

**Application of Laminam slab on ventilated façade:
Remont elewacji budynku D-20 Centrum Naukowo-Badawczego Politechniki Wrocławskiej**

All values and the design indication of this document are valid only for the porcelain stoneware slabs produced by Laminam SpA.

The variables related to the production of Laminam slabs, like raw materials, timing, systems and cooking curve, application of the fiber glass, make the product unique, with technical features not comparable to other slabs.

Laminam SpA cautions against the use of the values and the indication of this document for the design of porcelain stoneware slabs not produced in Laminam factory.

All the values are exclusively for internal use in support of the design engineer. They can not be divulged or published in any forms.

The values below indicated are valid if the prescribed aluminium substructure is correctly designed by the engineer, according to the local construction regulations. The deflection value has to be lower than the minimum value between 1/200 of the span or 15 mm (according to the European regulation) or anyway lower than the value imposed by the local standard/regulation.

The below indication are referred exclusively to the breaking value of the Laminam slab according to the ventilated façade systems. These indication allow a correct design of the slab according to the fastening system and span of the substructure (distance between the vertical profiles).

The breaking values of the slab indicated in the charts are expressed depending on the wind pressure and the substructure span.

In order to compare the serviceability limit state wind pressure, defined by the design engineer, with the ultimate limit state of the slab (breaking value), it is necessary to apply a safety coefficient, indicated on the local regulations.

The ultimate limit state wind pressure is obtained multiplying the serviceability limit state wind pressure for the safety coefficient. The obtained value can be compared to the breaking values indicated in the charts.

Vice versa the design load, comparable to the serviceability limit state wind pressure, is obtained dividing the breaking values of the slab indicated in the charts for the safety coefficient.

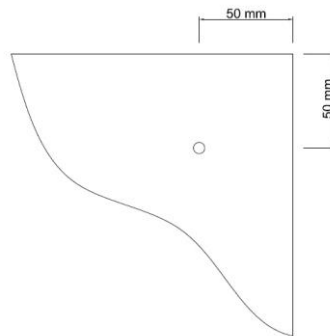
The check of the system slab + aluminium substructure is charged to the design engineer.

Rivet System Laminam 3+

The Laminam slab can be applied on ventilated façade using aluminium or stainless steel rivets. Laminam 3+ is usable, according to the requested resistance and the building characteristics.

The slab can be drilled using water jet and diamond tools suitable for the porcelain stoneware. It is essential to have an accurate executive project of holes.

The hole diameter is 6mm at least; the minimum distance between the hole centre and the edge of the slab is 50mm.



It is necessary to design the hole size in order to allow the thermal dilatation of the aluminium profiles without generate tensions on the slab.

The perfored slab once positioned in façade can be used as a guide to drill the substructure profiles.

Laminam advises to use tools for fastening recommended by the producer of rivets.

The rivet is a standard type.

The rivet body diameter (aluminium or stainless steel) is 4,8mm (d) and the large head diameter is 16mm (D). The length body (L) is determined according to the thickness of the materials to join.



An EPDM washer (1mm thickness and 15mm diameter with hole of 5mm) is applied between the rivet and the slab, in order to prevent the tensions development between the slab and the rivet.

A black neoprene tape is applied on the aluminium profile working as antivibration seal.

The Laminam slab can be applied both on vertical and horizontal way. To facilitate the handling operation, it is advisable to use suction cups or aluminium frames with suction cups (please, see out technical guide).

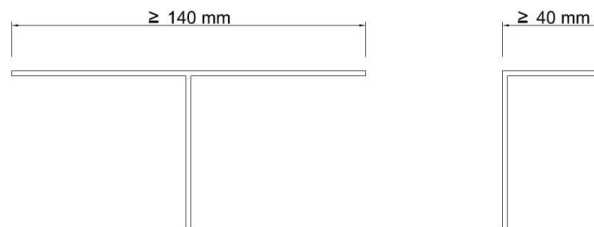
Avoid any tension and/or hit on the Laminam slab during installation.

