mm  
XPS insulation 80 mm  
Plasterwork 4 mm  
Total 474 mm

Ground floor  
U-value: 0.249 W/(m²·K)  
(top down)  
Top floor 30 mm  
Reinforced concrete (existing) 200 mm  
Foam underfloor 100 mm  
Total 330 mm
Summary of U-values W/(m²·K)

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
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<tbody>
<tr>
<td>Roof</td>
<td>0.42</td>
<td>0.111</td>
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<tr>
<td>Walls</td>
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<td>0.116</td>
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<tr>
<td>Ground Floor</td>
<td>1.754</td>
<td>0.249</td>
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<tr>
<td>Windows</td>
<td>3.6</td>
<td>0.6</td>
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</table>

**ENERGY PERFORMANCE**

Space + water heating (primary energy)
Before: 219 kWh/m²
After: 21 kWh/m²
Reduction: 90 %

**BUILDING SERVICES**

Before the renovation a typical family in the district uses 1835 m³ of gas per year. After the renovation the average annual consumption will be reduced to 509 m³, a reduction of 1326 m³ per house per year. The total annual reduction for the complete project is 0.15 km³ of natural gas.

**RENEWABLE ENERGY USE**

Tenants can opt for a solar dhw system (2.73 m² collectors + 110 litre storage tank). This will save them roughly 112 m³ per year or about 6.50 Euro per month.

**INFORMATION SOURCES**
Franke Architekten BV
Postbus 151, 3360 AD Sliedrecht, Holland
www.frankearchitekten.nl

Brochure authors
e.franke@frankearchitekten.nl
www.passiefhuis.nl