



VIRSEC®



Fully Online American Bureau
of Shipping Approved

Lithium-ion Battery Safety Awareness for Superyachts

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About

Lithium-ion batteries are becoming increasingly common in everyday items such as smartphones, laptops, and electric vehicles.

They are also found on yachts, in power tools, remote controls, UPS, servers, personal watercraft, and tenders. Despite their many benefits, these batteries can also present significant dangers.

Tailored specifically for yacht crew, officers, captains, and yacht managers, the Lithium-ion Battery Safety Awareness on Superyachts course helps Learners identify and implement suitable Li-ion fire prevention measures and considerations for responding to battery-related emergencies.

Lithium-ion battery Safety Awareness on Superyachts is essential for all yacht crew, staff and shoreside managers of yachts that carry Lithium-ion battery-powered tenders, toys, and equipment.

Entirely online, the course consists of eight short lessons that provide an in-depth study of the electrochemistry and hazards of Li-ion batteries.

The philosophy underpinning this course is that prevention is better than a cure, and the course sets out best practices that can be easily implemented to mitigate any risks associated with Li-ion technology.

Target Audience

This course is ideal for anyone involved in yacht operations who wishes to improve their knowledge of Li-ion battery safety and is specifically helpful for:

- Superyacht crew who use Li-ion battery-operated equipment.
- Competent Persons responsible for battery charging operations.
- Safety Officers and Emergency Response Teams.
- Yacht Captains and Officers who must provide confident leadership in implementing safe operating procedures for Li-ion batteries.
- Yacht Managers who must manage and document their safety culture for Li-ion batteries.

Course Duration

The course lasts for approximately 3 to 4 hours depending on the learner's abilities and reading speed, and whether you use the voiceover facility.

You can enter and exit this course as often as you require as the system will save your progress. However, please ensure you undertake the assessment in one sitting.



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Li-ion Competent Person – MGN 681

In their recent MGN 681, the UK’s Maritime and Coastguard Agency introduced the requirement that competent persons undertake battery charging operations.

Drawing from the UK’s Code of Safe Working Practices and MGN 681, this course helps define the role and duties of this person when working with Li-ion batteries.

The course will provide the Learner with the detailed knowledge required to safely conduct battery charging operations, identify hazardous or suspect batteries and recognise the necessary steps to mitigate the risk until these batteries are removed from the yacht.

- Recognising the challenges of responding to a thermal runaway event.
- Recognising the suitability of water-based fire suppression systems for battery fires.
- Introducing specialist equipment for containing and suppressing Li-ion fires.
- Identifying battery abuse conditions and hazardous battery defects.
- Appreciating their requirements for battery stowage compartments.
- Understanding the requirements for battery charging stations.
- Appreciating the knowledge required of the Competent Person overseeing battery charging operations.

Course Learning Outcomes

Selected learning outcomes of this course include:

- Identifying where lithium-ion batteries may be encountered on yachts.
- Understanding the basic electrochemical processes of lithium-ion batteries
- Understanding the requirements for identifying hazards on yachts.
- Appreciating the toxic and explosive gases emitted from Li-ion batteries.
- Understanding the hazards of thermal runaway and battery fire.

Compliances

1. Compliance with ISM Code

ISM Code 6.3 mandates yacht managers to establish procedures for personnel, especially those in safety and environmental roles, ensuring proper familiarisation with their duties.

Our course addresses this by offering comprehensive lithium-ion battery safety training, showcasing a commitment to fulfilling ISM Code obligations and keeping personnel updated on safety protocols.

2. Meeting ISM Code 6.5 Requirements

ISM Code 6.5 stresses the importance of identifying and providing necessary training to support safety management systems.





As lithium batteries become more common on luxury yachts, proper crew training in their safe handling is essential. These batteries pose fire and explosion risks if mishandled, and trained staff are crucial for preventing incidents and ensuring the safety of guests, crew, and the vessel.



Compliances Continued

2. Meeting ISM Code 6.5 Requirements

ISM Code 6.5 stresses the importance of identifying and providing necessary training to support safety management systems.

The “Lithium-ion Battery Safety Awareness for Superyachts” course aligns with this mandate, offering in-depth insights into lithium-ion battery safety to ensure all personnel have essential training for safe superyacht operations.

3. STCW Convention Regulation I/14 - 5 Compliance

STCW Convention Regulation I/14 - 5 highlights the need for companies to familiarise seafarers with their duties, ship arrangements, equipment, and relevant procedures.

Our course surpasses theoretical frameworks by providing practical knowledge crucial for routine and emergency situations involving lithium-ion batteries, empowering yacht managers to enhance crew competency in line with the STCW Convention.