It's important to fix the slab first with two central rivets (as "fixed points") of $\varnothing 6\text{mm}$ and then the remaining rivets with required hole diameter.

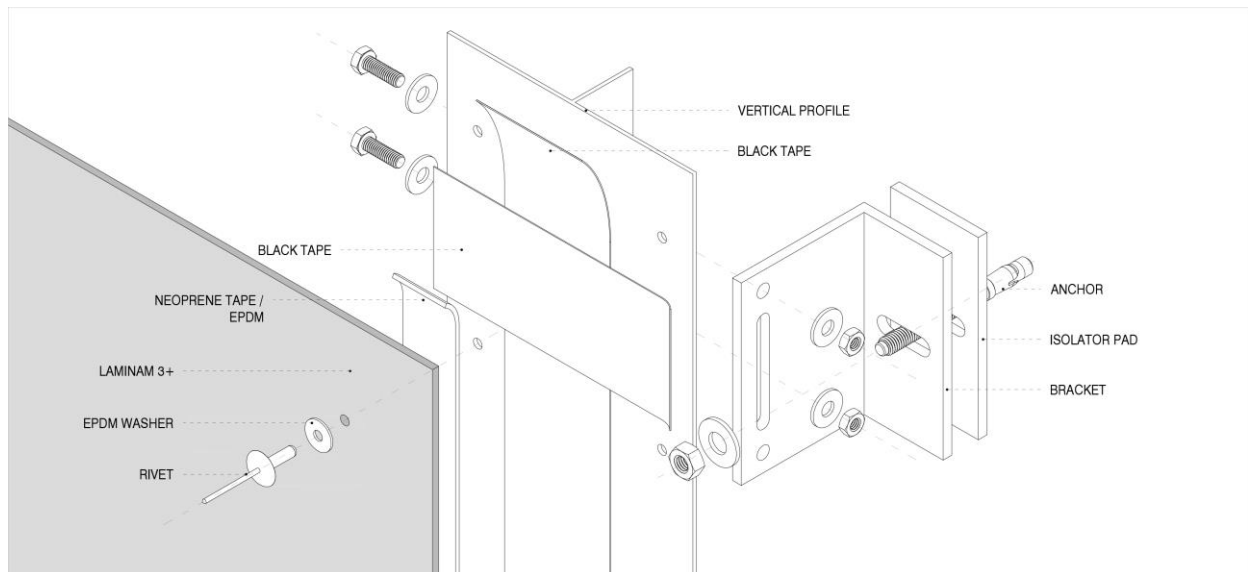
Generally, a groove of 5 mm is recommended.

The substructure is made by aluminium profiles with "L" or "T" section, fixed to the wall using bracket.

The "L" profiles are used on the backside of the slab, while the "T" profile are used in correspondence of the joints.



Below a mounting scheme of the rivets system in rain screen façade.



