

EPIA
EUROPEAN PACKAGED ICE ASSOCIATION
Ice you can trust.

European Packaged Ice Association
ICE Standards
Issue 2

europeice.com

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Introduction

The purpose of this document is to assist EPIA members without formal food safety accreditation, such as Brand Reputation through Compliance Global Standards (BRCGS), in developing a Hazard Analysis Critical Control Point (HACCP) plan. There is additional information to help develop pre-requisite programmes (PRP) and general good manufacturing practices (GMP) on site that will help to support the HACCP plan.

For EPIA members with formal food safety accreditation the ICE Standards can be used as a reminder of best practice or as a reference guide if needed. This document could also be used for staff training.

The EPIA has a wide membership across many countries. Throughout the guide both EU and UK legislation is referred to where relevant. Whilst HACCP is internationally recognised each EPIA member is responsible for ensuring that they are familiar and compliant with relevant legislation at a national and local level. This includes legislation pertaining to food safety, product labelling and water quality standards.

Foreword

Having been the owner of an Ice Business for 30+ years I have to confess that in my early years of manufacturing and selling ice products, I paid little attention to Food Safety issues. All those years ago I thought: 'Its only ice, what could possibly go wrong?' How wrong I was!

The truth is that manufacturing to a high standard of Food Safety is a legal, ethical, and commercial requirement for all of us in this industry.

In our drive towards creating a more useful European Packaged Ice Association it felt necessary to establish a Food Safety Committee that sets the basic standards that all Producer Members should be following. This represents an important step forward for the EPIA.

I would like to thank Bill Message and the Food Safety Committee for the recent release of the updated Issue 2 of the EPIA ICE Standards which serves our association with continuously improving guidelines for the safe manufacture of packaged ice products. Following these guidelines helps protect every person that consumes our ice products and as a consequence it helps to protect our businesses too.

Gavin Marks, EPIA Chairman, October 2025

EPIA Mission

Our Mission is to advance and unite the European Ice Industry by promoting high standards within the community of our membership. High standards of Food Safety, Health & Safety & Product Quality are expected from our Producer Members. High standards of equipment, service and products are expected from our Supplier Members.

Disclaimers

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Section 1: Inspection

Internal Audits

EPIA members should be able to demonstrate that they can verify the effective application of their food safety and quality management system.

Why are internal audits necessary?

Audits are a way to keep your company on track for making safe ice and prove that you're doing a good job. An auditor, be it internal or a third-party external auditor will not be seeking to catch members out, they will be looking for conformance and are verifying that you are doing the things you say you will do.

Internal Audit Schedule

Each EPIA member should have an internal audit schedule in place over the calendar year.

The scope of the internal audit programme should include areas such as:

- The site's HACCP plan
- prerequisite programmes (e.g. hygiene, pest management)
- product defence

A full audit of the HACCP Plan should be performed annually. Members should have a formal document to record the internal audit on. The audit report should include at a minimum:

- the date of the internal audit
- what was reviewed
- any findings and corrective actions
- It should be signed by the auditor as well as a senior management of the company

Internal Audits – Who can conduct audits?

Internal audits should be carried out by appropriately trained, competent auditors. Auditors should be independent (i.e. not audit their own work). Auditors can be from a third-party, or from within the EPIA members business. If auditors are being used from the workforce, then they should not be involved in the area they are auditing and should have some form of auditing certification or previous auditing experience (that can be proven).

Reporting Internal Audit Findings & Non-conformance

All internal audit reports should identify conformity as well as non-conformity and include objective evidence of the findings. The results of the audits should be reported to the individuals who are responsible for the area or activity being audited.

In the event a non-conformance is found corrective and/or preventive actions should be raised to correct the issue. A timescale for the implementation of the corrective and/or preventive actions, should be agreed and their completion verified.

Summary

Internal audits provide assurance of process integrity that is, that systems work the way they are intended to work, and the way that management and the Quality Management System (QMS) promise those systems work. These audits can identify risks of human error, system failures, GMP issues, damage to fabrication, before they become more problematic.

Daily Checks

Routine checks in an ice manufacturing plant are crucial to ensuring the production of safe, high-quality ice. These checks should be carefully scheduled to monitor various aspects of production and quality control.

The Importance of Daily Checks

Daily checks as part of day-to-day ice production are critical for ensuring product safety, quality, and compliance with regulatory standards. Here's why they are important:

Contaminant Prevention

- Glass Audits: Regular inspections of glass and brittle materials (e.g., windows, light fixtures) help detect cracks or breakages that could lead to glass contamination in food. Early identification prevents glass fragments from entering production lines, which can pose serious health risks.
- Metal Detection Checks: Daily tests of metal detectors ensure they are functioning correctly to catch any metal contaminants (like broken machine parts or metal fragments). Proper functioning metal detectors reduce the risk of metal contamination, safeguarding both consumer health and the EPIA member's reputation.

Regulatory Compliance

- Food safety regulations like HACCP often mandate routine checks to prevent contamination and ensure the safety of food products. Daily inspections demonstrate adherence to these standards and reduce the risk of non-compliance penalties.

Consumer Safety

- The primary goal of daily checks is to protect consumers from physical contaminants that can cause injury or illness, maintaining product safety and trust.

Operational Efficiency

- Regular checks help identify potential equipment issues early, allowing for timely repairs and reducing costly production downtime.

Quality Assurance

- Ensuring that contaminants are kept out of the production process and hygiene practices are adhered to helps maintain the overall quality of the food products, reinforcing brand reputation and consumer confidence.

Documented Inspections & Checks

In addition to the internal audit programme, there should be regular documented inspections to ensure that the ice production environment and processing equipment is maintained in a suitable condition to produce ice products.

At a minimum, these inspections should include:

- hygiene inspections to assess cleaning
- housekeeping performance to assess good manufacturing practices
- fabrication inspections (e.g. doors, walls, facilities and equipment) to identify risks to the ice products from the building or equipment.
- Checks and inspections should be dated and signed by the person who performed them. Some checks may require an additional verification signature.

The frequency of these inspections should be based on risk and on any changes that may affect the safety of the products. However, inspections should be monthly as a minimum, in any open product areas.

Below is a breakdown of the types of checks that should be performed. The frequencies in the list below are recommendations. The frequency of checks within EPIA members plants should be based on risk. Justifications to frequencies should always be documented.

Recommended Daily Checks

Metal Detection Testing

- Testing of inline metal detectors is essential, especially if metal detection is a critical control point (CCP).

Water Quality Testing

- Details: Test the water used for ice production to ensure it meets potable standards. Check for microbial contamination (e.g., coliform, E. coli) and chemical parameters (e.g., chlorine levels, pH).

Cleaning Verification

- Details: Verify that all daily cleaning and sanitising procedures have been correctly followed for equipment, production surfaces, and utensils. Inspect the cleanliness of hoppers, trays, moulds and storage bins.

Temperature Monitoring

- Details: Monitor and record the temperatures of freezers, storage areas, and any refrigerated equipment to ensure they are within specified ranges to ensure product integrity and quality.

Equipment Inspection

- Details: Check the operational status of ice machines, conveyors, water filtration systems, and packaging machines. Look for any signs of wear, leaks, or malfunctions that could affect production.

Personal Hygiene Checks

- Details: Ensure that all employees adhere to personal hygiene policies, including handwashing, wearing appropriate clothing (hairnets, gloves), and avoiding contamination.

Ice Quality Inspection

- Details: Visually inspect ice cubes for clarity, uniformity in size, and the presence of any contaminants.

Quality Control Checks

- Bag Weight Accuracy: Regularly check the weight of packed ice to ensure the machine's weighing system is accurate and consistent.
- Bag Integrity: Inspect the quality of packaging to ensure bags are sealed without any leaks and check for consistency in material usage (film thickness, seal strength).
- Batch Code Printing: Check the legibility and accuracy of batch code prints on bagged product for traceability purposes.
- Ice Quality: Ensure the ice remains free of contamination, clumping, or excess moisture, which could lead to suboptimal packaging or product damage during storage or transportation.
- Product Consistency: Monitor the size and shape of ice being packed to ensure they meet the standards required by the customer or end-user.

Weekly Checks

Cleaning Verification

- Details: Check the cleaning and sanitisation of all equipment, focusing on areas that might not be addressed during daily cleaning verification, such as behind and under machines.

Water Filtration System Inspection

- Details: Check the filters in the water treatment systems for signs of clogging or wear.

Inventory and Storage Checks

- Details: Inspect raw material storage (e.g., water, additives) and finished ice storage for proper rotation (first in, first out), temperature control, and potential contamination.

Record Review

- Details: Review and verify records from daily checks to ensure accuracy and compliance with SOPs and to identify any recurring issues or trends.

Monthly Checks

Comprehensive Equipment Maintenance

- Details: Conduct relevant preventive maintenance on machinery, including lubrication, parts replacement, and calibration of monitoring devices such as thermometers and pressure gauges.

Microbiological Testing of Ice

- Details: Send samples of the finished ice product to a laboratory for comprehensive microbiological analysis to ensure it is free from pathogens such as E. coli.

Environmental Monitoring

- Details: Test the production environment, including air and surfaces, for microbial contamination. This can help identify areas where hygiene practices may need improvement.

Pest Control Inspection & Review

- Details: Inspect the facility for any signs of pest activity (e.g., droppings, nests) and ensure that pest control measures are in place and effective. Review the effectiveness of the pest control programme, including trap locations, pesticide use, and any pest-related incidents. Adjust strategies as necessary. This maybe done internally or using a third-party contractor.

Water Treatment System Maintenance

- Details: Perform maintenance on water treatment systems, including checking for scale buildup, ensuring UV systems are working, and backwashing filters.

Glass & Hard Plastic Audits

- Glass and hard plastic audits within the production areas should be checked for cracks or breakages. If glass or hard plastic is near to open product you may need to consider more regular audits.

Employee Training

- Details: Review employee adherence to safety and hygiene protocols. Provide refresher training as needed, especially for any new or updated procedures

Quarterly Checks

Comprehensive System Audit

- Details: Conduct a full audit of all systems, including HACCP, GMPs, and SOPs, to ensure that all processes are functioning correctly, and that documentation is complete and accurate. An EPIA members Internal Audit programme will cover much of this work.

Waste Management Review

- Details: Review waste management procedures to ensure proper disposal and recycling practices are being followed, and that they are effective in preventing contamination.

Annual Checks

Employee Competency Testing

- Details: Assess the competency of employees through testing and observation to ensure they understand and can properly implement food safety procedures.

Regulatory Compliance Review

- Details: Review the facility's compliance with local and national regulations related to food safety, water quality, and environmental impact. Update procedures and practices as needed to remain compliant.

HACCP Review

- Details: Conduct an internal audit of the HACCP system, reviewing critical control points (CCPs), monitoring records, and corrective actions. Adjust the HACCP plan as necessary based on findings.

Supplier Audit (if applicable)

- Details: Review and audit suppliers to ensure they continue to meet quality and safety standards for raw materials, especially water.

Summary

Daily checks, such as glass audits and metal detection, are vital for preventing contamination, complying with regulations, ensuring product quality, and protecting consumers.

Good Manufacturing Practice (GMP) Audits

EPIA members should conduct GMP Audits at regular intervals. The frequency of the GMP Audits should be based on risk. Conducting GMP audits will ensure that the site maintains high standards of cleanliness, hygiene, and food safety. Ice is considered a food product, so the GMP audit process should follow a similar approach for any food production facility.

Best Practices for Performing GMP Audits

Prepare a Comprehensive Checklist

- Prior to the audit, create a checklist of GMP requirements specific to your site. Structure the checklist based on areas within your site. It is important to understand the site's production process, including how ice is manufactured, stored, and distributed. Review past records, including non-conformances, to tailor the checklist to include any problem areas.

Observe Production Process in Real Time

- As part of the GMP audit the auditor should walk through the facility to observe real-time production. The auditor should look at how ice is handled, stored, and packaged to identify any potential contamination risks.

Check Documentation and Records

- Review records such as cleaning logs, maintenance schedules, employee training records and testing certificates reports to ensure that documentation is up to date and in line with GMP standards.

Engage with Employees

- Speak with staff during the audit to gauge their understanding of GMP procedures, food safety protocols, and any potential issues they face during operations.

Focus on Continuous Improvement

- Recommend areas for improvement based on audit findings, emphasising the importance of maintaining high standards beyond the audit.

Report Findings and Follow-Up

- Provide clear, detailed reports with specific improvement actions and deadlines. Ensure there's a follow-up process to verify that any issues found are addressed.

Key Areas to Check During the GMP Audit

Water Source and Quality

- Filtration and disinfection (e.g., UV, chlorination) systems should be checked.
- Is testing regime being adhered to? Are certificates and/or testing records in place?

Equipment and Machinery

- Cleanliness of ice-making and packing machines.
- Regular maintenance checks and calibration of machines have been conducted as per defined schedules.
- Ice storage bins and conveyors should be free from rust, mould, and debris.

Cleaning

- Effectiveness and frequency of cleaning and sanitising procedures for equipment and the production area.
- Proper use of cleaning agents and sanitisers (food-safe, correct concentrations).
- Cleaning records should be accurate and up to date.

Employee Hygiene

- Employees should be following hygiene practices such as wearing hairnets, gloves, and other appropriate PPE.
- Hand-washing stations should be available, being used and properly equipped (soap, sanitisers).

Pest Control

- Is the pest control programme up to date? Have the scheduled visits/inspections taken place?
- Is there any evidence of rodents, insects, or other pests on site?
- Check sealing of entry points and screens to protect production areas.
- Are bait boxes and electronic fly killers (EFKs) in good condition.

Storage and Handling of Ice

- Proper storage temperatures and conditions to prevent ice from melting and refreezing (which can introduce contaminants).
- Ice should be handled with clean tools or gloved hands to avoid cross-contamination.

Packaging and Labelling

- Ice packaging must be sanitary, free from defects, and appropriate for food contact.
- Clear labelling of packaging with the required information (e.g., product description, date codes, batch numbers).
- Packaging material should be food-grade and stored in sanitary conditions.

Cross-Contamination Prevention

- Procedures in place to avoid cross-contamination between ice, packaging materials, and chemicals.
- Segregation of chemicals (cleaners, lubricants) from the production area.
- Segregation of food grade and non-food grade chemicals in storage area.
- Use of food-grade lubricants on equipment.

Fabrication

- Proper ventilation, lighting, and drainage in the production area.
- Floors, walls, and ceilings should be cleanable and in good repair.
- Drainage systems should prevent water accumulation, which can promote microbial growth.

Waste Management

- Proper disposal of waste materials, such as plastic packaging and ice that is unsuitable for sale.
- Regular collection and removal of waste to avoid pest attraction.

Documentation and Record Keeping

- Check key records of equipment maintenance, cleaning schedules, water testing, pest control, metal detection testing and employee training for completion and accuracy.

Audit Report & Conclusion

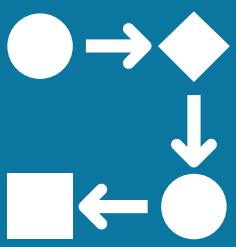
- EPIA members should have a scoring system in place for GMP Audits. This could be a percentage score (i.e. 95%), or a total score (i.e. 60/67). After a few GMP Audits have been conducted you can benchmark and settle on a target score for GMP audits. This will help you trend your overall compliance to GMP.
- The audit should conclude with an inspection report citing any areas for improvement that need to be addressed immediately or within a set period. Depending on the severity would determine whether the finding will lead to a full non-conformance.
- The GMP audit report should be available to all staff in the business. High standards and a good GMP audit result should be communicated, not just the non-compliant areas.

Non-conformity to Expected Standards

Similarly, as with internal audits, any areas for improvement or non-conformances will require corrective actions, and timescales for their implementation, should be agreed and their completion verified.

Summary

A GMP audit should be comprehensive, focusing on production practices, staff hygiene, materials, site fabrication, equipment, packaging and labelling and documentation. By implementing GMP audits at the appropriate frequencies, EPIA members can maintain high standards of quality and safety and help to encourage and maintain adherence to best practices that are crucial to ensuring that the final product is safe for consumption and meets all regulatory requirements.



Section 2: Control

HACCP (Hazard Analysis Critical Control Point)

Having a HACCP plan in place is mandatory for EPIA membership. The ICE Standards outlines a best practice approach to developing a HACCP Plan based on HACCP principles.

Why should EPIA members have a HACCP Plan?

HACCP is an internationally recognised, systematic approach used to ensure food safety by identifying and controlling potential hazards in food production processes. For an ice manufacturing facility, the HACCP plan is crucial to prevent contamination and ensure the production of safe, high-quality ice products.

Article 5 of Regulation (EC) No 852/2004 – which has been retained within UK law – states that: 'Food business operators shall put in place, implement and maintain a permanent procedure based on the Codex HACCP principles.' Therefore, having a quality management system (QMS) based on the HACCP principles is a legal requirement.

Alongside ensuring compliance with food safety law, successfully implementing the HACCP principles will help EPIA members to:

- Avoid costly product withdrawals/recalls.
- Protect the reputation of the business.
- Increase customer and consumer confidence.
- Reduce the likelihood of contamination.
- Establish a good traceability system.

Developing a HACCP Plan

This section gives an approach for developing a HAACP plan that can be customised to each EPIA member. The approach comprises of two stages:

- Stage 1 Initial activities.
- Stage 2 Application of the seven HACCP principles.

STAGE 1

Description of Producer

In this section of the HACCP plan the following details should be documented:

- A brief history of the company.
- A copy of the company's mission statement.
- Detail of the operation.
- Detail of markets supplied (local, national, international markets should all be included).

- Customer base.

Assemble a HACCP Team

Start by forming a multidisciplinary HACCP team. Include individuals with expertise in food safety, production, quality assurance, and maintenance. The team should understand the entire ice production process, including water sourcing, freezing, storage, and distribution. The size of the HACCP team will depend on the size of the EPIA member.

The minimum number of people in a HACCP team should be two people, as more than one person is required for validation and verification purposes. Within each HACCP team a HACCP team leader must be selected. The HACCP team leader should not be the most senior person in a company but the person best qualified and suited to developing and maintaining the HACCP plan. The team leader must have a good knowledge of both HACCP principles and the site's activities. Details of the team and their qualifications and/or suitability to sit of the team must be documented.

A member of the senior leadership should be on the HACCP team to demonstrate the company's commitment to HACCP.

Describe the Manufacturing Process

Document the primary methods of production of the ice products manufactured on site. This should include and mention the use of filtration, reclaimed water, machinery etc.

Describe the Product

Document the characteristics of the ice, including size, shape, and intended use. Describe the packaging, storage conditions, and distribution methods.

Identify Intended Use and Consumers

Determine the intended use of the ice cubes and identify vulnerable populations that might use the product, such as immunocompromised individuals or children. This helps in assessing the level of control required for safety. The use of ice cubes and the end-users often extend further than just cooling drinks at home and the hospitality industries. EPIA members should review their customer base. Industries such as fishing, baking, pharmaceuticals and biosciences should all be considered.

Construct a Process Flow Diagram

Create a detailed flow diagram that outlines each step of the ice production process. This diagram should cover, at a minimum:

- Water sourcing and treatment
- Freezing
- Storage
- Packaging
- Distribution

The flow diagram should show points of transfer and key equipment. A Flow diagram should be produced for each product produced. If the only variable is weight, it's not needed but if different types of ice are being made then different diagrams are needed.

Ensure the accuracy of the flow diagram by validating it with the HACCP team through on-site verification.

STAGE 2

Principle 1: Conduct a Hazard Analysis

Principle 1 of HACCP involves conducting a hazard analysis. Similar to a risk assessment, this involves considering all of the procedures and processes within the business that could pose a risk to the ice products manufactured and therefore cause harm to the consumer. This includes looking closely at the physical, chemical, allergenic and microbial hazards at each step of the process flow diagram:

- Biological hazards: Contamination from waterborne pathogens like E. coli, Salmonella, or Listeria.
- Chemical hazards: Residual chemicals from water treatment, cleaning agents, or lubricants.
- Physical hazards: Foreign objects like plastic, metal, or glass in the ice.
- Allergenic hazards: Most ice manufacturers will not have allergenic ingredients in their products, however, allergenic risks should also be considered, even if they are low risk.
    - Consider food that is brought on to site by staff or contractors and the risks of it getting into non-designated eating areas.
    - Consider lubricants or chemicals used in-house or brought onto site by visitors.
    - If additional cold storage is undertaken on site, then these products need to be considered.

Once all the hazards have been identified and listed, they need to be graded according to how likely they are to occur and the severity of the consequences if they did occur.

The matrix listed below details a systematic approach, helping determine whether a risk needs further analysis to reduce the risk to an acceptable level. There are two major aspects of hazards analysis:

- Determination of the severity ranking for a particular food safety hazard
- The ranking of its likelihood of occurrence within the food business operations

Severity (Left side)			Likelihood (Bottom Side)		
Risk Rating	**Severity**	**Example**	**Risk Rating**	**Likelihood**	**Example**
5	Catastrophic	Fatality	**5**	High Chance	Common repeating occurrence / is expected to happen
4	Major	Serious sickness/injury	**4**	Likely	Will probably happen in most circumstances
3	Serious	Product Recall	**3**	Possible	Could happen
2	Minor	Customer complaint	**2**	Unlikely	Has not happened but could
1	Insignificant	Hazard will not result in unsafe product	**1**	Rare	Will happen in exceptional circumstances

A risk that scores in the green category should be considered an acceptable risk that is managed by an EPIA member's PRPs. Risks that score in the amber or red categories will need further analysis by the HACCP team to determine risk.

SEVERITY						
	5	**5**	**10**	**15**	**20**	**25**
	4	**4**	**8**	**12**	**16**	**20**
	3	**3**	**6**	**9**	**12**	**15**
	2	**2**	**4**	**6**	**8**	**10**
	1	**1**	**2**	**3**	**4**	**5**
		1	**2**	**3**	**4**	**5**
		LIKELIHOOD				

The first task for risks in amber or red categories is for them to be put through the HACCP Decision Tree.

Question 1: Do control preventative measure(s) exit?
If yes, go to **Question 2.**
If no, is control at this step necessary for safety?
If yes, modify step, process, or product.
If no, not a CCP. Stop and proceed to the next identified hazard in the described process.

Question 2: Is the step specifically designed to eliminate or reduce the likely occurrence of a hazard to an acceptable level?
If yes, it's a Critical Control Point.
If no, go to **Question 3.**

Question 3: Could contamination with identified hazards occur in excess of acceptable level(s) or could these increase to unacceptable levels?
If yes, go to **Question 4.**
If no, not a CCP. Stop and proceed to the next identified hazard in the described process.

Question 4: Will a subsequent step eliminate identified hazard(s) or reduce likely occurrence to an acceptable level?
If yes, it's not a CCP. Stop and proceed to the next identified hazard in the described process.
If no, it's a **Critical Control Point**

Principle 2: Determine Critical Control Points
Principle 2 of HACCP involves determining the critical control points in the food handling processes. A critical control point (CCP) is the last step where you can intervene to eliminate or reduce a hazard to an acceptable limit.

Unlike Control Points (CPs) – which is any step in the flow of food where a physical, chemical or microbial hazard can be controlled – at a CCP, a loss of control would lead to an unacceptable level of risk if an appropriate control is not implemented to eliminate or reduce it as quickly as possible.

Common CCPs in ice production might include:

- Water treatment and filtration: Ensuring the water used is free from pathogens and harmful chemicals.
- Freezing process: Maintaining the appropriate temperature to ensure ice is properly formed and contaminants are minimized.
- Storage: Controlling the temperature and preventing contamination from external sources.
- Metal detection: Metal detection of product in its final packaging.

Principle 3: Establish Critical Limits

A value outside the Critical Limit indicates a deviation and potentially unsafe product. Usually a numerical value, a critical limit this outlines the minimum acceptability of which the hazard can be controlled. For each CCP identified set measurable critical limits that define acceptable safety parameters. Examples include:

- Water quality: Ensuring water meets local and international standards for potable water or defined parameters.
- Freezing temperature: Maintaining a freezing temperature at or below -18°C to ensure ice quality and safety.
- Storage temperature: Keeping stored ice at a temperature that prevents melting and contamination.
- Metal Detection: The limit of detection for a metal detector, and therefore the critical limit, may be 2.0mm Ferrous, 2.5mm Non-ferrous and 4.0mm Stainless Steel to reflect the test pieces used to check the viability of the metal detector.

Principle 4: Establish Monitoring Procedures

Principle 4 of HACCP states that the food safety system must have a way of determining whether the CCPs and critical limits are under control. This can be achieved through consistent and continual monitoring.

CCPs should be monitored at all times in order to efficiently detect any loss of control, identify any deviations and ensure that corrective actions are carried out where necessary.

Principle 5: Establish Corrective Actions

Principle 5 of HACCP involves establishing corrective actions, which is any action that must be taken when the results of monitoring a CCP indicate that a critical limit has been breached.
The aim of corrective action is to:

- Make the product safe.
- Prevent recurrence of the problem.
- Maintain a chain of documentation for audit purposes.

There are 3 levels of corrective action that need to be put in place:

- Immediate action to regain control of the process.
- Short term action to identify and deal with the affected product by placing it under control.
- Long term action to investigate the cause and prevent it happening again.

Corrective actions will be determined through a documented non-conformance procedure.

Principle 6: Establish Verification Procedures

Principle 6 of HACCP involves establishing verification procedures. This includes regularly reviewing the HACCP system to ensure that the food safety management system is working effectively. This can be confirmed through:

- internal audits
- third party audits
- validation activities
- verification procedures.

Verification and internal auditing take an overview of the whole HACCP system rather than individual activities. Verification looks to check that each element of the HACCP system is working correctly, in accordance with the HACCP plan and to ensure that the system is up to date.

Validation is the process of collecting evidence to show that the HACCP plan is effective, particularly at the points of critical control and critical limits, to prove that the HACCP system will effectively control the hazards.

The table below gives examples of the differences between HACCP validation and verification activities.

HACCP Validation vs Verification	
Validation examples	**Verification examples**
Carrying out cleaning trials to show: ○ That the cleaning procedure reduces the contamination to the required level. ○ What monitoring limits need to be achieved using ATP and micro swabs to validate.	○ ATP testing to show that the clean has been carried out effectively.
Metal detector trials to show: ○ What test piece sizes can be achieved. ○ Where the test piece should be placed.	○ Start, hourly and end of run testing of the metal detector using the test pieces.
The HACCP plan the team validates that: ○ The scope covers all relevant information. ○ The flow chart covers all the required process steps. ○ The hazards at each process step have been covered.	○ Routine audit of the CCPs. ○ Routine audit of the PRPs. ○ Full HACCP plan review.

A HACCP validation should be carried out before the HACCP plan is first implemented to make sure it is thorough and accurate. If the HACCP plan is in any way incomplete or inaccurate it must be amended. Validation checks should also be carried out whenever the HACCP Plan is reviewed. Below is a list of questions to be considered as part of HACCP validation. This list is not exhaustive, and EPIA members are encouraged to add questions that may be relevant to their operation.

- Is the scope an accurate description of the process?
- Does the flow chart correctly identify each step of the process?
- Are all significant hazards correctly identified and addressed?
- Are adequate control measures in place?

- Have the CCPs been correctly identified justified?
- Are the critical/legal limits acceptable?
- Are there procedures in place for the monitoring?
- Are corrective actions in place and understood by relevant staff?
- Are there adequate records in place?
- Will the plan control all the significant hazards if followed correctly?

Principle 7: Establish Documentation

Principle 7 of HACCP requires accurate records to be kept for each stage of the QMS. This documentation should verify that the controls in place are working as planned.

Types of documentation that support a HACCP plan include:

- Details of the hazard analysis.
- CCP determination.
- Training records.
- SOPs such as:
  - corrective action procedures
  - glass breakage procedures
  - cleaning procedures
- Cleaning schedules.
- Pest control reports.
- Supplier documentation, such as lists, specifications and audit records.
- Records, for example:
  - CCP monitoring records including deviations and corrective actions,
  - modifications to the HACCP plan
  - visual inspection reports
  - daily checks such as temperature checks

Documentation is also essential for a due diligence defence should it be needed. For this reason, it's essential that information, documentation and resources are maintained and kept up to date.

Summary

Implementing a robust HACCP plan will form the backbone of EPIA members QMS. Having a HACCP plan in place will prevent contamination and ensure the production of safe, high-quality ice products. To help establish and maintain a HACCP plan effectively requires establishing several prerequisite programmes (PRPs). These PRPs will lay the foundational practices and conditions necessary to ensure food safety and support the effective functioning of the HACCP system.

The rest of Section 2 outlines some of the key prerequisite programmes for EPIA members to consider as part of their operations.

The maintenance of equipment is also an important PRP but is covered separately in Section 3 of this document.

Training of staff is a PRP but is covered separately in Section 4 of this document.

Good Manufacturing Practice (GMP)

GMP ensures that ice products are safe, free from contamination, and of consistent quality. This is critical since food products like ice are highly susceptible to contamination, which can result in injury, illness or foodborne diseases. GMP applies to every stage of the manufacturing process, from sourcing raw materials to packaging and storage. GMP helps EPIA members comply with HACCP.

What is Good Manufacturing Practice?

Good Manufacturing Practice (GMP) is a system designed to ensure that all products produced are safe, authentic, legal, of good quality and fit for their intended use (primarily consumption by the general public). Originally developed for pharmaceutical manufacturing, GMP is now a fundamental framework applied across industries, including food manufacturing.

GMP covers all aspects of the manufacture of ice products. EPIA members must comply with GMP requirements and thus ensure that all ice products produced are free from contamination, are correctly produced according to product specification and are correctly packed and labelled.

Documentation

- Accurate and comprehensive records of every batch of product, from raw materials to distribution, must be kept. This ensures traceability and aids in recalls or investigations if a product issue arises.

