

# 1. panel facades

## Definition:

- a thin natural stone cover attached to the building's stable wall construction.  
  
The thickness of the cover is usually 30–50 mm. Fixings must be from stainless steel, aluminium, or hot-dip galvanized steel.
- There are two fixing methods: either by fixing the tiles on metal frame, or by installing them on anchors that are drilled in the concrete wall.
- Metal fixings that are in direct contact with natural stone must be from stainless steel.
- The used fixing method must enable the minimal natural movement of the facade tiles in different conditions (wind load, temperature, and other conditions).
- The use of the given methods is not limited by the height or size of the building.
- The width of the joints between tiles is usually 8–10 mm.
- Joints may be left open or filled with special elastic and weatherproof joint mixture.
- In the case of ventilated facades, a 20–30 mm gap must be left between the backside of the tile and the building's external construction.

## Choice of stones:

- Chosen according to standard EN 1469:2005 Slabs for cladding.
- Dimensions depend on the material of the stone and the fixing method, which in turn depends on the location and the environment the stone wall has to be able to resist.

## Suitable materials:

- Åland Grey-Beige limestone
- Baltic Grey limestone
- Gotland Grey limestone

## Choice of fixing methods:

1.2. VENTILATED FACADE ON MECHANICAL ANCHORS

1.3. VENTILATED FACADE ON HOT-DIP GALVANIZED FRAMES (with insulation) with stainless steel splines

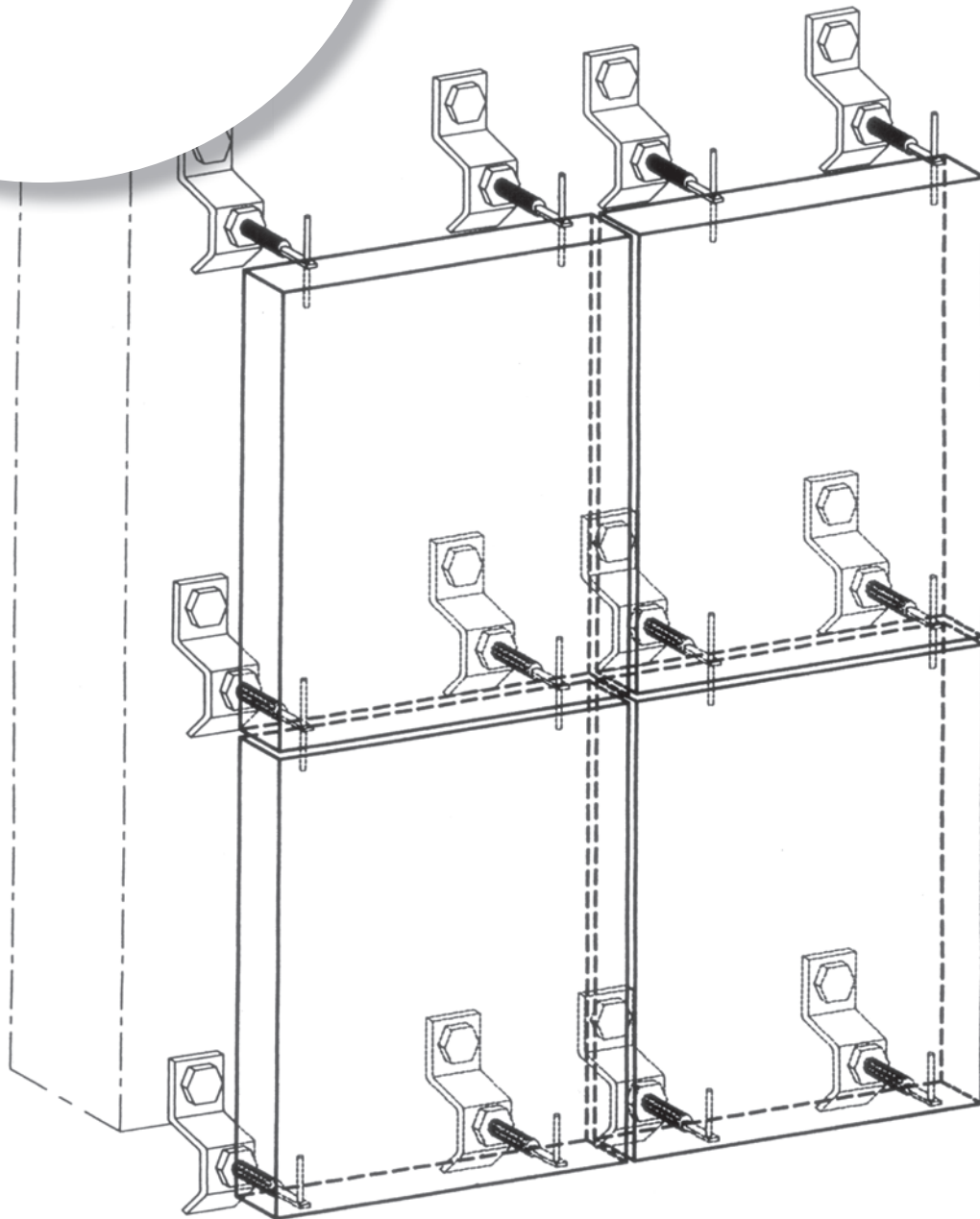
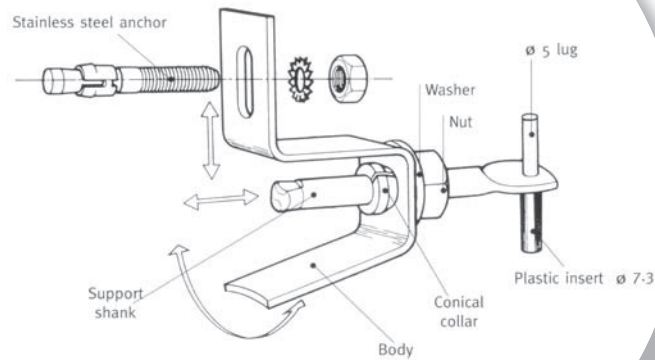
1.4. VENTILATED FACADE TYPE "EKLAND STONE" ON HOT-DIP GALVANIZED FRAMES (with insulation) with stainless steel clips

