American Fiber Cement Corporation
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Beroun, 25th of September 2024

STRICTLY WITHOUT PREJUDICE

Ref : Law Enforcement Academy, Des Moines, IA

Dear Customer,

Based on our site visit made on the 10th of September 2024 we can inform you as follows.

There has been the problem of longitudinal cracks and deformations reported.

Cracked boards found on the facade

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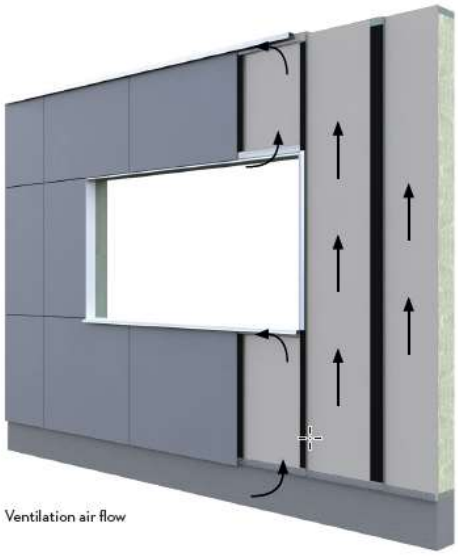

All facades must be designed and constructed as ventilated systems. This requires the provision of an air inlet at the bottom and an air outlet at the top, which applies equally to facade components such as windows and doors. A continuous ventilation gap must be maintained between the backside of the fiber cement boards and the underlying insulation, free from any obstructions.

Upon inspection, it was determined that the façade in question does not meet these ventilation requirements. For all facades incorporating fiber cement boards mounted on a subframe, adequate ventilation is essential. The ventilation principles specific to Swisspearl Patina boards are detailed in the installation manuals provided by our partner, AFCC, which are available on their official website.

To meet the general ventilation requirements, a continuous and unobstructed gap must be present behind the boards. The minimum dimensions for the air inlet and outlet should be at least 3/4 inch.

Proper ventilation is critical in rainscreen cladding systems using fiber cement boards. It serves several essential functions, such as preventing moisture accumulation, which can lead to material degradation and potential structural damage. Ventilation helps to regulate the temperature differential between the outer cladding and the internal insulation, reducing thermal stress on the system. Moreover, the movement of air through the cavity behind the boards helps to evaporate any moisture that infiltrates the cladding, thereby extending the lifespan of the façade and maintaining its aesthetic and functional integrity. Without sufficient ventilation, the risk of mold growth, rot, and decreased thermal efficiency significantly increases, compromising the performance of the building envelope.

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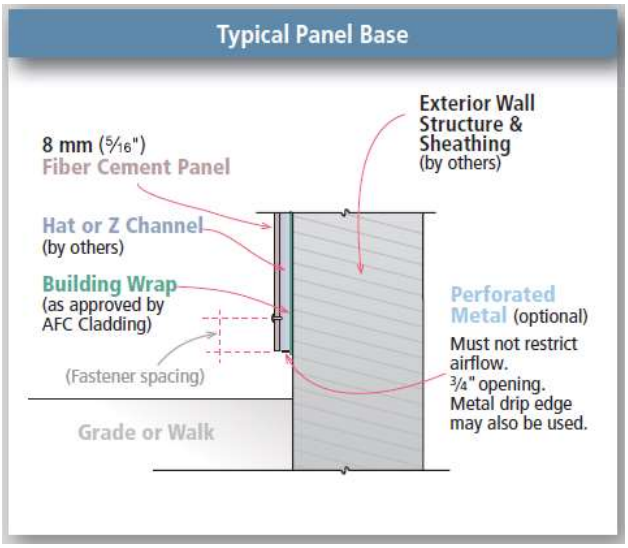
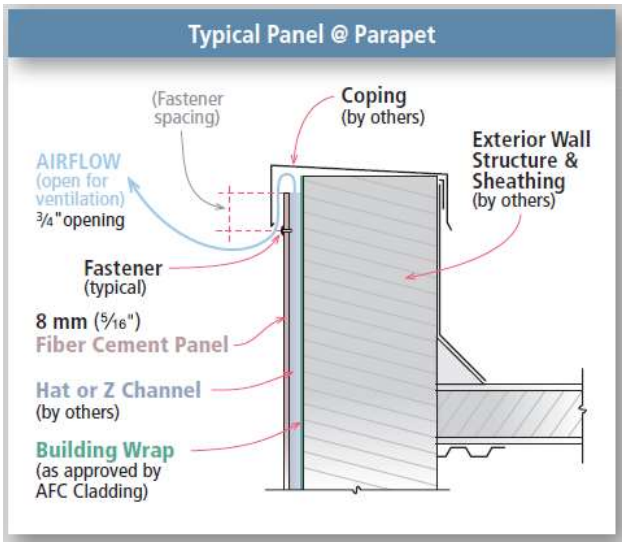


