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# The QUANTUM of RISK

**Risk Assessment on Lithium Batteries**

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# The QUANTUM of RISK

## Agenda Today

**General Intro**

- **UNWME**
- **Risk Assessment on Lithium Batteries - C-SAR 101C**

**Part A → General Risk Assessment**

**Part B → Vessel-Voyage Risk Calculation Assessment**

**Part C → Definitions Risk Assessment and RA Matrix**

**Part D → Exercise**

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# United Network World Maritime Experts - UNWME

## Is a partnership between Maritime Experts that have next values:

**Integrity and Trustworthiness**

To ensure Highest standards of honesty, transparency, and reliability in their research, recommendations, and communications.

**Knowledge and Expertise**

To demonstrate Deep understanding of maritime operations, cargo logistics, and safety protocols through their research and policy proposals.

**Guidance and Leadership**

To provide Leadership and direction in improving safety standards, offering guidance to industry stakeholders, and shaping policies that enhance maritime health and safety.

**Safety and Responsibility**

To prioritise Safety of maritime workers, cargo, and the environment, and advocating for responsible practices throughout the supply chain.

**Collaboration and Partnership**

To work closely with government agencies, maritime organizations, and industry players to foster a collaborative approach to enhancing safety in the maritime cargo supply chain.

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# Lithium Batteries

# General Risk Assessment

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# C-SAR 101C - General Intro Risk Assessment

Main Policy and Guidance
Let's bear in mind that an effective approach to Risk Management must be comprised of three domains:

**1. Risk Governance** **2. Risk Identification & Monitoring** **3. Risk and Control Assessment**

To assess the maturity of the Risk Management, the ISO 31000 Risk Maturity model can be used:

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# Lithium Batteries – General Risk Assessment 1/2

When conducting a risk assessment related to the transport of lithium batteries with a focus on sensation (presumably, the potential hazards these batteries might pose to human senses), the following points should be addressed:

1. **Identification of Hazards**
2. **Potential Exposure**
3. **Risk of Damage During Transport:**
4. **Packaging and Labelling:**
5. **Training and Awareness**
6. **Emergency Response Plan**

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# Lithium Batteries – General Risk Assessment 2/2

**7. Disposal and Recycling**

**8. Regulatory Compliance:**

**9. Monitoring and Review:**

**10. Communication:**

**11. Health Monitoring**

**12. Environmental Impact**

Note: Addressing these points will help ensure that the transport of lithium batteries is as safe as possible, minimising the risks to both personnel and the general public.

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## Risk Assessment in Equatorial Zones

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# C-SAR 101C - Lithium Batteries – General Risk Assessment Equatorial Zones 1/2

The off-gassing of hydrogen and oxygen due to thermal runaway in lithium batteries is a significant concern, especially in higher temperature conditions such as equatorial zones. Thermal runaway is a self-sustaining reaction within the battery that can result in the release of gas, heat, and fire or explosion.

How do we address the risk assessment now in the equatorial conditions :

1. **Identification of Hazards**

2. **Potential Exposure in Equatorial Zones**

3. **Preventative Measures**

# C-SAR 101C - Lithium Batteries – General Risk Assessment Equatorial Zones 2/2

**4. Emergency Response Plan**

**5. Training and Awareness**

**6. Regulatory Compliance**

**7. Review and Update**

**8. Communication with Stakeholders**

Note: Incorporating these points also into the risk assessment will provide a comprehensive overview of the potential dangers and mitigation strategies related to the off-gassing of hydrogen and oxygen from lithium batteries in equatorial zones.

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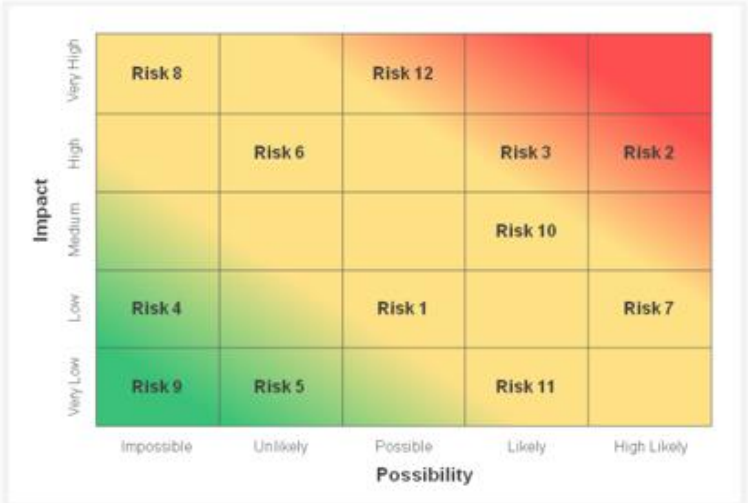
# Lithium Batteries