1.5. VENTILATED FACADE ON ADHESIVE ANCHORS





## 1.1. ventilated facade on mechanical anchors:



## 1.2. ventilated facade on hot-dip galvanized frames (with insulation) with stainless steel splines:

- It is possible to get a panel facade with insulation:
  - when the panel facade is attached directly to the base wall;
  - when the panel facade is attached to a previously insulated wall.

### Number of anchors:

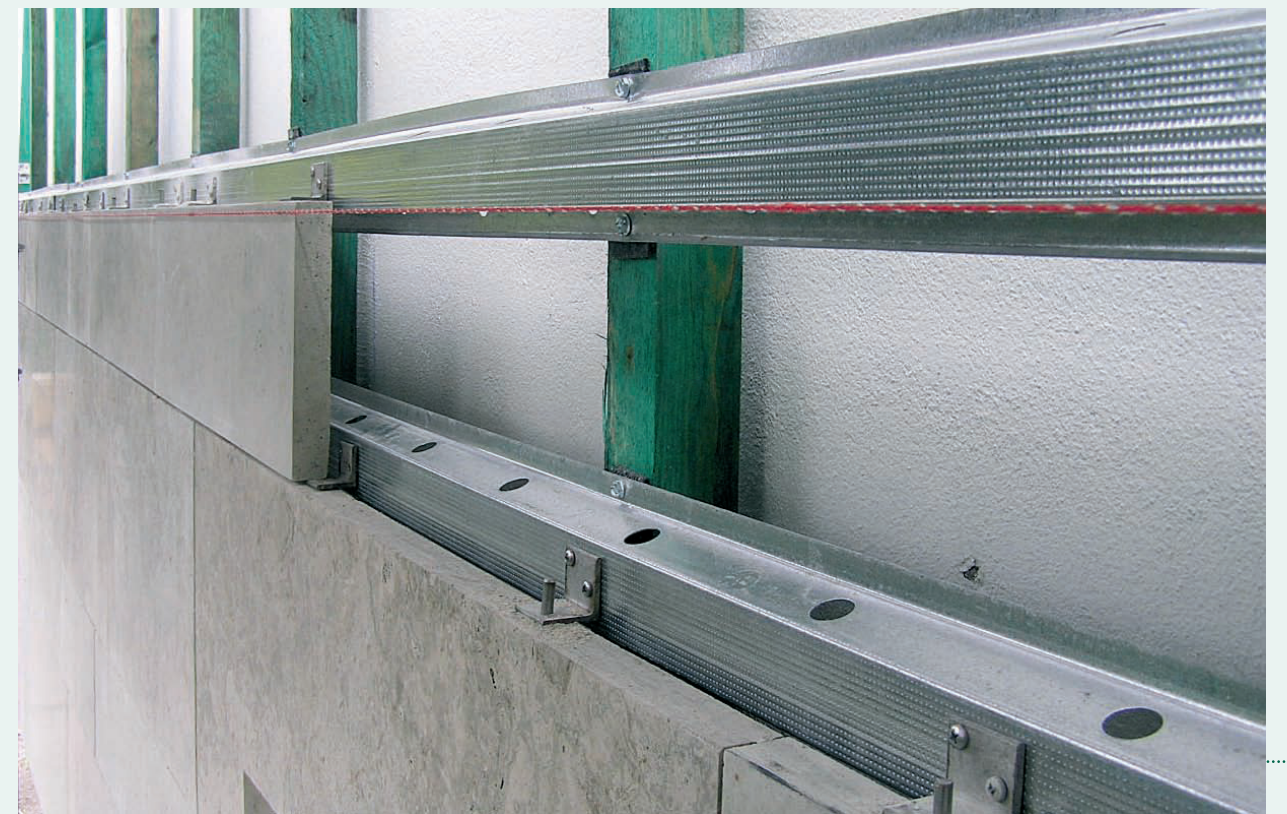
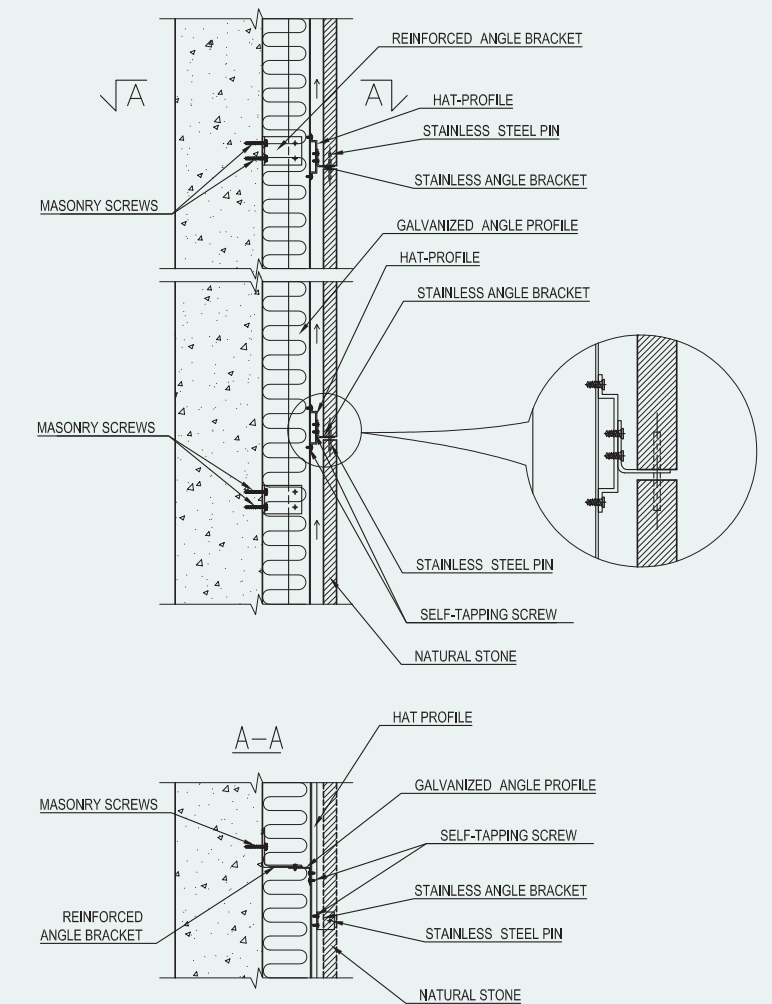
- usually 4 pieces per panel (2 bearing + 2 sustaining)

### Air gap:

- wider than 20 mm

### Gaps for fixing splines:

- Holes in the panel must be 0.5–3 mm bigger than the stainless steel splines, and they must be located 10–20 cm from the corners.
- The axis of the hole must be in the centre of the panel thickness and about L/5 away from the corner.
- The thickness of the stone from the edge of the hole to the edge of the panel must be at least 10 mm in the case of a 3 cm panel.
- The depth of the hole must be at least 30 mm in the case of a 5 mm spline, and the spline must extend in the stone for at least 20–25 mm.



# 1.3. ventilated facade type "Ekland Stone" on hot-dip galvanized frames (with insulation) with stainless steel clips

## Adjusting splines:

- The hole must be 0.5–1 mm bigger, and before the spline is inserted, the hole is filled with a special mixture or glue.