Air inlet, Installation guide page 6



Air outlet, Installation guide page 7

We found the whole façade as lacking the ventilation as it is shown on the following pictures.

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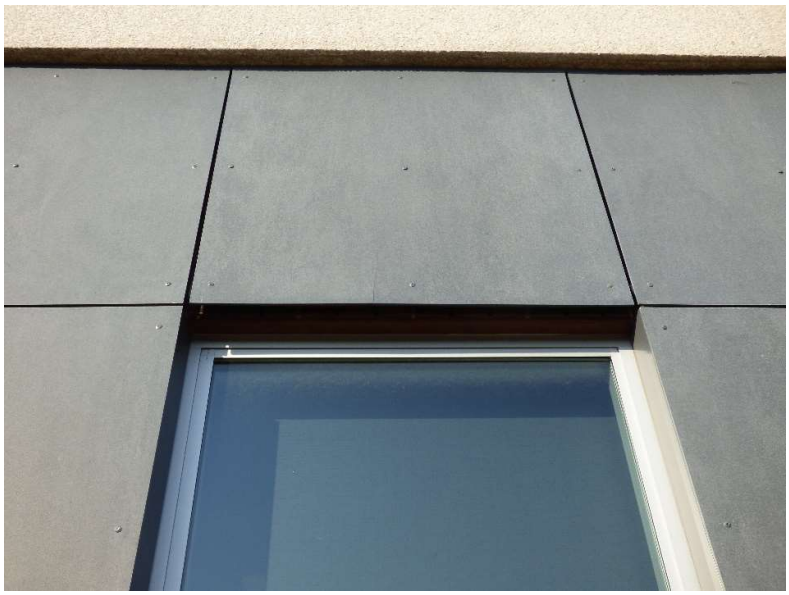
No ventilation inlet at the bottom of the facade



The boards are installed very tight below the parapet. There is no gap.

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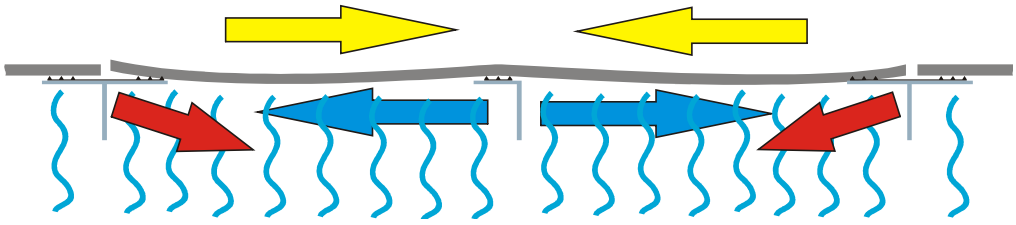
Fiber cement boards are subject to significant moisture movement, which increases the risk of defects in facades that are inadequately or non-ventilated. When ventilation is insufficient, the boards tend to warp and crack. This typically occurs when one side of the board becomes wet while the other remains dry, such as during periods of sunlight following rainfall or during transitional times of the day like dawn and dusk.



