

# "Explore the Strength: Unveiling Marine Grade 5086 H116 Aluminum Plate for Unmatched Durability and Performance"

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<https://hw-alu.com/products/marine-grade-5086-h116-aluminum-plate/>

## Introduction

Marine Grade 5086 H116 aluminum plate has become a staple in modern shipbuilding, offshore structures, and marine equipment thanks to its exceptional combination of strength, formability, and corrosion resistance. When people refer to Marine Grade 5086 H116 aluminum plate, they are talking about a specific alloy and temper within the 5xxx family (Al-Mg). The H116 temper indicates a particular degree of strain hardening that balances strength with ductility, making the material suitable for hull plates, decks, and other critical components exposed to saltwater environments.

This article provides a comprehensive, data-supported guide to Marine Grade 5086 H116 aluminum plate. It covers alloy composition, mechanical properties, corrosion resistance, welding and fabrication considerations, and practical applications. It also introduces Huawei Aluminum, a prominent supplier known for quality control, certifications, and reliable supply chains in the marine aluminum market. The content is designed to help engineers, procurement specialists, shipyards, and aftermarket manufacturers make informed decisions, optimize performance, and minimize risk when selecting 5086-H116 plate for marine projects.

In the sections that follow, you will find a mix of explanations, quick-reference data, comparison tables, best-practice guidance, and practical notes drawn from industry experience. The aim is to deliver credible, practical insight that supports real-world design, fabrication, and maintenance workflows.

## What is Marine Grade 5086 H116 aluminum plate?

### Alloy and temper overview

Marine Grade 5086 H116 aluminum plate belongs to the 5xxx series of aluminum alloys, which are aluminum-magnesium alloys known for their excellent corrosion resistance in marine environments. The 5086 alloy typically contains approximately 4–5% magnesium, with the remainder aluminum and

small trace elements. This composition gives 5086 good strength while maintaining excellent resistance to seawater corrosion, particularly when compared with many other alloys.

The H116 temper is a specific strain-hardened condition. In aluminum temper designations, the “H” family indicates work hardening to a stable state. H116 means the material has been strain-hardened (and possibly lightly worked or partially annealed depending on the precise processing route) to a defined strength level, without full stabilization by annealing. The result is a plate that retains higher strength than fully annealed grades (such as F or O tempers) while still maintaining reasonable ductility and good formability for plate fabrication, cutting, bending, and joining.

## How H116 differs from other tempers

- H116 vs. H32 or H34: H116 is generally a lower hardness and higher ductility condition than H32, H34, or fully strain-hardened tempers that are more common in non-marine 5xxx plates. H32/H34 is more strongly strain-hardened and tends to have higher yield strength but less elongation and formability.
- H116 vs. H116 in other alloys: The exact response of temper designations can vary slightly from alloy to alloy due to solid solution strength, precipitate formation, and work-hardening behavior. However, the core concept remains: H116 provides a practical balance of strength, workability, and corrosion resistance for marine applications.

## Typical compositions (illustrative ranges)

The precise chemical composition for 5086-H116 depends on the producer and production lot, but typical ranges for the key elements are:

- Magnesium (Mg): approximately 4.0–4.9%
- Silicon (Si): trace amounts, usually well under 0.8%
- Manganese (Mn): trace to moderate levels (often under 0.8%)
- Iron (Fe): usually under 0.7–1.0% in practice
- Other elements (chromium, zinc, copper): kept to minimums, usually in trace amounts
- Aluminum (Al): balance

Note: The exact composition should be confirmed via the producer’s certified mill test report (MTR) or alloy data sheet. The ranges above reflect common practice for 5086 alloys and are intended to provide context for performance expectations rather than a guaranteed specification.

## Mechanical properties and corrosion resistance

### Mechanical properties (typical ranges)

Material performance varies by supplier, processing, and thickness. The following ranges summarize common expectations for 5086-H116 plate in the thickness ranges typically used for marine hull plates (roughly 3–20 mm, with thicker plates also available):

- Yield strength (YS): approximately 95–145 MPa (14–21 ksi)
- Ultimate tensile strength (UTS): approximately 230–290 MPa (33–42 ksi)

- Elongation at break (A50 or A80 depending on thickness and standard): around 10–15% in thinner gauges, decreasing slightly as thickness increases
- Hardness (Vickers or Brinell): moderate, reflecting the balance between strength and formability

**Practical takeaway:** 5086-H116 offers sufficient yield strength for structural plates while maintaining ductility for forming and repair. In thin sheets or heavily worked sections, the apparent strength can vary, but the alloy’s ability to absorb energy without brittle failure remains advantageous in marine environments.