## Joints:

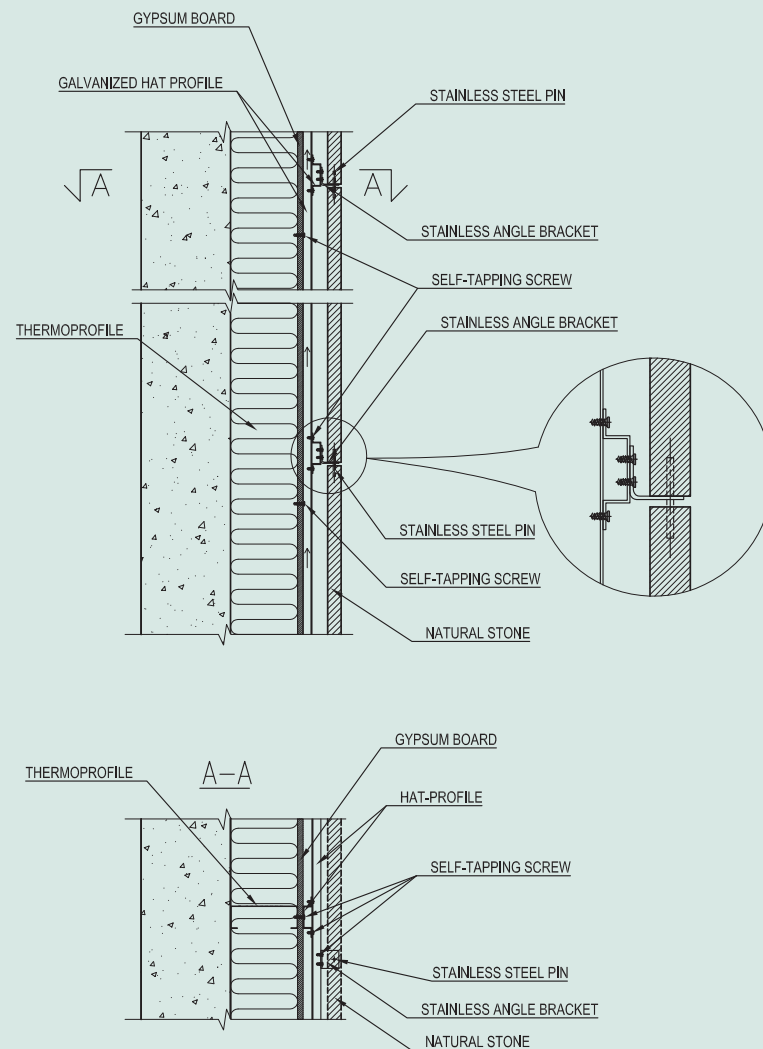
- They are either left open or filled with a special elastic joint filling.

## Expansion joints:

- Should be as wide as and in same direction as the panels. They are left open or filled with special joint mastics.

## Architectural and constructional joints:

- Joints that are determined by base constructions.
- There should be a joint per each floor when the joints are filled with mixture (for example, up to 10 mm open joints or horizontal joints with special mastic should be 3 m apart).



- Panel facade from natural stone that emphasizes horizontal joints and does not need elastic filling joints.

## Number of clips:

- usually 4 pieces per panel (2 bearing + 2 sustaining)

