

The RightShip Safety Insights Series shares key lessons from maritime incidents and RightShip Inspections to highlight identified gaps and provide guidance to help improve onboard practices and reduce risk — supporting our mission of achieving a Zero Harm maritime industry.

This paper focuses on fatalities caused by unsafe practices when using portable lights on board ships and provides insights into risk management and engineering changes that can help prevent these tragic events.

## Introduction

Portable equipment uses a voltage of 220V AC on most vessels, and the lights are subjected to higher physical damage and wear. When a person touches a defective portable light conductive body, it can provide an easy path for live current to pass through the body, leading to electrical shock and possibly cardiac arrest or worse.

Numerous fatal incidents have occurred in recent years during tasks like cleaning cargo holds, cargo hold inspections, rigging portable lights for cargo work and general maintenance using portable lights. Investigations highlight a need for improved safety management systems and improved maintenance and engineering solutions.

## Incident Case Studies from the Last 2 Years

### Case 1 – Crewmember electrocuted while handling cargo light

While loading cargo at night in port, a crew member was tasked with setting up portable floodlights in a cargo hold. Shortly after, he was found unconscious on deck, still clutching a metal-framed portable light. He died of cardiac arrest due to electrocution. Despite receiving CPR from crewmembers and shore medical attention, the crewmember could not be revived and was declared dead.

Post-accident investigation revealed the portable light's power plug had been incorrectly wired during a prior maintenance or repair. This connection energised the entire metal frame of the light fixture. When the crewmember picked up the light, the current flowed through his body to the ship's deck (ground), causing a fatal shock.

Even though a live wire was connected to the vessel's earth system, the current leakage had not alarmed when the accident took place.

### Case 2 – Crewmember electrocuted due to current leakage from the improperly extended and connected portable light cable

A crewmember died from electrocution aboard while the vessel was at sea. The incident occurred in the forecabin store during maintenance work, where the crewmember was found lying with a portable light in his hands.

The use of insulation tape to cover the connection between two different cables failed to meet marine industry practices, leading to an electrical hazard at the cable joint. Contributing factors

were humid conditions in the bosun store, wet PPE, including gloves and coveralls, and failure to implement a risk assessment for portable lights. The vessel's safety management system lacked a formal system for the control or testing of portable electrical equipment.

**Case 3 – Crewmember electrocuted while working in a dark and confined cargo tunnel. A second crewmember who went to his aid also received an electric shock, sustaining a serious injury.**

Poor maintenance of the portable light caused the incident; improper prior repairs to the portable light involved using electrical tape to cover exposed wires instead of an approved connector or a completely new cable. The vessel's Safety Management System did not capture the condition and maintenance of the portable lights.

**Case 4 – Crewmember electrocuted during cargo hold cleaning operations.**

Cargo hold cleaning was in progress in preparation for steel cargo. The crewmember in the No. 1 cargo hold (which was wet and humid) attempted to move a portable cargo hold light to illuminate a bilge well when he received an electric shock and collapsed. The power supply was cut off, and the crew initiated CPR under shore medical instructions, but the crewmember was declared dead by a shore doctor.

Post-accident inspection revealed that the crew used an improperly rated portable lamp powered at 220 volts, with an IP20 rating (not protected against water), in a damp or humid environment.

Lack of Safety Awareness – the crew were absent from the toolbox meeting due to rest, and lacked safety awareness regarding the dangers of using electrical equipment in a wet, conductive environment.

Inadequate Risk Assessment – the crew failed to conduct a proper toolbox meeting and risk assessment for the cleaning operation, as the risk of using the portable electrical light was not identified.

**Case 5 – Crewmember electrocuted while handling metal framed portable cargo light.**

While positioning a live portable light, the metal casing was damaged due to an impact with the hatch coaming, and live electric current flowed through the crew member, resulting in a fatality. Primary root causes were damaged metal casing of the light, coupled with a lack of complete risk assessment, wet PPE and humid conditions.

## RightShip Analysis – Major Causes

From a review of RightShip's data, the following are considered the leading immediate causes of fatalities related to portable cargo lights.