## Risk Indicators
## vs. Vessel-Voyage-Risk-Calculation Risk Assessment




| Mitigation Strategy | |
|---|---|
| Risk 1 | Transfer Risk Strategy |
| Risk 2 | Avoid Risk Strategy |
| Risk 3 | Avoid Risk Strategy |
| Risk 4 | MRS |
| Risk 5 | Monitor Risk Strategy |
| Risk 6 | Transfer Risk Strategy |
| Risk 7 | CRS |
| Risk 8 | TRS |
| Risk 9 | Accept Risk Strategy |
| Risk 10 | Control Risk Strategy |
| Risk 11 | TRS |
| Risk 12 | ARS |

In the maritime transport industry, risk assessment for vessel voyages is crucial for ensuring the safety of both the crew and cargo. The risk assessment indicators can be quantified using a systematic approach.

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## Risk Indicators for a Vessel-Voyage-Risk-Calculation (1 from 2)

Here's a general method for calculating the risk assessment indicators for a vessel-voyage:

**1. Hazard Identification**

**2. Probability Assessment (P)**

**3. Consequence Assessment (C)**

**4. Determine Risk Value (R)**

- For each hazard, multiply the probability (P) by the consequence (C)

  → to obtain a risk value where $R = P \times C$

- This provides a numerical value for each risk, allowing for prioritization.

**5. Mitigation Measures**

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## Risk Indicators for a Vessel-Voyage-Risk-Calculation (2 from 2)

**6. Determine Risk Acceptance Criteria**

**7. Monitor and Review**

**8. Quantitative Analysis**

**9. External Factors**

**10. Documentation**

By systematically calculating and reviewing these risk assessment indicators, maritime transport operators can make informed decisions, prioritise safety measures, and reduce the potential negative impacts of identified hazards.

It is obvious that this is valid for the whole supply chain. You do not want to happen the explosion of the MV MSC Carlotta in front of a school or at a traffic light.

# C-SAR 101C Lithium Batteries Definitions related to Risk and Risk Assessment

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# C-SAR 101C Lithium Batteries

## Definitions related to Risk Assessment and Risk Assessment Matrix

(1 from 2)

**Risk Assessment Definition:**

A risk assessment is a systematic process of evaluating the potential risks that may be involved in a projected activity or undertaking. It involves identifying potential hazards, analysing or evaluating the risk associated with that hazard, and determining appropriate ways to eliminate or control the hazard.

**Risk Assessment Matrix:**

A risk assessment matrix is a visual tool that helps in the evaluation of risks by plotting the severity of consequences against the likelihood of the hazard occurring. It allows for a more structured approach to risk evaluation, making it easier to prioritise and manage potential threats.

**Why Use a Risk Assessment Matrix?**

1. Prioritisation
2. Visual Representation
3. Standardisation
4. Informed Decision Making
5. Communication

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# Lithium Batteries

## Definitions related to Risk and Risk Assessment
(2 from 2)

How Does the Matrix Look?

A typical risk assessment matrix is a table with one axis representing the likelihood or probability of a risk occurring and the other axis representing the severity or consequence of the risk. The matrix is then divided into sections, often colour-coded, to represent different risk levels.