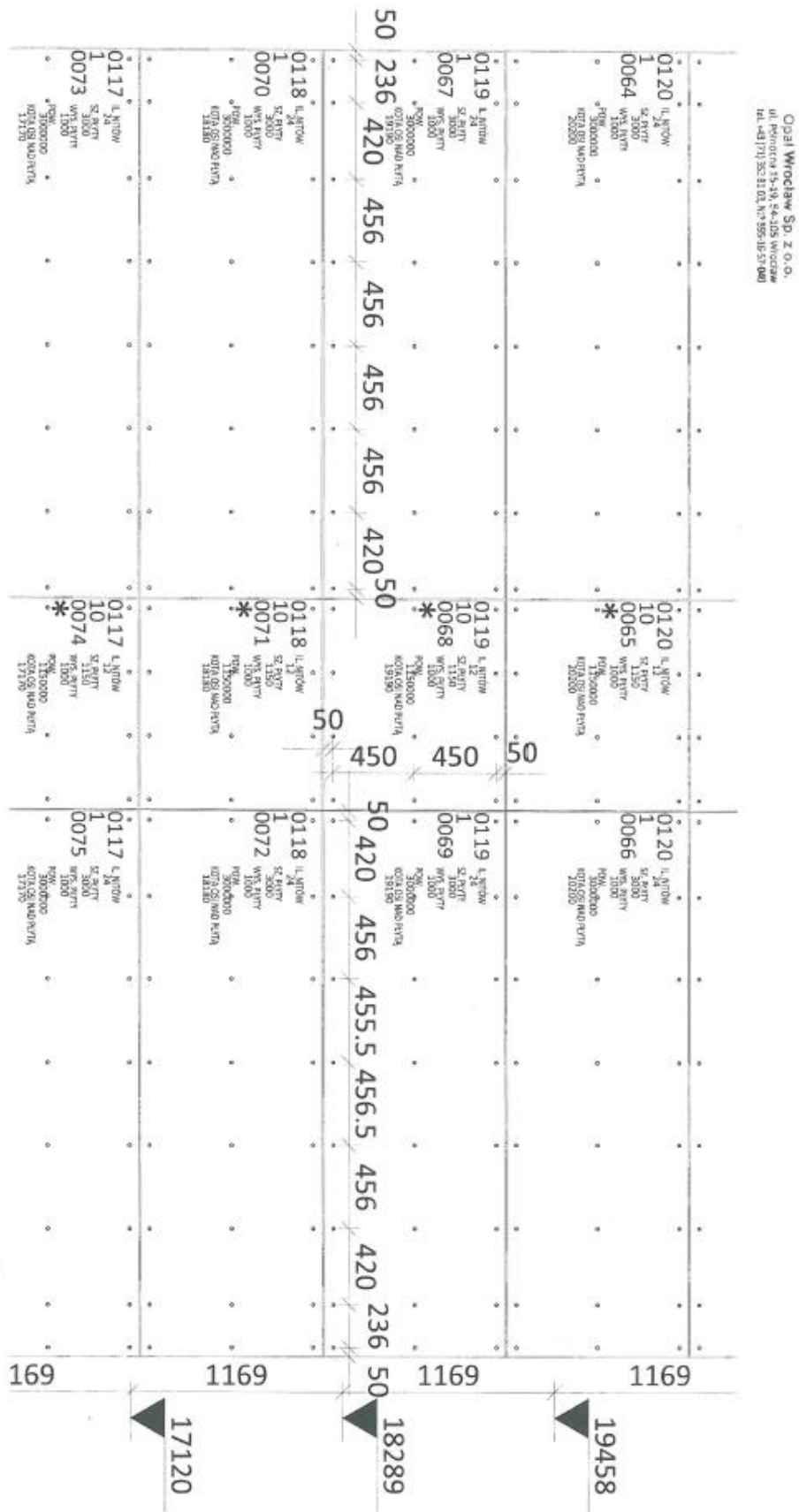
The span between the vertical profiles is determined according to the building site, the building high and the wind pressure.

In the chart below is shown the breakage value for the rivets span used in the project.

Rivets 3+ v.s. 500 mm	
Horizontal span [mm]	Breakage value [Pa]
500	2000

v.s is referred to Vertical span

In the image below is shown the rivet configuration for this project.



FELICE ZARZARDU
Opil. Włodław Sp. z o.o.
mgr inż. Aleksander Mascher

Conclusion

Multiplying the maximum wind design load (618Pa) at the serviceability limit state with the safety factor of 1,5 used by the designer we obtain the ultimate limit state:

$$618\text{Pa} \times 1,5 = 927\text{Pa}$$

As the design wind pressure at the ultimate limit state (927Pa) is minor than the slab breakage value (2000Pa), at the ultimate limit state too, the rivet spans shown in the image above are suitable for this project.