

HACCP: Physical Hazards Management

Identifying and Controlling Potential Physical Hazards

Development

To define detail, scope and purpose.

Development

This information can be used to develop food safety and quality programs that meet the requirements of modern Regulatory, Customer and Industry Standards:

- We take the time to explain the expectations and requirements of food safety and quality compliance as these relate to your food safety and quality programs.
- You may choose to use our Premium Resources to build, enhance or upgrade your food safety and quality program.
- We encourage you to share this webpage with any food compliance associates and peers you believe may benefit from our commitment to providing our users with user-friendly information and resources to achieve a superior Food Compliance Culture.
- We welcome your suggestions for additions of general or specific content through the haccp.com Contact Page.

Key Definitions for HACCP: Physical Hazards Management

- Biological Hazard: The danger posed to food safety by the contamination of food with pathogenic microorganisms such as viruses, bacteria, spores, fungi, or naturally occurring toxins.
- Chemical Hazard: The danger posed to food safety by the contamination of food by chemical substances, such as pesticides, detergents, additives, and toxic metals.
- Electron: A subatomic particle that carries a negative electric charge. X-ray systems generate X-rays by directing high-voltage electrons at a metal target.
- Foreign Object: Any material in food that is not intended to be there, such as glass, metal, stones, wood, plastic, bone, or pests.
- Hazard Analysis Critical Control Point or HACCP: HACCP is a food safety methodology that relies on the identification of Critical Control Points in all stages of food business processes.
- Macro-biological: Large living organisms, such as insects, that can be seen with the naked eye.
- Micro-biological: Organisms too small to be seen with the naked eye, including protozoa, bacteria, fungi, and viruses.
- Photodiode: A type of photodetector capable of converting light into either current or voltage, depending upon the mode of operation.
- Physical Hazard: Particles or fragments of items not supposed to be in foods.
- Product Effect: A signal generated in a metal detector by the conductivity or moisture of the food itself, even when no metal is present.
- Reject Device: A mechanism fitted to a detection system that removes contaminated product from the production line.
- X-Ray: A form of electromagnetic radiation that passes through food and is used to produce an image that reveals dense contaminants.

HACCP: Physical Hazards Management Development

When considering the development, documentation, and implementation of HACCP: Physical Hazards Management food safety and quality management systems, the following information should be considered to ensure effective outcomes:

About HACCP: Physical Hazards Management

When considering the hazards associated with the process steps in the HACCP plans, the three traditional groupings of hazards to consider include biological, chemical, and physical hazards. As HACCP plans evolve and customer standards and regulatory requirements become more stringent, allergens, regulatory hazards, quality hazards, and engineering hazards are also commonly considered in HACCP plans.

Physical hazards, as with chemical and biological hazards, can enter a food product at any stage of processing. There is a limitless number of physical items that can enter food as foreign objects, some of which can also be classed as macro-biological. Very few of these pose a real food safety risk. For example, a customer may find a hair in their food undesirable, but it is most unlikely to harm them. Such foreign objects need to be assessed to determine whether they are food safety hazards or quality hazards. Any physical hazard has the potential to become a food safety hazard if the item could cause the consumer to choke or be injured. A food business could also face prosecution whether or not the item is a genuine food safety hazard, simply because the product received by the customer was not of the nature, substance, or quality demanded or expected. Foreign items can also carry microbiological hazards into a food product. The food's intrinsic ability to remain safe relies on its processing status and on whether the product will undergo a further control measure after the physical object is introduced. Good manufacturing practices should ensure that physical hazards are controlled within the food production environment. Examples of physical hazards that are of concern regarding foods include:

Glass



Glass containers are a breakage risk and are controlled or removed from processing areas.

Glass fragments can cause cuts to a consumer's mouth, and could potentially have very serious health consequences if swallowed. Smooth pieces of larger glass can cause injury through choking or could be broken into smaller, sharper pieces when the consumer bites into the food.

Glass can be present in raw materials, generally as foreign matter from the growing or processing site, or from the container in which the raw materials are or have been stored. Glass containers for storage and handling should be eliminated wherever possible in food processing areas. In addition, staff should limit the glass they carry on their person while handling foods, and equipment should use specified safety glass where needed instead of substitutes. Glass light fittings should always be covered appropriately to reduce the risk of contamination should the light bulb shatter. It is often difficult to remove glass entirely from food contact areas, especially where glass is used as packaging or for food service. Food safety systems should identify where in food production glass is a potential hazard, so that it can be managed with stringent breakage control procedures. Broken glass should be reported immediately, the area isolated, and any exposed product held until it has been assessed and, where necessary, discarded.

Metal

Like glass, metal can enter food products at all stages and is of concern because of its ability to cause injury as sharp pieces, or choking. Equipment maintenance is particularly important within this issue, effectively reducing the risk of machine parts, filings, or similar items from entering foods. The process of maintaining the equipment also becomes a cause for concern, as equipment parts can enter foods during servicing. Where raw materials are delivered in metal containers, great care should be taken not to introduce swarf or metal shavings into the food

processing environment.

Stones

Stones most commonly originate from plant sources, where they are carried into production within or on the surface of fruits, vegetables, and other plant materials from harvesting. Stones are hazards as they can cause dental damage or choking, and sharper stones may cause problems similar to those of glass and metal. The presence of stones within foods can be prevented through careful handling and preparation procedures, and by the use of equipment such as centrifuges and flotation tanks for food items.

