


COLD CHAIN FEDERATION

FOOD SAFETY SERIES

# ENSURING FOOD SAFETY IN THE COLD CHAIN

FS1 / 2021 / ISSUE 1

COLD CHAIN COMPLIANCE

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# FOREWORD: SHANE BRENNAN



I am delighted to introduce the Cold Chain Federation's guidance on Ensuring Food Safety in the Cold Chain. Food Safety is at the heart of what makes the cold chain so critical to UK society – ensuring temperature sensitive products such as food and pharmaceuticals reach consumers in the freshest and safest condition. This guide, the culmination of a year of dedicated planning and consulting with our members, will ensure the cold chain continues to demonstrate the highest possible standards in food safety from temperature management to managing allergens and food crime.

I am extremely grateful to all the individuals and organisations who have contributed to this guidance.

**Shane Brennan**, Chief Executive, Cold Chain Federation

# ACKNOWLEDGEMENTS

This guide was commissioned by the Cold Chain Federation and written by Su Dakin Consulting Ltd. We are indebted to a number of organisations and individuals for supporting the production of the guide, providing technical input and review from the perspective of end users, enforcement agencies and third-party accreditors.

**Food Standards Agency**
The FSA has reviewed this document and provided feedback on those issues within the FSA's direct policy remit under its role as National Regulator.

**Slough Borough Council**
**(Primary Authority Partner to the Cold Chain Federation)**
This guide has been reviewed and is generally supported by the Cold Chain Federation's Primary Authority partner Slough Borough Council. The guide provides recommendations to businesses on measures they can take to ensure food safety and by doing so improve their compliance with the regulations covering this area.

Cold Chain Federation members with specific compliance concerns on any of the topics covered in this guide which they think might benefit from the enforcement protection provided by specific Primary Authority advice, are encouraged to contact the Federation with their requests. Member questions will be reviewed and if of benefit to the wider membership the Federation will work with Slough Borough Council to develop PA advice. Queries should be directed to compliance@coldchainfed.org.uk

**BRCGS**
As the dominant certification standard governing cold chain storage and logistics, this guide has been produced with the support of BRCGS. We have ensured that the measures outlined within this guide support BRCGS accreditation and have stated where recommendations are a direct requirement of the BRCGS Storage and Distribution Global Standard.

**Cold Chain Federation Food Safety Expert Group**
The production of this guide was overseen by the Cold Chain Federation's Food Safety Group. A collective of member companies comprising of individuals with a responsibility for food safety within their business. The group helped steer the contents of the guide, provided case studies and technical expertise, as well as a critical review of the finished draft.

# INTRODUCTION

The use of cold in the preservation of food is an ancient practice, thought to date back as far as 1000 BC. Since the mid-19th century when the first patents for compressed gas artificial refrigeration systems were filed, the ability to store and transport in a frozen and chilled state has revolutionised the widespread availability of safe food. Today, more than ever, cold chain storage and distribution remains an absolutely essential contributor to health and nutrition, reduced post-harvest food waste and food integrity.

Food is the UK's biggest manufacturing industry, the agri-food sector contributed £120.2bn, or 9.4% to national Gross Added Value in 2018[1]. Right now, the sector is experiencing an unprecedented degree of change as it responds to evolving consumer habits. This offers both opportunities and challenges for the cold chain, none more so than in preserving food safety. Despite developments, the burden of foodborne disease in society remains high. In the UK, one in 27 people falls ill each year from foodborne disease[2]. It beats the global average of one in 10 but still gives no room for complacency.

Global food supply chains are subject to constant change, but with the exit of the UK from the EU and new trade arrangements, this is likely to accelerate. We may see potentially rapid growth in trade with historically less developed food producing nations. Food safety compliance systems across the industry need to be resilient and agile in response. Criminals are quick to identify the opportunities to use food supply routes and that food fraud can be very lucrative.

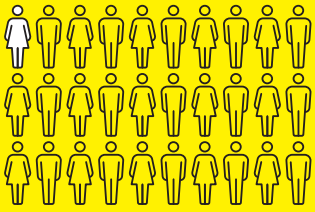
The Covid-19 pandemic indelibly re-shaped consumer habits in 2020, making supply chains more digitised than ever before and extending them right to the consumer's front door. We must take care, e-commerce and last mile delivery have the potential to pose huge issues with transparency and food safety. Good standards, innovation and technology are all going to be needed to maintain safe food throughout the entire food chain from beginning to end.

Managing the cold chain is a very specific responsibility and requires specialist skills, knowledge, facilities, vehicles and technology. The purpose of this guidance is to provide, for the first time, a single and comprehensive guide which is specific to the storage and distribution of temperature-controlled food and other products. We hope it helps this vibrant sector to maintain regulatory compliance, play its part in keeping the nation supplied with safe food and achieve recognition for its high standards through continued development of certification standards.

**MICROBIOLOGICAL FOODBORNE DISEASE (FBD) PLACES BOTH A PUBLIC HEALTH AND FINANCIAL BURDEN ON SOCIETY**

**PUBLIC HEALTH**

**IN 2018** an estimated **2.4m** **PEOPLE SUFFERED FROM AN FBD IN THE UK**



That's about **1 in 30** people

APPROXIMATELY **16,300** **RECEIVED HOSPITAL TREATMENT**

**OVER 180** **reported deaths**

**FINANCIAL**

BASED ON 2018 CASE ESTIMATES, **THE FINANCIAL COSTS OF FBD TO SOCIETY** ARE:

**£2bn** per year including:

**£1.8bn** **IN LOST EARNINGS** & **£157.5m** **DISTURBANCE COSTS TO BUSINESSES**

Data source: The Burden of Foodborne Disease in the UK 2018, Food Standards Agency, March 2020

# USING THIS GUIDE

This guidance has been written to support chilled and frozen food storage and distribution operations. It is primarily for the use of senior managers and those team members who are responsible for ensuring food safety compliance and BRCGS Storage and Distribution certification. It may be used to support training and give employees at every level access to further information and will also provide a useful reference for enforcement agencies, local authorities and certification bodies involved with assessing cold chain operations.

To help in its practical application the guidance is written to indicate which parts are mandatory, good practice or best practice. **Must** indicates legal requirements which are mandatory; **should** indicates expected practice for the storage and distribution sector as required for BRCGS[3] *Global Standard for Storage and Distribution* (Issue 4); and **recommended** denotes sector leading best practice, which goes beyond legal and BRCGS certification requirements but demonstrates an industry leading approach to food safety.

[1] https://tinyurl.com/sj8jxaxs
[2] Foodborne Disease Estimates for the United Kingdom in 2018, UK Food Standards Agency, January 2020
[3] Other Global Food Safety Initiative Accredited Standards are available but BRCGS S & D is the most ubiquitous for Cold Chain Federation members

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# 1 / FOOD SAFETY REGULATION AND CERTIFICATION STANDARDS /

## REGULATORY CONTEXT FOR FOOD SAFETY IN THE UK

Most current UK food law originates from the European legislative process. Before EU Exit much EU legislation was directly applicable in the UK, whilst others had to be remade into national regulations known as Statutory Instruments (SIs). SIs also contain national enforcement arrangements. Much of UK food law is also the direct responsibility of the devolved Parliaments. In consequence there are many separate, albeit almost identical laws in each of Northern Ireland, Wales, Scotland and England. The Food Standards Agency is the Central Competent Authority for the UK, (except Scotland which has its own authority, Food Standards Scotland) and works closely with branches in the devolved nations to ensure a similar approach and protections are in place throughout the UK.

### BEST PRACTICE

- When searching for regulations that apply in the UK, make sure to access the **UK version** on the UK government legislation website: https://tinyurl.com/yvxwuc5z
- The **EU version** can be found on Eur-lex: https://tinyurl.com/8t7pd7ar

### TIP

Food Regulations can be complex and hard to keep track of. Your Local Authority Environmental Health team can be a great source of information and help. Contact details are usually available on the Local Authority website, or you can find your local team using the FSA's 'find my food safety team' portal: https://tinyurl.com/c8eauszs. Establish a good relationship and maintain regular communication.

### EU EXIT

As part of the EU Exit process EU food regulations were retained as UK food law. The EU (Withdrawal) Act 2018 (EUWA) provides a framework for the continuity of food and feed safety and hygiene standards. It is applicable across three nations of Great Britain. Provisions of the Act meant that at the end of the EU Exit transition period the food laws in the UK were made separate but identical to the EU food laws in place on 31st December 2020. New SIs amend the UK version of the EU laws to reflect that they apply only to the UK. This body of law is known as *retained regulation*.

Trade with Northern Ireland has, additionally, to take into account the Northern Ireland Protocol. Under the terms of EU Exit food law in Northern Ireland **must** remain aligned with EU regulation.

Since 1st January 2021, the UK has been able to make its own regulations separately from the EU, and the EU can do the same. Over time this will cause a gradual divergence in the detail of food laws between GB and EU (including Northern Ireland). Under the World Trade Organisation Sanitary and Phytosanitary Agreement[3] the UK is obliged to notify World Trade Organisation (WTO) members, including the EU, of any proposed changes to food regulations. All other WTO members can make comments which the UK must consider. This is an established mechanism of international consultation to maintain a degree of global equivalence and to facilitate trade.

[2] World Trade Organisation Sanitary and Phytosanitary Agreement of 1995. https://www.wto.org/english/tratop_e/sps_e/spsund_e.htm

## FOOD SAFETY ACT

*Regulation (EC) No 178/2002 of 28 January 2002 (which is directly applicable as retained EU law) lays down the general principles and requirements of food law* and is the main law which sets out the principles for food safety, animal and plant health, traceability, importing and exporting of food, food composition and labelling and product recalls. Its primary purpose is to protect consumers from misleading practices, unsafe food, food fraud and food adulteration. It is laid into UK National legislation through the *Food Safety Act 1990 (as amended). Guidance* for its implementation is available.

In Northern Ireland the equivalent National Regulation is *Food Safety (Northern Ireland) Order 1991* which also has accompanying *guidance*.

Offences for not complying with these regulations carry stiff fines and even imprisonment. However, if a business can show that it had systems in place and took all reasonable steps to avoid the issue it can plead what is called a 'Due Diligence' defence. This is why it is so important that checks and controls are in place, monitored, recorded and maintained. Powers of seizure and detention are also set out in the Act as a means of dealing with unsafe food.

## FOOD HYGIENE REGULATIONS

Other rules are set out in the secondary legislation, such as *The Food Safety and Hygiene (England) Regulations 2013* and its equivalents in the devolved nations of the UK, provides Local Authorities with a range of enforcement powers including hygiene improvement notices to improve hygiene standards and emergency hygiene prohibition notices to immediately stop businesses from operating if they find unsafe conditions. Officers can certify as unfit, any foods not prepared, stored or transported in accordance with food safety legislation. This can then result in formal seizure powers being used to remove and destroy food.

Schedule 4 of the 2013 regulations also requires that any food which can support food poisoning, bacteria or the formation of toxins **must** be stored at 8°C or below, except food for which the temperature requirements in Regulation (EC) 853/2004 apply.

The EU Hygiene Regulations: *Regulation (EC) 852/2004* on the Hygiene of Food Stuffs and *Regulation (EC) 853/2004* laying down specific rules for food of animal origin are retained in UK food law since EU exit.

**These regulations introduce:**

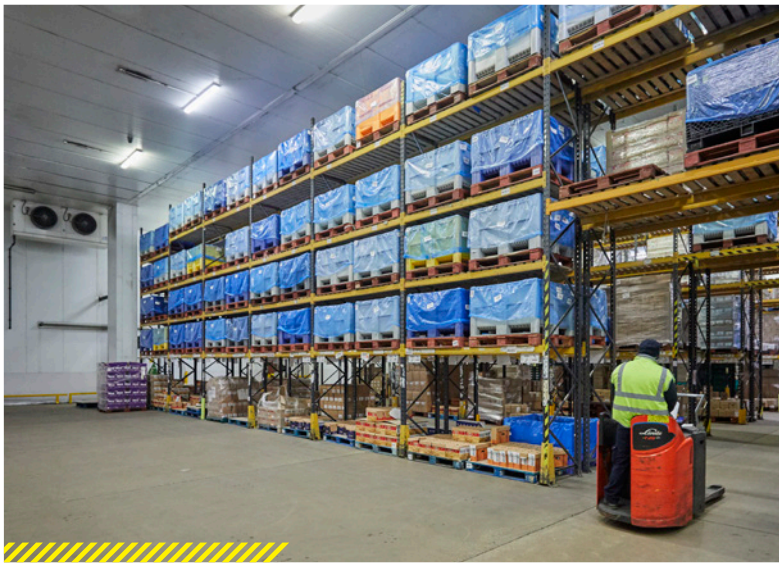
- the requirement to implement procedures based on Hazard Analysis and Critical Control Points principles (HACCP) which are covered in Chapter 3 of this guide;
- general hygiene rules around cleanliness (see Chapter 8) and maintenance of food premises including the provision of certain facilities, the protection of food from contamination and the need for arrangements to control pests (see Chapter 5);
- the requirement for the Registration or Approval of food premises through the Local Authority. This includes establishments involved with food distribution or supply that operate from an office – even if no food is kept at the premises, such as transport operators and food agents and brokers;
- businesses that handle meat, fish, dairy or egg products including stand-alone cold stores **must** make an application for 'Approval' to the Local Authority. The scope of the approval is specific to the establishment and **must** cover all the relevant food handling activities of the business. For storage and distribution businesses this might include, cold storage, packing and/or re-wrapping activity. Once approved, the establishment receives an approval number which appears on the *Food Standards Agency website*. Businesses cannot start to carry out any activity which requires approval before approval is given;
- there are some exemptions to approval – each case is assessed on its merits. Businesses are **recommended** to approach their Local Authority for a discussion as early as possible, so agreement can be reached on whether approval will/will not be required.

Chapter IV of *Regulation (EC) No 852/2004* on the hygiene of foodstuffs is concerned with the requirements of transport. There are specific provisions for vehicles which **must** be followed:

- to be in good repair and constructed of hygienic materials which are easily cleaned (See Chapter 8 of this guidance);
- If used for carrying non-food items, to have suitable segregation to prevent any potential for contamination and to have effective cleaning between loads (See Chapter 6 of this guidance);
- to be capable of maintaining the appropriate product temperature and have provision to allow temperature to be monitored (See Chapter 4 of this guidance).

The regulation also stipulates that the cold chain **must** be uninterrupted, except for brief periods to accommodate operational practicalities (loading/unloading/defrost cycles etc) but that these **must** not present a risk to health.

Specific laws relating to storage and transport temperatures of chilled food are laid down, these are primarily for products of animal origin and are to be found in *Regulation (EC) No 853/2004 laying down specific hygiene rules for food of animal origin*. More detail on the temperature requirements for specific foods can be found in Chapter 5 of this guidance.



## QUICK-FROZEN FOOD REGULATIONS

Specific laws relating to frozen foods are limited to the Quick-frozen Food Regulations. The original EU law, which has been amended several times is *Council Directive 89/108/EEC relating to quick-frozen foodstuffs for human consumption*. It is supported by *Commission Regulation 37/2005* on the monitoring of temperatures in the means of transport, warehousing and storage of quick-frozen foodstuffs intended for human consumption.

Implementation in the UK of the requirements is through *The Quick-Frozen Foodstuffs (England) Regulations 2007* with corresponding regulations for Wales and Northern Ireland. In Scotland they are implemented as *The Quick-frozen Foodstuffs Amendment (Scotland) Regulations 2007* (amending the Food Safety Act 1990 as it applies in Scotland).

The Quick-Frozen Regulations (QFF) apply only to frozen foodstuffs that are **quick frozen and marketed as such**. That means the law only applies when the food, packaged as destined for the final consumer or for sale to a caterer and has a label on which states the description of 'quick-frozen'. Despite the majority of commercial freezing operations being able to legally apply the term its use is quite uncommon in the UK.

Though not mandatory, the requirements in the QFF Regulations do form the basis of accepted good practice throughout the industry and **should** be followed. The Regulations also inform many customer policies. Nearly all such policies specify the warmest product temperature allowable as -18°C. Although deviation to -15°C is quite acceptable for food safety and for all but extended periods will not affect product quality. Whilst the ATP[4] permits frozen food to be transported at -12°C.

[4]ATP, United Nations Economic Commission for Europe Agreement on the International Carriage of Perishable Goods and on the Special Equipment to be Used for such Carriage, updated July 2020

**The specific requirements of the QFF Regulations which should be followed:**

- That vehicles, warehousing and storage are fitted with equipment to monitor and record air temperatures.
- That the equipment monitors air temperature at sufficiently frequent and regular intervals, to give confidence that the equipment is performing correctly.
- That the temperature monitoring equipment used for transport, storage and distribution complies with BS EN 12830 (2018) on temperature recorders; BS EN 13485 (2001) on technical standards for thermometers, and EN 13486 (2002) setting verification procedure for temperature recorders and thermometers. More detail can be found in Chapter 5.
- That businesses keep documentation to prove that temperature monitoring equipment complies with the EN Standards, this **should** be provided by the equipment supplier.
- That businesses keep properly dated temperature records for at least 1 year or longer to take into account and go beyond the full shelf life of the products stored and transported..
- That businesses make temperature monitoring records available to enforcement officers on request.
- That the temperature of QF foodstuffs be maintained at a temperature of -18°C or colder except for temporary deviations during transport to -15°C.



## CERTIFICATION AND STANDARDS

Businesses can choose to implement quality and food safety management systems that comply with recognised standards. Certification bodies carry out independent third-party audits and inspections against these standards and issue graded certificates which demonstrate compliance. Once certified the business can display the logo of the standard setting body on stationary and packaging. Certification demonstrates to customers and enforcement agencies that good practices are in place which have been independently inspected. For storage and distribution businesses the key certification standards to consider are:

- BRCGS – *Global Standard for Storage and Distribution* (Issue 4): more information is available from https://www.brcgs.com/
- *ISO 23412:2020: Indirect, temperature-controlled refrigerated delivery services* available to buy at https://tinyurl.com/3eryedty
- *ISO 9000 series for Quality Management Systems*. Find out more at https://tinyurl.com/wa5ke2vp
- *ISO 22000:2018: Food Safety Management*. Available to buy at https://tinyurl.com/5rkdvs4c

Issues with cold stores were prominent during the horsemeat crisis of 2013. The subsequent investigation and report *Elliott Review into the Integrity and Assurance of Food Supply Networks* highlighted cold stores as a particular risk for food fraud. The food industry was urged to use reputable warehouses and conduct audits with much greater frequency. More robust Standards have developed since then and the Cold Chain Federation **recommends** third party certification as a mechanism to continue to build greater confidence in the sector.

Certification, whilst not mandatory, is a common customer prerequisite in the retail, quick service restaurants and the main food wholesalers supply chains. Certification is **recommended**, it can open new business opportunities as it demonstrates both a commitment to quality and food safety and a culture of continuous improvement. The BRCGS Standard for example means entry into the online BRCGS Directory so that a business can be easily found by potential customers.

The BRCGS – Global Standard for Storage and Distribution (Issue 4) is benchmarked and recognised by the *Global Food Safety Initiative (GFSI)* a worldwide organisation committed to the harmonisation and raising of food standards globally. GFSI define the elements of a robust certification standard based on internationally-recognised standards such as ISO and Codex Alimentarius.

**The scope of the BRCGS – *Global Standard for Storage and Distribution* (Issue 4) includes:**

- senior management commitment;
- hazard and risk analysis;
- product safety and quality management systems;
- site and building standards;
- vehicle operating standards;
- facility management;
- good operating practices.

The advice laid down in this guidance is consistent with many of the requirements needed to achieve certification against Issue 4 of the Standard.



## OTHER STANDARDS AND FURTHER GUIDANCE

Detailed information on food safety and standards is available from a number of sources. Below you will find reference and links to internationally recognised standards, general information and guidance useful in the temperature-controlled storage and distribution sector. Further links can also be found within the specific chapters of this guidance.

- **FAO Codex Alimentarius General Principles of Good Hygiene (updated 2020)**
  The Codex Alimentarius Commission is an intergovernmental body, established by the Food and Agriculture Organisation of the United Nations (FAO) and the WHO. Its purpose is to protect consumers and ensure fair practice in the food sector. The Codex Alimentarius (meaning food law or code) is a collection of internationally adopted food safety and hygiene standards including HACCP. https://tinyurl.com/5ajxnapf

- **United Nations Economic Commission for Europe Agreement on the International Carriage of Perishable Goods and on the Special Equipment to be Used for such Carriage, updated July 2020 (ATP)**
  The purpose of this international standard is to facilitate sustainable development by providing definitions and standards for the equipment used in the temperature-controlled transport of food. It includes standards for the refrigeration equipment itself as well as for insulation and methods for the testing of such. It is essential reference for haulage businesses which operate internationally. https://tinyurl.com/zrh58dp8

- **ISO 23412:2020: Indirect, temperature-controlled refrigerated delivery services – Land transport of parcels with intermediate transfer**
  This ISO standard covers best practice requirements for the operation of temperature-controlled refrigerated delivery services for refrigerated parcels of any size via road freight it is available to purchase from the ISO bookshop. https://tinyurl.com/3eryedty

- **Refrigerated Transportation Best Practice Guide, version 2.0, 2017**
  Produced by The International Refrigerated Transportation Association, this practical guide, based on US, FDA regulations, provides best practice advice for the hygienic operation of refrigerated trailers, including temperature management and load handling for food safety. https://tinyurl.com/nxufcbha

- **Food Standards Agency, Meat Industry Guide, 2018**
  Although no longer maintained this useful guidance remains available from the FSA website and details how to satisfy the requirements of the food hygiene regulations for products of animal origin. The various chapters include the approval of premises, traceability and personal hygiene. Chapter 10 specifically concerns temperature-controls.
  https://tinyurl.com/4kvbkxd6

- **Food Standards Agency approved Food Industry Guide to Good Hygiene Practice: Wholesale Distributors, 2013**
  This guidance, referred by some as the 'blue book' breaks down each paragraph of hygiene regulation 852/2004 and provides guidance on how to comply. Although it is written for businesses operating as food wholesale distributors it also provides general advice useful for storage and distribution.
  https://tinyurl.com/38sjbu3k

- **BFFF Guide to the Storage & Handling of Frozen Foods 2017 Edition**
  This longstanding guidance, often referred to as the 'gold book', provides a detailed breakdown on the requirements of the quick frozen food regulations. https://tinyurl.com/2yj3bf3n







# 2 / DRIVING MANAGEMENT COMMITMENT AND FOOD SAFETY CULTURE /

The contents of this chapter lay important foundations for safe food throughout a business and the food chain. Management commitment has been a fundamental element in BRCGS certification standards since their inception; whilst food safety culture has relatively recently emerged as how that commitment manifests itself. It is new for BRCGS – *Global Standard for Storage and Distribution* (Issue 4). Detailed guidance to promote a food safety culture is provided in this chapter. Only certain elements are mandated in the BRCGS Standard, and **should** be followed; the remainder of this chapter is **recommended** best practice.

## MANAGEMENT COMMITMENT

Demonstrating management commitment is the single most important measure to developing a clear food safety culture. It manifests through communication, the way roles are structured, the equipment, resources and tools that are provided and the reaction when issues occur. How these things are done, says a lot about what the leaders in a business think is important. What is viewed as important at the top of the organisation, becomes culturally embedded through every level and function.

Temperature-controlled storage and distribution primarily deals with food so senior management commitment to food safety is critical. Without it, no matter how well devised, a food safety management system will not deliver the full benefits, protection or continuous improvement. The consequences of which could be significant and potentially costly.

To demonstrate management commitment there **should** be a Food Safety and Quality Policy statement in place, supported by technically competent staff whose role it is to ensure food safety. Businesses need access to trained and experienced food safety compliance professionals, either as permanent staff or as contractors. Business key performance indicators (KPIs) **should** include food safety measures. These **should** be used to regularly review performance and set continuous improvement targets and objectives across the functional teams; in just the same way as for health and safety, environmental or financial performance.