1. Poor risk management
  - a. Limited crew understanding of the risks associated with portable lights.
  - b. The presence of wet conditions (hands, PPE, clothing, or the surrounding environment) increases the potential for a dangerous outcome upon contact.
  - c. Incorrect/reckless handling of the lights, using cables for rigging.
2. Improper maintenance of equipment
  - a. Insufficient or non-existent maintenance systems for portable lights, damaged cables, plugs and casing.
  - b. Improper modification of the lights, cables, and connections.
  - c. Use of improper equipment, such as home-made or modified portable lights and power cords, especially those not designed for marine use, bypasses critical safety and significantly increases risk.
3. Design and Equipment Failures
  - a. Electric power supply of higher than 24V.
  - b. Failure of safety devices to cut off the power when a short circuit occurs.

## RightShip Inspections and Portable Cargo Lights

Question 14.10 of the RightShip Inspection Ship Questionnaire (RISQ) emphasises the need for:

- Material of the portable light casing, metal vs non-conductive.
- Isolation transformer for voltage higher than 50V.

**14.10**      **Are portable and fixed cargo lights used for illumination of cargo holds inspected regularly and maintained in good condition? (V)**

Yes     No     N/A     N/V

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**Guide to Inspection**

**Record a finding if the lamp holder, drip shield, and shade of portable cargo lights are not non-conductive, do not isolate the crew from electrical shock hazards by the installation of an isolation transformer, or have a voltage greater than 50V AC (1-1000Hz) or 120V DC.**

The human hazard of electric current depends on the intensity and duration of current flow in a specific current path through the body. The technical specification IEC TS 60479-1 comprises the permissible touch currents and the required data to calculate the permissible touch voltages under several conditions (e.g., body resistance, current path, skin moisture (see Parameters for effects of electric current) for alternating current and direct current. A touch voltage of 50 V AC (1-1000 Hz) or 120 V DC for long shock duration (> 3 s) should not be exceeded in healthy adults otherwise a life-threatening condition may occur.

"Many bulk carrier / general cargo holds have fixed cargo lights. These can easily ignite combustible cargoes such as grain, animal feed, wood chips, pulp, and paper if they are too close to the light. Self-decomposition of fertiliser has been initiated in this manner. Cargo lights in holds need to be properly isolated before cargo is loaded".

"This is best done by removing fuses or other physical links in the electrical circuits so that the lights cannot be switched on by mistake. In container ships the lights need to be properly placed so that they do not overheat cargo or other combustibles and thus cause damage or fire. Lights in car carriers and ferries are usually fluorescent, which are unlikely to cause ignition. Nonetheless it makes sense to leave lights switched off when they are not needed, particularly in cargo areas where combustibles are present"

(A guide to the causes and prevention of cargo fires, 2017)

During the 2025 calendar year, 23% of all completed RightShip inspections identified at least one finding related to portable cargo lights. This demonstrates that portable lighting remains an ongoing area of concern across the inspected vessel fleet and highlights a significant opportunity to reduce risk through improved prevention of failures associated with faulty or substandard equipment and system limitations.



Improper cable connections  
Different specifications of cables connected



Damaged power plug with unsafe repairs



Power cable damaged and missing protective sheath  
Cable gland is loose



Unauthorised cable repairs and broken power cable gland



Missing safety guard



Damaged safety guard

## Recommendations for Vessel Operators

### Enhance Risk Management

- Perform a **formal assessment** of risks for portable electrical equipment. Crew risk perception plays a crucial role in ensuring safety onboard ships, especially concerning seemingly harmless portable lights and the rising fatalities associated with portable lights. Unfortunately, there are instances where crew members may lack a proper understanding or appreciation of these risks, leading to potentially hazardous situations.
- **Identify** “electric shock while using electrical equipment” as one of the main risks onboard the vessel when working in cargo holds.
- **Ensure that lights are not handled when powered on.** Securely position all lights prior to plugging them in and connecting the power source.
- Hold an effective **pre-work toolbox talk** at or near the work location, including a review of the risk assessment before using portable lights.
- **Implement suitable precautions** to avoid electric shock in damp or humid conditions.

### Engineering changes

- **Low voltage (24V DC) lighting system** – making changes to the electrical system to provide low voltage to the portable lights, thereby eliminating the risk.
- **Low voltage equivalent portable lights (36V AC)** – Replace the portable floodlights with low voltage equivalent portable lights (36V AC).
- **Isolation transformers** for portable light power supply – this prevents shock by creating a secondary electric circuit “floating” and ungrounded, so touching one wire doesn’t complete a dangerous circuit to the earth.