For instance:

| | Low Severity | Medium Severity | High Severity |
|---|---|---|---|
| High Likelihood | Medium Risk | High Risk | Extreme Risk |
| Medium Likelihood | Low Risk | Medium Risk | High Risk |
| Low Likelihood | Low Risk | Low Risk | Medium Risk |

# C-SAR 101C Lithium Batteries
# Simple Exercise on Risk Assessment

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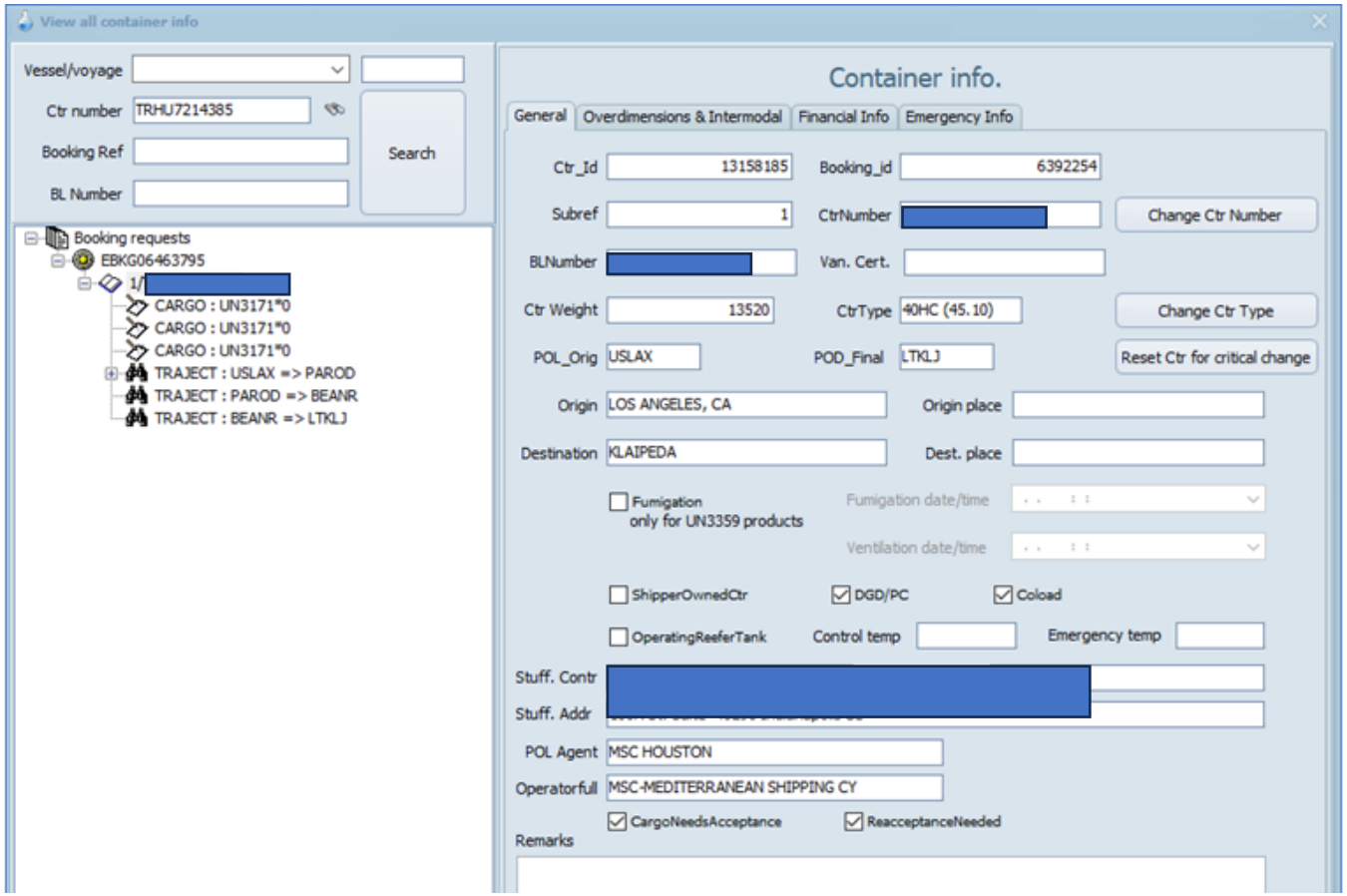
# “Explosion on MV MSC Carlotta”