## Air gap:

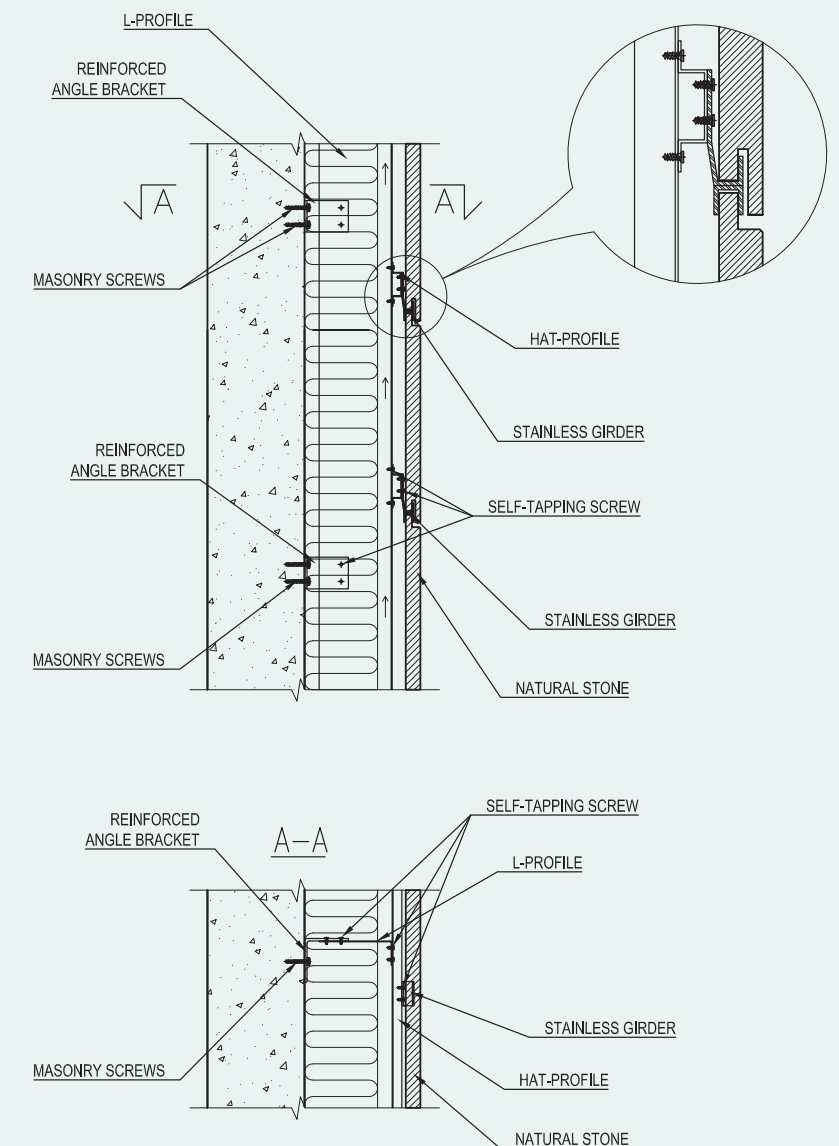
- wider than 20 mm

## Adjusting clips:

- Clips are adjusted with plastic wedges, using stone glue and mastics for fixing.

## Joints:

- Vertical joints are usually left open and are minimal between stone panels (stone panels are installed right next to each other).
- The width of horizontal joints can be adjusted by the client. The same natural stone is visible through the joint.

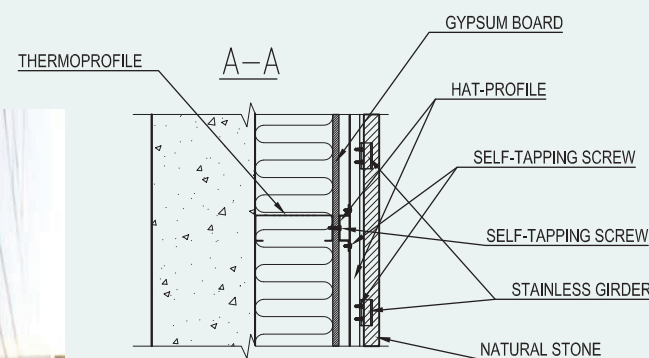
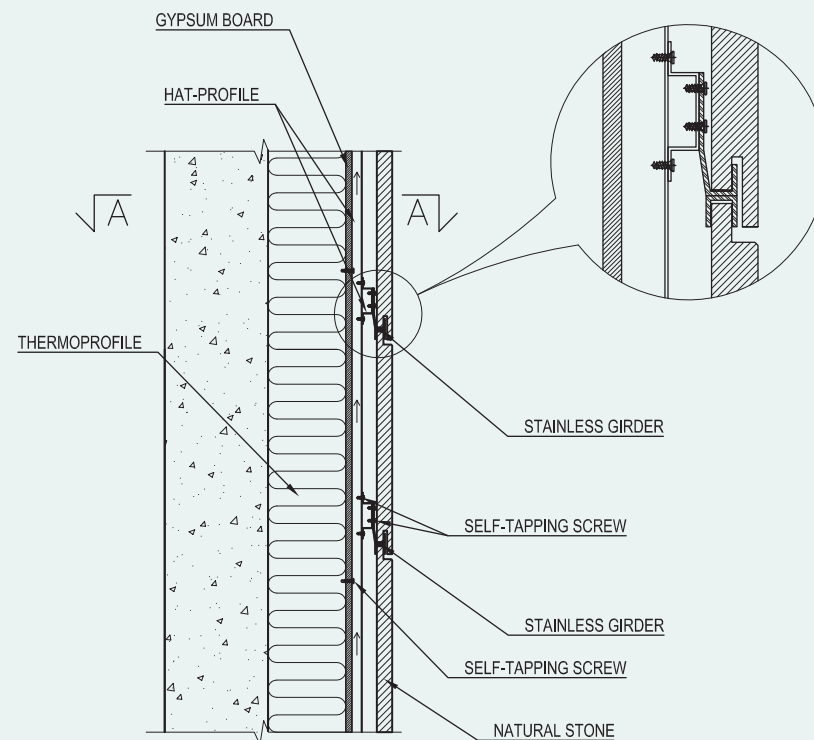




# 1.4. ventilated facade on adhesive anchors:

## Expansion joints:

- They should be in the same place as the base construction expansion joints (the width depends on the base construction and technical factors). They are either left open or filled with special joint mastics.
- Horizontal expansion joints are needed for every 24 meters. They are determined by technical conditions and the particular situation.