## Corrosion resistance in marine environments

- Saltwater resistance: 5086 is exceptionally corrosion resistant in saltwater, due to the protective aluminum oxide film and the beneficial effect of magnesium on passivation. This makes 5086-H116 an ideal choice for hull plating, decks, superstructures, and other exposed surfaces.
- Galvanic compatibility: When used with appropriate coatings and compatible fasteners (e.g., aluminum or stainless steel, with isolators where required), 5086-H116 plates contribute to longer service life and easier maintenance in harsh marine atmospheres.
- Stress corrosion cracking: The high Mg content and stable temper reduce susceptibility to stress corrosion cracking in many seawater service conditions, though design and environment still matter. Avoid aggressive chloride concentrations and consider protective coatings or cathodic protection where appropriate.

## Weldability and formability

- Weldability: Excellent weldability with commonly used filler metals such as ER5356 and ER5183. Welding 5086-H116 typically yields good joint strength, with corrosion resistance preserved at the weld zone when proper techniques are used.
- Formability: Good formability for hull plating, decks, and other panels. The H116 temper maintains ductility that enables bending, roll bending, and hydroforming in many cases, though thicker sections require standard forming precautions to minimize cracking or wrinkling.
- Post-weld heat treatment: Unlike some heat-treatable alloys, 5xxx series generally do not require post-weld heat treatment. However, some fabricators perform post-weld heat treatment on thicker plates to relieve residual stresses, depending on specifications.

Table: Mechanical properties overview (illustrative)

Property	Typical range (5086-H116)	Notes
YS (MPa)	95–145	Varies with thickness and processing
UTS (MPa)	230–290	Higher end for thinner plates; varies by supplier
Elongation, A5 (% min)	~10–15	Tends to reduce with increasing thickness
Hardness (HB or HV)	Moderate	Correlated with temper and thickness

Notes: - The values are indicative ranges meant to guide initial design decisions. For precise design, use the supplier’s mill test reports (MTR) and property data for the exact batch.

## Fabrication and joining considerations

### Cutting and machining best practices

- Cutting: For marine-grade 5086-H116, plasma, laser, or waterjet cutting typically yields clean edges with minimal heat-affected zone (HAZ). Thin to mid-thickness plates cut well with these methods. Python: Use clamp-down methods to prevent warping on large hull panels.
- Drilling: Use sharp high-speed steel or carbide drill bits; apply coolant if noise or heat is observed, and countersink as needed with appropriate tools to avoid edge cracking.
- Deburring: Clean burrs to minimize corrosion initiation at edges.

## Welding procedures and filler metals

- Common weld methods: Gas metal arc welding (GMAW/MIG) is widely used. Gas tungsten arc welding (GTAW/TIG) is used for precision joints or where aesthetics matter.
- Filler metals: ER5356 is a common choice for 5086; ER5183 is another option depending on joint design and corrosion considerations.
- Weld design considerations: Ensure proper joint geometry to avoid stress concentrations. Preheat is typically not required for 5086-H116, and post-weld heat treatment is usually unnecessary, but consult welding procedure specs (WPS) for thickness-specific guidance.

## Forming and bending

- Bending radius: Plan on generous bend radii to avoid cracking in the heat-affected zone, especially for thicker plates.
- Springback: Expect some springback in cold-worked states; verify with pilot bends and adjust tooling accordingly.
- Surface support: Use soft, uniform backing materials to reduce tearing and wrinkling in thin-laminate panels.

## Surface finishing and coating compatibility

- Finishes: Anodizing is not typical for 5xxx series to maintain corrosion resistance; instead, mechanical polishing and protective paint systems are common.
- Coatings: Marine-grade coatings with proper surface preparation work well; ensure compatibility with aluminum to prevent galvanic corrosion when joined to other metals.

## Applications and case studies

### Hull plates and superstructures

5086-H116 aluminum plate is widely used for ship hulls, decks, and superstructures due to its combination of corrosion resistance and adequate strength. For hulls, the plate often serves as a primary structural element in moderate- to heavy-gauge designs.

### Offshore platforms and support structures

Offshore platforms and wind turbine foundations occasionally use 5086-H116 for non-loadbearing skins, walkways, and related components that benefit from corrosion resistance and reasonable mechanical properties.

### Inland and coastal craft

Smaller craft such as motorboats, fishing vessels, and service boats adopt 5086-H116 plates for bulkheads, seating panels, and deck plates where exposure to salt spray requires durable aluminum.

