

Air and Gas Standards

Compressed Air, Environmental Air and Gas Standards

Development

To define detail, scope and purpose.

This information is provided as part of the flexible Training Courses available through haccp.com.

- Training participants will gain a basic understanding of the application and management of elements within food safety and quality systems.
- Basic knowledge competency can be verified through the successful completion of the available assessment activity for this course.
- Basic skill competency can be verified through the completion of the competency checklist available through your haccp.com Training Matrix.

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Key Definitions for Air and Gas Standards

- **Aerosol:** An aerosol is a substance enclosed under pressure and released as a fine spray through a propellant air or gas. In the context of Air and Gas Standards management, this may include water and chemicals propelled into the air or onto product or product contact surfaces. Micro-organisms may potentially be transported by 'aerosols' onto product or product contact surfaces.
- **Anemometer:** An anemometer is an instrument for measuring the speed of the wind, or any current of gas.
- **HEPA:** High-Efficiency Particulate Air or HEPA, also referred to as high-efficiency particulate absorber, high-efficiency particulate arresting, or high-efficiency particulate arrestance, is a type of air filter. Filters meeting the HEPA standard have many applications within the food sector, including direct and indirect applications.
- **Positive Pressure Air System:** Positive pressure is a pressure within a system that is greater than the environment that surrounds that system. Consequently, if there is any leak from the positively pressurized system, air will flow outward, from the system into the surrounding environment.
- **Ventilation:** The provision of sufficient airflow to facilitate required tasks.
- **Air Socks:** A textile or fabric duct used for draught-free air distribution and delivery of conditioned air as an alternative to traditional spiral or rectangular steel ducts with grilles and diffusers.

Air and Gas Standards Development

When considering the development, documentation, and implementation of Air and Gas Standards within food safety and quality management systems, the following information should be considered to ensure effective outcomes:

About Air and Gas Standards

Air and Gas Standards must be risk assessed, controlled, and monitored on an ongoing basis to ensure appropriate outcomes are maintained. HACCP Risk Assessments are commonly used to identify specific potential hazards that may result from a lack of control in Air and Gas Standards.

Environmental Air Quality and Ventilation

Adequate means of natural or mechanical ventilation should be provided within the food processing and packaging areas to:

- Minimize air-borne contamination of food from aerosols and condensation droplets;

- Control ambient temperatures;
- Control odors that might affect the suitability of food; and
- Control humidity, where necessary to ensure the safety of food.

Ventilation systems for high-risk or High-Care foods should be designed and constructed so that air does not flow from contaminated areas to clean areas and, where necessary, they can be adequately maintained and cleaned. Condensation caused as a result of poor ventilation can facilitate cross-contamination by transporting micro-organisms into foods. The problem can be controlled by ensuring adequate airflow around food products, evaluating ventilation systems and their types such as air socks, and controlling temperatures in processing, packing and storage areas.

The air and gases used in food production, packaging, or within the food premises, regardless of whether considered as an ingredient or not, should be monitored regularly to ensure they do not present any food safety or quality risks. It is important to prioritize the scheduled testing of air and gas sources to ensure they are not impacting the safety or quality of the foods being produced.

Microorganisms of Concern in Air and Gas Management

The Microorganisms of concern with Air and Gas Management are many and varied and differ from site to site based on their site and the processes and products facilitated. Both pathogens and spoilage organisms may be nominated as micro-organisms of concern.

In conjunction with the risk of micro-organisms being directly present within air flows or gas flows, the additional presence of fine moisture particles within such air or gas flows may exponentially increase the risk of microbiological contamination.

Documented HACCP Plans and their risk assessments should be used to identify and manage related risk at the process steps where contamination may occur from air or gas flows.

Identification of Air and Gas Utilities

As with other site utilities such as potable hot and cold water, wastewater, and effluent, site Air and Gas Utilities must be adequately identified to ensure they don't become a source of contamination. The general best practice is for all Air and Gas lines and systems to be identified as their intended scope and purpose of usage, both physically within the site and within site plans and schematics. Related delivery points, filtration points, and treatments should also be clearly defined.

It is important to consider Air and Gas Systems commissioning and validation processes to ensure they don't introduce risk to related products or processes.

About Environmental Air Filtration

Environmental Air Filtration is an important factor in the management of airborne microorganisms and other contaminants that may enter foods from the available environmental air. Where Environmental Air Filtration is required, the related systems should be selected and implemented in alignment with the outcomes of HACCP risk assessments.