- Natural stone panels are attached to the stable retaining construction with metal anchors that are attached to the retaining wall with special mixtures.
- Choice of materials: Depends on the client as well as on base constructions, technical conditions, and the location (wind load, weather conditions, etc).

## Suitable materials:

- Kaarma dolomite
- Selgase dolomite
- Orgita dolomite
- Vasalemma limestone

## Type of retaining wall:

- concrete is the best option, other variants (hollow brick is not recommended)

## Height:

- Preferably up to 28 m, if the joints are filled with mixture.

## Requirements for the retaining wall:

- Flatness should not vary more than 2 cm.

## Anchors:

- Vertical and horizontal stainless steel anchors whose wall-facing ends are rotated 90°.

## Number:

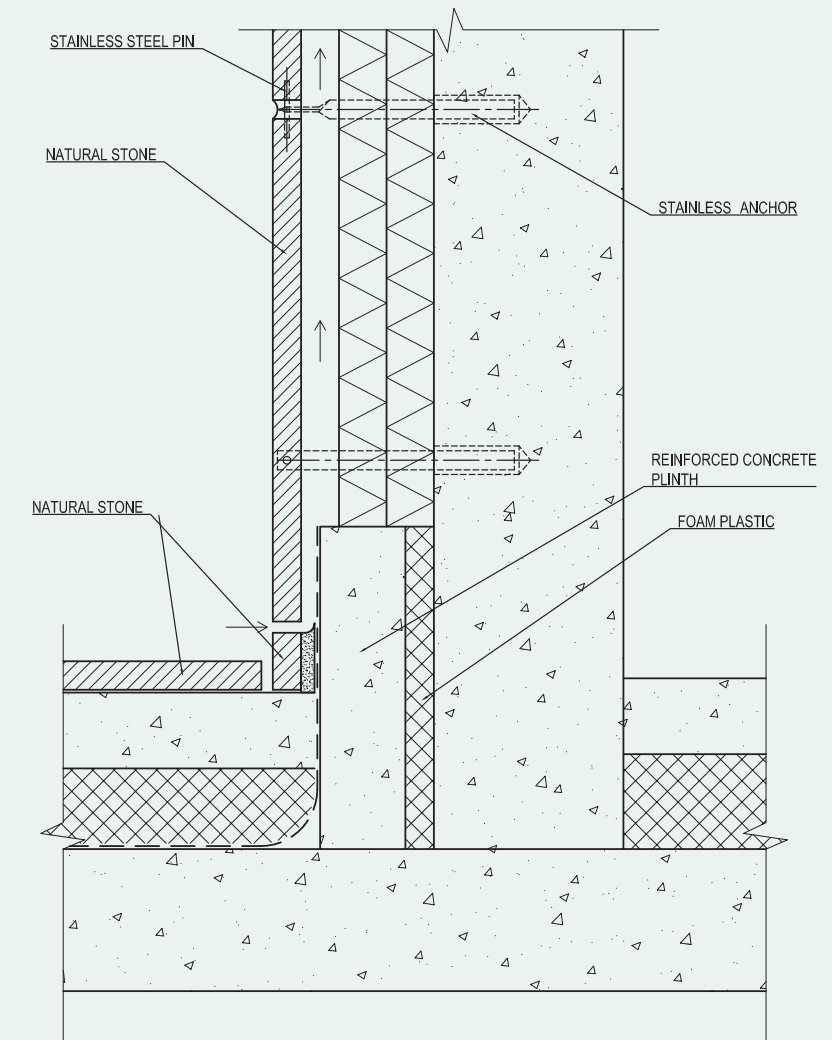
- 4 pieces, 2 of which are bearing and 2 sustaining