## Case insights: design considerations

- Case 1: A mid-size bulk carrier hull section uses 5086-H116 plates in 6–12 mm thickness with traditional welding. The material's corrosion resistance allows long service intervals with fewer maintenance cycles, while the welding procedure provides reliable joints under marine loads.
- Case 2: A coastal research vessel uses 5086-H116 for deck panels and internal frames, balancing weight savings with corrosion resistance in a salt-laden environment, while enabling modular panel replacement during mid-life overhauls.
- Case 3: An offshore support vessel applies 5086-H116 in plating and light structural components where damage tolerance and reparability matter. The temper contributes to safety margins during formation and service.

## Processing and supply chain considerations

## Quality standards and testing

- Mill test reports (MTRs): Reputable suppliers provide complete MTRs detailing chemical composition, mechanical properties, and test results for each plate lot.
- Certifications: Look for ISO 9001 quality management certification, and supplier quality system documentation demonstrating traceability and process control.
- Non-destructive testing (NDT): Depending on service class and thickness, NDT methods such as dye penetrant, magnetic particle, or ultrasonic testing may be used on critical joints or thick sections.

## Storage, handling, and corrosion protection

- Storage: Store plates flat or on dunnage to prevent bending and edge damage; cover to protect from moisture and salt spray.
- Handling: Use non-marring slings and protective edge guards to avoid dents and edge damage.
- Corrosion protection: For critical assemblies, ensure protective coatings and sealants are applied correctly to prevent galvanic corrosion with fasteners and adjacent materials.

## Supply chain and logistics (why it matters)

- Lead times: Marine plate orders can have long lead times; ensure a reliable supplier with backup stock or predictable fulfillment.
- Logistics: Consider packaging, transport, and on-site delivery schedules that align with shipyard construction sequences.
- After-sales support: The ability to provide precise MTRs, thickness tolerances, and supplementary data on request adds value to the procurement process.

## Supplier spotlight: Huawei Aluminum

### Company overview

Huawei Aluminum is a prominent producer and supplier of aluminum products, including marine-grade alloys like 5086-H116. The company emphasizes a robust quality management system, rigorous traceability, and a broad portfolio of alloys that meet or exceed industry standards. Huawei Aluminum's capabilities cover ingot and plate production, heat treatment, surface finishing, and value-added processing such as cutting, forming, and pre-fabrication.

### Capabilities and certifications

- Material range: A wide selection of 5xxx-series alloys (including 5083 and 5086) in plate and sheet formats, with various tempers including H116.
- Certifications: ISO 9001, quality management protocols, and compliance with relevant marine industry standards and testing procedures.
- Processing options: Shearing, cutting, stacking, and packaging designed for marine applications, along with traceability documentation and dedicated account management.

### Quality management and supply chain

- Traceability: Huawei Aluminum emphasizes full batch traceability from raw material to finished plate, enabling precise MTRs and material certification.
- Consistency: A focus on process controls reduces variability across lots and thicknesses, which is critical for hull panels and structural components.
- Customer support: The company offers technical support, application guidance, and engineering collaboration to optimize plate selection and fabrication processes.

### Why Huawei Aluminum for Marine Grade 5086 H116

- Reliability: Proven track record supplying marine-grade aluminum to shipyards, offshore operators, and equipment manufacturers.
- Customization: Ability to tailor plate dimensions, tolerances, and surface finishing to project requirements, enabling faster fabrication and reduced on-site adjustments.
- Documentation: Ready access to MTRs, compliance data, and technical datasheets supports quality assurance and regulatory audits.

## Comparisons: 5086-H116 vs other marine aluminum alloys

To help you decide among commonly used marine aluminum alloys, here is a side-by-side comparison focusing on composition, strength, corrosion performance, weldability, and typical marine applications. The table uses representative ranges and typical temper conditions; exact results depend on supplier and thickness.

**Table: Selection guide for marine aluminum plates (illustrative)**

Alloy	Typical composition (Mg, Al balance)	YS (MPa)	UTS (MPa)	Corrosion resistance in seawater	Weldability	Common marine applications	Common tempers
5083	Mg ~4.0–4.9%	120–160	230–290	Very good; best among common 5xxx alloys	Excellent; widely welded	Hull plating, offshore structures, superstructures	H111, H116, H32, H34
5086-H116	Mg ~4.0–4.9%	95–145	230–290	Excellent; outstanding corrosion resistance	Excellent; good for welds	Hull plates, decks, pressure hulls	H116, H32, H34
5059 (if used)	Mg ~5.0–6.0%	110–150	260–300	High; good corrosion resistance	Good to excellent	Specialized structural panels	H32, H34, H116 (depending on alloy)
5083-H116	Mg ~4.0–4.9%	120–170	280–320	Excellent; high corrosion resistance	Excellent	Rail cars, hulls, pressure-tod plates	H116, H32, H34

