



Zinc Composite Material Special Considerations

Reynobond® ZCM

Special Considerations

I. Reynobond ZCM: Zinc Composite Material

A. Alcoa Architectural Products' Reynobond® Zinc Composite Material (ZCM) combines the natural beauty of zinc with the flatness, durability, ease of fabrication and cost-effectiveness for which Reynobond Aluminum Composite Material (ACM) is known. Utilizing a zinc-titanium alloy, Reynobond ZCM comes in a natural blue-gray, pre-weathered appearance, an attractive color that matures over time as it is exposed to air and the elements, developing the natural zinc carbonate patina that protects the surface. Scratches and imperfections melt away over time as the natural patina develops and matures. The natural beauty of zinc projects a powerful yet natural look on your building. ZCM offers architects the benefits of designing with composite material while giving the building a classical exterior material. For this reason, zinc has been used by architects with great success in natural settings and historic districts and as accents on older, more traditional buildings undergoing renovation.

B. Product Basics

Thickness	4 mm; 0.5mm or 0.7mm thick skins
Core	FR core is used
Skin Thickness	Standard: 0.020"/0.50mm/10 gauge* Optional thickness: 0.028"/.070mm/12 gauge*
Zinc Skin Alloy	Titanium zinc alloy (Ti ≤ 1%, Zn ≥ 99%, Cu ≤ 1%)
Weight †	Standard: 2.33lb/ft ² (12.92 kg/m ²) Non-Standard: 2.81lb/ft ² (15.58kg/m ²)
Widths	39.37" (1000 mm)
Maximum Length	243" (6172 mm)
Coefficients of Expansion ASTM E228	Longitudinal 12.2×10^{-6} in/in/°F Transverse 9.4×10^{-6} in/in/°F
Zinc Manufacturer	Rheinzink and VM
Finish	Rheinzink: Blue-Gray, Graphite Gray VM: Anthra, Pigmento and Quartz

*Oberg, et al. (2004). *Machinery's Handbook* (27th edition ed.). New York: Industrial Press. P 2502

†Weights calculated and based on 499 lb/ft³ for zinc and 106.1 lb/ft³ for the "FR" core

C. Appearance of Reynobond ZCM

i. Pre-weathered Finish

Titanium zinc alloy utilizes a unique patented process to alter the surface of the titanium zinc alloy to resemble a naturally weathered surface in both color and structure. A unique color that cannot be duplicated with paint or other coatings either in color or uniformity is the end result. From a distance the panels' patina will have a bluish-gray color. Up close, the natural surface variation and grain of the natural metal finish are revealed.

ii. Patina Process & Aging

The surface of Reynobond ZCM using titanium zinc alloy coil develops over time a blue-gray patina that serves as a protective layer. The patina (zinc carbonate) is a dense, firmly adhering and water-insoluble coating layer, which is responsible for the high corrosion resistance of zinc. Since other substances from the environment are incorporated into the patina, the color will vary slightly from one place to another.

iii. Cleaning and Maintenance

For the same reasons mentioned above, the surface of Reynobond ZCM requires only minor cleaning and maintenance over its lifetime. The zinc carbonate protective layer is a self-healing benefit. The patina immediately begins forming in scratches and abrasions at an accelerated rate. Over time the surface will achieve uniformity and the surface aberrations will virtually disappear.

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D. Corrosion Resistance

Much like aluminum and aluminum oxide, zinc carbonate is a naturally forming patina that protects the surface and makes ZCM very corrosion resistant. Water must not be allowed to stand, permanently contact, or pool on zinc products, even before installation. Long term exposure to water (including wet wood or pallets), other than rain running over panels, will cause zinc to permanently stain white. For information on electrolytic and galvanic corrosion, please refer to Section (G) Reaction with Other Metals.

E. ZCM Only Available with FR Core

This is necessary in order to pass ASTM E84 Steiner Tunnel Tests for flame spread and smoke generated. ZCM from Alcoa, with the FR core is NOT fire rated per the IBC, Section 1407.

F. Reaction with Other Metals

To eliminate the danger of galvanic corrosion between zinc and other metals of differing electrochemical voltage potential, please ensure that other metals coming in permanent contact with ZCM are made of aluminum, galvanized steel or stainless steel.

G. Environmental Impact

Zinc is a non-corrosive, environmentally friendly product with 100% clear-water runoff.

II. Handling

A. Fingerprinting

Use gloves and long sleeves when handling ZCM. Handling the unprotected surface of ZCM with bare hands could leave fingerprints on the surface, which over time will incorporate into the patina and discolor the metal due to the acidity contained in perspiration. For removal of fingerprints see cleaning instructions.