Air management systems for High Risk and High-Care food production areas should be implemented and verified on an ongoing basis to ensure the ingress of unfiltered air into the High-Risk area is minimized.

HEPA Filtration of Environmental Air

High-Efficiency Particulate Air or HEPA, also referred to as high-efficiency particulate absorber, high-efficiency particulate arresting, or high-efficiency particulate arrestance is a type of air filter. Filters meeting the HEPA standard have many applications within the food sector, including direct and indirect applications.

Where HEPA Filtration of Environmental Air is facilitated within a food site, the sizing and operational efficiency ratings of related filtration units must be selected based on considered operational parameters.

Filter management must be scheduled and managed as part of Preventative Maintenance routines commensurate with the risk status of related HEPA applications. This is regardless of whether related HEPA filtration is applied for direct or indirect applications.

Monitoring and Verifying Environmental Air Standards

Standards for the Monitoring and Verification of Environmental Air Standards rely heavily on the risk status of the relevant food site and the products/processes facilitated. For the most effective management of Environmental Air Standards, the outcomes of any Monitoring and Verification activities should be ratified in conjunction with a strong understanding of applicable air filtration and air delivery systems.

Where new or amended Air and Gas fixtures or fittings are applied, these should be reviewed and verified.

Common Environmental Air Monitoring and Verification Activities include:

- Microbiological testing of collected air for micro-organisms such as *Listeria* species, Yeasts, or Molds;
- Microbiological swabbing of Environmental Air contact surfaces such as vents, ducting, or filters.

As with any targeted Microbiological Verification Activity, the testing and assessment of Air should be based on a logical risk-based methodology to ensure sampling points and methods and microbiological testing methods provide outcomes that genuinely allow for the ratification of risk.

About Positive Environmental Air Pressure

Where Positive Environmental Air Pressure is facilitated within a food site, a significant volume of considerations needs to be processed to ensure the best outcomes. These considerations may include:

- The volumetric size of the area requiring Positive Environmental Air Pressure and related capacity of the Air Production and Air Filtration Systems;
- The ability of Air Production and Air Filtration Systems to facilitate required capacity at different air temperatures (including during different weather conditions);
- The ability of Air Production and Air Filtration Systems to facilitate required capacity at specified humidity levels (including during different weather conditions);
- The frequency of filter changes and how different filter loadings may impact upon the operational capacity and efficiency of Positive Environmental Air Pressure systems;
- The direction of Positive Environmental Air Pressure airflow within specified site areas may impact the transport of particulates such as dust or aerosols containing micro-organisms.

Positive pressure airflow systems should be considered for high-risk and high-care areas to control the intake of airborne microorganisms which may potentially contaminate foods. Air being provided into high-risk or high-care areas, particularly for ready-to-eat products, should also be filtered to decrease the content and viability of airborne microorganisms which may contaminate foods. Within High Risk and High-Care Scenarios, air introduction and reticulation systems should be filtered to an appropriate standard based on risk assessment outcomes. Related positive pressure air systems should be implemented and verified on an ongoing basis to ensure the ingress of unfiltered air into controlled areas is minimized.

Monitoring and Verifying Positive Environmental Air Pressure

As with any targeted Microbiological Verification Activity, the testing and assessment of Air should be based on a logical risk-based methodology to ensure sampling points and methods and microbiological testing methods provide outcomes that genuinely allow for the ratification of risk. Standards for the Monitoring and Verification of Positive Environmental Air Pressure rely heavily on the risk status of the relevant food site and the products/processes facilitated. For the most effective management of Positive Environmental Air Pressure Standards, the outcomes of any Monitoring and Verification activities should be ratified in conjunction with a strong understanding of applicable air filtration and air delivery systems.

Common Environmental Air Pressure Monitoring and Verification Activities include:

- Verification of Air Movements through and out of a specific area using an air measurement device such as an anemometer;
- Microbiological testing of collected air for micro-organisms such as Listeria species, Yeasts, or Molds;
- Microbiological swabbing of Environmental Air contact surfaces such as vents, ducting, or filters.

As with any targeted Microbiological Verification Activity, the testing and assessment of Air should be based on a logical risk-based methodology to ensure sampling points and methods and microbiological testing methods provide outcomes which genuinely allow for the ratification of risk.

About Compressed Air

Where Compressed Air is used for product or product contact surface applications it needs to be managed to ensure it does not introduce any Food Safety Hazards. General requirements include the use of suitable Compressed Air sources for any applications where the product or product contact surface contacts are relevant. Where Compressed Air is used within sealed systems that do not facilitate the product or product contact surfaces, safety and suitability parameters should still be risk assessed and considered for monitoring and verification activities where peripheral risks may be present.

