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Marazzi Ventilated Wall System

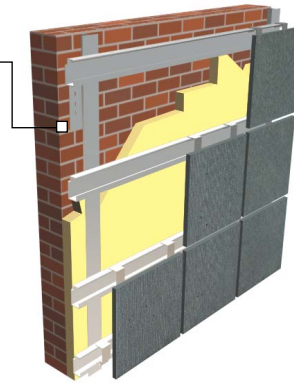
Porcelain stoneware cladding solution for energy efficient buildings

LARGE FORMAT ENERGY EFFICIENT SOUND INSULATION

An external, ventilated wall is the most effective technology for addressing the issues of thermal insulation and humidity protection facing the architectural community.

A ventilated wall system consists of three major components:

- An external cladding layer of large-format porcelain with open joints
- An aluminum substructure secured by brackets to the building
- A thermal insulation layer (comprised of waterproofed insulation) fastened to the building's exterior wall

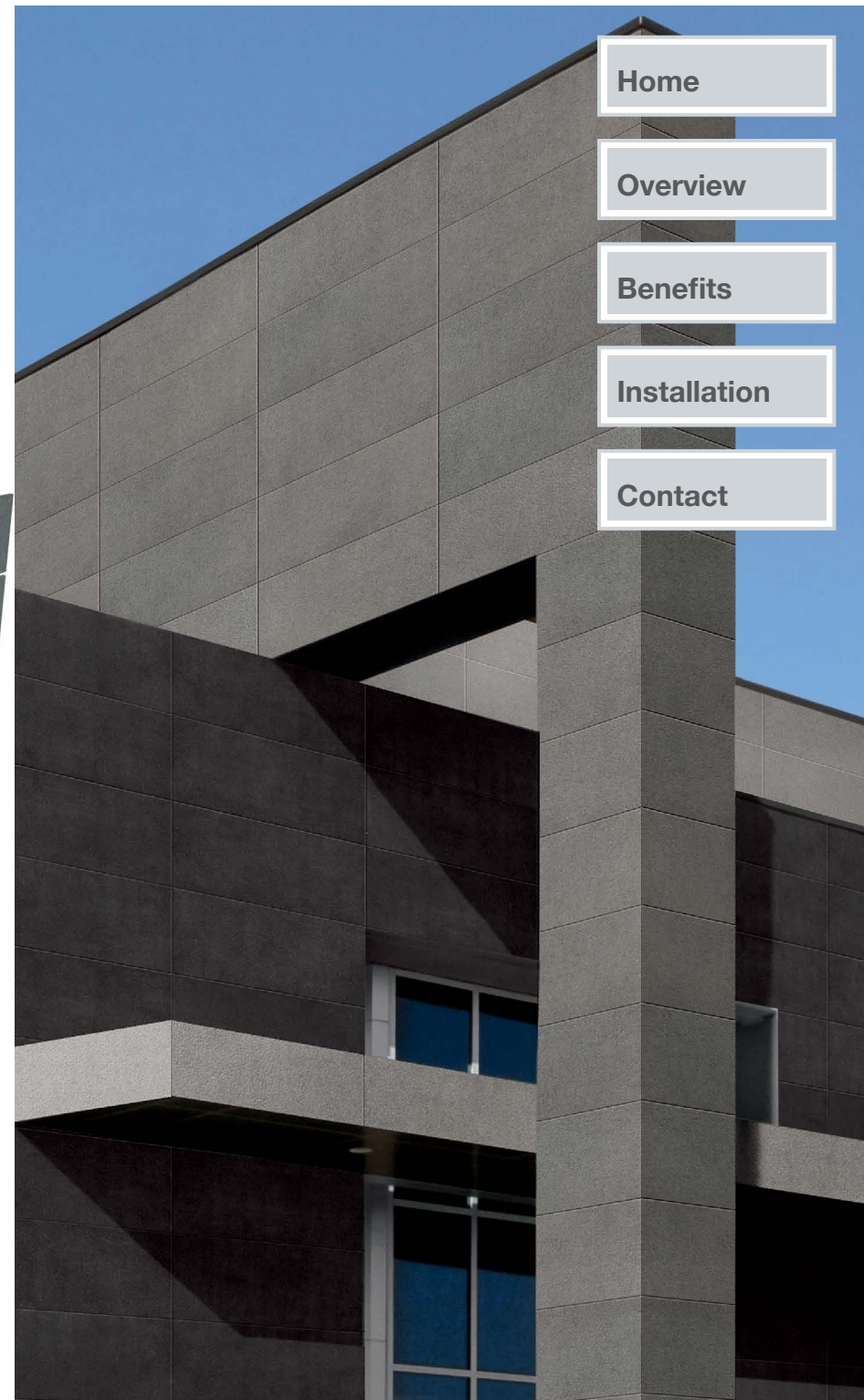


Porcelain stoneware is an ideal surfacing choice for ventilated walls. It is available in multiple finishes – matte, polished, glazed – as well as countless color combinations and styles ranging from stone to marble to granite to travertine. Abrasion, freeze-thaw, fading, graffiti and harsh weather conditions become non-issues. Large-format porcelain

offers excellent performance, both technical and aesthetic.