As illustrated in the accompanying image, the top side of the board remains dry and undergoes negative contraction (represented by yellow arrows), leading to shrinkage. Meanwhile, the bottom side remains wet and expands (indicated by blue arrows). This imbalance in moisture levels causes deformation, creating significant tension in the central and edge areas.

These forces become concentrated in the critical areas, which are inherently weakened by pre-drilled holes for mounting, making this region particularly susceptible to cracking. The issue is exacerbated by prolonged exposure to weather, and is most likely to first manifest on façades oriented toward the south and west, which receive the most direct sunlight.

The described phenomenon was observed and measured during an onsite inspection, confirming the impact of inadequate ventilation on the structural integrity of the fiber cement boards.

There were also mistakes found in the fixing of the panels.

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3. Pre-drill holes in panel. Diameter of the fixed and gliding point holes are all 11.1m (7/16"). Drill bits supplied by AFC.

This paragraph is taken from Installation manual, page 6 and it defines the requirement for the hole predrilling.

Holes are predrilled only for diameter equal to 8 mm

Too small holes restricted any necessary expansion or contraction movement caused by the natural moisture dilation of fibercement material.

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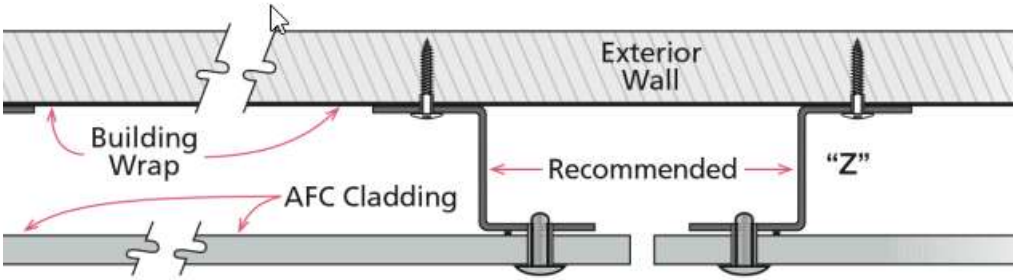
Also subframe must be revised.



Picture taken from Installation manual, page 5 showing the board installed on the "Z" profiles

6. Profiles to be straight, plumb, level, and aligned correctly on the building. For installations without exterior insulation, the metal profiles are typically hat-channels or Z-channels affixed directly to the exterior wall, provided the sheathing has adequate screw-holding strength.

This paragraph is taken from Installation manual, page 4 and it defines the requirement for profiles.

"Z" profile are visibly installed in an improper way, these are fixed askew and deformed

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As shown on the previous page, the profiles don't seem to provide sufficient screw-holding strength. Also the used material and the thickness of the profiles supporting the edge areas of the boards are questionable.

We recommend to check whether the profiles meet the basic requirements.

3. Profiles for affixing panels to be a minimum of 16 gauge steel or 2 mm aluminum, determined by building orientation/ location and load factors. For steel, depending on location and climate, a minimum of G90 or greater hot-dipped galvanized coating is required. Galvalume® and powder coat finishes may also be used. The surface of the profile the panel is attached to must be completely flat. (See FIG. J-2)

This paragraph is taken from Installation manual, page 4 and it defines the requirement for material of the profiles .

In conclusion, observed defect of the fiber cement boards installed on the facade can be attributed to a combination of factors, prominently inadequate ventilation, mistakes in fixing system and improper profiles used to support the boards.

The insufficient ventilation led to excessive deformation in the central and edge areas. Additionally, too small holes restricted any necessary expansion or contraction movement. Also the improper subframe contributed to the boards deformations as it isn't able to hold the boards in a proper way. **This combination of unfavorable conditions exceeded the material's tolerance, ultimately causing cracks to form in the central sections.**

I am forced to refuse the claim as the observed defect hasn't the origin in the production process and is purely caused by the construction issues which Swisspearl, as producer of the boards, cannot influence in any matter.

Elaborated by:

Petr Frolik
After Sales Service Manager
Swisspearl Belgium N.V.