

Aluminium Composite vs. Corrugated-Core vs. Honeycomb Aluminium Panels

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Key Engineering Takeaway: ACP, corrugated-core and aluminum honeycomb panels represent three distinct sandwich core architectures rather than a simple 'basic, better, best' hierarchy. Selecting the optimal panel depends on specific project performance criteria—including core geometry, span dimensions, skin specifications, tested fire performance, and system fabrication details. Product-specific test data and manufacturer declarations must always take precedence over generic category descriptions.

1. Comprehensive Comparison Matrix

Feature / Metric	ACP / ACM Panels	Corrugated-Core Panels	Honeycomb Panels
Core Architecture	Continuous core, which may be polyethylene-based or a mineral-filled polymer formulation depending on the product	Corrugated aluminum core (formed aluminum ribs or waves)	Cellular aluminum honeycomb core
Structural Depth Scope	Typically thin section profiles (e.g., 3mm – 6mm)	Medium to deep sandwich depths (e.g., 4mm – 10mm+)	Deep sandwich depths (e.g., 6mm – 50mm+)
Bending Stiffness Performance	Section stiffness depends on skin thickness, total depth, and continuous core formulation	Mechanical behavior depends on core geometry, orientation, skin thickness, depth, bond quality, and loading direction	Cellular geometry can provide high stiffness-to-weight performance; properties depend on cell size, foil gauge, and skins
Weight Profile / Mass	Product/configuration dependent — compare declared mass for equivalent project requirements	Product/configuration dependent — compare declared mass for equivalent project requirements	Product/configuration dependent — compare declared mass for equivalent project requirements
Fire Reaction (EN 13501-1)	Reaction-to-fire classification belongs to the specific tested product/construction under the applicable standard	Reaction-to-fire classification belongs to the specific tested product/construction under the applicable standard	Reaction-to-fire classification belongs to the specific tested product/construction under the applicable standard
Exterior Surface Flatness	Good surface flatness can be achieved depending on panel dimensions, skins, support conditions, and system design	The corrugated core is internal; finished architectural products can use flat exterior face sheets	Good surface flatness can be achieved across larger depths; compare manufacturer flatness and tolerance data
Directional Behavior	Generally more balanced planar behavior than a unidirectional corrugated core; actual response depends on panel construction and loading.	Corrugated-core construction commonly exhibits directional behavior; extent depends on design	Cellular matrix geometry provides balanced multi-directional section stiffness

Fabrication & Detailing	Mature fabrication ecosystem; standard routing, grooving, and cassette folding	System dependent; edge closure, joining, routing, framing, and fastening should be checked with manufacturer	System dependent; edge closure, inserts, joining, routing, framing, and fastening should be checked with manufacturer
Primary Application Scope	Architectural cladding, signage, interior wall systems, canopy soffits	High-rise cladding, architectural façades, industrial wall systems	Large-format curtain walls, high-rise cladding, transportation & industrial structures

2. Core Architecture Breakdown

A. Aluminium Composite Panels (ACP / ACM)

An aluminum composite panel uses a continuous core, which may be polyethylene-based or a mineral-filled polymer formulation depending on the product, bonded between two aluminium face sheets. The core provides continuous support across the panel surface area. ACP is widely specified due to a mature fabrication ecosystem, allowing established routing, grooving, and cassette folding techniques.

B. Corrugated-Core Aluminium Panels

Corrugated-core aluminum panels feature formed aluminum ribs or channels sandwiched between outer aluminum face sheets. The corrugated core is internal; finished architectural products can use flat exterior face sheets. Separating face sheets with a formed metal core increases section depth while removing continuous core mass. Mechanical behavior commonly exhibits directional stiffness along the core rib axis, with the extent depending on the specific core design.

C. Aluminium Honeycomb Panels

Aluminum honeycomb panels utilize a cellular aluminum honeycomb core bonded between aluminum face sheets. This cellular geometry can provide high stiffness-to-weight performance by separating face skins across deeper sandwich sections without solid material density. Actual structural, deflection, and dimensional behavior depend on the overall panel thickness, skin gauge, cell size, foil gauge, bonding system, and support conditions.

3. Clarifying Common Industry Misconceptions

Myth 1: 'All metallic-core panels automatically achieve non-combustible or A2-s1,d0 fire ratings.' Correction: Reaction-to-fire classification belongs to the specific tested product/construction under the applicable standard (e.g., EN 13501-1). Factors including adhesive bonding systems and complete wall assembly details influence test results. Specific ACP, corrugated, and honeycomb products may achieve A2-s1,d0 classifications, while other products within the same broad categories carry different ratings.

Myth 2: 'Corrugated aluminum panels create a wavy exterior façade appearance.' Correction: The corrugated core is internal; finished architectural products can use flat exterior face sheets. Internal corrugation does not inherently create a wavy exterior finish, though overall surface flat performance depends on panel dimensions, skin gauge, support framing, and installation.

Myth 3: 'Honeycomb panels guarantee absolute flatness and freedom from oil-canning.' Correction: No panel category guarantees zero oil-canning or zero deflection under all conditions. Good surface flatness can be achieved depending on panel dimensions, skin thickness, core specification, fabrication quality, support framing, and environmental thermal loading. Always evaluate manufacturer flatness and dimensional tolerance data.

Myth 4: 'ACP is always heavy, while metallic-core panels are always lightweight.' Correction: Panel mass depends on overall panel thickness, face and back skin thickness, core construction or density, surface coatings, and specific product configuration. Category names alone do not determine weight rankings; compare manufacturer-declared mass per square meter for equivalent performance requirements.

4. Specifier's Decision Framework

Specify ACP / ACM when: Project priorities focus on standard cassette fabrication, established routing and folding methods, broad coating and color options, and cost-effective cladding, provided the exact product and façade assembly satisfy applicable performance and fire requirements.

Specify Corrugated-Core Panels when: An all-metal core architecture, low mass and useful panel rigidity suit the project, provided the exact product's mechanical properties, reaction-to-fire classification and fabrication/system requirements satisfy the specification.

Specify Aluminium Honeycomb Panels when: High stiffness at relatively low weight, greater sandwich depth, large panel formats or demanding architectural/transport requirements justify the selected system's cost, fabrication and detailing requirements. Verify actual structural and dimensional performance from product/system data.

5. Project-Dependent Verification Tender Checklist

When issuing architectural, structural, or procurement specifications, avoid generic panel category names. Verify the following project-specific parameters:

- Applicable reaction-to-fire classification and test documentation for the specific tested product and assembly.
- Total panel thickness (mm) and face/back skin thicknesses (e.g., 0.5mm / 0.5mm).
- Applicable alloy grade and temper for face and back skins where relevant to structural or anodizing needs.
- Core parameters relevant to the selected product (mineral filling density for ACP, rib pitch/height for corrugated, cell size and foil gauge for honeycomb).
- Coating and surface finish specification (e.g., PVDF, FEVE, anodized, or other specified finish) verified against manufacturer data and warranty terms.
- Required mechanical performance, certified bending rigidity (E-I), section modulus, and shear strength.
- Manufacturer dimensional tolerances, surface flatness data, and thermal expansion behavior.
- Fixing, sub-framing, and attachment system requirements (e.g., rivets, disc anchors, or cassette hook-on systems).
- Compliance with applicable project standards, local building codes, and jurisdiction-specific façade regulations.

Engineering Note: This guide is intended for material understanding and preliminary product evaluation. It is not a substitute for project-specific structural, façade, fire, wind-load or code-compliance engineering. Verify the exact product, test reports, certification scope, fixing system and complete assembly before specification or procurement.