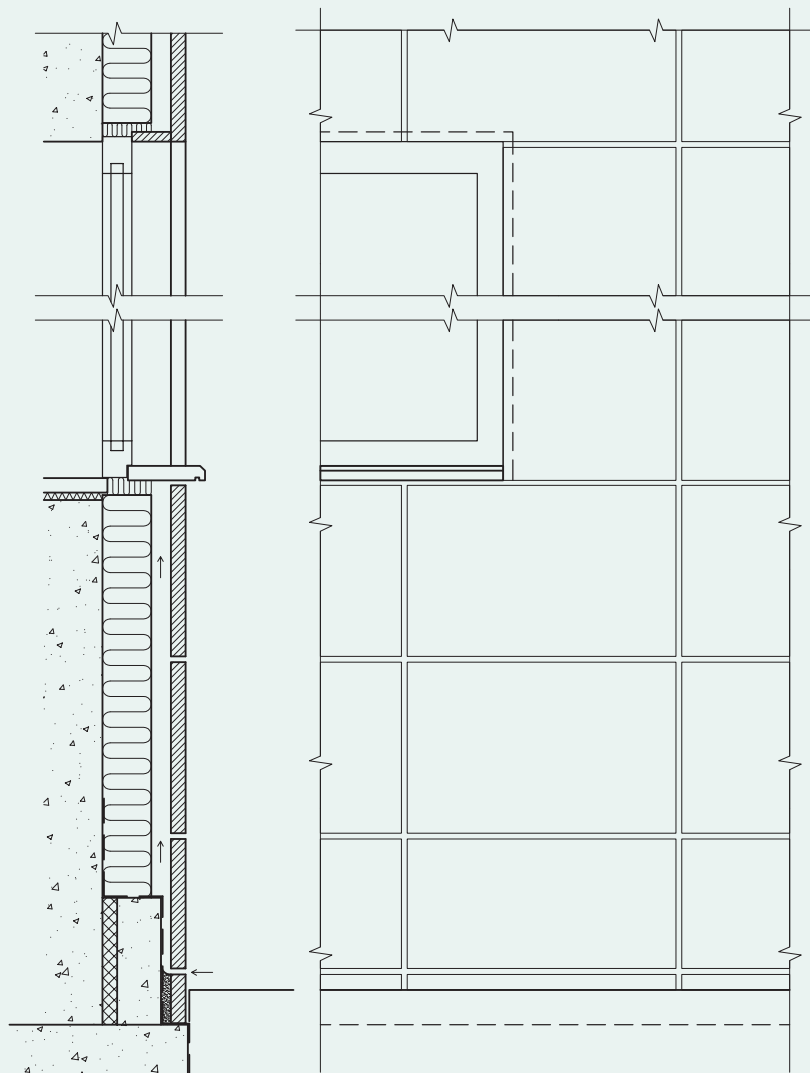
## Air gap:

- the gap between the back side of the natural stone and the retaining wall or insulation must exceed 2 cm.

## Fixing the anchors to the retaining wall:

- special mixtures are used to attach the anchor to the pre-drilled holes in the retaining wall whose diameter is up to 3 cm and depth up to 8 cm.





#### Plate anchor fixing:

- Natural stone panels are attached to the anchors with stainless steel spline that is inserted in the holes that are drilled 10–20 cm away from the corners of the panel. The diameter of the hole must be 0.5–3 mm bigger than the diameter of the spline.

#### Installation holes must be drilled as follows:

- The axis of the hole must be in the centre of the panel thickness and about  $L/5$  away from the corners.
- The thickness of the stone from the edge of the hole to the edge of the panel must be at least 1 cm in the case of a 3 cm panel.
- The depth of the hole must be at least 30 mm, and it should be 5 mm deeper than the end of the spline that is inserted in the stone.

#### Adjusting splines:

- splines can be adjusted in both directions, if the hole of the spline is up to 10 mm deeper.
- before inserting the spline the hole is filled with a special mixture or mastic.

