Fires at Sea: The Hidden Dangers of Lithium-Ion Batteries



Lithium-ion (Li-ion) batteries have become an integral part of modern life, powering everything from mobile phones and household appliances to electric vehicles (EVs) and energy storage systems. However, when these batteries are transported by sea, they pose a significant and often underestimated risk. The maritime community is increasingly facing the devastating consequences of fires at sea caused by Li-ion batteries, and the urgency to address this issue has never been greater.

A Growing Risk

In 2023, Allianz Global Corporate & Specialty (AGCS) reported 200 fire incidents at sea, with 55 significant fires occurring over the past five years. Notable incidents, such as the GRANDE COSTA D'AVORIO in the United States, the FREMANTLE HIGHWAY in the Netherlands, and the GENIUS STAR XI near Alaska, have ignited intense debate about the dangers of transporting Li-ion batteries. While the exact causes of these fires remain under investigation, the potential link to Li-ion batteries is enough to send shockwaves through the shipping industry.

As the demand for EVs and renewable energy storage systems continues to surge, the volume of Li-ion batteries shipped by sea is rapidly increasing. Yet, the maritime industry is still grappling with understanding the full scope of the dangers involved, leaving shipowners, crews, and emergency responders potentially unprepared for the worst-case scenarios.

Li-ion batteries can fail due to mechanical, chemical, or thermal abuse. This failure can lead to a phenomenon known as "thermal runaway", where the heat generated becomes self-sustaining, causing temperatures to soar and triggering a dangerous chain reaction. Once thermal runaway starts, it can be almost impossible to stop, often resulting in explosions and fires.

Adding to the risk is the toxic vapour produced during battery failure. Industry sources indicate that up to 6,000 litres of vapour per kWh can be released, containing highly toxic substances like hydrogen fluoride. To put this into perspective, a single 100 kWh battery could release 20 kg of hydrogen fluoride. Now, imagine a vehicle ferry loaded with 10 such EVs — it's no wonder authorities would be extremely wary of allowing that ship anywhere near port during an incident.

The International Maritime Dangerous Goods (IMDG) Code governs the sea transportation of Li-ion batteries, but gaps in its regulations leave room for dangerous oversights. For instance, while Li-ion batteries are classified as "miscellaneous" under Class 9, this fails to fully acknowledge the severe risks they pose. Furthermore, electric vehicles are not required to be declared as dangerous goods when transported on car carriers, leaving crews unaware of how many EVs are onboard or their specific locations.

There are also no strict regulations on the state of charge (SOC) for Li-ion batteries during sea transport. While air transport regulations limit SOC to 30%, no such criteria exist for sea freight. This omission is problematic as recent studies suggest that the toxicity of batteries can vary depending on their SOC levels. Moreover, current guidelines for the packaging of batteries to prevent short circuits lack specific instructions, such as covering terminals, leading to varying safety standards.

Firefighting at Sea: An Uphill Battle

Fighting a Li-ion battery fire at sea is unlike anything most firefighters have ever faced. A fire involving an electric vehicle, for example, might require 136,000 litres of water over four hours to extinguish, compared to just 10,000-17,000 litres over 30 minutes for a traditional combustion engine vehicle. The self-sustaining nature of Li-ion fires, combined with their tendency to re-ignite even after being "extinguished", poses a unique and formidable challenge.

Moreover, these fires emit toxic vapours that are flammable and have varied densities, making them harder to manage than regular smoke. On top of that, there's the risk of electrocution from the batteries, especially when large volumes of water are involved. The potential for explosions during thermal runaway incidents means approaching a burning vehicle is highly dangerous.

In land-based firefighting scenarios, some services have adopted defensive strategies, such as letting the fire burn out while protecting surrounding areas. However, on a ship, where space is limited and the environment enclosed, this is far from a viable option. The rapid spread of flames in such confined spaces can quickly overwhelm the vessel's limited firefighting resources.

So, what can be done? A multipronged approach is essential. The IMDG Code could benefit from updates to include clearer guidance on the prevention and detection of Li-ion battery fires. More stringent testing requirements for batteries, third-party certification, and mandatory documentation detailing battery chemistry, capacity, and safety systems would enhance transparency and safety.

