Project Summary
134 single family houses built in 1965. Renovations to Passive House in occupied condition. New timber frame facades + roofs; and innovative heating + solar dhw

Special Features
Prefabricated Passive House timber frame elements, compact HVAC

Architect + Energy Concept
Architectenwerkgroep - design Trecodome - passive house advice

Owner
Aramis Alleewonen, Roosendaal www.alleewonen.nl

Row houses 505 Alphenlaan in Roosendaal NL
BACKGROUND

Kroeven, Roosendaal is the first large scale passive renovation project in The Netherlands.

After 40 years only gradual improvements and normal maintenance, Allee Wonen decided to upgrade the area. The tenants had expressed interest in an energy efficient renovation. Whereas Allee Wonen had learned about the passive house concept as part of her involvement in the European Treco network for social housing providers (www.treco-housing.org) Allee Wonen and the tenants developed a shared interest in low energy renovation.

The full upgrade of Kroeven consists of 370 single family houses, of which 246 will be renovated and 124 units will be newly constructed, replacing about 90 existing houses.

In block 505 134 houses will be renovated to Passive Houses and 116 newly constructed as Passive Houses in six building types. In block 506 112 houses will be renovated and 8 will be newly constructed.

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In block 505 a completed demonstration house shows the insulation system with prefab timber elements and other modifications to achieve very the Passive House Standard. From 2010 to 2012 this approach will be implemented in 134 houses.

SUMMARY OF THE RENOVATION

• 350 mm timber frame element with cellulose insulation.
• triple glazed passive house window frames and prefabricated timber roof elements, filled with 350 mm insulation.
• Airtightness to PH Standard: of 0.6 at 50 Pa.
• External facade cladding in natural slate.
• New compact heating, heat recovery ventilation and hot water systems, connected to solar collectors.
Prefabricated elements are placed after demolition of external layer of the cavity wall.

CONSTRUCTION

**Roof construction**  
*U-value: 0.11 W/(m²·K)*  
(interior to exterior)  
OSB 25 mm  
Cellulose fibre insulation 350 mm  
OSB 25 mm  
PVC roofing 2 mm  
Total 400 mm

**Wall construction**  
*U-value: 0.107 W/(m²·K)*  
(interior to exterior)  
Existing brickwork 100 mm  
OSB 15 mm  
Cellulose fibre insulation 350 mm  
Dampopen MDF 15 mm  
cavity 30 mm  
Natural slates 10 mm  
Total 520 mm

**Ventilated floor**  
*U-value: 0.20 W/(m²·K)*  
(top down)  
Screed (existing) 30 mm  
Concrete floor (existing) 200 mm  
Spray PUR 120 mm  
Total 350 mm
Summary of U-values W/(m²·K)

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<thead>
<tr>
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<th>Before</th>
<th>After</th>
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<tbody>
<tr>
<td>Attic floor</td>
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<td>0.11</td>
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<tr>
<td>Walls</td>
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<td>0.75</td>
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<td>frame</td>
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RENEWABLE ENERGY USE
There are 5.4 m² of solar collectors covering about 55% of energy needed for domestic hot water.

ENERGY PERFORMANCE
Space + water heating (primary energy)*
Before: 220 kWh/m²
After: 40 kWh/m²
Reduction: 82%
*PHPP2007 energy calculations:

INFORMATION SOURCES
Boonstra, J.M., A. van Reekum, R. van Rede. Treco project information
www.treco-housing.org

Brochure authors
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www.trecodome.com

BUILDING SERVICES
The heating, ventilation and domestic hot water systems will be upgraded using new compact systems, which include per house a mechanical heat recovery system, a 200 liter storage tank, connected to a solar collector array, with a backup by a small condensing gas boiler. The number of existing radiators will be reduced.