Wood

Wood can cause cutting and choking, as with other sharp objects. Wood may be present in raw materials from its primary production, or may be introduced into production through other means. Wooden packaging in raw materials should be handled with care so as not to cause splintering where food contact may occur. Some traditional products may contain wood as part of their production, for example, some Japanese fish cake products that are cooked on wooden slabs. Such products should be handled with caution so that they do not become a food hazard. Wooden equipment has in most cases been replaced in commercial food production.

Plastic

Plastic is often used to replace glass and wood objects to reduce hazard risks, but it can itself become a hazard. Hard plastic can cause serious injury, almost as severe as glass, and breakages should be treated as for glass. Soft plastics are used for packaging as well as protective clothing such as gloves and aprons. They are usually monitored by visual inspection, and their bright colours make them more readily identified. Hard and brittle plastics are commonly included within glass policies to ensure appropriate and effective control.

Pests

Along with their risk as biological hazards, pests also pose a threat as choking hazards in foods. Of most concern in this regard are large insects and parts of rodents or birds. An effective pest control regime will eliminate the risks of such pests entering the food production process and should be part of the good manufacturing practices as expressed in the food safety system.

Bone Fragments

Bone fragments can remain in meat, poultry, and fish products, particularly where products are filleted, deboned, or mechanically separated. Bone can cause choking, dental damage, and injury to the mouth or throat. Controls include supplier specifications for bone content, careful trimming and deboning procedures, visual inspection, and X-ray detection where the bone is dense enough to be detected.

Jewellery and Personal Items

Jewellery, hair clips, pens, buttons, and other personal items can fall into food during handling. Rules on personal items should be set within personal hygiene standards and enforced through pre-entry checks. A register of permitted items, and clothing without loose buttons or external pockets in high-risk areas, reduce the risk. Visitors and contractors should follow the same rules.

Foreign Object Outcomes

Foreign materials of significance can be defined as to their ability to cause:

- A potential choking hazard for consumers;
- Potential damage to teeth or internal organs;
- Potential carriage of microbiological hazards into the product.

Physical Hazard Policies

Policies commonly define the scope and purpose of controls for all categories of physical hazards relevant to a food business.

Potential hazard policies may include:

- Which physical hazards are of particular concern;
- Areas in which the control of physical hazards is relevant;
- Procedures regarding the control of relevant physical hazards, including strategies for corrective actions;
- The use of a register for physical hazards which are required and used in high-risk areas. This may include nominations for items such as glass light bulbs and wooden pallets, which may be unavoidable in use.

Physical Hazard Identification and Control Methods

There are numerous methods through which physical hazards can be identified and controlled within food businesses, including, but not limited to:

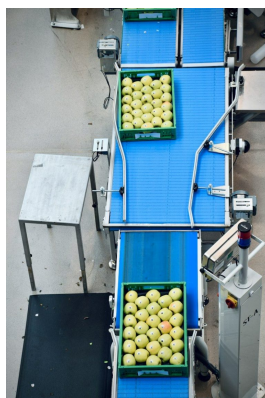
Screening

In-line screens are useful for the removal of foreign objects during food processing. A relevant-sized screen, or series of screens, may be placed in line to capture any foreign matter as the product passes through it. Screening is useful for manufacturers of liquids, powders, and free-flowing granulated products such as coffee beans or grains.

Magnets

In-line magnets are commonly used within dry and liquid food and ingredient industry sectors. Where a product is air blown or vacuum pumped around its processing circuit, in-line magnets may be used to capture metal fragments. Often a series of magnets are used since not all of the product moves over the surface of every magnet. Regular removal of the magnets and cleaning of them is essential for the magnet to work at its maximum capability. It is also important to consider that magnets may lose their strength over time, so they should be checked and calibrated on a regular schedule.

Metal Detection



Conveyor detectors are the most common metal detection configuration in food businesses.

Advances in technology and its availability to food businesses have ensured that metal detection is a standard hazard control method within many differing international food industry sectors.

Reasons for including metal detection within a food processing or packaging environment include:

- Product safety;
- Equipment protection;
- Contract or customer requirements; and
- Regulatory compliance.

The use of metal detectors will never guarantee a metal-free food product, but a properly designed, installed, and

maintained unit, along with a metal contamination control program, can be extremely effective in identifying and controlling related hazards.

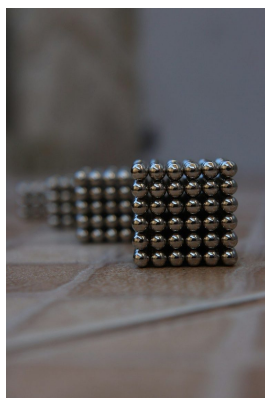
Metal detectors are an important part of any comprehensive physical hazard control program. If metal detection units have been specified, installed, operated, and maintained correctly, they will contribute to improving product quality and reducing operational losses. A properly used metal detector should not be treated as insurance against metallic contamination. Rather, it is a diagnostic device that can help to discover accidental metallic contamination. Plans and procedures should be in place to prevent contamination. If contamination does occur, contaminants must be identified immediately, traced back to their source, and eliminated. Line strainers are useful for removing foreign particles from liquid products and magnets have long been used to remove ferrous materials from particles and pumpable liquids.

