TerraCORE PANELS

REDUCTION IN ENERGY CONSUMPTION DRIVES SUSTAINABILITY:

Ventilated Facade Systems

AIA | HSW | CEU
Course #SVF010 | Credit 1

INTRODUCTION

For years, covering a building façade has been an important challenge to overcome the fundamental characteristics of ceramic tile that will outperform other cladding material such as natural stone, wood, aluminum and or prefabricated concrete systems. This one-hour AIA | HSW program will cover the Ventilated Façade criteria required for a porcelain tile exterior cladding solutions and, attendees will gain knowledge why porcelain tile ventilated façade systems that incorporate the open joint system are fast emerging of choice for buildings across a variety of commercial and/or residential sectors today. Fact, ventilated façade systems are playing a key role for sustainable building envelopes especially since reduction in consumption is now driving sustainability.

A system with a naturally ventilated wall cavity has an 80-year plus-life expectancy and helps to eliminate potential for “sick-building syndrome,” a common to closed cavity walls.

OBJECTIVES

- Understand the ventilated facade system as a sustainable building product and why installing a VFS will make the building a more energy efficient thermal regulator.

- Understand the aluminum curtain wall sub-frame system, as it relates to:
    - The differences between exposed mechanical anchor system – vs – concealed undercut mechanical anchoring systems. And understand how the two anchoring systems transfer the load of the tiles onto the aluminum sub-frame.
    - MTech High Impact Laminated Porcelain Façade System.

- Appreciate the porcelain tile ventilated façade system ease of installation and the minimal maintenance characteristics.

- Gain Knowledge as to why ventilated facades are economically and aesthetically superior to other exterior building facades.

1. **Importance of USA Testing:**
    a. Discuss ICC-Evaluation IBC ESR Compliant Testing requirements as it relates to the porcelain tile ventilated façade system (VFS) becoming IBC (International Building Code Compliant).
    b. Discuss ICC- Evaluation Formalized Test Plan as it relates to porcelain tile ventilated façade systems.
    c. Review NFPA-285 Flame Propagation.
    d. Review ASTM E-119 Fire-Resistant Rated Construction.
    e. Review Dade County HVHC (High Velocity Hurricane Zone) requirement as it relates to.
        i. 89psf, 180mph Wind loads.
        ii. Airborne missile projectiles.
            1. Masonry wall construction
            2. Light Gauge metal and/or wood framed wall construction and how Dade County differs between Masonry and metal framed buildings.
            3. Review the sustained wind load requirements for the USA as it pertains to the VFS.

2. **Mechanical Anchors:**
    a. Introduce the two types of mechanical anchors responsible for transferring the tile load to the curtain wall aluminum sub-frame and discuss how each anchor is uniquely different.
    b. Exposed mechanical anchors.
    c. Concealed undercut mechanical anchors.
    d. Show how the exposed and concealed anchors are attached to the tile.
    e. Introduce the structural silicon adhesion anchor system.
    f. Demonstrate the differences between the differences between the exposed and concealed anchors.
    g. Discuss the pullout loads for the different anchors.
    h. Provide a detailed overview demonstrating how the undercut anchor securely locks in place and fastens the undercut to tile.
    i. Provide crosscut section detailing the undercut whole in the tile.

3. **Aluminum curtain wall sub-frame Description:**
    a. L-Brackets, Vertical T-Profiles, Horizontal C-Rails, C-Brackets, Horizontal Hat Channels:
    b. L-Brackets
        i. Discuss the installation of the L-Brackets on.
            1. Masonry walls of buildings.
                a. Installing the L-Brackets directly to the masonry walls
            2. Light gauge metal studs and/or wood stud framing.
                a. Installing horizontal aluminum hat channels to the 16” O/C metal stud. and/or wood studs
        ii. Discuss the installation spacing of the L-Brackets vertically and horizontally.
        iii. Discuss the Static (round hole) and dynamic (elongated) attachment points located in the L-Brackets and review how these attachment points allow for proper expansion and contraction of the VFS sub-frame at a 70-degree temperature difference.

c. Vertical T-Profile.
    i. Discuss the length and gauge of the T-Profile.
    ii. Vertical spacing of the T-Profile.
    iii. Explain how L-Bracket and T–Profile attachment connections remove any inconsistencies in the building wall.

d. Horizontal C-Rails:
    i. Discuss the attachment of the C-Rails to the vertical T-Profiles.
    ii. Cover the different installation options by installing the C-Rails to the T-Profiles and/or installing the C-Rail directly to the building walls.
    iii. Review the expansion and contraction requirements when installation the C-Rail to the T-profiles and/or directly onto the building walls.
    iv. Cover the horizontal spacing of the C-Rails.