APPLICATIONS AND USAGE OF THE SYSTEM

- Suitable for external brick or concrete walls, newly built or already existing, whether solid or with openings
- Installation on standard vertical surfaces as well as on sloping and curved surfaces
- The ventilated facade overcomes all of the mechanical phenomena encountered during its lifetime, such as its own weight, suspended loads, external ambient shock, wind loading, deformation in the support structure, temperature or humidity variation, solar radiation, chemical and atmospheric agents



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1) ENERGY EFFICIENCIES

- Up to 1/3 savings on energy usage
- Elimination of thermal bridges
- Lower heating/cooling requirements result in less pollution entering the atmosphere

The discontinuity of shapes and materials - so typical of contemporary buildings - increase the occurrence of thermal bridges that cause an unbalanced temperature distribution within walls and make it easier for molds and condensation to form. In a Ventilated Wall System, continuous external insulation provides uniformity in thermal protection, while the cladding material stops direct sun radiation. **Together, they reduce the unbalanced temperature distribution and enhance the energy efficiency of the building.**

2) COST SAVINGS

Porcelain tile offers the perfect cladding alternative as its overall costs are significantly less than natural stone products (example: porcelain costs 20-25% less than granite). Freight and installation costs are also significantly less, due to tile's lower weight.

3) AESTHETICS

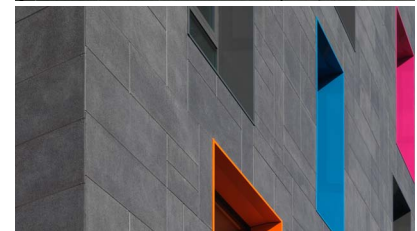
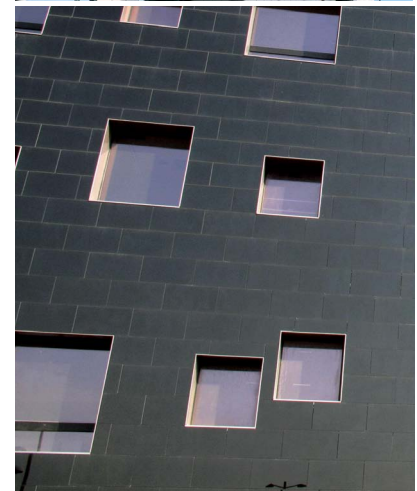
This system has a wide variety of design and colors with porcelain tile. The system can accommodate square and rectangular sizes (horizontally and vertically) in large formats. A multiplicity of finishes from polished to matte and virtually unlimited color ranges can be obtained through the use of beautiful porcelain products.

4) INSTALLATION EFFICIENCIES

The simplicity of the anchor bracket structure coupled with the pre-plotted design of the aluminum framework minimizes installation time. The use of porcelain, which weighs less than natural stone products, also reduces time and labor costs. The mesh backing applied to each piece provides an added measure of safety to the installation. In the event of breakage or defacement, individual tiles can be easily replaced.

5) BETTER SOUND INSULATION (“sound deadening”)

Ventilated walls provide better absorption of outside noises, **lowering the level by 10-15 dB. This “sound deadening” contributes to healthier, safer living and working environments.**

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6) ELIMINATES CONDENSATION EFFECT

When two environments separated by a wall have different relative temperatures and humidity, steam tends to migrate within the wall towards the nearest area in the room that has the lowest effective pressure. If during this movement, and following the lowering of the temperature, pressure decreases faster than the saturation pressure, condensation occurs. By positioning the insulation element on the outside of the wall, the curves of effective and saturation pressure will never meet, hence avoiding the creation of condensation.

7) WATER TIGHTNESS

The external cladding is normally installed with open joint widths measuring MINIMUM 5 mm. This **very narrow opening does not compromise protection from heavy rain or gusting winds**. The insulation is also water-repellent.

8) THERMAL STABILITY

When the outside cladding material is heated by solar radiation the **density of the air within the ventilation cavity varies vis-à-vis the ambient air, causing an upward flow**. This effect is particularly useful in summer, allowing dispersal of such heat as is not reflected away by the outside face. From a temperature and humidity point of view, the seasonal behavior of the facade can be summarized as follows:

SUMMER: Much of the angular radiant heat is reflected away from the face. The heat that does enter triggers the chimney effect so that only a minimal part of the heat flow is absorbed by the building. The reflective effect can be heightened by using light colors for the face. Additionally, the insulation retains the cool air produced by the air conditioning inside the building. **Building remains cooler in summer.**

WINTER: The “chimney effect” is lessened because the external ambient air and the air inside the cavity are approximately the same temperature and density; however, it offers some effect on sunny days. Primary benefits accrue because the waterproof insulation prevents heat loss, i.e. retains the heat generated by heating systems inside building. **Building remains warmer in winter.**