Cleaning

- Before commencing work staff in production areas should ensure that all machines, equipment are areas are clean.
- Cleaning solutions must be made up with the correct concentration using automatic dosing equipment or measuring jugs/cylinders.
- Equipment that is used for cleaning (buckets and containers) must only be used for cleaning and not for use in any aspect of production of ice. The correct piece of equipment must be used for cleaning the correct area. Col
- Cleaning of equipment/areas must be carried out as per the relevant Cleaning Instruction Card (CIC).
- If PPE/uniform gets dirty or heavily soiled, they must be changed.

Staff

- All staff require induction training on cleaning. Specific cleaning tasks should be trained out and refresher training given at least annually.
- Mistakes or errors should be reported. It is only by admitting fault that lessons can be learned. Where necessary a non-conformance should be raised.
- All PPE and uniform should be stored correctly when not in use.
- Staff should always keep in mind that the primary use of ice products are to be consumed by the general public, so cleanliness and personal hygiene are very important.

Materials

- No containers, equipment, parts, packaging reels may be stored on the floor in production areas (with the exception of waste bins).
- All packaging reels should be labelled, this includes part reels. Labels should be clearly visible. on the outside of the reels and within the inner core.
- When not in use packaging reels should be completely covered, even if they are in situ on packing machines.
- All cleaning agents and cleaning equipment should be returned to its storage location after cleaning is completed.
- Tools should be placed back on shadow boards or returned to workshops after use. If shadow boards are not used, then a check in and out procedure should be used

Glass & Plastic Breakages

- If there is a glass or plastic breakage production should stop, and a manager informed immediately.
- A glass breakage clean up procedure should be in place for staff to follow.

Body Fluid Spillage

- If there is a bodily fluid incident production should stop, and a manager informed immediately.
- A bodily fluid spillage clean up procedure should be in place for staff to follow.

Premises

- Food premises are required to be located, designed, constructed, adapted and maintained to suit the operations being carried out.
- All maintenance requirements should be complied with, to include, but not limited to:
  - No water damage
  - All production and building fabrication in good order (ceilings, walls etc.)
  - Good housekeeping (no clutter)
  - Lighting in working order
  - Waste bins emptied/not overflowing/used correctly
  - All equipment in good working order
- Any issues with equipment or building fabrication should be reported.

Personal Hygiene

EPIA members are bound by legislation when it comes to personal hygiene. All staff and visitors must comply with:

- Relevant legislation
- Any customer requirements

Personal hygiene applies to every employee or visitor on an EPIA member site. It is a very important control to protect food.

It is the people involved in production of ice products that can have the greatest impact on its safety. Consequently, it is not possible to remove the risks that people present to food therefore it is essential that the risks are controlled.

Personal cleanliness

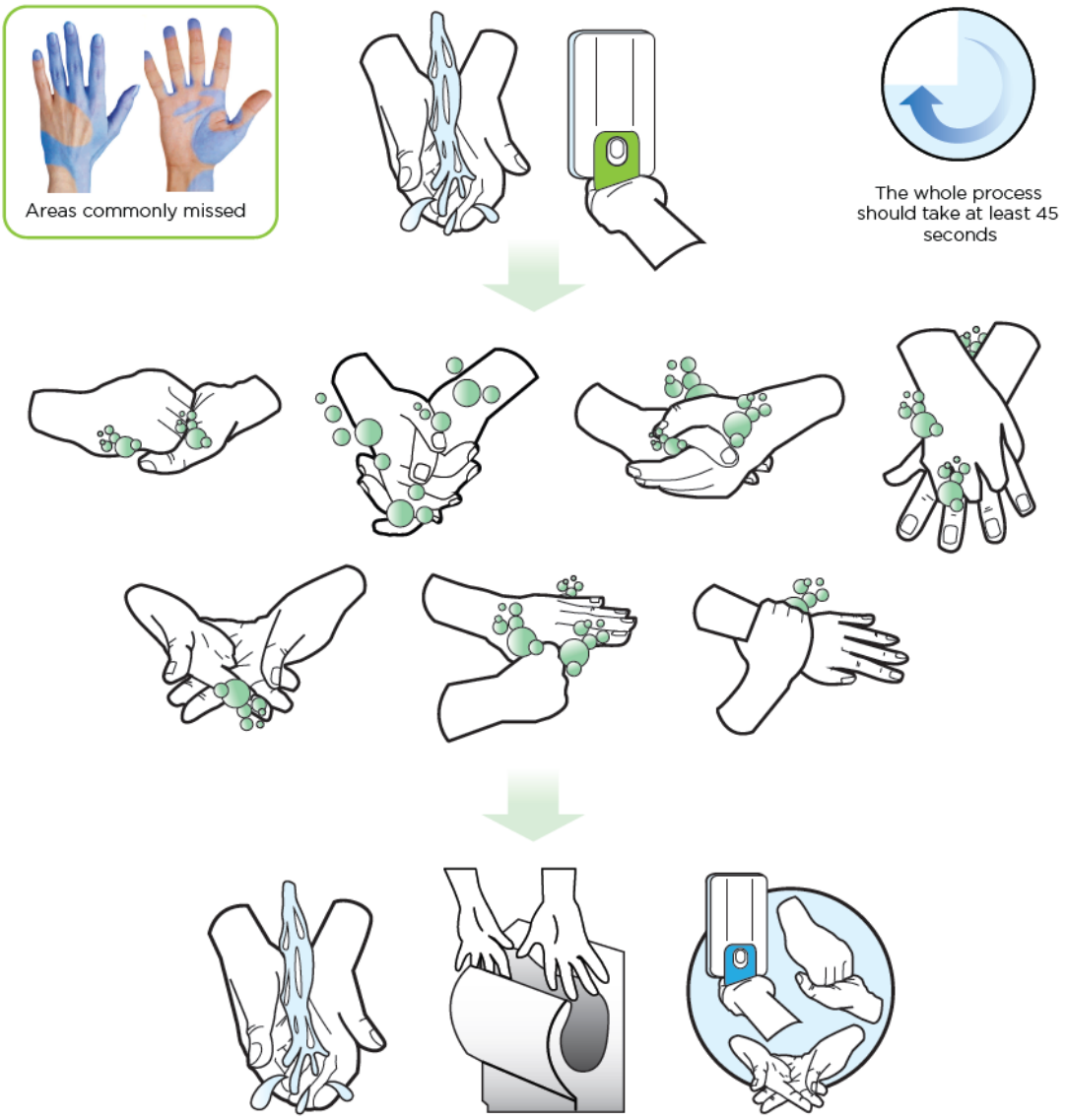
- A high degree of personal hygiene is required.
- Fingernails should be short and clean.
- Hands must be kept clean and washed thoroughly especially after using the toilet.
- Hands must be washed on entering the production area.
- Jewellery and watches should be removed (other than plain wedding band or medical alert necklace tucked into shirt)
- All sickness and injuries, however minor, must be reported.

Hand Washing

- Hand washing is vital and should be carried out thoroughly to prevent spread of contamination. An effective hand washing technique must be used. In particular, hands must be washed at the following times:
  - Before starting work
  - Before handling ice
  - After using the toilet
  - After touching bins or handling waste
  - After every break
  - After eating and drinking
  - After cleaning
  - After blowing your nose
  - After smoking

Effective Hand Washing

1. Use water and wet your hands thoroughly.
2. Use soap (1-3 mL) and lather very well.
3. Scrub your hands, between your fingers, backs of your hands, wrists, and forearms with soap for at least 20 seconds.
4. Scrub under your nails.
5. Rinse thoroughly under clean, running water.
6. Dry your hands using an air dryer.
7. Apply hand sanitiser.
8. Protect your hands from touching dirty surfaces as you leave the toilet / kitchen / production areas.



Personal Dress

- No personal possessions or outdoor clothing are allowed in production area or stores.
- No jewellery including, but not limited to, the below is permitted in the production areas:
  - Necklaces
  - Studs/piercings in exposed parts of the body (e.g. ears, nose, tongue and eyebrows)
  - Earrings
  - Watches, smartwatches or fitness trackers
  - Bracelets
  - The only permitted jewellery allowed in production areas should be plain wedding rings or bands.
  - EPIA members may need to make concessions on jewellery for medical or religious reasons.
- No nail varnish, false fingernails, nail art allowed in the production areas
- Excessive use of perfume or aftershave is not permitted.

Miscellaneous

- Contact Lens wearers must be registered with the site. The loss of the lenses or the breakage of spectacles must be reported immediately. There can also be issues with certain industrial chemicals and cleaning agents when wearing contact lenses, this is for staff safety as well as product safety.
- Light bulbs are only to be replaced when production is not taking place.
- Personal medicines should be prohibited from production areas. These must be kept in staff lockers.
- Smoking and the use of electronic cigarettes should not be permitted within the building and only in the designated areas.
- No food or drink (including chewing gum) of any description should be consumed anywhere in the production areas or freezers. It is imperative that all food brought onto site be consumed only within the designated areas. The same rules should apply to visitors and contractors working on site.

Personal Protective Equipment

Personal Protective Equipment (PPE) covers all devices/clothing used by employees and visitors to protect their health. PPE must be used on site where instructed. Signage around site should indicate what PPE is required in what areas.

PPE has two primary functions:

1. To prevent the individual coming into contact with a hazard/harm
2. To protect the products from staff and visitors to site i.e., nitrile gloves to prevent bacteria getting onto equipment and products

These are examples of PPE, but each EPIA member can decide what they require for their operation.

PPE Type	PPE Use	Use on site
	Safety glasses and goggles provide protection from debris, dust, and chemicals.	Goggles may need to be used when using certain chemicals during maintenance (lubricants, oils etc.) or cleaning (e.g. cleaning agents).
	Hard hats provide protection from impacts and in some cases electrical shock.	Hard hats are used when working at height such as on top of freezers or ice machinery.
	Work boots/shoes provide protection from falling or rolling objects or from penetration.	To be worn in the production and despatch areas to protect from falling bags of ice, rolling pallet trucks etc.
	As a form of personal protective equipment, high-visibility clothing is worn to increase a person's visibility and therefore prevent accidents caused by persons not being seen. As a result, it is often worn in occupations where hazardous situations are created by moving vehicles or low lighting conditions.	High-visibility vests/clothing should be worn in areas where HGVs and FLTs operate.
	Gloves can protect hands and fingers from cuts, heat/cold, abrasions and chemicals.	Thermal gloves used in cold areas or for handling ice products for long period of time. Nitrile gloves (powder free) provided for use during testing of water/finished product. Nitrile gloves are also worn in production areas at times to prevent contamination with finished product (when required) and during cleaning.
	Respiratory Protective Equipment (RPE) is used to protect the wearer from exposure to respiratory hazards. This can include asbestos, biological contaminants (including viruses), dusts, vapours etc. A fit test must be conducted by an independent third-party.	RPE may be required when using certain cleaning agents or maintenance chemicals. The products SDS will need to be referred to.

PPE Type	PPE Use	Use on site
	Headphones / ear buds protect employees from exposure to noise. Under UK and EU law, the requirement to wear hearing protection is governed by occupational noise regulations, specifically: ○ UK: The Control of Noise at Work Regulations 2005 ○ EU: Directive 2003/10/EC on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise)	At 80 dB(A) — employers must make hearing protection available. At 85 dB(A) — workers must wear hearing protection if exposure cannot be otherwise reduced. No worker should be exposed to 87 dB(A) or higher after protection is worn.
	Hairnets serve two purposes. The first is to keep hair from contacting exposed food, clean and sanitised equipment, utensils and linens, or unwrapped single-service articles. The second purpose is to keep worker's hands out of their hair.	To be worn in production areas on site to protect ice products from hair.
	Hair loss from beards offers a more serious hygienic risk as facial hair harbours more germs than other hair as facial hair is coarser than other hair so tends to trap dirt and germs more easily. They are worn to prevent hair getting into finished products.	To be worn in production areas on site to protect ice products from hair.
 	Over coats act as a barrier to their surrounding environment and stop the spread of contaminants that come into contact with clothing. By wearing over coats, it can help eliminate the spread of dirt, dust, and germs; this can be from the outdoors or from other rooms. Using over coats helps keep surrounding environments clean and free from unwanted materials.	Disposable over coats covers should be used when entering areas containing open product.
	Disposable aprons are resistant to bacteria and body fluids and protect the areas on the front of the body, which are at highest risk of contamination. Aprons also act as a barrier to their surrounding environment and stop the spread of contaminants that come into contact with clothing. By wearing an apron, it can help eliminate the spread of dirt, dust, and germs; this can be from the outdoors or from other rooms. Using aprons helps keep surrounding environments clean and free from unwanted materials.	Disposable aprons are required when the potential of coming into contact with open product is higher. Often worn when cutting ice blocks down into other product types.

PPE Type	PPE Use	Use on site
	Shoe covers act as a barrier to their surrounding environment and stop the spread of contaminants that come into contact with footwear. By wearing shoe covers, it can help eliminate the spread of dirt, dust, and germs; this can be from the outdoors or from other rooms. Using shoe covers helps keep surrounding environments clean and free from unwanted materials.	Shoe covers must be placed over work boots when entering open product areas. Shoe covers are one use and should be disposed of when exiting the area.

- Clean PPE must be stored in the employee's personal locker.
- All Visitors /contractors must wear high-visibility clothing, hairnets and beard snoods (if required) in the production and storage areas.
- Clothing should be worn in a manner, which ensures it does not become trapped in machinery or doors.
- When using any chemicals on site refer the chemicals SDS to see what PPE is required.
- All PPE should be CE marked and compliant.
- A record of PPE issuance should be kept and maintained.

How to Correctly Wear Beard Snood



1. Hold the beard snood open with one hand while pulling the elastic over your head with the other.
2. Secure the elastic to the back of the head in a comfortable manner.
3. Pull the beard snood over your nose to ensure you protect your moustache and cheek hair.
4. While keeping the beard snood over your nose, ensure the beard snood is also pulled under the chin to properly cover all facial and neck hair.
5. Check that the beard snood elastic is still secure around the ears and head.
6. Once your beard snood is secured, then put your hairnet on. Ensuring that the beard snood closures are covered by the hairnet will provide extra security and keep both the beard snood and hairnet in place.

How to Correctly Wear Hair Net



1. If necessary, brush and tie your hair back. The hair net elastic must be able to lie flat against your hairline.
2. With both hands, hold the hair net open with the seams to the front and back of the head.
3. Put the hair net across your forehead and pull over the top of your head.
4. Ensure the hair net completely covers your ears. This will secure the hair net in place.
5. Once your hair net is secured in place, put on any other personal protection equipment necessary.

How to Remove Disposable Gloves



1. Pinch and hold the outside of the glove near the wrist area.
2. Peel downwards, away from the wrist, turning the glove inside out.
3. Pull the glove away until it is removed from the hand and hold the inside-out glove with the gloved hand.
4. With your un-gloved hand, slide your finger/s under the wrist of the remaining glove, taking care not to touch the outside of the glove.
5. Peel downwards, away from the wrist, turning the glove inside out.
6. Continue to pull the glove down and over the inside-out glove being held in your gloved hand. This will ensure that both gloves are inside out, one glove enveloped inside the other, with no contaminant on the bare hands.

DON'T touch door handles, keys, steering wheels. – with contaminated gloves
DON'T touch your face or adjust PPE with contaminated gloves
DON'T remove one glove, and then pull the other glove off by the fingertips
DON'T reuse disposable gloves once they have been removed

Reporting Illness

Food borne illness can result from infected food handlers contaminating food. The following conditions must be reported by staff to line management:

- Diarrhoea and vomiting (may indicate a gastro-intestinal infection)
- Close contact with a family member experiencing diarrhoea or vomiting
- Exposure to an outbreak of infectious illness whilst abroad
- Lesions on exposed skin (hands, face, neck or scalp) that are weeping or discharging

E. coli & Hepatitis A

Should staff be identified as infected with E. coli O157, the individual must be excluded from site until clearance has been given by a medical professional:

- This will normally be after two consecutive negative faecal samples.
- The second sample being taken 48 hours after the symptoms have stopped naturally.

Staff diagnosed with Hepatitis A should remain off work until seven days after the symptoms have disappeared.

Infections requiring special attention

Anyone suffering from typhoid or paratyphoid must be excluded from food premises because:

- Of the severity of the illness
- After recovery, the individual can continue to carry and excrete the organism for a long time.

Returning to Work After Illness or Exclusion

If a staff member has suffered diarrhoea, vomiting, gastroenteritis, dysentery, food poisoning, hepatitis, septic sores on body/hands, discharging wounds, cholera, typhoid or paratyphoid certification from a doctor may be required.

- Staff may return to food handling duties if there has been no vomiting or diarrhoea for 48 hours or once medical treatment has ceased.
- Lesions on open skin should be completely healed before returning to work.
- Staff returning to work must fill out a Return-to-Work Form.
- Staff returning to work from holidays abroad suffering or having suffered with the above illnesses must be cleared by a doctor before commencing work and a Return-to-Work Form should be completed.

Accident Recording

All accidents, however minor, should be reported to the employee's line manager immediately. A designated first aider must then record details of the accident.

- A First Aider must be sought immediately if an employee or any other person on site are in need of first aid.

- Minor cuts, grazes etc. must be covered by a food grade or metal detectable plaster. Issuance of all dressings should be recorded, and the loss of a dressing should be reported immediately.

Health & Safety (H&S)

Whilst separate from GMP H&S should be part of all day-to-day operations on EPIA member sites. PPE should be used where instructed when in the production areas or handling any chemicals during maintenance, cleaning or laboratory work. All GMP processes should be followed and conducted in a safe manner. Specific Health & Safety (H&S) instructions may be specified in individual SOPs within an EPIA members site and must be followed as well as any visual signage around site directing employees on H&S matters/PPE must be obeyed.

As a general rule all employees should:

- Cooperate with supervisors and managers on health and safety matters.
- Not interfere with anything provided to safeguard their health and safety.
- Take reasonable care of their own health and safety.
- Report any health and safety concerns to their manager.

Fire Procedures

- If a fire is discovered the alarm should be raised immediately and reported to nearest manager.
- No attempt should be made to fight the fire unless it can be easily and safely extinguished or contained. Ammonia and other chemicals can accelerate or explode in a fire it is best to get out and let professionals deal with fire.
- In the event of a fire alarm sounding or fire, employees and all visitors must evacuate the building immediately by the nearest available exit (all fire exits should be clearly marked as per national legislation).
- All employees and visitors should assemble at the designated fire assembly point. This should be signposted. A warden should be assigned to each rally point to keep track of who has exited building.

Summary

Good Manufacturing Practices (GMP) are crucial in an ice manufacturing environment because they ensure the safety and quality of ice products. GMP guidelines help prevent contamination, minimise risks of foodborne illnesses, and ensure that ice is produced under sanitary conditions. By regulating aspects such as hygiene, equipment maintenance, and employee training, GMP supports consistent compliance with regulations, protects consumer health, and maintains brand reputation. Implementing GMP also ensures traceability and accountability in case of product recalls or safety concerns.

Cleaning

Cleaning is one of the most important activities undertaken by ice manufacturers. A cleaning system should be in place to ensure a high standard of hygiene is maintained at all times and the risk of contamination to ice products is minimised.

The Importance of Cleaning

Cleaning is important because:

- It minimises and destroys bacteria which can be harmful to consumers
- EPIA member sites have a legal duty to ensure thorough cleaning
- Cleaning is a prerequisite programme that supports a member sites HACCP plan
- A clean environment creates a good visual impression for customers and visitors
- A clean environment reduces the risk of physical contamination to product
- A clean environment provides a nice working environment and sets a good example for all personnel on site
- A clean environment is less likely to attract pests

Cleaning Procedures & Cleaning Instruction Cards (CICs)

EPIA member sites must have documented cleaning and disinfection procedures in place for the building, equipment

Cleaning procedures or CICs should be designed to provide practical cleaning instructions and health and safety guidance to personnel for cleaning tasks. The following areas should be covered:

- A unique document reference.
- The personnel who are responsible for completing the cleaning task.
- The equipment or area to be cleaned.
- How often the cleaning task must be completed.
- The method of cleaning.
- Any relevant instructions for dismantling the equipment.
- Photographs highlighting areas that are difficult to clean.
- Details of the cleaning chemicals to be used, their concentrations and instructions for use.
- Details of the cleaning equipment and consumables to be used.
- Any personal protective equipment (PPE) required.
- Details of how cleaning checks must be done and who is responsible for them performing the checks (include any photographs of key inspection points).
- Details of acceptable limits.

- Directions of which cleaning records need to be completed upon completion of the cleaning task and how this should be done.

Procedures for the cleaning of non-product surfaces and equipment must also be in place, but they do not have to include all the information above.

If a cleaning task requires the disassembly of machinery personnel should be trained in how to do so. Alternatively, support should be provided by the sites engineering team. The disassembly should be detailed within the cleaning procedure or relevant CIC.

Cleaning Risk Assessment

The frequency and methods of cleaning should be based on risk following the conclusions of a cleaning risk assessment.

All cleaning tasks should be risk assessed to determine which pose the greatest risk should failure occur in the task. The outputs of the risk assessment should be used to direct cleaning resources and verification activities to the highest risk cleaning tasks.

Cleaning Schedule

A cleaning programme must be in place which ensures that facilities and equipment are kept in a suitably hygienic condition. The aim of cleaning is to prevent:

- Allergenic contamination
- Microbiological contamination which may lead to food poisoning or spoilage
- Taints and odours
- Physical contamination
- Chemical contamination
- The attraction of pests

The minimum scope of the cleaning programme must cover:

- Product handling environment.
- Ceilings and roof voids.
- Overheads, wall ledges and pipework.
- Elevated walkways.
- Ventilation systems, including air socks and filters.
- Product handling equipment.
- Vehicles, tankers and containers.
- Loading and unloading equipment.

Results of cleaning (post environmental swabbing) should be trended to identify trends for continuous improvement. The cleaning programme must be reviewed when:

- There is a change to the equipment or area to be cleaned.
- There is a change to the cleaning chemicals or the supplier of chemicals.

- The method of cleaning needs to change.
- Revalidation is required due to changes to safety acceptable limits, or chemical residues.
- Identified from a trend in failures of cleaning checks.
- When root cause analysis identifies an issue with the effectiveness of the cleaning programme.

Cleaning Best practice

Cleaning should be completed in a methodical way to prevent cross contamination of surfaces. When cleaning, it is important to clean from high to low, from clean to dirty and wipe in an 'S' shape pattern.

- Before commencing cleaning in production areas Operatives should ensure that all machines are turned off.
- Different cleaning requirements are relevant to different areas and pieces of equipment. The relevant cleaning instruction card (CIC) should be referred to.
- Hoses which have been used to assist in cleaning must be disconnected from the mains supply after use and stored so that the reaming water drains away. Do not use hoses to transfer liquid other than water.
- Mop heads should be stored in a way that allows the mop head can dry and isn't touching the floor or dripping onto itself.
- All mop heads (flat and fabric) must be discarded once no longer fit for cleaning. Mop heads can shed material with repeated use. Once damaged or heavily soiled these should be replaced.
- Cleaning solutions must be made up with the correct concentration, manually, or using the dosing equipment and made up in the appropriate container for the job.
- Equipment that is used for cleaning (buckets and containers) must only be used for cleaning and not for use in any aspect of the production of ice. The correct piece of equipment must be used for cleaning the correct area. This applies both to in-house staff and contract cleaners who bring some of their own equipment on-site.
- If PPE/uniform gets dirty or heavily soiled during cleaning activities, they must be changed.
- Where equipment is manufactured from materials other than stainless steel, such as anodised aluminium, these materials can be sensitive to cleaning agents.
- When manually diluting cleaning chemicals always add water to the bottle or bucket first, then add the chemical next. This minimises the risk of the concentrated cleaning chemical splashing back at you and over foaming of the mix.
- Always use the right cleaning chemicals for the cleaning task assigned. If in doubt as to the correct use of the chemical, refer to the CIC or the manufacturers SDS.

Cleaning Chemicals

The purpose of cleaning using chemicals is vital to maintaining clean and sterile work environments. To remove dirt energy is required in the form of:

- Wiping
- Sweeping
- Scrubbing

- Brushing

As well as hot water and soap, chemicals such as detergents help to remove dirt, food particles, grease and stains.

Types of Cleaning Chemicals

- Detergents are chemicals that are used to remove grease, dirt and food debris, such as soaps and washing-up liquid. They clean by helping to dissolve and remove the contamination and hold it in solution. However, these are not designed to kill pathogens.
- Disinfectants are chemicals that reduce the number of pathogens (germs) to safe levels. Disinfectants are not designed to clean surfaces, so in order to work properly surfaces need to be cleaned and free from grease, dirt and food before the disinfectant is used. If the surface is not cleaned properly before this disinfection stage, then the pathogens can be trapped in and under the debris and survive the disinfection stage.
- Sanitisers are two-in-one products that act as both a detergent and a disinfectant. They are available as liquids, sprays and in some "wipe" applications. Some are only suitable if surfaces require light cleaning and are not heavily contaminated with dirt and debris.
- Degreasers are powerful chemicals used to remove oils and grime. These are often used after maintenance tasks.
- Descalers are used to remove limescale, a build up of which would attract bacteria and hinder the efficient working of machines.

Cleaning Chemical Use - Best Practice

- Treat all chemicals and cleaning solutions with respect, even if they are non-hazardous, natural or claim to be chemical free.
- Read the product label, and SDS prior to use. Employees should be aware of the colour, characteristics and safety directions of the products used for cleaning on site.
- Cleaning chemicals should never be mixed. Mixing cleaning chemicals can result in serious injury or death.
- Employees should never 'Top Up' chemical containers as they risk cross contamination and could possibly mix chemicals.
- Only cleaning chemicals with a label should be used.
- Damaged or illegible labels should be reported. Replace any labels, which are damaged or illegible.
- Employees must be aware of the type of chemicals they are using, the PPE required and the risks to their use.
- All stored cleaning products should be accompanied by safety data sheets (SDS) and should be stored outside of production areas in locked cupboards or storerooms.
- Do not use any chemicals near ice products.

Cleaning chemicals should be:

- Assessed to make sure they are suitable for the application.
- Assessed to ensure that they are not strongly scented, which could cause taints.
- Assessed, considering what is going to be cleaned, and what the surface is made from – to make sure it won't negatively impact the integrity of the material.
- Used in accordance with manufacturers' instructions, so that they achieve the required clean.
- Rinsed according to the manufacturer's instructions, so remove chemical residues.
- Kept in closed containers, to reduce the risk of spills.
- Labelled so they don't get used by mistake.
- Stored in a designated and secure location, so that they are only accessible to trained personnel.

Cleaning Verification & Validation

Cleaning Verification & Validation are critical processes for maintaining a clean and hygienic environment and are often used interchangeably. However, there are distinct differences between the two, and it's important to understand the distinction to ensure that the facility is properly cleaned and disinfected.

- Cleaning verification is the process of confirming that a cleaning procedure has been performed correctly. This involves testing equipment and surface areas to ensure residue limits fall within acceptable limits and that all meet predetermined cleanliness standards. This could involve a sign-off from a supervisor independent of the cleaning checking and signing that the work has been done or internal ATP swabbing.
- Cleaning validation is the process of proving that a cleaning procedure is effective in removing all traces of contaminants from a surface or equipment. This involves a more rigorous testing process, including a risk assessment and a detailed cleaning validation plan. Sending swabs to an external third-party accredited laboratory periodically to prove that your cleaning is effective.

Cleaning Validation is typically performed less frequently than cleaning verification, such as once a month or once every three months. Validation is critical in ensuring that high-risk areas are properly cleaned and disinfected. Validation is required in the food industry as the risk of contamination and microbial growth is high and the consequences of failure can be severe.

Summary

Cleaning in is crucial to ensure product safety, prevent contamination, and maintain quality. Since ice can easily carry and spread bacteria or other contaminants, thorough cleaning helps prevent foodborne illnesses. Proper sanitation also ensures compliance with health and safety regulations, extends the life of equipment by preventing buildup of scale or debris, and maintains the trust of consumers by producing clear, safe ice.

Environmental Swabbing

Environmental swabbing is a key element of food safety and an EPIA member's QMS. In industries like ice manufacturing contamination can easily spread if proper cleaning practices and standards are not maintained.

What is Environmental Swabbing?

Environmental swabbing involves collecting samples from surfaces, equipment, and the production environment to detect potential microbial contamination. In the ice industry, the primary goal is to ensure that the environment where ice is produced, handled, and stored is free from pathogens and harmful microorganisms that could compromise product safety.

Environmental swabbing should be performed after cleaning.

Purposes of Environmental Swabbing

Detecting Contamination

- Microbial Presence: Swabbing helps to identify the presence of pathogens (e.g., E. coli, Listeria, Salmonella) or other microorganisms like moulds that could contaminate the ice and potentially harm consumers.
- Indicator Organisms: Swabbing often targets "indicator organisms" like coliforms and enterococci, which signal potential hygiene issues that need corrective action before they lead to more severe contamination.

Monitoring Cleaning and Sanitation Effectiveness

- Verification of Cleaning Practices: Regular environmental swabbing verifies whether cleaning and disinfection procedures are being effectively implemented. In an ice manufacturing plant, areas such as ice-making machines, storage bins, and packing stations are prone to microbial contamination.
- Hygiene Audits: Swabbing results provide data to assess the hygiene practices of staff and the efficacy of cleaning protocols.

Preventing Cross-Contamination

- Early Detection: Swabbing surfaces that are in contact with food (like conveyor belts, packaging stations) ensures early detection of contaminants, preventing cross-contamination to the final product.
- Critical Control Points: It helps to monitor critical control points (CCPs) in the production process, ensuring that bacteria do not spread from the environment to the ice.

Compliance with Regulatory Standards

- Food Safety Regulations: Environmental swabbing supports compliance with food safety standards in the UK and EU, such as those outlined in the EU's food hygiene regulations (EC 852/2004) and Hazard Analysis and Critical Control Points (HACCP) requirements.
- Audit Readiness: Many regulatory bodies and food safety accreditations (e.g., FSSC 22000, BRCGS) require documentation of routine environmental monitoring.