e. C-Bracket:
    i. Explain in detail how the C-Bracket is attached to the tile with the mechanical undercut anchors.
    ii. Discuss the leveling screws and lock attachment screw located on the top C-Clamps provide a contractor friendly installation façade system.
    iii. Review in detail the number of C-Brackets required on each tile.

f. Horizontal Hat Cannel:
    i. Discuss in detail how the horizontal Hat Channel is used with 16" O/C light gauge metal studs and/or wood framings.
    ii. Review the vertical spacing used with the Hat Channel.
    iii. Discuss the anchoring of the L-Brackets and vertical T-Profile attachment system used with the horizontal Hat Channels expedites the installation of the VFS.

4. <u>Porcelain Tile Open Joints:</u>

a. Porcelain Tile (open joint) ventilated façade system (VFS) is the most effective way to place a building in the shade twenty-four hours a day.
b. Provide an in-depth overview as to how the open joint porcelain tile VFS system reflects solar radiation and reduces the amount of heat the building will absorb.
c. Discuss how the open joints (between the tiles) provide an air cushion within the air chamber that allows the passage of air and little water through the open joints.
    i. Review pressure equalization on the face of the tile and inside the air chamber.
d. Provide an overview as to why open joint VFS reduces energy costs related to solar heat gain and at the same time, provides an energy efficient building.
e. Provide an overview of the chimney effect inside the air cavity and the building envelope.
    i. Discuss why the chimney effect contributes to natural ventilation and how it removes heat and moisture inside the air chamber and helps with lowering the buildings energy consumption by reducing the cost of air conditioning.
f. Provide an in-depth overview showing how the VFS helps to retain heat in the building walls during the winter months.
g. Discuss Thermal Bridging and why installing continuous thermal insulation on the exterior of the building (inside the air chamber) eliminates 95% of the thermal bridging

found with traditional metal stud framed buildings and, building where the concrete slab meets the vertical walls.

i. Detail how relocating the moisture barrier from inside the building walls to the outside of the building envelope (inside the air chamber) will eliminate mold, mildew and condensation.

h. Sound Management

i. Review how relocating the Insulation to inside the VFS cavity will positively affect the acoustic sound insulating properties of the building envelope by as much a 14dB.

ii. Review how the open joint VFS reduces sound and isolates conduction.

5. <u>Laminated High-Impact Laminated Porcelain Slab System:</u>

a. Two Nominal 5'x10'x6mm thick slabs are laminated with Polyvinyl Butyral (PVB or equal .

b. Laminated panels are fired at 600-dgrees for approximately 90-minutes.

c. Initially developed for hurricane glass glazing applications making it water resistant, and stronger.

d. Withstands the Miami-Dade County Large Missile Impact Test.

6. <u>NASA Sustainability Opportunity Assessment Use of a Ventilated Façade:</u>

a. Discuss the NASA Energy Assessment for the NASA Center for Human Space Flight Performance and Research Building (CHSPAR Building 26) located in Houston, TX.

b. Provide an overview showing by installing a 24" x 24" Black polish porcelain tile VFS contributed to reducing the energy cooling costs for building #26 from $33,348.96-year down to $11,471.75-year savings of 21,475.21.

7. <u>Discuss the 5' x 10' x 6mm Thick Porcelain Tile Slabs:</u>

a. Introduce the technology used during the manufacturing process of the 5'x10'x6mm thick porcelain tile slabs.

b. Discuss the structural silicone adhesion installation methods required to install the 6mm thick slabs on

i. Exterior ventilated porcelain tile façade system installation.

c. Introduce the different mechanical anchoring systems used to anchor 5'x10x6mm slabs to the building envelope to include the following.

i. Aluminum Alloy 6060 T6 continuous anchor system.

ii. 6mm thick mechanical anchor system.

iii. Raimondi mechanical anchor strap / kerf cut / thin-set anchor system.

d. Provide an overview on the 5'x10'x6mm thick slabs exterior façade application and discuss how the anchor system incorporates the open joint ventilated façade technology.

i. Discuss how the structural silicon adhesion anchor system is adhered to the 6mm thick slabs using SikaSill Sika Tack Panel 50 Structural silicone .

8. <u>Projects:</u>

a. Review Projects around the world installed with a porcelain tile VFS.

b. Detail the different tile sizes and installation difference using the visible and invisible anchoring system.