How do Metal Detectors Work?

Most metal detectors use a balanced three-coil system to detect small particles of non-ferrous and stainless steel. The coils are wound on a non-metallic frame, each parallel with the other. The centre coil is connected to a high-frequency radio transmitter. Coils on either side of the transmitter coil are receivers. As these two coils are identical and placed at the same distance from the transmitter, they receive the same signal and produce an identical output voltage. When the coils are connected in opposition, the output is cancelled, resulting in a zero value. When a particle of metal passes through the coils of a metal detector, the high-frequency field is disturbed under one coil, changing the voltage by a few microvolts. The state of balance is lost and the output from the coils is no longer zero. It is this phenomenon that is used to detect metal.

An important aspect of metal detector operation is the metal-free zone, which is needed for proper operation. The zone includes a space on each side of the aperture that must be free from any metal structure such as rollers and supports. As typical manufacturer guidance, the metal-free zone is approximately 1.5 times the aperture height for fixed structures and 2 times the aperture height for moving metal such as reject devices or rollers. Follow the manufacturer's specification for each unit.

What Types of Metals can be Detected?



Ferrous metals are magnetic, which is why magnets capture them and why detectors respond differently to other metals.

Metals used in the construction of food premises and equipment can generally be classed as ferrous, non-ferrous, or stainless steel. The ease of detection will depend on their magnetic permeability and electrical conductivity. The list below shows metal types and their ease of detection. The size, shape, and orientation of the metal particle relative to the detector coils are also important. Since the size, shape, and orientation of metal contaminants cannot be controlled, it is best to operate a metal detector at the highest possible sensitivity setting applicable to any particular product.

Metal Types and Their Ease of Detection:

- Ferrous metals, for example, iron, are usually magnetic, are good conductors of electricity, and are generally easy to detect;
- Non-ferrous metals, for example, aluminium, copper, brass, and lead, are usually non-magnetic, are good conductors of electricity, and are generally easy to detect;
- Stainless steel variants are usually non-magnetic but can become magnetised, are usually poor conductors of

electricity, and can be difficult to detect compared to ferrous and non-ferrous metals.

Food product parameters can have a major effect on the effectiveness of metal detection. Electrical conductivity in foods such as cheese, fresh meat, warm bread, jam, and pickles can generate a signal in a metal detector even though metal is not present. This phenomenon is known as the product effect. It is best to be aware of this phenomenon and to work with your metal detector supplier or manufacturer to determine the best means to compensate for the product effect.

Metal Detection Rejection Devices

The purpose of rejection mechanisms is to remove the contaminants and/or contaminated products from the product and process stream. The rejection system must be specified and validated to remove all detected contaminants along with a minimum amount of unaffected product. The contaminants are removed and stored in a manner that prevents their reintroduction into the product or process stream.

Metal detectors are typically installed in three basic configurations: pipeline, conveyor, and free-fall. Pipeline detectors are used for any product conveyed in tubes or pipes. A diversion valve is normally used to redirect materials containing detected contaminants into a designated vessel or container.

Conveyor detectors are by far the most commonly used in food businesses. Many variations of manual, semi-automated, and fully automated rejection mechanisms are possible, such as air blow, push arms, retractable conveyor bed, reversible conveyor, slider gate, ink marker or coder, diversion conveyors, and robotic grippers.

Free-fall detectors are often found on dry product fillers and are useful for any material that can be dropped through an aperture. A fast-acting valve or deflector plate is used to divert detected material to a designated container.

X-ray

X-ray inspection systems are fast becoming a common feature of food processing plants throughout the world. The advantages that X-ray Inspection has over traditional metal detection and check weighing systems make them essential pieces of equipment for many companies.

There are three key reasons for investing in X-ray inspection:

- The business benefits of better quality and greater confidence in compliance;
- The technical and marketing advantages of better metal detection and detection on non-metallic contaminants; and
- The operational advantages of maximum inspection performance at high line speed with reliability and online simplicity.

The Advantages of X-ray

X-ray inspection systems detect metal contaminants better than metal detectors and detect non-metallic contaminants, as well as missing, underweight or broken products.

Advantages of X-ray detection include:

- X-ray is not affected by foil or metallic packaging;
- Excellent stainless-steel detection;
- Immune to environmental effects;
- Ability to detect metallic and non-metallic;
- Identifies missing product and low fill and broken product;
- High production line speeds;
- Ability to deal with product density variations and inspect randomly produced products on a production run.

X-ray inspection systems only generate X-rays when power is applied and do not use radioactive sources that require controlled disposal. X-ray systems do not make the product radioactive, and radiation exposure of food is strictly controlled.

What will X-ray Detection Identify in Food Products?

X-ray detection systems will generally effectively detect:

- Metal;
- Non-ferrous metals in foil packaging, including stainless steel;
- Glass;
- Stones;
- Calcified bones;
- PVC, Teflon, and other plastic variants;
- Ceramic or concrete;
- Dense clumps within raw materials or finished products;
- Missing components or parts of equipment;
- Damaged or non-conforming products.

In some food products, based upon their composition and physical characteristics, X-ray systems may not routinely detect the following materials:

- Low-density plastics;
- Small pieces of thin glass, such as fluorescent glass tubes;
- Low-density stones;
- Insects;
- Wood;
- Hair;
- Cardboard;
- Paper.