Filtration of Product Contact or Product Surface Contact Compressed Air

Best practice food industry usage of Product Contact or Product Surface Contact Compressed Air requires consideration and application of filtration systems to ensure moisture, chemical, physical and microbiological contaminants don't impact the safety or suitability of foodstuffs produced. The types of filters implemented should be based upon product risk status and the related processing methods applied.

Where the Filtration of Product Contact or Product Surface Contact Compressed Air is facilitated within a food site, the sizing and operational efficiency ratings of related filtration units must be selected based on considered operational parameters. Filter management must be scheduled and managed as part of Preventative Maintenance routines commensurate with the risk status of related Product Contact or Product Surface Contact Compressed Air applications.

Monitoring and Verification of Product Contact or Product Surface Contact Compressed Air

Standards for the Monitoring and Verification of Product Contact or Product Surface Contact Compressed Air rely heavily on the risk status of the relevant food site and the products/processes facilitated. For the most effective management of Product Contact or Product Surface Contact Compressed Air, the outcomes of any Monitoring and Verification activities should be ratified in conjunction with a strong understanding of applicable air filtration and air delivery systems.

Common Product Contact or Product Surface Contact Compressed Air Monitoring and Verification Activities include:

- Microbiological testing of collected air for micro-organisms such as Listeria species, Yeasts, or Molds;
- Microbiological swabbing of Compressed Air contact surfaces such as compressors, piping, or filters.
- Chemical verifications of collected air for chemicals such as compressor lubricants.

As with any targeted Microbiological or Chemical Verification Activity, the testing and assessment of Air should be based on a logical risk-based methodology to ensure sampling points and methods and microbiological/chemical testing methods provide outcomes that genuinely allow for the ratification of risk.

About Steam

Where steam is used for product or product contact surface applications it needs to be managed to ensure it does not introduce any Food Safety Hazards. General requirements include the use of suitable potable water sources for any applications where the product or product contact surface contacts are relevant. Where Steam is used within sealed systems that don't facilitate product or product contact surface contacts, safety and suitability parameters should still be risk assessed and considered for monitoring and verification activities where peripheral risks may be present.

Filtration of Product Contact or Product Surface Contact Steam

Best practice food industry usage of Product Contact or Product Surface Contact Steam requires consideration and application of filtration systems to ensure moisture, chemical, physical and microbiological contaminants don't impact the safety or suitability of foodstuffs produced. The types of filters implemented should be based upon product risk status and the related processing methods applied.

Where the Filtration of Product Contact or Product Surface Contact Steam is facilitated within a food site, the sizing and operational efficiency ratings of related filtration units must be selected based on considered operational parameters. Filter management must be scheduled and managed as part of Preventative Maintenance routines commensurate with the risk status of related Product Contact or Product Surface Contact Steam applications.

Monitoring and Verification of Product Contact or Product Surface Contact Steam Suitability

Standards for the Monitoring and Verification of Product Contact or Product Surface Contact Steam rely heavily on the risk status of the relevant food site and the products/processes facilitated. For the most effective management of Product Contact or Product Surface Contact Steam, the outcomes of any Monitoring and Verification activities should be ratified in conjunction with a strong understanding of applicable air filtration and air delivery systems.

Common Product Contact or Product Surface Contact Steam Monitoring and Verification Activities include:

- Microbiological and Chemical testing of the water used to create Product Contact or Product Surface Contact Steam.

Common Usage of Gases within the Food Sector

Many different types of gases are commonly used within Food Processing and Manufacturing businesses, including individual and mixed variants of:

- Carbon dioxide: As an additive, pressurizing agent, aeration agent, or atmospheric preservative.
- Nitrogen: As an aeration agent, pressurizing agent, or preservative.
- Oxygen: As an oxidizing agent.
- Ozone: As a sanitizing agent.
- Nitrous oxide: As a pressurized dispensing agent.
- Propane: As an aeration agent or as a propellant.
- Iso-butane or n-butane: As a propellant.
- Ethylene: As a ripening agent.
- Chlorine: As a sanitizing agent.