Benefits of Environmental Swabbing

Improved Food Safety

- Environmental swabbing provides early detection of microbial contamination, allowing ice plants to address issues before they affect product safety.

Data-Driven Improvements

- Swabbing programmes generate valuable data that can guide improvements in cleaning protocols, employee hygiene, and facility design to reduce contamination risks.

Regulatory Compliance

- Routine swabbing helps ice manufacturers meet stringent UK and EU food safety regulations. This reduces the risk of non-compliance, fines, or production shutdowns.

Operational Efficiency

- A structured swabbing programme ensures consistent monitoring, reducing the need for more drastic corrective measures and downtime caused by contamination incidents.

Cost Savings

- Detecting contamination early helps avoid costly recalls, reputational damage, and legal liabilities associated with selling contaminated ice.

Enhanced Risk Management

- Environmental swabbing helps manage risks by identifying problem areas in the facility where contamination might originate. These insights enable more precise preventive actions.

Protecting Consumers

- By regularly monitoring surfaces and preventing contamination, EPIA members can reduce the risk of distributing contaminated ice that might lead to recalls, thus protecting their brand and public health.
- Demonstrating rigorous environmental monitoring builds trust with customers by ensuring that the ice they consume is produced in a clean, well-monitored environment.

Establishing an Environmental Swabbing Plan

A robust environmental swabbing plan is essential for ensuring that the ice manufacturing environment remains free of harmful contaminants.

Below is a step-by-step guide for EPIA members to help guide the setup of an environmental swabbing programme.

Identify Key Areas and Surfaces for Swabbing

- Critical Contact Surfaces: Focus on surfaces that come into direct contact with the ice, such as ice production equipment, screw conveyors, hoppers and storage bins.
- Non-Contact Surfaces: Include areas like floors, walls, ladders and conveyor belts as they can indirectly contribute to contamination if not cleaned properly.
- Drains and Water Supply: Water is the primary raw material in ice production. Swabbing water lines, filters, and drains can help detect microbial growth in these moist environments.
- Air Handling Units: Since airborne contamination is possible, consider swabbing areas near vents or air filtration systems, especially if the site uses recirculated air.

Determine the Frequency of Swabbing

Best practice dictates performing a risk assessment to determine swabbing frequency. This can be reevaluated based on the baseline level and trended results over time. It is always better to start with more frequent testing and back off as data shows less frequency is acceptable

- High-Risk Areas: Critical contact surfaces should be swabbed more frequently (e.g., daily or weekly), especially after cleaning or repairs.
- Medium-Risk Areas: Areas that do not directly contact ice but are frequently touched (like handles or switches) can be swabbed weekly to monthly.
- Low-Risk Areas: Walls, ceilings, and floors can be swabbed monthly or quarterly unless contamination is suspected.

Use Appropriate Swabbing Methods

- Wet Swabbing: Sterile swabs moistened with a neutralising buffer are commonly used to collect samples from dry or hard-to-reach areas.
- Dry Swabbing: For moist areas like drains, use dry swabs to avoid additional moisture that could skew results.
- Sponges: Sterile sponges are effective for larger surface areas, such as countertops or equipment exteriors.
- ATP Testing: Adenosine triphosphate (ATP) bioluminescence swabs can provide immediate results by detecting organic matter, which can indicate poor cleaning or contamination.

Create a Sampling Plan

- Routine Sampling: Set a fixed schedule for swabbing key surfaces. This consistency ensures that any microbial trends can be detected early.
- Random Sampling (optional): Randomly select surfaces in high-risk areas to ensure that all parts of the facility are covered over time.

Establish Baseline Levels

Before implementing corrective actions, determine baseline levels for acceptable and unacceptable microbial counts. This will help in measuring improvements or declines in cleanliness. Best practice to establish a baseline limit would be:

- Identify swabbing points for sampling plan.
- Conduct three ATP swabs pre-clean on “dirty” equipment/surfaces.
- Conduct three ATP swabs post-clean on “clean” equipment/surfaces.

- Show the different to show that cleaning is working (the post-clean results should be at a lower level).
- Support the findings using a certified third-party laboratory with a minimum of one pre-clean and post-clean swab.

Analyse and Act on Results

- Lab Testing: Samples should be sent to a certified third-party laboratory for analysis, where results will indicate if any harmful bacteria or excessive microbial loads are present.
- Corrective Actions: If contamination is detected, perform an immediate investigation to identify the source. This could involve retraining staff, revising cleaning procedures, or replacing faulty equipment.
- Trend Analysis: Regularly review swab results to identify trends over time. This will allow EPIA members to address persistent issues or areas of concern.

Documentation and Record Keeping

- Keep detailed records of all swab results, corrective actions taken, and any changes made to cleaning protocols. This documentation will be necessary for audits, regulatory inspections, and internal reviews.

Training Staff

Staff should be trained on:

- How to swab surfaces using the proper techniques for collecting samples.
- The importance of environmental swabbing.
- How contamination occurs.

Summary

In the ice industry, environmental swabbing is a proactive and essential practice to ensure product safety, compliance with food safety regulations, and operational efficiency. It allows EPIA members to detect contamination early, validate cleaning procedures, and prevent costly outbreaks or recalls. By implementing a thorough swabbing plan tailored to critical areas of the production environment, EPIA members can enhance their food safety system and QMS and safeguard consumer health.

Pest Management

EPIA members must have an effective preventive pest management programme in place to minimise the risk of pest presence. Procedures should be in place to enable members to respond quickly to any issues which occur to prevent risk to products.

The Importance of Pest Management

Pests are inherently drawn towards food. Hence, the food industry is one of the most vulnerable segments which cannot do without pest control to maintain the high levels of food safety expected. As a food product ice is not attractive to most pests, but pests still pose a threat to premises. While ice may not be attractive to pests, employees bring food onto site, and some members may store other food products for income, or have warm areas that pests desire to nest in. Pests are the carriers of a wide variety of disease-causing bacteria, viruses and a host of other organisms. They threaten the health of the personnel involved in the processing and handling of ice, to consumers.

When it comes to the food industry, pests pose major threats. Some of these are listed below:

- Spreading diseases through a transfer of pathogens
- Property and equipment damage
- Contamination of ice products and production areas
- Bad reputation and loss of credit for EPIA members
- Potential for prosecution and closure of business

Pest Types

The three pests that pose the biggest risk to EPIA members are rodents, flies and birds. However, each EPIA member site is different and individual pest problems may affect different members.

- Rodents: Rodents include rats and mice. EPIA members can identify a possible rodent infestation through signs such as visual sightings, gnawing sounds, droppings, gnawing of wires and insulation and urine stains which are visible under UV light. They nest close to food sources and are known for their rapid breeding capacity. Risks associated with rodent infestation are damage to property, electrical equipment, machinery, food containers, packaging, contamination of food with droppings, fur, urine, the transmission of hazardous parasites thus increasing the risk of serious diseases.
- Flies: Different types of flies are known to be the carriers of over 100 harmful pathogens. They usually breed in decaying waste and moist unclean environments and then move to food,

manufacturing and processing equipment and other workstations, thus contaminating them by spreading disease-causing bacteria. Flies pick up contaminated material in their mouthparts and on their bodies, as they feed. Some species regurgitate digestive juices and even defecate while feeding and resting. This further increases the risk of contamination.

- Birds: cause a great amount of physical damage by blocking guttering systems with their nests and feathers as well as dislodging roofing materials, especially large birds. Bird droppings, nesting materials and feathers can contaminate food products, surfaces, preparation areas and equipment. Apart from emitting a bad odour and being unsightly, bird droppings are poisonous. They can transmit harmful pathogens including bacteria, viruses, protozoa and fungi so make sure to consider bird control services. Some of the common disease-causing microorganisms include Salmonella, Campylobacter and E. coli. Besides, their roosting and nesting sites also encourage infestations of other pests such as fleas, bird mites and even some species of beetle.

Pest Management System

Pest management system must be in place, which includes:

- Risk assessment to define the scope and inspection schedule.
- A site plan.
- Inspection protocol, including follow up procedures.
- Safety data sheets, H&S information and instructions for the effective use of pest control chemicals.
- Records.
- Trending of results for continuous improvement.
- Reviews.

The site plan must detail all the pest monitoring devices, their identification codes, the locations and the type of monitoring. The plan must be reviewed at least annually and signed by the person responsible on site and also the pest controller.

The pest management must be applied through either, or a combination of:

- A competent pest management contractor.
- In-house management using appropriately trained on-site personnel.

Specific pest control training should be formally carried out by nationally or locally recognised schemes, for both contracted personnel and in-house personnel.

External Pest Contractors

When using a third-party pest contractor the following must be considered:

- There must be a service scope which clearly defines the contracted activities.
- the contract must include details of the procedures to be applied for pest ingress and infestation follow ups.

- responsibilities must be documented for the contractor and the site.
- the service must meet all applicable legislation.
- the contractor must be able to demonstrate competence, and this evidence must be kept up-to-date and retained.
- there must be agreed methods of communication, including contact details for the nominated site and contractor personnel.
- set dates for when review meetings will take place, which must be at least annually.
- after each visit, the site representative and the pest control contractor must review the results of the inspection.
- the contractor must leave a report detailing any evidence of pest activity, actions taken and recommendations.

In-house Pest Management

Where EPIA members take on the pest management internally the following must be considered:

- Responsibilities for relevant personnel are documented and understood.
- That sufficient resources of labour, consumables and equipment are available.
- That specialist knowledge is available when needed.
- That the system is compliant to all applicable legislation.
- Chemicals are controlled and facilities are provided for their safe storage.

For in-house pest management staff must be appropriately trained in the following disciplines:

- Carrying out inspections.
- Determining and applying suitable treatments.
- Management of the system and keeping records.
- Handling and use of chemicals (pesticides, rodenticides etc.)

Baits

For both internal and external pest control baits, both toxic and non-toxic, should not be used in production areas. All bait stations and traps should be inspected regularly based on risk and findings documented so a trend analysis can be conducted annually to see if specific areas of a facility need further attention.

Summary

A well-managed pest management system is crucial for maintaining health, safety, and productivity on site. It prevents pests from spreading diseases, contaminating ice or packaging, and damaging property. Effective pest management also helps ensures compliance with health and safety regulations, protects public health and reduces the need for chemical interventions. By identifying and addressing pest issues early, a well-run programme can minimise long-term damage and costs, safeguarding employees and consumers.

Temperature Control

In an ice manufacturing plant, maintaining proper temperature control is crucial for ensuring product quality. Ice needs to be stored at consistent, low temperatures to prevent melting. Key areas that require temperature control include freezers, ice bins, and other storage areas. Additionally, preparing for and responding to equipment malfunctions, such as freezer breakdowns, is vital for maintaining operational efficiency and product integrity.

Temperature Control of Ice

Whilst ice is considered a foodstuff the nature of the product, water frozen into ice, does not support microbiological growth (although it could harbour microbiological if the water used is contaminated pre-freezing e.g. cryptosporidium).

The risk to the product from a food safety standpoint is the same at -18°C (0°F) as -2°C (28°F), and that risk is zero! The only issue affecting our product as an industry, temperature related, would be the quality and integrity of the product (melting) but this would occur at below a temperature of 0°C (32°F).

Whilst the risk to product from fluctuating temperatures is low robust temperature management should be in place at all EPIA member sites.

It is also worth noting that customers or third-party storage providers may have set delivery temperatures or temperature ranges that EPIA members supplying ice may have to adhere to.

Temperature Control in Key Areas

Freezers

- Recommended Temperature: Ice should be stored at temperatures below -18°C (0°F) to ensure that it remains solid and uncontaminated, but as previously mentioned this is a recommendation.
- Continuous Monitoring: Install temperature monitoring systems that provide real-time data and alerts if temperatures rise above safe levels. This ensures rapid response in the event of a malfunction. Monitoring equipment should be tested on a regular basis as it is monitoring only valuable if it works when EPIA members need it.

- Airflow: Ensure proper air circulation within the freezer to maintain uniform temperatures throughout. Blocked vents or overcrowded storage can lead to temperature fluctuations and uneven freezing.
- Maintenance: Regularly service freezers to ensure they are operating efficiently. Clean the condenser coils, check the refrigerant levels, and inspect the door seals to prevent warm air from entering the storage area.
- Temperature Alarms: Equip freezers with alarm systems that notify operators if the temperature rises above a set threshold, which can help prevent ice from melting or being exposed to unsafe conditions.

Ice Bins

- Temperature Control: Ice bins should be insulated and, where possible, kept in temperature-controlled environments. They should also be designed to prevent direct exposure to warmer air, which can cause partial melting and re-freezing, potentially leading to contamination.
- Cleaning and Sanitation: Bins should be regularly cleaned to prevent biofilm formation and bacterial growth. Use food-safe cleaning agents that comply with UK and EU hygiene regulations.
- Manual Temperature Checks: Since bins are often not equipped with built-in temperature monitoring systems, manual checks should be performed regularly using calibrated thermometers.

Storage Areas

- Ambient Temperature Control: Ice packaging and storage rooms should be maintained at low temperatures to reduce the risk of ice melting during handling and packaging. Temperatures around 5°C (41°F) or lower are recommended for these areas to maintain quality during short-term storage or handling.
- Humidity Control: Keep humidity levels low in storage areas to avoid excess moisture that can cause ice to clump together or deteriorate packaging materials.

UK and EU Legislation for Temperature Control

Hygiene Regulation (EC) 852/2004

- The EU Food Hygiene Regulation (EC 852/2004) requires that food businesses maintain appropriate temperature controls to prevent contamination and ensure food safety. This includes proper storage of ice, which is considered a food product in most regulations.
- Annex II, Chapter IX specifically mentions the need for proper temperature control in storage and transportation to ensure that foodstuffs are not exposed to conditions that could lead to spoilage or contamination but allows for limited periods outside temperature to *"accommodate the practicalities of handling during preparation, transport, storage, display and service of food, provided that it does not result in a risk to health"*.

UK Food Safety and Hygiene (England) Regulations 2013

- These regulations implement the EU's hygiene regulations in the UK and require businesses to adopt adequate measures for storing food at proper temperatures.

HACCP Compliance

- As part of a HACCP plan, temperature control can sometimes be a critical control point (CCP) in ice manufacturing. Regular monitoring and record-keeping are necessary to ensure compliance with both UK and EU standards.

Responding to a Freezer Breakdown

In the event of a freezer malfunction, quick action is required to prevent ice from melting and becoming unsafe for use. Here's a step-by-step guide on how to manage this situation effectively:

Immediate Actions

- Isolate Affected Products: Close the freezer doors immediately to retain as much cold air as possible. Avoid opening the freezer unless necessary.
- Monitor Temperatures: Use portable thermometers to monitor the temperature inside the freezer continuously. If the temperature rises above 0°C (32°F), further action is required to protect the ice.
- Activate Alarm Systems: If the freezer is equipped with an alarm system, ensure it is functioning, and alerts are sent to maintenance teams or key personnel.

Relocating Products

- Transfer to Backup Freezers: If available, move the ice to an alternative freezer with adequate storage capacity and appropriate temperatures to prevent product loss. This could be on-site or with a third-party storage provider.
- Use Insulated Containers: If no immediate freezer space is available, use insulated containers to temporarily store the ice. This can slow down the warming process and protect the ice for a limited period.

Assessing Product Safety

- Temperature Threshold: If the temperature of the freezer rises above 0°C for an extended period, assess the quality of the ice to determine whether it is still safe for consumption.
- Quality Checks: Conduct microbiological tests to ensure that the ice has not been exposed to conditions conducive to bacterial growth, especially if the temperature exceeded safe levels for several hours.

Communication and Documentation

- Inform Authorities: If the breakdown affects a large volume of product or exceeds several hours, it may be necessary to inform food safety authorities in line with HACCP protocols.
- Record the Incident: Maintain detailed records of the breakdown, including the time of the malfunction, temperature logs, and corrective actions taken. This documentation is essential for compliance with food safety audits.

Preventative Measures

- Regular Equipment Maintenance: To prevent breakdowns, schedule routine maintenance for freezers and cooling systems. This includes checking refrigeration units, cleaning condensers, and ensuring door seals are functioning properly.

- Backup Systems: Consider installing backup generators or auxiliary cooling systems that can take over in the event of a power failure or mechanical issue.
- Emergency Response Plan: Establish and train staff on an emergency response plan for freezer breakdowns, ensuring that everyone knows the correct steps to take to minimise product loss.

Benefits of Proper Temperature Control

- Product Quality Preservation: Maintaining ice at appropriate temperatures ensures it remains solid and free of bacterial contamination, preserving both its physical integrity and safety.
- Regulatory Compliance: Strict adherence to temperature control standards ensures compliance with UK and EU food safety regulations, reducing the risk of fines, sanctions, or product recalls.
- Cost Efficiency: Effective temperature control minimizes the risk of product loss due to melting, saving the business from having to discard compromised ice or suffer from reduced inventory.
- Customer Safety and Satisfaction: Properly stored ice is less likely to harbour pathogens, ensuring that customers receive a safe, high-quality product that meets both industry and regulatory standards.

Summary

In the ice manufacturing industry, maintaining proper temperature control is not only a regulatory requirement but a fundamental part of ensuring product safety and quality. Freezers, ice bins, and storage areas must be carefully monitored, with systems in place to respond to any fluctuations in temperature. In the event of a freezer breakdown, a rapid response plan can prevent significant product loss and ensure compliance with UK and EU legislation, such as the EU Food Hygiene Regulation (EC 852/2004) and the UK Food Safety and Hygiene Regulations. Regular equipment maintenance, continuous temperature monitoring, and a well-defined emergency protocol are essential to a successful temperature control strategy.

Water Quality Management

Water quality management in ice manufacturing is crucial to ensuring that the produced ice is safe for consumption and meets regulatory standards. Proper water quality control not only affects the taste and clarity of the ice but also prevents contamination that could pose health risks.

Regulatory Framework and Compliance

Water quality management in the UK and the EU must comply with specific regulations and standards to ensure the safety and quality of ice products. These standards focus on both the quality of water used in production and the safety of the ice produced for human consumption. The main regulations include EU Drinking Water Directive (EU 2020/2184), UK Drinking Water Inspectorate (DWI) standards, and various food hygiene and safety regulations.

Summary of Key Standards

- EU Drinking Water Directive (EU 2020/2184): This directive sets the minimum quality standards for water intended for human consumption, including water used in ice production. It specifies limits for microbiological, chemical, and physical contaminants.
    - Key Parameters: Microbiological limits (e.g., no coliforms, no E. coli), chemical parameters (e.g., nitrates, lead), and physical properties (e.g., turbidity).
- UK Drinking Water Inspectorate (DWI): In the UK, water quality is overseen by the DWI, which enforces similar standards as the EU directive. It requires water used in food production, including ice, to meet potable water standards.
- EU Food Hygiene Regulation (EC 852/2004): This regulation sets out hygiene standards for food businesses, including those producing ice. It requires food-grade water, safe ice production practices, and proper cleaning and sanitation of equipment.

Below is a guide to water quality management with a focus on these standards.

Source Water Quality

- Initial Testing: Conduct a comprehensive analysis of the source water (municipal supply, well, etc.) to check for contaminants, including bacteria, heavy metals, chemicals, and total dissolved solids (TDS).
- Contaminant Levels: Ensure the water source complies with both UK and EU drinking water standards before use in ice production. This means conducting regular testing for:
    - Microbiological: Absence of harmful bacteria such as E. coli, enterococci, and Pseudomonas aeruginosa.

        - Chemical: Acceptable levels of nitrates, heavy metals (like lead), fluoride, and other potential contaminants.
        - Physical: Clear water with low turbidity and proper pH levels.
    - Pre-treatment Systems: If the source water quality is inadequate, implement pre-treatment measures, such as filtration, reverse osmosis, or UV sterilisation. Irrespective of water quality pre-treatment provides a control step that you can control rather than relying on municipal supply.

Filtration and Purification

- Multi-Barrier Filtration: Implement a filtration system that aligns with EU and UK guidelines for potable water.
    - Sediment Filters: Remove particulate matter that can affect the clarity and safety of the ice.
    - Activated Carbon Filters: Remove chlorine and organic compounds that affect taste and odour.
    - Fine Filtration (e.g., Reverse Osmosis): For removing dissolved salts, metals, and chemicals, reverse osmosis or other fine filtration methods can be employed. This ensures compliance with chemical and TDS limits.
- Disinfection Systems
    - UV Disinfection: Commonly used to ensure microbiological safety by killing bacteria, viruses, and parasites. It is important to make sure the UV system used is rated for the water flow of your facility and is checked for proper calibration at manufacturer specification.
    - Ozonation: This method is sometimes used for additional microbial control. Ozone quickly degrades into oxygen, leaving no harmful residues in compliance with food safety regulations.

Regular Cleaning and Sanitising

- Equipment, storage bins, and ice handling tools should be cleaned regularly using food-safe sanitisers to prevent microbial contamination.

Water Softening

- Hard Water Treatment: If the water source contains high levels of calcium or magnesium, install a water softener. Hard water can lead to scaling in the ice-making machines, affecting efficiency and the clarity of the ice.
- Ion Exchange: In case of water hardness, ion exchange systems can remove calcium and magnesium, helping to maintain machinery and ice clarity.

Monitoring Water Quality

- Regular In-house Testing: Continuously monitor the quality of the incoming water and the water used in ice production. Regularly test for microbiological contaminants (e.g., coliforms,

E. coli), chemical contaminants (e.g., chlorine levels, TDS), and physical parameters (e.g., turbidity, pH).

- Online Monitoring Systems: Consider implementing real-time water quality monitoring systems that can alert staff to any deviations from the accepted parameters.

Equipment Maintenance

- Scaling Control: Regularly check and maintain equipment like evaporators and condensers to prevent scale buildup from hard water, which can affect the performance of the ice machine. Implement a periodic descaling procedure for machines, especially if hard water is a persistent issue. Scale is a place where bacteria can live and grow.
- Filter Replacement: Replace filters and other consumable parts according to the manufacturer's recommendations to ensure optimal performance and water quality.

Wastewater Management

- Wastewater Discharge Regulations: Ensure that any wastewater generated during ice production is treated and discharged according to UK and EU wastewater regulations. Wastewater should not contain harmful levels of chemicals or microorganisms.
- Sustainability Practices: UK and EU laws encourage environmental sustainability. Consider implementing water-saving practices, such as recycling treated water where possible, and reducing energy use in water purification processes. Overflow from ice making equipment is a great way use prechilled water to send to cooling towers

Staff Training

- Hygiene Practices: Train staff on proper hygiene and handling procedures to avoid contamination of the water supply or ice during production and packaging.
- Water Quality Monitoring: Staff should be trained to monitor water quality, recognise deviations from set parameters, and understand corrective actions required by the HACCP plan.

Summary

Taking a multi-barrier approach to filtration and consistently monitoring water quality based on risk will ensure EPIA members in the UK and EU produce safe ice, of high quality, and fully compliant with local and international standards.

Supplier Control

Ensuring that raw materials, such as water, are sourced from reliable suppliers and meet safety standards is essential for producing ice that is safe for consumption. Additionally, it is important to ensure that food contact packaging materials used in the production and distribution of ice conform to relevant UK & European legislation.

The importance of Supplier Control

Supplier control is a crucial aspect of maintaining the safety and quality of the final product. Several things can be done to ensure suppliers of water and packaging meet the required standards.

Best Practices for Supplier Control

Selection of Reliable Suppliers

The first step in supplier control is the careful selection of suppliers. This involves:

- Supplier Audits: Conducting audits to assess the supplier's facilities, quality management systems, and adherence to good manufacturing practices (GMP).
- Supplier Accreditation: Ensuring suppliers are accredited by recognised bodies (e.g., FSSC 22000 for food safety management) and comply with local and international regulations. Annual letters of guarantee are also acceptable, but they must be kept up to date.
- History and Reputation: Evaluating the supplier's track record, including past compliance with regulations, product quality, and reliability of deliveries. Look to the EPIA membership to help you! Who have other EPIA members received good service from?
- EPIA: There are a number of packaging and equipment suppliers who are EPIA members. Consult the EPIA website to find their details.

Quality Assurance of Raw Materials

For an ice manufacturing plant, the primary raw material is water, and its quality directly impacts the safety and purity of the final product. To ensure the water meets safety standards:

- Water Source Verification: Establishing the origin of the water, whether it is municipal, well, or other sources, and ensuring it is free from contaminants.
- Regular Testing: Implementing regular testing protocols for microbiological and chemical contaminants. This includes testing for bacteria like E. coli, and checking for chemical residues, heavy metals, and other pollutants.
- Water Treatment: If necessary, the water should be treated using methods such as filtration, UV sterilisation, or reverse osmosis to ensure it is safe for ice production.

Food Contact Packaging Materials

Packaging materials that come into contact with ice are critical in maintaining its safety and quality. The materials must conform to UK and EU legislation to ensure they do not pose any risk to consumers.

- Compliance with EU Legislation: Packaging materials must comply with Regulation (EC) No 1935/2004, which ensures that materials in contact with food do not release harmful substances into the food. This regulation applies to all materials and articles intended to come into contact with food, including ice.
- Traceability: Article 17 EC No 1935/2004 mandates that traceability of the packaging materials must be ensured at all stages of production, processing, and distribution.
- Declaration of Compliance (DoC): Suppliers should provide a DoC to confirm that the packaging material complies with all relevant EU regulations, including specific migration limits for substances that may transfer from the packaging into the ice.
- Testing and Validation: Periodic testing of packaging materials to verify their compliance with safety standards and legislation. This includes testing for migration of chemicals into the ice and ensuring the materials maintain their integrity at freezing temperatures.

Ongoing Supplier Management

Maintaining an effective supplier control system requires ongoing management, including:

- Performance Monitoring: Continuously monitoring supplier performance regarding delivery times, product quality, and compliance with safety standards.
- Regular Re-Evaluation: Periodically re-evaluating suppliers through audits and quality assessments to ensure ongoing compliance with safety and quality requirements.
- Communication and Feedback: Establishing clear communication channels with suppliers to address any quality issues, non-conformities, or changes in regulatory requirements.

Documentation and Record-Keeping

Accurate documentation is essential for ensuring traceability and accountability. This includes:

- Supplier Agreements: Detailed agreements outlining the specifications, quality requirements, and compliance with regulatory standards.
- Inspection Records: Keeping records of all inspections, audits, and testing results for raw materials and packaging.
- Corrective Actions: Documenting any corrective actions taken in response to non-compliance or quality issues, along with follow-up measures to prevent recurrence.

Supplier Risk Assessment

A documented risk analysis of water and primary packaging should be conducted to identify potential risks to product safety, integrity, legality and quality. The risk assessment should consider the potential for:

- Microbiological contamination

- Chemical contamination
- Physical contamination
- Allergens and possible allergen contamination
- Radiological contamination
- Possible substitution or fraud

In assessing risk, the following factors should also be considered:

- History of supply of raw material by the supplier
- Supplier's country of manufacture/production
- If the material is imported and subject to less stringent legislation
- If the material is introduced before or after a step which will eliminate a hazard

The results of the risk assessment dictate the criteria for supplier assurance, testing and acceptance of raw materials and procedures for supplier monitoring.

The supplier risk assessment should be reviewed:

- When there are changes to materials, suppliers, or material processing.
- If a new risk emerges.
- Following a product recall or withdrawal, or food safety incident where a specific raw material has been implicated.

Service Suppliers

The other types of suppliers that you should consider holding records for include, but are not limited to:

- Offsite storage
- Pest control
- Calibration Services
- Consultancy related to food safety
- Contracted cleaning
- Contracted servicing and maintenance of equipment
- Food Safety training providers
- Transport and distribution
- Laboratory testing
- Waste management

Outsourced manufacturing

If an EPIA member outsources manufacturing to another ice producer the risks to the product safety, authenticity and legality should form part of the site's HACCP plan.

Requirements for outsourced manufacturing should be agreed in advance and documented in a contract and service level agreement (SLA). The SLA should include any specific handling requirements for the products with full product traceability maintained.
EPIA members should ensure that outsourced manufacturers are monitored, to ensure that they effectively manage any risks to product safety and quality and are operating effective traceability processes.

The approval and monitoring of outsourced manufacturing should be based on risk and include either one or a combination of a valid accreditation to a GFSI-benchmarked standard or through a supplier audit, with a scope to include, but not limited to:

- product safety
- traceability
- Review of HACCP plan
- product defence
- GMP

Any audit of an outsourced manufacturer should ensure that these key points are satisfactory to the EPIA member and that any points that are not satisfactorily met are addressed before manufacturing commences. The supplier audit should be undertaken by an experienced and demonstrably competent auditor (be it a third party or a trained member of staff). A copy of the full audit report should be retained on file.

As with any supplier there should be a supplier performance review, based on risk and defined performance criteria laid out in the SLA.

EPIA members should have microbiological results for products manufactured off site. The frequency of testing should be based on risk. Microbiological test results from the supplier are acceptable if the supplier can prove the accreditations of the testing laboratory.

Summary

Implementing robust supplier control practices in an ice manufacturing plant is essential for ensuring that raw materials like water meet safety standards and that food contact packaging materials conform to European legislation. By carefully selecting suppliers, conducting regular testing, ensuring compliance with EU regulations, and maintaining thorough documentation, ice manufacturers can safeguard the quality and safety of their products, thereby protecting consumers and maintaining regulatory compliance.

Allergen Control

Despite being a low-risk product EPIA members need to consider the potential for allergenic contamination to ice products, and all staff need to be aware of the effects of allergens through allergen awareness training.

