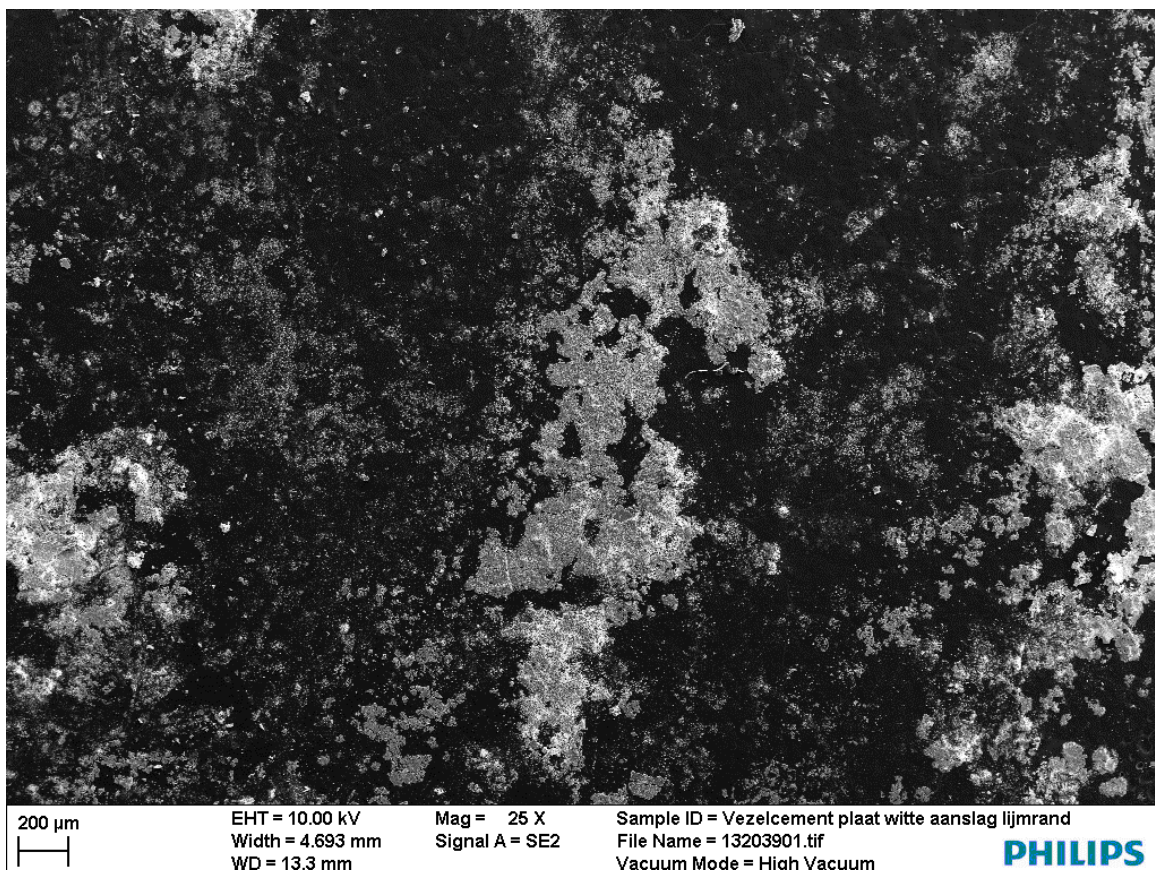


## CARBONATATION FIBER CEMENT BOARD

A fiber cement board characteristic phenomenon is 'carbonatation'.

After applying the fiber cement façade panels, the cement the fiber cement panels will continue to curing, due to influence of Carbon Dioxide ( $\text{CO}_2$ ) the molecules in the cement of calcium-hydroxide  $\text{Ca}(\text{OH})_2$  is converted to calcium carbonate ( $\text{CaCO}_3$ ). Due to this process water will be released. This so-called carbonization process is accompanied by shrinkage of the plate.