B. Scratches and Abrasions

Zinc is self-healing. When scratches and abrasions occur on the panel surface, the zinc carbonate patina immediately begins to form in those areas. The patina will develop at an accelerated rate, eventually blending into the surrounding area on the panel.

III. Transportation & Storage

A. Support

Transport flat and fabricated ZCM panels in secure packing configurations to avoid abrasions and scratches. Also take special care to store and transport Reynobond ZCM panels on flat, well-supported surfaces to avoid material deflection and potential permanent set. Even though Reynobond ZCM is a strong and flat panel, the titanium zinc alloy is softer than aluminum.

B. Protection from Water & Moisture

Reynobond ZCM panels are transported and stored under dry, ventilated conditions. Direct contact between wet surfaces and panels should be avoided. Keep all stored ZCM panels physically elevated above the ground, with proper ventilation underneath storage skids and to the enclosed volume. Keep all storage skids covered and allow airflow under waterproof tarps or other material secured against the wind. If possible, avoid stored panel exposure to changes in dew point or temperature that could result in condensation buildup. If ZCM is stored on a porous damp surface, such as foam or wood pallets, likely permanent staining will result.



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C. Installation During Rain

Reynobond ZCM can be installed during wet and rainy conditions or on surfaces wet from rain provided that subsurfaces do not have water-accumulating properties and provided that they can dry out after installation.

D. Removal of Heavy-Gauge Protective Film

The heavy-gauge protective film applied during material manufacture should be left on until the material is installed on the building façade, at which time it should be removed as soon as possible.

IV. Design

A. Benefits of ZCM

- i. ZCM combines the natural beauty of zinc with the flatness, durability, ease of fabrication and cost effectiveness of Reynobond. ZCM can be fabricated to accommodate the most challenging interior and exterior design applications.
- ii. ZCM is very flexible in design application. It can be used in modern urban districts or in historic settings where a natural surface is desired to blend into the surroundings and project a feeling of times past.

B. Panel Width Limitation 39.37 Inches

Due to manufacturing process parameters, Reynobond ZCM is limited to a width of 1 meter (39.37 inches). With a standard rout-and-return system, panel modules of 36 to 37 inches in width are recommended.

C. Panel Length Recommendations

Though ZCM panels can be manufactured up to 243 inches in length, it is recommended that panel module no more than 10 feet (120 inches / 3048 mm) maximum be utilized. Additional stiffeners will be needed as per the recommendations in Section (F) below. A 10-foot module will require a flat panel.

D. Optical Directionality Concerns

When designing panel placement, it is extremely important to treat Reynobond ZCM in the same manner as ACM finished with metallic coatings that exhibit directionality. The longitudinal and transverse direction of the zinc panel has both optical thermal expansion differences. ZCM panels should be installed with the metal grain oriented in the same direction on the building façade utilizing the directional arrows printed on the back of panels.

E. ZCM Rigidity & Stiffener

The lower tensile yield strength for zinc compared to aluminum translates to lower wind-loading capabilities for ZCM versus ACM. ZCM panels will experience permanent set after deflection under much lower loads than ACM panels. With proper stiffener placement, ZCM can be installed in most architectural applications.



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F. Thermal Expansion & Contraction

The coefficients of thermal expansion and contraction of Reynobond ZCM differ greatly from Aluminum Composite Material. ACM will expand and contract equally longitudinally and transversely to the metal grain. The titanium zinc alloy used in Reynobond ZCM will expand and contract differently in each direction. The coefficients of expansion per ASTM E228 are listed below with respect to directional orientation to the metal grain.

ZCM Longitudinal Coefficient of Thermal Expansion = 12.2×10^{-6} in/in/°F

ZCM Transverse Coefficient of Thermal Expansion = 9.4×10^{-6} in/in/°F

Significance:

When performing thermal movement calculations for a particular “run” of panels on an elevation or façade, it is very important that calculations be performed in both vertical and horizontal directions.

G. Minimizing Color Variation

Due to the unique alloying characteristics and patina formation process inherent to each batch of zinc coil used for ZCM, it is very important to order material in one release, from one production lot. Doing otherwise will result in high degrees of optical color variation. It is important to mention though that zinc is a natural metal; small degrees of color variation within a single production lot should be expected.

H. Design with Moisture-Weeping Systems and Ventilation

It is extremely important to design to include adequate weeping of condensation or rainwater from behind the panel to the ground. Failure to do so will result in material corrosion due to standing-water.