Allergen Risk in Ice Manufacturing

The UK and EU mandate that 14 specific allergens must be declared on food labels. These allergens are:

- celery, cereals containing gluten (such as wheat, rye, barley, and oats)
- crustaceans (such as prawns, crabs and lobsters)
- eggs
- fish
- lupin
- milk
- molluscs (such as mussels and oysters)
- mustard
- peanuts
- sesame
- soybeans
- sulphur dioxide and sulphites (if the sulphur dioxide and sulphites are at a concentration of more than ten parts per million)
- tree nuts (such as almonds, hazelnuts, walnuts, brazil nuts, cashews, pecans, pistachios and macadamia nuts).

This also applies to additives, processing aids and any other substances which are present in the final product. Consumers may be allergic or have intolerance to other ingredients, but only the 14 allergens are required to be declared as allergens by food law.

The risks of allergens in ice manufacturing are extremely low. The majority of EPIA members will be making only ice on their sites. Despite the low risk of allergenic contamination EPIA members should document the risks associated to the control of allergens within their HACCP documentation. Things to consider would be any possible contamination from:

- raw materials
- food contact packaging
- cleaning chemicals
- maintenance chemicals (lubricants, greases, oils etc.)
- employees

- visitors to site

One of the biggest risks specific to allergens will relate to food brought onto site. The use of vending machines should also be considered for allergens. All EPIA members should consider having a no peanut and nut policy on site.

Employee Training

All staff that come into contact with the product should be given some form of allergen awareness training. As food brought onto site would be one of the biggest risks pertaining to allergens the training should stress that food brought onto site must be stored and consumed in the permitted areas and away from areas.

Allergen Risk Assessment

EPIA members should carry out an assessment of raw materials to establish the presence and likelihood of contamination (cross-contact) by allergens. This shall include a review of the raw material specifications and, where required, the acquisition of additional information from suppliers. The risk assessment should focus on potable water and packaging. The allergenic risks will be low, but justification as to why should be documented. This can be covered as part of the HACCP risk assessment.

Applicable to EPIA members who maybe producing other products on site a list of allergen-containing materials handled on site should be made. This should include raw materials, processing aids, intermediate and finished products. A more detailed risk assessment, separate from the HACCP plan should be carried out to identify potential routes of cross-contamination and establish documented SOPs for handling any identified allergenic materials to ensure cross-contamination is avoided. The risk assessment should include:

- consideration of the physical state of the allergenic material (e.g. powder, liquid, particulate)
- identification of potential points of cross-contamination through the process flow
- assessment of the risk of allergen cross-contamination at each process step
- identification of suitable controls to reduce or eliminate the risk of cross-contamination (cross-contact).

Multi Product Sites

If an EPIA member produces other products on site other than ice, such as ice cream, with potential allergens such as milk, peanuts or nuts then procedures should be put in place to ensure the effective management of allergenic ingredients to prevent cross-contamination (cross-contact) of products not containing the allergen. Having a separate ice plant with no shared equipment is the best course of action. If this is not possible and products other than ice are produced in the same areas, then the following practices should be put in place:

- physical or time segregation while allergen-containing materials are being stored, processed or packed
- the use of separate or additional protective overclothing when handling allergenic materials

- use of identified dedicated equipment and utensils for processing (colour coded to denote allergens)
- scheduling of production to reduce changes between products containing an allergen and products not containing the allergen
- systems to restrict the movement of airborne dust containing allergenic material
- waste handling and spillage controls
- restrictions on food brought onto site by staff, visitors and contractors and for catering purposes

Where a justified, risk-based assessment demonstrates that the nature of the production process is such that cross-contamination (cross-contact) from an allergen cannot be fully prevented, a warning should be included on the ice labelling. Relevant legislation, national guidelines or codes of practice should be used when including such a warning statement on your product.

Cleaning to Prevent Allergenic Contamination

Equipment or area-cleaning procedures shall be designed to remove or reduce to acceptable levels any potential cross-contamination (cross-contact) by allergens. The cleaning methods shall be validated to ensure that they are effective, and the effectiveness of the procedure routinely verified. Cleaning equipment used to clean allergenic materials shall either be:

- identifiable and specific for allergen use (colour coded)
- single use
- effectively cleaned after use.

Summary

Whilst the allergen risk to ice production is very low it is important that EPIA members are not complacent about the potential risks to product that allergens can present.

Waste Management

Waste is an inevitable by-product of ice manufacturing. Whether it is waste ice, plastic, cardboard or pre-printed packaging proper waste management is critical to ensuring a safe and efficient manufacturing operation. Improper handling of waste can lead to contamination, safety issues or pest harbourage.

Managing Waste on Site

Each EPIA member must be aware of the waste practices in their local area and member country. Where licensing is required by law for the removal of waste, it should be removed by licensed contractors and records of removal should be maintained and available. A copy of the contractor's waste license or certificate should be kept on file.

Internal and external waste collection containers (bins, wheelie bins, compactors etc.) and/or rooms housing waste facilities should be managed to minimise risk. Best practice of waste management includes:

- Ensuring waste containers or rooms housing waste facilities are clearly identified and signed.
- Ensuring waste containers or rooms housing waste facilities are designed for ease of use and effective cleaning.
- Ensuring waste containers or rooms housing waste facilities are maintained to allow cleaning and, where required, disinfection
- That waste is emptied at appropriate frequencies.
- That waste is collected from site regularly.
- External waste containers should be covered or doors to areas housing waste kept closed when not in use.
- Waste removal from open product areas should be managed to ensure that it does not compromise safety of the ice being manufactured.

Waste ice

If ice is deemed that it need be destroyed for whatever reason and is transferred to a third party for destruction or disposal, that third party should be licensed and provide records which include the quantity of waste ice collected for destruction or disposal.

Pre-Printed Packaging Disposal

Pre-printed packaging, such as plastic packaging, boxes or labels with company logos, branding or other identifying marks, poses a risk if not properly disposed of, as fraudsters may misuse these for counterfeit goods. Additionally, environmental concerns require compliance with recycling protocols.

- Fraud Prevention: Shred or deface packaging to prevent misuse. Pre-printed packaging, especially branded materials, should be rendered unusable by shredding or incinerating. Incineration may be used as a final option, but care should be taken to ensure it's done in an environmentally friendly way. Alternatively use a third-party waste disposal company that offer secure destruction or recycling services. Keep records of disposed packaging, especially for large quantities, and require certifications from disposal companies for secure destruction.

Disposing of pre-printed packaging falls under various waste and recycling regulations in the UK and the EU, with specific requirements around both fraud prevention and recycling.

- UK Legislation
  - Environmental Protection Act 1990 (EPA): This act governs the proper handling and disposal of waste, including pre-printed packaging. Businesses must ensure that packaging waste is handled responsibly to prevent harm to the environment and comply with waste hierarchy principles (reduce, reuse, recycle).
  - Packaging (Essential Requirements) Regulations 2015: This legislation covers packaging waste, stipulating that all packaging placed on the market must be designed to minimise environmental impact and promote recovery and recycling. Packaging must also be limited in weight and volume to the amount needed for safety and hygiene.
  - Waste Duty of Care Code of Practice: Businesses have a duty of care to ensure their waste is managed properly. This includes choosing reputable recycling or disposal contractors, maintaining records of waste transfer, and ensuring that sensitive packaging is not misused or fraudulently reproduced.
- EU Legislation
  - Directive 94/62/EC on Packaging and Packaging Waste: This EU directive requires member states to ensure that packaging waste is minimised, reused, or recycled where possible. The directive sets out targets for recycling rates and promotes the design of packaging to facilitate recovery, reuse, and recycling.
  - Directive (EU) 2019/904 on the reduction of the impact of certain plastic products on the environment: This directive focuses on reducing plastic waste, including certain packaging materials. Companies in the EU must ensure that plastic packaging is minimised and designed to be easily recyclable or reusable.
- Extended Producer Responsibility (EPR)
  - In both the UK and the EU, EPR schemes are in place, where producers are responsible for the end-of-life management of the packaging they place on the market. This includes ensuring packaging is recyclable and taking responsibility for the costs of recycling or disposal.

Summary

Waste is an inevitable by-product of ice manufacture. Good waste management is critical to ensuring a safe and efficient factory. Improper handling of waste can lead to contamination, unwanted pests and safety issues. EPIA members must be especially careful about how they manage their waste and ensure removal of waste by reputable service providers. Recycling where possible, is essential in reducing the environmental impact of production by minimising the amount of waste sent to landfills. In summary, good waste management and recycling contribute to sustainability, regulatory compliance and improved brand image, while reducing the ice industry's environmental footprint.

Product Labelling & Packaging Control

Labelling requirements for ice products in the UK and EU are governed by general food labelling regulations, which include specific rules to ensure that consumers receive accurate and sufficient information about the product. These regulations also help ensure traceability, safety, and consumer protection.

Labelling Requirements for Ice Products in the UK

In the UK, food labelling is governed by the Food Information Regulations 2014 (FIR 2014), which enables local authorities to enforce the retained European Food Information to Consumers (FIC) Regulation 1169/2011 retained post-Brexit. For ice products specifically, the following are the core requirements:

- Name of the Product: Ice must be clearly labelled, either as "ice cubes," "crushed ice," or another accurate description of the form of ice.
- List of Ingredients: For plain ice, there is generally no need for a list of ingredients, as it is typically 100% water. If additives or flavourings are used (e.g., flavoured ice cubes), they must be listed.
- Net Quantity: The weight or volume of the ice (in grams or litres) must be displayed clearly.
- Date of Minimum Durability: Although ice can last indefinitely if stored properly, manufacturers may still provide a "Best Before" date to ensure optimal quality.
- Storage Conditions: Guidance on how to store the product to maintain quality, such as "store at -18°C or below."
- Manufacturer Details: The name and address of the manufacturer, packer, or distributor must be provided.
- Batch or Lot Number: For traceability in case of a product recall.
- Country of Origin (if applicable): If the product is imported or produced outside the UK.

Though allergens are unlikely to be present in ice, if any are introduced through flavourings or other additives, the allergens must be highlighted in bold on the label, in accordance with UK allergen labelling rules.

In the UK, all mandatory information must be provided in English. However, in regions where Welsh is spoken, bilingual labelling may be used if desired.

Labelling Requirements for Ice Products in the EU

The EU follows the Regulation (EU) No 1169/2011 on the provision of food information to consumers (FIC). This regulation outlines similar labelling requirements to those of the UK but with some slight differences. Mandatory Information (Similar to UK):

- Name of the Product: Clearly labelled as ice cubes, crushed ice, etc.
- List of Ingredients: As with the UK, for unflavoured ice, the ingredient is simply water.
- Net Quantity: Display the volume of the ice product weight.
- Date of Minimum Durability: Display a "Best Before" date, even for products like ice.
- Storage Instructions: Information on proper storage temperatures.
- Name and Address of the manufacturer: The responsible company within the EU must be listed.
- Country of Origin (COO) (if applicable): This applies especially if the ice is produced outside the EU.

Under EU regulations, if allergens are present in any form, they must be declared in the ingredients list and highlighted (e.g., bold text).

All labelling information must be provided in the official language(s) of the member state where the product is sold. Multilingual labelling is commonly used across EU countries.

In the EU, the minimum font size for mandatory information is specified: it must be at least 1.2mm in height to ensure legibility. This applies to all text on pre-packaged food products. Make sure to be aware and follow your country or local requirements for packaging.

Labelling Claims (UK & EU)

Any labelling on packaging pertaining to claims regarding production processes (e.g. UV-filtered, pure-filtered) or product characteristics (e.g. slow-melting) EPIA members shall ensure that all claims are substantiated and fully validated to meet the stated claim and any legal requirements (in the country of intended sale) relating to the claim are met.

Best Practices for Handling Pre-Printed Food Contact Packaging in Manufacturing Environments

Pre-printed packaging is often in ice production, to streamline operations and ensure that product labels meet legal requirements. However, handling these materials correctly is critical to maintaining safety, hygiene, and compliance with food contact material regulations. EPIA members should start with an inspection of the packaging as it arrives on site and reject packaging that does not meet their standards.

Storage of Pre-Printed Packaging

- Hygienic Environment: Pre-printed packaging materials, such as plastic bags or containers that will come into contact with ice, must be stored in clean, dry conditions to prevent contamination. The packaging should also be wrapped prior to use and any part used packaging must be covered when not used in production.
- Segregation from Contaminants: Packaging should be stored separately from raw materials, chemicals, and non-food-contact materials to avoid cross-contamination.

- Temperature and Humidity Control: Packaging materials should be stored under recommended environmental conditions to prevent deformation or spoilage of the packaging material.

Handling and Transportation Within the Facility

- Minimise Handling: Limit the number of times pre-printed packaging is handled to reduce the risk of physical contamination or damage to the print. Staff handling packaging should wear gloves and other protective gear.
- Dedicated Equipment: Use dedicated carts, bins, trolleys or trays for transporting packaging to prevent contamination from other areas of the facility.

Labelling Checks and Compliance

- Pre-Printing Checks: Before placing an order for pre-printed packaging, ensure that all regulatory requirements for labelling (e.g., ingredients, allergens, barcodes) are correctly displayed.
- Verification of Compliance: When receiving pre-printed packaging, conduct spot checks to verify that the information is accurate, legible, and compliant with UK/EU labelling regulations.

Quality Control for Food-Contact Materials

- EU and UK Regulations on Food-Contact Materials: Ensure that the pre-printed packaging complies with EU regulation (EC) No 1935/2004, which governs materials intended to come into contact with food. The materials should not transfer harmful substances to the ice product or alter its composition in any way.
- Migration Testing: For packaging that comes into direct contact with ice, perform or request migration testing from suppliers to confirm that the material does not leach chemicals into the ice under freezing conditions.

First In, First Out (FIFO) Inventory Management

- Inventory Rotation: Use a FIFO system for packaging materials to ensure that older packaging is used before newer stock. This prevents the use of packaging that may have degraded over time or become non-compliant due to changing regulations.

Waste and Defect Management

- Separate Defective Packaging: If defects (e.g., misprints or damaged packaging) are found, ensure that they are removed from the production line immediately and quarantined to avoid non-compliance with labelling laws.
- Document Disposal: Maintain a record of all defective packaging that is discarded and ensure it is disposed of securely to prevent any unauthorised use of incorrect labels or damaged packaging.

Summary

Both the UK and EU have stringent labelling requirements for ice products to ensure consumer safety, accurate product information, and compliance with food regulations. Key labelling elements include the product name, net quantity, batch number, storage instructions, and contact details of the food business operator. Allergen labelling, though less relevant for pure ice products, must still be considered if additives are used.

Handling pre-printed food contact packaging in manufacturing environments requires careful attention to hygiene, storage, and quality control. Ensuring that packaging meets food-contact material regulations and avoiding contamination during handling and transportation are crucial steps in maintaining product safety and compliance.

Traceability & Recall Procedure

EPIA members must ensure that ice products are traceable through all stages of production, processing, and distribution. This will enable rapid identification and control of potentially unsafe products.

Traceability Under Regulation (EC) No 178/2002

Regulation (EC) No 178/2002, also known as the General Food Law, is the fundamental legal framework governing food safety and traceability in the UK (still largely applicable post-Brexit) and the EU. Key traceability requirements include:

One Step Back, One Step Forward Principle

EPIA members must be able to identify:

- Where their raw materials come from (suppliers), and
- Where their products are going (customers/distributors).

EPIA members must maintain records of:

- the source of water
- additives (if flavoured or fortified ice is produced)
- equipment used in production.
- Their customers, such as distributors or retail outlets.

Documenting Critical Information

Ice producers must keep accurate and up-to-date records of:

- Raw materials: Source of water, quality test results, and any additives used.
- Production: Batch numbers, production dates, and quantities.
- Storage: Dates of freezing, storage conditions, and temperature monitoring logs.
- Distribution: Destination of shipments, including the identity of customers (wholesalers, retailers).
- Packaging and Labelling: Details of labelling (batch number, date of production, etc.).

This traceability allows a quick reaction if there is any food safety issue, such as contamination. In the case of ice production, if contamination (e.g., microbiological or chemical) is identified, or if faulty equipment leads to the production of unsafe ice, EPIA members must follow strict procedures for recalling or withdrawing products from the market.

Withdrawal vs. Recall

- Withdrawal: Removing ice from the distribution chain before it reaches the consumer (e.g., from warehouses or retail stores).

- Recall: Removing ice from the market when it has already reached consumers, involving communication to customers to return or dispose of the product.

Steps to Take During a Recall or Withdrawal

Identify Affected Batches

- Using traceability records, identify the batch numbers, production dates, and distribution channels of the affected ice.
- Establish the scope of contamination (e.g., water contamination or equipment malfunction) to understand the extent of the recall.

Notify Competent Authorities

- In the UK, notify the Food Standards Agency (FSA) or local environmental health authorities.
- In the EU, inform the relevant national food safety authority.
- This notification is mandatory under Article 19 of Regulation (EC) No 178/2002, which requires immediate action if a product may pose a risk to human health.
- If EPIA members have an in-house legal team or representative, or a legal team on retainer it is best to consult with them on any further requirements or obligations.

Alert Distributors and Retailers

- Contact all downstream businesses (e.g., distributors, retailers) who have received the affected ice batches.
- Instruct them to cease sales immediately and to withdraw products from shelves.
- If the ice has reached consumers, advise retailers to display recall notices in stores and on websites.

Inform Consumers

- Issue a public recall notice through media outlets, company websites, and social media, providing clear instructions on the nature of the risk, how to identify the affected product (e.g., batch numbers), and what steps consumers should take (e.g., return or disposal of the ice).
- Include contact details for further information or refunds.

Recover Affected Products

- Organise the retrieval of affected ice from distribution centres, retail outlets, or directly from consumers.
- Implement proper procedures to safely dispose of or quarantine contaminated or unsafe ice.

Investigate the Cause

- Conduct a root cause analysis to identify the issue, whether it's contaminated water, faulty production equipment, or improper handling.
- Implement corrective actions to prevent future incidents, such as improving water filtration, enhancing hygiene protocols, or upgrading equipment.

Document the Recall Process

- Maintain records of all actions taken during the recall or withdrawal process, including communications with authorities, distributors, and customers.
- Document the quantities of ice withdrawn or recalled and any actions taken to remedy the issue.

Report to Authorities

- Provide a final report to the relevant food safety authority (e.g., the FSA or EU national authority), detailing the cause, actions taken, and preventative measures for future production.
- The EPIA should be notified of any major recall. Product recalls involving food products can get major media attention and the sooner the EPIA knows the better then can prepare for media questions and scrutiny. It can also act as a learning moment for all EPIA members.

Regulatory Compliance in Recalls

UK (post-Brexit)

- After Brexit, the UK adopted similar laws based on EU regulations. The Food Safety and Hygiene (England) Regulations 2013 is closely aligned with EU food laws and enforces traceability and product recall processes in the UK. UK businesses should ensure they meet FSA guidelines on product recalls.

EU (EC No 178/2002)

- The Rapid Alert System for Food and Feed (RASFF) enables swift communication of food safety issues between EU member states. When a recall is initiated, the affected member state must notify the RASFF to ensure that other countries are informed about the potential hazard.

Key Legal Requirements for Traceability and Recalls in Ice Production

Requirement	Description
Traceability (Article 18)	Maintain records of suppliers and customers ("one step back, one step forward").
Risk Management (Article 19)	Immediate withdrawal or recall if ice is deemed unsafe, and notify authorities
Product Recall Process	Identify affected batches, notify distributors/retailers, inform consumers, and retrieve products.
Authorities Involved	Notify the FSA (UK) or relevant EU national food safety authority, and report actions taken.
Public Communication	Issue public recall notices and provide instructions for consumers to return or dispose of products.

Summary

In the event of contamination or other food safety issues in ice production, Regulation (EC) No 178/2002 ensures that ice producers have a robust system for tracing products and taking immediate action to protect consumers. Adhering to these regulations in both the UK and the EU helps ensure that unsafe products are rapidly removed from the market, and preventive measures are taken to avoid future incidents.

Storage & Distribution of Product

Effective distribution and storage of ice in an ice manufacturing plant are critical to maintaining product quality, hygiene, and efficiency. The best practices must ensure that ice remains at optimal temperatures and is handled in a sanitary manner throughout storage and transportation, whether managed in-house or by third-party logistics providers.

Storage & Distribution Best Practice

Below are the best practices for product distribution and storage, considering both third-party storage and distribution as well as on-site management, with specific considerations for vehicle fleet checks required in the UK and EU.

On-Site Storage Best Practices

Temperature Control

- Optimal Storage Temperature: Ice should be stored at a consistent temperature of -18°C (0°F) to 0°C (°F) in order to maintain its quality and prevent melting.
- Monitoring Systems: Consider using temperature monitoring systems to continuously track the storage environment. Alerts should be in place to notify staff of any deviations in temperature.
- Insulation: Storage facilities should have high-quality insulation to maintain consistent temperatures, especially in warmer climates or during high-demand periods.

Sanitation and Hygiene

- Clean Surfaces: All storage surfaces (walls, floors, shelving, racking) should be made of non-porous, easy-to-clean materials (e.g., stainless steel, food-grade plastic). Regular cleaning schedules should be maintained to prevent contamination.
- Pest Control: Implement a robust pest control plan to prevent contamination from pests such as rodents or insects.

Inventory Management

- FIFO (First In, First Out): Implement the FIFO system to ensure that older stock is used or distributed first, preventing ice from exceeding best before dates or becoming exposed to temperature fluctuations over time.
- Real-Time Inventory Tracking: Consider using real-time inventory management software to track stock levels, monitor expiration dates, and manage orders efficiently. This minimises wastage and ensures a steady supply to meet customer demand.

Third-Party Storage and Distribution

Selecting a Third-Party Logistics Provider

- Cold Chain Compliance: Ensure that the third-party storage and distribution provider complies with international cold chain logistics standards, such as the European Hygienic Engineering & Design Group (EHEDG) guidelines. Verify that they maintain the necessary temperature controls and hygiene practices.
- Reputation and Experience: Choose a logistics company with proven experience in handling frozen goods or food products. They should have established protocols for maintaining product quality during storage and transit.
- Audit Their Facilities: Conduct regular audits of third-party storage facilities to ensure compliance with food safety and cold storage requirements.

Temperature Monitoring and Tracking

- Telematics Systems: Ensure that third-party trucks are equipped with telematics or GPS tracking systems that allow for real-time monitoring of temperature during transport. The ice must remain at optimal temperatures throughout the journey.
- Temperature Loggers: Use temperature loggers to continuously monitor the conditions of storage and transit environments. These logs should be reviewed regularly to identify any issues.

Contracts and Liability

- Contractual Agreements: Clearly define the responsibilities for maintaining product integrity during storage and transport. Contracts should outline liability for damaged or spoiled goods and include insurance provisions for goods lost due to equipment failure or mishandling.
- Quality Assurance: Ensure that the third-party distributor has a quality assurance process in place that aligns with your plant's standards for food safety and handling.

On-Site Vehicle Fleets and Distribution

Vehicle Selection and Maintenance

- Refrigerated Vehicles: Vehicles used for ice distribution must be equipped with reliable refrigeration units that can maintain a temperature below 0°C throughout the journey.
- Fleet Maintenance: Regular maintenance checks are required to ensure vehicle reliability and hygiene. Maintenance should focus on refrigeration units, insulation integrity, and engine performance to avoid any breakdowns that could jeopardise product quality.

UK and EU Vehicle Fleet Compliance

- Driver Licensing and Training
  - Drivers must hold the correct category of driving license for operating refrigerated vehicles (e.g., Category C for large trucks in the UK).
  - They should also be trained in handling frozen goods, understanding hygiene protocols, and maintaining proper refrigeration temperatures.

- Roadworthiness Checks (UK)
  - Ensure vehicles pass MOT (Ministry of Transport) tests annually, as required for all commercial vehicles. These tests assess safety, emissions, and roadworthiness.
  - Conduct regular checks on tire condition, lights, and braking systems.
- EU Compliance
  - Under EU regulations, refrigerated vehicle drivers must use tachographs to record driving times, rest periods, and ensure compliance with road safety laws.
  - Ensure that all vehicles meet the latest Euro emissions standards (e.g., Euro 6 for new vehicles) to comply with environmental regulations.
  - Vehicles carrying perishable goods (including ice) must be certified under the Agreement on the International Carriage of Perishable Foodstuffs (ATP) to ensure that they can maintain proper temperatures during transport across EU borders.

Hygiene and Cleaning

- Regular Vehicle Cleaning: Refrigerated trucks must be cleaned and sanitised regularly to prevent contamination. Focus on the high traffic areas where ice is stored to avoid dirt, mould, or any residual water that could compromise product quality.
- Cleaning Logs: Maintain detailed logs of cleaning and sanitation activities for each vehicle, ensuring compliance with UK and EU food hygiene regulations.

Fuel Efficiency and Route Optimisation

- Route Planning: Optimise routes to reduce transport time and fuel consumption. Shorter routes not only save costs but also ensure that ice remains in optimal conditions for a shorter period.
- Fleet Telematics: Consider using fleet management software to monitor vehicle performance, fuel efficiency, and driver behaviour. These systems can provide insights to reduce fuel consumption and improve overall fleet efficiency.

Best Practices for Loading and Unloading

- Temperature Control During Loading: Ensure that ice is loaded into trucks as quickly as possible to prevent exposure to ambient temperatures. Loading areas should be temperature-controlled or located close to storage to minimise exposure.
- Minimise Handling: Reduce the number of times the ice is handled to prevent physical damage to the product and maintain cleanliness.
- Palletised Storage: Use palletised storage to streamline loading and unloading processes. This method also minimises human contact with the ice, preserving hygiene.

Documentation and Compliance

- Record Keeping: Maintain detailed records of temperature logs, maintenance activities, vehicle cleaning, and product distribution for traceability. This ensures compliance with food safety laws and allows for quick response in the event of product recalls.

- Health and Safety Regulations: Ensure compliance with Hazard Analysis and Critical Control Points (HACCP) standards to identify and control potential hazards throughout the storage and distribution process.

Sustainability Considerations

- Energy-Efficient Refrigeration: Use energy-efficient refrigeration units in storage facilities and vehicles to reduce energy consumption and operational costs.
- Eco-Friendly Packaging: Consider using sustainable and recyclable packaging materials to reduce the environmental impact of your product distribution.
- Carbon Footprint Monitoring: Track the carbon footprint of your distribution network and implement measures such as route optimisation and vehicle upgrades to reduce emissions.

Summary

Optimising the distribution and storage of ice in an ice manufacturing plant requires a comprehensive approach that integrates temperature control, hygiene, and compliance with food safety regulations. On-site storage facilities should be well-insulated and regularly monitored for temperature consistency, while third-party logistics providers should meet stringent cold chain standards. Vehicles used for distribution must be maintained in accordance with UK and EU regulations, including regular checks for roadworthiness, emissions compliance, and hygiene protocols. Implementing best practices in these areas ensures that ice remains in optimal condition from production to delivery.

Site Design & Layout

Designing and laying out an ice manufacturing plant requires careful planning to optimise production efficiency, ensure food safety, and minimise contamination risks. Incorporating a risk-based approach to zoning, proper workflow organisation, and fabrication considerations ensures both regulatory compliance and operational efficiency.

Risk-Based Zoning

Risk-based zoning helps segregate areas of the ice plant based on their contamination potential, protecting the ice production process from environmental and human contamination.

High-Risk Areas

- Description: These are areas where ice open to the facility and is at risk of contamination. These zones should be strictly controlled.
- Examples: Ice bins, drying belts, snow wheels, hoppers.
- Requirements:
  - Hygienic Barriers: Install physical barriers to separate high-risk areas from other zones.
  - Restricted Access: Limit access to authorised personnel only; ensure they follow strict sanitation protocols, including the use of personal protective equipment (PPE).
  - Air Quality Control: Use filtered air or positive air pressure systems to minimise airborne contaminants.
  - Cleanable Surfaces: Walls, floors, and ceilings should be made of non-porous, easily cleanable materials like stainless steel or epoxy.

Low-Risk Areas (Water Filtration and UV Treatment)

- Description: These zones handle water treatment processes that affect the purity and quality of ice but may not directly involve ice handling.
- Examples: Filtration rooms, UV treatment systems, water tanks.
- Requirements:
  - Sanitation Control: Regular sanitation schedules should be in place. Workers should wear appropriate PPE and sanitise hands before entering this zone.
  - Temperature and Humidity Control: Monitor temperature and humidity to prevent condensation, which can lead to mould or bacterial growth.

Enclosed Product

- Description: Product is in an enclosed zone, or contained within machinery, and is not open to the facility posing a low contamination risk to ice products.

- Examples: Augers, screw conveyors, ice machines, packing machines, packed product, stored product, freezers.
- Requirements:
  - Controlled Access: Limit access to authorised personnel only; ensure they follow strict sanitation protocols, including the use of personal protective equipment (PPE).

Non-product

- Description: There's no product in this area therefore there is no product at risk within this zone.
- Examples: Mechanical rooms, utility areas, maintenance workshops, staff break rooms, and administrative offices.
- Requirements:
  - Separate Entrances: Provide separate entrances for maintenance workers and administrative staff to avoid cross-contamination.
  - Maintenance Isolation: Ensure that any fabrication or repairs of machinery happen away from production areas to prevent the spread of dust, grease, or other contaminants.

Production Workflow & Layout Considerations

The layout should promote an efficient production flow, reduce bottlenecks and contamination risks while ensuring that different processes do not interfere with each other.

Equipment Placement

- Space Efficiency: Allow enough space between machinery for maintenance access, cleaning, and airflow while maximising production area utilisation.
- Flow Optimisation: Ensure that equipment is placed in a way that facilitates smooth transitions between stages, reducing the need for handling or moving the product between zones.
- Maintenance Consideration: Design machine placements to allow for easy access to critical components for routine maintenance without disrupting production.

Staff and Material Flow

- Staff Segregation: Define clear pathways for personnel to avoid unnecessary movement between high-risk and low-risk areas. Consider color-coded uniforms or PPE for different zones to visually indicate where workers should be.
- Material Handling: Implement separate pathways for raw materials (water, packaging) and finished products (ice) to prevent cross-contamination. Consider using automated conveyors to minimise human contact with the product.