How does X-ray Work?

An X-ray system usually has three main components:

- Device to generate X-rays;
- Sensor to detect contaminants;
- High-speed computer to process sensor data.

The X-ray unit operates as follows:

- X-rays are generated by a special glass tube that is cooled;
- When high voltage is applied to the tube, electrons are generated;
- The electrons strike a target which emits a stream of X-rays that are focused and reduced to a fan beam;
- The fan beam passes through the product before entering a sensor;
- The sensor converts the X-ray signal into a form where it can be passed to a computer for processing and detection.

X-Ray Density Difference

X-ray systems detect contaminants by density difference. As an X-ray penetrates a product, it loses some of its energy. A dense area such as a contaminant will reduce the energy even further. As the X-ray exits the product, it reaches the sensor or photodiodes that precisely measure the X-ray energy that reaches them. The sensor then converts the energy signal into a greyscale image and a high-speed computer scans the sensor thousands of times per second and stores the individual signals. It compares them to a dynamic value that delivers the maximum level of sensitivity and the minimum level of false readings. A contaminant is typically highlighted as a darker shade of grey than the product. Effective X-ray inspection depends on the sophistication of data analysis.

Controlling Foreign Materials



Trained staff and structured hygiene rules help keep foreign objects out of food.

Controlling foreign materials can be achieved by:

- Giving preference to suppliers who have systems in place to counter foreign materials within their products, for example, metal detectors, X-ray, sieving, or centrifugal systems;
- Discarding exposed product within an appropriate radius from broken glass, ceramic, or other potentially hazardous substances within food production areas;
- Reduction of use of wooden and other hard materials where a suitable substitute is available;
- Structured personal hygiene and maintenance policies.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific HACCP: Physical Hazards Management Development requirements in relation to their items.

References

The following official sources support the information on this page:

- ISO 22000:2018 Food safety management systems: Requirements for any organization in the food chain;
- Codex Alimentarius codes of practice;
- World Health Organization: Food safety fact sheet.

HACCP: Physical Hazards Management Development Key Points

- HACCP: Physical Hazards Management programs must be developed to meet relevant Regulatory, Industry, and Customer standards and requirements;
- The Senior Management of your business facilitate a commitment to ensuring adequate resources to the development of your HACCP: Physical Hazards Management program;
- Should you require additional resources for the development of HACCP: Physical Hazards Management program elements, please discuss this with the relevant Senior Management representative;
- A properly developed HACCP: Physical Hazards Management program will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;
- A poorly-developed HACCP: Physical Hazards Management program will not fully support your business and may contribute to significant non-compliance against Regulatory, Industry, and Customer standards and requirements.

Documentation

To establish the developed detail in a viewable format to facilitate information.

Documentation

Document: A document provides guidance and/or direction for performing work, making decisions, or rendering judgments that affect the safety or quality of the products or services that customers receive.

Documented policies, procedures, work instructions, and schedules form the basis of any food safety and quality management system. The following documentation formats may be considered to ensure ongoing compliance with specified requirements for HACCP: Physical Hazards Management:

- HACCP: Physical Hazards Management policy;
- HACCP: Physical Hazards Management development procedures;
- HACCP: Physical Hazards Management implementation procedures and work instructions;
- HACCP: Physical Hazards Management monitoring procedures;
- HACCP: Physical Hazards Management corrective and preventative action procedures;
- HACCP: Physical Hazards Management verification schedule;
- HACCP: Physical Hazards Management verification procedures;
- HACCP: Physical Hazards Management validation schedule;
- HACCP: Physical Hazards Management validation procedures;
- HACCP: Physical Hazards Management training procedures.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific HACCP: Physical Hazards Management Documentation requirements in relation to their items.

You may wish to visit the HACCP: Physical Hazards Management Templates section of haccp.com for examples of HACCP: Physical Hazards Management documentation, record, and resource formats commonly applied within food safety and quality systems.

HACCP: Physical Hazards Management Documentation Key Points

- HACCP: Physical Hazards Management programs must be documented to meet relevant Regulatory, Industry, and Customer standards and requirements;
- All documented HACCP: Physical Hazards Management program elements must be controlled to ensure compliance;
- Key documented HACCP: Physical Hazards Management program elements should be available to your business team at all times to ensure they can facilitate required tasks;
- A properly documented HACCP: Physical Hazards Management program will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;
- A poorly documented HACCP: Physical Hazards Management program will not fully support your business and may contribute to significant non-compliance against Regulatory, Industry, and Customer standards and requirements.

Implementation

To facilitate the application of the documentation.

Implementation

Implementation: Implementation is the application of documented food safety and quality system elements into the actual business operation.

The implementation of HACCP: Physical Hazards Management within any food business requires genuine commitment from senior management, staff, and visitors to ensure the nominated goals of implementation are achievable on an ongoing basis. It is a step that requires significant planning and consideration of general and specific food business circumstances to ensure the outcomes of HACCP: Physical Hazards Management do not negatively impact the safety and quality of the food items dispatched from the business.

Implementation of HACCP: Physical Hazards Management must include a clear definition of responsibilities and authorities for all levels of participation by senior management, staff, and visitors to the site.