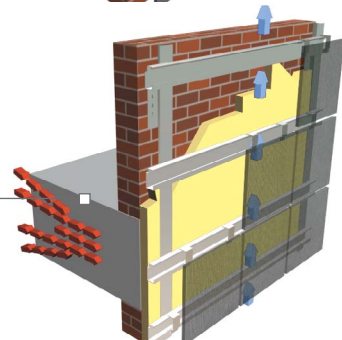
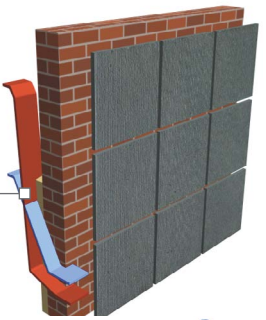
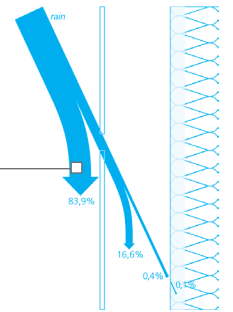
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A facade must meet many requirements, ranging from the observance of technical norms to the solution of static and functional problems as well as desired energy savings. However, it is also true that aesthetic and creative factors are the most visual elements of a building and are often uppermost in the mind of the designer. **Technical criteria must, therefore, run parallel to aesthetic criteria, allowing creativity to range without excessive constraints.**

ANCHOR BRACKETS ARE AFFIXED TO THE TILE

- To “interface” the tile structure with the substructure so that it is strong and long-lasting, four points are identified on the back of the tile. These points are pre-drilled for the insertion of specifically designed anchors which facilitate attachment of the tile to the aluminum framing.
- The location of the four points will vary according to the requirements of the design.
- A cone shaped hole is drilled and undercut (inverted cone-shape) into the tile in one step by completely automated equipment to extremely tight tolerances. Once the programmed design depth has been reached, a specialized flaring, (wider than the entry diameter) creates the housing for the anchor.
- Once inserted, the anchor expands without creating internal forces on the tile. The anchors and screws are stainless steel. Anchor brackets are then secured with stainless steel self-locking nuts.

BEARING FRAME COMPRISED OF VERTICAL RISERS AND HORIZONTAL RUNNERS

- A grid of vertical risers and horizontal runners form the bearing structure in this system.
- Vertical framework is comprised of extruded aluminum sections.
- Horizontal runners are secured to the vertical risers with aluminum alloy rivets.
- Brackets allow the coupling of the tile and the bearing substructure.
- The bracket shape exactly complements that of the horizontal runners, featuring a screw adjustment system that allows the tile to be perfectly aligned in the vertical plane during installation.
- A second headless screw allows the slab to be locked to the runner, avoiding any horizontal movement due to side winds on the facade or thermal expansion.
- Only one of the upper brackets is fixed, allowing expansion in one direction only.

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THERMAL INSULATION IS APPLIED

- The rigid fiberglass insulating panel is specially designed for use in ventilated facade systems.
- Due to the completely inorganic nature of fiberglass, the physical characteristics of the panel will not alter over time, thus guaranteeing constant thermal performance, with no degeneration.
- A fiber scrim covering the exposed face prevents mechanical erosion due to air-flow.

WALL CLADDING ELEMENTS ARE INSTALLED

Wall cladding options in porcelain stoneware are diverse. The use of different finishes - natural, polished, glazed – or a combination of more than one type creates wallscapes truly customized to the designer's vision. Both in technical and aesthetical terms, porcelain is a superior choice for beautiful, strong and frost resistant walls.

Porcelain stoneware is also a more efficient choice than products like natural stone because it is less expensive, more economical to transport and accounts for 1/3 less weight on the building.

- A ventilated facade is always the result of a carefully calculated design that leads to the selection of the desired tile elements and their dimensions. However, two approaches to installation are available:
 - 1) Tile elements with pre-fitted anchors can be factory-supplied. They are immediately ready for attachment to the brackets.
 - 2) When the dimensions of the material to be cut are determined at the construction site, a compact, user-friendly, portable machine is available to accomplish the drilling and automatic insertion of the anchors on-site. In this scenario, the installer has maximum freedom to correct any jobsite variations from the original design.
- Maximum design freedom is inherent due to the compatibility of different sizes and the flexibility of tile mounting patterns. Diagonal mounting or staggering of one row of tiles vis-à-vis adjacent ones thus become straight-forward operations. Curved surfaces are covered by becoming polygons with the sizes of the sides being a function of the curvature radius.

MARAZZI PROVIDES A TURN-KEY SOLUTION

Marazzi Engineering, located in Italy, offers a turnkey solution for our Ventilated Wall System. The engineering department is able to assist in all phases of a project: building site study, beam layout, anchor placement and tile layout as well as supply prepared tile for installation.

Contact your Marazzi representative for more information on our Marazzi turnkey solution.

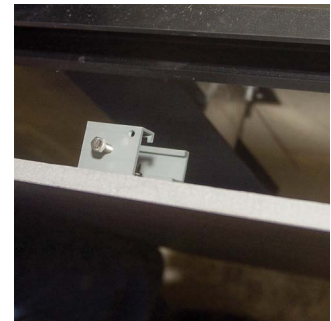
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