V. Fabrication

A. Fabricate ZCM as ACM

ZCM can be fabricated with the same equipment used for fabricating ACM. It is a softer metal than aluminum; therefore no major tooling changes are required.

B. Minimum Working Temperature

To avoid cracking, ZCM should not be worked when the temperature is lower than 10° C (50° F).

C. Soldering

ZCM can be soldered with good strength acquired if the joints are correctly designed. Though soldering is preferred, ZCM can also be welded.

D. Importance of Gloves

When handling the unprotected surface of ZCM with bare hands, fingerprints could be left on the surface, which will discolor the metal due to the acidity contained in the perspiration. For information on removing fingerprints, see the cleaning instructions.

**For fabrication guidelines visit or website www.alcoaarchitecturalproducts.com*



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VI. Installation

A. Avoid Standing Water and Condensation on Installed ZCM

Install Reynobond ZCM to prevent conditions of standing water or moisture in areas behind panels. Moisture can result in premature corrosion of the zinc skins. Any moisture behind panels as a result from condensation or water penetration must be moved away from the zinc surfaces. Alcoa Architectural Products recommends that weeping and ventilation be incorporated into the installation of any glazed panel, dry, reveal or rainscreen using ZCM.

B. Use of Temporary Façade Covers during Construction

If covers are used to protect panel areas during construction or staging it is critical that the covering:

- i. should not be placed over wet or damp ZCM panels
- ii. should not be used if the cover material is damp
- iii. should be installed in a manner that ensures proper ventilation to all the covered panels

C. Fasteners & Attachment Extrusions of Different Metals

To eliminate the danger of galvanic corrosion between zinc and other metals of differing electrochemical voltage potential, please ensure that fasteners and attachment extrusions used with ZCM are made of aluminum, galvanized steel or stainless steel only. When ZCM is in direct contact with aluminum, in principle there is no risk of contact corrosion.

D. Weeping of Condensation / Moisture / Rainwater

Panels should be installed adhering to design specifications for weeping condensation or rainwater from behind the panel and installation system to the ground. Failure to do so will result in material corrosion due to standing water.

E. Silicone Sealants

Reynobond ZCM reacts well with neutral or slightly alkaline silicone sealants (pH < 12). Do not use systems with an acid reaction, such as acetoxy or acetic acid systems, since upon contact with ZCM they may initiate corrosion.

F. Compensation for Thermal Movement

As mentioned in the design section, it is extremely important to install Reynobond ZCM strictly adhering to design specifications for compensation of thermal movement. This includes not only proper orientation of panels but also correct use of fasteners.

G. Removal of Factory-Applied Protective Film

A strippable film is applied to ZCM during the manufacturing process to protect the surface from dirt, moisture and scratches during handling, fabrication and installation. This film should be removed immediately after installation.

H. Importance of Gloves and Long Sleeves

Even with the protective film still in place, it is important that workers wear gloves and long-sleeve shirts while installing Reynobond ZCM panels to avoid skin-to-metal-substrate contact. Such contact will result in subsequent zinc oxide formation and blemishing.



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VII. Cleaning

A. General Recommendations

A unique property of titanium zinc alloy is that as the material ages it forms a natural and variable patina influenced by its local environment. Over the lifetime of the building little cleaning will need to be done. It is important to NOT use traditional cleaning agents commonly used in construction to perform "final cleaning" before building acceptance. These can interfere with the natural patination process.

B. Mortar & Concrete Contact

In general, alkaline chlorine-free mortar or concrete will not lead to critical corrosion of zinc substrates. Corrosion occurs only if there is sufficient moisture trapped against the panel surface. Plaster will not cause problems provided that it dries very quickly and does not maintain a constant state of dampness. Mortar and concrete contact can initiate corrosion due to chlorides present in mixing water that persist beyond the curing phase. Therefore all mortar residue, concrete and plaster that come in contact with ZCM should be removed promptly. Some aesthetic discoloration may be observed but this is non-destructive in nature.

C. Fingerprint Removal

Fingerprints can be removed immediately following fabrication or installation with acid-free oil or washing with a mild water-based detergent. If the discoloration is not removed immediately the fingerprints will be incorporated into the patina.

D. Surface Runoff Marking

Under most circumstances Reynobond ZCM panels have a 100% clearwater runoff from rainwater. However, traces of zinc hydroxide runoff can occur if large amounts have formed on the metal surface due to improper storage prior to installation.