When implementing HACCP: Physical Hazards Management within food safety and quality system, you may wish to consider the following requirements before completion:

- Communication and display of the HACCP: Physical Hazards Management policy;
- Completion of Verification and Validation of HACCP: Physical Hazards Management development procedures;
- Availability of HACCP: Physical Hazards Management implementation procedures and work instructions;
- Availability of HACCP: Physical Hazards Management monitoring procedures and record templates where applicable;
- Availability of HACCP: Physical Hazards Management corrective and preventative action procedures and record templates where applicable;
- Availability of the HACCP: Physical Hazards Management verification schedule;
- Availability of HACCP: Physical Hazards Management verification procedures;
- Availability of the HACCP: Physical Hazards Management validation schedule;
- Availability of HACCP: Physical Hazards Management validation procedures;
- Completion of HACCP: Physical Hazards Management training procedures;
- Completion of product design and development requirements related to HACCP: Physical Hazards Management;
- Completion of process design and development requirements related to HACCP: Physical Hazards Management;
- Completion of training for team members who have responsibilities and involvement within HACCP: Physical Hazards Management;
- Completion of competency approval for team members who have responsibilities and involvement within HACCP: Physical Hazards Management.

Purchase and Installation of Metal Detectors

Some of the information needed to specify a metal detection unit includes:

- A thorough definition of product or materials to be inspected, including an ingredient list, physical properties, and a description of the package if the product is packaged. The most important initial physical properties are salt and moisture content;
- List of available utilities at the installation site, including services such as compressed air and electricity;
- Description of the operating environment, including temperature, humidity, and corrosive materials;
- Description of the process;
- How the product or material to be metal detected is being made and handled in the area where the metal detector is to be installed;
- Description of controls desired: manual, automatic, or semi-automatic;
- Description of the desired reject mechanism, if it is included within the metal detection unit and not being fitted as an after-market addition.

Installation of the metal detector will generally require a qualified electrician and a mechanical contractor familiar with metal detectors and the type of conveyors used in the operation. If there is a chance that the metal detector or the rejection mechanism could impede the normal flow of production, it may be desirable to install and test the unit during a scheduled downtime to avoid production losses. An alternative is to install and test the unit on a mock production line as an element of commissioning.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific HACCP: Physical Hazards Management Implementation requirements in relation to their items.

HACCP: Physical Hazards Management Implementation Key Points

- HACCP: Physical Hazards Management programs must be Implemented to meet relevant Regulatory, Industry, and Customer standards and requirements;
- Your HACCP: Physical Hazards Management program must be fully implemented as per relevant documented Policies, Procedures, and Work Instructions;
- The implementation of HACCP: Physical Hazards Management requires a commitment to the provision of resources by the Senior Management of your business;
- A properly implemented HACCP: Physical Hazards Management program will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;
- A poorly implemented HACCP: Physical Hazards Management program will not fully support your business and may contribute to significant non-compliance against Regulatory, Industry, and Customer standards and requirements.

Monitoring

To review, confirm and document evidence of the implementation against documented limits.

Monitoring

Monitoring: Monitoring is the act of reviewing and confirming measurable parameters of a defined process or product status.

Monitoring requirements within food industry sectors are generally identified against limits of acceptability defined within HACCP plans, implementation procedures, and work instructions. Monitoring usually includes some element of record-keeping, which may be maintained manually or through digital systems. It is important to consider that advancements in technology have spawned many systems and processes which are self-monitored and/or self-adjusted when variances are identified. Regardless of the system used, the goal of any monitoring activity is to provide sufficient evidence that any limit of acceptability has been met.

Traditional HACCP: Physical Hazards Management monitoring requirements include manual recording and the application of corrective actions when the results of monitoring are found to be outside acceptable limits. Corrective Actions should also generally be strongly linked to the monitoring process where applied to ensure full traceability of the applied actions.

Common monitoring activities and record formats may apply to HACCP: Physical Hazards Management:

- HACCP Monitoring Records: The monitoring activities for HACCP Control Points, Critical Control Points, Quality Points, and Critical Quality Points are in their intent, designed to provide evidence of meeting the nominated Critical Limits;
- Routine monitoring of GMP Prerequisite Programs for all food manufacturing premises is recommended. Daily pre-operative checks allow management and staff to ensure that all items are cleaned, sanitised, and suitably stored before the commencement of daily production;
- Detection test piece checks of metal detectors and X-ray units at the start of production, at set intervals, and at the end of production;
- Glass, brittle plastic, and ceramic register checks, including breakage log review;
- Magnet and screen integrity checks, including inspection for damage, wear, and retained material;
- Reject bin checks to confirm that rejected product is held securely and investigated.

Foreign Object Detection Systems

Once installed into the facility by a qualified technician, the performance of the metal detector or X-ray machine should be monitored using the test pieces recommended by the manufacturer to ensure detection capabilities are maintained.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any

specific HACCP: Physical Hazards Management Monitoring requirements in relation to their items.

You may wish to visit the HACCP: Physical Hazards Management Templates section of haccp.com for examples of HACCP: Physical Hazards Management documentation, record, and resource formats commonly applied within food safety and quality systems.