Maintenance & Repair Areas

Maintenance and repair areas should be segregated from the production areas to avoid contamination of the ice with dust, oils, or other debris generated during maintenance work. Equipment should be taken out production areas when possible, for maintenance. When not

possible, it should be limited to times when product is not being run. Always clean and sanitise equipment that has been worked on before putting back in service.

Dedicated Maintenance Workshops

- Location: Workshops should be located in low-risk zones, separate from the production lines. This helps ensure that repairs and equipment servicing are isolated from ice production.
- Containment: Use partitions or separate rooms for any welding, cutting, or mechanical work to prevent dust or particulates from spreading.
- Tools and Spare Parts: Maintain clean storage for tools and spare parts, preferably in a dedicated tool chest or workshop.

Fabrication Process

- Hygienic Design: If any equipment is fabricated on-site, follow hygienic design principles. Use stainless steel and other non-porous, easy-to-clean materials.
- Cross-Contamination Prevention: Ensure that tools and materials used in the fabrication area do not come into contact with food-grade surfaces or the production line.

Water Filtration & UV Light Systems

Properly design and locate the water filtration and UV light systems to ensure they do not interfere with ice production while maintaining easy access for maintenance.

Filtration Room Design

- Room Environment: The filtration room should be kept clean, dry, and free from any dust or potential contaminants.
- Ease of Access: Ensure that the filtration system is easily accessible for regular maintenance and filter changes but located away from high-traffic production areas to prevent disruptions.

UV Light System Placement

- UV System Enclosure: The UV light system should be enclosed and sealed off from external contaminants.
- Placement Location: Position the UV light system before water enters the ice-making system to ensure the water is purified and free of microorganisms.

Environmental Controls

Temperature, humidity, and air quality control are vital to the operation of an ice manufacturing plant, especially in high-risk zones.

Temperature & Humidity Control

- Cooling Systems: Ensure that cold storage areas and production rooms are equipped with proper refrigeration systems to maintain consistent temperatures.
- Dehumidifiers: Install dehumidifiers to prevent condensation, particularly in areas where water is stored, filtered, or processed.

Ventilation Systems

- Airflow Management: Implement air filtration and positive-pressure systems in high-risk zones to prevent contaminants from entering clean areas. Ensure airflow moves from clean zones to less clean zones.
- Regular Cleaning: Ventilation ducts should be regularly cleaned and maintained to prevent dust buildup.

Drainage & Waste Management

Drainage and waste management systems play a crucial role in minimising contamination and ensuring hygiene.

Floor Drainage

- Sloped Floors: Ensure all floors are sloped towards drainage points to prevent standing water, which could lead to bacterial growth.
- Covered Drains: Use covered or grated drains that can be easily cleaned and sanitised.

Waste Segregation

- Separate Waste Areas: Dedicate waste disposal areas outside of high-risk zones to prevent any cross-contamination.
- Sealed Containers: Use sealed containers for waste storage to prevent odours and pest issues.

Ice Plant Materials

When designing an ice manufacturing plant, selecting the appropriate materials for walls, ceilings, floors, and other surfaces is crucial for maintaining food safety, hygiene, durability, and ease of cleaning. The materials used must comply with food industry regulations and ensure a sanitary environment that prevents contamination.

When investing in your plant design and setup there will be various options on materials. The third-party partners and suppliers you are purchasing from and who are installing/building the plant will be experts on the required materials. The information below is a guide only.

EPIA members primary responsibility is ensuing that the parties they are working with are reputable and supply materials that are suitable for a food manufacturing environment. Where ice will come into contact with any of the fabrication of the plant food-grade materials must be used and proof of the materials food-grade status must be obtained from the supplier. Consider consulting with EPIA member suppliers to help you build or upgrade your facility.

Here are recommended materials for various areas of an ice manufacturing plant:

Walls

Walls in an ice manufacturing plant should be made from materials that are easy to clean, non-porous, and resistant to moisture, mould, and bacteria. They must also withstand temperature changes and regular washing.

Materials:

- Stainless Steel (Grade 304 or 316):
  - Highly durable, corrosion-resistant, and easy to clean.
  - Suitable for high-risk areas like ice production zones and packaging rooms.
- Fiberglass Reinforced Panels (FRP):
  - Moisture-resistant and easy to clean.
  - Cost-effective and commonly used in food production environments.
- Polyvinyl Chloride (PVC) Panels:
  - Water-resistant, low maintenance, and non-porous.
  - Ideal for areas where hygiene is critical, such as around water filtration or ice-making machines.
- Epoxy or Vinyl-Coated Walls:
  - Seamless coatings that are easy to clean and resistant to chemicals and moisture.
  - Prevent bacteria growth and withstand frequent washdowns.

Key Considerations:

- Smooth Finish: Walls should have a smooth finish to prevent dust or bacteria buildup.
- Coving: Incorporate coved corners where the walls meet the floor to eliminate crevices that can harbour bacteria.

Ceilings

Ceilings in an ice manufacturing plant should be made of materials that resist moisture buildup, are easy to clean, and discourage the accumulation of dust, dirt, and condensation.

Materials:

- PVC Ceilings:
  - Non-porous and water-resistant.
  - Prevents mould and mildew growth, ideal for humid environments like ice production rooms.
- Aluminium or Stainless-Steel Panels:
  - Corrosion-resistant and durable.
  - Suitable for high-humidity areas, especially above ice production equipment.
- Fiberglass Reinforced Panels (FRP):
  - Light, moisture-resistant, and easy to clean.
  - Effective in areas prone to condensation, such as cold rooms and freezer spaces.
- Vinyl-Covered Gypsum Board:
  - Provides a smooth and washable surface.
  - Less expensive option for lower-risk areas of the plant.

Key Considerations:

- Condensation Control: Use insulated ceilings or materials that resist condensation to prevent water from dripping onto the production areas.
- Sealed Ceilings: Ensure the ceiling is properly sealed to prevent moisture intrusion or contamination.

Flooring

Floors in an ice manufacturing plant must be highly durable, non-slip, resistant to moisture, and easy to clean. The material should also withstand the cold environment of ice production and regular exposure to water and cleaning chemicals.

Materials:

- Epoxy Resin Flooring:
  - Seamless, non-porous, and highly resistant to water, chemicals, and heavy foot traffic.
  - Ideal for high-risk areas like ice production and storage rooms.
- Polyurethane Flooring:
  - Durable and flexible, which makes it ideal for cold environments.
  - Resistant to cracking and chemicals, with anti-slip properties.
- Quarry Tiles with Epoxy Grout:
  - Durable and slip-resistant with water and chemical resistance.
  - Suitable for areas with heavy traffic and wet environments.
- Anti-Slip Concrete with a Protective Sealer:
  - Economical and durable but must be sealed to prevent water absorption and cracking.
  - Often used in utility or low-risk areas like machine rooms.

Key Considerations:

- Non-Slip: Floors must be slip-resistant to ensure worker safety in wet environments.
- Sloped for Drainage: Ensure that the flooring is properly sloped toward drains to prevent standing water, which could lead to bacterial growth or accidents.

Doors & Windows

Doors and windows in an ice manufacturing plant must be designed to limit contamination risks, provide insulation, and maintain cleanability.

Materials:

- Stainless Steel Doors:
  - Durable and corrosion resistant.
  - Ideal for high-traffic and wet areas like ice production and packaging rooms.
- Insulated Fiberglass Doors:
  - Lightweight, moisture-resistant, and thermally insulated.
  - Suitable for cold storage areas or freezers.
- Tempered Glass Windows with Aluminium or PVC Frames:
  - Tempered glass is durable and easy to clean.
  - PVC or aluminium frames provide moisture resistance and are easy to maintain.

Key Considerations:

- Sealed Windows: Windows should be sealed to prevent moisture infiltration and contamination. Windows should not open directly into bagging or production areas as this can allow pests into the area as well as allow odours from the outside to enter.
- Automatic Doors or Air Curtains: In high-risk zones, consider automatic doors or air curtains to maintain hygiene and minimise manual contact.

Drains & Drainage Systems

Drains play a critical role in ensuring that the plant stays sanitary by facilitating proper water runoff and preventing standing water.

Materials:

- Stainless Steel Drains and Grates:
  - Corrosion-resistant, durable, and hygienic.
  - Ideal for wet and high-traffic areas.
- Polypropylene Drain Covers:
  - Resistant to chemicals and heat, making them a durable alternative for drain covers.

Key Considerations:

- Sloped Floors: Floors should be sloped towards drains to prevent pooling water.
- Regular Cleaning: Drains should be designed to be easily cleaned and sanitised to prevent bacteria buildup.

Fixtures & Fittings

All fixtures and fittings (e.g., lighting, electrical conduits, and piping) in an ice manufacturing plant must be designed for easy cleaning, durability, and safety in food production areas.

Materials:

- Stainless Steel: Ideal for exposed fittings, electrical conduits, and pipework in high-risk areas due to its corrosion resistance and ease of cleaning.
- Food-Grade Plastics (PVC or Polyethylene): Suitable for water pipes or non-critical fixtures in lower-risk areas.

Key Considerations:

- Sealed Fittings: All fixtures should be properly sealed to prevent contamination and allow easy cleaning.
- Flush-Mounted Lighting: Use flush-mounted or recessed lighting fixtures to prevent dust buildup and facilitate cleaning.

Roofing

The roof structure must prevent water from leaking into the plant and be designed to handle insulation needs, especially in cold environments.

Materials:

- Insulated Metal Panels (IMP):
  - Highly effective for controlling temperature and preventing condensation.
  - Provides insulation for cold storage and production areas.
  - Make sure the IMP are the proper thickness for your area to handle the temperatures you are maintaining.
- EPDM (Ethylene Propylene Diene Monomer) Rubber Roofing:
  - Durable and resistant to weather conditions.
  - Offers water resistance and flexibility in design.

Key Considerations:

- Thermal Insulation: Ensure proper insulation to maintain cold temperatures in ice production and storage areas.
- Moisture Prevention: Roofs should be designed with proper drainage systems to avoid water pooling and leaks into production areas.

Summary

A well-designed ice manufacturing plant considers risk-based zoning, efficient workflow layout, and attention to environmental controls. Segregating high-risk and low-risk areas, optimising the flow of personnel and materials, and ensuring that critical equipment like water filtration and UV systems are placed correctly can significantly enhance both the safety and efficiency of operations.

The choice of materials in an ice manufacturing plant plays a significant role in maintaining hygiene, safety, and operational efficiency. Materials must be durable, resistant to moisture, easy to clean, and compliant with food safety regulations. Using stainless steel for high-risk zones, moisture-resistant panels for walls and ceilings, and non-slip, durable flooring ensures that the plant operates safely and meets all hygiene standards. Additionally, proper attention should be given to insulation, drainage, and sealed surfaces to prevent contamination and ensure long-term durability.

Product Defence

Product defence, also known as food defence, is a crucial aspect of ensuring the safety of ice in manufacturing. Ice manufacturers need to safeguard against various forms of food fraud, malicious contamination, and intentional adulteration.

What is Product Defence?

This process involves protecting the integrity of ice products throughout the supply chain from production to distribution. In the UK and EU, food defence is supported by specific guidelines from regulatory bodies, and following best practices helps mitigate risks related to food fraud and malicious contamination.

Below is a detailed outline of product defence strategies for ice manufacturers, including types of food fraud and malicious contamination, advice from UK and EU organisations, and cited sources.

Types of Food Fraud and Malicious Contamination

Food Fraud in Ice Manufacturing

Food fraud refers to the deliberate and intentional substitution, adulteration, or misrepresentation of food products for economic gain. While ice manufacturing may not be as vulnerable to food fraud as other sectors, there are still key risks to consider, such as:

- Substitution of Water Sources: Use of lower-quality or non-potable water instead of high-quality or certified potable water could pose health risks. This would be done to cut costs but could lead to contamination or compromise safety.
- Mislabelled Ice Products: Ice marketed as “purified” or “filtered” could be sold without undergoing the promised filtration processes.
- Adulteration: Intentional dilution of ice products or use of contaminated water sources could occur in unregulated or non-certified facilities.

Malicious Contamination (Food Defence Threats)

Malicious contamination refers to the deliberate attempt to harm consumers or the public by contaminating food products, including ice. Potential threats include:

- Intentional Biological or Chemical Contamination: Individuals could attempt to introduce harmful pathogens (e.g., Salmonella, E. coli) or chemicals (e.g., toxins, bleach) into the ice production process.
- Sabotage in the Supply Chain: Tampering with ice or its packaging during distribution or transportation.
- Cybersecurity Threats: Cyberattacks on automated ice manufacturing systems or cold storage units could lead to product spoilage or intentional shutdown of refrigeration systems.

Product Defence Best Practices for Ice Manufacturers

Develop a Food Defence Plan

- Both the UK and the EU strongly recommend the implementation of a food defence plan, a proactive strategy aimed at preventing intentional contamination. This plan should be integrated into EPIA member's overall risk management programme and may include the following key elements:
  - Vulnerability Assessments: Identify critical points in the production and distribution chain where the ice could be most vulnerable to attack or adulteration. This should include an analysis of water sourcing, production equipment, storage, and transportation.
  - Mitigation Strategies: Develop and implement measures to reduce the risk of intentional contamination at vulnerable points. This may involve physical security measures, monitoring systems, and staff training.

Access Control

- Controlled Access to Production Areas: Restrict access to the ice production and storage areas. Only authorised personnel should have access to critical points of the production process, such as water sources, ice machines, and storage units.
- Employee Identification Systems: Implement employee identification systems, such as badges or biometric systems, to ensure that only trusted personnel enter sensitive areas.

Regular Security Audits

- Conduct regular security audits of your facility, focusing on both physical security and operational controls. This includes reviewing access logs, checking surveillance systems, and verifying that all food defence measures are in place.
- Third-Party Inspections: Consider having external auditors conduct periodic inspections to ensure compliance with food defence and safety standards.

Employee Training and Awareness

- Training on Food Defence: All employees should receive regular training on food defence and the potential risks of malicious contamination or food fraud. This training should focus on identifying suspicious behaviour and responding to food defence threats.
- Whistleblower Systems: Establish a system for employees to anonymously report suspicious activities or security vulnerabilities.

Supply Chain Security

- Supplier Verification: Work only with certified and trusted suppliers, ensuring that the water used in ice manufacturing and other materials are safe and meet regulatory standards.
- Secure Transportation: If using third-party distributors, verify that they have proper security measures in place, such as GPS tracking, tamper-evident seals on transportation units, and temperature monitoring systems for refrigerated trucks.

UK and EU Guidelines and Advice on Food Defence

Several UK and EU organisations provide specific guidance on food defence and protecting against food fraud. EPIA members should align their practices with these recommendations to meet regulatory requirements and best practices.

Food Standards Agency (FSA)

- The FSA's Food Defence Guidance emphasises the importance of conducting vulnerability assessments and developing food defence plans tailored to specific businesses, including ice manufacturers. It advocates for strict controls over water sourcing, access to production areas, and ensuring the security of supply chains.
- The FSA also suggests companies adopt the PAS 96 standard for food defence, which provides practical advice on identifying and mitigating threats of malicious contamination.

British Retail Consortium (BRC)

- The BRCGS Food Safety Standard contains a section specifically related to food defence. It includes guidelines on vulnerability assessments, personnel security, tamper-proof packaging, and securing the supply chain.
- BRCGS accreditation ensures that a company has a robust system in place to prevent intentional contamination and fraud.

European Commission Food Safety Guidelines

- The EU Regulation (EC) No 178/2002, which governs food safety in Europe, mandates that businesses adopt measures to prevent contamination and fraud. Under this regulation, ice manufacturers must have comprehensive safety systems in place, including food defence plans and secure sourcing of ingredients.
- The EU also recommends applying the Food Fraud Vulnerability Assessment (FFVA), a tool used to assess and mitigate risks related to economically motivated adulteration and intentional contamination.

European Food Safety Authority (EFSA)

- EFSA's Risk Assessment: The European Food Safety Authority provides detailed risk assessments related to food defence and contamination. Their guidelines focus on establishing proper hygiene practices, secure water sourcing, and applying HACCP (Hazard Analysis and Critical Control Points) principles to prevent contamination of ice.

Approaches to Food Defence Risk Reduction

Test to Regulatory Standards

- Water Quality: Ensure that water used in ice manufacturing meets the standards set by Drinking Water Directive EU 2020/2184 in the EU or the UK Drinking Water Inspectorate (DWI). Regular microbiological testing should be conducted, focusing on pathogens like E. coli, Salmonella, and Legionella.
- Chemical Contaminants: Regularly test for any chemical contaminants, including chlorine and other cleaning agents, to ensure they remain within safe levels.

Continuous Monitoring

- Implement continuous monitoring systems for critical points (water sources, production machinery) to ensure rapid detection of any contaminants or abnormal activity.
- Monitor and control visitors to site to ensure only authorised persons have access to the premises.

Security Measures

- CCTV around the site can act as a deterrent as well as be used in the event of any food defence breaches.
- Fencing around site can limit entry to unknown persons.
- Locks, keypads, biometrics to high-risk areas can be installed to control access.

Traceability Systems

- Maintain full traceability of all materials (water sources, packaging) and products (ice batches) to ensure that any contaminated or compromised batches can be quickly identified and removed from the supply chain.

Summary

Product defence in ice manufacturing is essential for protecting against both food fraud and malicious contamination. By conducting risk assessments, developing a food defence plan and securing access to production areas, producers can significantly reduce their vulnerability to intentional adulteration. Following guidance from UK and EU organisations, such as the Food Standards Agency and EFSA, will ensure compliance with legal standards and best practices.

Product Testing

Microbiological testing of ice and potable water is essential for ensuring safety and compliance with health regulations. Since ice can be consumed or come into contact with food, it must meet potable water standards. Testing for pathogens and other microorganisms is crucial to prevent the spread of waterborne diseases.

Best Practices for Microbiological Testing of Ice and Potable Water

Best practices for microbiological testing should be risk-based, targeting specific pathogens relevant to the potential risks at each stage of production.

Below is an outline of best practices, pathogens to test for, and how to determine testing limits:

Risk-Based Approach

Testing frequency and scope should be based on a risk assessment considering:

- Source Water Quality: If the water source is from municipal supplies, the risk might be lower, but if from private wells, boreholes or surface water, the testing should be more frequent and comprehensive.
- Process Control: Poorly maintained ice machines, storage, or distribution networks can introduce contamination risks.
- End-Use: Ice intended for direct consumption or food contact (e.g., in restaurants, bars) presents a higher risk and should be subject to stricter testing standards.

Sampling Procedures

- Routine Sampling: Regularly scheduled sampling (weekly, monthly, or quarterly, depending on risk) is essential for maintaining ice and water quality.
- Aseptic Sampling Techniques: Use sterile containers and equipment when collecting samples to avoid external contamination. Best practice is to wear clean disposable gloves while collecting the samples.
- Storage and Transport: Samples must be kept at temperatures between 1°C (34°F) and 4°C (39°F) and transported to a certified laboratory as quickly as possible (within 24 hours).

Testing Locations

- Source Water: Test the incoming potable water to the plant.
- Ice Production Machines: Test the output of ice machines to monitor potential contamination points.

- Storage Areas: Sample from ice stored in bins or containers to assess contamination risks from handling and environmental exposure.
- Distribution Points: For ice that's delivered or distributed to multiple locations, test samples from delivery bags, packaging, or bulk storage units.

Pathogens and Microorganisms to Test For

The following are the most common pathogens and indicators to be monitored in ice and potable water testing. EPIA members should determine which pathogens to test for based on their water source, legislation and consultation with a third-party laboratory or water expert:

Bacterial Pathogens

- Escherichia coli (E. coli)
  - A key indicator of faecal contamination.
  - Testing for E. coli helps to ensure that the water source or ice has not been contaminated by sewage or animal waste.
- Coliform Bacteria
  - Used as an indicator for general sanitary quality and faecal contamination.
  - Includes both faecal and non-faecal coliform bacteria.
- Salmonella spp.
  - A significant pathogen that can cause severe foodborne illnesses if consumed.
  - Can enter the water supply through contaminated sources or improper handling of ice.
- Legionella spp.
  - Found in water systems, this pathogen can cause Legionnaires' disease, particularly in systems where water or ice is aerosolised.
  - Higher risk in poorly maintained or older ice machines.

Viral Pathogens

- Norovirus
  - A leading cause of gastroenteritis and foodborne illness. Contaminated ice or water can transmit norovirus, especially in crowded or shared environments (e.g., restaurants, hotels).
- Hepatitis A
  - Waterborne outbreaks of hepatitis A have been reported, making this virus a significant concern in ice manufacturing.

Protozoan Pathogens

- Cryptosporidium spp.
  - A chlorine-resistant parasite that can survive in water and cause severe diarrhoea.
  - Particularly important in systems using surface water sources.
- Giardia spp.
  - Another protozoan that causes gastrointestinal illness. Testing for Giardia is particularly important for untreated water sources.

Fungal and Yeast Contamination

- Mould and Yeast
  - While not commonly pathogenic, moulds and yeast in ice may indicate poor hygiene or contamination in the ice production and storage areas.

Total Plate Count (Heterotrophic Plate Count)

- This test provides an indication of the general microbiological quality of the water or ice by counting all bacteria present (both pathogenic and non-pathogenic).
- High total plate counts may indicate biofilm formation in ice machines, poor cleaning practices, or contaminated water sources.

Establishing Testing Limits

Regulatory Guidelines

- World Health Organisation (WHO) Guidelines for Drinking Water Quality recommend microbiological parameters for potable water, which can also be applied to ice.
- European Union Directive EU 2020/2184 on the quality of water intended for human consumption sets limits for microorganisms in drinking water.
- UK Drinking Water Inspectorate (DWI) sets legal standards for water in the UK, which ice manufacturers must comply with.

Microbiological Limits for Ice and Potable Water

The following are general guidelines based on WHO, EU, and UK standards:

- Escherichia coli (E. coli)
  - 0 CFU/100 mL in both water and ice. The presence of E. coli indicates faecal contamination and is unacceptable in any amount.
- Coliform Bacteria
  - 0 CFU/100 mL. The presence of coliform bacteria indicates poor water quality or potential faecal contamination.
- Total Plate Count (TPC)
  - For drinking water, the TPC should not exceed 500 CFU/mL at 22°C or 100 CFU/mL at 37°C.
  - For ice, best practices suggest similar thresholds for TPC.
- Legionella spp.
  - The UK HSE (Health and Safety Executive) suggests a limit of <100 CFU/L for Legionella in water systems, with more frequent monitoring for high-risk systems like ice machines.

Testing Frequency Based on Risk

- Low Risk: If the source is municipal water, and ice machines are well-maintained, testing may be performed monthly or quarterly.
- Medium Risk: If water is sourced from private wells or the production environment presents moderate contamination risks, monthly testing should be considered.

- High Risk: For water sourced from surface sources, poorly maintained ice machines, or distribution to high-consumption venues (e.g., hospitals, hotels), weekly testing may be required.

Interpreting Results and Corrective Actions

- Immediate Action for Positive Results: If pathogenic microorganisms such as E. coli, Salmonella, or Legionella are detected, immediate corrective actions should be taken, including halting production, cleaning equipment, and identifying the source of contamination.
- Review Cleaning Protocols: In the event of high total plate counts, review and enhance cleaning protocols for ice machines, filters, and storage units.
- Retesting: After corrective actions, retesting should be carried out to ensure that the issue is resolved.

Summary

Microbiological testing for ice and potable water in an ice manufacturing plant must follow a risk-based approach to ensure public safety. Regular testing for key pathogens such as E. coli, Salmonella, Norovirus, Cryptosporidium, and Legionella is essential, with limits set according to WHO, EU, and UK regulatory standards. Testing frequency should vary based on the risk level of the water source, ice production system, and distribution network, but at least monthly is recommended.

Foreign Body Control

Foreign body contamination remains one of the most significant risks to ice safety, product quality, and brand reputation. Even small foreign materials can cause consumer harm or product recalls, leading to loss of customer confidence and potential legal or regulatory consequences. In the UK and EU, legislation and certification standards require all food business operators to implement proactive measures to prevent, detect, and control the presence of physical contaminants in food.

General Principles

EPIA members should have a robust foreign body prevention programme in place as part of its Food Safety Management System. Preventative controls must be based on risk assessment (HACCP) and include both engineered and procedural safeguards. Inspections, maintenance, and staff awareness are key components. Any incident or suspected contamination must be reported immediately to a supervisor, and affected products placed on hold pending investigation.

Foreign bodies may originate from many sources:

- damaged equipment
- poor maintenance
- personal items
- environmental debris.

Common examples include glass fragments, metal shavings, wood splinters, plastic pieces, and fragments from handheld tools or utensils. Because these risks cannot be eliminated through design alone, they must be managed systematically through a combination of good manufacturing practice (GMP), hazard analysis (HACCP), and continual verification of control measures.

Glass and Brittle Plastic Control

All glass, hard plastic, and similar brittle materials within production and storage areas must be minimised and controlled. A complete register of all items such as viewing panels, gauge covers, light fittings, and instrument lenses should be maintained and reviewed at least annually.

Routine inspections should verify integrity and cleanliness, with any damage reported and repaired or replaced without delay. Where possible, protective covers or shatter-resistant materials should be

used. Breakage procedures must specify isolation of the affected area, full clean-up verification, and documentation of the incident before production resumes.

EPIA members should consider a policy that limits glass or brittle plastic from coming into the facility.

Metal Control

Metal contamination risks are managed through equipment design, maintenance, and detection systems. All machinery must be maintained in sound condition, with loose or missing fasteners immediately replaced. Tools and utensils should be subject to a sign-in/sign-out system where appropriate and shadow boards should be used in production areas.

Magnetic separators, sieves, and metal detectors should be calibrated and tested at defined frequencies using certified test pieces. Records of all checks and corrective actions should be retained. If metal is detected during production, the affected batch must be isolated and investigated according to the site's non-conformance procedure.

Wood Control

The use of wood in production areas should be avoided wherever possible. Where unavoidable, for instance, in pallets or structural elements, it must be sound, clean, and free from splinters or damage. Wooden pallets must not be used within high-risk or open product areas unless fully encapsulated or subject to equivalent controls. Prefer plastic or metal pallets for storage areas connected to production.

Regular inspections should verify that no degradation or contamination risk exists, and any damaged wood must be removed from service immediately.

Sharps Control (Knives, Blades, etc.)

Sharps represent a particular hazard and should be strictly controlled. Only authorised and trained personnel may use cutting tools, which must be of approved design and in good condition. Snap-off blades and glass thermometers are prohibited in production areas.

Knives, blades, and scissors should be clearly identified and issued and tracked through a documented control system, with counts verified before and after use. Broken or missing blades must be reported and investigated immediately. Designated containers for the safe disposal of sharps must be available in relevant areas.

Handheld and Portable Equipment

Devices such as scanners, tablets, pens, and electronic thermometers should be food-safe, cleanable, and in good repair. All such equipment must be subject to inventory control and visually inspected prior to use.

Where possible, items should be fitted with retention cords or designed to prevent component detachment (e.g., stylus tips, battery covers). Damaged or missing parts must be reported and replaced at once. The use of personal items in production areas such as mobile phones should be prohibited unless approved by site management.

Staff Responsibilities and Awareness

All staff must understand the importance of foreign body control and be vigilant for potential risks. Induction and refresher training should include recognition of contamination hazards and reporting procedures. Supervisors are responsible for ensuring that inspections, tool controls, and housekeeping standards are maintained.

Contractors and visitors must follow site rules, and their tools or materials should be checked and recorded prior to entry and exit using a Permit to Work.

Housekeeping, Maintenance, and Environmental Controls

- Good housekeeping minimises accumulation of debris and foreign material. Production areas must be kept clean, and cleaning equipment itself must be controlled to prevent fibre or bristle loss.
- Maintenance work should, where possible, occur outside production hours, with line clearance and inspection conducted before restart.
- Lighting covers, ventilation fittings, and overhead structures should be regularly inspected to ensure integrity and cleanliness.

Incident Management and Corrective Action

In the event of suspected or confirmed foreign body contamination, the affected area should be isolated immediately. All potentially impacted product must be identified, placed on hold, and assessed.

Root cause investigation should determine whether the contamination originated from process failure, equipment damage, or procedural lapse. Findings must be documented, corrective actions implemented, and verification performed before production resumes. Notification to customers or regulators shall occur as required by company policy and UK/EU legislation if a product recall is required.

Summary

Effective foreign body control requires cooperation at every level of the organisation, from design and procurement to frontline production and maintenance. A strong foreign body management culture not only protects products but also promotes operational excellence and continuous improvement.

Metal Detection

Metal detection is one of the most important physical-contamination control measures in food safety management. Properly designed and maintained systems are essential for preventing metallic fragments from entering ice products and for demonstrating compliance with both legislative and certification requirements.

Metal Detection Requirements

In the United Kingdom and European Union, food business operators are legally required to ensure that food placed on the market is safe for consumption. This duty is established under Regulation (EC) No. 178/2002 (the General Food Law Regulation), Regulation (EC) No. 852/2004 on the hygiene of foodstuffs, and the Food Safety Act 1990.

While these regulations do not explicitly mandate the use of metal detectors, they require businesses to identify and control all potential physical hazards. Metal detection is therefore recognised as best practice under HACCP principles and forms a key component of accreditation standards such as BRCGS Food Safety and other GFSI-benchmarked schemes.

Benefits of Metal Detection

Metal detectors provide both preventive and protective functions in a food-production system. Their principal benefit is consumer protection ensuring that sharp or hard fragments of metal cannot reach the end user.

Beyond consumer safety, metal detection supports an EPIA member's due-diligence defence, offering verifiable evidence that reasonable precautions have been taken to prevent contamination. The technology also contributes to operational efficiency, as trends in metal contamination can help identify failing equipment, excessive wear, or poor maintenance practices. Furthermore, metal detection reduces the risk of product recall, protects brand reputation, and strengthens confidence among customers, regulators, and certification bodies.

