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# Considerations for boosting productivity and preserving safety across the food & beverage production cycle

## **ABB Safety Series**

Food & Beverage

Installation Products Division



Electrical design considerations to help  
protect consumer confidence across  
Food & Beverage processing



### — Adaptability is essential.

Food and Beverage is a complex and constantly changing industry. Whether digitizing operations or adapting processes, producers are looking for easier, better and more cost-effective ways of doing things. It is why we see F&B is in need of new and innovative solutions that allow for faster changeovers, reduce downtime and improve overall operations.

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Part of a series on electrification and safety  
in Food & Beverage processing

## — ABB Food & Beverage Safety Series

Considerations for boosting productivity and preserving safety across the food & beverage production cycle

**Over decades in the Food & Beverage industry, we've found many food recalls and outages are preventable.** Whether prompted by a recall or threat, identified through a site assessment, or integrated into proactive planning, there are **six key areas** we consistently find food and beverage partners need to assess or address.

### 1 Productivity

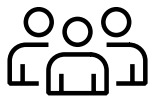
**Demand is growing and many food and beverage factories worldwide are operating 24/7 to meet higher efficiency, productivity and sustainability goals.** In this era of continuous operations, uptime and on-time delivery, F&B processors also need to be able to adapt production to supply changes and demand surges.

Every touchpoint across food and beverage production is held to high standards of safety, from personnel and practices to preparation and packaging. Not only can downtime in F&B cost thousands of dollars per line per hour, it can result in significant food waste. Overlaying the entire operations are production schedules that factor in added or extended shifts, maintenance, and cleaning and sanitation, while assuring minimal downtime.

The United Nations predicts food production must increase by **70%** between 2010 and 2050 to meet growing population needs.<sup>1</sup>



**70%**



to meet the needs of our growing global population. We all need to eat to survive.



**Production of farming inputs**  
such as seeds, fertilizers, animal feed, nutrients and equipment.

**Production of raw commodities**  
such as rice wheat, sugar canes, fruit, pulses, milk, meat, poultry and fish.

**Initial processing**  
of raw commodities so they can be used as inputs to a range of end products.

**Conversion of ingredients**  
and commodities into forms that can easily be consumed and distributed to consumers.

**Food & beverage storage**  
warehousing, fulfillment and transportation.

**Distribution of finished goods**  
to consumers in homes stores and restaurants.

To balance cost and regulatory pressures with the need to automate and meet rising production targets, it's valuable to look at the operations holistically. ABB's Installation Products portfolio is needed in every F&B processing application and segment.

In the food and beverage production facilities we serve, we assess capacity and cleanability of existing operations and electrical systems to help implement standards built around food safety, people safety and reduction of unscheduled downtime.

Adaptability is essential. Food & Beverage is a complex and constantly changing industry.



## 2 Environment

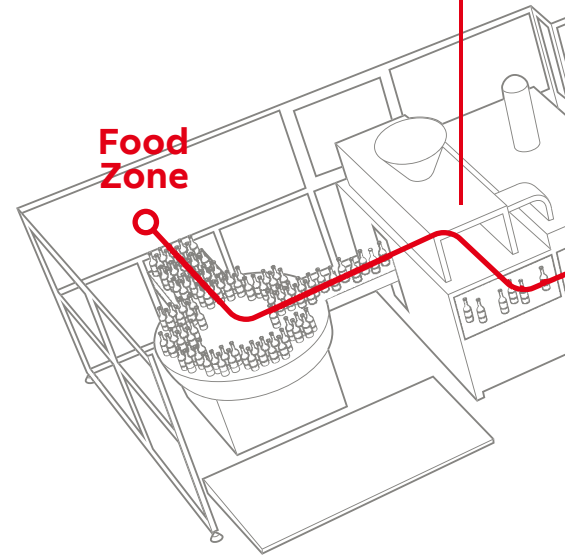
**In a food and beverage production environment, lack of space can cause safety issues.** Limited space for wiring, air flow, and access to clean and maintain equipment can be hazardous. As advances in automation, hardware technology and control capabilities are integrated into the production environment, flexible designs that allow for reconfigurations within a certain area or existing facility footprint are invaluable. It's common for an F&B manufacturer to frequently modify equipment or change a process – sometimes every few months.

Another critical element is how a system is rated and performs in an environment with moisture, constant use and cleaning, or temperature fluctuations. It's important to know electrical installations are designed and tested to meet the regulations and requirements for the environment including: IP, which is a global certification and test, and the most desired rating by F&B processors is an IP69 ingress protection rating; UL (Underwriters Laboratory) third-party testing; NEMA ratings; FDA-compliant materials; and NSF International for third-party accreditation. ABB uses NSF because it is internationally recognized and its mark is assurance that our product has been tested by one of the most respected independent certification



### Food Zone no contact

Areas that include surfaces not in direct contact with food, but adjacent or in proximity to food contact surfaces.