Gases may be used as Additives or Processing aids, and are commonly used in scenarios such as:

Packaging with Gas

Modified Atmosphere Packaging or MAP relies on altering the composition of gases in contact with the food by replacing air with a single gas, or a mixture of gases. The general aim of MAP is to exclude or greatly reduce oxygen levels, retain the moisture content of the food, and inhibit aerobic microbiological growth. The choice of packaging material used for MAP depends on the recommended storage temperature for the food, the relative humidity of the package, and the effect of light, if any, on the contents. Food Grade Carbon Dioxide and Nitrogen are commonly used within the MAP processing of foodstuffs. Food Grade Carbon Monoxide is also used in some jurisdictions (such as the USA) but is prohibited in many others, so its use must be confirmed against the regulations of the country of sale. These gases generally have no adverse effect on the safety or quality of the foods being packaged but do have the potential to increase the shelf life of products when applied appropriately.

It is important to note that some gases (for example Carbon Monoxide) are prohibited from use within some packaging scenarios as they potentially mask product spoilage.

Chilling or Freezing Processes

Chilling and freezing processes can benefit from the use of liquified gases such as Nitrogen that swiftly promote a cryogenic state. Processes using gases in this way offer an increased chilling or freezing rate that far surpasses the efficiencies offered by most purely mechanical units. Freezing scenarios can also benefit from reduced product dehydration and increased shelf life. The immediate nature of Gases for chilling and freezing processes can also dramatically decrease microbiological activity within foodstuffs being processed.

Environmental Regulators

Many gases offer substantial benefits through their use in controlled environments within the food processing and storage scenarios:

- Gases such as Carbon Dioxide or Nitrogen are commonly pumped into storage tanks to prevent oxidation or moisture degradation. This type of application often involves the total or near-total exclusion of Oxygen when other gases are added. Gas flushing or pressurization may also be used to prevent pressure variations or back-flow within a sealed tank and piping systems.
- Fruits and vegetables may be stored within a temperature-controlled Ethylene environment to initiate and control ripening.
- Stored commodities such as grains, rice, and flour may be held in Carbon Dioxide or Nitrogen environments for a specified timeframe before packing to eliminate insect infestations.
- Gases may also be added to food storage environments to facilitate preservation. Sulphur Dioxide gas is commonly added as a preservative for wine, acting to prevent product spoilage and changes in acidity.

Sterilization Processes

Reactive gases are often used to kill microorganisms that may be present in foods or water as an essential part of food manufacturing processes. Common sterilizing gas usage within the Food Sector includes:

- Ethylene oxide;
- Ozone;
- Formaldehyde;
- Chlorine dioxide;
- Hydrogen peroxide.

Many gases used in Sterilization Processes have fallen out of favor due to their toxicity to human health, both within impacted foodstuffs and to staff working with such chemicals.

Functional Gases

Gases such as Carbon Dioxide and Nitrogen are commonly used to pressurize lines for the dispensing of liquids. These not only propel the liquid but also assist in the prevention of oxidation. Nitrous oxide is a common propellant for use within pressurized aerosol packaging formats.

Gas Food Suitability Standards

In all cases of gas usage within the scope of food processing and production, it is important to ensure the type of gas and method of application you choose to use is acceptable within the country of processing and sale for related food items.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific Air and Gas Standards Development requirements with their items.

Air and Gas Standards Development Key Points

- Air and Gas Standards 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 Air and Gas Standards program;
- Should you require additional resources for the development of Air and Gas Standards program elements, please discuss this with the relevant Senior Management representative;
- A properly developed Air and Gas Standards program will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;
- A poorly-developed Air and Gas Standards 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.

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 Air and Gas Standards:

- Air and Gas Standards policy;
- Air and Gas Standards development procedures;
- Air and Gas Standards implementation procedures and work instructions;
- Air and Gas Standards monitoring procedures;
- Air and Gas Standards corrective and preventative action procedures;
- Air and Gas Standards verification schedule;
- Air and Gas Standards verification procedures;
- Air and Gas Standards validation schedule;
- Air and Gas Standards validation procedures;
- Air and Gas Standards training procedures.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific Air and Gas Standards Documentation requirements with their items.

You may wish to visit the Air and Gas Standards Templates section of haccp.com for examples of Air and Gas Standards documentation, record, and resource formats commonly applied within food safety and quality systems.

Air and Gas Standards Documentation Key Points

- Air and Gas Standards programs must be documented to meet relevant Regulatory, Industry, and Customer standards and requirements;
- All documented Air and Gas Standards program elements must be controlled to ensure compliance;
- Key documented Air and Gas Standards program elements should be available to your business team at all times to ensure they can facilitate required tasks;
- A properly documented Air and Gas Standards program will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;

- A poorly documented Air and Gas Standards 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 is the application of documented food safety and quality system elements into the actual business operation.

