PROJECT SUMMARY
Housing renovation with new floor plan and creation of four penthouse maisonettes. Reduction of heating energy: 60%

SPECIAL FEATURES
Innovative ventilation system

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Apartment Building in Ostermundigen, CH

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

This apartment building from 1965, was in need of renovation and had been vacant for 1 ½ years until the architects Rollimarchini were able to finance its purchase and renovation. The new apartments are today, after the refurbishment, handicapped accessible, have a contemporary layout with improved daylight use and combine a raised living standard with a considerably reduced heating energy demand. In addition, more rentable living space was achieved by creating four penthouse maisonettes.

SUMMARY OF THE RENOVATION

• Insulation of the building envelope: roof (280 mm), façade (140 mm) basement ceiling (140 mm)
• New triple glazed windows (U-value glass: 0.5 - 0.7 W/m²K, g-value: 51 - 58%)
• New technical systems core with elevator
• Attic converted into four penthouse maisonettes
• Enlarged balconies with sunspaces
• Renovated bathrooms and kitchens
• Ventilation system (HRC 80%)
### CONSTRUCTION

**Roof construction**  
*U-value: 0.18 W/(m²·K)*

- (top down)
  - Roof tiles (existing)
  - Wooden strapping: 24 mm
  - Air gap, wooden cross strapping: 60 mm
  - Roof sheathing: 18 mm
  - Mineral wool insulation: 140 mm
  - Wood planking (existing): 20 mm
  - Cellulose insulation: 140 mm
  - Mat: 25 mm
  - Gypsum board: 18 mm
- **Total**: 445 mm

**Wall construction**  
*U-value: 0.19 W/(m²·K)*

- (interior to exterior)
  - Interior plaster: 15 mm
  - Brick wall (existing): 300 mm
  - Exterior stucco (existing): 15 mm
  - Mineral wool insulation: 140 mm
  - Mineral plaster with reinforcing net: 15 mm
- **Total**: 485 mm

**Basement ceiling**  
*U-value: 0.37 W/(m²·K)*

- Parquet flooring: 18 mm
- Gypsum board and paperboard: 30 mm
- Cement mortar (existing): 50 mm
- Separation gap (existing): 10 mm
- Reinforced concrete (existing): 140 mm
- Mineral wool insulation: 140 mm
- **Total**: 388 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>(W/m²K)</td>
<td></td>
<td></td>
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<tr>
<td>Roof</td>
<td>2.00</td>
<td>0.20</td>
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<tr>
<td>Walls</td>
<td>0.42</td>
<td>0.23</td>
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<tr>
<td>Basement ceiling</td>
<td>1.50</td>
<td>0.23</td>
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<td>Windows’*</td>
<td>2.70</td>
<td>1.2 - 1.3</td>
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* including frame

**BUILDING SERVICES**

Since the existing oil furnace was still functional, the architects decided not to replace it yet. Although an additional living area of 370 m² had to be heated after the renovation, today, 12'000 litres of heating oil are saved per year. The novel ventilation system with heat recovery (efficiency 80%) exchanges the heat, thanks to its special profile, directly inside of the aluminium ducts and doesn’t need an additional heat exchanger. The ventilation system electrical consumption amounts to 3.59 kWh/m²a. The fans have 54 W connected power.

**ENERGY PERFORMANCE**

Space + water heating (primary energy)*
Before: ca. 173 kWh/m²
After: 69 kWh/m²**
Reduction: 60 %

*Swiss Standard: SIA 380/1: 2001
**The new living area after the renovation is 370 m² larger

**INFORMATION SOURCES**

Enz, D.: Bauerneuerung für die Zukunft, Flumroc AG, Postfach, CH-8890 Flums, 36 pages (German, French, Italian) www.flumroc.ch
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