Notes: - The table conveys relative performance and typical uses. Actual figures depend on plate thickness, annealing/strain hardening history, surface condition, and supplier specifications. - 5086-H116 often presents a favorable combination of formability and corrosion resistance, which is why shipyards actively select it for hull applications and other marine components. - 5083 generally shows higher strength in some tempers; 5083 is often preferred for higher-strength hull components or areas requiring additional strength, but 5083 can be more susceptible to certain corrosion issues in some environments compared with the very corrosion-resistant 5086.

**Design and procurement best practices**

- Specify exact temper and thickness: In marine applications, clearly specify the temper (H116) and the required thickness, ensuring the fabrication shop can work with the exact grade.
- Review supplier MTRs: Request mill test reports for each batch and verify chemical composition, mechanical properties, and heat treatment details. For critical hull plates, obtain certifications including batch traceability and testing data.
- Plan weld details: Tailor welding procedure specifications (WPS) to the plate thickness and joint geometry. Decide on filler metal (ER5356, ER5183) appropriate for the joint, and confirm preheating or post-weld heat treatment if needed per project spec.
- Check corrosion protection strategy: Align plating, coatings, and cathodic protection methods to address potential galvanic corrosion with other materials and fasteners. Ensure proper primer and topcoat compatibility with aluminum.
- Consider reparability: In the event of damage, ensure that the chosen alloy and temper are amenable to patching and replacement, with ready access to spare plates and pre-fabricated patches.

**FAQs**

Q: What exactly does H116 mean for marine-grade 5086 plate? A: H116 indicates a strain-hardened temper with a specific level of work hardening that balances strength and ductility. It is designed to maintain good formability for forming processes while delivering adequate yield strength for structural use in marine environments.

Q: Can I weld 5086-H116 to other materials? A: Yes, but compatibility matters. Aluminum-to-aluminum welds with ER5356 or ER5183 filler metals are common. If joining to steel, stainless steel, or dissimilar metals, use appropriate bonding strategies and isolation to avoid galvanic corrosion. Consult a welding engineer for joint design.

Q: Is post-weld heat treatment required for 5086-H116? A: Typically no. The 5xxx-series alloys are not heat-treated after welding. Some projects with thick sections may opt for stress-relief methods or other treatments per project specifications, but this is not standard practice for most marine plates.

Q: How does 5086-H116 compare with 5083-H116 for corrosion resistance? A: Both offer excellent corrosion resistance in seawater. 5086 tends to provide better general corrosion resistance and a better balance of formability with corrosion resistance in hull plating compared with some 5083 tempers. However, 5083 can offer higher strength in certain tempers, so the choice depends on design requirements.

Q: What factors should I consider when ordering Marine Grade 5086 H116 plate? A: Consider thickness, plate width and length, surface finish, tolerances, required MTRs, certification needs, welding and joining design, and the project's corrosion protection plan. Align with the supplier on lead times and packaging to ensure smooth fabrication.

Q: Why would I choose Huawei Aluminum for Marine Grade 5086 H116 plate? A: Huawei Aluminum offers a broad product portfolio, consistent quality control, transparent MTRs, and a global supply capability. The company's focus on marine-grade alloys, process reliability, and customer-centric service makes it a credible partner for hull plates and related components.

## **Conclusion**

Marine Grade 5086 H116 aluminum plate represents a pragmatic choice for marine construction, balancing corrosion resistance, weldability, and mechanical performance. Its magnesium-rich Al-Mg composition provides resilience in saltwater environments, while the H116 temper offers workable strength for hull plates, decks, and structural panels. For shipyards and marine equipment

manufacturers, selecting 5086-H116 can translate into longer service life, reduced maintenance costs, and reliable fabrication workflows.

When selecting a supplier, Huawei Aluminum stands out as a credible option with a focus on quality assurance, traceability, and technical support. The combination of robust product specifications, rigorous testing, and responsive service helps ensure that projects proceed smoothly from design to deployment and beyond.

If you are evaluating marine aluminum plates for a new build or retrofit, use the information above to guide your decision. Build a requirements checklist that includes alloy grade, temper, thickness, tolerances, MTR documentation, welding procedures, coatings compatibility, and after-sales support. With careful planning and the right partner, Marine Grade 5086 H116 aluminum plate can deliver dependable performance in the harsh realities of the sea.