### TIP

Put food safety KPI measures into place to track complaint levels; product damages, rejections and returns; the results of, internal and external hygiene, housekeeping and pest control inspections; audit non-conformances; food spills and temperature issues.

A series of interim monthly or quarterly reviews in addition to the annual Management review required as part of BRCGS *Storage and Distribution (Issue 4)* is a **recommended** approach to stay on track. Reviews **should** involve business leadership, the cross functional management team and ideally be a specific meeting. Food safety has to have sufficient time, consideration, and be seen as a priority. The agenda might include but not be limited to:

- actions and commitments from previous reviews;
- key performance indicators for food safety and their trends;
- customer, supplier and third party complaints or feedback;
- changes made, required or proposed to site prerequisites, the HACCP plan or the food safety management system;
- planned operational changes or investments and implications for food safety and requiring technical input;
- results of internal and external audits, corrective and preventative actions and proposed recommendations;
- major incident reports, outcomes and key learnings;
- updates in legislation, customer requirements or certification standards for consideration;
- business continuity challenges;
- outputs and threats from horizon scanning;
- resource requirements, people, tools or equipment.

Furthermore, daily, weekly and or monthly operational meetings **should** be used to highlight any food safety opportunities and concerns to senior management. BRCGS *Storage and Distribution (Issue 4)* requires that actions from such operational meetings be documented and retained.



**Food safety culture can be defined as:**
*'shared values, beliefs and norms that affect mindset toward and behaviour regarding food safety in, across and throughout an organisation.'*

## FOOD SAFETY CULTURE

The foundation of a food safety management system is based on written rules, procedures and compliance inspections, but food safety culture is about hearts and minds. The values exhibited throughout the organisation influence how people within it behave when faced with activities which influence food safety. Culture is reflected in how people behave when no one is looking; it is the unsaid rules and behaviours that staff follow based on the values of their peer group. All businesses have a food safety culture which is unique to them, good or bad. The aspiration is to have an interdependent, positive and mature culture. There can be a number of culturally different groups within an organisation with separate beliefs and behaviours. Groups might include those split by nationality, management level or working in different teams e.g. warehouse and transport teams. Each group can pass on its own code of conduct to new members when they join the organisation. The differences are in addition to their job description and company policies and procedures and **should** be considered when embarking on a plan.

### BEST PRACTICE

The benefits of a positive culture? Fewer issues, a right first time by choice attitude throughout the organisation; better food safety outcomes; customer confidence and a competitive advantage; an engaged workforce, lower staff turnover and reduced compliance costs. Whilst Hazard Analysis Critical Control Point (HACCP), prerequisite programs, training and knowledge may all be in place this is not enough to guarantee a positive culture. Culture comes from the TOP, the values and behaviour of senior management filter down through all levels. Poor behaviour also, if not dealt with, is condoned and can quickly become accepted practice.

There are currently no laws which require a business to have specific activities relating to a food safe culture. Some level of food safety culture is proposed for future iterations of Regulation 852/2004, although not to the degree covered in this document.

The recently published *EU REGULATION 2021/382 Amends rules on hygiene of foodstuffs for food allergen management, redistribution of food and food safety culture*. The new regulation is applicable in Northern Ireland under the Northern Ireland Protocol but not in Great Britain. As it was introduced following the end of the EU exit transition period it does not form part of 'retained regulation' as detailed in Chapter 1.

Nevertheless, food safety culture can fundamentally affect the relationship a business has with local enforcement. Local Authorities apply a risk rating to food businesses which includes an element that considers the inspectors confidence in the management of the business as it applies to food safety. The rating takes into account:

- The 'track record' of the company, its willingness to act on previous advice and enforcement, and its complaint history.
- The attitude of the present management towards hygiene and food safety.
- The hygiene and food safety knowledge within the business, including hazard analysis/HACCP and the control of critical points.
- Evidence of satisfactory food safety management-based procedures.

In 2012, the FSA published a *food safety culture diagnostic toolkit*. Although its use is not mandatory for local authorities, it represents further guidance for inspectors.

Actions a business takes to promote a positive food safety culture can inform a due diligence defence by demonstrating a serious approach to food safety. Local authorities have finite resources, therefore they focus effort where there is a greater risk to consumer safety. The risk rating informs decisions on the frequency of inspections and, along with consideration of the seriousness of any regulatory breach, whether it is within the public interest to pursue a prosecution. More information about the Local Authority approach to food business interventions can be found in the *Food Law Code of Practice*.

Considerable guidance is available to support in the development of a positive food safety culture. British Standards Institute (BSI) published a white paper: *Food Safety Culture: Elements and Approach* which is free to download from the BSI website.

From a certification perspective the Global Food Safety Initiative (GFSI) includes Food Safety Culture in its benchmark standard. This is the reason that certification standards, including BRCGS *Storage and Distribution* (Issue 4), include a requirement for business to build a positive food safety culture as part of management commitment.

The *GFSI food safety culture position paper* gives much more detail than is provided here about what it means and the steps a business can take to build a successful program. GFSI break down the building of a positive food safety culture into five elements:

## 1. LEADERSHIP

Visible and consistent leadership is profoundly important, leaders set the moral compass for a business, they define what good looks like, set the tone, the expectations and the policies. Leaders have to walk the talk to make the intention real. Put simply, if top managers don't make food safety a priority, no-one else will and aspirations to improve food safety culture are doomed to fail.

**Actions to support this should include:**

- setting out a food safety policy which establishes clear business intentions;
- having a visible two way engaging communication strategy;
- having clearly defined accountabilities;
- establishing a safe, confidential and trusted reporting mechanism for concerns;
- using a culture survey, discussion groups or polls to assess current culture;
- setting food safety related objectives and targets, have a plan of what will be done and when;
- putting measurement in place to monitor performance and progress and reviewing them regularly (things like staff turnover, culture survey results, the level of non-conformances, investments in training and level of communication).

**Actions recommended to support this include:**

- having a clear strategic direction, the right structure, resources and considered investment;
- having published, embedded and consistently reinforced values and non-negotiable rules.

## 2. PEOPLE

The members of the technical team are not to be seen as solely responsible for an organisation's food safety or food safety culture. To be successful it requires embedding within all activity, just as health and safety is part of everyone's responsibility.

To influence behaviours all staff need to understand how they personally contribute to food safety in their everyday work. Relevance will enable buy in and influence staff to do the right thing even when no-one is looking. When everyone knows that food safety is important, a strong culture is possible. Staff are empowered when they have the knowledge and the authority to do the right thing, as well as the confidence to raise concerns. New staff quickly adapt to the expected behaviours in their work environment.

**Actions to support this should include:**

- incentive and recognition schemes rewarding the right behaviours;
- cross functional working groups to find solutions to food safety issues;
- visible KPI measurements and actions to continuously improve;
- values and food safety expectations as part of induction.

**Actions recommended to support this include:**

- customising food safety training and awareness to specific functions;
- posters, meetings and briefings;
- suggestion schemes and competitions.

## 3. CONSISTENCY

Reinforces a food safety culture by ensuring that the values, priorities, resources, requirements, processes and actions compliment and support rather than contradict the food safety vision. It takes a well-considered plan, constant reinforcement, unrelenting consistency and good disciplines over a period of time to change a negative culture.

**Actions to support this should include:**

- defined food safety accountabilities in job descriptions;
- individual performance appraisal, measurement and honest feedback;
- functional and organisational metrics (e.g. completion of planned preventative maintenance, inspection results, audit outcomes, customer complaints analysis) regularly reviewed with committed actions;
- incentive, reward and recognition schemes.

**Actions recommended to support this include:**

- disciplinary consequences on non-negotiable rules.

## 4. ADAPTABILITY

Business conditions constantly change, new customers, major incidents and acquisitions are all examples. Whilst a business adjusts to new conditions, food safety need to remain a priority. It's about safely managing change, adapting to new circumstances and reacting to business challenges without compromise of core values. As well as being a learning organisation that doesn't make the same mistakes over again.

**Actions to support this should include:**

- change management processes.

**Actions recommended to support this include:**

- crisis management and business continuity plans;
- cross functional strategic planning;
- cross functional root cause analysis and problem solving.



## 5. HAZARD & RISK AWARENESS

If understanding of hazards vary so will perception and reaction. Building the ability at all levels and across all functions of the organisation to identify potential hazards and risks puts eyes in every corner and will prevent issues. As a business, it's important to keep current on the latest industry intelligence including market incidents, scientific and technical advances, changes to food safety legislation, and food fraud horizon scanning. Furthermore sharing that information internally, raises awareness, increases engagement, informs and empowers everyone in the business.

**Actions to support this should include:**

- food safety induction training and refreshers.

**Actions recommended to support this include:**

- newsletters and notice boards;
- work councils;
- briefings;
- near miss reporting systems and review;
- audits and interviews.

Many of these things, a business will already have in place, forming a foundation on which to build a cohesive plan. For those who really want to excel, BRCGS operates a module in product safety culture excellence which sites can elect to add to their BRCGS Storage and Distribution audit.






# 3 / HAZARD ANALYSIS AND CRITICAL CONTROL POINT (HACCP) SYSTEM FOR THE COLD CHAIN /

HACCP is the systematic approach to food safety hazard identification, assessment of risk, and control for all stages in the food supply chain. HACCP principles **must** be properly applied to maintain food as safe to eat. The requirement to implement a food safety management system based on HACCP is a regulatory, certification and customer requirement.

**This chapter covers:**

- The seven principles of HACCP, which identify and define the Critical Control Points (CCPs).
- Guidance on the process steps for successful implementation.
- The introduction and definition of prerequisites and operational prerequisite programmes (OPRPs).
- Control and monitoring systems for verification and validation. These help to distinguish, when things go wrong, whether it is the design or the implementation of the food safety management system which is at fault.

## IMPORTANT TO KNOW BEFORE YOU START

Later chapters of the guide will explore the detail around the key food safety prerequisites, but it is **essential to note** that before a HACCP plan is formulated or implemented, the prerequisites **must** be in place, in full. Most of them are legal requirements, without them HACCP cannot progress.

A business **must** ensure a HACCP study is fully implemented and validated to ensure its effectiveness. Despite now being so well established, issues on hazard and risk assessment are the third biggest cause of nonconformances raised against BRCGS – *Storage and Distribution Standard*, Issue 3, accounting for nearly 12% of non-conformances. Issues are most commonly found in the definition of the full scope to include all processes, the production of a detailed and complete product flow and the identification and recording of the full scope of hazards.

Having sufficient and competent resource for a thorough study is fundamental to achieving HACCPs primary purpose in protecting food safety. For this reason success is dependent on the unequivocal, visible and vocal support of senior management. A business' approach to food safety needs to be as uncompromising as its approach to personnel safety and commercial success.

## WHY A HACCP STUDY IS NECESSARY AND BENEFICIAL

- Handle, store and transport food safely to protect the consumer.
- Reduce business risk by taking a preventative approach.
- Maintain and improve reputation.
- Fewer complaints and food safety incidents.
- Compliance with regulation.
- Meet customers pre conditional qualifications.
- Comply with BRCGS Storage and Distribution certification requirements.
- Clarity for staff on what is expected, therefore greater likelihood of compliance.
- Reduced resource wastage, time, materials, products and consequential reduced costs.

## UNDERSTANDING THE DIFFERENT LEVELS OF CONTROL MEASURE

**Critical Control Points (CCPs)** are a step in the process at which control of high-risk hazards is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level. CCPs apply to specific processes and **must** have a measurable limit.

**Prerequisite Programmes (PRPs)** are the basic conditions and activities necessary to maintain a food safe environment. More on prerequisites below.

**Operational Prerequisite Programmes (OPRPs)** are for intermediate hazards where control at a particular process step is still essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level, but it may not have a measurable limit or the prerequisite programmes on their own are insufficient to control the identified risk. Levels and frequency of monitoring for control are over and above those for prerequisites. An example might be a time limitation restricting how long product can remain on a loading bay prior to removal to warehouse storage or loading into a pre-chilled vehicle.

## PREREQUISITES

Prerequisites are the basic elements of environmental and operating good practice that **must** be defined, implemented and working effectively **before** HACCP can be successfully applied. If prerequisites are not in place or functioning, every single check and procedure would have to be part of the HACCP study itself; making it overly complicated; difficult to read and understand and most importantly; make the identification and focus on the really **Critical Control Points** very difficult. Many of the prerequisites listed below are covered in more depth in later chapters.

Whilst it is the responsibility of each individual business to define the prerequisites for their particular operation; those in the following list **should** be considered. Many of them **should** be included to comply with specified requirements in BRCGS Storage and Distribution Issue 4. The list further includes those recommended on the Food Standards Agency (FSA) MyHACCP website. Depending on the activity of the business, some of these will not be relevant to businesses limited to storage and distribution:

- Allergen management (see Chapter 7).
- Calibration of monitoring equipment (See Chapter 5).
- Contagion (See business continuity (Chapter 3) and hygiene (Chapter 8).
- Dealing with complaints and returns (See Chapter 5).
- Dealing with non-conformities, including damaged product (See Chapter 6).
- Document control.
- Control of contamination including glass and brittle plastic (See Chapter 6).
- Facility and vehicle hygiene, cleaning and disinfection (See Chapter 8).
- Facility, vehicle and equipment location, and maintenance (See Chapter 6).
- Facility and equipment layout and design.
- Internal audit (See Chapter 4).
- Loading, unloading and product handling standards (See Chapter 4).
- Microbiological control (depending on food handling activity of the business).
- Packaging, food information and labelling (depending on the food handling activity of the business).

- Personal hygiene and employee facilities (See Chapter 8).
- Pest control (See Chapter 6).
- Product recall (See Chapter 4).
- Return to work (See Chapter 8).
- Rework.
- Site security and food crime defence (See Chapter 9).
- Specifications for incoming materials and finished product. (note this does not include specifications for products which are simply stored or distributed but would include materials and products which are transformed and intended for ultimate supply to a consumer).
- Standard operating procedures.
- Supplier approval and monitoring including contract services (See Chapter 4).
- Temperature-control (See Chapter 5).
- Traceability (See Chapter 4).
- Training (See Chapter 4).
- Utilities (air, water and energy) management.
- Vehicle and transport and distribution standards (See Chapter 5, 6 and 8).
- Warehouse condition (See Chapter 6).
- Waste control (See Chapter 6).

**Codex Alimentarius** defines the systematic approach for conducting a HACCP study with **seven Principles** whilst guidelines set five preliminary stages and include training for the **13 step practical application process**.

## THE SEVEN PRINCIPLES OF HAZARD ANALYSIS CRITICAL CONTROL POINT

- **Principle 1:** Conduct a hazard analysis.
- **Principle 2**: Identify Critical Control Points (CCPs).
- **Principle 3:** Establish critical limits for each CCP.
- **Principle 4:** Establish CCP monitoring procedures.
- **Principle 5:** Establish corrective actions.
- **Principle 6:** Establish verification procedures.
- **Principle 7:** Establish record-keeping and documentation procedures.

## TYPES OF HAZARD TO CONSIDER

**Codex Alimentarius identifies three types of hazard:**

### PHYSICAL HAZARDS

Handling open or exposed product, damage to packaging and resulting spillages, leakages of liquids, poor housekeeping, poor pest control and handling are the main routes to physical contamination. Physical contamination can come from other products, people, equipment and the environment and are covered in detail in Chapter 6.

### CHEMICAL HAZARDS INCLUDING ALLERGENS

Include refrigerants such as ammonia; battery contents like sulphuric acid, spilled cleaning chemicals, fuel, oils and lubricants. These things **must** be stored separately and be considered as hazards where there are opportunities in the product flow for cross contamination. See Chapter 6 for more on chemical contamination.

Allergens can be included as chemical hazards but categorising separately is **recommended**, see Chapter 7 for more detail.

### BIOLOGICAL HAZARDS

Biological contamination comes from the growth of bacteria, viruses and mould, some of which can produce fatal toxins. This can occur if food product is exposed to incorrect temperature for too long (see Chapter 5); if it is allowed to get wet, from poor hygiene and handling of open product with dirty hands or utensils (Chapter 8) or if it accessed by pests (Chapter 6).

### OTHER HAZARDS TO CONSIDER

The hazards introduced through deliberate malicious contamination are considered in Chapter 9 on food defence.

Codex Alimentarius very much focusses on the HACCP team being responsible for the hazard analysis, as this is where the intimate process knowledge sits. However some may be suggested by customers or regulators in response to previous issues or those experienced elsewhere and **should** be included for consideration.



# GUIDELINES FOR CONDUCTING A HACCP STUDY

## 1. ASSEMBLE A HACCP TEAM

A multi-disciplinary approach is essential to harvest a wide range of knowledge in the identification of hazards and ensure monitoring and controls are going to be practical in use and relevant to the particular operation. Staff from all departments involved in activities to ensure food safety **should** be represented on the team i.e. warehouse and transport operations, health and safety, maintenance, technical and regulatory compliance, human resources and logistics planning. Those most able to contribute are the staff with first-hand knowledge and experience of the operation and its processes. The team leader **must** have recognised HACCP training. The remainder of the HACCP team primarily contribute their knowledge, however they will also need a working understanding of HACCP and the basic principles of food safety and hygiene (refer to training in Chapter 4). Often this is provided through a recognised external provider, but it may also be internally provided by a competent trainer. The use of consultants as HACCP team leaders is acceptable, however there **should** be a business based deputy in place with the training, competence and authority to step in when needed and able to make informed decisions about food safety.



## 2. DESCRIBE THE FOOD AND ITS DISTRIBUTION

The team first describes the food products that are handled. This part of the process **should** capture the diversity and scope of the products handled and all the operational activities outlined below. It consists of a general description of the different foods stored and transported; how they are packaged (if applicable); any additional processes within the operation and how the food is handled. The method of distribution **should** be described along with information on whether the food is frozen, refrigerated, or at ambient temperature; including, any product sensitivities (to temperature), whether it is ready to eat or has special customer handling requirements. All the business' activities **should** be included: any cross docking, consolidation, picking, waste handling, rework and repacking, tempering and blast freezing, back haul, multi-drops, e-commerce, last mile delivery, sub-contracted storage or activities, export etc. An outline of any conditions for product receipt or transit **should** be detailed along with key checks for compliance or recording for example pallet height restrictions, minimum temperatures or condition on receipt, the recording of durability dates and lot numbers. Unless a wholesale distributor, the ownership of the food is general retained by the customer; ownership **should** be indicated but does not negate any obligation to maintain food safety.

## Guidelines for the practical application of HACCP

1. Assemble a knowledgeable and experienced multidisciplinary team.
2. Describe the products that are handled and the storage, distribution and other processes.
3. Identify the intended consumer and how products will be used.
4. Construct flow diagram(s) of the defined processes taking place.
5. Verify that the flow diagrams accurately reflect the on site process.
6. List all the potential hazards and conduct a hazard analysis – Principle 1.
7. Use the decision tree to determine the Critical Control Points in your storage and distribution processes – Principle 2.
8. Establish the Food Safety Critical Limits for each identified Critical Control Point (CCP) – Principle 3.
9. Define and establish a monitoring system for each CCP – Principle 4.
10. Establish the appropriate corrective actions to take when CCPs deviate from defined critical limits – Principle 5.
11. Define and establish verification procedures – Principle 6.
12. Establish record keeping and documentation – Principle 7.
13. Establish and implement a HACCP and food safety training programme.

## 3. DESCRIBE THE INTENDED USE AND CONSUMERS OF THE FOOD

As far as it is reasonably practical describe the types of food stored and/or transported i.e. chilled, frozen, ready to eat or raw for full cooking by the consumer and the normal expected use of the food. This would include whether food is ready to eat, raw or a mixture; a description of the customer, market and ultimate consumer, for example retail, wholesale, quick service restaurants, hospitality or B2B raw materials; whether the food products are for particularly vulnerable groups, such schools, care homes or hospitals, or that could be subject to extreme conditions such as for military use, export or are subject to a particular certification scheme such as organic.

## 4. CONSTRUCT A FLOW DIAGRAM

A diagram of all the process steps in the scope of the control and management of the operation is written. The purpose of a flow diagram is to provide a clear, simple outline of all the steps involved in the product and how they are joined together. To assist there **should** be a plan of the entire site showing flows of people, waste and product to highlight areas where contamination could occur. Process flows for returns, damaged products, quarantined goods and waste **should** be included. It is useful to note on the flow top line controls such as temperatures or the maximum time product can stand outside of temperature-controlled storage. Off site or subcontracted elements of the process **should** also be clearly indicated to ensure hazards associated with third party storage facilities or transport are not missed.

## 5. VERIFY THE FLOW DIAGRAM

The HACCP team performs an on site review of the operation to verify the accuracy and completeness of the flow diagram. Often referred to as 'walking the process', assumptions are often challenged when the flow diagram is compared to actual practices. Any necessary changes are then made to the flow diagram.

## 6. PRINCIPLE 1: CONDUCT A HAZARD ANALYSIS

When conducting a hazard analysis, food safety **must** be clearly differentiated from quality and health and safety. HACCP is only concerned with food safety, though a similar approach can be useful for quality and health and safety.

**The purpose of the hazard analysis is twofold:**

- Firstly, to develop a list of potential hazards at each process step, which may be present, could be introduced, or could increase, grow or survive to unacceptable levels, or need to be controlled. They ought to be significant enough that if they were not controlled they might cause injury or illness. It's a brainstorming session taking into consideration all the information gathered during the preliminary stages 1-5. PIGS are a useful approach to hazard identification: are they **P**resent? Could they be **I**ntroduced? Can they **G**row or increase? Can they **S**urvive?

- Secondly, to evaluate each potential hazard based on the severity of the potential hazard if the food is consumed (e.g. illness or death) and the likelihood of occurrence.

Existing control measures and prerequisite programmes for each step are captured. More than one control measure may be required for a specific hazard. On the other hand, more than one hazard may be addressed by a specific control measure. If the hazard analysis is not done correctly and the hazards needing control within the HACCP system are not identified, the plan will not be effective regardless of how well it is followed. It is also important to appreciate that hazards identified in one operation or facility may not be significant in another operation handling the same or a similar product. For example, due to differences in equipment and/or an effective maintenance programme, the probability of temperature deviation in the warehouse may be significant in one facility but not in another. If the HACCP study is carried out centrally, it **must** be reviewed locally. The hazard analysis is a great opportunity to look critically at processes in the business and explore ways to continuously improve them to reduce the risk of costly food safety issues.