HACCP: Physical Hazards Management Monitoring Key Points

- Monitoring provides real-time confirmation and evidence that your risk-based FS&Q Controls are effectively implemented;
- HACCP: Physical Hazards Management programs must be monitored to meet relevant Regulatory, Industry, and Customer standards and requirements;
- Monitoring of HACCP: Physical Hazards Management must be facilitated as per relevant documented Policies, Procedures, and Work Instructions;
- Nominated monitoring records for HACCP: Physical Hazards Management must be maintained as per relevant documented Policies, Procedures and Work Instructions;
- A properly monitored HACCP: Physical Hazards Management program will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;
- A poorly monitored HACCP: Physical Hazards Management program will not fully support your business and may contribute to significant non-compliance against Regulatory, Industry, and Customer standards and requirements.

Corrective Action and Preventative Action

To apply “real time” interventions to documented monitoring limits.

Corrective Action and Preventative Action

Corrective Action: Corrective action is mandatory action to be taken when a deviation to the Quality System occurs, particularly to a Critical Control Point.

Preventative Action: At any step in the process where a hazard has been identified, preventative action must be put into place to prevent re-occurrence.

Corrective Action and Preventative Action are implemented to ensure that any identified non-conformance issues are documented, investigated, and rectified within appropriate time frames. Corrective action is any action applied to regain control over a product, process, policy, or procedure that has been identified as being non-conforming or outside nominated limits of acceptability. Preventative action is any action applied to prevent any identified non-conformance from reoccurring.

The outcomes of corrective and preventative actions should result in regained process control after effective application. Specified corrective actions are commonly linked to the HACCP Plans and the food business certification process.

Below are Corrective Action and Preventative Action examples which may be associated with HACCP: Physical Hazards Management related non-conformance:

- Review of the HACCP: Physical Hazards Management policy;
- Review of HACCP: Physical Hazards Management development procedures;
- Review of HACCP: Physical Hazards Management implementation procedures and work instructions;
- Review of HACCP: Physical Hazards Management monitoring procedures;
- Review of HACCP: Physical Hazards Management corrective and preventative action procedures;
- Review of the HACCP: Physical Hazards Management verification schedule;
- Review of HACCP: Physical Hazards Management verification procedures;
- Review of the HACCP: Physical Hazards Management validation schedule;
- Review of HACCP: Physical Hazards Management validation procedures;
- Review of HACCP: Physical Hazards Management training procedures;

- Re-training in HACCP: Physical Hazards Management;
- Review of management review activities to include HACCP: Physical Hazards Management as an agenda item;
- Initiation of product hold procedures where safety or quality may be compromised;
- Initiation of a product recall or product recall procedures where investigations show that there is a substantial safety and/or quality risk to the released product;
- Contacting stakeholders including customers regarding any confirmed or potential HACCP: Physical Hazards Management concerns involving their product.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific HACCP: Physical Hazards Management Corrective Action requirements in relation to their items.

You may wish to visit the Corrective Action and Preventative Action section of haccp.com for examples of best practice applications for this food safety and quality system element.

HACCP: Physical Hazards Management Corrective Action and Preventative Action Key Points

- The implementation of Corrective Action and Preventative Action provides confidence that your FS&Q Program is effectively implemented and that FS&Q criteria is being met;
- Where deviations or variations are observed, Corrective Action and Preventative Actions must be facilitated to meet relevant Regulatory, Industry, and Customer standards and requirements;
- Corrective Action and Preventative Action of HACCP: Physical Hazards Management must be facilitated as per relevant documented Policies, Procedures and Work Instructions;
- Records of Corrective Action and Preventative Action for HACCP: Physical Hazards Management must be maintained as per relevant documented Policies, Procedures and Work Instructions;
- Proper application of Corrective Action and Preventative Action for your HACCP: Physical Hazards Management program will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;
- Poor application of Corrective Action and Preventative Action for your HACCP: Physical Hazards Management program will not fully support your business and may contribute to significant non-compliance against Regulatory, Industry, and Customer standards and requirements.

Verification

To review and confirm documented monitoring and corrective actions against documented parameters.

Verification

Verification: The act of reviewing, inspecting, testing, checking, auditing, or otherwise establishing and documenting whether items, processes, services, or documents conform to specified requirements.

Verification is the detailed review of all food safety and quality system elements to confirm that they are effectively developed, documented, implemented, monitored, and reviewed. All food safety and quality system elements, including documented policies, procedures, training, HACCP plans, and their operational applications must be verified on an ongoing scheduled basis. The verification process commonly includes a defined schedule for which verification activities are required, how often they are conducted, who is responsible, and detailed documented procedures for each nominated verification activity.

The general goal of an established verification process is to ensure any systemic non-conformance issues are identified and rectified within an appropriate time frame. When non-conformance issues are identified through the verification process, Corrective Actions and Preventative Actions should be implemented to ensure they do not impact the effectiveness of the food safety and quality system.

The following examples of verification activities may apply to HACCP: Physical Hazards Management:

- Review of the HACCP: Physical Hazards Management policy;
- Review of HACCP: Physical Hazards Management development procedures;
- Review of HACCP: Physical Hazards Management implementation procedures and work instructions;

- Review of HACCP: Physical Hazards Management monitoring procedures;
- Review of HACCP: Physical Hazards Management monitoring records;
- Review of HACCP: Physical Hazards Management corrective and preventative action procedures;
- Review of the HACCP: Physical Hazards Management verification schedule;
- Review of HACCP: Physical Hazards Management verification procedures;
- Review of the HACCP: Physical Hazards Management validation schedule;
- Review of HACCP: Physical Hazards Management validation procedures;
- Review of HACCP: Physical Hazards Management training procedures;
- Review of HACCP: Physical Hazards Management performance since the last review and historically;
- Analytical testing of product or process to ensure the effectiveness of HACCP: Physical Hazards Management;
- Review of metal detector, X-ray, magnet, and screen verification logs;
- Review of rejected product and foreign object investigation records;
- Review of glass and brittle plastic breakage records and register audits;
- Inclusion of HACCP: Physical Hazards Management as an agenda item within the Management Review Process.

