

MaterialMind - Material Recommendation Report

General Recommendations:

It is recommended to use a combination of materials to achieve the desired strength, durability, and corrosion resistance for the hull. HSLA steel should be used for the main structural components, while FRP and aluminum alloy can be used for non-structural components. Magnesium alloy can be used for the cathodic protection system.

Material	Properties	Application	Rationale
Hull Plate	density: 7.9 g/cm ³ tensile strength: 550 MPa thermal conductivity: 50 W/mK endurance limit: 250 MPa fatigue strength: 150 MPa	Main structural component of the hull	High-strength, low-alloy steel (HSLA) is suitable for the hull plate due to its high strength-to-weight ratio, corrosion resistance, and ability to withstand harsh marine environments.
Bulkhead	density: 7.9 g/cm ³ tensile strength: 550 MPa thermal conductivity: 50 W/mK endurance limit: 250 MPa fatigue strength: 150 MPa	Internal partitions to divide the hull into compartments	HSLA steel is also suitable for bulkheads due to its high strength, corrosion resistance, and ability to withstand high pressures and stresses.
Decking	density: 1.4 g/cm ³ tensile strength: 35 MPa thermal conductivity: 0.2 W/mK endurance limit: 20 MPa fatigue strength: 10 MPa	Outer surface of the hull	Fiberglass-reinforced polymer (FRP) is suitable for decking due to its low weight, high strength-to-weight ratio, and resistance to corrosion and abrasion.
Superstructure	density: 2.5 g/cm ³ tensile strength: 70 MPa thermal conductivity: 0.3 W/mK endurance limit: 40 MPa fatigue strength: 20 MPa	Upper decks and cabins	Aluminum alloy is suitable for the superstructure due to its high strength-to-weight ratio, corrosion resistance, and ability to withstand high temperatures and stresses.
Anodes	density: 4.5 g/cm ³ tensile strength: 100 MPa thermal conductivity: 10 W/mK endurance limit: 50 MPa fatigue strength: 30 MPa	Cathodic protection system	Magnesium alloy is suitable for anodes due to its high reactivity, low cost, and ability to withstand harsh marine environments.