## Safety Management System (SMS) Procedural processes

- **Inventory control** – Implement a system to record all tagged portable lights with test date tags. All cargo lights must be properly stored in a dry, designated space with a shelf or respective hooks. Each light needs to have a cable and a handling line separately coiled.
- **Purchasing standards** – SMS should clearly provide guidance to staff and vendors for specifications of the portable lights.
- Conduct a **fleet-wide campaign** for inspection of all portable electrical lighting systems.
- **Training** - Provide safety training on electrical hazards and the use of portable electric tools.

## Planned Maintenance System

- **A competent person** must be assigned the task of regular maintenance of the portable equipment, which must include checking that the physical condition of the casing is free of cracks, or structural damage, and free of oil or contaminants.
- **Cables & Plugs condition** – Preventive maintenance must include inspection of portable lights for cable outer sheath that is free of fraying, cuts, or taped repairs, cable glands that are tight, plug pins that are straight, and not showing arcing.
- Incorporate inspection of electrical cables and **insulation resistance tests** into the Planned Maintenance System.
- **Electrical Safety** – Safety devices on the electric supply are tested periodically to ensure that the devices shut off power to portable lights and the circuit breakers.

## Conclusion

By addressing crew risk perception through the above measures, it is possible to improve safety awareness, reduce incidents and create a safer working environment onboard ship.

## Appendix

**A. The Code of Safe Working Practices for Merchant Seafarers** (COSWP) 2024 and 2025 editions provide authoritative guidance on the safe use, inspection, and maintenance of portable electrical equipment, including portable lights, to reduce the risk of electric shock, fire, and related incidents onboard.

### Key COSWP Requirements for Portable Lights

- **Voltage Standards:** Wherever possible, portable lights should be supplied via low-voltage circuits (typically 110V or lower). For high-risk areas like cargo holds, Extra-Low Voltage (ELV) (e.g., 24V) is strongly recommended.
- **Physical Protection:** Portable lights must be equipped with guards to prevent bulbs from shattering or coming into contact with personnel. Only intrinsically safe or explosion-proof lighting is permitted in areas where explosive gases may be present. Please refer to the vessel's hazardous area drawings to ensure compliance.
- **Mandatory Pre-Use Inspection:** Seafarers must visually inspect cables for fraying, plugs for damage, and casings for cracks before every use. Equipment with taped repairs or improvised wiring must be immediately removed from service.
- **Risk management while using Portable lights** – by using permit to work, toolbox talks.
- **Routine Testing of Portable equipment.**

**B. AMSA Electrical Safety Bulletin – An evaluation of electrical hazards.** Emphasises key measures like, Risk Assessment, Training, Inspection of equipment, Maintenance, and PPE.

[https://iims-media-library.s3.eu-west-2.amazonaws.com/wp-content/uploads/2016/03/20080942/AMSA-Safety-Bulletin-on-Electrical-Safety-2016\\_03.pdf](https://iims-media-library.s3.eu-west-2.amazonaws.com/wp-content/uploads/2016/03/20080942/AMSA-Safety-Bulletin-on-Electrical-Safety-2016_03.pdf)

### **C. Previous similar cases**

**(2023) Malta flagged vessel** - Crew member fatality during cargo light operations.

[https://msiu.gov.mt/wp-content/uploads/2024/09/MV-Drawsko\\_Final-Safety-Investigation-Report.pdf](https://msiu.gov.mt/wp-content/uploads/2024/09/MV-Drawsko_Final-Safety-Investigation-Report.pdf)

**(2022) Hong Kong flagged vessel** - Crew member fatality during cargo hold inspection using a portable light.

[www.mardep.gov.hk/filemanager/en/share/publications/pdf/reports/mai220815\\_f.pdf](http://www.mardep.gov.hk/filemanager/en/share/publications/pdf/reports/mai220815_f.pdf)

**(2017) Netherlands flagged vessel** - Crew member electrocuted by a home-made portable lamp.

[https://onderzoeksraad.nl/wp-content/uploads/2023/11/8a23d852303d20172585\\_b\\_rapport\\_atlantic\\_dawn\\_en\\_170823.pdf](https://onderzoeksraad.nl/wp-content/uploads/2023/11/8a23d852303d20172585_b_rapport_atlantic_dawn_en_170823.pdf)

**(2010) Bulk carrier in Great Lakes** – Crew member electrocuted in cargo tunnel

<https://www.dco.uscg.mil/Portals/9/TVNCOE/Documents/SafetyAlerts/03-10LessonlearnedPersonalCostOfPoorMaintenanceandRepairs.pdf?ver=2017-08-11-142810-067>