#### Joints:

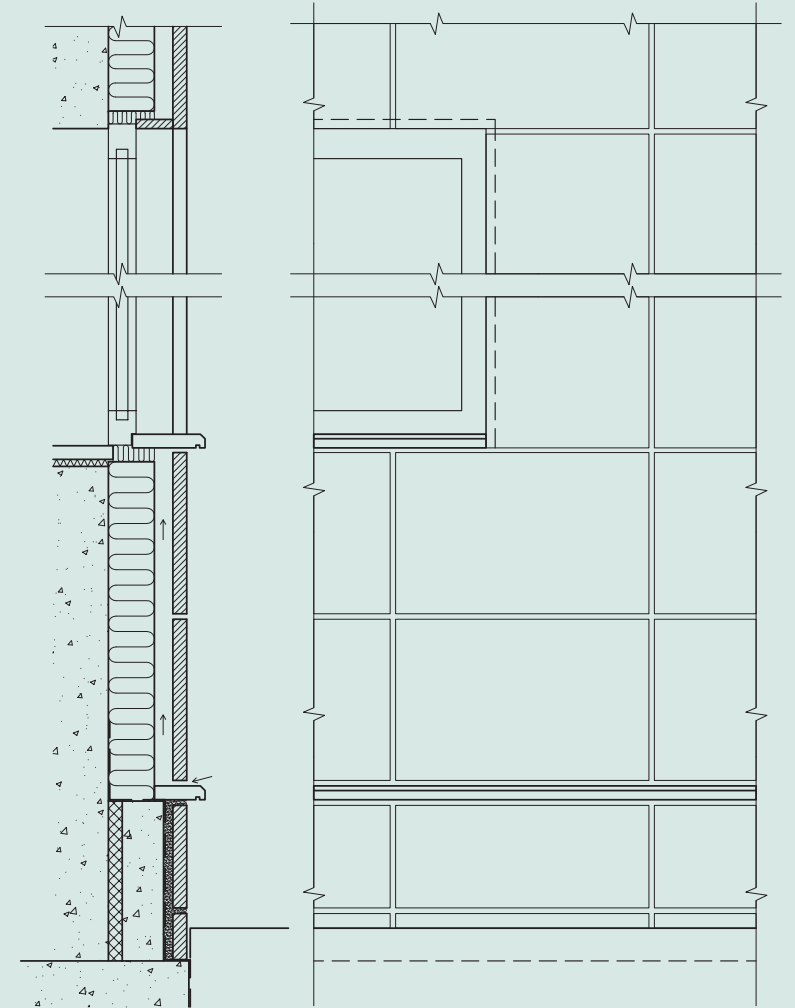
- They might be left open or filled with elastic mastic (for example urethane mastic). Do not use mastics that contain silicone oil, these will later leave a thin, dark, oily marks around the edges of the panels.

#### Expansion joints:

- They should at least run in the same direction as joints, and their width should be as same as or slightly wider than that of the joints.

#### Distributional or dividable joints:

- In the case of open joints, each joint is also a distributional joint.
- If the joints are filled with mixture, one horizontal joint for each 3 meters or per floor should be left open or be later filled with special mastic.
- Elastic vertical joints should be approximately 6–8 m apart.
- Minimal width of horizontal joints is 10 mm.
- Minimal width of vertical joints is 8 mm.
- Both are usually filled with elastic urethan-based mastic.





## 1.5. panel facades pasted with mixture

### Definition:

- Covering the internal and external facades with natural stone panels, using adhesive.

### Choice of materials:

- Similar to previous. The dimensions of the panel must take into account the weight of the material, the qualities of the adhesive, the height of the construction, the fixing method, and the base construction.

### Suitable materials:

- Åland Grey-Beige limestone
- Baltic Grey limestone
- Gotland Grey limestone

### Type of the retain

- Possible options in external conditions: reinforced concrete that is 2–3 months old and plastered with cement mixture, or 3 weeks old masonry with adhesive mixture.
- In the interior other retaining wall types can be used, such as plastered surfaces, gypsum walls, lightweight blocks walls, etc, that are in accordance with the technical requirements.

### Evenness:

- Generally the retaining wall must be carefully prepared and meet the standards. For example: in case of plastered or concrete wall the evenness should be less than +/- 3 mm in the case of a 2 m bar.

### Cleanliness:

- The wall to be covered with panels must be clean and previously undercoated with bond dispersion corresponding to the used mixtures. The wall must not be dusty or oily.

### Humidity:

- Gluing must be performed on a slightly moist base wall. In hot weather when the humidity is low or the base wall is very porous, it should be slightly moistened before gluing.

### Temperature:

- The panels must not be glued on a wall with temperature below +5°C or above +30°C.

### Choice of adhesives:

- When gluing the facade stones, adhesives should be used that do not stain the stone and that correspond to the technical requirements. Use adhesive intended for use with natural stones.

### JOINTS

#### Expansion joints:

- Should be as wide as and located in the same manner as the rest of the facade joints. They should follow the expansion joints of the base construction as closely as possible.

#### Dividable joints:

- Joints must be at least 5 mm wide, and filled with decay resistant elastic joint mastic that does not stain the stones. It is advisable to create horizontal dividable joints 3 m apart (or one per floor) and vertical joints 6–8 m apart.

#### Joints:

- Joints are filled with mortar, traditional joint mixture, or other special joint product that corresponds to the technical requirements.
- The width in internal walls is at least 1 mm: The width in external walls is at least 2 mm, preferably 5 mm. Protection of the top edges of panel facades:
- The top edges of the vertical part of the external facade must be protected in an appropriate manner (cornice, etc) to prevent rain from leaking behind the stones.

