

**MIDDLETON EVENTS RISK ASSESSMENT
USE AND HANDLING OF DRY ICE (GENERAL)**

Important Note

This document serves as a comprehensive general risk assessment for the use of dry ice (solid carbon dioxide). All users are required to thoroughly review this document prior to the initial use of dry ice and subsequently, as needed. In the event that this document is deemed insufficient to adequately control the risks associated with the specific nature of use, users must incorporate additional risk control measures as deemed necessary.

It is imperative that users familiarise themselves with the identified hazards, mitigation measures, and recommended controls outlined in this risk assessment. Careful consideration should be given to the likelihood and severity of potential risks associated with the handling, storage, and transportation of dry ice.

Regular reviews of this document are essential to account for any changes in procedures, equipment, or workplace conditions. This ensures that the risk assessment remains up-to-date and effective in mitigating potential hazards associated with the use of dry ice.

Users are encouraged to actively participate in safety training programs, adhere to established guidelines, and communicate any concerns or modifications required to enhance the safety of dry ice-related activities. Safety is a shared responsibility, and the commitment to continuously improve and adapt risk control measures is vital for maintaining a secure working environment.

By acknowledging and adhering to the guidelines presented in this risk assessment, users contribute to the overall safety and well-being of themselves, and others involved in the handling of dry ice.

[Signature/Date: _____]

Introduction

Dry ice, or solid carbon dioxide (CO₂), is commonly used for various applications, including cooling, preserving, and creating special effects. While dry ice has numerous benefits, it also presents potential hazards that must be carefully assessed and managed to ensure the safety of individuals involved. This risk assessment aims to identify and mitigate potential risks associated with the use of dry ice.

For information consider the following:

- 1kg of dry ice will produce 0.45 m³ of gas (figure supplied by Gas Safety UK Ltd.).
- Dry ice to CO₂ sublimation rate = approx. 1% of total mass per hour in an insulated container (figure supplied by Gas Safety UK Ltd. - source: Federal Aviation Administration in USA).
- Dry ice to CO₂ sublimation rate = approx. 14% of total mass per hour at room temperature in the open (figure supplied by Gas Safety UK Ltd. - source: a study published in *Aviation, Space and Environmental Medicine* 1977).

(adapted from Imperial College London Guidance Note GN028 Safe Use Of Carbon Dioxide In Laboratories - <http://www3.imperial.ac.uk/safety/guidanceandadvice/gasesandcryo/co2>)

Persons At Risk

All persons working with dry ice and those persons accessing areas in which these materials are used and stored may be at risk.

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Date Of Assessment	23/01/24	Completed By	MIDDLETON EVENTS
Risk Assessment	Probability Rating	Outcome Rating	Risk Rating
	Likely	Harmful	Moderate Risk

Risk Assessment for the Use of Dry Ice (Solid CO2)

Identification of Hazards:

2.1. Cold Burns:

- **Description:** Dry ice has an extremely low temperature of approximately -78.5°C (-109.3°F), which can cause severe cold burns upon direct contact with skin or other body tissues.
- **Mitigation Measures:** Handlers must use insulated gloves and appropriate tools when handling dry ice to minimize the risk of cold burns.

2.2. Oxygen Depletion:

- **Description:** Dry ice sublimates, releasing carbon dioxide gas, which can displace oxygen in confined spaces, leading to oxygen deficiency.
- **Mitigation Measures:** Ensure proper ventilation in areas where dry ice is used. Avoid using dry ice in confined or poorly ventilated spaces.

2.3. Explosion Hazard:

- **Description:** Sublimation of dry ice releases carbon dioxide gas, which can pressurize sealed containers, leading to a risk of explosion.
- **Mitigation Measures:** Use vented containers when storing or transporting dry ice to prevent pressure build-up. Avoid sealing dry ice in airtight containers.

2.4. Inhalation Risk:

- **Description:** Inhaling high concentrations of carbon dioxide can lead to respiratory distress and asphyxiation.
- **Mitigation Measures:** Work in well-ventilated areas. Use appropriate personal protective equipment, such as respiratory protection, when handling large quantities of dry ice.

2.5. Physical Trauma:

- **Description:** Dry ice can be brittle and may shatter if subjected to impact, potentially causing physical injury.
- **Mitigation Measures:** Handle dry ice with care to prevent drops or impacts. Use appropriate tools and containers designed for dry ice transport.

3. Risk Evaluation:

3.1. Likelihood:

- Likelihood of cold burns: Low to Medium
- Likelihood of oxygen depletion: Low
- Likelihood of explosion hazard: Low
- Likelihood of inhalation risk: Low to Medium
- Likelihood of physical trauma: Low

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3.2. Severity:

- Severity of cold burns: Moderate to High
- Severity of oxygen depletion: Moderate to High
- Severity of explosion hazard: Moderate
- Severity of inhalation risk: Moderate to High
- Severity of physical trauma: Low to Moderate

4. Risk Control Measures:

4.1. Administrative Controls:

- Provide training on the safe handling and storage of dry ice.
- Establish clear guidelines for working in areas where dry ice is used.
- Implement procedures for emergency response in case of accidental exposure or spills.

4.2. Engineering Controls:

- Ensure adequate ventilation in areas where dry ice is used.
- Use containers designed to release pressure to prevent explosion hazards.
- Employ signage to indicate areas where dry ice is stored or used.

4.3. Personal Protective Equipment (PPE):

- Mandate the use of insulated gloves and eye protection when handling dry ice.
- Provide respiratory protection in situations where there is a risk of high concentrations of carbon dioxide.

5. Emergency Response:

- Establish an emergency response plan, including procedures for addressing exposure, spills, and injuries related to dry ice use.
- Ensure the availability of appropriate emergency equipment, such as eyewash stations and first aid supplies.

6. Review and Monitoring:

- Regularly review and update the risk assessment based on changes in procedures, equipment, or workplace conditions.
- Conduct periodic safety audits and inspections to ensure compliance with established controls.

This risk assessment serves as a guide for understanding and managing potential risks associated with the use of dry ice. It is crucial to tailor these measures to specific workplace conditions and activities, considering local regulations and standards. Regular training and communication with individuals involved in the handling of dry ice are essential for maintaining a safe working environment.

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Residual risk (when all control measures have been implemented)	Probability Rating	Outcome Rating	Risk Rating
	Unlikely	Harmful	Acceptable Risk
Residual risk acceptable	Yes		
Revision History	Rev. 0 Issued 23/01/2023 Rev. 1 Issued 23/01/2024		

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Part B: Additional Information For Dry Ice

Dry Ice Details	Details Of Use (e.g.. location, amount used, process concerned, etc)

Additional Risk Control Measures

- 1.
- 2.
- 3.
- 4.
- 5.

Residual Risk Rating

Residual risk acceptable

Dry Ice Details	Details Of Use (e.g.. location, amount used, process concerned, etc)

Additional Risk Control Measures

- 1.
- 2.
- 3.
- 4.

Residual Risk Rating

Residual risk acceptable

Insert copied sheets as required.