Implementation and Site Integration

Before installing a metal detector, a site must conduct a foreign-body risk assessment that identifies where and how metal contamination could occur. Often this will form part of the HACCP risk assessment. Common sources include broken machine parts, nuts, bolts, washers, worn blades, or contamination introduced with raw materials or packaging components.

The risk assessment should determine the most suitable point on the production line for detection. In most cases, this is at the end of the process, after packaging but before product dispatch, since this provides the final opportunity to detect and remove contaminants.

The selected equipment must be appropriate for the product type and environment. Metal detectors should be designed to identify ferrous, non-ferrous, and stainless-steel fragments at a sensitivity consistent with product characteristics. For example, wet or conductive products, such as ice, typically require adjusted sensitivity settings due to product effect. Detectors in high-moisture or washdown environments must have a sufficient Ingress Protection (IP) rating to prevent water ingress and should be mounted on stable surfaces to avoid vibration interference.

During commissioning, the manufacturer or a qualified engineer must verify that the detector is correctly installed, electrically grounded, and safely integrated with the conveyor and reject system. Sensitivity tests must be carried out using certified test pieces that reflect real production conditions. A full commissioning report, including baseline sensitivities and calibration certificates, should be issued and retained by the site's Technical or Quality department.

Daily Operation and Control

Effective operation of a metal detector depends on consistent testing, accurate documentation, and trained personnel. Each production shift must begin with a start-up verification using certified test pieces representing ferrous, non-ferrous, and stainless-steel contaminants. These test pieces should be placed within product packs or carriers that replicate the actual food being processed to ensure the test reflects normal product effect. If different detection programmes are used for different products a check to ensure the correct programme selection should be built into the metal detection standard operating procedure.

Each test confirms two things: that the detector identifies the metal and that the reject system functions correctly. If any test fails, production must stop immediately. All product produced since the last satisfactory test must be isolated and rechecked. The failure must be investigated, corrective actions taken, and the results recorded before production can recommence.

Throughout the shift, detectors should be re-tested at defined intervals, which may range from hourly to every two hours depending on risk, product type, and customer requirements. Additional tests should take place after any line stoppage, maintenance activity, product changeover, or when the reject bin has been emptied.

At the end of each shift, a final verification must be completed to demonstrate that the detector remained effective throughout the production run. All test results, including time, operator name, and outcome, must be documented on a controlled record sheet or logged electronically.

Depending on the design of the metal detector additional checks may be needed, these are known as fail safe checks. For example, if the method of rejection requires an air powered arm, a check to make sure that low or lost air pressure will trigger a stop in production line will need to be conducted. Other fail safes that can cause a stop in production can be full a full reject bin, open reject bin (for a set time) and confirmation of rejection.

If reject bins are used, then they must remain locked during production and only be accessible to authorised personnel. Each rejection should be investigated to confirm whether contamination was genuine or a false reject. Rejected product must be segregated, examined, and disposed of or reprocessed according to documented procedures.

Calibration and Maintenance

Calibration ensures that the metal detector continues to perform at its designed sensitivity. It must be carried out by the equipment manufacturer or an accredited engineer, at least once per year, or more frequently if required by customers or audit standards. The calibration process uses certified test spheres of known diameter that are traceable to UKAS or equivalent international measurement standards.

Calibration certificates must be retained and form part of the site's due-diligence records.
Routine maintenance should include cleaning of the conveyor system, inspection of reject devices, and verification that air or mechanical rejects operate within the specified time frame. Conveyor belts must be intact and free from wear that could trap metal particles. Electrical connections and shielding should also be inspected to prevent interference or signal drift.

Verification Using Test Pieces

Test pieces are precision-engineered spheres encapsulated in inert material such as acrylic or nylon. They are manufactured in three materials: ferrous, non-ferrous, and stainless steel and supplied with a certificate of conformity indicating sphere diameter, tolerance, and serial number.

Common sphere sizes range from 1.5–2.5 mm for ferrous metals, 2.0–3.5 mm for non-ferrous, and 2.0–4.5 mm for stainless steel. The exact sizes are determined during commissioning to ensure the detector can identify contaminants of a realistic and significant hazard level without generating excessive false rejects.

Each site should hold its own set of certified test pieces, which are colour-coded (typically red for ferrous, green for non-ferrous, and blue for stainless steel) and kept in a secure, designated location. Operators should test using each metal type sequentially, passing the test pack through the centre of the aperture to simulate normal product flow. Orientation and speed should remain consistent for each test to ensure reliable results.

Test pieces should be visually inspected regularly for damage, contamination, or wear. Certificates must be current, and any expired or damaged pieces replaced immediately.

Testing Approaches

Modern food-production environments use different approaches to verify ongoing detector performance:

- Continuous testing involves manual verification by an operator at defined time intervals using the certified test pieces. This remains the most widely accepted method in the industry. It provides tangible evidence that both the detection system and the reject mechanism are functioning as intended. The primary advantage of continuous testing is its simplicity and transparency; the operator physically observes the rejection of the test pack and can confirm system performance in real time. However, the main disadvantage is that performance between tests is not verified. If a fault develops immediately after a successful test, the issue may go undetected until the next scheduled check. Frequent testing can also briefly interrupt production and create downtime.
- Memory Testing A metal detector "memory test" is a specific manual procedure to ensure the detector can correctly identify and reject a metal contaminant while not incorrectly rejecting a good product. It involves passing a series of "test packs" containing known metal targets through the detector, separated by "good packs" that are free of metal. If the metal detector fails to reject any of the test packs or rejects a good pack, the test is failed, and the system must be investigated.
- Automatic testing is a more recent development in which the metal detector continuously monitors its own performance electronically. The system performs internal checks at programmed intervals, ensuring that the detection circuitry remains within its specified sensitivity range. The results are stored digitally and can be downloaded or reviewed when required. The advantage of automatic testing lies in its ability to provide near-continuous verification without operator intervention, reducing the chance of undetected drift and supporting electronic traceability. However, it cannot physically test the reject mechanism or confirm that the product effect has remained stable. For that reason, auditors and accreditation bodies require that even automated systems are supported by periodic manual tests using certified test pieces.

Automatic testing provides real-time assurance of electronic function, while scheduled manual tests confirm full mechanical and process integrity, including the reject system.

Recordkeeping and Documentation

Accurate and complete recordkeeping is essential for demonstrating due diligence.
The following documentation should be maintained and made readily available during audits or inspections:

- Daily and shift-based test records showing times, outcomes, and operator signatures.
- Reject registers detailing any rejected product, the cause, and corrective action taken.
- Calibration certificates and maintenance records.

- Training and competency records for all operators.
- Trend analysis reports summarising detection performance, false rejects, and any recurring issues.

The Technical or Quality Manager should review these records regularly at least monthly to identify patterns or equipment issues that require attention. Findings should be discussed at management-review meetings to drive continual improvement.

Review and Continuous Improvement

The effectiveness of the metal-detection system must be reviewed as part of the HACCP verification process. When there are changes in product type, packaging, or equipment, sensitivity settings and testing frequencies should be reassessed.

Root-cause analysis of any contamination incident or detector failure must be documented and corrective actions implemented promptly. Where feasible, the introduction of more advanced technology such as combined metal-detection and X-ray systems should be evaluated to enhance control capability.

Summary

A metal detector is a critical safeguard in any food-manufacturing process. When properly implemented, maintained, and verified, it offers strong protection against one of the most common and serious physical hazards.

The key to its effectiveness lies not in the hardware itself, but in the discipline of operation: trained operators, routine verification, accurate calibration, and comprehensive documentation. By combining manual test-piece verification with continuous electronic monitoring, a site can demonstrate the highest level of assurance that metal contamination is controlled and that every reasonable step has been taken to protect consumer safety and meet legal and customer expectations.

Non-Conformance System & Corrective Actions

A non-conformance system is a critical tool for EPIA members to manage and address deviations from established food safety, quality, or regulatory standards. In the ice production industry, non-conformances could involve issues such as contaminated water, improper storage temperatures, faulty machinery, or inadequate hygiene practices. The system helps to identify, document, and rectify these issues to ensure compliance and maintain product safety.

What is a Non-Conformance?

A non-conformance refers to any deviation from established standards or specifications, whether these are related to product quality, food safety, regulatory compliance, or internal processes. In the ice industry, non-conformances could include:

- Contamination during ice production (physical, chemical).
- Microbiological contamination
- Hygiene issues such as unsanitary equipment or improper handling by staff.
- Failure to meet temperature requirements during storage or transportation.
- Labelling errors (e.g., incorrect batch numbers or expiration dates).

Classifying Non-Conformances: Minor, Major, and Critical

Non-conformances are often rated according to their severity, typically classified into three categories: minor, major, and critical. This classification helps prioritise corrective actions and resource allocation.

Minor Non-Conformances

- Definition: Deviations that do not immediately affect food safety or the quality of the final product but are still a departure from standard practices.
- Examples
  - Incorrect labelling (e.g., missing batch number but no risk to food safety).
  - Minor hygiene lapses, such as improper documentation of cleaning schedules.
- Action: Typically requires simple correction with no long-term impact on the product's safety or quality. Often managed through routine monitoring and improvement. No root cause analysis required.

Major Non-Conformances

- Definition: Non-conformances that have the potential to compromise the safety or quality of the product but have not yet caused harm.

- Examples
  - Deviation from required storage temperatures, but no sign of product deterioration.
  - Water filtration system failure, though no contaminated ice has been produced.
  - Physical contamination of product. (Depending on the level and type of contamination may lead to a critical rating and potential recall).
- Action: Requires immediate corrective action to prevent future product safety or quality issues. Usually involves management intervention and rigorous root cause analysis using root cause analysis tools such as 5Whys, fishbone diagram, FMEA etc.

Critical Non-Conformances

- Definition: Non-conformances that pose an immediate risk to food safety or product quality, potentially leading to consumer harm.
- Examples
  - Microbial contamination detected in the ice due to a breach in water quality standards.
- Action: Immediate recall of affected products from the market may be necessary, along with corrective and preventative actions. Authorities (e.g., Food Standards Agency) must be notified, and root cause analysis is mandatory.

Corrective and Preventative Actions (CAPA)

A CAPA system is integral to managing non-conformances by addressing both immediate issues (corrective actions) and preventing them from reoccurring (preventative actions).

Corrective Actions

- Definition: Actions taken to eliminate the cause of a detected non-conformance, preventing it from happening again.
- Example: If an ice machine has been found to produce ice that does not meet the required freezing temperature, the corrective action might be to repair or recalibrate the machine immediately.
- Steps:
  1. Identify and document the non-conformance.
  2. Investigate the root cause (e.g., faulty equipment, poor water quality).
  3. Implement an immediate fix (e.g., repairing machinery, cleaning contaminated areas).
  4. Verify that the issue has been resolved (e.g., testing ice for microbial contamination).

Preventative Actions

- Definition: Proactive steps taken to prevent the reoccurrence of similar non-conformances by addressing systemic issues.
- Example: After identifying that poor water filtration caused contamination, the preventative action might be to install a backup filtration system and implement more frequent testing of water quality.
- Steps:
  1. Analyse the root causes that led to the non-conformance.
  2. Identify long-term improvements to processes, procedures, or equipment.

3. Implement training programmes or system upgrades (e.g., staff training on hygiene or upgrading equipment).
4. Monitor and review the effectiveness of preventative measures regularly.

The key difference between corrective action and preventative actions include:

- Reactive vs. Proactive: Corrective action is implemented after a nonconformity is reported. Preventive action is predicting a likely occurrence or recurrence of a problem and mitigating the risk.
- Root Cause vs. Risk-Based Approach: A root cause analysis is the key tool to identify the real cause of an issue. Preventive action requires risk assessment and implementing controls.

Advantages of a Non-Conformance System

Implementing a structured non-conformance system in ice production offers several key advantages:

Ensures Compliance with Food Safety Standards

- A non-conformance system helps maintain compliance with regulations such as Regulation (EC) No 852/2004 on hygiene and HACCP principles by identifying and correcting deviations before they result in unsafe products.

Reduces Risk of Product Recalls

- By identifying non-conformances early (e.g., issues with storage temperatures or water quality), businesses can address them before contaminated or unsafe ice reaches consumers, reducing the risk of costly recalls.

Enhances Product Quality

- Continuous monitoring and correction of issues ensure that the ice produced is of consistently high quality, free from contaminants, and stored or transported under the right conditions.

Improves Operational Efficiency

- A well-managed non-conformance system helps identify weaknesses in production processes (e.g., equipment failure, staff training issues), leading to long-term improvements in operational efficiency and cost savings.

Protects Brand Reputation

- Quickly resolving issues before they become public, or cause harm protects the brand's reputation and builds consumer trust.

Facilitates Continuous Improvement

- Documenting and analysing non-conformances lead to continuous improvement in production processes, helping businesses optimise their operations over time and prevent repeat incidents.

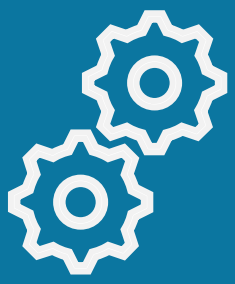
Steps for Implementing a Non-Conformance System

- Document the Process: Establish clear procedures for identifying, reporting, and documenting non-conformances (e.g., temperature checks, water quality monitoring).
- Employee Training: Train staff on how to recognise and report non-conformances and explain the importance of corrective and preventative actions.

- Root Cause Analysis: For each non-conformance, perform root cause analysis to identify underlying issues.
- Corrective Action Plans: Develop and implement corrective action plans for any detected non-conformances, addressing immediate safety concerns.
- Preventative Action Plans: Implement long-term preventative measures to prevent recurrence (e.g., improved water testing protocols, equipment maintenance).
- Review and Audit: Periodically review non-conformance reports and CAPA effectiveness to ensure continuous improvement and identify any repeating issues.

Summary

Through careful management of non-conformances EPIA members can ensure that their business remains compliant with regulations and legislation while minimising risk. It all starts with clear and detailed documentation of the issue, followed by an assessment of consequences to establish risk. Investigating non-conformances as a team in a timely manner, conducting root cause analysis (where appropriate) for determining underlying causes and contributing factors, setting appropriate timescales for corrective and preventative action initiatives, allocating responsibility for remedial measures as well as verifying improvement initiatives are crucial steps to closing out non-conformance accurately. All these steps together will allow EPIA members to monitor the effectiveness of their remediation actions in order to protect their business from further issues.



Section 3: Equipment

Maintenance

Routine maintenance is essential for an ice manufacturing plant to ensure equipment efficiency, minimise downtime, and maintain high-quality production. This section covers key aspects of preventative maintenance, spare parts inventory, machinery checks, filtration, and UV light checks.

Preventative Maintenance

Preventative maintenance ensures that equipment remains in peak condition, preventing breakdowns and prolonging the life of machinery. A well-structured schedule should be followed, typically based on manufacturer recommendations and operating conditions. Below are some suggested checks and frequencies to consider as part of a preventative maintenance schedule. These checks can be done internally or by external contractors where required.

Daily Tasks

- Visual Inspection: Conduct a thorough inspection of all machines, looking for leaks, unusual noises, and signs of wear.
- Ice Quality Check: Monitor ice cubes for clarity, size, and hardness, which can indicate problems with the filtration or freezing system.

Weekly Tasks

- Lubrication: Check and lubricate moving parts (motors, conveyors, bearings) according to the manufacturer's instructions.
- Condenser Coil Cleaning: Remove any dirt or dust from air-cooled condensers to ensure they function efficiently. Clean condenser fans as needed.
- Water Supply Line Inspection: Ensure there are no leaks or clogs in the water lines or piping. Replace any hoses that show signs of deterioration.

Monthly Tasks

- Check Refrigerant Levels: Ensure refrigerant is at optimal levels to avoid issues with the cooling system. If the level is low, inspect for potential leaks.
- Compressor Maintenance: Inspect the compressor and check for any oil or gas leaks.
- Calibration: Check and calibrate temperature and pressure sensors for accurate readings.

Annual Tasks

- Electrical Inspection: Have a licensed electrician check the electrical connections, wiring, and control systems for wear or malfunction.
- Comprehensive Inspection: Conduct a full inspection of the entire system, from water filtration to the ice delivery system. Consider scheduling professional maintenance for key equipment like the evaporators, compressors, and condenser units.

Spare Parts Inventory Management

Having a well-stocked inventory of critical spare parts is essential to minimise downtime in case of equipment failure. Critical spare parts to stock could include:

- Compressors: For both refrigeration and freezing systems.
- Thermostats and Sensors: Temperature and pressure sensors can malfunction and need quick replacement.
- Gaskets and Seals: These tend to wear out and cause leaks.
- Belts and Bearings: Vital for the operation of motors, conveyors, and other moving parts.
- UV Bulbs and Filtration Cartridges: These are part of the water treatment system and need regular replacement in line with manufacturers recommendations.
- Valves and Fittings: Critical for ensuring water and refrigerant lines function properly.

Controlling and tracking spares inventory is important to track usage rates of spare parts, ensuring that there is stock available. Tracking inventory can be done through a dedicated maintenance software package or on a spreadsheet. Establishing good working relationships with reliable suppliers to ensure rapid delivery of replacement parts can also support keeping spares inventory levels optimally stocked.

Machinery Checks

Regular machinery checks ensure that all components are functioning correctly. Suggested tasks and frequencies are detailed below:

Daily Checks

- Machine Temperature Readings: Ensure the freezing systems are operating within the required temperature range.
- Conveyor Belt Functionality: Verify that conveyor belts are moving smoothly without slippage or abnormal noise.
- Packing machines
  - Power and Connectivity: Ensure the machine is properly connected to the power supply.
  - Hopper and Feed System: Check the hopper for any blockages or buildup of ice that could obstruct the flow into the packing area.
  - Bag Formation: Confirm that the bag formation system is working correctly, and bags are formed without tears or deformities.
  - Sealing Mechanism: Inspect the heat or cold sealing elements for proper alignment and ensure bags are sealed tightly to prevent leaks. Adjust temperatures as required.
  - Lubrication: Check all moving parts such as motors, belts, and conveyors for proper lubrication.
  - Sensors and Actuators: Test all sensors (such as load cells, temperature sensors, and proximity sensors) for proper functionality and recalibrate them if needed.
  - Guards and Shields: Ensure that all safety guards, panels, and shields are in place and not damaged. These protect the operator from moving parts.

- Ice Machines & Storage Bin Checks
  - Is the machine running or the ice bin full? – If not, there could be faulty component making the machine inoperative.
  - Are the bin doors closed? – Shutting the doors helps keep warm air from getting into the bin.
  - Is the thermostat bulb/sensor in the bracket? – The thermostat bulb/sensor helps monitor the ice level in the bin. Make sure it's still in the bracket to assure accurate monitoring.
  - Is ice discharging during harvest? – If there is no ice being discharged during the harvesting cycle, the machine could be dirty or have clogs.
  - Is the machine clean? – If you notice buildups of dust or debris around significant areas of the machine, such as the air-cooled condenser and ice-making section, it will need to be cleaned as soon as possible.
  - Are there noises? – While humming sounds are standard with any machine, clunky, screeching and squealing sounds could be the result of a larger issue.
- Emergency Stops: Test the functionality of emergency stop buttons and other safety mechanisms to ensure the machinery on site can be shut down immediately if necessary.

Weekly Checks

- Motor Functionality: Inspect motors for overheating or abnormal vibrations.
- Evaporators: Inspect for ice buildup and defrost regularly to maintain efficiency.
- Water Pumps: Ensure water pumps are delivering consistent pressure.
- Belts and Chains: Inspect conveyor belts, chains, or other mechanisms for wear and tear. Replace any damaged or frayed belts immediately to avoid machine downtime.

Monthly Checks

- Fan Blades: Ensure that fan blades in the cooling and refrigeration systems are balanced and free from obstructions.
- Heat Exchanger: Inspect heat exchangers for scaling or buildup that can reduce efficiency.
- Control Panel: Test the control system for responsiveness and accuracy in relaying data.
- Electrical Safety: Check the wiring and connections for any exposed or damaged wires. Ensure all electrical systems are properly grounded and there are no signs of overheating.
- Software Updates: Ensure machinery's software or control systems are up to date with the latest firmware from the manufacturer.
- Calibration: Periodically calibrate the weighing systems, sealing systems, and temperature sensors around the facility to maintain accuracy.

Filtration System Maintenance

Clean water is essential for high-quality ice production. Regular maintenance of the filtration system ensures the removal of impurities, extending the life of the equipment and improving the quality of the ice. Filtration types include:

- Sediment Filters: Capture dirt, rust, and particles.

- Carbon Filters: Remove chlorine and organic contaminants.
- Reverse Osmosis Systems: Provide advanced filtration by removing minerals and dissolved solids.

A suggested maintenance schedule for filers is below. Some filter types are easy to replace, others such as carbon filters may need to be outsourced to specialist external contractors. Filter replacement should be as per manufacturers suggestions.

- Daily: Check the filtration system pressure and water flow. Record any deviations in water quality or flow rate.
- Monthly: Replace sediment and carbon filters if pressure drops or the recommended replacement interval is reached.
- Quarterly: Inspect reverse osmosis membranes and replace if there is a significant drop in water purity.

UV Light Checks

UV light is often used in water treatment to kill bacteria and viruses. Maintaining UV light systems is critical to ensuring proper disinfection. UV Bulb Inspection checks could be done as per the below suggested schedule:

- Daily: Verify the UV light indicator is on, and the system is functioning.
- Monthly: Clean the UV light chamber, ensuring no debris or scaling interferes with UV penetration.
- Annually: Replace UV bulbs according to the manufacturer's recommendations, as the effectiveness diminishes over time, even if the bulb is still lit.

UV Intensity should be monitored. Some systems have sensors that measure UV intensity. Ensure these are functioning and calibrated to detect drops in UV efficiency.

Record-Keeping and Reporting

Regular documentation of maintenance tasks is essential for identifying trends, anticipating breakdowns, and ensuring compliance with health and safety standards. Maintain records for daily checks, filter replacements, machinery inspections, and part replacements. Ensure that records are kept up-to-date and accessible. These records will help you to determine your preventative maintenance programme and required frequencies.

Tracking Tools Used During Maintenance

The use of tools in production areas should be tracked using a paper or digital log to avoid any potential physical contamination to product. It is advisable for the maintenance team to label, tag or ID their tools in some way either with sticky labels or chemical etching.

If contractors are visiting site to perform repairs or maintenance, then they should complete a Permit to Work form and sign their tools in and out of production areas using this document.

Maintenance Software

A computerised maintenance management system (CMMS) can be utilised to track maintenance schedules, manage inventory, and document repair tasks. This software can generate reports that highlight frequent issues or upcoming maintenance needs. This may not be suitable for all EPIA members but can be a useful tool for consolidating maintenance activities.

Summary

Routine maintenance in an ice manufacturing plant is crucial for consistent product quality, operational efficiency, and equipment longevity. By following the preventative maintenance schedule, monitoring machinery and filtration systems, and maintaining an inventory of spare parts, plant managers can ensure smooth operations and minimise costly downtime. While inspection and maintenance frequency will differ between EPIA members a system of inspection should be in place to look after equipment. EPIA members should adapt and adjust to the facility and their own needs.

Purchasing of Equipment

EPIA members will often have to purchase new equipment due to expansion or replacement. It is important that all aspects of machinery purchase are carefully considered so that the equipment is fit for purpose and compliant with relevant legislation.

Purchasing of equipment

EPIA members need to ensure that all food processing equipment is suitable for the intended purposes and is used to minimise the risk of contamination to product and is compliant with New Machinery Directive 2006/42/EC.

When purchasing new equipment, it is imperative that EPIA members ensure that what they are purchasing complies with safety, health and environmental requirements, and has relevant CE or UKCA markings and has documentation to prove this.

New equipment includes:

- equipment bought directly new from the manufacturer.
- second hand equipment bought by the site.
- equipment that has been refurbished.

Equipment should be purchased from reputable suppliers and all new equipment purchased should be supplied with a certificate of conformity or specification demonstrating that its suitable for food contact. The purchase specification includes:

- Reference to legislation.
- The intended use of the piece of equipment.
- Materials are suitable for food contact and will not deteriorate, cause food contamination or taint.
- Fit for purpose and constructed so that they can be easily cleaned and dismantled where appropriate.
- Will it withstand regular contact with detergents and sanitiser.
- Constructed so that all parts are secure.
- Specific to each risk area.
- All fittings and equipment used for ice production and its storage must minimise the risk of product and packaging coming into direct contact with floors and walls.

The supplier should provide evidence that equipment meets these site requirements prior to supply to EPIA members.

Food Contact Equipment

Equipment that is in direct contact with ice should be suitable for food contact and meet legal requirements. To ensure that the equipment is not a source of contamination, it should be checked to comply with Food Contact Materials – Regulations (EC) 1935/2004.

Food contact surfaces should be smooth and impervious; weld joints should be flat and easily cleaned to prevent cross contamination. The risk of foreign body contamination from bolts, screws, screw conveyors, rakes and snow wheels etc. should be risk assessed as part of the HACCP plan.

Equipment Risk Assessment

EPIA members should consider having an equipment risk assessment in place. This will sit outside of the HACCP risk assessment and be more detailed and specific to each equipment type. The main hazards considered in the risk assessment should be microbiological, physical, chemical and allergenic with the following taken into consideration:

- The nature of the food contact surface and it's known characteristics
- The length of contact time with the ice.
- The nature of the ice and its potential for contamination e.g. cross contamination of pathogens or foreign bodies.

The risk assessment should be based on the likelihood of the hazard occurring, considering the existing control measures that are in place, along with the severity of that hazard. The risk assessment should cover a variety of equipment. Any equipment not covered by the risk assessment that needs to be purchased should be performed separately.

Managing Equipment Purchases

All equipment should be properly specified before purchase, tested and commissioned prior to use to ensure suitability and maintain product safety and legality.

The design and placement of equipment should ensure that it can be effectively cleaned and maintained.

Delivery, Installation & commissioning of equipment

Delivery of equipment to site should not take place until satisfactory Factory Acceptance Testing (FAT) has been completed by the supplier of the equipment to ensure that:

- the operation of the equipment is validated
- the purchase order specifications and all other requirements have been met

New equipment should be inspected at the point of delivery to ensure no damage in transit and that all equipment and parts ordered have arrived.

All risks should be documented prior to installation to ensure that food safety and integrity is maintained during the installation of new equipment to site.

Site Acceptance Test (SAT)

After installation a Site Acceptance Test (SAT) will be necessary to verify that the equipment meets member requirements. The SAT is important because it will help to ensure that the equipment/system works as expected and that members are satisfied with the results. The SAT will also help to identify any issues that need to be addressed before the equipment/system goes into production.

The FAT protocol is a document that outlines the procedures that will be followed during the SAT. This document will be provided by the supplier and should be reviewed and signed by all parties involved in the SAT. It should also be followed during the entire SAT process.

The SAT should include at a minimum, but not limited to:

- Visual Check: A visual check involves examining the physical equipment to ensure that it meets the requirements specified in the project documents. This may include checking for trip hazards, correct signage, and verifying that the equipment is free from any damage or deformation, while also checking for missing parts, components, or documentation.
- Functionality Check: The equipment should undergo a series of tests to evaluate its performance. Mechanics, software, electrics, interaction with other systems, and usability (to name a few examples) should all be tested as well as verification of any specific requirements made by the EPIA member at point of order.
- Environmental Conditions: Certain environmental conditions for the equipment, like operation during certain temperature, should be tested as the conditions are not always possible at the supplier's site. Some utilities such as compressed air also cannot be tested at supplier site so during an SAT, it is necessary to verify the performance under actual environmental conditions.
- Safety Check: Safety checks such as machine guarding, trip hazards, fire hazards and verifying the electrical wiring and voltage overload.

Throughout the entire SAT, it is advisable that the supplier's representative is present to analyse the testing procedure.

Validation Activities

After the SAT has been completed and signed off the equipment is ready for production purposes. It is essential to verify that the machine's production follows the specification and requirements previously set forth by members at the point of order from the supplier.

The validation tests are written proof that the tests performed are according to industry regulations and the machine's equipment meets all compliance requirements. The Technical and Maintenance teams should perform these activities. Other departments, such as production, will provide support when necessary.

Any cases of deviation are reported and corresponding corrective actions, including installation qualification (IQ), operational qualification (OQ), and performance qualification (PQ) are required.

- IQ ensures that the equipment is installed according to the manufacturer's recommendation and specification. This includes verification that all utilities, power sources, and safety systems have been correctly placed.
- OQ ensures that the equipment's operation is according to the recommendation and specification per the supplier's requirements. In this test, the working of the machine's individual components are verified.
- PQ is performed on the process and product. It is used to verify the process or product as a result of the installed machine and its operation conforms to the buyer's standards and requirements.

Documentation Update & Training

EPIA members where necessary, should update elements of the QMS that are affected by the new equipment, for example:

- Write new procedure for the equipment
- update of any other site SOPs
- training
- cleaning
- environmental monitoring
- maintenance schedules
- internal audits
- HACCP plan

Equipment relocation

In the event that static equipment in production areas, is to be moved a full risk assessment should take place to ensure that food safety is managed, and the integrity of the equipment is maintained. Additional validation activities and documentation and training requirements will need to be reviewed.

Stored equipment

Redundant equipment that is not used or is taken out of service must be cleaned and stored on a pallet (wrapped) and stored away from production areas so that does not pose a risk to the product. Food contact equipment that has been stored but is not in daily use should be cleaned and disinfected prior to use.

Summary

Regulation (EC) No 1935/2004 and the New Machinery Directive 2006/42/EC are vital in ensuring the safety of both ice products and the machinery used in their production. Together, they provide a comprehensive framework that helps ice manufacturers ensure the safety, hygiene, and traceability of their products, while also protecting workers operating machinery in these environments. Compliance

with both regulations is essential for EPIA members to maintain high standards of production, minimise risks, and meet both consumer expectations and legal requirements.