This chemical reaction will expedite as the plate becomes more in contact with carbon dioxide ( $\text{CO}_2$ ).

To what extent does this affect now in the case of a frustrated ventilation?

Due to a relatively limited ventilated air gap behind the façade panels, the air in the cavity is less refreshed than the outside air. As a consequence, the concentration of  $\text{CO}_2$  in the cavity is lower than in the outside air, so that the above-described chemical reaction on the image and cavity side of the plate will not be equal. This is referred to as differential carbonation. Because the façade panel then shrinks sharper than the cavity side, the panel will show curvature.

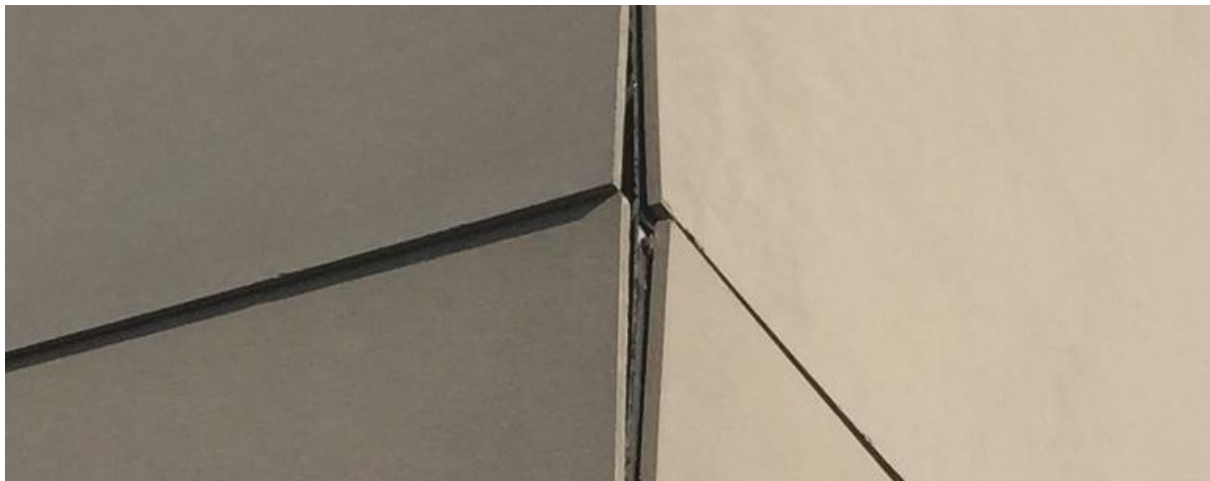
Due to frustrated ventilation, the air humidity in the cavity, possibly due to temperature differences, will not be equal to the outside air humidity also.

Thus, on the image and cavity side of the panel, there are different climate conditions which make the drying on both sides of the plate uneven. In that case, the dry shrinkage on the most dry side, the image side, will be the largest.

This will cause the plate to curl also.

We can therefore conclude that the ventilation conditions, especially for façade cladding with fiber cement panels, require a lot of attention.

In the event of insufficient ventilation, the combination of the above-mentioned conditions enhances the defined reaction whereby a permanent curvature of the fiber cement panel occurs in both the width and the height of the panel.



The stresses that occur are reflected in the “curling of the ears” of the façade panel. As a consequence, there is a permanent tensile stress on the glue joint, eventually resulting in an adhesive fracture and / or delamination of the glued substrates located at the corner(s) of the façade panel.

Regarding carbonatation of fiber cement panels we need to emphasize bonding these kind of panels with a pre-treatment on the surface where you put your adhesive bead with TWEHA Prefix X-tra is functioning without any problem.

However the carbonatation process of fiber cement panels needs attention. When the panels are not completely dried a thin layer of calcium carbonate  $\text{CaCO}_3$  (see attached photograph) forms itself at the backside of the panel which may form a brittle layer difficult to bond on.