Course Benefits

The benefits of the **Lithium-Ion Battery Safety Awareness on Superyachts** eLearning course are:

- **Enhanced Safety Knowledge:** The course equips crew members, safety officers, and competent persons with the knowledge and skills to identify and mitigate lithium-ion battery hazards on superyachts.
- **Tailored for a Yachting Audience:** The course is explicitly designed for individuals in the yachting industry, ensuring that the content is relevant and applicable to their needs.
- **Delivered Entirely Online:** The course's online format allows participants to conveniently access the material anywhere, making it suitable for busy yacht professionals.
- **Real-World Examples:** Learners have access to real-world examples and case studies that help them relate theoretical knowledge to practical situations they may encounter in their roles.
- **Flexible Duration:** The course is designed to be completed within 2.5 hours, offering flexibility for customisation based on participants' specific needs and organisational objectives.
- **Comprehensive Course Outline:** The course covers essential topics, from the fundamentals of lithium-ion batteries to identifying hazardous conditions, proper stowage, and safe charging practices.





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YACHT CREW TRAINING

SEASCOPE FRANCE

Course Benefits Continued

- **Regulatory Compliance:** It ensures that participants understand and comply with relevant regulations and guidelines for lithium-ion battery safety on yachts.
- **Preventative Focus:** The course emphasises the prevention and early identification of hazardous conditions, reducing the risk of battery-related incidents on board yachts.
- **Safety Culture Promotion:** By providing knowledge about battery safety, the course fosters a safety- culture among crew members and staff, ultimately enhancing overall safety on superyachts.
- Approved by the American Bureau of Shipping (ABS).



Course Certificate

This course has been Approved under the American Bureau of Shipping (ABS).

Upon completion of this online course, learners will receive an ABS Approved Certificate for Electric Vehicles (EV) Hazard Awareness on Ro-Ro Ships that they can download from the Learner Portal and save to their device.



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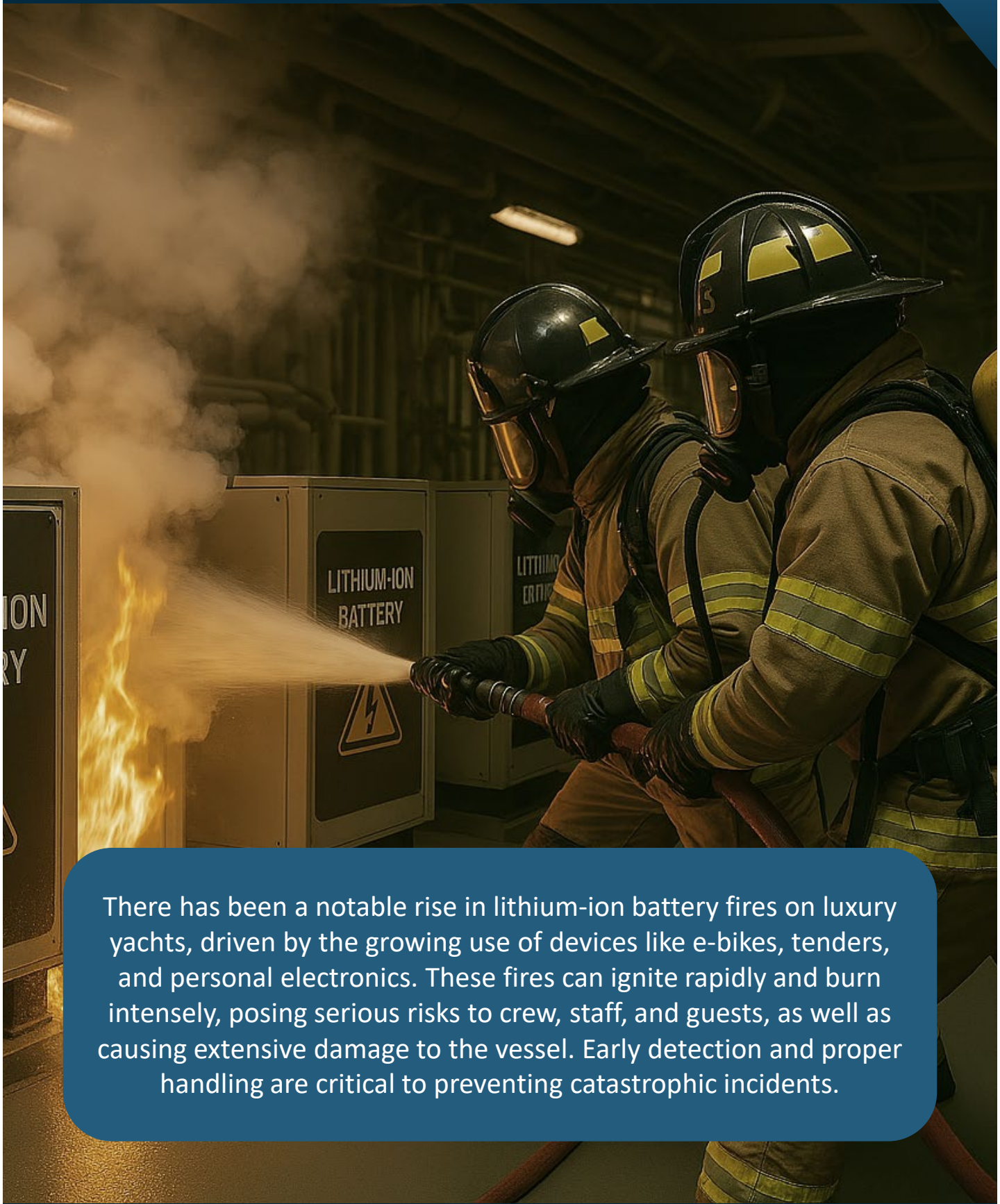