## Example of a risk matrix

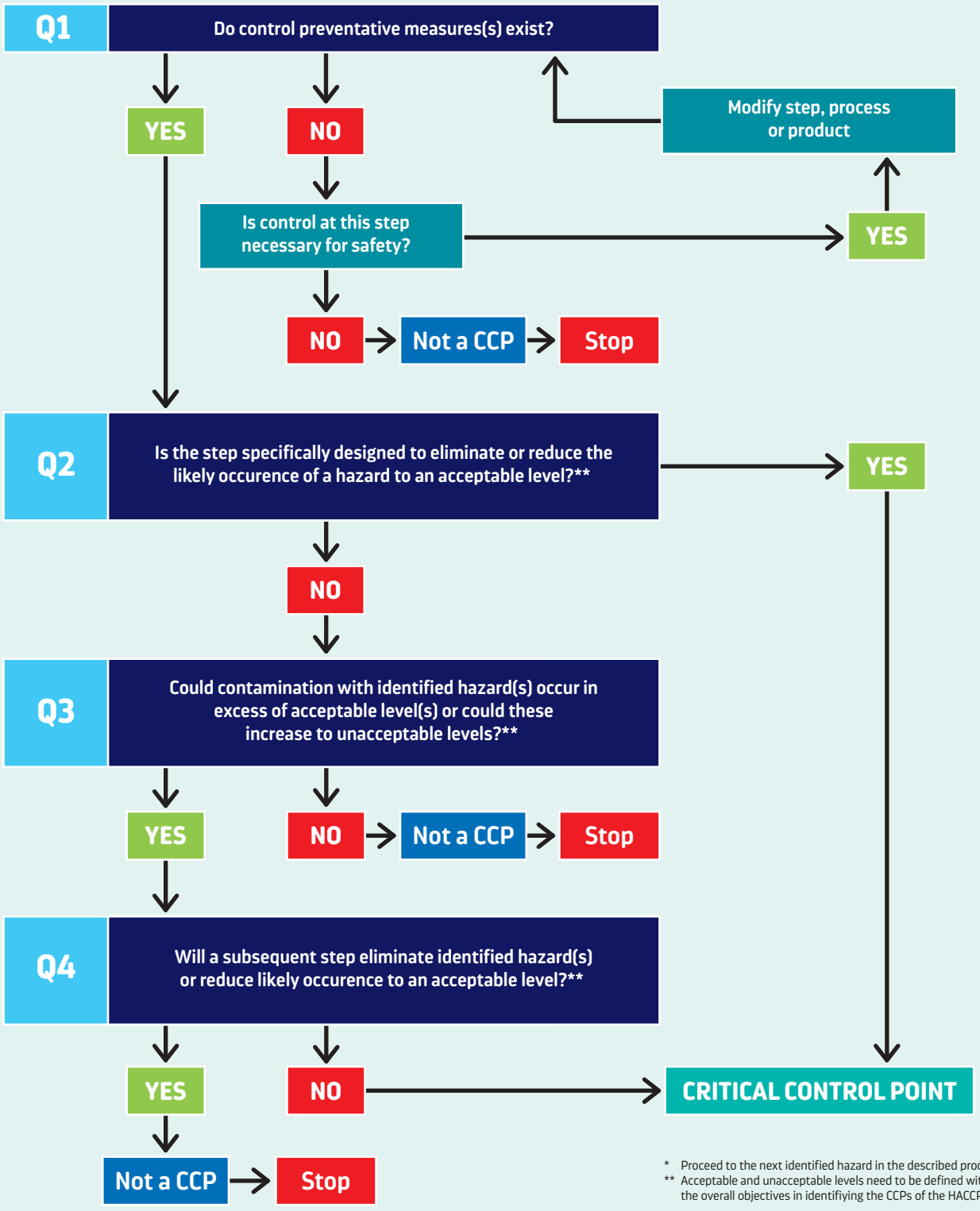
For each significant risk, existing mitigation controls are then considered and the residual risk score calculated.

| | | IMPACT | | | | |
|---|---|---|---|---|---|---|
| PROBABILITY x IMPACT | | Immaterial (1) | Notable (2) | Serious (3) | Significant (4) | Catastrophic (5) |
| PROBABILITY | Highly probable (5) | 5 | 10 | 15 | 20 | 25 |
| | Very probable (4) | 4 | 8 | 12 | 16 | 20 |
| | Medium probability (3) | 3 | 6 | 9 | 12 | 15 |
| | Low probability (2) | 2 | 4 | 6 | 8 | 10 |
| | Negligible probability (1) | 1 | 2 | 3 | 4 | 5 |

## 7. PRINCIPLE 2: IDENTIFY CCPs AND OPRPs

In most operations, there will be one or more points in the process where a failure of Standard Operating Procedures (SOPs) has both a significant chance of occurring and causing harm to a consumer. At such a point, a **Critical Control Point** or **Operational Prerequisite Programme** is identified, this is a process or step that controls, eliminates, or reduces the hazard to an acceptable level and where prerequisite programmes alone are insufficient. Use of one of the standardised decision trees (including *Codex Alimentarius' own* see below) is **recommended** to help in the determination of CCPs/OPRPs and/or the use of a risk assessment matrix (see risk assessment matrix example on previous page). Auditors expect to see a documented approach to decision making, based on a sound scientific justification.

### Example of decision tree to identify CCPs (answer questions in sequence)




* Proceed to the next identified hazard in the described process.
** Acceptable and unacceptable levels need to be defined within the overall objectives in identifiying the CCPs of the HACCP plan.

## 8. PRINCIPLE 3: ESTABLISH CRITICAL LIMITS FOR EACH CRITICAL CONTROL POINT

A critical limit is a maximum and/or minimum limit of a parameter that **must** be controlled at a CCP to prevent or reduce the risk from a food safety hazard. A critical limit is used to distinguish between safe and unsafe conditions at a CCP and are science based. Critical limits are not to be confused with operational limits which are established for reasons other than food safety (customer requirement, operational efficiency or quality). A critical limit **must** be a definite quantifiable measure, for example a temperature.

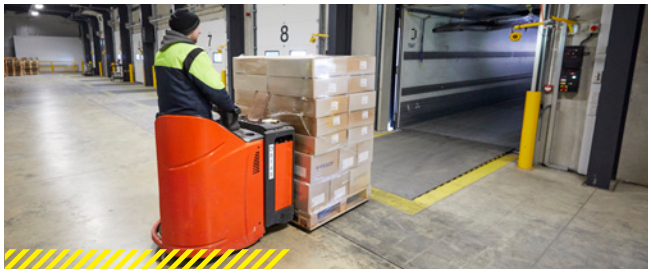
## 9. PRINCIPLE 4: ESTABLISH CRITICAL CONTROL POINT MONITORING REQUIREMENTS

This is defining the method for monitoring CCPs and critical limits. Decisions are made on an effective way and the appropriate frequency to check each CCP. The intention is to be able to detect before a CCP reaches the critical limits. It is **recommended** that action levels are in place to alert that product is at risk and action is needed to prevent breach of a CCP and an unsafe situation. **Recommended** best practice systems are mechanisms that are continuous and automated and fail safe. An example might be a warehouse management system which monitors air temperature in the warehouse and sounds an alarm and/or sends an SMS warning to a competent and accountable manager.

## 10. PRINCIPLE 5. ESTABLISH CORRECTIVE ACTIONS

Although the HACCP management system is meant to prevent hazards, there are occasions when processes go outside of critical limits. With this in mind, the business **must** develop corrective actions that will put the process back into control and identify affected product so that potentially hazardous food is managed. This is likely to include notifying the customer, putting affected product into quarantine, identifying how product will be disposed of and the investigation into root cause to develop preventative actions. The plan will also include who is responsible for the implementation of the corrective actions and how it will be recorded.





## 11. PRINCIPLE 6: ESTABLISH VERIFICATION PROCEDURES

Verification activity ensures that the HACCP plan is properly implemented, consistently applied, is effective and maintained.

- Verification is the application of methods, procedures, tests and other evaluations, in addition to monitoring, to **determine compliance** with the HACCP plan and that the system is operating according to the plan. Verification includes periodic testing e.g. validation of time and temperature of pallets stood on a dock prior to loading), HACCP review, third party and internal audits.

- Validation activities are in addition to monitoring and involve collecting evidence based on sound science to demonstrate that the HACCP plan, when properly implemented, is **effective** in controlling hazards or reducing them to an acceptable level. It is evidence collected prior to the implementation of a process, periodically repeated or after change to scientifically justify the food safety system. Examples include study of the temperature profile of a warehouse or chamber to determine the warmest and coldest points so that probes can be positioned to assure that the monitoring process provides an accurate and representative or 'valid' measure. Acceptable validation is informed by science (for example establishing the temperature at which pathogens will grow) and the evidence from investigations following customer complaints and returns.

## 12. PRINCIPLE 7: ESTABLISH RECORD-KEEPING AND DOCUMENTATION PROCEDURES

If the HACCP plan involves you saying what you will do and doing what you say, the seventh principle requires you to keep records documenting to prove that you do what you say. If you didn't record it, you didn't do it. Clear, consistent records make it possible to demonstrate that the food was stored and distributed safely. Essential during audits and if ever challenged by the authorities. These will not only be process records but will also include items relating to each step in the HACCP process, the HACCP plan and the verification activities, including regular review.

## 13. TRAINING

Training that provides clarity and builds competence on HACCP principles, CCPs, basic food hygiene and prerequisite controls are essential elements to equip the whole team for the effective implementation of a food safety programme. Guidance on training as an important prerequisite is covered in Chapter 4.

## HACCP REVIEW

Finally, a HACCP plan needs to be maintained, which largely depends on regular and scheduled verification activities. A review to check it remains current and update it if necessary **should** be scheduled at least annually, but there are other occasions when things change and a review may be needed:

- New customers, suppliers or product ranges.
- New or modified processes, equipment or facilities, physical or digital.
- Changes to policies, procedures or contractual arrangement notified by customers or suppliers.
- As the result of an incident investigation, e.g., product recall.
- Evidence of increasing or excessive customer complaints or returns.
- Changes to legislation or enforcement feedback.
- As an output of verification activity.
- The raising of internal concerns by those who do the job.
- As a output of the management review.
- As a preliminary review shortly after a major change – refer to the change management protocol detailed in Chapter 4.

## CASE STUDY

### CCF member wanted to demonstrate validation of a CCP control

The control in place limited the maximum holding time for pallets on intake, within the loading bay area prior to moving into the warehouse at -20°C, to 60 minutes. The team designed the exercise considering worse case conditions. The study was carried out in July, at midday using a temperature sensitive bakery product packed into cardboard cases, (representative of the product handled by the site). Temperature readings on accepted delivery were recorded at -18.8°C. The temperature within the cases was then continuously logged using an Ebro EBI 300 datalogger and verified with a needle probe during holding. After 75 minutes the temperature reading was -19.6°C.

After a subsequent full review of the cold-store HACCP risk assessment, it was decided control at this process step was not a CCP. Using the decision tree, it was determined that the temperature could not increase to a level that would cause the growth or multiplication of micro-organisms to an unacceptable level. Ongoing monitoring would remain in place as an important prerequisite control and for product quality. The study was carefully documented and used as evidence to demonstrate the change to the HACCP to customers, auditors and the local authority.

## Further guidance

HACCP methodology used today is based on the Codex Alimentarius Commission standard, first published by Codex in 1997 as an annex to the 1969 *general principles of food hygiene*. Go to https://tinyurl.com/4rmzh7xk

Campden BRI have a good guide which is widely used: *HACCP: A practical guide 5th edn 2015*, Guideline 42.

The American Food and Drugs Administration NACMCF Group (National Advisory Committee On Microbiological Criteria For Foods) also published a very practical guide on *HACCP Principles & Application* in 1997 that's free to download and excellent for reference.

The European Commission has produced guidance in a *Commission notice on the implementation of food safety management systems covering prerequisite programmes (PRPs) and procedures based on the HACCP principles*.

The FSA website has useful and free to use resources that can support businesses to conduct a food safety hazard analysis. The MyHACCP tool is web-based application: *MyHACCP* or for very simple operations the Safer Food Better Business initiative could be used although it is primarily aimed a small caterers and shops.





# 4 / SYSTEMS AND PROCESSES SUPPORTING FOOD SAFETY /

These are elements of a food safety and quality management system which support the food safety policy, allowing it to function successfully. Some of these processes are the prerequisite or operational prerequisite programmes (OPRPs) for the successful implementation of hazard analysis critical control point (HACCP) explained in Chapter 3; and, others are part of the validation process to make sure management systems are working as expected. This chapter covers:

- Governance
- Training
- Business continuity
- Internal audit
- Change management
- Management of suppliers
- Traceability
- Managing incidents, investigations and non-conformances
- Loading, unloading and product handling

For each element of the food safety management system there **should** be documented:

- Policies outlining management commitments and the systems used to control hazards. This includes providing the resources required and responding proactively to any issues that arise.
- Procedures to implement and maintain the policy; detailing what will be done, how it will be done, when and by whom.
- Provision not only for training staff but ensuring that the training is effective and staff are properly equipped and competent.
- Arrangements for governance, verification, auditing, reporting and review activities to ensure that systems remain in place and effective.



## GOVERNANCE

Governance can be thought of as the collection of rules, standards and activities within an organisation to maintain and regulate it. Governance activities are aspects of HACCP verification and validation. It defines the accountability for decision making and also how an organisation is held to account. From a food safety perspective defining the standards, agreeing the rules and holding the business to account is generally the role of the technical team, which may be internal or a contractor.

To be effective the food safety governance structure **should** be consciously considered as a whole to monitor and maintain the food safety management system and **should** comprise the following elements, specific advice on many of them is given later in this chapter:

- defined and measured key performance indicators (KPIs) for food safety;
- internal audits on Critical Control Points (CCPs) and the food safety management system and inspections of fabric, hygiene and housekeeping;
- regular and routine reports, shared with the accountable supervisors and the appropriate management level;
- regular and routine cross functional team meetings at all levels and a frequency appropriate to the information reported;
- incident investigation reviews with root cause analysis and corrective and preventative action;
- mechanisms for continuous improvement and change management;
- management review.

Additional support from independent review can on occasion be beneficial. External oversight of systems or the use of professional expertise can support governance activity.

## TRAINING

Food safety training is a foundational prerequisite which is not only a legal requirement, so **must** be done, but also underpins every other chapter of this guide. Training **should** not only cover what the correct procedures and controls are, but also why they are important.

**Elements of food safety training which must, should or are recommended to be in place are:**

- All food handlers throughout the cold chain **must** be trained in the basic principles of hygiene before they start work, even if they only come into contact with food that is fully wrapped and packaged. This takes place during induction or may be delivered by an employment agency. In the case of the latter, the business **must** ensure the content of the training meets the required standard.
- Individuals responsible for managing HACCP **must** have adequate training on the HACCP principles. The appropriate level depends on the complexity of the operation. For simple operations limited to storage of packaged product level 2 would be appropriate and proportionate, whilst for open product handling this **should** be at least intermediate or level 3. Best practice is level 4 and for high-risk product handling activities this is **recommended**. The remainder of the HACCP team primarily contribute their knowledge, however they will also need a working understanding of HACCP and formal training on the basic principles of food safety and hygiene.
- Staff carrying out checks as part of critical control point (CCP) and operational prerequisite programmes (OPRPs) monitoring **must** have training in how to carry out these duties and demonstrate that they are competent to do so. Supplementary food safety training is **recommended** to level 2 or equivalent which will equip these staff with greater understanding of the impact of these tasks.
- It is recommended that a food safety training programme and records are documented and delivered using a mechanism that establishes a thorough understanding of food safety, in line with the risk of the task they perform and include a mechanism to assess competency once training is completed.

- Training **should** be carried out by a trained and competent trainer.
- Non-food handling staff for example staff who carry out hygiene tasks, engineers, supervisors and managers who are not involved in food handling but can impact on food safety **should** have food safety awareness training relevant and commensurate to the potential food safety impact of their role and responsibilities.
- The degree and level of training **should** be consistent with the job role, specifically, the responsibility it carries and the potential impact on food safety. Whilst there are no hard and fast rules and each site and business will have its own risk profile the following general approach can be applied.
  - **Food Hygiene Level 2** – Open food handlers, HACCP team members, operators carrying out CCP checks.
  - **Food Hygiene Level 3** – Managers and members of the food safety team.
  - **Food Hygiene Level 4** – Food safety team leaders.

  Some further guidance on training for specific roles can be found in the *Wholesale Distributors: Food industry Guide to Good Hygiene Practice* which is available to buy from the stationery office at www.tsoshop.co.uk
- Training and awareness of key food safety aspects relevant to the business **should** be ongoing. Refresher training, posters and briefings can all be used alongside hygiene inspections, which **should** be in place and reinforced by managers. These also support a food safety culture (culture is covered in Chapter 2).
- Staff who have roles that can impact on food safety **should** be trained against documented standard operating procedures for the tasks they carry out. Examples include training for cleaning, waste handling and engineering activity.
- Operators **should** be trained and encouraged to spot and report issues and avoid actions that make the situation worse.
- Staff **should** be aware of customer or policy requirements.
- It is **recommended** that all who work on site or visit have an appropriate level of food safety training, instruction and supervision.
- It is **recommended** that the training and support materials are provided in the native language of staff, and comprehension is fully checked to ensure training is effective.

## ASPECTS OF FOOD SAFETY TRAINING

It is important that operators are trained in the food safety aspects relevant to their job, this aids assimilation of the key aspects and staff appreciation of their personal impact and responsibilities to food safety.

Food safety training **must** cover all of the following topics which are relevant to the food handlers role and commensurate with their level of responsibility:

- Allergens (see Chapter 7 of this guidance).
- Contamination sources and their control (see Chapter 6 of this guidance).
- Clean as you go, hygiene and good housekeeping (see Chapter 8 of this guidance).
- Food safety critical control points (see Chapter 3 of this guidance).
- Food safety hazards (see Chapter 3 of this guidance).
- Temperature-control in the food chain and food poisoning (see Chapter 5 of this guidance).
- Product handling standards (see Chapter 4 of this guidance).
- Personnel hygiene (see Chapter 8 of this guidance).
- Pest control (see Chapter 6 of this guidance).
- Raising food safety and security issues and concerns.
- Reporting illness (see Chapter 8 of this guidance).
- Site hygiene rules, eating smoking etc (see Chapter 8 of this guidance).
- Site security (see Chapter 9 of this guidance).

## FOOD HYGIENE TRAINING PROVIDERS

Training courses are available which are provided or recognised by the Royal Institute of Public Health and Hygiene (RIPHH), the Chartered Institute of Environmental Health (CIEH) and the Society of Food Hygiene and Technology (SOFHT). Food hygiene training courses specific to food handling in the cold chain storage and distribution sector are not generally available. Bespoke courses developed in house can be specific and relevant whilst still covering all bases.



## BUSINESS CONTINUITY

Planning and resilience go hand in hand, so a business continuity plan, sometimes called a disaster recovery or incident management plan is an essential proactive management tool and a HACCP prerequisite (Chapter 3). Food safety is just one consideration amongst significant potential issues: fires, natural disasters, power cuts, loss of key services or resources, serious accidents, refrigerant releases, fraud, cyber-attacks and now pandemics! Never has it been more important to have a comprehensive and up to date plan; one which has been practised and where everyone is aware of their role.

A business continuity plan is designed to assess and mitigate the likelihood of potentially disastrous incidents that can halt normal business activity and provide guidance on how to deal with incidents themselves. Considering issues up front removes the need to think about how to manage a situation under stress; allowing the business to rapidly identify, evaluate, and react to emergency situations and protect customers, consumers and the business.

### WHAT SHOULD COLD CHAIN BUSINESSES CONSIDER?

From a food safety perspective business continuity could consider a whole range of potential issues. For example, the impact of flooding in a food storage area; issues causing the loss of refrigeration; clandestine travellers in vehicles; food fraud or cyber-attack that implicates the integrity of food, its traceability or specification information; loss of building integrity or significant contamination exposure; a pest infestation or loss of transport on short life perishable foods.

The process starts with an impact assessment considering the main business risks, including those above using a risk matrix, an example of which can be found on page 18 of Chapter 3.



## Example of a business continuity risk assessment

| | RISK RATING | | | | RESIDUAL RISK | | |
|---|---|---|---|---|---|---|---|
| **Business Risk** | **Probability** | **Impact** | **Direct Risk** | **Risk Control Measures** | **Probability** | **Impact** | **Direct Risk** |
| Loss of refrigeration | 5 | 5 | 25 | Regular scheduled maintenance is carried out by authorised contractors. In the event of a failure, restricting all access can limit temperature rise to 1°C each day. Product at risk could be trunked to alternative sites or stored on vehicles. | 3 | 4 | 12 |
| Loss of or disruption to IT systems. Loss of physical assets/ network access/ cyber attack | 5 | 5 | 25 | Data is backed up to independent servers every 24 hours. System fall over tests and maintenance completed regularly. Firewalls in place to restrict website access and spam filters in place to reduce cyber threats. | 3 | 3 | 9 |
| Loss of operator's licence or site certification | 3 | 4 | 12 | High level of management committment to food safety and standards. Food safety management system in place, compliance audits and regularly reviewed KPIs proactively highlight weaknesses which are promptly acted upon. | 2 | 2 | 4 |
| Threat to site security | 3 | 2 | 6 | The site has a secure eight foot boundary fence, CCTV in operation and visible to a 24/7/365 manned gatehouse. Access to site is via security barriers. Access to the warehouse is through a tensor activated turnstile and there is restricted access to office areas to authorised personnel only again via the tensor keycard. | 1 | 2 | 2 |
| Road traffic collision | 2 | 3 | 6 | Camera systems are installed in all vehicles to record instances of road traffic collisons or inappropriate behaviours and telematic systems monitor driver behaviour. All drivers are correctly licensed for the vehicle type and have current CPC training which includes modules on accident management, spillage, and relevant legislation. An accident or breakdown procedure is in place and accessible to drivers which instructs on how to protect and monitor loads. | 1 | 2 | 2 |

**The continuity plan should also document:**

- the cross functional members of the incident management team, their deputies and responsibilities;
- essential 24 hour emergency contacts (see below);
- the actions and process to follow for each identified highest risk exposure event with as much detail as reasonably foreseeable;
- arrangements for prompt communication to all stakeholders;
- the three stages of an incident **should** all be considered as elements of the business continuity plan:
  - considering and mitigating the effects, both during and immediately after an incident, including customer contingency plans;
  - establishing temporary solutions until full recovery is achieved;
  - putting in place a permanent recovery in the shortest possible time;
- the requirements for documentation of all decisions and actions; product traceability and the supporting information. This will be important for the subsequent investigation and **should** be dated and bound or digitised as it will be admissible evidence for any judicial proceedings or insurance claim;
- the requirement for a post incident investigation and review covered in more detail later in this chapter.

The business **should** have objectives focussed on implementing mitigation activity for the highest risk issues in order to continuously reduce business exposure.

Regardless of the type of incident; when one occurs the possible impact on food safety **must** be considered.

## Emergency contacts list for the business continuity plan

| | |
|---|---|
| **Senior management** | Members of the crisis management team, other senior contacts. Work and out of hours. |
| **Customers** | Including 24 hour emergency contact details. |
| **Utilities** | Gas, electricity, water, waste, internet. |
| **Emergency services** | Police, fire, medical. |
| **Local organisations** | Local authority emergency planning group, Environmental Health and Trading Standards, local community association. |
| **National organisations** | Health and Safety Executive, Food Standards Agency, certification body, Cold Chain Federation. |
| **Specialist knowledge experts** | Insurance broker, general council, IT provider, public relations. |
| **Support services** | Refrigeration, racking, logistics, plant hire, analytical laboratory. |
| **Other key suppliers** | |



## INTERNAL AUDITS

Once food safety standards are defined, training done and monitoring processes in place; internal audits and inspections are an opportunity to do a health check; they are a HACCP verification activity (see Chapter 4). This not only verifies that the plan is being faithfully followed (compliance), but also that it is **effective** at preventing the issues as intended. It allows businesses to proactively fix problems, grow a positive food safety culture and address weaknesses before they become an issue. This could be a customer complaint, an issue raised by the local authority or a non-conformance from an auditor or customer visit.

Whilst the BRCGS and many customer standards require internal audits, it is a mistake to treat them as a tick in the box, as potential benefits can be missed. The CCF **recommend** internal audits be used as a powerful tool to probe the effectiveness of systems. Against Issue 3 of the BRCGS Storage and Distribution Standard internal audit is amongst the clauses for which non-conformances are most often raised, so particular attention **should** be placed on the following aspects:

- **Scheduling audits at a frequency defined by risk, covering the full scope of the standard and all locations**. Audits **should** be scheduled throughout the year not on just in one but at least two hits and ideally more. These usually lack the detail, depth and rigour needed or are not reflective of all year round operation. For example using an external consultant to carry out a BRCGS style internal audit before the annual audit is due might seem to tick a box but does not add much value and will not be seen as compliant by an auditor. Frequency **should** focus more on area's where compliance is critical and where issues most often occur, rather than on those activities that never go wrong. The risk assessment is about documenting this thought process and its conclusions.

  If a third party warehouse is in use and it is under the business management control it **should** be included directly in the scope, or else indirectly under the management of suppliers and contractors.

- **Keeping records of conformance as well as non-conformance**. As simple as: if it has not been written down, it hasn't been done. A record of the documents and evidence reviewed during the audit **should** be made.

  Records **should** include collecting evidence, e.g. documents or photos, that show that non-conformances have been corrected and reviewed before being closed. For significant non-conformances or ones that are repeatedly found, a root cause analysis **should** be carried out in an effort to identify and apply preventative corrective actions.