Miscellaneous

Food Safety Culture

Product Safety Culture or Food Safety Culture (when applied to food products) refers to the shared values, beliefs, norms, and behaviours in an organisation that influence how food safety is perceived, prioritised, enacted, and sustained day-to-day.

What is Food Safety Culture?

Food safety culture is the collective set of values, beliefs, and behaviours within an organisation that determine how food safety is managed, prioritised, and practiced every day. It goes beyond formal procedures or compliance it's about how people actually think and act when it comes to protecting consumers. A strong food safety culture means that everyone, from senior leaders to front-line staff, understands the importance of safe food and feels personally responsible for maintaining it. It's reflected in daily decisions, communication, and the willingness to do the right thing, even when no one is watching. Food Safety Culture should form part of the broader organisational culture, to be matured over time through governance, continuous improvement and integration with EPIA members Food Safety Management System (FSMS).

Key features of a mature food safety culture often include:

Food Safety Culture Elements	
Element	Description and significance
Vision, mission, values	Clarity and alignment about what food safety means in the business, embedded in purpose and strategy (not just in a policy document).
People, competence, awareness	Enabling staff (at all levels) to have the knowledge, skills, hazard awareness, and ownership to act on food safety imperatives.
Consistency	Ensuring consistent standards, behaviours, decision-making, practices across shifts, sites, functions. Reducing variability in how food safety is handled.
Adaptability and resilience	Ability to respond to change, disruptions, new hazards, crises, lessons learned, and to adapt practices accordingly.
Hazard and risk awareness	Constant vigilance of hazards, critical thinking about risks, recognition that risks evolve (e.g. new pathogens, allergen cross-contact, supply chain threats).

Why Food Safety Culture Matters (Risks, Benefits, Drivers)

- Reducing incidents, recalls, and consumer harm: Even with good FSMS procedures, breakdowns happen because of human error, shortcuts, complacency, or miscommunication. A strong culture helps to "catch" these before they escalate into serious events.
- Regulatory expectations and auditing: Accreditation schemes (especially GFSI-benchmarked ones) increasingly expect evidence of culture, not just procedures. The absence of attention to culture can be viewed as a weakness.
- Reputation and trust: A food safety failure can damage brand, consumer confidence, and market access. Conversely, a proactive culture can become a differentiator. Food safety underpins trust in food businesses, and boards have a role to play in ensuring that trust is maintained.
- Resilience and adaptability: A culture that supports learning, feedback, open communication and responsiveness is better able to handle crises (e.g. contamination events, supply chain disruption) without collapsing.
- Employee engagement and ownership: When employees feel that food safety is genuinely valued, they are more likely to speak up, share near misses, and take corrective actions proactively.
- Integration and sustainability: A mature culture embeds food safety into every decision (from procurement, scheduling, training, maintenance), not as a "bolt-on" or afterthought.

Food safety culture is about behaviours, consistency, an attitude of "how things are done here," formal controls alone such as standard operating procedures (SOPs), audits and checklists are insufficient without the underlying commitment and behaviour.

Senior Management Commitment

Leadership commitment is often the linchpin in a successful food safety culture. Without visible, consistent support from senior levels, culture efforts tend to drift or stall. While much culture work happens in operations, directors have an essential role in oversight, accountability, and ensuring long-term commitment. Key dimensions of leadership commitment include:

- "Walking the talk" / leading by example: Senior leaders must visibly engage in food safety decisions, walk the shop floor, attend safety meetings, respond to issues, show they take food safety seriously. Leaders should demonstrate consistent desired behaviour to build credibility.
- Allocation of adequate resources (budget, staffing, training, tools): Culture efforts require investment; measurement, training, continuous improvement, internal audits, reporting systems, feedback mechanisms. Leadership must commit these resources meaningfully.
- Setting vision, policy and alignment: Senior management should define or endorse the vision, mission and company values around food safety, and ensure that these are aligned with the business strategy. Embedding food safety into the organisation's broader vision and values will help food safety culture initiatives to succeed.
- Governance, accountability and oversight: Leaders should define:

  - clear responsibilities, accountability and escalation pathways for food safety performance
  - set targets and metrics and regularly review those metrics
  - ensure governance mechanisms (e.g. board-level oversight of food safety) is in place.
- Communication and feedback loops: Leadership must ensure two-way communication, listen to concerns, encourage reporting of near misses, act on feedback, and communicate successes and lessons. This builds trust amongst the wider team.
- Sustaining and reinforcing: They must keep momentum over time, reinforcing behaviours, celebrating improvements, integrating food safety into performance reviews, ensuring culture is resilient to changes (e.g. organisational restructuring, leadership turnover).

Without strong leadership commitment, culture programmes risk being seen as optional, unimportant, or peripheral. Senior management commitment is not a "nice to have" but a necessary enabler, it provides the authority, resources, visibility, accountability, and persistence that cultural change requires.

Resource Allocation

Even the best leadership intent or policy statements will not translate into behaviour unless backed by adequate and well-directed resources. A strong culture is built through repeated actions, consistent reinforcement, training, monitoring, and improvement all of which depend on resources. Resourcing decisions should reflect the organisation's stated risk appetite and commitment to food safety under-resourcing is a common root cause of system failure.

Resources aren't just financial; they include people, time, training, systems, and attention. A mature food safety culture ensures each of these categories is deliberately planned and aligned.

Food Safety Culture Resourcing

Resource Type	Examples	Why it is important
Financial resources	Budget for hygiene & maintenance, laboratory testing, training programs, internal audits, continuous improvement projects, external benchmarking, technology (e.g., digital traceability).	Underinvestment leads to corner-cutting, deferred maintenance, and lower staff morale; signals that food safety isn't truly a priority.
Staffing	Adequate number of trained quality, production, and maintenance staff; clear responsibilities; succession planning; dedicated culture champions.	Overstretched or under-trained teams can't consistently deliver safe food; high turnover disrupts culture.
Time and scheduling	Allocated time for training, communication meetings, incident reviews, audits, and improvement work.	If production targets always override safety discussions, employees learn that speed matters more than safety.

Knowledge and competence	Structured training, onboarding, refresher modules, mentoring, competency matrices, leadership development in food safety culture.	GFSI emphasizes that competence and awareness underpin all culture dimensions.
Technology and tools	Access to monitoring systems, sensors, incident reporting software, learning platforms, dashboards.	Enables proactive management, faster learning, and engagement.
Physical infrastructure	Facility design, maintenance, lighting, layout, hygiene zones, waste management, etc.	Poor infrastructure sends the message that hygiene and food safety are low priorities.
Recognition and incentives	Reward systems, recognition programs for food safety leadership, culture metrics in performance reviews.	Reinforces and sustains desired behaviours long term.

Steps to Develop and Sustain a Food Safety Culture (Leveraging PAS 320 & GFSI principles)

Below is a simple roadmap for EPIA members for implementing or maturing food safety culture in their business (inspired by PAS 320, GFSI, and practitioner literature):

- Understand context and assess current state
  - Analyse internal and external issues (culture, regulatory environment, workforce, supply chain).
  - Use surveys, interviews, observations, focus groups, and audits to assess current maturity levels across the culture dimensions.
  - Identify gaps, strengths, risk areas, change readiness.
- Establish governance and leadership structures
  - Appoint a guiding coalition (champions) across functions/levels. PAS 320 recommends this to drive culture change.
  - Define responsibilities, authorities, escalation, accountability.
  - Ensure board/director oversight and regular reviews.
- Define the desired culture (vision, values, principles)
  - Articulate what behaviours, mindsets, and values are expected (and why).
  - Align food safety vision with business strategy, values and mission.
  - Communicate this broadly, repeatedly, in accessible ways (stories, examples, from leadership).
- Plan change interventions
  - Prioritise interventions (training, awareness campaigns, feedback loops, recognition, process integration, communication) targeting gaps.
  - Integrate culture change into existing FSMS / management system rather than as separate initiative.
  - Prepare for resistance, define change management tactics.
- Deploy and embed changes (“Do”)
  - Implement pilots, rollouts, training, nudges, incentives, visual cues, audits.

        - Encourage reporting of near misses and lead indicator metrics.
        - Leadership must visibly support and monitor.
    - Monitor, measure and review ("Check")
        - Use key performance indicators (KPIs) and metrics related to both outcome (incidents, nonconformities, recalls) and leading indicators (reporting rates, training completion, employee perception).
        - Undertake periodic maturity assessments of the culture dimensions.
        - Conduct management reviews, feedback loops, audits.
    - Sustain and continuously improve ("Act")
        - Reinforce successes; recognise and reward desired behaviour.
        - Update the approach based on learnings, emerging risks, organisational changes.
        - Keep leadership engagement, refresh messages, maintain momentum across changes (e.g. turnover, growth).

This "Plan–Do–Check–Act" cycle is central to PAS 320's model for maturing and sustaining food safety culture. It can be a useful tool to develop a food safety culture programme on site as it works in logical steps. Additionally, the GFSI position paper emphasises combining top-down (leadership) and bottom-up (employee engagement, accountability) efforts. In practice incremental steps, pilot programmes, continuous feedback, adjusting interventions, and "culture champions" embedded in each area are indicative of a good food safety culture.

Challenges, Pitfalls, and Enablers to Food Safety Culture

Challenges and pitfalls

- "Culture vs compliance" tension: organisations may focus on ticking boxes (procedures, audits) rather than addressing underlying beliefs and behaviours.
- Leadership turnover or fading attention: if senior management interest wanes, culture efforts may regress.
- Insufficient resource or underinvestment: e.g. in training, measurement systems, tools.
- Lack of alignment: different functions (production, quality, maintenance) may have conflicting sub-cultures.
- Fear-based or punitive culture: if reporting is punished, people hide issues.
- Slow time horizon: culture change can take years; impatience or short project timelines can derail progress.
- Inconsistent messaging or mixed signals: e.g. when production targets override food safety, sending a message that safety is secondary.

Enablers / success factors

- Senior management commitment: visible, consistent leadership support
- Empowering employees and creating psychological safety: enabling people to speak up, report near misses, challenge unsafe practices
- Clear metrics and feedback systems: measuring culture dimensions and leading indicators
- Recognition and reinforcement: praising desired behaviours, celebrating improvements

- Cross-functional engagement and inclusion: involving operations, procurement, maintenance, supply chain etc.
- Sustainment mechanisms: embedding in performance reviews, onboarding, policies
- Learning orientation: treating failures as opportunities to learn, not punish

Summary

Developing a positive food safety culture requires visible leadership commitment, open communication, adequate resources, and continuous learning. It involves embedding food safety into the organisation's core values, rewarding safe behaviour, and ensuring that safety and quality are never compromised for speed or cost. Ultimately, a mature food safety culture creates consistency, trust, and resilience ensuring that food safety is not just a rule to follow, but a shared mindset and way of working across the entire business. In practice, achieving a mature food safety culture is a journey (often over years) rather than a one-time project.

Employee Training

Staff training programmes must focus on several critical areas, including food safety, HACCP (Hazard Analysis Critical Control Point), health and safety, operational efficiency, and quality management. Given that ice is considered a food product under EU and UK law, compliance with food safety standards and regulations is paramount.

Induction Training

Induction training is a critical first step in onboarding new employees. It helps them understand the company's operations, health and safety requirements, food safety protocols, and their specific roles within the production environment. A well-structured induction programme ensures that new staff members are competent, aware of the risks involved, and aligned with regulatory standards from their first day on the job.

Key Components of Induction Training

Introduction to the Company

- Company Overview: New employees should be introduced to the company's history, mission, and values, as well as the importance of producing safe, high-quality ice products.
- Roles and Responsibilities: A clear explanation of the employee's role in the production process, reporting structure, and communication channels within the team.
- Production Process Overview: An explanation of the step-by-step process of ice production, from water sourcing to packaging, so new staff understand where their role fits into the larger system.

Health and Safety Protocols

- Workplace Safety: Training on general workplace safety in compliance with relevant health and safety legislation. New employees must be aware of potential hazards in the plant (e.g., working with machinery, lifting heavy items, handling cleaning chemicals, as well as what equipment they are not allowed to use without additional training).
- Personal Protective Equipment (PPE): Instruction on the correct use of PPE, such as gloves, protective clothing, masks, and safety shoes. New employees should be shown where PPE is stored and how to use it effectively to minimise contamination and injury risks.
- Emergency Procedures: Orientation on emergency procedures, including fire evacuation routes, first aid stations, and incident reporting. New employees should be introduced to key safety personnel, such as first-aid officers and fire wardens.

Ongoing Support and Mentorship

- Assigning a buddy: Each new employee should be assigned a buddy or supervisor who can provide guidance during the first few weeks of their employment. This ensures that they have a point of contact for any questions or issues they may encounter.
- Performance Monitoring: Buddies or supervisors should regularly check on the progress of new staff to ensure they are following the correct procedures and adhering to safety and quality standards.

Key Training Areas for Ice Manufacturing Staff

- Food Safety Standards
  - Food Hygiene Regulations: All employees should be trained in food hygiene regulations that apply to ice production, ensuring that the ice produced is free from contamination.
  - Personal Hygiene: Staff must follow strict personal hygiene rules, including regular hand washing, the use of protective clothing, and avoiding contact with ice during illness.
  - Cleaning and Sanitisation: Training on cleaning and disinfecting surfaces, equipment, and containers used in ice production. This helps prevent contamination from bacteria, moulds, and other pathogens.
- HACCP (Hazard Analysis and Critical Control Points)
  - Understanding HACCP: Training should cover the seven HACCP principles outlined in Section 2.
  - Hazard Identification and Risk Management: Training must ensure that staff can identify potential hazards such as water contamination, equipment failure, or packaging issues. They should understand control measures, such as ensuring the water supply is clean and using proper filtration systems.
  - Implementation of CCPs: Employees should be trained to monitor critical control points, such as metal detection.
  - Documentation and Record-Keeping: Staff must learn to maintain accurate records of ice production, critical control points, and any corrective actions taken.
- Water Quality Management
  - Water Supply Monitoring: Staff should be trained to regularly check the quality of water used in ice production, ensuring that it meets potable water standards.
  - Filtration and Treatment Systems: Training on the operation and maintenance of water filtration and treatment systems to ensure ice is produced with safe water.
- Microbiological Testing
  - Staff should be trained to perform routine microbiological testing of ice to detect the presence of harmful bacteria, such as E. coli or Listeria. This includes sample collection, handling, and interpreting test results.
- Pest Control
  - Pest Monitoring and Prevention: Training should focus on preventing pests in the manufacturing environment by maintaining cleanliness, properly sealing production areas, and eliminating potential breeding grounds.

- Operational Training
  - Machine Operation and Maintenance: Employees must be trained to operate ice manufacturing equipment safely and efficiently. They should also receive training on routine maintenance and troubleshooting to prevent equipment failures that could compromise food safety.
  - Packaging and Storage: Staff should be trained in proper packaging techniques, including the use of food-safe materials and ensuring the correct labelling. Ice must be stored at the appropriate temperatures (e.g., below -18°C) to prevent melting and contamination.
- Allergen Awareness and Cross-Contamination Prevention
  - Allergen Training: While allergens are not typically an issue in standard ice production, induction training should still cover basic allergen awareness, especially if the plant produces flavoured or ingredient-enhanced ice products. Staff should know how to prevent cross-contamination and ensure proper labelling of allergenic ingredients if applicable.
- Digital Systems
  - If the plant uses digital systems for record-keeping, staff should be given basic training on how to use these systems, including logging in, inputting data, and troubleshooting common issues.

Ongoing and Refresher Training

- Regular refresher training should be in place to keep staff updated on any changes in legislation or best practices. This also helps to reinforce key safety procedures and address any gaps identified in audits or inspections.

Documenting Training

Documenting and monitoring staff training is crucial for ensuring that employees at an ice manufacturing plant are properly trained and remain compliant with food safety, HACCP, and other regulatory requirements. Effective documentation also provides evidence of training during audits and inspections. Below are best practices for documenting and monitoring training:

Training Matrix

Develop a training matrix that outlines all required training for each role within the plant. This matrix should include:

- The types of training needed (e.g., food safety, HACCP, machinery operation, health and safety).
- The frequency of training (e.g., induction, annual refresher courses).
- Specific modules or topics covered in each training session.
- Employee-Specific Training Needs: Customise the matrix for each employee based on their role and responsibilities, ensuring that they receive the necessary training for food safety and production.

The training matrix can be a simple spreadsheet or managed via training management software, allowing easy updates and quick reference during audits.

Training Records

Use a standardised training record form to document each training session. The record should include:

- Employee Name: The name of the staff member who attended the training.
- Trainer Name: The name of the person who conducted the training (internal or external).
- Date of Training: The date the session took place.
- Training Content: A brief description of the topics covered (e.g., "HACCP principles," "Ice production machinery operation").
- Duration: The length of the training session.
- Training Method: Specify whether the training was on-site, online, classroom-based, or hands-on practical training.
- Results/Assessment: Include any assessment results, such as quiz scores or pass/fail results for practical demonstrations.
- Signatures: Both the trainer and the employee should sign the record to confirm attendance and completion.

This document serves as a permanent record and can be used during internal reviews, audits, and inspections.

Regular Assessments and Testing

- Assessments Post-Training: After each training session, employees should complete an assessment (quiz, test, or practical demonstration) to ensure they have understood and absorbed the information. The results should be recorded in their individual training records.
- Practical Evaluations: For operational training, like machine operation or hygiene practices, monitor employees while they perform the task to ensure competence. This can be documented in a skills checklist, which lists specific tasks that the employee must demonstrate proficiency in.
- Frequency of Testing: Regular refresher assessments can be scheduled annually depending on the training type (e.g., food safety refreshers or HACCP updates).

Certificates and Accreditation

- Certificate of Completion: Any certificates gained for external training curses should be filed in the staff members training folder and the training added to the training matrix.
- Accredited Training: Where possible, ensure that training courses (e.g., HACCP or food hygiene) are accredited by recognised bodies.
- Tracking Expiry Dates: For certifications and accreditations with expiry dates ensure that these are tracked via the training matrix, and refresher courses are scheduled before expiration.

Training Logs and Employee Files

- Centralised Employee Files: Store training records in each employee's training folder (either electronically or as a hard copy). This ensures all training records are easily accessible for both internal management and external auditors.
- Audit Trail: Regularly check the training matrix to create a clear audit trail showing that all employees have received the required training and that their knowledge is up to date.

Refresher Training and Continuous Monitoring

- Refresher Courses: Schedule refresher courses based on the frequency required by regulations or company policy. For example, food hygiene or HACCP refresher training might be done annually to keep employees informed of the latest standards and practices.
- Monitoring Performance: Supervisors should regularly monitor employees' performance to ensure they are applying the training effectively. This can be done through periodic observations, spot checks, or during quality audits.
- Update Training Programmes: Use feedback from employees and performance monitoring to update and improve training programmes. If certain procedures change or new regulations come into force, ensure that the training programme or SOPs reflects these updates.

Training Review and Internal Audits

- Internal Audits of Training Programmes: Regular internal audits should be conducted to review the effectiveness of the training programme. This includes ensuring all employees are up to date on mandatory training and that documentation is thorough.
- Continuous Improvement: Based on the findings of internal audits or external inspections, update training materials, and methods. Continuous improvement is key to maintaining compliance and operational efficiency.

Employee Feedback and Training Adaptation

- Employee Feedback: Encourage employees to provide feedback on the training they receive. This can help identify areas where training can be improved, made more efficient, or updated to reflect current best practices.
- Adapting Training Programmes: Use this feedback to tailor future training sessions to better meet employees' needs and ensure they are relevant to the daily operations and safety challenges of the ice manufacturing plant.

Summary

A comprehensive staff training programme should emphasise food safety, HACCP principles, equipment handling, and compliance with UK and EU regulations. By ensuring that all employees are knowledgeable and skilled in these areas, ice production can meet the highest safety and quality standards. It is equally as important to document the training given. Monitoring of training is essential for compliance, operational safety, and maintaining high standards of food safety. By using structured training records, digital management systems, and continuous monitoring, EPIA members can ensure

all staff members are competent, compliant, and capable of performing their roles safely. This approach also creates a transparent, auditable trail that demonstrates compliance with food safety and health regulations.

Risk Assessment

Risk assessments are some of the most important documents within the business helping to identify and control potential hazards related to ice cube production.

How to Prepare a Risk Assessment

A 5x5 risk matrix is an effective tool for assessing and managing risks at your site. The EPIA offer a template to members for risk assessments. Here's how to approach preparing a risk assessment using a 5x5 risk matrix:

Identify Potential Hazards

Start by identifying hazards that could arise during the production, storage, and distribution of ice cubes and their derivatives. Common hazards include:

- Microbiological contamination (e.g., pathogens like E. coli, Listeria, or Salmonella)
- Chemical contamination (e.g., cleaning agents or harmful additives)
- Physical contamination (e.g., foreign objects like metal fragments or plastic)
- Water quality issues (e.g., untreated or poorly filtered water)
- Poor storage conditions (e.g., temperature abuse or cross-contamination during storage)
- Improper handling (e.g., contaminated surfaces, hands, or utensils)
- Allergen cross-contact (if flavourings are used)
- Equipment malfunction (e.g., improper freezing or maintenance leading to risks)

Define Risk Criteria: Likelihood and Severity

In a 5x5 risk matrix, you will evaluate each hazard based on its:

- Likelihood (Probability): The chance of the hazard occurring, rated on a scale of 1 to 5.
- Severity (Consequence): The impact or consequence of the hazard, rated on a scale of 1 to 5.

Fill Out the Risk Matrix

Once you've identified hazards, plot each one in the matrix based on its likelihood and severity (Refer to the 5x5 matrix in Section 2).

Where:

- Low-risk range: 1-4 (Green)
- Medium-risk range: 5-9 (Amber)
- High-risk range: 10-25 (Red)

For example, microbiological contamination due to improper handling might be rated as 2 (unlikely) for likelihood and 4 (major) for severity, resulting in a risk score of 8 (medium risk).

Analyse and Prioritise Risks

Based on the risk scores, prioritise the hazards:

- Low-risk hazards (1-4): Monitor and control, but minimal action required.
- Medium-risk hazards (5-9): Requires action to reduce the risk, such as improving hygiene practices or ensuring proper water filtration.
- High-risk hazards (10-25): Immediate action is needed, such as correcting faulty equipment or revising safety procedures.

Develop and Implement Control Measures

For each identified risk, create control measures to mitigate them. For example:

- Microbiological contamination
  - Control Measure: Regularly test water quality, maintain hygienic handling practices, train staff in food safety, and sanitise equipment.
- Physical contamination
  - Control Measure: Implement strict quality control procedures (e.g., metal detectors, regular inspection of ice-making machines).
- Improper storage
  - Control Measure: Ensure ice is stored at appropriate temperatures and protected from cross-contamination.

Monitor, Review, and Revise the Risk Assessment

Risk assessments should be dynamic, continually reviewed, and updated:

- Regular reviews: Schedule routine reviews to ensure that control measures are working.
- Incident-triggered updates: Reassess risks if any incident or near-miss occurs (e.g., a batch of contaminated ice).
- Changes in production or materials: Update the risk assessment when there are changes in processes, equipment, or suppliers.

Risk Assessment Types

Risk assessments that EPIA members should consider having in place (this list is not exhaustive):

- HACCP risk assessment (mandatory)
- Internal Audit frequency risk assessment
- Raw Material risk assessment
- Outsourced processing/manufacturing risk assessment (if applicable)
- Pest Inspection frequency risk assessment
- Allergen risk assessment
- Raw material vulnerability risk assessment
- Cleaning frequency risk assessment
- Glass breakage risk assessment

Example Risk Assessment for Ice Production (5x5 Risk Matrix)				
Hazard	**Likelihood**	**Severity**	**Risk Score**	**Control Measures**
Microbiological contamination	3 (Possible)	4 (Major)	**12**	Use treated water, maintain hygiene practices.
Chemical contamination	2 (Unlikely)	4 (Major)	**8**	Safe storage of chemicals, proper cleaning.
Physical contamination	1 (Rare)	3 (Serious)	**3**	Metal detectors, visual inspection of machines.
Water quality issues (cryptosporidium)	2 (Likely)	5 (Catastrophic)	**10**	Regular water testing, filtration maintenance.
Equipment malfunction	2 (Unlikely)	4 (Major)	**8**	Routine equipment maintenance and checks.

Summary

By using this 5x5 matrix, EPIA members can systematically identify, assess, and control risks in the production of ice cubes, ensuring food safety and regulatory compliance. The format can be used to assess risks of all types for different areas of the business.

Document Control & Record Keeping

Effective document control and record keeping are essential for EPIA members in the UK and the EU to ensure compliance with regulatory standards, maintain food safety, and guarantee traceability. Best practices for managing documentation and records in food manufacturing align with the requirements of the Food Safety Management Systems (FSMS), such as FSSC 22000 or British Retail Consortium (BRCGS) Global Standards and are critical for both quality assurance and meeting legal obligations.

Key Best Practices in Document Control and Record Keeping

Compliance with Legal and Regulatory Requirements

- UK Regulations: Food businesses in the UK must comply with the Food Safety Act 1990 and the Food Hygiene Regulations 2006, which mandate that businesses must have robust record-keeping procedures in place. They are also governed by the FSA (Food Standards Agency) guidelines and other standards like BRCGS and FSSC 22000.
- EU Regulations: In the EU, Regulation (EC) No 178/2002 of the European Parliament provides the framework for food law. Regulation (EC) No 852/2004 on the hygiene of foodstuffs requires food businesses to implement and maintain procedures based on HACCP (Hazard Analysis Critical Control Point) principles, which involve extensive record-keeping.

Structured Document Control System

- Implement a centralised document control system that clearly organises, stores, and updates all documents.
- Use a document hierarchy, for example, starting with policies, followed by SOPs and then records.
- Ensure all documents are uniquely identifiable with titles, version numbers, revision dates, and reference numbers.
- Define a responsible person or team for reviewing and approving documents (such as the Quality team). Best practice dictates that each document should have an author and a reviewer to check the information.
- Standardise templates for procedures, reports, and records to ensure consistency across the organisation.

- Maintain version control, ensuring that outdated versions of documents are archived and accessible if required, while only the most recent version is actively used.

HACCP Documentation and Record Keeping

- HACCP Plans: Maintain documentation of the HACCP Plan with clearly defined CCPs.
- Monitoring Records: Document the monitoring of CCPs, such as temperature logs, metal detection tests, pH levels, etc.
- Verification Records: Keep records of verification activities that demonstrate the HACCP system is effective, such as internal audits, calibration certificates, and supplier audits.
- Corrective Actions: Record corrective actions when CCPs are not within the control limits.

Traceability Systems

- Establish a robust traceability system to track products from suppliers to consumers. According to EU Regulation 178/2002, food businesses must be able to trace all food, feed, food-producing animals, and any other substance intended to be incorporated into food.
- Record details of batch numbers, production dates, ingredient sources, and destination of products.
- Implement two-way traceability (backward to suppliers and forward to customers), enabling a fast response to product recalls if required.

Electronic Record Keeping

- Where possible, transition from paper-based systems to electronic record-keeping systems. This allows for easier access, better organisation, and faster data retrieval, especially in audits.
- Automated data logging systems can improve accuracy and reduce human error (e.g., temperature sensors automatically logging data to the cloud).
- Ensure that data security measures are in place for electronic records, including regular backups, restricted access, and compliance with GDPR (General Data Protection Regulation) for any personal data.

Retention Periods

- Define clear retention periods for different types of records, in line with regulatory requirements.
- EU and UK law recommends that food safety records be retained for at least one year after the product's shelf life, or for two years if no shelf life is defined.
- Personnel and training records, supplier documentation, and internal audit records should also have defined retention schedules.
- Archive obsolete records in a secure manner, while ensuring that they remain accessible for audits or investigations.

Supplier and Ingredient Documentation

- Keep a complete record of supplier certificates, such as GFSI (Global Food Safety Initiative) accreditation, allergen statements, and specifications for all raw materials.
- Supplier audit reports and supplier approvals should be maintained and regularly updated.
- Ensure specifications and certificates of analysis (COAs) are on file for each ingredient and final product batch.

Internal and External Audit Trail

- Conduct regular internal audits to review document control and record-keeping systems, ensuring all procedures are up-to-date and compliant with regulatory standards.
- Maintain records of these audits, including findings, corrective actions, and follow-up actions.
- Be prepared for external audits (e.g., by accreditation and certification bodies, government agencies) by ensuring all documentation is easily accessible and in compliance.

Training and Competency Records

- Record details of all staff training related to food safety, HACCP, allergen management, and equipment operation.
- Maintain records that demonstrate competency evaluations, especially for CCP monitoring and other critical roles in food safety.
- Ensure that training records are updated regularly to reflect ongoing staff development and refreshers.

Effective Change Management

- Document any changes to procedures, processes, or materials through a controlled change management process.
- When changes are made, ensure that all affected documents (e.g., procedures, work instructions, product formulations) are revised, and obsolete versions are archived.
- Communicate changes to all relevant staff and ensure that training is provided if necessary.

Incident Management and Corrective Actions

- Maintain comprehensive records of non-conformance incidents, food safety breaches, and customer complaints.
- Ensure that all corrective actions taken in response to incidents are documented, and that the root causes are identified and addressed.
- Keep records of recall or withdrawal actions, if they occur, including communication with authorities, stakeholders, and customers.

Data Integrity and Security

- Ensure that data integrity is maintained, meaning that records are accurate, complete, and not tampered with.

- Implement controls to prevent unauthorised access, manipulation, or deletion of records, especially in electronic systems.
- Regular audits of the digital infrastructure and backup systems are essential to prevent data loss.

