Attic conversion in Innsbruck AT

PROJECT SUMMARY
An attic conversion of a historic building in Innsbruck built in 1882. The two new levels are built of connected wooden boxes. Complies with Austrian low energy requirements.

SPECIAL FEATURES
- 15 m² solar collectors for DHW
- laminated wooden roof construction
- connected wooden boxes

ARCHITECT
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OWNER
Dr. Michael Harrer
Private

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

The massive exterior walls of this five storey 19th century building were not insulated and the original windows were still in place. The attic floor was not used and the roof was in a poor condition. Heating the top apartment needed 193 kWh/(m²a).

After the renovation 2007, including the attic conversion, comfort is greatly improved and the new attic apartments comply with Austrian low energy requirements, needing only 55 kWh/(m²a) for space heating.

OBJECTIVES OF THE RENOVATION

• reduce heating costs
• ecological renovation with renewable resources
• extremely high quality of building and construction
• exceptional interior design

SUMMARY OF THE RENOVATION

• high insulation of facade, floors, roofs
• replacement of old windows
• two connected wooden boxes for new living space
• central gas unit
• solar collectors for preparation of domestic hot water
CONSTRUCTION

Roof construction  
U-value: 0.184 W/(m²·K)  
(interior to exterior)  
laminated wood       218 mm  
wood-fibre insulation 140 mm  
air space            140 mm  
green roof, solar panels, copper  
Total                358 mm  

Wall construction  
U-value: 0.285 W/(m²·K)  
(interior to exterior)  
laminated wood       150 mm  
wood-fibre insulation 80 mm   
air space            30 mm  
boaring              20 mm  
Total                280 mm  

Separating ceiling  
U-value: 0.864 W/(m²·K)  
(top down)  
floor screed        70 mm  
impact sound insulation 30 mm  
filling             50 mm  
concrete floor (existing) 200 mm  
Total                350 mm  

Window:  
double thermopane glazing  
U₁: 1.00 W/(m²·K)  
U₃: 1.19 W/(m²·K)
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>Attic floor</td>
<td>0.8</td>
<td>0.18</td>
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<tr>
<td>Walls</td>
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<tr>
<td>Separating ceiling</td>
<td>0.9</td>
<td>0.86</td>
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<tr>
<td>Windows</td>
<td>ca. 2.7</td>
<td>1.19</td>
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</table>

BUILDING SERVICES

The new floor and wall radiant heating systems are supplied by a new central gas boiler (10 kW). Domestic hot water is heated by solar collectors, back-up is provided by the gas boiler.

RENEWABLE ENERGY USE

15 m² solar collectors on the southeast-oriented roof with only 500 l storage achieve an annual solar fraction of 85% for domestic hot water preparation.

ENERGY PERFORMANCE

Space + water heating (primary energy)*
- Before: 468 kWh/(m²a)
- After: 124 kWh/(m²a)
- Reduction: 74 %

* according to OIB Richtlinie 6

INFORMATION SOURCES

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