- **Using competent internal auditors who are independent of the area being audited**. This can be tricky, especially in the technical function and in small teams. To be really effective internal auditors need to have more than documented formal training in auditing and HACCP. They have to know what to look for, how to spot compliance and have enough knowledge of the area to determine whether the systems are effective. They have to prepare, execute and record audit findings; then submit the report, follow up and verify corrective actions. So consider very carefully, unless a business has a well-developed positive food safety culture and auditors are very well trained; cross functional internal auditors often do not have the skills, motivation or sufficient time. External expertise can be contracted, but consultants need to have the right qualifications, training and knowledge.

## CHANGE MANAGEMENT

The intention of a change management process is to ensure that any modifications to business practice is first assessed for its impact on food and health and safety. Change management is an essential prerequisite. It **should** be applied to all significant changes introduced within a business which have any kind of impact across more than one function or department. Its benefit is optimised when applied to change activity in all teams and is a truly cross functional exercise. Implemented properly it can be a powerful management tool, proactively preventing problems and increasing engagement in and acceptance of change.

It is an exercise to formally consult with other teams so that the full implications and potential issues can be considered upfront, and the appropriate adjustments and preparations made across the whole organisation.

Change management is not suitable for all changes, larger projects will require a more formal and structured project management approach.

### TIP

**Examples of change that would benefit from a change management process:**

- A change to operational shift patterns which might mean that windows for hygiene and maintenance have to be changed; or additional CCP training carried out to ensure there are sufficient trained operators to do checks.
- The introduction of new equipment, the safety of which needs to be checked, operating procedures written, training carried out, a new HACCP study conducted and hygiene schedule developed.

All these necessary tasks for successful implementation are the accountability of different teams. Approached in a co-ordinated way with clear responsibilities, timeframes and good communication it can avoid the disruption or additional expense even small changes can cause.




## MANAGEMENT OF SUPPLIERS

All suppliers can directly or indirectly impact on food safety. Whether it is a consumable, piece of equipment or service, suppliers **should** be subject to controls. These controls ensure that food safety is not compromised and that the items or services purchased are to an expected standard. Management of suppliers is a prerequisite for both HACCP and Threat Analysis Critical Control Point (TACCP).

Good supplier and contractor management is essential to avoid unexpected disruption, additional costs and risks to safety and security. Procedures **should** include an approval process; having contracts or agreements in place covering specifications, expected standards and legal requirements, and; arrangements to supervise and monitor performance. Even if it is short term, avoid 'spot' buying by considering contingency upfront or having 'emergency' approval requirements.

**Typical suppliers for storage and distribution will include:**

- Pest control.
- Laundry services.
- Contract cleaners.
- Contracted engineering or maintenance services such as for MHE and refrigeration servicing.
- Equipment suppliers.
- Consultants.
- Subcontracted vehicles or storage facilities.
- Agency labour providers.
- Canteen services.
- Waste management contractors.

All suppliers and subcontractors **should** be subject to approval against a set of food safety criteria specific to what is supplied and proportionate to the risk. Criteria would be very different between an outsourced temperature-controlled storage supplier and laundry services.

**Typically, criteria to consider might include a combination of:**

- Successful physical audit by a competent auditor.
- Satisfactory self-audit questionnaire reviewed by a technical professional and followed up if needed.
- Accreditation or certification to a professional body or certification standards like BRCGS, for outsourced warehousing.
- Professional training to a recognised level such as the Air Conditioning and Refrigeration Industry Board (ACRIB) Gold Card, or the appropriate National Vocational Qualification for refrigeration engineers.
- Licensing or registration to a scheme or regulating department or organisation, for example waste licensing by the Environmental Agency and labour providers to the Gangmasters and Labour Abuse Authority.

All suppliers **should** have one or a combination of agreements that clearly define the expected service and the standards, including for food safety; the consequences when they fail to be met; any requirements for monitoring performance and the frequency and nature of formal reviews. These can be documented in a contract, specification, service level agreement or memorandum of understanding.

Supplier approval is an ongoing process, maintenance **should** be at a defined frequency for licence, certification renewal or re-audit. Supplier review may be in the form of a meeting but **should** be against the performance criteria set down in the contractual agreement. Where suppliers need to improve, monitoring and review **should** be increased in level and/or frequency.

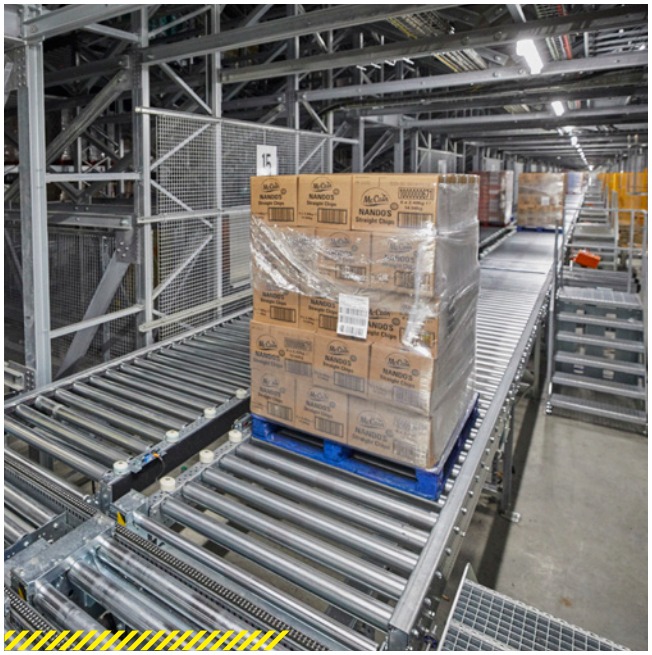
## TRACEABILITY

A business **must** have the ability to track each pallet of product from where it has originated, through arrival, storage, despatch and transit to its destination. This is a legal requirement, a customer requirement and a fundamental clause in the BRCGS *Storage and Distribution Standard*.

Traceability is another prerequisite system for HACCP and Threat Analysis Critical Control Point (TACCP). Even during storage and distribution of products not owned by the business, a system to be able to trace batches of product **must** be in place. As a part of the site Quality Management System there **should** be a document that describes how the traceability system works and references to the specific documents required. Traceability information **must** be easy to retrieve and regularly tested. The system **must** identify where the product came from, the vehicle, when it was booked in, codes to identify the product and the batch to which it belongs and the facility where is it stored. When despatched the same information including details of the destination and vehicle **must** be recorded.

If authorities request the information, or customers enact product recalls, it is essential that traceability information can be rapidly retrieved in a format that is easy and effective for communication. Whilst traceability can be paper based, it is more efficient, accurate and effectively managed digitally. The use of radio-frequency identification (RFID) and scannable codes are becoming more common and **recommended** as best practice since manual entry can be subject to human error. Such systems can significantly speed up access to and transparency of information. With certification standards having a limit of 4 hours to complete a traceability and the need to include mass balance to account for all product digital systems can be a distinct advantage.

Traceability systems **should** be able to account for 100% of product, including any that is taken for sampling or that is wasted, for example, due to damage. Challenge testing **should** be carried out at regularly defined intervals under different scenarios, including at night, both to and from source and destination and for simulated recalls. It's important to document and try and learn from each one, using the information to continuously improve systems.




## MANAGING INCIDENTS, PRODUCT RECALL, INVESTIGATIONS AND NON-CONFORMANCE

When issues arise, procedures **must** be in place to deal safely with the situation and protect the safety and legality of the food. These procedures are prerequisites and crucial for food safety. They ensure consumers are protected and can prevent re-occurrence. Whether it is contamination, an incorrect temperature, damage, a suspicion of fraud or any other non-conformance which arises, the first actions to thoroughly assess and contain the situation can significantly impact on the overall outcome. This **should** be carried out by a member of the team with suitable authority and competence. Where the incident involves a potential for contamination through breakage or spillage it is **recommended** that this chapter be read in conjunction with detailed guidance at the end of Chapter 6 on contaminants.

- Immediate corrective actions stabilise the situation, prevent the issue from becoming worse and return status to standard operating condition if possible. If product is involved it **must** be identified, protected and contained. That might mean rejection on arrival; repalletising and overwrapping to provide stability; or could involve cordoning off an area and restricting access.

- External stakeholders i.e. the customer or product owner **should** be contacted and appraised of the situation for decision making where necessary or the appropriate authorities notified (see below).

- Quarantine of affected product can be in a physical area of the warehouse and/or a location digitally locked to prevent picking. Any affected product **should** be accounted for in a documented mass balance up to and including either disposal or release under concession.

- The next step is to gather as much information and evidence as possible. Serious or regularly occurring issues warrant deeper investigation to understand the root cause. This **should** be formal and can be done using tools such as root cause analysis (RCA) and the five whys. Online training and websites explaining RCA techniques like mindtools for example are widely available.

- The process **should** yield preventative corrective actions to stop repetition. Start with a clear and factual statement of the issue. Use the five whys to get to the true cause of an issue. Insufficient depth can mean corrective actions which treat only the symptom.

- Brainstorming with the wider team is a good mechanism to yield insights into causes and the development of practical and enduring solutions. It also supports understanding and acceptance when implementing actions and a food safety culture.

- Corrective actions are best allocated to specific individuals to be completed in a defined time frame. Closure **should** be verified and evidence of completion signed off and kept on file. Release of product **should** only be on the authority of the designated and technically competent person.

Incidents, non-conformances and the corrective actions **should** be logged, trended where appropriate and discussed as part of the management review process. This can help to identify continuous improvement objectives for progress by the particular functional team.

Retained EU law, Regulation 178/2002 places an obligation on the food business operator to bring issues of unsafe food to the attention of the competent authority. Where there is a food safety issue which poses a risk to consumers and may require a public recall, a food business **must** report it to the local authority and the Food Standards Agency (FSA) through the website: food.gov.uk. In the event that an issue arises, a discussion is needed with the relevant supply or customer and a decision made on who will do this. It is usually the brand owner but this can't be assumed. The FSA will require details of the product, the affected codes, the retailers through whom the product is sold to the consumer, details of the issue and any investigation and action to date. Having considered the evidence the FSA may issue a recall notice and oblige the business to notify customers, instructing them to put up recall notices in store. Most cold chain storage and distribution businesses with the exception of wholesale business will not be the brand owner. However, there is an obligation both to quickly raise and discuss issues and concerns and to promptly provide complete and accurate traceability information if requested. This will enable the investigation and allow all affected product to be accounted for.

Often overlooked, the BRCGS *Storage and Distribution Standard* also requires that a business which enacts a recall **should** notify the certification body, they need to do this within three working days.

## THE FSA WEBSITE STATES:

If you believe food or feed you have supplied is either harmful to health, unfit for people to eat or does not meet legal requirements, you **should**:

- Immediately withdraw or recall the food from the market.
- Tell your competent authority (local authority or port health authority), which will advise you of any further action you might need to take.

If you believe unsafe food has reached consumers, tell the FSA incidents team. A recall notice may need to be issued.

To help with this, you need to be able to identify your suppliers and food business customers.



## LOADING, UNLOADING AND PRODUCT HANDLING

Whilst strict and well defined monitoring and controls are often in place for storage and transport, transfer activities are of equal importance and can form essential aspects of OPRP programmes or sometimes even as CCPs. Detail on OPRPs can be found in Chapter 3 of this guide (HACCP) and on temperature-control in Chapter 5.

There **should** be a comprehensive set of policies, rules and checks in place throughout the process to ensure product is secure and maintained in food safe condition and cross contamination avoided. There are some legal requirements which **must** be included, whilst all others in the checklist below **should** be included:

- Vehicles **must** be maintained, clean, free from taint or potential contaminants.
- Any products which require different or even segregated storage or handling. This can be legislative and **must** be followed e.g. mince at ≤2°C; due to fragility, specific customer policy, heightened allergen risk (for example sacks of sesame seeds) or potential for taint. These exceptions might form OPRPs.
- Traceability **must** be maintained, requirements are covered earlier in this chapter.
- Operators **should** inspect the load carrying area of the vehicle prior to loading and unloading, such inspection **should** cover:
  - A check to verify the temperature at which it is set and operating.
  - The stability of the load and that it is free from damage.
  - The presence of other items being carried do not pose a risk.
  - The cleanliness and/or presence of dirt, debris or mould growth.
  - Fabric damage.
  - The condition of weather and pest proofing.
  - Fittings are clean and intact – securing bars, lashing points, strip or insulating curtains, bulkheads, lights and temperature sensors.
  - Odours or taints.
  - Excessive ice build-up.
  - Excessive moisture or humidity.
  - Evidence of unauthorised access to the load area.

The outcome of the inspections and any corrective actions **should** be recorded and traceable to the particular load.

- Vehicles presented for loading **should** be swept of debris, cleaned if required or rejected for loading.
- Re-palletisation and wrapping standards maintained. These **should** ensure no product overhang off the pallet and secure stretch wrapping or strapping is safely secured to the pallet.
- Correct storage off the floor or vehicle bed. Products **should** be placed on pallets or on racking unless loading to or from a specifically designed reefer.
- Prohibiting the use of snap off blades in any food area.
- The thorough pre-chilling of vehicles – it can take up to two hours for the fabric to be fully chilled from ambient.
- The setting, checking and monitoring of refrigeration units at the correct temperature in the load carrying area on loading and during delivery.
- Vehicles to be secure and carry the appropriate seal.
- Defined standards for the maximum time and temperature conditions for loading, unloading, booking, cross docking, marshalling or move to storage. More on this in can be found in Chapter 5 of this guidance.
- Mixed loads with incompatible non-food products, which **should** be avoided or have specific separate compartments, including separate compartments for chilled, frozen and ambient foods.
- Loading standards that may include rules such as: open product above wrapped; ready to eat above raw; light products above heavy; clean above dirty (i.e. produce); and, last on first off and restrictions on pallet height.
- Consideration of specific customer needs.
- Operator training.


T047
T20




# 5 / TEMPERATURE MANAGEMENT /

**For food safety in the cold chain, unbroken and effective temperature management, which is appropriately chilled or frozen is business critical and must be in place. Specific elements of temperature-control are likely to be critical control points (CCPs) and operational prerequisite programmes (OPRPs), the principles of which are dealt with in Chapter 3 of this guidance; with general temperature management a food safety prerequisite.**

The primary objective for food safety and regulatory compliance with respect to temperature, is control of **product** temperature; however, as **air** temperature forms the basis of almost all existing storage and distribution control systems the relationship between air temperature and product temperature **must** be understood. Definition and validation of operating standards, selecting the correct monitoring and recording systems, good maintenance, calibration, managing breakdowns and temperature discrepancies across storage and transport are the essential elements for temperature-control. All of these will be explored in this chapter.

Cold chains are complex and temperature regimes within them vary enormously, although standard practice is storage and transport at 0-8°C for chilled and ‹-18°C for frozen, setting a business standard is more complex. It also has to take account of the different temperature requirements for particular foodstuffs, governed by legislation, food safety or quality and stated customer standards. Compare ‹4°C for meat and fish with 8- 12°C for salads. The regulatory landscape for temperature is fragmented with rules scattered across *the hygiene regulations, The Food Safety Act and the Quick Frozen Food Regulations*. Even brief fluctuations in temperature for products such as bread, flour, confectionary and ice-cream can adversely affect product quality. Customer standards too can be diverse and do not always directly align to certification requirements, regulation, codes of practice or even HACCP. The cold chain is sometimes expected and inefficiently used to compensate for shortcomings in other parts of the overall supply chain.



## CHILLED FOOD TEMPERATURE REQUIREMENTS

| Food stuff | State or stage in the process | Temperature requirement Reg 853/2004 | Temperature requirement ATP | Conditional criteria |
|---|---|---|---|---|
| Fresh meat (not otherwise mentioned) | Post chill storage and distribution | ≤7°C | | Temperature to be maintained during storage and distribution |
| Red meat, large game and meat preparations thereof | Storage and distribution | | ≤6°C | |
| Offals | Post chill | | ≤3°C | |
| Minced meat | Post production storage and distribution | ≤2°C | | |
| Minced meat and preparations thereof | | | ≤2°C * | |
| Small game and poultry | | ≤4°C | ≤4°C | |
| Mechanically separated meat | | ≤2°C | | |
| Meat preparations | | ≤4°C | | |
| Egg | Shelled/Liquid egg | ≤4°C | | |
| Raw milk | Storage and distribution | | ≤6°C | Except farm collections (10°C) |
| Products of animal origin | | | ≤6°C * | Except those otherwise mentioned or salted, sterilised, dried or smoked |
| Concentrated fruit juice and RTE prepared vegetables | | | ≤6°C * | Except those just washed, peeled or cut in half |
| Fish products and preparations | | | ≤6°C * | Except those mentioned below |
| Untreated fish, molluscs and crustaceans | | On melting ice or at the temperature of melting ice | | Excluding still live |
| Pasteurised milk, fresh dairy inc. fresh unripened cheese | | | ≤6°C * | |
| Ready to eat meat and fish | | | ≤6°C * | |
| Any food able to support the growth of pathogenic micro-organisms or the formation of toxins | | 8°C | | Other than those already mentioned |

* Or at the temperature indicated on the label and/or transport documents

When setting temperature targets, it is important to consider any temperature indications provided on packaging which may be different from regulation, for example *'store chilled below 5°C'* on pre-packed ham when the regulatory maximum is 8°C. Customer policies may also contain specified limits that are lower than the regulated maximum. These lower temperatures may have been used to establish the safe shelf life of the food products, so it is important to identify and consider all of the applicable temperature regimes; then select and apply the lowest temperature as the standard.

## FROZEN FOOD TEMPERATURE REQUIREMENTS

Food is technically frozen at -12°C (although all free water is not crystalline until -40°C). Storage and transit at -12°C will not impact on food safety, though storage at this temperature over extended time periods can affect product quality and shorten the optimum 'best before' keeping life. The Quick Frozen Food Regulations cover temperature requirements in detail and are discussed in Chapter 2 of this guidance.

The Food Standards Agency takes a very precautionary approach, recommending -18°C. Although not necessary for food safety, -18°C was historically adopted as accepted practice as it corresponds to the 0°F adopted in the USA. Customer policies and standards also have to be taken into consideration. Rules on managing temperature during storage and distribution **should** be followed.

## EXISTING STANDARDS FOR MAXIMUM TEMPERATURE OF FROZEN PRODUCT DURING STORAGE AND TRANSPORT

| Food material or product | ATP[3] standard for frozen food maximum temperature | Hygiene Regulation (EC) 853/2004 frozen storage and transport temperature requirements |
|---|---|---|
| Ice cream | -20°C | |
| Frozen or quick (deep)-frozen fish, fish products, molluscs and crustaceans and all other quick (deep)-frozen foodstuffs.* | -18°C | |
| All frozen foodstuffs (except butter) . | -12°C | ≤3°C |
| Butter | -10°C | |
| Minced meat, meat preparations, mechanically separated meat** (MSM). | | -18°C |
| Freezing in brine of whole fish intended for canning. | | -9°C |
| Fishery products.*** | | -18°C |

[5] ATP, United Nations Economic Commission for Europe Agreement on the International Carriage of Perishable Goods and on the Special Equipment to be Used for such Carriage.

* Council Directive 89/108/EEC relating to quick-frozen foodstuffs for human consumption.

**If, after chilling, MSM is not processed within 24 hours, it must be frozen within 12 hours of production and reach an internal temperature of not more than –18 °C within six hours. Minced meat, meat preparations and MSM must not be re-frozen after thawing. Frozen MSM must not be stored for more than three months.

*** Transport and vessels must have refrigeration equipment with sufficient capacity to maintain fishery products at not more than -18 °C. Food business operators need not comply when frozen fishery products are transported from a cold store to an approved establishment to be thawed on arrival for the purposes of preparation and/or processing, if the journey is short and the competent authority so permits.

## MANAGEMENT

Customer requirements **should** be taken into consideration, if there is no specific written policy, advise them of the existing storage and distribution standard in place for chilled and frozen product, including realistic tolerances for an acceptable product delivery standard. A written standard of customer acceptance and rejection criteria should be in place including the expected response following a failed check.

Handlers **should** have procedures and know what to do if temperatures, either of product or air in storage and refrigerated staging areas are found outside the set limits defined in the HACCP and prerequisite plan (as described in Chapter 3). Where it is practical, for example with warehouse air temperatures, it is beneficial to have warning limits to allow correction before CCP limits are breached. Where non-conformances occur record and manage them in line with the incident management guidance in Chapter 4.

### BEFORE LOADING

Picking **should** be carried out in a temperature-controlled area.

It is **recommended** that vehicles are pre-chilled and given sufficient time to reach the correct operating temperature. From an ambient temperature it can take up to two hours for the vehicle fabric to be fully chilled. The set point and the air temperature **should** both be checked prior to loading. On multi-drops, the air temperature **should** be checked each time the doors are opened.



* Or at the temperature indicated on the label and/or transport documents

## TEMPERATURE DURING LOADING AND UNLOADING

During normal operations, temperature sensitive foods are most vulnerable during handling activities. Whilst it is standard practice to have temperature monitoring during storage and transport, temperature changes during transfer points also require consideration.

Four temperature readings **should** be taken using a validated method: Top and bottom of the load by the doors, in the centre of the load. Then either: product closest to the return air (warmest) or for sensitive chilled product substitute with product closest to the air coming off the fridge unit (coldest) to check that product has not become frozen.

Loading and unloading **should** be done promptly so that product is standing outside of the ideal temperature environment for a time that is insufficient to impact on product safety, particularly on open or unrefrigerated docks. The maximum time and temperature **should** be defined and justified through validation to a documented procedure taking into account worse case local and seasonal environmental factors. Data loggers are available and can be used to verify the effectiveness of any rules.

It is **recommended** that fridge units continue to run for the loading and unloading of chilled product as these products are much more vulnerable to temperature changes. An open door places more work on the refrigeration unit; the ingress of humidity can cause icing up making equipment less efficient and enables condensation formation, with the potential to weaken paper and cardboard packaging and creation of microbial issues. This makes it very important to minimise the time that vehicle doors remain open.

For frozen products, generally loaded with the fridge unit switched off, the fridge **should** re-engaged immediately after the doors are closed.

## GOOD DESIGN

It is **recommended** that docks are enclosed, with covered bays that are refrigerated. Designs for new vehicles and docks **should** consider the ability to keep doors closed until fully docked or fitted with curtains to protect the load area from warm air as well as weather and contaminants.



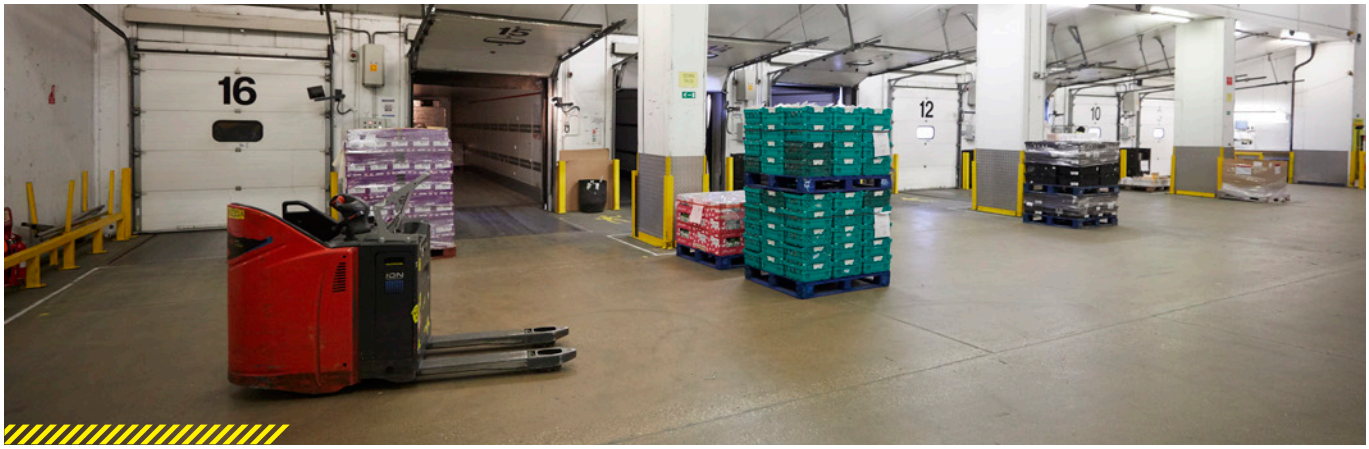
## CASE STUDY

### Loading docks that ensure the cold chain remains completely unbroken

One CCF member has incorporated the latest developments into their newest warehouse. Their new loading bays allow the trailer to reverse, sealing directly onto the bay whilst allowing trailer doors to remain closed.