1. Search for discrepancies




**MULTIMODAL DANGEROUS GOODS FORM**

| | |
|---|---|
| 1. Shipper | 2. Transport document number: EBKG06463795 |
| | 3. Page 1 of 1 pages; 4. Shipper's reference: EBKG06463795 |
| | 5. Freight forwarder's reference |
| 6. Consignee | 7. Carrier (to be completed by the carrier) |
| | SHIPPER'S DECLARATION: I hereby declare that the contents of this consignment are fully and accurately described below by the proper shipping name, and are classified, packaged, marked and labeled/placarded and are in all respects in proper condition for transport according to the applicable international and national government regulations. |
| 8. This shipment is within the limitations prescribed for: (Delete non-applicable) | 9. Additional handling information: EMERGENCY CONTACT |
| 10. Vessel/flight no. and date: MSC CARLOTTA MC333R | 11. Port/place of loading: Long Beach, CA |
| 12. Port/place of discharge: Klaipeda, LT | 13. Destination: Klaipeda, LT |

14. Shipment information — Number and kind of packages; description of goods (*see bottom)

UN 3171 PSN: BATTERY POWERED VEHICLE Class: 9

UN 3171 PSN: BATTERY POWERED VEHICLE Class: 9

UN 3171 PSN: BATTERY POWERED VEHICLE Class: 9

HYBRID AND/OR ELECTRIC VEHICLES BEING SHIPPED DO NOT NEED TO BE PACKAGED PER INTERNATIONAL MARITIME ORGANIZATION. MEETS MDG CODE SP962. THE BATTERY CABLES HAVE BEEN DISCONNECTED, AND THE FUEL TANK(S) COMPLETELY DRAINED. THE BATTERY SOC IS WITHIN THE LIMITATION OF 30-40%.

| 15.Container Number | 16. Seal number(s) | 17. Container Size & type | 18. Tare mass | 19. Total Gross Mass |
|---|---|---|---|---|
| | V222234454 | 40 HC | 5218 KG | 5218 KG |

| | |
|---|---|
| CONTAINER/VEHICLE PACKING CERTIFICATE<br>I hereby declare that the goods described above have been packed/loaded into the container/vehicle identified above in accordance with the applicable provisions. **<br>MUST BE COMPLETED AND SIGNED FOR ALL CONTAINER/VEHICLE LOADS BY PERSON RESPONSIBLE FOR PACKING/LOADING | 21. RECEIVING ORGANIZATION RECEIPT<br>Received the above number of packages/containers/trailers in apparent good order and condition, unless stated hereon:<br>RECEIVING ORGANIZATION<br>REMARKS: |
| 20. Name of company | Hauler's name<br>Vehicle reg. no.<br>22. Name of company (OF SHIPPER PREPARING THIS NOTE) |
| Name/status of declarant | Signature and date<br>Name/status of declarant |
| Place and date: Los Angeles, CA 08/24/2023 | Place and date |
| Signature of declarant | DRIVER'S SIGNATURE<br>Signature of declarant |

* DANGEROUS GOODS:
You must specify: UN No., proper shipping name/correct technical name, IMO hazard class (sub risk), Packaging group (where assigned), Marine pollutant, flashpoint (where assigned), quantity of packages, Gross weight, Net weight and observe the mandatory requirements under applicable national and international governmental regulations. For the purposes the IMDG Code see 5.4.1.1
** For the purposes of the IMDG Code see 5.4.2

# C-SAR 101C Lithium Batteries

# Risk Assessment & Management

| Used abbreviations | |
|---|---|
| C | Consequence(s) |
| CDC | Critical and Dangerous Cargoes |
| CINS Network | Cargo Incident Notification System & Network |
| C-SAR | Cargo Safety Alert and Related Guidance |
| DGD/PC | Dangerous Goods Declaration / Packing Certificate |
| EV | Electric Vehicle |
| FMEA | Failure Mode and Effect Analysis |
| HEV | Hybrid Electric Vehicle |
| KYC | Know Your Customer-Cargo-Carrier |
| LIB | Lithium-Ion Batteries |
| LMB | Lithium Metal Batteries |
| P | Probability |
| QRA | Quantitative Risk Assessment |
| R | Risk |
| RA | Risk Assessment |
| RAM | Risk Assessment & Management |
| “x” | Multiplied by |
| TY | Thank You |

# Thank You

Contact us

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