

How do LiVault systems comply? ^

MGN 681 (M) SECTION	REQUIREMENT	HOW WE COMPLY
Section 4.2	<i>"...should be stored in a dedicated cabinet or locker constructed according to a recognised international standard including but not limited to EN 14470, EN 16121 and EN 16122, or an approved dedicated battery storage and charging cabinet or locker..."</i>	RACLAN Square Marine Box: Tested under TÜV NORD DMT Test Programme M02/22. RAMBSS: <ul style="list-style-type: none"> • Tested by Research Institute of Sweden in accordance with UL-1487. • Lloyd's Register Design Appraisal completed. • Lloyd's Register Type Approval currently in progress.
Section 4.10	<i>"A means to monitor the temperature of these spaces should be included with integration into the ships alarms and control system where practical"</i>	All marine systems can integrate with the vessel's Alarm Monitoring and Control System (AMCS). RACLAN Square Marine Box: Optional AMCS connection. RAMBSS: AMCS connection and visual display provided as standard.
Section 4.12.1	<i>"Charging activities to take place while the charging cabinet is closed."</i>	Integrated internal sockets enable charging within the enclosure. Door lock sensors ensure charging can only occur when the door is closed and both locks fully engaged.
Section 4.12.2	<i>"Detection of temperature rise inside the cabinet and indication that there is an over temperature event."</i>	Intelligent thermal management system with visual and audible alerts, and automatic charging shutdown on fault detection.
Section 4.12.3	<i>"A suitable extinguishing medium to be applied to the battery in the event of a battery fire without opening the cabinet."</i>	Multi-nozzle cooling spray system using TRIDENT cooling agent
Section 4.12.4	<i>"Venting of off-gases to prevent overpressure and a build-up of explosive gases."</i>	High-efficiency exhaust system with multi-stage filtration for gas cooling and scrubbing of explosive, flammable and toxic gas including H ₂ , Hf and VOC.
Section 4.13	<i>"Any charging cabinet should be suitably insulated to prevent spread of fire from any battery fire and should be constructed such that it provides suitable protection from explosion."</i>	Fire-resistant enclosure with ballistic, explosion-resistant construction, designed to contain thermal runaway and manage blast pressure.
Section 4.13.1	<i>"Charging should be automatically stopped if any fault or overheating is detected."</i>	RACLAN Square Marine Box: Automatic power isolation on temperature detection with immediate shutdown of charging. RAMBSS: Automatic power isolation on temperature rise or smoke detection with immediate shutdown of charging.
Section 4.14	<i>"Storage or charging cabinets or boxes should have a maximum capacity limit (in kWh) that must not be exceeded."</i>	Systems are designed and tested with defined maximum capacity limits: RACLAN Square Marine Box: up to 3.5 kWh RAMBSS: up to 5.25 kWh.
Section 5.1	<i>Product Type Approval required before 1st January 2027.</i>	RACLAN Square Marine Box: Anticipated before deadline. RAMBSS: Lloyd's Register Type Approval currently in progress.

How do LiVault systems exceed? ^

FEATURE	HOW WE EXCEED
Pre-emptive Detection	Early detection using temperature and infrared smoke detectors, triggering automatic isolation of the charging system and immediate cooling on early detection of thermal runaway.
VOC (Volatile Organic Compounds)	An integrated VOC adsorbent in RAMBSS removes contaminants and volatile organic compounds typically produced during thermal runaway.
Gas management with EXO-Filter System	A patented multi-stage EXO filtration system removes hydrogen (H ₂), HF, and VOCs. The EXO-Filter also provides cooling, reducing off-gas temperature to below 100°C, ensuring gases released are non-toxic, non-flammable, and non-explosive.
Full submersion cooling	The RAMBSS system completely floods the enclosure with TRIDENT coolant and fresh water, fully submerging batteries to stop thermal runaway propagation.
Double-walled construction	All systems are constructed with non-combustible and ballistic panels. RAMBSS incorporates an additional internal layer of FIPRO non-combustible panels, MED and Bureau Veritas approved, offering fire performance equivalent to A1 classification and compliant with SOLAS fire safety requirements and IMO 2010 FTP Code (Annex 1 Part 1 - non-combustibility test).
Frame-in-frame design	Structural frame-within-frame construction using aluminium profiles, reinforced with concealed stainless steel rods. This significantly enhances resistance to external fire exposure and maintains enclosure integrity under explosion conditions.
Designed for marine	System engineered specifically for marine environments, including resistance to salt air, moisture, vibration, and continuous operation.
Certifications and why not EN 14470	EN 14470 is not applicable to lithium battery risks, as it covers only liquids and gases with passive fire resistance. RAMBSS and RACLAN Square Marine Box systems instead use UL 1487 and TÜV NORD M02/22 to address thermal runaway, gas generation, and active mitigation. All systems are tested and certified for fire, explosion, and gas hazards.
Air circulation during charging	Active ventilation in RAMBSS maintains controlled internal temperature during charging while safely managing gas extraction through filtration.
Designed for explosion	All systems are specifically engineered for explosion resistance, with testing demonstrating internal pressure peaks of up to 7.2 bar without structural failure.
Internal component redundancy	Critical components, pumps, relays, etc., are backed up with redundancy components.
Alarm System Integration (AMCS)	Integrated with vessel AMCS, providing real-time alarms.
Fail-safe operation	Internal backup battery maintains monitoring, alarms, and suppression capability for extended periods (up to 90 days).
Visual display	RAMBSS is equipped with a visual display to give real time internal temperature and alerts.