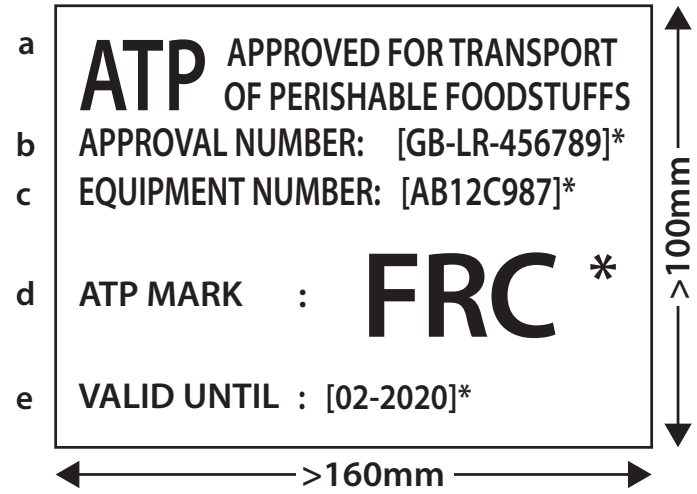
The vehicle doors then open directly onto the loading bay as and when the operators are ready to unload. The design allows for the cold chain to remain completely unbroken, restricts the opportunity for contamination and temperature compromise of both bay and trailer as well as improving yard safety and overall security.

Although the new dock design requires a slightly deeper bay area than traditional designs this forward thinking business are happy to invest in retrofitting where possible as well as in new builds.



# TRANSPORT

## Temperature-controlled transport refrigeration classification




*The international ATP standard* defines the capability of mechanically refrigerated vehicles to reach and maintain specific load carrying area temperatures, based on an empty insulated box with an external ambient temperature at 30°C. When licenced to the standard the vehicle is fitted with a plate as pictured.

* The particulars in square brackets are given by way of example.

It is **recommended** that all transport of chilled or frozen food is undertaken in the correct classification of vehicle; as well as vehicles bearing a plate to demonstrate a vehicles capability and capacity to maintain safe specified product temperatures. The required vehicle classification and the operating capability of temperature monitoring and recording methodology and equipment can be included in service level agreements when contracting logistics providers to clarify and simplify expectations between all parties.

## TEMPERATURE MONITORING IN THE COLD CHAIN

**a) Equipment considerations which should be taken into account**

Wasteful destructive temperature sampling **should** be avoided. Instead, non-destructive (between pack or case measurements) is more suitable. The thermocouple **should** ensure good product contact and sufficient length to minimise any conductivity error. The sensor used **should** be pre-cooled to be close to the expected product temperature. Often it is most practical to keep probes hygienically stored in the area of use.

Infra-red (IR) equipment is very useful for loading and unloading activity when speed is required. When choosing IR business **should** appreciate and take into account the limitations of the technology.

- Only the temperature of the surface of the outside of the pallet or trolley is being monitored, in the event of deviation the actual temperature **should** be verified with a between box or pack surface contact probe.
- IR is not always as accurate as traditional penetration, needle, between pack, or surface probes and can be up to 2°C out. The deviation **should** be established and built into the monitoring standard.
- IR thermometers **should** be checked against a calibrated contact probe.

Traditional calibrated handheld contact thermometers **should** be retained for back-up, verification and in the event of discrepancies.

Both the ATP standard and UK's *Food Law Code of Practice Guidance* provide the following standard for manual temperature monitoring equipment. It's a good documented standard and **recommended** as best practice, thermometers:

- have a valid calibration certification from a UKAS accredited service provider;
- have a display operating in increments of at least 0.1°C;
- be capable of reaching 90% of the final temperature reading within three minutes;
- have an accuracy of +/- 0.5°C within the measurement range of -20°C to +30°C;
- vary no more than + / - 0.3°C within the measurement range of -20°C to +30°C;
- be robust and shock proof and are regularly checked for accuracy;
- be protected from the undesirable effects of condensation;
- be hygienic and designed to ensure good thermal contact with the product.

The Quick Frozen Food Regulations, ATP and BSI Standards specify that temperature monitoring equipment used for transport, storage and distribution **must** comply with EN standards.

- **BS EN 12830 (2018):** This European Standard specifies the technical and functional characteristics of temperature recorders for the transport, storage and distribution of temperature sensitive goods between -80 °C and +85 °C. It not only applies to chilled, frozen, deep frozen, quick frozen food, ice cream, fresh and hot food but also to pharmaceuticals, blood, organs, chemicals, biologicals, electronic and mechanical devices, flowers, plants, bulbs, raw materials and liquids, animals, art and furnishing.
- **BS EN 13485 (2001):** This accompanying standard sets the technical standard and functional requirements for both air and product thermometers.
- **EN 13486 (2002):** Sets the verification procedure for temperature recorders and thermometers complying with standards BS EN 12830 and BS EN 13485.

Operators **should** keep documentation to prove that temperature monitoring equipment complies with the relevant standards. If not automatically provided it will be available from the equipment supplier.

**b) Warehouse temperature monitoring considerations which must, should or are recommended to be taken into account**

Air temperature monitoring **must** be in place, with defined critical limits and corrective actions taken when temperatures move outside of the acceptable standard. The monitoring **should** take place at defined intervals, confirmed by validation exercises which are sensitive enough to allow intervention before product temperature exceeds safe or legal limits or those specified in the HACCP plan and operate 24/7/365.

The allowable tolerances must be clearly defined and understood. Suffice to say that the more frequent the check, the lower the risk of an issue which might result in product wastage. Continuous automated systems are **recommended** and **should** be fitted with alarms. Such systems **should** still be subject to verification monitoring based on risk. This will include testing that alarms function as expected, monitoring system temperatures and physical verification of chamber temperature.

There will be a number of air temperature sensors in the warehouse except in small chambers (<30,000m$^3$ ) or in retail cold storage rooms where there may be only one. The location and number of sensors required in each chamber will vary but **should** be positioned to give as good an overview of chamber temperature as possible, taking into consideration the following:

- Distribution **should** be representative of the warm spot locations of the chamber. This can be established through a survey to model the temperature profile.
- Each doorway **should** have an associated probe but positioned at least 6m away so it is not overly sensitive to the short term influence of the door being opened.
- Not too close to evaporator fans.
- Positioned at the height of maximum product storage.
- Approximately 20m–30m apart.
- Distributed throughout – staggered front middle and back walls.

## TIP

Probe placement example: a warehouse with a 65m x 65m footprint with two doors into the chamber might have six probes. Two at the front adjacent but 6m away from the doors, two halfway across the chamber and two on the back wall furthest away from the doors.

Note that decisions on where to place probes **should** be made by a competent engineer.

Real time temperature monitoring and control is **recommended** and supports both food safety, quality and sustainability by enabling optimum temperature to be consistently and efficiently maintained.

Technology using wireless sensors enable ease of maintenance and calibration; with pre-set warning alerts and alarms providing immediate visibility of status and performance. Such systems allows for proactive temperature management; assists with planning maintenance and facilitates understanding of the effect of defrost cycles and of doors being opened. They can help to avoid the expense of product loss and insurance claims and by understanding temperature distribution more fully provide an opportunity in future for the review and general increase in frozen storage operating temperature.

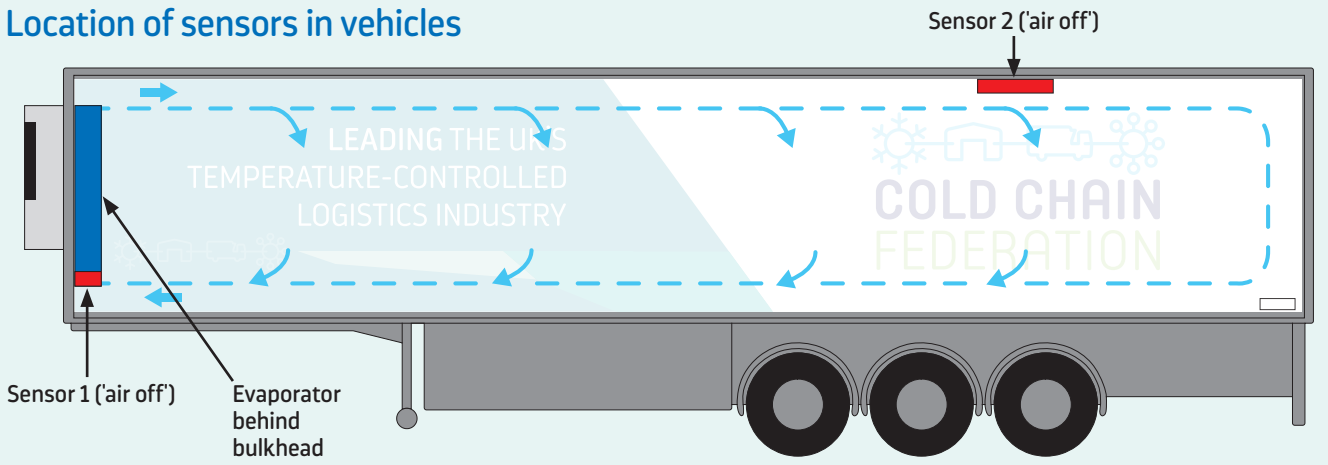
Online and cloud based records **should** be downloaded to a back-up drive to ensure they are readily available for regulatory inspectors and auditors to review if requested and as data to inform investigations.

Whilst older monitoring systems utilising paper thermographs can satisfy the regulatory requirement that temperature monitoring **must** be in place, they represent a greater risk of failure and **should** be checked frequently, at least three times daily to: ensure correct recording; monitor and react to any temperature deviation and change the paper ensuring continuous temperature records. This **must** include periods when the warehouse is closed.

Whilst manual checks as part of verification activity is a requirement. Its use as the single and primary method of control and monitoring can be unreliable, unrepresentative, inconsistent and is not recommended. Manual and paper-based systems are unsuitable for proactive preventative temperature-control and are frequently only examined when things go wrong. Incident investigations can take a significant amount of time and effort when a prompt response is inevitably critical.

Independent verification of air temperatures is a good practice. Done through placing dataloggers in various locations. This builds a temperature distribution profile for the store and can be used to identify the adequacy of refrigeration; any long term change or deteriorations in performance or be used to optimise performance.

## Location of sensors in vehicles




Source: BFFF *Guide to Storage & Handling of Frozen Foods*

**c) Transport temperature monitoring options which should be considered**

Air temperature in the load carrying area **should** be measured and recorded at the start of the journey, then at intervals, including after rest periods and load drops and at the destination. The driver **must** have access to a visual readout of the temperature, ideally from the cab, but as a minimum on the side of the fridge unit to which an alarm **should** be fitted. An alarm **should** trigger a physical check on the fridge unit and the driver **must** also know what action to take if temperatures move outside of pre-set limits.

Cold air coming off the fans **should** be uninterrupted. For double deck vehicles this requires specified limits on pallet/load height.

Cooling units in distribution vehicles are designed only to maintain the temperature of a pre-cooled load, they are not designed for chilling or freezing product. Product **should** only be loaded once the temperature is checked and OK.

With multi-drop delivery, maintaining specified frozen temperatures, a -18°C air temperature is not easy. Vehicles used **should** be operated and capable of delivering frozen foods at or colder than -15°C (it is a legal maximum temperature requirement for quick-frozen). Frozen foods not subject to the quick-frozen food regulation, in accordance with the ATP can be transported at -12°C and experience brief periods when the surface temperature of the product surface nearest to the fans may be -9°C. Although the safety of the food is not compromised, this is not an accepted practice for most UK specifiers and businesses **should** always refer to the customer agreements in place.

Maintaining both chill and frozen temperatures in summer can be challenging. Mechanisms such as roller shutter doors, well maintained strip curtains or air curtains can limit temperature rises in the load carrying area.

Most trailer units have two temperature managing sensors (there may be additional for telematics). One monitoring evaporator return air and the other a third of the way from the back of the trailer. Large differences between the return air and the set point can indicate that something is amiss. Either load temperature, fridge unit malfunction, poor air circulation or failure to prechill the load carrying area. Differences outside of normal operation (as advised by the manufacturer) warrant investigation as discrepancies can cause freezing of product subject to air immediately from the fridge unit or overwarming of product close to the doors.

For older single sensor trailers the thermometer **should** be located to measure the temperature of the evaporator return air as this **should** be the warmest point (see illustration above).

A temperature monitoring system **must** be in place which can provide a permanent record of air temperatures for the load. There are a number of systems in use for temperature-controlled transport from paper based chart and print-out systems right through to real-time digital, cloud-based temperature monitoring and recording systems. Systems where possible **should** be fitted with a visual alarm, fault codes for reporting and automated alerts, SMS messages to responsible Managers and to monitoring systems in the transport hub are useful.

Multi-compartment vehicles require separate monitoring of each compartment carrying food.

The BSI Standard, whilst not mandatory, recommends a documented verification of temperature-controls and processes within the transport network a minimum of once a month. This can be done using a calibrated data-logger or manual probe to independently check that the vehicle temperature monitoring system is accurate to within the equipment manufacturers specified tolerances. It also satisfies the BRCGS Storage and Distribution Standard (Issue 4) requirement for validation and ongoing verification of the capability of temperature-controlled transport equipment.

Records of temperature monitoring for each journey **should** be maintained for a minimum of a year or for the maximum life of product, whichever is the longest - this could be in excess of three years for frozen products.

All systems **should** be set with automatic or procedural action and warning limits taking into account known periods for defrost and doors open. Validation **should** establish that normal operating limits in place to account for doors being opened and defrost cycles do not compromise product safety.

It is beneficial to maintain informal arrangements between warehouse operators to allow offload and temporarily store product at risk at the nearest unit until any transport problem can be resolved.

## VEHICLE INCIDENT PROCEDURES

Whilst preventative maintenance procedures **should** be in place for vehicles, breakdowns do occur. In the event of an incident, whether it is a breakdown, including temperature monitoring faults or accidents occurring during transit, detailed procedures **should** be in place to include the points listed below to ensure that the cold chain is maintained and product safety preserved if possible. In any case food safety **should** be a consideration and the food safety status of a load established. Incident procedure measures to be included are:

- **The safety of the driver and other road users must be the primary consideration in all circumstances.**
- The trailer doors **should** not be opened, nor the seal (if present) broken to ensure product temperature and integrity is maintained as far as possible. Exceptions to this should be understood, such as the need to open doors in the event of a suspected clandestine traveller in the trailer (see Chapter 6 of this guide).
- The refrigeration unit temperature **should** be regularly monitored and any fault code noted, reported and actioned if possible, for example if the temperature is rising due to de-frost mode, the unit should be switched off.
- The driver **should** have access to information on how to respond and have the appropriate contact details available to him on who to contact for support and guidance. Incidents should be reported without delay and include information on the prevailing status of the load. An incident log should be opened.
- The incident **should** be escalated appropriately according to a documented incident management protocol. Prompt decision making and frequent communication with the customer is essential to provide transparency and confidence in a well-managed situation.
- The cold chain **should** always be maintained. It is important to maintain records of every stage of the incident and the decisions made. It will form important evidence that the cold chain has been uninterrupted and will assist any subsequent investigation to identify any corrective and preventative actions needed.
- Once recovered the load information available **should** be assessed in conjunction with the customer to determine whether food safety of the load is compromised or is safe to ship. Decisions on product release **must** be by an appropriately authorised and technically competent member of staff.



## EQUIPMENT MAINTENANCE

For best food safety practice and operational efficiency it is **recommended** that temperature of product does not significantly fluctuate and it **must** stay within the legal limits indicated earlier in this chapter. To work effectively reliance is on properly performing refrigeration equipment, good maintenance of the insulated box (whether that is a vehicle or a cold store) and good practice with reference to door management. The following practices **should** be included:

- Refrigeration and temperature monitoring equipment require a documented planned preventative maintenance (PPM) program in place; aligned to manufacturers recommendations and known failure rate from historic data.
- Temperature management is a CCP in almost all cold chains, making these PPMs also critical. Whilst it is not unusual for PPMs to slip, those on equipment necessary as part of control measures for CCPs **must** not be compromised.
- Actions following breakdowns and PPMs on temperature critical equipment **should** be reviewed, investigated if necessary and documented. The data is valuable and can be used to improve temperature-controls either through modification of PPM procedures and frequency or used to inform investment decisions.
- Where equipment failure occurs, a procedure **should** be in place to determine its impact on product temperature and the information used to confirm, in conjunction with the customer, the food safety status of the product.
- To perform efficiently equipment and facilities necessary for maintenance of air temperatures should be kept free from ice-build up. This is particular to frozen cold storage and transport and includes fridge equipment, evaporators and condensers, permanent temperature probes and doors.
- Faulty, iced up doors are common. Investment into trace heating, air curtains, rapid reaction and automated open/close mechanisms, supported by effective PPM improves efficiency, reduces costs and stress on resources and will support efficient maintenance of the correct temperatures.
- Although there will be a cold mass and sufficient insulation to preserve product temperature for a period of time; in the event of breakdown or failure of refrigeration equipment a prompt response is critical. A documented procedure to maintain the temperature integrity of the 'cold box' as part of the continuity plan (see Chapter 4 of this guide) will ensure everyone is aware of the appropriate action to take. Typically, it would include keeping doors shut, limiting movement, stopping defrost cycles and having refrigeration service engineers on emergency call out.
- Equipment modifications, even upgrades **should** be subject to a change management process (see Chapter 4 of this guidance), including review of HACCP (see Chapter 3 of this guidance) and validation of temperature performance.
- Use only qualified refrigeration engineers, specify ACRIB Skill-card carrying engineers or City and Guilds qualifications specific to the refrigerant in use.
- If issues do escalate, a contingency plan **should** be in place and capable of being enabled quickly. This may mean the installation of temporary refrigeration equipment or product being moved/diverted to other suitable sites.



# CALIBRATION

All equipment used for temperature measurement **should** be purchased with a certificate of calibration, indicating operational, accuracy and intervals of measurement error. Procedures for calibration **must** be in place to ensure that the accuracy of monitoring equipment in use is maintained.

**Calibration is an activity of two halves:**

**a)** Calibration is an exercise generally performed either by the manufacturer or by a specialist before supply and as part of ongoing routine and regular scheduled maintenance. The time period between calibrations can vary depending on the equipment and use. Frequency **should** be guided by the equipment manufacture, but a typical period is annual.

Operators **should** maintain a log detailing all temperature monitoring equipment which requires calibration. Each instrument **should** have a unique identification marking or serial number to enable tracking and auditing of calibration status. By logging the unique identifier for the equipment used as part of a temperature monitoring check, the business can demonstrate to auditors and inspectors that the check was carried out with a calibrated instrument.

**b)** Calibration checks are generally in-house and they verify that the temperature monitoring equipment remains within an acceptably accurate temperature range of operation and is working correctly. Such checks are much more frequent, and again operators **should** be guided by manufacturers recommendations as well as take into account actual failure rate experienced with the equipment. Frequency can vary as daily, weekly or monthly. Once the appropriate frequency is determined it **should** be documented in the appropriate QMS procedure. Calibration checks **should** be recorded and carried out by an individual trained against a documented SOP.

To have an effective system of calibration it is not necessary to have certified calibration for every instrument and sensor as long as all instruments are supplied with a certificate and have recorded calibration checks against a traceable standard. Businesses can choose to have a set of fully calibrated 'Master' probe, test caps or electronic verifiers against which a regular calibration check is carried out.

## UKAS AND CALIBRATION TRACEABILITY

It is important that any calibration has unbroken traceability back to a National or International standard. Credible organisations who carry out calibration **must** be accredited to UKAS (the United Kingdom Accreditation Service) which means they use reference equipment calibrated to the National Standards held by the National Metrological Institute (NMI). The calibration certificates provided **should** be retained as they demonstrate the UKAS accreditation number of the calibration service provider and their traceability link back to the NMI.

Calibration and calibration checks **should** be done at or close to the operating temperature -18°C for frozen / 0 - 4°C for chilled.

Equipment outside of the set operating parameters **should** be removed from service for repair or replacement and this documented on the log.

Calibration checks on IR thermometers is best carried out by comparison with a calibrated standard probe.

For warehouse temperature monitoring systems, a nominated UKAS accredited service provider, often the equipment supplier, **should** calibrate annually and provide a calibration certificate. A calibration check **should** be included in the regular equipment PPM. Sensor calibration can take place outside of the chamber, facilitated by the **recommended** use of wireless sensors.

Temperature is so critical, business operators **should** maintain calibrated back-up equipment and have a back-up procedure. For calibration checks on probes the ice/water test can be used as a last resort.

- Iced drinking water has a melting point of 0.00 to -0.06 and is therefore accurate enough to carry out the following test.
- Ice **should** be broken into small pieces and then placed into a wide necked vacuum flask, moistened with cold water and stirred.
- The probes **should** be placed in the centre of the flask at a depth of at least 50mm and agitated frequently.
- After three minutes the reading can be taken and decision made on standard operating limits.

## DEALING WITH TEMPERATURE DISCREPANCIES

Where product is outside of required temperature standards the warehouse **should** have the capability to place the product into quarantine which **must** prevent picking for despatch. This can be achieved through blocking via a warehouse management system or be a physical area within the store. It will ensure protect integrity is preserved whilst an outcome is sought.

If the CCP is breached then the appropriate documented corrective action **must** be applied. The outcome and the decision made about 'out of specification product' **should** be documented and retained to demonstrate that the corrective action was taken properly.

If, at any time during delivery product is rejected due to temperature, immediately gathering available information and asking the right questions can be the key to an acceptable outcome. Customers **should** be involved early, with full transparency on activity to facilitate sensible decisions which protect food safety.

**Information requirement:**

- Delivery date and time.
- Haulier name if contract.
- Trailer number, delivery point location.
- Customer, delivery note number, customer advice/order number, incident report number.
- The reported product temperature.
- Accountable person at the rejecting site, name, position and contact details.
- Where was the product probed? (i.e. between/into boxes or into the product itself, was it base/middle or top).
- How long were the doors open or the product on the bay before the product was probed?
- What is the nature of the loading bay? (i.e. frozen/ambient or open).
- Nature of temperature probe and calibration and when next due?
- Number of pallets implicated and how many probed?
- Details of implicated product traceability. Product, dates and lot codes?
- Is it possible for the stock to be probed with an independently calibrated thermometer?

Until an investigation is completed and a decision made by a competent authorised person the entire load **should** be quarantined. Several temperature readings as part of the investigation can establish the food safety status of each individual pallet. Where IR readings have been taken a documented escalation procedure **should** include between pack readings with a calibrated probe or even authorised destructive testing with a penetration probe.

Stock returns **should** routinely be checked, including a mass balance, to ensure the correct stock is returned and fully accounted for.




STILL



# 6 / PHYSICAL AND CHEMICAL CONTAMINATION /

Implementing systems to control the potential for contamination of food in storage and transit is a legal requirement and **must** be developed. Provision can range from simply providing suitable sanitation and handwashing facilities and those to allow cleaning of equipment (see the schedule of Regulation 852/2004) to management systems embedded as prerequisites or operational prerequisite programmes (OPRPs) with significant remaining hazards addressed as part of the business' hazard analysis. Examples of hazards include:

- **physical contamination** – glass, wood, plastic, cardboard, paper, metal and water;
- **chemical contamination** – battery acid, refrigerants, cleaning and maintenance chemicals, fuel;
- **contamination by allergens** – the 14 regulated food allergens are examined in Chapter 7 of this guidance;
- **biological contamination** – from poor handling, water leaks, contagion or pest activity.

