



TUTORIAL OUTLINE

to the 5th workshop exercise of the Building Construction 3. Class **Up to Date Lightweight Elevation Claddings**

This workshop exercise illustrates the basic rules of lightweight elevation cladding design including layout, adjustability and critical details.

The featured building has loadbearing masonry walls onto which a composite, ventilated elevation cladding system is mounted. The composite skins are:

- 30 cm ceramic wall blocks
- 1 cm airtight surface rendering plaster (not needed in case of reinforced concrete wall)
- 15 cm mineral fiber thermal insulation in 120/60 cm panels between the steel supporting rails, fixed with plates that connect to wall
- 4 cm ventilated air gap
- 0,8 cm lightweight, plain, large element elevation cladding

The following cladding materials may be fixed using the technology displayed in the workshop exercise: fiber cement (artificial slate), compressed timber, artificial resin building boards etc. (e.g. CREATON, ETERNOVA, ETERCOLOR, GLASAL, COLORNYP, TRESPA, FINNFOREST).

Examples for alternative fixing methods:

- screws: fiber cement
- hooks: fiber cement, lightweight ceramic panels
- concealed hooks: all of the above, metal panels

Section details at the elevation:

- indicate the thickness of every skin
- determine thermal insulation thickness (15 cm in front of reinforced concrete in Hungary) so that the composite's U-value is validated against the required performance threshold (maximum 0,24 W/m²K in Hungary)
- the minimum ventilated air gap width is 4 cm, the maximum width is 10 cm
- the width of the elevation cladding depends on the applied material (e. g. lightweight panels: 8-10 mm, stone 3 cm, brickwork 12 cm etc).

Placement and sizing of the air inlets and outlets of the ventilated air gap:

- The area of the air outlets must be at least the same as the area of the air inlets, or more.

- for 20 m² elevation area 7500 mm² unobstructed ventilation air inlet area must be provided
- the ventilated gap air inlets and outlets must be protected with insect net (perforated metal sheet is the ideal solution for this purpose because it also keeps rodents out)

Furthermore, the accurate dimensions and all characteristic features of the cladding elements must also be indicated on the drawings.

The continuous, vertical, aluminum L-profiles are laid out according to the dimensions of the standard cladding elements. These L-profiles are bolted to short, L-shaped supporting elements that are fastened to the elevation by wall plugs.

The **thermal insulation** material must be noncombustible mineral fiber (A1 or A2 rated as combustibility classification), if it is applied in a ventilated composite. Plastic foams are only allowed at the footing. They are suitable for non-ventilated composites or as part of thermal insulating plastering systems, but not for ventilated composites, because of the fire and moisture condensation hazards. The backing of the thermal insulation must be made of a noncombustible, water resistant but vapor permeable material. It improves the ventilation efficiency and prevents the cold winter air from decreasing the performance of the thermal insulation. Its black color conceals the thermal insulation that is visible through the gaps of the open gap elevation cladding systems.

The workshop exercise details show the details of a ventilated fiber cement elevation cladding with metal supports. The basic constructional principles displayed on the drawings are similar in case of most lightweight elevation types. The differences between the systems are due to the various cladding materials and related fixing methods.

On the **details** note:

1-2. *Bottom and top window details* (vertical sections)

- The window is aligned with the thermal insulation, which must overlap the window frame by 4 cm minimum. This way the building's thermal insulating envelope is continuous, and the installation of the window and wall cladding is easier.
- The cladding is applied on the wall rebate around the window, as well, to cover the width of the cladding, the air gap and the thermal insulation. No separate supporting elements are mounted for this area, so the cladding elements that cover the wall rebate are fixed to the sides of the regular cladding elements around the window along one side and the window frame on the other side.
- The thermal insulation capacity of the window detail is mediocre (somewhat worse than in case of the solution displayed in the workshop exercise), if the window is aligned with the internal surface of the thermal insulation.

3. Footing detail

- The continuous vertical metal profile supports the footing cladding as a cantilever, in order to avoid the piercing of the vertical waterproofing membrane of the footing. This solution is applicable only if the footing is not designed to withstand intensive mechanical impacts (cars, heavy traffic etc)
- Extruded polystyrene foam thermal insulation is applied below snow level, in reverse composite skin order.
- The vertical waterproofing membrane of the footing is fastened by a zinc-coated steel strip.
- It is advisable to place round, Ø16-32 mm pebbles around the footing instead of a solid walkway, in order to avoid the bouncing back of raindrops onto the footing.

Budapest, April 2021.

PhD Lajos Takács
lecturer

Keve Kund Bándi
workshop
instructor

Botond Kovácsi
workshop
instructor

Katalin Toldi
course
responsible