Key Regulations and Standards

- UK Food Safety Act 1990: Governs food safety and hygiene practices, including the need for comprehensive record-keeping.
- EU Regulation (EC) No 852/2004: Focuses on food hygiene and necessitates comprehensive documentation for HACCP.
- FSSC 22000: A widely recognised international food safety management system that requires extensive documentation and record-keeping.
- BRCGS Global Standards: The British Retail Consortium's standard emphasises document control and record-keeping as part of an effective FSMS.
- GDPR: Ensures that any personal data captured in food safety records is handled in compliance with data protection laws.
- Codex Alimentarius: provisions of an advisory nature in the form of codes of practice, guidelines and other recommended measures around HACCP documentation.

Summary

EPIA members must maintain robust document control and record-keeping systems to comply with UK and EU regulations, including the Food Safety Act 1990 and EU Regulations (EC) 178/2002 and 852/2004. A centralised, structured system with clear version control, defined responsibilities, and consistent templates ensures accuracy and compliance. Comprehensive HACCP documentation, traceability systems, and secure electronic records are essential for demonstrating food safety controls and facilitating rapid product recalls. Records must be retained in line with legal requirements and archived safely. Data integrity and security, especially under GDPR, are critical. Adherence to standards such as BRCGS, FSSC 22000, and Codex Alimentarius strengthens transparency, accountability, and confidence in food safety management systems

Block Production

Many EPIA members will be producing ice blocks as well as cubes and crushed ice. Within some sites block production will often sit outside the scope of formal food safety accreditation, but it is important that high standards and GMP principles are still maintained in these areas.

Block Ice Production

Block Ice production should still fit into an EPIA member's food safety plan / QMS, especially if the block ice is used to make craft ice for human consumption The plan should include, but is not limited to:

- A HACCP Plan
- Monitoring Procedures
- Corrective Action and Verification Procedures
- SOP's
- Product Testing
- Product Recall Plan
- Cleaning Regime

Block Ice Requirements

- Potable water: Block ice should be produced using potable water.
- Equipment & tools: All equipment and tooling used for freezing, harvesting, processing, and handling block ice should be made of food grade materials. This includes, but is not limited to the following items:
  - Block ice machinery (special attention to be paid to ice machine lids ensuring no insulation is exposed above product)
  - Pumps
  - Ice picks
  - Cutting tools and blades (bandsaws)
  - Water hoses
  - Air lines
  - Water lines and piping
- Packaging: Packaging that comes into contact with the block ice should be of food grade materials and fully traceable. This includes liners for freezing and bags for transport/delivery to customer. Bags should be sealed to protect the product in transit and storage.

Block Ice Best Practice

- Potable water shall be used in any operation, which comes into contact with the product ice.
- Block Ice should not come in direct contact with any material which is not constructed of food grade materials.
- If transition surfaces or areas are not food grade, ice must be adequately covered or rinsed, with potable water, or trimmed to remove any potential contaminants.
- Block Ice manufactured for industrial use or art installations, and not intended for human consumption, should be labelled as such. If the ice does not have any type of packaging to carry such a warning label, it must be printed on relevant documentation accompanying the delivery. When stored on site it should be segregated from other product.

PPE Requirements

PPE requirements in block ice production is no different to standard ice production. PPE should be used in block ice production areas. Gloves, disposable aprons, hair nets and beard snoods etc. must be worn when working around the product.

Airlines

If air is used on site for agitation (to facilitate the removal of bubbles and speed up freezing), then the air should be filtered or to remove dust, dirt and/or contaminants. All compressed air must be free of all oil and moisture. Any filters shall be placed upstream from the compressor and shall be easily removable for cleaning, inspection, and/or replacement.

Cleaning

Block ice production areas should have a full cleaning programme in place, based on risk, and relevant instructions or CICs should be available to staff.

- Air and water lines must be regularly cleaned, and sanitised.
- Any tools which come into direct contact with the ice must be properly cleaned and sanitised before and after use (including tools used for shaving or cutting).

Product Testing

Water sources and samples of block ice finished product, should be subject to a testing regime for pathogens such as coliform and E. coli and a Heterotrophic Plate Count (HPC). The testing should be based on risk but a minimum of monthly is recommended.

Summary

EPIA members involved in block ice production must maintain high food safety and GMP standards, even when operations fall outside formal accreditation. Block ice processes should be incorporated into each site's food safety plan, including HACCP controls, monitoring, corrective actions, cleaning, and testing procedures Ice intended for non-consumption should be clearly labelled and stored separately

Workflow Optimisation

Optimising workflow in an ice manufacturing plant is essential to enhance productivity, reduce operational costs, minimise downtime, and ensure consistent product quality. By refining processes, organising resources efficiently, and reducing waste, you can maximise output and maintain high standards.

Optimisation and its Relationship to Product Safety

The inclusion of workflow optimisation in this document may seem to be a deviation from the rest of the content, however, smooth operating practices will compliment EPIA members food safety systems and QMS. When staff are not faced with operational issues, they will have more time to complete required records. When production is running without issues there will be less chances on non-conformances occurring.

Workflow Optimisation Strategies

Each EPIA member's operations are different, and each will face different challenges. Below are some suggested strategies to optimise workflow on site:

Implement Lean Manufacturing Principles

Lean manufacturing focuses on minimising waste and maximising value. By applying these principles, you can improve efficiency and streamline production.

- Identify Bottlenecks
  - Conduct an analysis to identify areas where production slows down. Look for delays caused by machinery, material handling, or human error.
  - Implement real-time monitoring systems to track equipment performance and production speed.
- Reduce Waste
  - Overproduction: Match ice production to demand to avoid energy and storage costs.
  - Defects: Reduce the production of defective ice by maintaining equipment and ensuring proper water filtration.
  - Motion Waste: Minimise unnecessary movement of workers and materials through optimised layout design.
- Continuous Improvement
  - Engage workers in continuous improvement efforts. Encourage them to provide suggestions for reducing inefficiencies or improving processes.
  - Conduct regular audits and evaluate processes for improvement opportunities.

Optimise Production Plant Layout for Workflow Efficiency

A well-organised production layout ensures that production flows smoothly, reduces unnecessary steps, and minimises cross-contamination risks.

- Use a Linear Layout
  - Arrange processes in a sequential order (water filtration → ice production → storage → packaging → loading).
  - Minimise backtracking and crisscrossing of workers or materials.
- Dedicated Zones for Different Operations
  - Create clear zones for each step of the process (water treatment, production, storage, and packaging).
  - Use visual markers or barriers to clearly define different areas.
- Minimise Distance Travelled
  - Place critical equipment such as ice making machinery, freezers, and packaging machines in close proximity to reduce the time spent moving materials and products.
  - Designate direct pathways for moving ice from production to packaging to minimise handling.

Automate Processes

Automation can significantly improve workflow by reducing manual labour, speeding up production, and minimising human error.

- Automated Conveyors: Use automated conveyor systems to transport ice from production to storage and packaging areas. This reduces manual handling, improves speed, and enhances hygiene.
- Automated Packaging Systems: Implement automated packaging machines to seal and box ice without human intervention, ensuring consistency in packaging and reducing labour costs.
- Integrated Monitoring and Control Systems: Use sensors and automated control systems to monitor ice production parameters such as temperature, pressure, and water quality. Automatic alerts can notify operators of any issues before they become serious problems, reducing downtime.

Optimise Human Resources

Efficient workforce management can greatly impact workflow. Proper scheduling, training, and role allocation are key to optimising human involvement.

- Cross-Train Employees: Crosstrain workers to perform multiple tasks, allowing for flexibility in case of absenteeism or increased production demand. This ensures that there is always someone available to keep production moving.
- Use a Shift-Based System: Plan employee shifts based on production demand to avoid overstaffing or understaffing. Ensure that key roles such as maintenance, quality control, and operators are always staffed.

- Streamline Communication: Use digital tools to communicate efficiently between departments. For example, real-time dashboards displaying production data can help operators and managers make quicker decisions.

Implement Real-Time Data and Monitoring

Real-time monitoring and data analysis are crucial to detecting inefficiencies and preventing equipment failures before they occur.

- Track Production Metrics
  - Measure metrics like ice production rate, equipment downtime, and energy consumption. Use these insights to find areas of improvement.
  - Identify peak production times and adjust workflow accordingly to balance workloads.
- Use Preventative Maintenance
  - Implement predictive maintenance systems that rely on sensors to detect early signs of equipment wear and tear. This can help you schedule maintenance activities before a breakdown occurs, minimising unplanned downtime.
- Cloud-Based Workflow Management
  - Use cloud-based tools to manage schedules, track progress, and assign tasks. These platforms can enhance collaboration and give managers visibility into the status of operations.

Optimise Material Handling

Efficient material handling is essential for streamlining the production process and reducing waste and delays.

- Automated Storage and Retrieval Systems (AS/RS)
  - Implement AS/RS for storage and retrieval of ice, particularly in large production plants. These systems can help in automating the movement of ice pallets to and from the storage areas, reducing labour and time.
- Organise Storage Efficiently
  - Store materials (e.g., packaging, filters, pallets) close to where they will be used.
  - Store finished ice products near loading docks to reduce time spent moving products during dispatch.
- Just-in-Time (JIT) Inventory Management
  - Use a just-in-time approach for stock management, so that materials arrive only when needed. This prevents overstocking and ensures that production is aligned with demand.

Ensure Regular Maintenance and Equipment Calibration

Regular maintenance ensures that equipment is running efficiently, reducing the chances of breakdowns that can disrupt workflow.

- Scheduled Preventative Maintenance

        - Set up a regular maintenance schedule for critical equipment, including ice makers, freezers, compressors, and conveyors. Keeping machinery in top shape prevents unexpected downtime.
    - Calibration and Testing
        - Ensure that machines, especially water filtration and UV systems, are calibrated correctly for optimal ice production. Improperly calibrated equipment can lead to inconsistent ice quality and reduce production efficiency.
        - Weighing scales, thermometers and metal detectors should also be calibrated.
    - Maintenance Logs
        - Use digital or paper logs to document maintenance activities. This ensures that no maintenance task is overlooked and helps track recurring problems with specific equipment.

Enhance Quality Control Systems

Streamlined quality control can help catch defects early in the production process, reducing waste and improving overall product quality.

- Inline Quality Checks
    - Implement quality checks at critical stages of the production process. For example, ensure water purity before ice production, and perform weight and quality checks before packaging.
- Automated Quality Control Systems
    - Use automated systems for quality control that can detect defects or contamination without halting production, ensuring consistent ice quality without slowing down the workflow.

Employee Accountability

Assign specific employees or teams to monitor quality at each production stage. Give them the authority to pause production or rework products if quality standards are not met.

Effective Cleaning and Sanitation Procedures

Maintaining hygiene in an ice manufacturing plant is critical, but cleaning processes should not disrupt production. Implement efficient sanitation protocols to ensure safety while optimising workflow.

- Scheduled Cleaning Times
    - Schedule deep cleaning during non-peak production hours.
    - Design cleaning protocols that cover all surfaces and equipment without causing major interruptions to production.
- Quick-Sanitise Procedures
    - Use quick-sanitising agents and methods for frequent cleaning of high-touch areas during production, reducing downtime while maintaining hygiene standards.
- Cleaning Automation

- Consider automating some cleaning processes, such as conveyor or storage cleaning, using automated cleaning-in-place (CIP) systems that minimise manual labour.

Safety and Ergonomics

Optimising workflow should also account for worker safety and ergonomics, ensuring that employees can work efficiently without injury or strain.

- Ergonomic Workstations
  - Design workstations and equipment to reduce the physical strain on workers, enhancing productivity while minimising injury risks.
- Safety Protocols
  - Implement strict safety protocols and training programmes to ensure that workers operate machinery safely and efficiently. Safety-related incidents can disrupt workflow and lead to delays.
- Legislation
  - EPIA members should operate in line with relevant national health and safety legislation.

Summary

Optimising the workflow of an ice manufacturing plant involves streamlining processes, enhancing automation, maintaining efficient plant layout, and focusing on continuous improvement. With lean principles, automation, real-time monitoring, and proper maintenance practices, production can be made more efficient, resulting in improved productivity and reduced costs. Additionally, a strong focus on quality control, preventative maintenance and regular cleaning ensures the plant consistently meets high standards for product safety and quality.



Appendices

Summary of Legal Requirements for Ice Cube Production (UK & EU)

In the UK and EU, ice cubes are regulated as ready-to-eat food products, and their production must comply with various legal frameworks related to food safety, hygiene, and labelling.

Relevant Legislation

Below is a summary of the key legal requirements that have been mentioned throughout the ICE Standards document.

EPIA members are advised to keep abreast of all relevant legislation and check for updates annually at a minimum as changes to legislation can result in changes to operating practices.

Food Safety Requirements

- General Food Law (Regulation (EC) No 178/2002)
  - All food (including ice) must be safe for consumption. Unsafe food must be removed from the market.
  - Requires a food safety management system based on HACCP (Hazard Analysis and Critical Control Points) principles to control potential hazards in production.
- Food Safety and Hygiene (England) Regulations 2013 (UK-specific)
  - Aligns with EU laws but applies post-Brexit in the UK. Requires food businesses to operate safely with routine inspections.

Water Quality Standards

- EU Drinking Water Directive (EU 2020/2184) / UK Water Supply Regulations
  - Water used for ice production must meet drinking water standards. Testing must ensure no harmful microbiological, chemical, or physical contaminants.

Hygiene and Sanitation Standards

- Food Hygiene Regulation (EC 852/2004)
  - Food businesses must ensure that ice production facilities maintain high standards of hygiene.
  - Includes provisions for equipment cleaning, staff hygiene, and maintaining clean premises.
- Good Manufacturing Practices (GMP)
  - Ice-making machines must be regularly cleaned and sanitised.
  - Staff must be trained in proper handling and hygiene procedures.

Labelling and Packaging Laws

- Food Information to Consumers (Regulation (EU) No 1169/2011)
  - Packaged ice must have clear and accurate labelling, including product name, net weight, manufacturer details, and any additives or flavourings.
  - Allergen information must be displayed if applicable (for flavoured ice or ice with additives).
- UK Food Information Regulations 2014 (Post-Brexit UK law)
  - Closely follows EU labelling requirements with slight variations on local enforcement.

Temperature and Storage Control

- Cold Chain Management
  - Ice must be stored and transported at 0°C or lower to maintain product integrity.
  - Facilities must monitor and document storage temperatures to comply with hygiene and safety standards.

Traceability and Recalls

- Regulation (EC) No 178/2002 (General Food Law)
  - Requires food businesses to maintain traceability records of raw materials, production batches, and distribution networks.
  - Businesses must be able to recall unsafe products quickly.

Workplace Health & Safety

- Health and Safety at Work Act 1974 (UK) / EU Health and Safety Framework Directive (89/391/EEC)
  - Ensures the safety of employees working in ice production facilities.
  - Employers must provide appropriate training, PPE (Personal Protective Equipment), and safe working conditions.

Local Licensing and Inspection

- Food Business Registration (UK & EU)
  - Ice producers must register with local authorities and undergo routine inspections to ensure compliance with food safety regulations.
- Environmental Health Officer (EHO) Inspections (UK)
  - Regular inspections by EHOs to verify adherence to hygiene, safety, and temperature control regulations.

Key Regulations Summary Table	
Category	**Key Legal Requirements (UK & EU)**
Food Safety	HACCP principles (Regulation (EC) No 178/2002), Food Safety and Hygiene Regulations (UK).
Water Quality	EU Drinking Water Directive (EU 2020/2184), UK Water Supply Regulations.
Hygiene & Sanitation	Food Hygiene Regulation (EC 852/2004), GMP, regular equipment cleaning, staff training.
Labelling	EU Regulation 1169/2011, UK Food Information Regulations 2014 (accurate labelling).
Temperature Control	Cold chain management, temperature monitoring.
Traceability	Traceability under Regulation (EC) No 178/2002, batch tracking for recalls.
Health & Safety	Health and Safety at Work Act 1974 (UK), EU Health and Safety Directive 89/391/EEC.
Licensing & Inspection	Local food business registration, routine EHO inspections for hygiene and safety compliance.

Summary

These regulations ensure that ice cubes produced in the UK and EU meet stringent safety, hygiene, and quality standards to protect consumers. Compliance with these laws is essential for food business operators involved in the ice production industry.

GFSI Food Accreditation

EPIA members are encouraged to seek external GFSI accredited food safety accreditation.

GFSI Accredited Schemes

The following Certification Programme Owners are currently recognised against Version 2020 of the GFSI Benchmarking Requirements.

Further information can be found using the website links provided.

GFSI Accredited Schemes		
Logo	**Certification Owner & Standard**	**Website**
BRCGS	BRCGS Global Standard for Food Safety issue 9	https://www.brcgs.com
FSSC 22000	FSSC 22000 FSSC 22000 version 6	https://www.fssc.com
IFS International Featured Standards	IFS International Featured Standards IFS Food v 8	https://www.ifs-certification.com

Glossary & Abbreviations

A summary of key terms and abbreviations used within this document and the ice industry.

Abbreviations

°C	Degrees Centigrade
°F	Degrees Fahrenheit
AS/RS	Automated Storage and Retrieval Systems
ATP	Adenosine triphosphate
BRC	British Retail Consortium
BRCGS	Brand Reputation through Compliance Global Standard
CAPA	Corrective and Preventative Actions
CCP	Critical Control Point
CE	Conformité Européene
CFU	Colony Forming Unit
CIC	Cleaning Instruction Cards
CIP	Cleaning in Place
CMMS	Computerised Maintenance Management System
CoC	Certificate of Conformity
COO	Country of Origin
CP	Control Point
DoC	Declaration of Compliance
EC	European Commission
EEC	European Economic Community
EFKs	Electric Fly Killer
EFSA	European Food Safety Authority
EHEDG	European Hygienic Engineering & Design Group
EHO	Environmental Health Office
EPDM	Ethylene Propylene Diene Monomer
EPIA	European Packaged Ice Association
EU	European Union
FAT	Factory Acceptance Testing
FIFO	First In, First Out
FMEA	Failure Mode and Effects Analysis
FRP	Fiberglass Reinforced Panels
FSA	Food Standards Agency
FSMS	Food Safety Management System
FSSC	Food Safety System Certification
GDPR	General Data Protection Regulation
GFSI	Global Food Safety Initiative

GMP	Good Manufacturing Practice
GPS	Global Positioning System
H&S	Health & Safety
HACCP	Hazard Analysis Critical Control Point
HPC	Heterotrophic Plate Count
HSE	Health & Safety Executive
IFS	International Featured Standards
IMP	Insulated Metal Panels
IP	Ingress Protection
IPIA	International Packaged Ice Association
IQ	Installation Qualification
JIT	Just In Time
MOT	Ministry of Transport
NC	Non-conformance
OQ	Operational Qualification
PH	potential of hydrogen
PIQCS	Packaged Ice Quality Control Standards
PPE	Personal Protective Equipment
PQ	Performance Qualification
PRP	Pre-requisite Programme
PVC	Polyvinyl Chloride
QMS	Quality Management System
RASFF	Rapid Alert System for Food and Feed
RO	Reverse Osmosis
SAT	Site Acceptance Testing
SDS	Safety Data Sheet
SLA	Service Level Agreements
SOP	Standard Operating Procedure
TDS	Total Dissolvable Solids
TPC	Total Plate Count
UK	United Kingdom
UKAS	The United Kingdom Accreditation Service
UKCA	UK Conformity Assessed
UV	Ultraviolet
WHO	World Health Organisation

Glossary

Accreditation Certificate	A document issued by a national accreditation body (like the BRCGS) that formally recognises competence.
Approved	Acceptable to local, state, or federal health authorities based on their determination as to conformance with appropriate standards of good public health practice.
Biological Hazards	Parasites, bacteria, moulds, or viruses that can cause illness or death.
Brexit	Brexit was the withdrawal of the United Kingdom (UK) from the European Union (EU). Following a referendum held in the UK on 23 June 2016.
Carbon filtration	A method of removing organic compounds and chlorine by-products from water using carbon's natural ability to adsorb these chemicals. The technique is often used to remove objectionable taste and odour from water.
CCP Decision Tree	A sequence of questions to determine whether a control point is a CCP.
Certification	The action or process of providing someone or something with an official document attesting to a status or level of achievement.
Colony Forming Unit	Colony-forming unit is a unit which estimates the number of microbial cells (bacteria, fungi, viruses etc.) in a sample that are viable.
Chemical hazards	Chemical products (e.g. agricultural chemicals, cleaning agents, food additives, waxes and coatings, heavy metals, etc.) that have the potential to cause illness or death.
Chlorination	The disinfection of water using chlorine or chlorine compounds.
Cleaning	The removal of soil, food residue, dirt, grease or other objectionable matter.
Cold storage	The area of a distributor’s facility where ice products are stored at freezing temperatures.
Coliform	A specific class of bacteria found in the intestines of warm-blooded animals. The presence of coliform in water indicates that the water is polluted and may contain disease-causing (pathogenic) microorganisms.
Contamination	The introduction or occurrence of a contaminant in food or food environment.
Continuous Monitoring	Uninterrupted collection and recording of data such as temperature on a strip chart.

Continuous Improvement	Continuous improvement is the ongoing process of analysing performance, identifying opportunities, and making incremental changes to processes, products, and personnel to deliver an overall better product.
Control	To prevent, eliminate, or reduce. (a) To manage the conditions of an operation to maintain compliance with established criteria. (b) The state wherein correct procedures are being followed, and criteria are being met.
Control measure	Any action or activity that is used to prevent, reduce to acceptable levels, or eliminate a hazard.
Control Point	Any point, step, or procedure at which biological, physical, or chemical factors can be controlled.
Corrective action	Actions taken to eliminate the cause of a detected non-conformance, preventing it from happening again.
Critical control point	A point, step, or procedure in a food process at which a control measure can be applied and at which control is essential to reduce an identified food hazard to an acceptable level.
Critical limit	The maximum or minimum value to which a physical, biological, or chemical parameter must be controlled at a critical control point to prevent, eliminate, or reduce to an acceptable level the occurrence of the identified food hazard.
Cross- contamination	The unacceptable migration or transfer of biological, chemical or physical hazards from one product to another or from a person or object to a product due to a variety of situations including improper storage, handling, sanitation or transporting.
Deviation	Failure to meet the critical limits or other specified requirements for a process or critical factor.
Disinfection	The treatment of water to inactivate, destroy and/or remove bacteria and other microorganisms from it. Chlorine, ultraviolet light and ozone are often used for this purpose.
Easily Cleanable	Readily accessible and of such material and finish, and so fabricated, that residue may be completely removed by normal cleaning methods.
Equipment	All crushers, ice makers, shavers, saws, cubers, rake bins, augers, baggers, and similar items used in ice plants.

Filtration	The process of removing particulate matter from water by passing it through a porous medium.
Flow diagram	Systematic representation of the sequence of steps or operations used in receiving, storage, assembly and delivery of a product.
Food handler	Any person who directly handles packaged or unpackaged food, food equipment and utensils, or food contact surfaces and is therefore expected to comply with food hygiene requirements.
Food hazard	Any biological, chemical, or physical agent that is reasonably likely to cause illness or injury in the absence of its control.
Food hygiene	All conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain.
Food-contact surfaces	Surfaces that are in direct contact with unpackaged food. This also includes any surface that might drip or drain onto a surface that directly contacts food products during normal operations.
Food safety	Assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.
HACCP	Hazard Analysis Critical Control Point system. A system that identifies, evaluates, and reduces the hazards that are significant for food safety.
HACCP Plan	The written document that is based upon the principles of HACCP and delineates the procedures to be followed.
HACCP Team	The group of people who are responsible for developing, implementing, and maintaining the HACCP system.
Hazard	A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect and cause a food to be unsafe for consumption.
Hazard Analysis	The process of collecting and evaluating information on hazards associated with the food under consideration to decide which are significant and must be addressed in the HACCP plan.
Ice	The product, in any form, obtained as a result of freezing water by mechanical or artificial means.
Ice Plant / Ice Facility	Any commercial establishment or production area within any type of establishment, together with the necessary apparatus, in which packaged ice is manufactured or

	processed, packaged, distributed, or offered for sale for human consumption.
Microfiltration	A process for filtering water by forcing it through a screen with very small pores (0.1 to 2 microns in diameter).
Microorganism	Organisms too small to be seen by the naked eye that include yeast, moulds, bacteria, and viruses.
Milligrams per litre (mg/L)	A measure of the concentration of a dissolved substance. For practical purposes, this unit is equal to parts per million (ppm).
Monitor	To conduct a planned sequence of observations or measurements to assess whether a process, point, or procedure is under control and to produce an accurate record for future use in verification.
Ozonation	Adding ozone to water to disinfect it or to remove objectionable taste or odour.
Parasite	An animal or plant living in or on an organism of another species (its host), obtaining from it part or all of its organic nutrient, and commonly exhibiting some degree of adaptive structural modification. The host is typically, but not always, harmed by the presence of the parasite; it never benefits from this presence.
Pathogen	A disease-causing organism.
Person	An individual, or a firm, partnership, company, corporation, trusted, association, or any public or private entity.
Personnel / Employee	Any person working in an ice plant, or ice production area in any commercial establishment, who transports ice or ice containers, who engages in ice manufacturing, processing, packaging, storage, or distribution, or who comes in contact with any ice equipment.
pH	A measure of the acidity or alkalinity of a solution.
Physical hazard	Physical components (e.g. wood or glass chip, metal piece, etc.) and foreign matter that can cause illness or injury.
Potable water	Potable water, also known as drinking water, comes from surface and ground sources and is treated to levels that that meet regulatory standards for consumption
Prerequisite programme	Refers to the universal steps, or procedures including Good Manufacturing Practices (GMPs) that control the operational conditions on site that allow for favourable environmental conditions for the production, processing, transportation and distribution of safe ice.

Preventative Measure	Proactive steps taken to prevent the reoccurrence of similar non-conformances by addressing systemic issues.
Processing	Grinding, crushing, flaking, cubing, or any other operation that changes the physical characteristics of ice or packaged ice for human consumption.
Product Area	The production area and all other areas where the product, ingredients, or packaging materials are handled or stored, and shall include any area related to the manufacturing, packaging, handling, and storage of ice intended for sale for human consumption.
Random Checks	Observations or measurements that are performed to supplement the scheduled evaluations required by the HACCP plan.
Ready-to-eat	Foods not requiring any further preparation before consumption.
Recall	Removing ice from the market when it has already reached consumers, involving communication to customers to return or dispose of the product.
Reverse osmosis	A process for filtering water by forcing it to flow under pressure through a semi-permeable membrane. The membrane allows the water to pass through, but not particulate, dissolved solids or microorganisms.
Risk	An estimate of the likely occurrence of a hazard.
Sanitation	A treatment process which destroys most microorganisms, including all pathogens (i.e., effective bactericidal treatment by a process that provides enough accumulative heat or concentration of chemicals for enough time to reduce the bacteria count, including pathogens, to a safe level on cleaned food contact surfaces of utensils and equipment.)
Sanitise	To treat by a process that destroys most microorganisms, including all pathogens.
Severity	The seriousness of a hazard.
Step	A point, procedure, operation or stage in the food chain including raw materials, from primary production to final consumption.
Site	Any building or area in which food is handled and the surroundings under the control of the same management.

Target Levels	Criteria that are more stringent than critical limits and which are used by an operator to reduce the risk of a deviation.
Total Dissolved Solids	The total weight of all solids (organic and inorganic) dissolved in water, in parts per million (ppm) or milligrams per litre (mg/L) of water.
Ultrafiltration	A process for filtering water by forcing it through a screen with very small pores. Ultrafiltration falls between reverse osmosis and microfiltration in terms of the size of particles removed, with ultrafiltration removing particles in the 0.002 to 0.1 micron range.
Ultraviolet radiation	A water treatment that involves exposing water to intense ultraviolet light to kill bacteria and other microorganisms.
Utensil	Any handheld items used in the manufacture, handling, and transport of ice.
Validation	Obtaining confirmation that the elements of the Food Safety System are complete and effective in controlling biological, chemical and physical hazards.
Verification	The application of methods, procedures, tests or other evaluations, in addition to monitoring conformance and effectiveness of the Food Safety System to determine if the HACCP system follows the HACCP plan and/or whether the HACCP plan needs modification and revalidation.
Water source	A type of specific water supply i.e. municipal, borehole.
Withdrawal	Removing ice from the distribution chain before it reaches the consumer (e.g., from warehouses or retail stores).

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The information within this document is the work of the EPIA Food Safety Committee, however, research and information has been gathered from the sources listed below. The bulk of this information is based on general regulatory frameworks and best practices aligned with UK and EU food safety standards and any similarities are coincidental.

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- ISO 22000:2018 Food Safety Management Systems

Images (front cover)

- Stock image, Shutterstock

EU Legislation

- Directive 89/391/EEC
- Directive 94/62/EC
- Directive 2006/42/EC
- Directive (EU) 2019/904
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- Directive (EU) 2020/2184
- Regulation (EC) No 1935/2004
- Regulation (EC) No 178/2002
- Regulation (EC) No 852/2004
- Regulation (EC) No 853/2004
- Regulation (EU) No 1169/2011

UK Legislation

- Environmental Protection Act 1990
- Food Hygiene (England) Regulations 2006
- Food Information Regulations 2014
- Food Safety Act 2006
- Food Safety and Hygiene (England) Regulations 2013
- Health and Safety at Work Act 1974
- Packaging (Essential Requirements) Regulations 2015

Regulatory Standards

- Codex Standards CXC-1-1969 2023
- Good Manufacturing Practices (GMP) Guidelines
- Guidelines for Drinking Water Quality: WHO
- UK Drinking Water Inspectorate (DWI) Standards
- Waste Duty of Care Code of Practice: UK Environment Agency

Websites

- Codex Alimentarius - General Principles of Food Hygiene https://fao.org/fao-who-codexalimentarius

- Elmed International
  https://.elmedint.com
- European Food Safety Authority (EFSA)
  https://efsa.europa.eu
- European Union – Legislation Summaries
  https://eur-lex.europa.eu
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