Rivet Material Selection Guide

Tip: Set your PDF viewer to "Actual size" before printing to maintain scale.

Material Properties Comparison

Material Combination	Body Material	Mandrel Material	Shear Strength	Tensile Strength	Corrosion Resistance	Weight	Cost
Aluminum/Steel	Aluminum 5052	Carbon Steel	Medium	Medium	Good	Light	Low
Aluminum/Stainless	Aluminum 5052	Stainless 304	Medium	Medium	Excellent	Light	Medium
Steel/Steel	Carbon Steel	Carbon Steel	High	High	Poor (needs coating)	Heavy	Low
Stainless/Stainless	Stainless 304/316	Stainless 304/316	High	High	Excellent	Medium	High
Structural Steel	High-strength Steel	High-strength Steel	Very High	Very High	Fair (coated)	Heavy	Medium

Material Selection by Application

Aluminum Rivets (Aluminum/Steel or Aluminum/Stainless)

- **Best for:** General fabrication, HVAC, lightweight structures, non-structural applications
- **Advantages:** Lightweight (1/3 weight of steel), excellent corrosion resistance, easy to install, non-magnetic
- **Limitations:** Lower shear and tensile strength than steel, not suitable for high-load structural applications
- **Typical uses:** Sheet metal ductwork, aluminum panels, electronics enclosures, gutters, trim work
- **Mandrel choice:** Steel mandrel for general use; stainless mandrel for outdoor/marine to prevent galvanic corrosion

Steel Rivets (Steel/Steel)

- **Best for:** Heavy-duty fabrication, automotive, machinery, high-load applications
- **Advantages:** Maximum shear and tensile strength, economical for high-strength needs, widely available
- **Limitations:** Heavier than aluminum, requires corrosion protection (zinc plating), not suitable for saltwater/marine
- **Typical uses:** Automotive body and frame, trailers, industrial equipment, heavy structural joints
- **Finish required:** Zinc-plated or coated for indoor use; not recommended for outdoor exposure without protection

Stainless Steel Rivets (304 or 316)

- **Best for:** Marine, food processing, chemical exposure, architectural, high-corrosion environments
- **Advantages:** Superior corrosion resistance, attractive appearance, food-grade safe, excellent longevity
- **Limitations:** Higher cost (2-4× aluminum), slightly harder to install, limited availability in some sizes
- **Typical uses:** Marine hardware, boat building, food equipment, chemical tanks, architectural features
- **Grade choice:** 304 for general corrosion resistance; 316 for saltwater and severe chemical exposure

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Material Selection by Environment

Environment	Recommended Material	Avoid	Notes
Indoor, dry	Aluminum/Steel Steel/Steel (zinc-plated)	Plain steel	Most economical options work well
Indoor, humid	Aluminum/Stainless Stainless/Stainless	Plain steel	Some corrosion protection needed
Outdoor, covered	Aluminum/Stainless Zinc-plated Steel	Plain steel	Aluminum preferred for longevity
Outdoor, exposed	Aluminum/Stainless Stainless/Stainless	Steel/Steel	Stainless for critical applications
Marine (freshwater)	Stainless 304 Aluminum/Stainless	Any steel	Match base material when possible
Marine (saltwater)	Stainless 316	Anything else	316 SS required for salt exposure
Chemical exposure	Stainless 316	Aluminum, Steel	Verify compatibility with specific chemicals
Food processing	Stainless 304 or 316	Zinc-plated	Must be food-grade approved

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Galvanic Corrosion and Material Compatibility

What is Galvanic Corrosion?

When dissimilar metals are in contact in the presence of an electrolyte (moisture), an electrochemical reaction occurs causing accelerated corrosion of the more anodic (less noble) metal. This is called galvanic or bimetallic corrosion.

Galvanic Series (Most to Least Noble)

Position	Metal	Behavior in Couple	Notes
Most Noble (Cathodic)	Stainless Steel 316	Protected, causes corrosion in less noble metals	Best corrosion resistance
	Stainless Steel 304	Protected in most couples	General stainless grade
	Copper	Protected, attacks steel/aluminum	Electrical applications
Middle	Steel (plain carbon)	Corrodes with aluminum, protected with magnesium	Requires coating outdoors
	Aluminum Alloys	Corrodes when coupled with more noble metals	Good alone, careful mixing
Least Noble (Anodic)	Zinc	Sacrificial, protects steel	Coating for steel rivets

Rivet-to-Base Material Compatibility

Base Material	Best Rivet Choice	Acceptable Alternative	Avoid
Aluminum	Aluminum/Stainless	Aluminum/Steel (indoors)	Steel/Steel
Steel	Steel/Steel (zinc-plated)	Stainless/Stainless	Plain steel (outdoors)
Stainless Steel	Stainless/Stainless	Aluminum/Stainless	Steel/Steel
Copper	Copper or Stainless	Aluminum/Stainless	Steel/Steel
Fiberglass	Aluminum/Stainless	Stainless/Stainless	Steel (marine)
Plastic	Aluminum or Stainless	Any (no galvanic concerns)	None

Preventing Galvanic Corrosion

- **Material matching:** Use rivet material similar to base material whenever possible
- **Barrier coatings:** Paint, powder coating, or anodizing can isolate dissimilar metals
- **Sealants:** Apply sealant in joint to exclude moisture and prevent electrolyte formation
- **Stainless upgrade:** When in doubt, stainless rivets are compatible with most materials
- **Avoid severe couples:** Never couple aluminum with steel/stainless in marine environments
- **Control environment:** Keep joints dry; corrosion requires moisture to act as electrolyte