JIANGYIN HRL NEW MATERIAL TECHNOLOGICAL CO., LTD
18 Huanxi road,Huashi,Jiangyin, Jiangsu,China
www.sky-rainbow.com
info@sky-rainbow.com

Unsuitable Applications for Aluminum Composite Panels (ACP)

Although aluminum composite panels (ACP) are widely used in construction and decoration, there are certain scenarios where their application may not be ideal:

1. High-Temperature Environments

ACP cores, typically made of low-density polyethylene (LDPE) or fire-retardant materials, can deform or lose strength in extreme heat. High temperatures may accelerate the degradation of the adhesive layer between the aluminum skins and the core, compromising the panel's structural integrity.

2. Heavy Load-Bearing Environments

While ACPs are suitable for light-duty applications, they are not designed to withstand significant impacts or prolonged heavy loads. Structural components or high-load surfaces (e.g., heavy-duty flooring) are not recommended uses for ACP.

3. Extreme Humidity or Prolonged Water Exposure

Although ACP performs well in standard humid environments, prolonged exposure to water or extreme humidity can degrade the adhesive, weakening the bond between the aluminum skins and the core. In areas like ground surfaces or walls with water seepage, the alkaline environment created by the reaction between water and cement can accelerate aluminum skin corrosion, reducing the panel's structural performance and lifespan.

Cement reacts with water to release hydroxide ions (OH^-). Its primary components, such as tricalcium silicate and dicalcium silicate, generate calcium hydroxide ($Ca(OH)_2$) during hydration. This raises the pH of the environment to 12–13, creating a highly alkaline condition. Even after hardening, cement retains this alkalinity, especially in moist or submerged conditions, posing corrosion risks to materials like ACP aluminum skins.

4. Highly Corrosive Environments

While ACP surfaces are coated for corrosion resistance, they may not perform well in highly corrosive conditions, such as chemical plants or coastal buildings exposed to high salt, strong acids, or alkalis. Stainless steel or other corrosion-resistant metals are more suitable for such environments.

5. Extreme Fire Safety Requirements

Standard ACP with LDPE cores lacks high fire resistance. Although fire-rated ACPs (A2, B1 grades) are available, they may not meet the strict fire safety standards for areas like emergency evacuation routes or stairwells, where higher-grade fireproof materials are typically required.

6. Projects Requiring Extensive Mechanical Processing

ACP is versatile for basic fabrication, but it is less suitable for heavy processing such as welding, large-scale bending, or thick plate perforation. Such operations can cause delamination or surface deformation. Materials like solid aluminum, steel, or stainless steel may perform better in these applications.

7. Areas Requiring High Hardness or Impact Resistance

ACP's impact resistance is relatively lower. In environments demanding high resistance to impact, scratches, or damage—such as commercial kitchens, factory workshops, or high-traffic areas—it may not be durable enough.

8. High-Rise Buildings in Strong Wind Zones

Although ACP can handle standard wind loads, it may not provide sufficient rigidity and wind pressure resistance for very tall buildings or regions with strong winds. Using denser reinforcement on the back or alternative materials with higher bending stiffness may be necessary.

9. Architectural Styles Requiring Natural or Unique Textures

ACP is ideal for modern and commercial designs but may not achieve the desired aesthetic in architectural styles favoring natural materials like stone or wood. Natural stone, wood, or high-texture decorative materials may be better suited for such projects.

These limitations provide guidance for designers and decision-makers to select materials wisely, ensuring ACP is applied in scenarios where it performs optimally, while alternative materials are used in areas beyond its strengths.