Firefighting strategies also need to evolve. Ships should be equipped with advanced fire detection systems, such as thermal imaging and CCTV, as well as improved gas detection capabilities. Firefighting crews should receive specialised training to deal with Li-ion battery fires and be provided with comprehensive personal protective equipment (PPE) to shield against toxic fumes.

Additionally, introducing regulations that require EVs to be declared and marked as hazardous cargo would allow for better stowage planning and emergency preparedness. By revisiting the current exemptions and classifications, we can better monitor and manage these risks at sea.

Li-ion battery fires are rare, but their potential for catastrophic consequences is undeniable. The maritime industry must prioritise a proactive approach that includes regulatory updates, technological advancements, and crew training. An ongoing dialogue with regulators, legislators, and industry experts is crucial to developing effective strategies for mitigating these risks.

For those in the shipping industry seeking guidance on managing the dangers associated with Li-ion batteries, Brookes Bell's team of fire response and investigation specialists stands ready to assist. Addressing the risks today is key to ensuring safer seas tomorrow.

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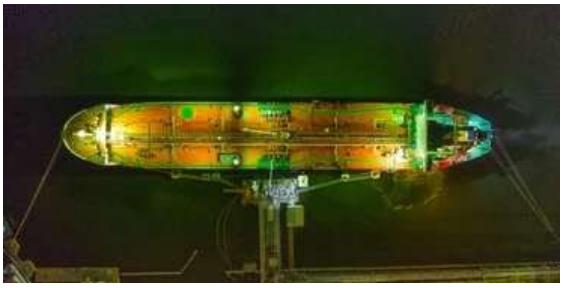


24/09/2026

The Duke of Edinburgh Opens Brookes Bell’s New Liverpool Office

His Royal Highness The Duke of Edinburgh, opened international maritime consultancy Brookes Bell’s new Liverpool office on Thursday 24th September 2026.

[https://www.brookesbell.com//news-and-knowledge/the-duke-of-edinburgh-opens-brookes-bells-new-liverpool-office/]

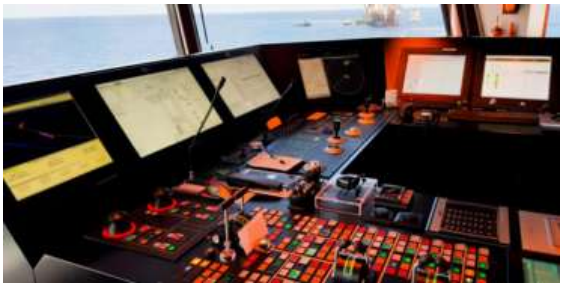


07/09/2026

More Methanol Cargoes, More Off-Spec Risk

Methanol is having a moment. DNV's Alternative Fuel Insight data shows the methanol-capable vessel fleet passed 120 in early 2026, with several hundred more vessels on order. Argus Media has forecast that alternative marine fuel demand will exceed 10 million tonnes in 2026, with methanol driving much of that growth. The Methanol Institute has also significantly revised its own demand projections upward as production and orderbooks have expanded. ***In this article, we’ll take a look at what this growth means – especially as off-spec cargoes incidents increase…***

[https://www.brookesbell.com//news-and-knowledge/more-methanol-cargoes-more-off-spec-risk/]



07/09/2026

What Is Dynamic Positioning? An Introduction

Some ships don't drop anchor. Instead, they use a network of thrusters, computers, and sensors to hold their exact position at sea – sometimes for weeks at a time, sometimes mere metres from an oil platform, a wind turbine, or another vessel. This is Dynamic Positioning (DP), and it underpins some of the most valuable operations in the maritime and offshore energy industries.

This article explains what DP is, why it carries commercial as well as technical risk, and why an independent assessment – beyond the standard class trial – is worth commissioning before problems find you.

[https://www.brookesbell.com//news-and-knowledge/what-is-dynamic-positioning-an-introduction/]



02/09/2026

A Guide to Bulk Vessel Sizes

Ask most people in shipping what a bulk carrier's "size" actually tells you, and the answer can get vague fast – a DWT figure, a hold count, a canal restriction, rarely the same thing twice. It can be especially confusing for people who are new to the industry.

This guide maps the most common bulk carrier size classes, from mini-bulkers to the 400,000-DWT Valemax and explains what each means in practice.

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