The implementation of Air and Gas Standards 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 Air and Gas Standards do not negatively impact the safety and quality of the food items dispatched from the business.

Implementation of Air and Gas Standards 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 Air and Gas Standards within food safety and quality system, you may wish to consider the following requirements before completion:

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

Implementation of Air and Gas Standards

Once the Air and Gas Standards plan has been developed for each relevant food business process, it has to be effectively implemented and validated.

Common points will need to be considered to facilitate this:

- Allocation of responsibility for the management and supervision of the Air and Gas Standards plan, monitoring of CCP's, record keeping, and documentation;
- Allocation of resources for the plans to be suitably implemented;
- Development of a simple, but clear, work instructions for the monitoring of CCP's;

- Development of recording sheets and other documentation;
- Training and education for staff based on the requirements of the Air and Gas Standards plan, including work instructions indicating what, how, when, and who should do what;
- Allocation of responsibility for decisions on corrective and preventative actions.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific Air and Gas Standards Implementation requirements with their items.

Managing Air and Gas Standards

- Air hoses used for supplying compressed air must not be left on the floor and kept on hose racks.
- Specified air pressure differentials are maintained.
- Non-toxic gases are used in processing facilities.

Air and Gas Standards Implementation Key Points

- Air and Gas Standards programs must be Implemented to meet relevant Regulatory, Industry, and Customer standards and requirements;
- Your Air and Gas Standards program must be fully implemented as per relevant documented Policies, Procedures, and Work Instructions;
- The implementation of Air and Gas Standards requires a commitment to the provision of resources by the Senior Management of your business;
- A properly implemented Air and Gas Standards program will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;
- A poorly implemented Air and Gas Standards 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 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 Air and Gas Standards 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 Air and Gas Standards 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 Air and Gas Standards:

- Air and Gas Standards Monitoring Records: The monitoring activities for Air and Gas Standards 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.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific Air and Gas Standards Monitoring requirements with their items.

You may wish to visit the Air and Gas Standards Templates section of haccp.com for examples of Air and Gas Standards documentation, record, and resource formats commonly applied within food safety and quality systems.

Air and Gas Standards Monitoring Key Points

- Monitoring provides real-time confirmation and evidence that your risk-based FS&Q Controls are effectively implemented;
- Air and Gas Standards programs must be monitored to meet relevant Regulatory, Industry, and Customer standards and requirements;
- Monitoring of Air and Gas Standards must be facilitated as per relevant documented Policies, Procedures and Work Instructions;
- Nominated monitoring records for Air and Gas Standards must be maintained as per relevant documented Policies, Procedures, and Work Instructions;
- A properly monitored Air and Gas Standards program will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;
- A poorly monitored Air and Gas Standards 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: Corrective action is mandatory action to be taken when a deviation to the Quality System occurs, particularly with 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 Air and Gas Standards Plans and the food business certification process.

Below are Corrective Action and Preventative Action examples which may be associated with Air and Gas Standards related non-conformance:

- Review of the Air and Gas Standards policy;
- Review of Air and Gas Standards development procedures;
- Review of Air and Gas Standards implementation procedures and work instructions;
- Review of Air and Gas Standards monitoring procedures;
- Review of Air and Gas Standards corrective and preventative action procedures;
- Review of the Air and Gas Standards verification schedule;
- Review of Air and Gas Standards verification procedures;

- Review of the Air and Gas Standards validation schedule;
- Review of Air and Gas Standards validation procedures;
- Review of Air and Gas Standards training procedures;
- Re-training in Air and Gas Standards;
- Review of management review activities to include Air and Gas Standards 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 Air and Gas Standards concerns involving their product.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific Air and Gas Standards Corrective Action requirements with 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.

Air and Gas Standards 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 are 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 Air and Gas Standards must be facilitated as per relevant documented Policies, Procedures and Work Instructions;
- Records of Corrective Action and Preventative Action for Air and Gas Standards must be maintained per relevant documented Policies, Procedures and Work Instructions;
- Proper application of Corrective Action and Preventative Action for your Air and Gas Standards 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 Air and Gas Standards 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: 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, Air and Gas Standards 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 Air and Gas Standards:

- Review of the Air and Gas Standards policy;
- Review of Air and Gas Standards development procedures;
- Review of Air and Gas Standards implementation procedures and work instructions;
- Review of Air and Gas Standards monitoring procedures;
- Review of Air and Gas Standards monitoring records;
- Review of Air and Gas Standards corrective and preventative action procedures;
- Review of the Air and Gas Standards verification schedule;
- Review of Air and Gas Standards verification procedures;
- Review of the Air and Gas Standards validation schedule;
- Review of Air and Gas Standards validation procedures;
- Review of Air and Gas Standards training procedures;
- Review of Air and Gas Standards performance since the last review and historically;
- Analytical testing of product or process to ensure the effectiveness of Air and Gas Standards;
- Inclusion of Air and Gas Standards as an agenda item within the Management Review Process.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific Air and Gas Standards Verification requirements with 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.