Metal Detection Verification and Validation

A formal metal detection program will help to ensure product quality. Metal detectors may be used in various phases of production. A combination of finished and bulk ingredients and product inspection gives the best performance. Detectors may need to be placed after identified process steps or equipment that are prone to breaking or chipping metal materials.

A metal detector sensitivity standard should be set for the entire food business covering the scope of products and processes involved. An important aspect of this is to identify an agreed-upon minimum particle type and size. For example, a typical detection standard for a finished product might be to remove all spherical, non-magnetic particles larger than 2 millimetres and all spherical, magnetic particles larger than 1.5 millimetres. Only detectors that meet these standards would be considered for purchase and installation. The conditions should be marked on the side of any installed detector and samples of the correct diameters should be available for testing the unit.

Metal detectors should be operated at the maximum sensitivity setting for a given product. The maximum acceptable sensitivity setting will allow the detector to perform reliably for extended periods without excessive false rejects. Scheduled testing of the detector and reject device with ferrous, non-ferrous, and stainless-steel metal samples will confirm the effective operation. Intervals between tests can be determined by the consequence of a failed test. A well-structured testing procedure should be established and followed. A plan of action must be specified for failed tests. Every effort should be made to identify, document, and correct the source of detected metal.

X-ray Verification and Validation

A formal X-ray detection program will help to ensure product quality. The x-ray may be used in various phases of production.

A sensitivity standard should be set for the entire food business. An important aspect of this is to identify an agreed-upon minimum particle type and size. For example, sizes of relevant particles of each type, glass, wood, plastic, bone, or metal can be defined based upon their known presence in raw materials, from the manufacturing site, or as excluded by other physical control mechanisms such as sieving or screening. Only detectors that meet these standards would be considered for purchase and installation. The conditions should be marked on the side of any installed detector and samples of the correct size should be available for testing the unit.

X-ray units should be operated at the maximum sensitivity setting for a given product. The maximum acceptable sensitivity setting will allow the detector to perform reliably for extended periods without excessive false rejects. Scheduled testing of the detector and reject device with relevant test samples will confirm the effective operation. Intervals between tests can be determined by the consequence of a failed test. A well-structured testing procedure should be established and followed. A plan of action must be specified for failed tests. Every effort should be made to identify, document, and correct the source of detected foreign objects.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific HACCP: Physical Hazards Management Verification requirements in relation to their items.

You may wish to visit the Verification Activities section of haccp.com for examples of best practice applications for this food safety and quality system element.

HACCP: Physical Hazards Management Verification Key Points

- Your verification program provides evidence that your FS&Q Controls have worked;
- HACCP: Physical Hazards Management programs must be verified to meet relevant Regulatory, Industry, and Customer standards and requirements;
- The verification of HACCP: Physical Hazards Management must be facilitated as per relevant documented Policies, Procedures and Work Instructions;
- Nominated verification records for HACCP: Physical Hazards Management must be maintained as per relevant documented Policies, Procedures and Work Instructions;
- A properly verified HACCP: Physical Hazards Management program will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;
- A poorly verified HACCP: Physical Hazards Management program will not fully support your business and may contribute to significant non-compliance against Regulatory, Industry, and Customer standards and requirements.

Validation

To confirm the documented monitoring or procedural limits.

Validation

Validation: The process of gathering evidence to provide a scientific basis for the documented act of demonstrating that a procedure, process, and activity will consistently lead to the expected results. It often includes the qualification of systems and equipment.

Validation is the provision of evidence to support the limits of control or acceptability for food safety or quality parameters nominated within systemic elements. Limits of control or acceptability are commonly included within documented food safety and quality systems elements such as procedures, HACCP plans, and specifications.

Common sources of validation include regulatory and legislative standards, finished product specifications and customer requirements, industry codes of practice and guidelines, verified and validated research, historical product, and process control outcomes, and analytical testing.

The general goal of an established validation process is to ensure any systemic non-conformance issues are identified and rectified within an appropriate time frame. When non-conformance issues are identified through the validation process, Corrective Actions and Preventative Actions should be implemented to ensure they do not impact the effectiveness of the food safety and quality system.

Validation activities are commonly defined within the verification schedules and procedures of established food safety and quality management systems.

The following examples may apply to the validation of the limits of control or acceptability for HACCP: Physical Hazards Management:

- Confirmation of nominated food safety and food quality control limits for HACCP: Physical Hazards Management. These limits may apply to regulatory, industry, customer, or finished product specifications;
- Confirmation of analytical testing methods being used to confirm the effectiveness of HACCP: Physical Hazards Management and ensure the accuracy of outcomes;
- Confirmation that metal detector and X-ray sensitivity settings detect the nominated test pieces in each product, including worst-case product effect and orientation.

