Energy Conservation in Buildings and Community Systems

IEA ECBCS ANNEX 50

Karl Höfler, Sonja Geier
AEE - Institut für Nachhaltige Technologien (AEE INTEC)
A-8200 Gleisdorf, Feldgasse 19

3 building types: Dieselweg
Year of construction: 1952 / 1959 / 1970

1st Phase of construction
Graz, Dieselweg
Year of construction: 1959

2nd Phase of construction
Graz, Dieselweg
Year of construction: 1970

3rd Phase of construction
Graz, Dieselweg
Year of construction: 1952
Survey foundation:

**Basic data:**
- Year of construction: 1959
- Number of apartments: 16
- Primary structure: solid structure (concrete, brick wall)

**Technical System:**
- Type of heating and energy source: decentral; 13% solid fuel; 33% oil; 54% electric
- Hot water supply: decentral electric boilers
- Ventilation: natural ventilation

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**Graz, Dieselweg 4, 6, 8**

- Actual stock
  - Very poorly insulated building

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**Graz, Dieselweg 4, 6, 8**

- Renovation
- Prefabricated facade incl. windows
Development & design:

Development of pre-fabricated modules:
- 3D - on-site measurement of building façade
- Development of the pre-fabricated module by a technical office "gap – solution"
- Approval of the detailed composition of the modules by the building physician, consulted by AEE INTEC
- Design of each module and all detailed drawings (window-connections, plinth-weathering, angles,..)
- Approval of the detailed drawings, consulted by AEE INTEC

View on the building façade:
- Horizontal joints
- Integrated windows
- Dimension of modules fixed by the line of ceiling and the upper line of the windows
- Mounting order: starting with the lowest module

Composition and layer formation of the prefabricated module:
- Internal plaster
- Existing exterior wall
- External plaster
- On-site installation: 40mm Equalization + installation plane, 60mm Timber construction between rockwool
- Pre-fabricated module: 19mm OSB-board, 120mm Post + mullion construction between rockwool, 16mm MDF board, 30mm Solar comb, 29mm Rear ventilation, Toughened safety glas

Lateral window-connection: <horizontal section>
- Vapour – proof barrier
- Borehole for ventilation pipe
- Singleroom ventilation - system heat-recovery
Procedure of pre-fabrication:

Pre-fabrication on works:
- "Solar comb - system" pre-existing from "gap-solar"
- Fabrication hall of carpentry "KULMER BAU"
- Approval on works by building physician, architect, client
- The single modules are produced according to the on-site measurement and plans
On-site installation:

Preparation before mounting:

- Installation of the elevator’s construction
- Installation of electricity cables
- Bore – holes for ventilation – pipes
- Installation of heating supply for exterior walls
- Installation of equalization plane
- Mounting of sheet steel angles
  "bearing at the plint-weathering"
- Mounting of rockwool between post and mullion construction
- Mounting of vapour-proof barriers
- Cutting-off roof-overhang
Running of cables:

- The pre-fabricated modules are brought by a truck and trailer on-site.
- Afterwards they are lifted by a truck-mounted crane to the building’s façade.
- Two additional mobile-cranes are positioned on each side.
- Assembly operators on these cranes are helping during the fitting procedure.

Procedure of mounting:

Mounting and fitting the single modules:

- The pre-fabricated modules are brought by a truck and trailer on-site.
- Afterwards they are lifted by a truck-mounted crane to the building’s façade.
- Two additional mobile-cranes are positioned on each side.
- Assembly operators on these cranes are helping during the fitting procedure.
Transportation on site:

Mounting:

Fitting:

Occurred problems:

Horizontal joint:
- MDF – board is designed with overhang
- During fitting procedure the upper module does not match to the lower module
- Too tight fits between the different modules

Problem enlarged by:
- Large-scaled modules
- Mounting procedures at 3rd, 4th, .. floor (high levels)
- Wood/timber construction is a “natural” construction material

To be asked:
- What happens if it is necessary to get access to an element near the lower floors?
- How to get access to the different pipes behind the fixed modules?
To be asked:

- Development of "installation" / "access" – modules, which are integrated in the façade??

- If there are integrated pipes, how is it possible to get the couplings?

Thank you for your attention