Air and Gas Standards Verification Key Points

- Your verification program provides evidence that your FS&Q Controls have worked;
- Air and Gas Standards programs must be verified to meet relevant Regulatory, Industry, and Customer standards and requirements;
- The verification of Air and Gas Standards must be facilitated as per relevant documented Policies, Procedures and Work Instructions;
- Nominated verification records for Air and Gas Standards must be maintained as per relevant documented Policies, Procedures, and Work Instructions;
- A properly verified Air and Gas Standards program will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;
- A poorly verified Air and Gas Standards 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: 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, Air and Gas Standards plans, and specifications.

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 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.

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 validation of the limits of control or acceptability for Air and Gas Standards:

- Confirmation of nominated food safety and food quality control limits for Air and Gas Standards. These limits may apply to regulatory, industry, customer, or finished product specifications;
- Confirmation of analytical testing methods being used to confirm the effectiveness of Air and Gas Standards and ensure the accuracy of outcomes.

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.

If your food business supplies foodstuffs manufactured to a customer's specifications, it is important to consider any specific Air and Gas Standards Validation requirements with 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.

Air and Gas Standards Validation Key Points

- Your validation program provides evidence that your FS&Q Controls will work;
- Air and Gas Standards programs must be validated to meet relevant Regulatory, Industry, and Customer standards and requirements;
- The validation of Air and Gas Standards must be facilitated as per relevant documented Policies, Procedures and Work Instructions;
- Nominated validation records and supporting documentation for Air and Gas Standards must be maintained as per relevant documented Policies, Procedures, and Work Instructions;
- A properly validated Air and Gas Standards program will provide a strong framework for your business to maintain compliance with relevant Regulatory, Industry, and Customer standards and requirements;
- A poorly validated Air and Gas Standards 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 are attributes of human interactions commonly linked to competency within any specified job-related task.

Training and competency requirements for Air and Gas Standards must be ongoing, including regularly scheduled reviews to ensure the effectiveness of training and competency outcomes.

Team members who have defined responsibilities regarding Air and Gas Standards should have a knowledge including:

- Basic Air and Gas Standards requirements;

- Positive outcomes of Air and Gas Standards;
- Negative outcomes of a lack of Air and Gas Standards;
- Current Air and Gas Standards procedures, methods, and techniques;
- General operational, corporate, and social awareness regarding Air and Gas Standards;
- Regulatory, industry, and customer requirements regarding Air and Gas Standards.

Team members who have defined responsibilities regarding Air and Gas Standards should have skills including:

- Competency regarding basic Air and Gas Standards;
- Effective application of current Air and Gas Standards procedures, methods, and techniques;
- The basic development, documentation, and implementation of Air and Gas Standards and Prerequisite Programs within the food industry sector.

Team members who have defined responsibilities regarding Air and Gas Standards should have access to resources including:

- Air and Gas Standards training;
- Air and Gas Standards associations and events;
- Regulatory standards, industry and customer information, and updates regarding Air and Gas Standards;
- Incidents within the food industry sector regarding Air and Gas Standards;
- Commitment to Air and Gas Standards by senior management;
- Suitably qualified food industry professionals with verified experience in Air and Gas Standards;
- Effective communication systems including email, internet, and phone through which Air and Gas Standards 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 Air and Gas Standards Training, Competency, and Resources requirements with 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.

Air and Gas Standards 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 Air and Gas Standards must be facilitated to meet relevant Regulatory, Industry, and Customer standards and requirements;
- Training, Skills, and Knowledge programs for Air and Gas Standards must be facilitated as per relevant documented Policies, Procedures and Work Instructions;
- Training, Skills, and Knowledge records for Air and Gas Standards must be maintained as per relevant documented Policies, Procedures and Work Instructions;
- Properly applied Training, Skills and Knowledge programs for Air and Gas Standards 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 Air and Gas Standards 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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