Method and Rationale

Metal Detection is implemented for many reasons; usually due to the risk of foreign objects within specific foodstuffs. Metal Detection is also commonly mandated by customers or as country-specific importing requirements. It is important to ensure that the usage of Metal Detection Devices is based on scientific rationale, rather than broad recommendations. The following parameters need to be considered in this regard:

Metal Detector Sensitivity: Are the sensitivity settings of the Metal Detection Unit appropriate for the types of products and processes in which the Metal Detector will be used? For example, Does the foodstuff composition include levels of fats, moisture, sodium, or electrolytes that may impact sensitivity settings?

Metal Types: Are the types of Metal being used for Verifying the Metal Detection unit suitable for the related product and process? For example, Why are you using certain Metal Test Piece types as opposed to other types?

Metal Test Piece Size: Is the size of the Metal Test Pieces the smallest possible at the optimum workable sensitivity for your products and processes? For example, Why are you using a certain Metal Test Piece size as opposed to other sizes?

Metal Test Piece Orientation: Is the placement of the Metal Test Pieces representative of the worst-case scenario and is this placement appropriate for the type of Metal Detector you are using? For example, Are you using test piece placement that replicates a worst-case scenario to challenge the effectiveness of the Metal Detection unit?

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific HACCP: Physical Hazards Management Validation requirements in relation to their items.

You may wish to visit the Validation Activities section of haccp.com for examples of best practice applications for this food safety and quality system element.

HACCP: Physical Hazards Management Validation Key Points

- Your validation program provides evidence that your FS&Q Controls will work;
- HACCP: Physical Hazards Management programs must be validated to meet relevant Regulatory, Industry, and Customer standards and requirements;
- The validation of HACCP: Physical Hazards Management must be facilitated as per relevant documented Policies, Procedures and Work Instructions;
- Nominated validation records and supporting documentation for HACCP: Physical Hazards Management must be maintained as per relevant documented Policies, Procedures and Work Instructions;
- A properly validated HACCP: Physical Hazards Management program will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;
- A poorly validated HACCP: Physical Hazards Management program will not fully support your business and may contribute to significant non-compliance against Regulatory, Industry, and Customer standards and requirements.

Training, Competency and Resources

Skills, knowledge and competency requirements to facilitate development, documentation, implementation, monitoring, corrective action, verification and validation of every Food Safety and Quality System Element.

Skills and Knowledge

Skills and Knowledge: Skills and knowledge are attributes of human interactions commonly linked to competency within any specified job-related task.

Training and competency requirements for HACCP: Physical Hazards Management must be ongoing, including regularly scheduled reviews to ensure the effectiveness of training and competency outcomes.

Team members who have defined responsibilities regarding HACCP: Physical Hazards Management should have a knowledge including:

- Basic HACCP: Physical Hazards Management requirements;
- Positive outcomes of HACCP: Physical Hazards Management;

- Negative outcomes of a lack of HACCP: Physical Hazards Management;
- Current HACCP: Physical Hazards Management procedures, methods, and techniques;
- General operational, corporate, and social awareness regarding HACCP: Physical Hazards Management;
- Regulatory, industry, and customer requirements regarding HACCP: Physical Hazards Management.

Team members who have defined responsibilities regarding HACCP: Physical Hazards Management should have skills including:

- Competency regarding basic HACCP: Physical Hazards Management;
- Effective application of current HACCP: Physical Hazards Management procedures, methods, and techniques;
- The basic development, documentation, and implementation of HACCP and Pre-requisite Programs within the food industry sector.

Team members who have defined responsibilities regarding HACCP: Physical Hazards Management should have access to resources including:

- HACCP: Physical Hazards Management training;
- HACCP: Physical Hazards Management associations and events;
- Regulatory standards, industry and customer information and updates regarding HACCP: Physical Hazards Management;
- Incidents within the food industry sector regarding HACCP: Physical Hazards Management;
- Commitment to HACCP: Physical Hazards Management by senior management;
- Suitably qualified food industry professionals with verified experience in HACCP: Physical Hazards Management;
- Effective communication systems including email, internet, and phone through which HACCP: Physical Hazards Management information can be sent and received within suitable timeframes.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific HACCP: Physical Hazards Management Training, Competency, and Resources requirements in relation to their items.

You may wish to visit the Training, Competency, and Resources section of haccp.com for examples of best practice applications for this food safety and quality system element.

HACCP: Physical Hazards Management Training, Skills and Knowledge Key Points

- Your Training, Skills and Knowledge program ensures all participating personnel, visitors, and contracted have the required skills and knowledge to effectively facilitate the requirements of your FS&Q Program;
- Training, Skills and Knowledge programs for HACCP: Physical Hazards Management must be facilitated to meet relevant Regulatory, Industry, and Customer standards and requirements;
- Training, Skills and Knowledge programs for HACCP: Physical Hazards Management must be facilitated as per relevant documented Policies, Procedures and Work Instructions;
- Training, Skills, and Knowledge records for HACCP: Physical Hazards Management must be maintained as per relevant documented Policies, Procedures and Work Instructions;
- Properly applied Training, Skills and Knowledge programs for HACCP: Physical Hazards Management will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;
- Poorly applied Training, Skills, and Knowledge programs for HACCP: Physical Hazards Management will not fully support your business and may contribute to significant non-compliance against Regulatory, Industry, and Customer standards and requirements.

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