Documented policies, procedures and training, commensurate to the significance of the hazards and the size of the business **should** sit behind each major source of contamination as part of the food safety management system, details of which are discussed at the beginning of Chapter 4.

This chapter explores the major sources of physical contamination, providing examples of basic management controls for each and details of the action needed when breakages and spillages are either reported or picked up during checks.

Everyone **should** have awareness of the hazards and be obligated to report and deal with damage or contamination issues promptly. As always, the best form of control is prevention. Maintaining disciplines to adhere to standards and a clean as you go approach builds the right culture and behaviours and fewer issues.



## Examples of physical and chemical contamination risks

| Sources of contamination | Basic management controls |
|---|---|
| Chemical contamination: lubricants, fuel, batteries, cleaning chemicals, strongly scented products. | Approved chemicals list, only chemicals suitable for food use in food areas, current and accessible Safety Data Sheets (SDS), clear labelling, segregated and secure storage areas, control of product flow, licensed and controlled chemical handling and disposal, staff training and procedures for chemical handling, planned preventative maintenance (PPM) and maintenance procedures, supervision of contractors and permitting systems. |
| Damaged packaging: paper, card, plastic, strapping. | Materials handling equipment (MHE) training, good housekeeping, load inspection (loading and unloading), incident record keeping, trend analysis and management review, operator training, staff supervision, 're-wrapping' procedures. Stacking and palletisation standards, customer contracts and communication, temperature and humidity control. |
| Food spills. | Product inspection (loading and unloading) spillage clean-up procedures, MHE training and supervision, damage and spillage reporting and incident investigations. |
| Glass and hard plastic can come from lighting, monitoring or recording devices. | Restrictions on glass items, personal hygiene standards and induction, fabric audits and damage reporting, glass register, routine integrity audits, breakage protocols, incident investigations. |
| Damaged building fabric, insultation foam, equipment parts like switches or covers. | Fabric audits and damage reporting, continuous investment in fabric and management, responsive maintenance procedure, good housekeeping. |
| Maintenance: contractor activity, warehouse equipment, tools. | PPM programme, maintenance procedures including protective precautions, briefing and supervision of contractors, permitting systems, restricted access dedicated workshop area, food hygiene training for engineers, accounting/control systems for tools and spares. |
| People: spectacles, pens, safety knives, bits of PPE, pocket contents, sweet wrappers, carried in on boots. See Chapter 8 of this guidance.. | Hygiene standards and training, visitor, contractor, agency worker rules and instructions, locker provision, audits and enforcement, PPE provision and standards, personnel movement, segregation and product flow controls. |
| Pests: birds, rodents such as mice and rats and flying and crawling insects. | Pest control services, proofing, waste management, internal and external housekeeping, door disciplines, pest bait and monitoring points. |
| Unauthorised access to vehicle load handling area, e.g. theft or stowaways. | Policy in place, CCTV to exterior of vehicle visible to the driver. Vehicle locked when unattended and in secure compound where possible. Seals used on all journeys, including multidrop and integrity checked on each stop. |
| Waste, from all of the above. | Defined waste flows, housekeeping activity and audits, licensed waste disposal, segregated waste handling area, covered waste receptacles, waste receptables and areas on hygiene schedule. |
| Wood from damaged pallets, vehicles or warehouse fabric. | Identifying and replacing broken pallets, good housekeeping and inspections, vehicle inspections (loading and unloading), fabric inspections, damage reporting and remediation. |

It is **recommended** that a sample library be maintained of potential physical contaminants. This can simplify the identification of contaminants in the event of complaint. The following chapters look separately at each of the key contamination hazards in detail.

## CHEMICAL HANDLING

The risk of chemical contamination comes from a number of potential sources: fuel, maintenance oils and lubricants, cleaning chemicals, pesticides and refrigerants, MHE battery charging. The following controls **should** be in place:

- All chemicals **should** be stored in secure (locked) areas, with restricted access and separate from food products. Food and non-food safe chemicals should be stored separately from each other.
- Procurement **should** be from a maintained, approved list of suppliers and chemicals selected from an approved list.
- Safety Data Sheets (SDS) **should** be held for all chemicals. SDS should be readily available and always accessible in case of incident.
- All hazardous substances in use **should** also be subject to a control of substances hazardous to health (COSHH) assessment. Needless to say unsuitable products which are toxic, heavily scented or have the potential to taint **should** not be used in food areas.
- Only chemicals suitable for use with food **should** be used in areas where food is stored or handled. Clear instructions for the dilution, use and storage of all chemicals on site **should** be available. All chemicals, including those decanted into other containers **must** be clearly labelled.
- Some chemicals are not suitable for storage together, so follow the suppliers instructions and store in bunded containers where appropriate away from storm drains; store powders separately to and above liquids if on racks.
- If it is necessary to store chemicals externally, they **should** be in a locked and secure covered compound.
- Diluted chemicals are generally safer to move around, some are available to buy in a ready to use format. If needed provide separate facilities for the safe decanting and dilution of concentrates. If dosing units are used, they **should** be calibrated and checked. Test kits to check dosing also contain chemicals which **should** be securely stored and handled accordingly.
- All staff using the chemicals **should** be trained on their safe and effective use.

## DAMAGED PACKAGING

Damaged packaging can be a contaminant itself and consequential product spillage a source of contamination for other products; furthermore, any exposed food can also become vulnerable. Causes can be internal or external. Poor palletisation at source is a common problem. Inadequate packaging design, weakness caused by damp (for example by condensation from temperature abuse or poorly drained refrigeration units) or inadequate care in the movement of goods are all potential sources of damage. Open and continuous communication with customers and suppliers, along with good data are needed to tackle external causes whilst internal issues **should** be addressed by good management.

Consequential food safety risks, complaints, rejections and returns are unwanted distractions at best but can also be expensive and pose a risk to consumers.

## GLASS AND BRITTLE PLASTICS

Glass and hard, brittle plastics can cause serious harm if they contaminate food. There **should** be a policy for prevention of issues through continuous review, to minimize and reduce the number of items on site or in vehicles. Other items brought onto site **should** be managed as part of the food safety management system outlined in Chapter 4 of this guidance.

**a) Policies and procedures**

**Documented systems should include:**

- Restrictions on glass and brittle plastics (for example bottles, thermos flasks, mirrors, glass thermometers) brought onto site and available in vending machines, and rules to prevent these items along with personal possessions such as mobile phone being taken into food areas.
- Training and awareness activities for everyone working within an operation to be aware of glass policies and their obligation to report breakages immediately.
- Provision and management of glass cleanup kits and clear instructions for their use (to ensure they do not become a source of glass contamination).
- Use of the appropriate protective films on windows, light tubes, EFKs and screens. Where light tubes are used they **should** be protected with shatterproof diffusers.
- Maintenance of a glass and brittle plastic register and regular inspections on integrity. Followed with notification systems for prompt repair when needed and verification of completion.
- Maintenance of a glass breakage register detailing the nature of any incidents, the actions taken and the outcomes of subsequent investigations; a sample of any broken material **should** be retained.
- The special precautions required when changing glass fittings within the food area, the warehouse or in vehicle load carry areas.
- Periodic review by senior management to ensure issues and incidents have been properly dealt with.

**b) Changing glass or plastic in food areas**

When glass or brittle plastic items need to be changed, there is an increased risk of breakage and the following precautions **should** be taken. Where possible replacement of fittings **should** take place outside of food storage, handling or transit areas. When this is not possible, the area **should** be restricted and product removed or protected. All changes of glass or brittle plastic **should** be recorded, with the date, time and the reason for the replacement and the glass register updated where necessary. It is recommended that access to stock of glass 'spares' is restricted, stock is monitored, with issues and replaced recorded so all may be accounted for.

## DESIGN AND MAINTENANCE OF FACILITY AND EQUIPMENT

Poorly maintained buildings and equipment are a hazard for operator safety as well as food safety. Layout and design are also an important prerequisite to protect food integrity and avoid risks of cross contamination. Facilities can be a source of contaminants and encourage pests. Staying on top of fabric issues is important to reduce the need to invest in expensive one-off repairs or replacements.

**The following controls should, or must be in place:**

- ▶ Storage facilities, vehicles, and equipment **must** be designed and constructed of non-toxic and easily cleaned materials. A process **should** be in place such as regular fabric inspections to identify, remove, or repair fabric, equipment or materials that are damaged or faulty.
- ▶ Some maintenance activities carry higher risk, such as working at height, on refrigeration systems or on lighting in food areas. On these occasions the risk to food products **must** be considered and they **should** be either moved or suitably protected. Restricting movement within the area protects both the safety of the engineer, the food and food handlers.
- ■ Specific containers **should** be designed for the purpose and marked for food use or waste only. Pallets and other packaging materials **must** be suitable for the purpose, in good repair to pose no risk of contamination.
- ■ The activity of engineers **should** be subject to documented controls. Controls could include a stock management system for issue of spares; having a defined toolkit; supervision of contractors; accounting for tools and parts; having a sign off after the completion of work, and physical segregation in food areas, through barriers or screens.
- ■ Planned preventative maintenance **should** be in place, supported by appropriate service contracts, by good housekeeping, fabric inspections and pest control.
- ■ Contractors **should** be well briefed on precautions to avoid contamination and be supervised.
- ■ Procedures **should** be in place in the event that building work is carried out that may impact on food areas.
- ■ Site engineers working in racking and equipment areas **should** ensure that all parts and tools used in works are accounted for when they finish and that the area is left clean to avoid contamination of goods.
- ■ Materials handling equipment (MHE), specifically those with acid batteries **should** be stored and recharged away from food areas. Modern lithium ion batteries are **recommended** as they pose a lower contamination risk, and do not require specific ventilated areas. They **should** however, have designated parking and charging points.
- ■ MHE requiring servicing, or repair **should** be removed from food areas.
- ■ Equipment **should** be cleaned, prior to being returned to service.

## CASE STUDY

### Benefits of lithium ion technology in MHE

All warehouses use a range of Materials Handling Equipment (MHE) but there can be challenges around the amount of space needed to house and charge the equipment. Traditional batteries contain hazardous acids and emit harmful fumes so **must** be charged in separate and well ventilated rooms. When faced with the need for more space a CCF member business looked at options to remove battery charging rooms and ways to reduce the potential contamination and manual handling issues associated with them.

Following extensive trials, they took possession of a fleet of 180 new lithium-ion forklift trucks and warehouse equipment. The batteries are a reduced contamination risk, do not need removal for charging, use less electricity and have zero emissions meaning that they can be charged at any electric point throughout the warehouse without impact on product or staff safety.

A potential issue with the BRCGS Storage and Distribution standard that ***'Suitable and sufficient extraction methods shall be provided in areas where fumes may build up (e.g. battery-charging areas). These areas shall also be segregated from product storage areas'*** prompted a discussion with the certification body who accepted the evidence of no risk to product safety or integrity and allowed the project to continue.

Additional safety features meant that by the end of 2018, the member recorded a 67% reduction in MHE related accidents and a 74% reduction in warehouse related manual handling accidents.



# PEST CONTROL

Pests take the form of birds, rodents such as mice and rats and flying and crawling insects. They are all seeking shelter, food and water. The purpose of pest control is to deny access to them all as far as is practically possible.

All food business **must** have in place adequate procedures to control pests. A site can choose to do their own pest control internally but **must** make sure that the accountable staff are fully competent with suitable training, as some pesticides are restricted to use only by those with recognised qualifications and staff need to understand safety best practice. They **must** also be provided with the resources they need and have access to expertise when needed.

Most businesses contract the services of a specialist registered to the British Pest Control Association (BPCA) or Confederation of European Pest Management Associations (CEPA) certificated to EN16636 for pest management services. Either of whom would be qualified to assess and meet a site's specific needs.

## TIP

A designated and suitably trained individual within the business **should** be responsible for managing pest control services and to carry out routine monitoring. Get the most from the pest control service contract offered by fully engaging with the service provider, learning from them and responding to their recommendations.

**a) The pest control management system**

The management system **should** be specific to the operation's hazards with a risk assessment to inform the nature and frequency of inspections. The system **should** include:

- Regular site inspections by technicians and specialist field biologists, typically one per month or a minimum of once every six weeks throughout the year. Each visit **should** leave the operation with a written report, depending on the activity this might cover pesticide treatments, bait takes, bug counts, pest activity and recommendations for follow up or continuous improvement. If there are particular pests of interest, give thought to increasing inspections in the periods of greatest activity during the year.
- An annual pest management survey to review adequacy of existing pest control measures. These can be carried out as part of a standard contract by the field biologist (FB) at least once per year. Typical contracts include four FB visits. Alternatively, some businesses like to bring in a completely independent expert to verify their pest management provision. BRCGS has a best practice guideline available, which is available on the BRCGS Participate website.
- All the pests of interest, with the appropriate number and distribution of bait and monitoring points, clearly indicated and kept updated on a site map.
- Include emergency call out. When pest issues occur, if they are not dealt with promptly they can affect the approval status of a site. The contract **should** include follow up visits until the all clear is given.
- Include details of active ingredients, concentrations and the SDS for any pesticides or rodenticides used.
- Trend analysis, to understand hot spots, identify weaknesses, lack of compliance and opportunities to strengthen precautions for continuous improvement.
- The need for re-assessment of risk when major changes are made either to buildings, product flows or processes.

**b) Pest prevention and proofing**

Pest control goes beyond employing a good contractor, responsibility for protecting against pests cannot be abdicated. Business **should** also put in place effective measures to prevent access by pests to food areas, this **should** include:

- Maintaining the fabric of buildings especially pest proofing, including in roof voids, drainage systems under-crofts, outbuildings and vehicles.
- Keeping doors and docks closed when not in use and maintaining pest proof seals.
- Good housekeeping in external areas and around waste skips including cleaning up spills promptly. Food waste skips **should** always be kept covered when not in immediate use.
- Not storing food or contact materials outside. Ideally pallets **should** not be stored outside, however if they need to be (for example for insurance reasons) then storage on a hardstanding yard is strongly **recommended** which is kept clean and clear of debris. Inspection of the pallets and cleaning where necessary **should** be carried out before they are brought inside.
- Limiting vegetation near to buildings and lorry parks and keeping it under control to limit harbourage and assist inspection.
- Pest-proofing the area immediately adjacent to buildings, that means hardstanding or deep gravel. Mice and rats burrow and climb. They can fit through the smallest crevice and will create nests in insulated walls if they are not sealed.
- Clearing unwanted equipment and rubbish promptly, internally as well as externally.
- Including pest awareness in induction training and the obligation for staff to report activity.





## VEHICLE AND TRANSPORT STANDARDS

Vehicles used to transport food in the cold chain **must** be constructed of easy to clean materials, be weathertight and well maintained to prevent the possibility of tainting, contamination or deterioration of food products. Condensation **should** be captured and drained away to prevent it from damaging packaging or contaminating food.

Drivers **must** know what to do to protect the integrity of the food they carry. Contamination during transport can come from damage to the trailer fabric and fittings, pallets, damaged packaging or product, product movement due to unsecured loading or tainting from previous loads or containers.

Vehicles are additionally uniquely vulnerable to contamination risk from unauthorised access to the load carrying area or clandestine travellers. There **should** be written procedures and driver training in how to deal safely with such incidents to include 24-hour emergency numbers and access to an accountable manager for support. For more detail on business continuity advice refer to Chapter 4 of this guidance.

### TIP

The Cold Chain Federation have produced specific guidance on the topic: *A guide for the prevention, detection and management of incidents involving clandestine travellers on vehicles transporting food into the UK*

Vehicles **should** be inspected regularly, and such inspections recorded, in order to identify when supplementary cleaning or maintenance action is needed and include the condition of glass or plastic items present within the trailer (for example diffusers or headlight coverings). Glass or plastic breakage found by the driver or warehouse operator **should** initiate a glass breakage procedure as detailed at the end of this chapter.

### CASE STUDY

#### Clandestine travellers

A small manufacturing customer of a CCF member discovered clandestine travellers in a loaded trailer received from the continent. They called the police and the local authority immediately and it is understood that a number of people were detained. However, there were significant signs of contamination inside the trailer which the small business was not equipped to deal with. Without a forklift the customer could not unload the vehicle without the goods passing through their warehouse, a situation that they needed to avoid.

The member stepped in to assist and the trailer was driven to one of the member's sites with a police escort. Personnel from the local authority and from immigration were waiting for its arrival along with additional police.

The trailer was safely unloaded in the yard area to prevent any possibility of contamination to other products held on site. Police and immigration specialists systematically stripped the trailer to check for signs of drugs, weapons or any other items hidden behind or underneath panels.

Once they completed the search, the trailer was re-loaded with the contaminated product and it was taken away, again under escort, for destruction.

## WASTE

Waste takes all forms, not just food. It includes the backing tape of labels coming off printers, damaged building fabric and wood; branded and unbranded discarded or damaged packaging, glass from replaced lights; obsolete tools or equipment parts; reclaimed refrigerants; empty chemical containers and cleaning water, that pile of spares or unused material that a contractor left behind. The generation of waste **should** be minimised; and that which is unavoidable **must** be properly and legally disposed of.

**Rules that must or should be in place for the management of waste:**

- In order to act on behalf of the customer with respect to food waste disposal, a site **must** be registered with the Environment Agency as a Waste Management Broker and carry an Environmental Permit.
- Approved waste contractors with the appropriate Environment Agency licences **must** be used for waste removal. Records and waste transfer notes **should** be kept on file and available for inspection.
- The disposal of food products of animal origin to landfill is regulated by EU retained Regulation (EC) No 1069/2009 on animal by-products and enforced through the Animal By-Products (Enforcement) Regulations (which for England is 2013). Three risk categories are defined, each with their own disposal rules:
  - **Category 1** – Very High Risk, e.g. animal suspected or confirmed as being infected.
  - **Category 2** – High Risk, e.g. condemned meat, for example if it has been on the floor.
  - **Category 3** – Low Risk, including raw meat, raw fish, eggs, lightly cooked meat and fish, meat and fish products that require cooking before consumption.

  Disposal of Categories 1 and 2 **must** be by direct incineration and Category 3 products by either:

  - incineration;
  - rendering followed by incineration or landfill;
  - anaerobic digestion;
  - alkaline hydrolysis;
  - composting.

  Businesses handling these types of products **must** do so by the correct waste stream and differentiate between categories with clear labelling. These items can only be removed by specifically licenced contractors – they **should** not be included in general landfill waste. It is **recommended** that businesses have arrangements in place **should** the need for an emergency collection arise.

- Waste **should** not be allowed to accumulate internally or externally, becoming not only a potential contaminant but also harbourage for pests.
- Spillages **should** be cleaned promptly.
- Disposal routes **should** be defined that avoid food areas if at all possible.
- Containers used for food (for example boxes, trays or crates) **should** never to be used for rubbish or waste. Dedicated and labelled collection receptacles or bins **should** be provided which are hygienic in design and kept clean.
- External waste containers **should** be kept covered when not in immediate use and yard areas around them clean, make sure drains go to foul or sumps never storm or water course.
- Food for disposal **should** not be allowed to accumulate over an extended time period (even if it is stored in a temperature-controlled area to prevent its deterioration). Ensure that it is regularly removed and at a minimum weekly or more often during the summer months.
- Be mindful and adhere to customer policies on disposal of branded or trademarked products and unused packaging. The last thing anyone wants is to see is it turning up on the local market for sale to the public. Businesses **should** use contractors with the right facilities for destruction and keep records of destruction, including the mass balance. These may be inspected during audits.
- Surplus product that is still safe, legal and fit for human consumption can be diverted to charity food banks and soup kitchens. Do note that customer branded products disposed of in this way **should** be approved by the customer concerned. Traceability and food safety systems such as the cold chain **must** be maintained.
- Catering waste, including cooked or processed meat and fish, bakery products, fruit and vegetables, can go directly to general landfill.

## WOOD

Wooden pallets vary in quality and breakage is very common. When pallet damage is identified, repalletisation, often carried out with the use of an inverter, and removal from the supply chain **should** be carried out. Regular occurrences can be monitored and picked up in review with the relevant supplier or customer.

Wood is often used as a structural building material and can be found underneath cladding around doorways. When damage occurs, it **should** be assessed and promptly repaired. Clean as you go policies, good general housekeeping and regular vehicle hygiene will ensure that broken wood pieces and associated fixings don't accumulate and become a hazard for equipment, product or staff in vehicles or warehouses.

## MANAGING SPILLAGE AND BREAKAGE INCIDENTS

The process for managing spillages and breakages is broadly the same for all potential contamination issues and builds on the principles explored in managing incidents discussed in Chapter 4 of this guidance. Documented procedures **should** include the following process:

- Assess the damage and determine the extent of possible contamination. Ensure that the area implicated is clearly identified.
- Contain the incident by limiting access and movement of people and equipment; when moving damaged product or items, wrap them or reseal holes to prevent spread of contamination. Segregate them in an area where they can be safely and securely handled.
- Identify and quarantine all implicated product so that it can't be outloaded in error prior to completion of either clean-up, disposal or authorised release.
- Depending on ownership, it may be appropriate to contact the customer or supplier to determine whether product (Including if it is on a vehicle) **should** be returned, rejected, re-wrapped or disposed; or this may be documented in the customer contract.
- Promptly and carefully clean up debris using the most appropriate means, to prevent spread, glass and allergens may have particular spill kits. The nature of the contamination **should** be considered, for example powders which can be airborne will be best dealt with using a damp cloth rather than a broom.
- Where spillage is extensive, clean-up **should** take place from the outermost affected area inwards towards the 'epicentre'.
- It may be necessary for the cleanup crew to change or clean protective clothing and cleaning implements be inspected and cleaned (or disposed of) before being returned to the cleaning station, particularly if glass or an allergen spill is involved.
- Clear instruction on how to dispose of any waste safely and appropriately, through a properly licensed waste handling contractor.
- Decisions about product on hold and arrangements for release of an area and product from quarantine after inspection and sign off by a competent and accountable manager.
- Incidents **should** be recorded and investigated. (see more on how to do this in Chapter 4 of this guidance.)





# 7 / FOOD ALLERGENS AND HYPERSENSITIVITY /

1-2% of adults and 5-8% of children in the UK live with a diagnosed food allergy, that is 1-2 million people in the UK. Tragically about 10 people lose their lives each year due to food induced anaphylaxis and in 2018-2019 there were over 5,000 hospital admissions for anaphylactic shock. Managing allergens is therefore an essential element of the food safety management plan. When materials containing allergens are present allergen management will be a prerequisite programme. Where there are specific high risk activities involving the handling of materials which contain allergens there may be the need for operational prerequisite programmes (OPRP) or even a critical control point (CCP) to control hazards (see Chapter 4 of this guidance).

