

Advanced Waterproofing Techniques for Electrical and Mechanical Assemblies

This document outlines comprehensive waterproofing strategies for electrical and mechanical assemblies, focusing on robust protection in aquatic environments. It details a multi-layered approach, combining material selection, precise application techniques, and sealing methodologies to ensure the long-term reliability and safety of sensitive components exposed to moisture.



Multi-Layered Waterproofing Protocol for Aquatic Systems

Effective waterproofing in aquatic projects demands a meticulous, multi-tiered approach to safeguard sensitive electrical and mechanical components from water ingress and potential damage. Our protocol integrates primary, secondary, and tertiary barriers, ensuring redundancy and enhanced protection.



Primary Encapsulation (Poly Wrap)

Each individual electrical component is initially wrapped using a high-density poly roll. This serves as the first line of defence, providing temporary protection against incidental water exposure during assembly or in the event of a breach in outer layers. This initial wrapping also aids in shock absorption and vibration damping.



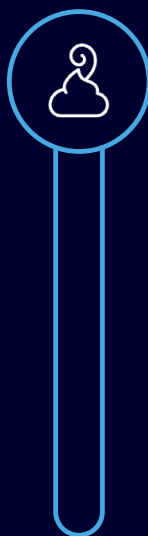
Terminal Sealing (Araldite & Hot Glue)

Critical entry points, such as the motor's two-wire connection points, are meticulously sealed. Araldite epoxy glue is applied to form a durable, watertight bond around these connections. Once dry, an additional layer of hot glue is applied over the cured epoxy, providing extra mechanical strength, vibration resistance, and a secondary hermetic seal. This two-stage application method significantly enhances the long-term integrity of the seal.



Structural Edge and Joint Sealing

Following the assembly of the dodecahedron structure, all external edges are sealed with a high-performance, marine-grade sealant. Particular attention is paid to the connecting area between the main structural plates and the motor canister. Due to the confined space, Araldite epoxy is precisely applied here to create an impermeable barrier. This step prevents capillary action and direct water penetration into the assembly's interior.



External Reinforcement (Poly Wrap & Tape)

After all internal sealing and assembly, the entire structure is wrapped multiple times with poly roll for comprehensive external protection. This layer acts as a sacrificial barrier against abrasion and minor impacts. Finally, high-strength scotch tape is applied to stabilise the poly wrap, ensuring it remains securely in place and maintains its integrity under operational conditions.



Internal Motor Protection & Lubrication

Recognising the potential for residual moisture or condensation within the motor canister, an internal defence mechanism is employed. Foam, pre-saturated with Mobil oil, is strategically placed around the motor. This oil-impregnated foam serves a dual purpose: it acts as a hydrophobic barrier, repelling any water droplets, and provides continuous lubrication to the motor components, preventing corrosion and ensuring smooth operation even in humid conditions. A layer of grease is then applied over this foam for additional protection.



Advanced Shaft and O-Ring Seal System

The crucial joint between the motor shaft and the main shaft, housed within a small canister, is filled with high-viscosity grease. A customised O-ring is fitted on the upper part of this small canister. Furthermore, a second customised O-ring is positioned just below and inside the upper face of the main motor canister. The space between these two O-rings is generously filled with grease, creating a dynamic hydrostatic seal. A final, smaller O-ring is placed just above the upper motor canister's upper face, serving as an additional splash guard and environmental seal. This multi-O-ring and grease-filled chamber system provides unparalleled protection against water ingress along the rotating shaft.