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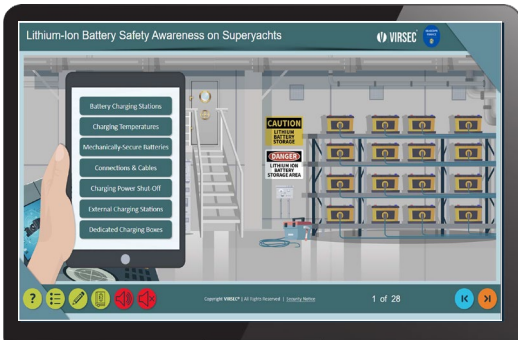




There has been a notable rise in lithium-ion battery fires on luxury yachts, driven by the growing use of devices like e-bikes, tenders, and personal electronics. These fires can ignite rapidly and burn intensely, posing serious risks to crew, staff, and guests, as well as causing extensive damage to the vessel. Early detection and proper handling are critical to preventing catastrophic incidents.

Sample Course Slides

Lithium-Ion Battery Safety Awareness on Superyachts



- Battery Charging Stations
- Charging Temperatures
- Mechanically-Secure Batteries
- Connectors & Cables
- Charging Power Shut-Off
- External Charging Stations
- Dedicated Charging Bays

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Lithium-Ion Battery Safety Awareness on Superyachts

Li-ion Fire Safety Risk Assessment

LIKELIHOOD

	Rare	Unlikely	Possible	Likely	Almost Certain
Catastrophe	Green	Yellow	Orange	Red	Dark Red
Major	Green	Yellow	Orange	Red	Dark Red
Moderate	Green	Yellow	Orange	Red	Dark Red
Minor	Green	Yellow	Orange	Red	Dark Red
Negligible	Green	Yellow	Orange	Red	Dark Red

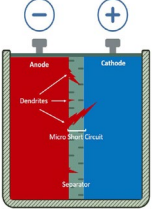
RISK = LOW MODERATE HIGH CATASTROPHIC

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Lithium-Ion Battery Safety Awareness on Superyachts

Dendrite Formation & Micro Short Circuit

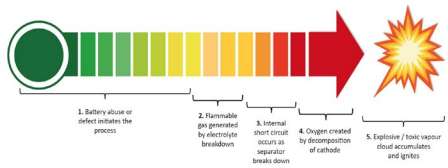
- Over time, even high-quality, genuine, and defect-free batteries can deteriorate due to a process called "dendrite growth".
- Dendrites are tiny, sharp metallic "fingers" that grow out from microscopic imperfections on the anode's surface.
- They consist of an accumulation of lithium atoms or other metallic particles which conduct electricity.
- Eventually, these metallic growths eventually perforate the separator, creating a conductive bridge between the electrodes. This is referred to as a micro short circuit (MSC).
- So, keeping a close eye on the performance of the yacht's Li-ion batteries, even high-quality ones that have been used for a long time, is essential.



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Lithium-Ion Battery Safety Awareness on Superyachts

LO4.2 - Stages of Thermal Runaway



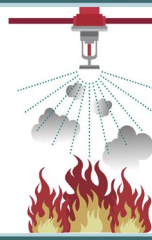
1. Battery abuse or defect initiates the process
2. Flammable gas generated by electrolyte breakdown
3. Internal short circuit occurs as separator breaks down
4. Oxygen created by decomposition of cathode
5. Explosive toxic vector cloud accumulates and ignites

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Lithium-Ion Battery Safety Awareness on Superyachts

Water Spray Protection Systems for Battery Compartments

- Batteries should be stored in compartments with a reliable water spray fire-fighting system to ensure safety on board.
- The system's capacity is determined by the volume of flammable materials stored inside the protected compartment, such as tenders, toys, and ropes.
- Water spray systems are designed to function during emergencies and come equipped with backup features that guarantee their operation even if there is an explosion or power loss on the yacht.
- They can provide over 30 minutes of water and be activated manually and automatically from outside the compartment.



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Lithium-Ion Battery Safety Awareness on Superyachts

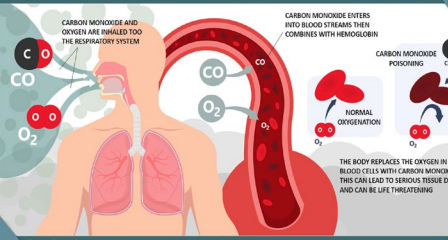
CARBON MONOXIDE AND OXYGEN ARE INHALED TOO THE RESPIRATORY SYSTEM

CARBON MONOXIDE ENTERS INTO BLOOD STREAMS THEN COMBINES WITH HEMOGLOBIN

CARBON MONOXIDE POISONING

NORMAL OXYGENATION

THE BODY REPLACES THE OXYGEN IN RED BLOOD CELLS WITH CARBON MONOXIDE. THIS CAN LEAD TO SERIOUS TISSUE DAMAGE AND CAN BE LIFE THREATENING



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