Food allergy is potentially the most serious of three main types of food hypersensitivity and can be fatal:

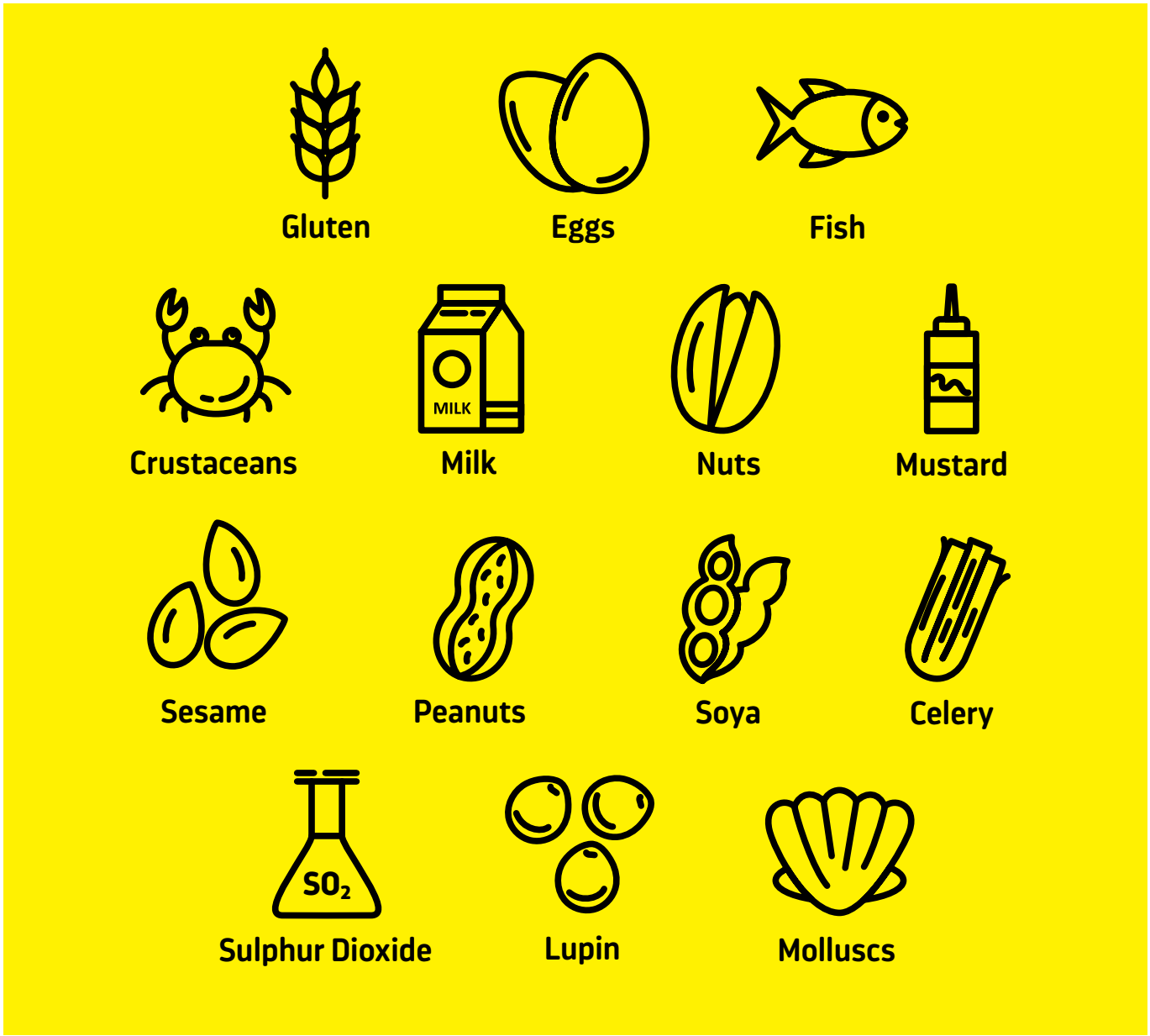
- **Food allergy:** occurs when a person's immune system overreacts to a protein in food. Very tiny amounts – parts per million, of an allergen substance can cause a reaction. Once diagnosed with a food allergy, individuals have to take life-long precautions to avoid exposure and consumption of the allergen.
- **Coeliac disease:** an auto-immune reaction to gluten, where the lining of the small intestine can become damaged. It affects the absorption of nutrients into the body and sufferers have to avoid gluten for the rest of their lives.
- **Food Intolerance:** an adverse reaction to a food involving the digestive system which causes difficulty digesting certain foods. The health issues whilst unpleasant are rarely life threatening.

All food hypersensitivities are stressful and can affect emotional wellbeing as well as physical health. Food allergies and intolerance can affect anyone, they can appear at any life stage, are life changing and lifelong. Businesses **must** take precautions to protect employees who suffer food hypersensitivity and ensure that all food that is handled, stored or transported cannot become contaminated with allergens. Across the population there are many foods which can cause anaphylaxis or unpleasant reactions in people. Although special care has to be taken with the 14 regulated allergens in the UK and EU; the **recommendation** to maintain safety is to have procedures in place to prevent all cross contamination between materials.

## LEGAL REQUIREMENTS

Beyond the requirement that food supplied to the consumer **must** be safe and of the expected quality, specific regulation on food allergens is mostly limited to labelling. There are 14 key allergens identified in EU/UK legislation. Regulation (EU) 1169/2011 on the provision of food information to consumers, EUFIC. Annex II Defines the 14 allergens: **celery, cereals containing gluten** (at >20 ppm such as barley and wheat), **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** (at a concentration of more than ten parts per million) and **tree nuts** (such as almonds, hazelnuts, walnuts, brazil nuts, cashews, pecans, pistachios and macadamia nuts).

### THE 14 MAJOR FOOD ALLERGENS




*EU REGULATION 2021/382* has recently been published by EU. It amends the hygiene rules for food allergen management, (as well as food redistribution and food safety culture). The regulation is applicable in Northern Ireland as part of the Northern Ireland Protocol but is not applicable in Great Britain. This is because it was introduced following the end of the transition period and therefore does form part of the body of retained regulation.

Other countries and regions of the world have different lists of allergens. The Food Allergy Research and Resource Program of Nebraska (FARRP) maintains a spreadsheet which identifies many of the different nationally regulated allergens https://farrp.unl.edu/IRChart Their website has many informative resources, to find out more go to: https://farrp.unl.edu/

## ALLERGEN POLICY

A policy **must** be in place to document the business commitment to managing allergen cross contamination. This means providing sufficient resources in the form of people and equipment, competence and training to maintain defined standards throughout transport and storage.

**The policy should include commitments to:**

- Train staff about the main allergens and implications for health. Staff with food hypersensitivities **should** be protected from exposure; also that they understand the obligation to handle products with care, maintain hygiene standards and to report spillages whenever they occur.
- Have detailed procedures on how to deal with spillages and who is accountable; The same basic procedure applicable to all food spillages, as well glass and brittle plastic breakages can be found in Chapter 6 of this guidance.
- Robustly wrap products to secure them against risk of damage, or otherwise segregate products that pose a high level of risk.
- Review issues and hazards when they occur and always work to continuously improve practices.
- Work with customers and suppliers to reduce risks of cross contamination at intake.
- Review the policy in the event of significant site changes, in line with HACCP review requirements and change management procedures.
- Take into account customer policies and any discussions with them based on the risk of cross contamination.
- The policy may also document the operation's position on foods allowed on site in canteens, rest areas, the cabs of lorries and brought onto site in packed lunches. This policy **should** be based on risk; taking into account:
  - the nature of the food products handled;
  - how they are packaged;
  - open food handling activities on site;
  - PPE practices;
  - track records on spillages.

For example, a site that handles only fully wrapped product may be considered low risk whilst a site carrying out re-wrapping or packing activities might be high risk. A high risk site **should** consider the exclusion of nuts on the premises; whereas as a low risk site with strongly enforced hygiene practices, may not have the need to exclude, if the assessed risk was low.



# STORAGE AND DISTRIBUTION – ALLERGEN PRECAUTIONS

For storage and transport, allergen management is about understanding the risks of cross contamination by allergens. In cases where product is fully packaged the focus of management control is the **prevention** of damage and **robust** control of spillage incidents when they occur.

BRCGS (section 7.7) and HACCP principles requires that the risk of cross contamination is assessed. There are a number of risk factors that **should**, or **must** be considered:

- **Packaging format** – Open product is both a risk of being a source of contamination for other products and of being contaminated itself. Some wrapping formats do not offer protection against contamination for example netting sacks. The operation may want to consider specifying some kind of covering to reduce the risk or to store separately.

  Some forms of packaging are more liable to damage. Paper or plastic sacks for example are much more vulnerable than cardboard cases or plastic kegs. Condensation formed when frozen product is exposed to a warm environment can weaken carboard boxes and cause collapse. Product that overhangs the pallet is much more likely to be damaged during movement and the potential for cross contamination can be significant.

- **Product format** – Taken into consideration with packaging format **should** be product format. Spillages of powders and granulated products are much more difficult to contain and clean up and liquid spillage onto paper based packaging impossible. Whilst its neither practical nor efficient to have dedicated areas for particular allergen or product storage, depending on the risk, precautions **should** be implemented. This might include storage of the products most vulnerable to spillage on lower racking or in different areas of the store.

- **Other activities on site** – Where sites are carrying out activities such as packing or re-wrapping of open product the risk of contamination is much greater and a more cautionary approach **must** be taken and a detailed risk assessment on potential allergen exposure levels required. Whilst such activities are outside the scope of this guidance an essential source of information for such a study is the Australia/New Zealand Allergen Bureau: http://allergenbureau.net/vital/vital-science/

- **Potential for cross contamination** – Where this is identified, the business **should** put controls in place to reduce the risk and manage them very closely.

  Some potential causes are outside of the direct control of the storage and distribution business. Issues may be identified on intake with product insufficiently protected or damaged during transit. The Cold Chain Federation **recommend** that each issue is recorded and communicated to the customer or supplier.

  When it comes to performance reviews the data can be used to work collaboratively with the customer or supplier to resolve any persistent problems. It also provides information on the biggest issues to tackle and where the greatest opportunities exist to improve.



## Further guidance

Free online training is available on the Food Standards Agency website https://allergytraining.food.gov.uk/index.php?

- The Anaphylaxis Campaign has lots of information and resources available - including posters. You can also sign up for allergy alerts: https://www.anaphylaxis.org.uk/
- Additional information on how to conduct a risk assessment can be found in this FoodDrinkEurope Document: https://www.fooddrinkeurope.eu/uploads/press-releases_documents/temp_file_FINAL_Allergen_A4_web1.pdf
- The Food Allergy Research and Resource Program of Nebraska (FARRP) maintains a spreadsheet which identifies many of the different nationally regulated allergens. https://farrp.unl.edu/IRChart
- The Allergen Bureau of Australia and New Zealand can provide science based data on allergen risk exposure. http://allergenbureau.net/vital/vital-science/



# 8 / GOOD HYGIENE PRACTICE /

The systems to maintain a hygienic standard in vehicles and warehouses and ensure that people working in those environments both understand and practice good hygiene habits are another crucial HACCP prerequisite programme (see Chapter 3 of this guidance) and **must** be in place. In cold chain storage and distribution businesses there are three elements to be considered, each of which is covered in this chapter:

- Personal hygiene
- Vehicle and transport standards
- Warehouse and facility hygiene

## PERSONAL HYGIENE

Proportionate measures **should** be based on a documented risk assessment considering food wrapping and packaging and needs to be in place to ensure that food handlers do not contaminate food. This includes the provision of clean personal protective equipment (PPE)/ clothing which is appropriate to the environment, providing training (see Chapter 4 of this guidance) and the exclusion of workers who are ill.

**These are good practice personnel hygiene rules, which must, or should apply all those who work on or visit site**:

- Limit eating and drinking to designated areas. Food and drink, including chewing gum and sweets **must** not be permitted in food storage, food handling or loading bay areas, except water from controlled drinking fountains or dispensers. These **should** be confined to a designated area to prevent a contamination risk.
- Maintain high levels of hand hygiene by providing sinks with hot and cold running water, soap hand-drying facilities and where appropriate hand sanitiser. Staff and visitors **must** be obliged to wash their hands:
  - before starting work, after breaks and before and after eating;
  - after using the WC, display handwash signs as a reminder;
  - after carrying out hygiene tasks or handling refuse.
- Staff **must** be obliged to report if they are suffering from any contagious disease, heavy cold, sickness or stomach complaints prior to entering the warehouse and food handling areas.
- Visitors and contractors **should** be given the site rules and requested to verify acceptance and understanding when they arrive and before access to food areas.
- Prohibit smoking except in designated areas away from food storage, handling and transit areas, including e-cigarettes and in the cabs of vehicles, arrangements **should** be in place to dispose of cigarette ends and smokers refuse. Tobacco products, lighters, e-cigarettes etc **must** not be allowed in food areas.
- In general glass and ceramics **should** not be permitted e.g. glass bottles for drinks, vacuum flasks. Be clear on what is allowed and where, for example ceramic mugs may be permitted in administrative offices where no protective clothing is worn but **should** not be permitted in any warehouse offices which are in free use by warehouse staff without removing PPE.



- Be clear on the allergen precautions and rules in place. Assessed on the basis of risk it may be acceptable to allow nut containing products or packed lunches to contain nuts as long as they are restricted to the canteen area where protective clothing is removed and handwashing is in place. (find more on allergen management in Chapter 7 of this guide).

- Ask new staff and visitors to alert their supervisor or managers if they suffer from a food allergy and put the appropriate safeguards in place so that they are not exposed to risks from spillages.

- The appropriate protective clothing (for example: boots, coats and high visibility jerkins) **should** be worn in food areas and clear rules in place for its removal before smoking, eating or visiting the toilet.

- Arrangements **should** be in place to launder and/or replace protective clothing when it becomes dirty or damaged.

- Coloured, usually blue, waterproof dressings **should** be used for cuts and grazes in food areas. Anyone arriving on site with an ordinary wound dressing, who will be working in food handling areas, **should** replace it with one that is coloured.

- Jewellery **should** be limited in food or equipment areas to a single wedding band and simple single stud earrings unless there is a medical imperative which **should** be considered by a health professional.

- Visitors **should** complete a health screening questionnaire and report this when they sign onto site. A health screening questionnaire could include specific questions regarding diarrhoea, vomiting, gastroenteritis, fever, sore throat with a fever, dysentery, jaundice, food poisoning, colitis, enteritis, hepatitis, septic sores on the arms and hands, boils, dermatitis, discharging wounds or any other contagious ailments.

- Whilst viruses like Covid-19 are not foodborne it has been demonstrated that they can persist on surfaces for many weeks in frozen conditions. Although contagion as a consideration seems newly emerged (even as a prerequisite) surface contamination as a source of illness is not, E. coli, Salmonella, Listeria and Hepatitis viruses will all persist. It is therefore necessary to fully embed employee health and facility hygiene controls.

- Staff who have been absent through sickness **should** be subject to a return to work procedure, often requiring completion of a form that is reviewed by an authorised person. This **should** be routinely used to ensure that no risk is posed to colleagues or product, whilst taking into account the need for medical confidentiality when this applies.

- Any need for staff to bring medications on site, **should** mean a requirement to notify a nominated staff member. If staff wellbeing requires them to carry medication with them into food areas it **should** be carefully controlled. Bearing in mind controls on glass, medications in glass **should** be avoided if at all possible or safeguards in place.

- Potential personal hygiene problems **should** be dealt with quickly, effectively, with compassion and confidentiality. Persistent or deliberate offenders **should** ultimately be dealt with through disciplinary means.

All food handlers, and those who work on food handling equipment **must** be trained in the basic principles of hygiene before they start work, even if they do not come into contact with open food. It is important that training is specific to the job they do so staff can appreciate their personal impact and responsibilities to food safety. Specific detail on staff training can be found in Chapter 4 of this guidance.

## VEHICLE AND TRANSPORT STANDARDS

The vehicles used to transport food in the cold chain **must** be hygienic and regularly cleaned. The following standards **should** be in place to ensure this:

- Cleaning of trailers **should** take place when-ever it is required but, just as for warehouses, the minimum frequency of regular trailer hygiene **should** be scheduled based on risk. Frequency will be dependent on the temperature regime and the nature of the loads, such as what they are and how they are packaged. It can be challenging to track vehicle cleaning with multiple depots but it needs to be visible, to enable it to be managed and demonstrated during inspections and audits.

- The same vehicle **should** not be used for the carriage of waste and food even if segregated or on separate journeys. If other journeys are used to carry non-food items, the risk of contamination **should** be assessed and suitable hygiene procedures put into place. The standards of cleanliness **should** be inspected and documented prior to release for any subsequent carriage of food products.

- The hygiene challenges will vary according to the typical nature of the loads carried. Routine transit of fresh meat for example can result in product drip and trailers could need cleaning between each load using a full Cleaning Instruction Card (CIC) process:

  - gross debris removal such as sweeping out;
  - rinse;
  - wash with hot water and detergent;
  - rinse;
  - dry;
  - sanitise.

  Whilst frozen trailers may need to be cleaned less often to remove ice build-up, sweep debris and maintain evaporators in an efficient and hygienic condition.

- Where vehicles are subcontracted, the responsibility for cleaning and expectation regarding standards **should** be clearly defined in the contractual arrangement.

- Where transport is not the responsibility of the storage business, concerns about vehicle hygiene standards **should** be raised with the appropriate customer or supplier, before loading or unloading begins.

- Clandestine travellers can pose a particular hygiene challenge for both vehicles and warehouse sites. Once an incident has been dealt with; procedures for decisions on and the execution of product disposal **should** be in place. This **should** include arrangements for thorough cleaning and disinfection of any affected facilities and vehicles. More detail on dealing with clandestine travellers can be found as part of the vehicle and transport standards in Chapter 6 of this guidance.





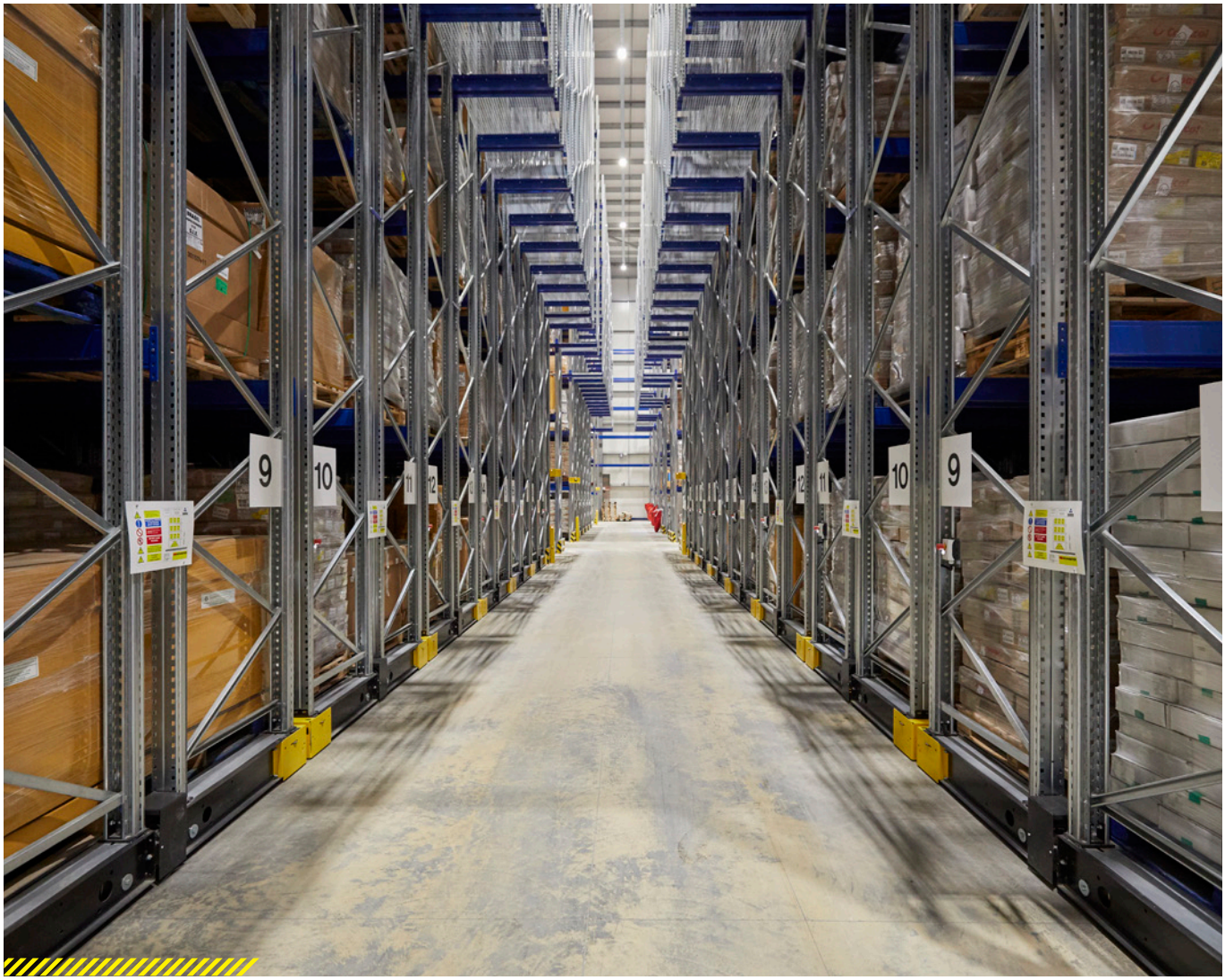
## WAREHOUSE AND FACILITY HYGIENE

Food handling and storage area in particular **must** be kept in a clean and hygienic condition. Good housekeeping **should** extend to all internal and external areas as food waste, rubbish and debris attracts pests, and contaminants find their way into food handling areas on people and equipment. Customers, auditors and enforcement inspectors will expect visible standards to be supported with documented policies, procedures, schedules and records for both cleaning activity and regular inspection.

**A hygiene schedule:** These are documents for each area and piece of equipment which detail the frequency and nature of cleaning. Frequency **should** be based on risk, which can depend on the level of activity in the area and the amount of debris, dirt and potential contamination which could possibly build up. Particular attention **should** be paid to high use equipment such as hand held scanners, thermometers, control panels and material handling equipment (MHE), which will need very frequent cleaning. Regular sanitisation will help control potential spread of contagious disease, as well as controlling food contamination from dirty equipment. For evaporators and other refrigeration equipment, cleaning intervals can be linked to efficient performance and ensuring condensate pipes remain clear.

These are given as examples of cleaning frequency. Individual businesses **should** determine their own required cleaning frequency on the basis of risk and need.

| | |
|---|---|
| **Daily** | Sweeping the loading bay, picking or marshalling area. Wiping handheld equipment and materials handling equipment (MHE). |
| **Weekly** | Warehouse and loading bay floor cleaning with the floor scrubber. Clean the area around the waste skips, inside and outside of waste receptacles. Beneath fixed scissors lifts; wiping handrails and crash barriers. |
| **Monthly** | Taking out floor level pallets to sweep behind them; cleaning the cleaning chemical storage area and battery charging areas. |
| **Quarterly** | Loading bay wall cleaning, fork trucks and manual handling equipment. Storage racking above level one for dust/debris build up on long term stored items. |
| **Annually** | High level cleaning, evaporators, fans and lights. |



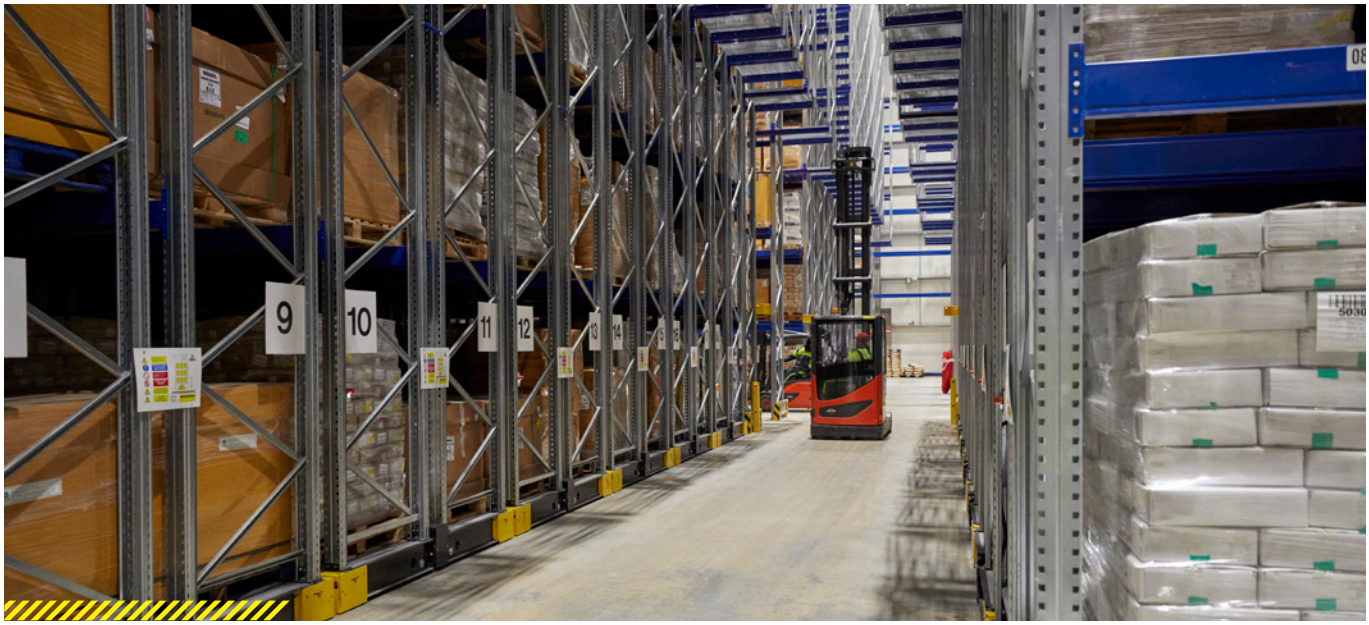
**Hygiene methods:** Usually procedurised through cleaning instruction cards (CIC), document how the cleaning is carried out. This will include the appropriate methods, cleaning equipment and materials, chemicals, dilutions where appropriate, safety precautions and PPE. Procedures **should** be specific to the equipment or area being cleaned and need to be detailed enough to be used as the basis for specific hygiene training. Procedures often include visual key inspection points which set the required visual standard for cleaning.

**Hygiene records:** These reference the hygiene procedure used and records who carried out the cleaning, when it was done, any highlighted issues and any specific checks. All cleaning activity **should** be documented and verified by inspection when completed. The verification also forms part of the record, documenting who carried it out, the outcome and any follow up actions required.

If cleaning is critical to control a particular food safety hazard, for example an allergen it **should** be formally verified (for example using sampling or analysis) to demonstrate that it is effective.

**Site cleaning rules which must, should or are recommended to be in place:**

- Cleaning operations **must** be carried out in a way which does not have the potential to contaminate the food.
- Cleaning chemicals **must** be kept secure at all times. Storage should be in a bunded facility, drainage for which **must** not be to storm drains or local watercourse. Chemical storage facilities **should** be kept locked.
- De-icing particularly around doors can be hazardous. Procedures **must** consider the proximity to food to avoid damage or contamination, in addition to personnel safety and the protection of building fabric.
- A clean as you go policy makes good hygiene the responsibility of everyone, potential food safety issues are promptly resolved and the warehouse, depot or vehicle a much more pleasant work environmental.
- Staff **should** be obliged to inform the relevant supervisor or manager without delay of any issues on site, in particular damage to facilities or product or chemical/product/substance spillages which require a clean-up crew.
- Spillages **should** be cleaned up promptly and carefully. Chapters 6 and 7 of this guidance cover specific spillages of contaminants and allergens in more detail.
- Cleaning utensils **should** themselves be kept clean, stored in designated hygiene stations away from food products and used in a way that does not pose a contamination risk.
- Cleaning chemicals **should** not be very strongly smelling or have the potential to taint product.
- The visible standards need to match the records to show the housekeeping and cleaning activity is carried out regularly and is effective.
- Clean up crews, hygiene staff and those carrying out the verification activity **should** be trained and signed off with respect to any chemicals that are handled and the hygiene procedures. Auditors will check that staff who carried out the cleaning were trained.
- Specialist cleaners are commonly used for high level or evaporator cleaning. They **should** be approved through the supplier approval programme and supervised during operations. Cleaning should be scheduled so that it does not pose a risk to food products.
- In the event of maintenance or building work the area or equipment **should** be assessed to identify any cleaning needs, which should be carried out before being returned to service.
- For food and personnel safety, it is **recommended** that chemicals are moved around in diluted format rather than concentrated to dilute at point of use.
- Modern solutions to prevent icing around doors, including trace heating or air curtains, are **recommended**.







# 9 / DEFENCE AGAINST FOOD CRIME IN THE COLD CHAIN /

Security considerations or food defence have become more important with the increased awareness of food fraud since the 2013 horsemeat scandal brought it into sharp focus. Cold chain transport and storage, whilst mostly not taking title to goods and often unaware of the full extent of the supply chain, are seen as vulnerable to the introduction and concealment of fraudulent goods.

Procedures to control and monitor vulnerabilities and access for malicious adulteration, theft or economically motivated fraud in order to deter or prevent crime **should** be captured in plans known as Threat Analysis Critical Control Point (TACCP) and Vulnerability Analysis Critical Control Point (VACCP) programmes which work on a similar principle as Hazard Analysis and Critical Control Point (HACCP as covered in Chapter 3 of this guidance). Whether intended or not, security breaches can have serious implications for food safety and for the businesses involved.

## EXPLAINING TACCP & VACCP

TACCP is inwardly focussed on intended malicious or ideologically motivated tampering, the intentional adulteration of food, compromises to site and transport security, IT security, and employee background.

VACCP is broader in scope to include economically motivated food crime, fraud and unintentional adulteration of food. It is carried out by identifying the vulnerable points in the business and its supply chain.

The purpose of this chapter is to address both aspects under one umbrella of defence against food crime and assist temperature-controlled storage and distribution businesses to get into the mindset of criminal intent. Then use the insight to design and implement effective food defence management systems. Whether it is internal or an aspect in the cold chain external to the business, it is food crime.

## Having a food defence management system means:

- Identifying and assessing the risks, threats and vulnerabilities of the food chain with respect to intentional acts, ideologically or economically motivated, which can impact on food safety.
- Developing and implementing business controls to defend the food supply chain and make it more resilient to attack.
- Monitoring and verifying that controls are in place.
- Being alert to new threats and making the necessary adjustments in light of new information.
- Working to continuously strengthen and improve food defence mechanisms throughout the organisation.

TACCP and VACCP are the systematic management of risk through the evaluation of threats, identification of vulnerabilities, and implementation of controls to materials and products, purchasing, processes, premises, people, distribution networks and business systems from criminal or unsafe activity.

## TYPES OF THREAT

**a) Fraud**
Codex describes fraud as *including adulteration, deliberate and intentional substitution, dilution, simulation, tampering, counterfeiting, or misrepresentation of food, food ingredients, or food packaging; or false or misleading statements made about a product for economic gain.* In PAS 96 (2017) food fraud is defined as *dishonest act or omission, relating to the production or supply of food, which is intended for personal gain or to cause loss to another party.*

The motivation for food fraud can be opportunistic, an act of organised crime or simply motivated by the need to take costs out of the supply chain. Food fraud is for financial gain, and whilst it does not intend harm, (as it relies largely on going undetected for success) it remains an essential element of food safety. Whether through ignorance or total disregard for consumer health, fraud regularly results in unsafe or unfit food.

- **Economically motivated adulteration**; these threats are food fraud risks from biological, ethical, radiological, physical or chemical resulting in unfit food being placed on the market, examples are the diversion of waste or dilution such as the addition of melamine to milk.
- **Misrepresentation, mislabelling or document fraud**; by way of example, these can include the passing off of a cheaper substitute; the marketing of non-organic as organic; changing of durability dates or altering traceability documents to mislead as to the true origin of a food product.

**b) Ideologically motivated food crime**
The motivation and intent is to cause harm. Threats can be both internal or external and include: sabotage, the actions of extremists; activist or special interest groups; people who are disgruntled for some reason, ex-employees or those suffering from mental health issues.

**c) Extortion**
Is the threat of contamination or theft of food, data or systems (ransomware) in an attempt to blackmail or extort money.

**d) Espionage**
Is the theft of intellectual property, it can be lists of customers, trade secrets or recipes, including blackmail of or inducements offered to employees.

**e) Counterfeiting**
Is the marketing of fake products, spirits is a popular one. Introducing counterfeit goods into credible and reputable distribution chains is increasingly common.

**f) Cyber crime**
With modern technology and the 'Internet of Things', almost any connected device can be used to commit crime. Common ones include business identity theft to procure goods, hacking into logistics systems to divert loads or the use of ransomware to extort money.

**g) Theft**
From product shrinkage in storage or distribution to the theft of entire loads or consignments. Either through physical removal of trailers or through e-commerce and load diversion.

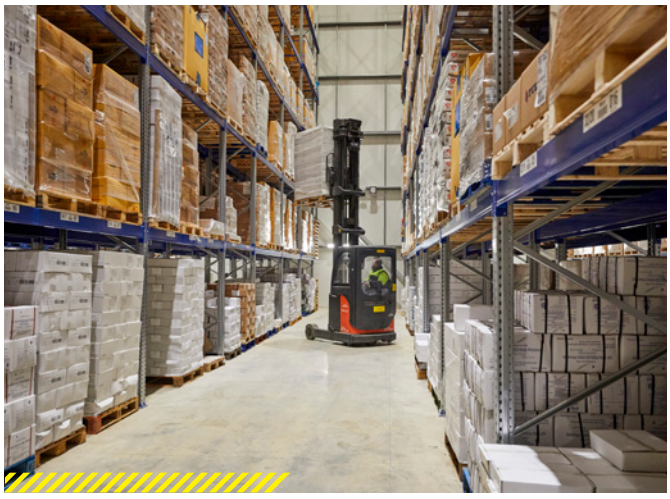
Other illegal activity not already listed but particularly relevant to food includes carrying out activities in unlicensed or unapproved premises or the use of storage and transport businesses for storing or moving illegal or fraudulent products.

## THE RISK ASSESSMENT PROCESS

TACCP and VACCP are prerequisite programmes based on a threat and vulnerability risk assessment following a similar process as the HACCP. They are often addressed as an adjunct to the HACCP study:

- Assemble a team, in addition to typical HACCP team members it may also include security, IT, HR, procurement, planning and logistics.
- Define the scope of the study, this **should** include site security and go beyond the direct activity of the business to identify where product comes from and where it is being transported to. It covers questions such as what kinds of threats will be considered and which products and processes are at significant risk or value to warrant inclusion.
- Brainstorm possible threats and vulnerabilities considering:
  - each aspect of the business or supply chain which may be the target of the attack, i.e. people, the premises, processes or services, logistics or digital systems;
  - the types of threat to each of these business aspects as described above;
  - the motivation and type of the attacker, extremist, extortionist, irrational individual or disgruntled employee, opportunist, cyber criminals or organised crime gangs;
  - areas in the supply chain that might from experience or intelligence scanning be attractive to criminals; this may be because of a lack of transparency, ease of concealment or where particular value can be gained.
- Carry out a risk assessment or a vulnerability assessment for each threat by considering the severity Impact (I) and Likelihood of occurrence (L) to give a Threat priority categorisation (T) T = I x L.
- Threat categorisation of **normal, heightened or exceptional** can be used to define the appropriate level of response and to develop the proportionate mitigating strategies for the identified threats. Ongoing objectives, investment and workstreams **should** seek to continuously strengthen the protection level and reduce threat risk.
- Implementation of the plan **should** consider how it will integrate into existing procedures, be documented, verified and audited, including staff training and ongoing communication.
- The business **should** have access to and resources for, ongoing horizon scanning activity to identify new and emerging threats, for consideration by the team.
- As with HACCP the food crime defence plan **should** be reviewed when things have changed, in any case at least annually but also:
  - on receipt of a credible threat or vulnerability either via horizon scanning or from other sources;
  - following a major food safety incident e.g. malicious or deliberate contamination or food fraud;
  - the introduction of a significant new product range, customer or supplier;
  - significant changes in the receipt, dispatch processing or warehouse handling systems;
  - information or complaint from a customer indicating a potential food safety risk;
  - an unexplained system failure;
  - any changes to food safety legislation;
  - on receipt of new scientific or industry information which requires a process change.

| Impact (I) | Likelihood (L) | I x L = T (Threat priority categorisation) |
|---|---|---|
| 1 = No impact | 1 = Very unlikely | **1 to 6 = Low Risk (L)** Acceptable, monitor & review |
| 2 = Minor disruption | 2 = Unlikely | |
| 3 = Significant loss or disruption | 3 = Likely | **8 to 12 = Medium** Risk (M). Acceptable with additional controls |
| 4 = Major loss or incident | 4 = Very likely | |
| 5 = Catastrophic incident | 5 = Almost certain | **>12 = High Risk** (H) Unacceptable |



## Example of part of a threat and vulnerability risk assessment

| Business aspect | Threat source | Threat | Vulnerability | Mitigation | Consequence | RISK RATING I | L | T | Threat priority | Preventative control measures |
|---|---|---|---|---|---|---|---|---|---|---|
| Logistics | Organised criminals | Vehicle or load theft | Deliveries with scheduled rest breaks >4 hours or over-night stops. | Vehicles fitted with 360° cameras, telematics and driver communication systems. Vehicles fitted with uniquely numbered seals for every journey, driv-er handbook with emergency and security procedures in place. | Financial loss, disappointed customer, driver welfare. | 2 | 3 | 6 | Normal | Driver procedures to lock cab and apply additional padlock to trailer connnection and door hasp before leaving the vehicle for any reason. Process to fit all vehicles with GPS. |
| Personnel | Disgruntled employee, activist or extortionist | Deliberate contamination of product with an allergen | Access to storage warehouse | Sensor controlled access to site, CCTV and manned security 24/7/365, visitor and contractor screening and supervision. All product is packaged. | Consumer harm or death. | 5 | 2 | 10 | Heightened | References checked for all new hires. Food safety culture initiatives, incentive schemes and confidential whistleblow-ing process for engaged staff. Leaver checklist in place. Implementing addi-tional cameras in warehouse, monitored by site security 24/ 7/365. |
| Digital systems | Cyber criminal, extortionist | Cyber attack – malware and loss of critical IT systems, extortion | Warehouse stock management system | Restricted access to trained and trusted personnel. Firewalls in place and contract to maintain with current protections. | Unable to locate stock for outload, loss of traceability. | 4 | 2 | 8 | Heightened | Internal rules, no personal electronic devices can be enabled on company intranet. System upgrade to require two factor authentication for access to systems externally. |

# RISK FACTORS TO BE CONSIDERED AND PRECAUTIONS TO PUT INTO PLACE

## PEOPLE

Managing recruitment. Make sure pre-employment and right to work checks are included, face to face interviews, health questionnaires and a probationary period. Source agency workers only from trusted and licensed labour providers.

**Consider:**

- A safe and secure whistle blowing mechanism **should** be in place. Communicate with staff at all levels openly and frequently.
- Visitors and contractors **should** be managed by having site access sign in, an accountable accompanying host and adequate if not continuous supervision. Security protocols **should** check ID on arrival, advise on site rules and request completion of a site hygiene questionnaire.
- Manage employment by monitoring attendance, performance and general welfare.
- Have an effective training and personal development programme which includes food safety and fraud awareness (training can be found in Chapter 4 of this guidance).
- Reward mechanisms to encourage staff to raise issues.
- Put a food safety culture programme into place, as detailed in Chapter 2, with employee engagement surveys to identify objectives to maintain and improve employee relations.
- Deal with poor performers and disciplinary procedures fairly through an open and transparent process.
- Manage leavers by conducting exit interviews to understand why and build learnings into continuous improvement efforts. Recognise previous efforts and the contributions they have made, pay them fully and on time.



- Have an exit checklist in place to ensure that all company property including access keys and electronic devices are returned. Cancel individual access codes or change general access codes.
- Make facilities good, clean and welcoming, providing all the services needed by visiting drivers and contractors whilst controlling access to unauthorised areas.

## PRODUCTS

Appreciate the nature and supply risks associated with the products that are handled or shipped.

**Things to consider are:**

- Particular security of very high value products, meat, seasonal foods, alcohol.
- Products with a reputation for high levels of crime, meat, wine and spirits
- Products that are more open to abuse like unpackaged product or those that are extremely temperature sensitive.
- Intelligence on the latest scams on particular food groups, sign up for alerts and regular updates. A list of good sources can be found at the end of this chapter.
- Be sensitive to changes in the status or behaviour of product supplier or customers, like trying to work outside of accepted systems, diverting product to alternative destination or changes to distribution services.
- Traceability **should** be robust enough for all packages to be 100% accounted by product, batch and durability date. Such data **must** be easy to retrieve and disseminate if required. Test it regularly to guard against product shrinkage. (Refer to the traceability advice in Chapter 4).
- Investigate reported shortages to establish root cause.

## PREMISES AND SITE SECURITY

Be aware of the activity of controversial neighbours and whether premises are located in a politically, geographical or socially sensitive area. The following precautions **must**, **should** or are **recommended** to be in place:

- ▶ Appropriate fire and access alarms **must** be in place and personnel on site trained in and procedures on how to react.
- ■ Have uninterrupted boundary security in place for warehouse sites and transport depots. This can take the form of boundary fences, with secure vehicular and pedestrian access.
- ■ Put security lighting and monitored and recorded CCTV in place.
- ■ Where a security detail is not present 24 hours a day the site **should** be secured against access with the appropriate alarms and emergency security arrangements.
- ■ Maintain grounds and keep overgrowth cut back to deny access over boundary fences via overhanging trees.
- ■ Ensure CCTV has unobscured vision around buildings and vehicles.
- ■ Restrict access to site buildings, vehicles and to the warehousing to authorised personnel only, a secure digital system is **recommended**.
- ■ Restrict access to plant and maintenance facilities which **should** be kept locked when not in use. This extends to access to utilities such as fuel, water, chemical or refrigerant tanks and storerooms.

## DISTRIBUTION

Freight distribution is considered one of the most vulnerable aspects of the supply chain.

- ▶ Drivers **must** have the appropriate licence, be fully trained and competent in security and emergency procedures and have the appropriate tools for their welfare such as methods of safe communication and to enable them to discharge their expected duties in load protection.
- ■ Vehicle cabs, trailers, fuel tanks and access to temperature settings **should** be closed and locked in the event that the vehicle is left unattended outside of a secure depot.
- ● A mechanism is **recommended** to enable the tractor cab and trailer to be locked together to prevent theft of the trailer.
- ● It is **recommended** that seals be used on all loads and multiple seals issued for multidrop journeys.
- • If distribution is carried out by a third party or is a contracted service supplier ensure that minimum standards are agreed with them or with the customer using them either through a service level agreement, contract or specification.
- • Ensure all vehicles are road legal, regularly inspected, serviced, cleaned and maintained, including preloading checks.
- • 360°cameras that can be monitored remotely or safely by the driver can be fitted along with GPS.
- • Clandestine travellers can be a problem, this issue is covered in Chapter 6 of this guidance.





## BUSINESS OPERATIONS

Consider the profile and sensitivity of the overall environment in which the business operates. This could be a media profile around the activity of competitors within the sector, prominent ownership under constant scrutiny, key high-profile customers or suppliers, controversial products or historic reputation.

The following aspects are **recommended**:

- A robust and thorough, documented supplier approval and monitoring process (see Chapter 4) is an essential prerequisite of HACCP. It **should** include considerations of food security threats and vulnerabilities.
- Protocols to investigate, assess the risk of and establish confidence that new customers or customer changes are fully genuine **should** also be in place. Procedures **should** take into account:
  - previous trading relationship and history;
  - nature of the products in relation to risk of fraud;
  - customer approval process and background checks – which can include using reference, trading and financial history, legal issues or previous prosecutions.
- Development of a food security plan **should** be a conscious activity to proactively protect and secure the business against food crime; This can mean specific controls and assurances for particular customers, suppliers or processes in the form of restricted credit terms, additional audit, inspection or authenticity verification.
- Carefully manage and screen all business relationships.
- Have approved contractors and call out lists, avoiding if possible, emergency call outs of businesses and services which are unknown without verification checks on professional credentials, affiliations or references.
- Build good collaboration and partnership relationships with customers and suppliers.
- Be sensitive to changes in customer or supplier practices and their business stability. Examples could be diverted loads, late payment, claims for short delivery, orders not put through the expected secure channels, changes to products, packaging formats, origin or out of life or damaged product. Food sent in at the wrong temperature or using unrefrigerated vehicles. Whilst these things may be totally innocent a **recommendation** is that they be followed up.
- Have governance mechanisms to identify when food crime occurs and to check information reliability.
- Have procedures as part of the business continuity plan to respond promptly when the risk is heighted or urgently if it is exceptional.

## CYBER CRIME

Food crime can come in many guises, cyber crime is on the rise and is constantly evolving. Measures businesses can take to protect themselves against these threats, include:

- Robust back up plans to enable business continuity **should** be in place which are regularly checked (see Chapter 4).
- Staff **should** be kept aware of phishing and suspect emails and know what to do if they are received and/or inadvertently opened.
- Having current firewall and data security arrangements in place either through an internal IT team or from a vetted, monitored and trusted third party contracted supplier.
- Providing staff with the digital equipment they need and restrict use of personal devices on site and their connection to business systems, as well as blocks on permitting employees to use business devices for personal use or social media access.
- Restricting the use of mobile phones with cameras and video recording capability.

## STANDARDS AND REGULATORY SUPPORT IN THE UK

*PAS 96 (2017) on protecting and defending food and drink from deliberate attack* is a publicly available specification collaboration between Food Standards Agency, Defra and food and supply chain businesses. It is available as a free download via the FSA website through this link: https://www.food.gov.uk/sites/default/files/media/document/pas962017_0.pdf

It is a useful guide to business on what to consider and how to conduct a TACCP study, including a vulnerability assessment as required by BRCGS Storage and Distribution.

In response to the 2013 Horsemeat Scandal an investigative, intelligence gathering and enforcement structure was set up in the UK to tackle food crime.

The National Food Crime Unit (NFCU) is a dedicated law enforcement function of the Food Standards Agency (FSA). Working closely with a similar unit in Scotland tackle food crime across the UK.

The *NFCU* is tasked with protecting consumers and the food industry from food crime within food supply chains. Food crime can be reported through the NFCU either online through this link: https://tinyurl.com/mjjhwf7e or by calling **0207 276 8787**.

The NFCU have developed a free to use *food fraud resilience self assessment tool* to support businesses in identifying the risk to their business from food crime and outline steps that they can take to mitigate that risk.

The *Food Authenticity Network* is an open access online resource led by *LGC* (previously the Laboratory of the Government Chemist) a public/private funded partnership set up by Defra. Its mission is to build a more resilient food supply chain by gathering information on food authenticity testing, food fraud mitigation and food supply chain integrity. It's a useful source of information for horizon scanning and individuals and businesses can sign up to receive monthly updates with early warning on the latest scams and targets for criminals.

### Further guidance

Websites with useful information and regular horizon scanning updates:

- Food Standards Agency https://www.food.gov.uk/
- UK Food Authenticity Network http://www.foodauthenticity.uk/
- MI5 Threat Level: https://www.mi5.gov.uk/threat-levels and the M15 Joint Terrorist Analysis Centre https://www.mi5.gov.uk/joint-terrorism-analysis-centre
- European Rapid Alerts for Safe Food and Feed (RASFF) https://ec.europa.eu/food/safety/rasff_en
- EU Food Fraud Network: https://ec.europa.eu/food/safety/food-fraud/ffn_en
- EU Food fraud monthly summary reports https://knowledge4policy.ec.europa.eu/food-fraud-quality/food-fraud-summary-reports_en
- Food and Drink Federation https://www.fdf.org.uk/
- Institute of Food Science and Technology https://www.ifst.org/home
- National Cyber Security Centre, for advice, guidance and keeping up to date: https://www.ncsc.gov.uk/



COLD CHAIN FEDERATION

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**For all membership enquiries, get in touch with the team at info@coldchainfed.org.uk or 0118 988 4468.**




COLD CHAIN FEDERATION

## PRIMARY AUTHORITY APPROVED GUIDANCE

This guide has been produced as part of Cold Chain Compliance, the advisory service from the Cold Chain Federation. It was written with support from the Federation's Primary Authority Partner, Slough Borough Council. Cold Chain Federation members wishing to benefit from primary authority advice for their health and safety compliance challenges are encouraged to:

### 1 BE UP TO DATE

Read and implement our guidance, bulletins and newsletters – produced by cold chain operators, for cold chain operators.

### 2 SEEK ADVICE

Contact our Cold Chain Compliance helpline for a second opinion, or to ask for advice on your local compliance challenges.

### 3 RECEIVE APPROVED GUIDANCE

If necessary, your query will be referred to the Federation's primary authority partner, to issue primary authority advice which can be used to underpin your compliance action.

### 4 HAVE CONFIDENCE

By following the advice, you are complying with the law and any potential local enforcement action may be blocked by Slough Borough Council. **The same rules, interpreted consistently, wherever your facility is in the country.**

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COLD CHAIN COMPLIANCE

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