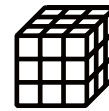
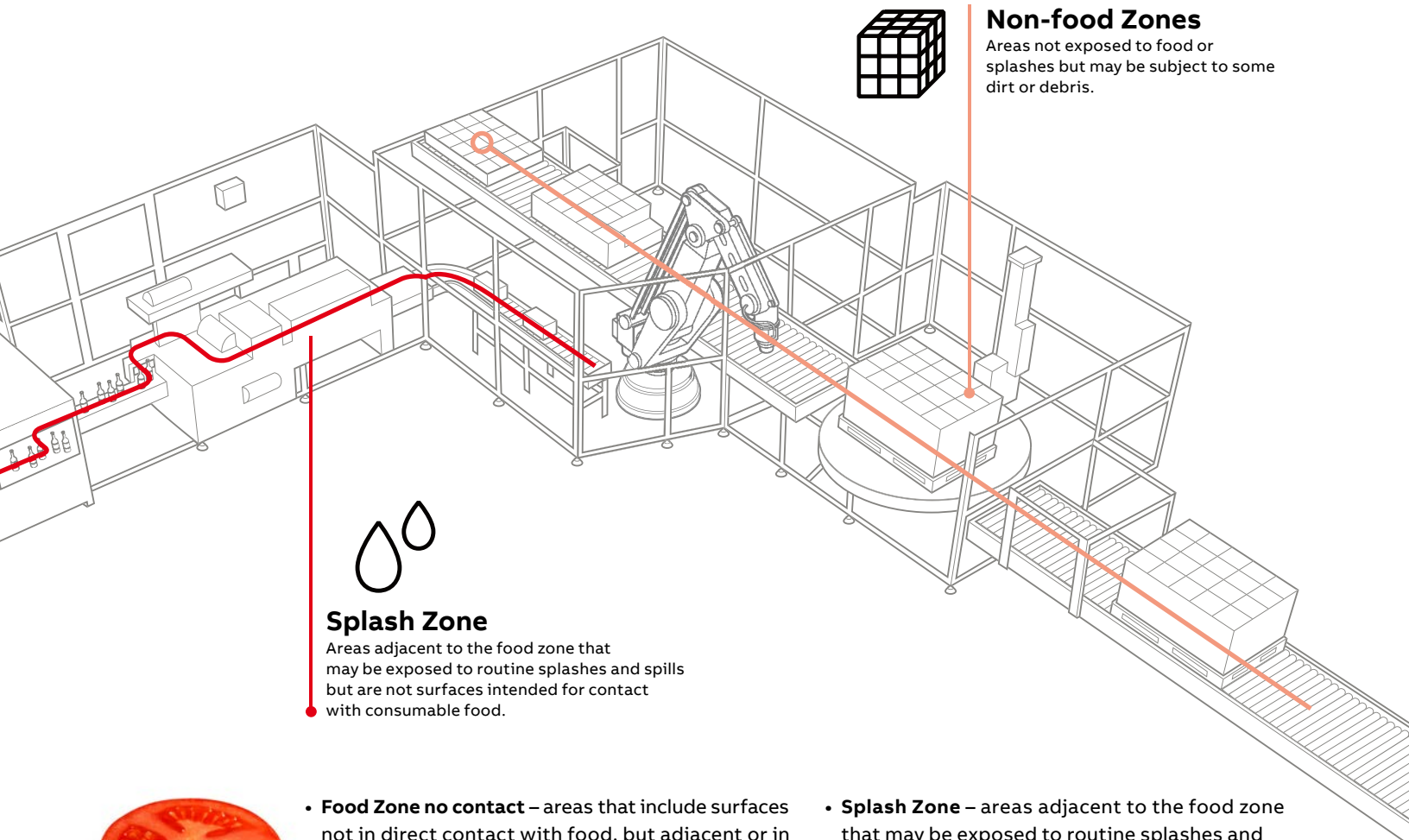
organizations and demonstrates our commitment to quality, compliance and safety.

Whether targeting certain areas or the entire facility, food and beverage applications require wire management and cable protection, as well as plans that comply with electrical and reliability standards, including sanitation such as NSF certifications. Providing third-party accreditation, NSF certifications help protect food, water and consumer products, as well as the environment.<sup>2</sup>

**It is essential that production facility plans include dependable solutions to address issues like corrosion, liquid ingress, condensation, washdown, temperature transitions, and SKU reduction and standardization, while incorporating antimicrobial and hygienic designs across key segments and applications.**

Products to be used in installations requiring hazardous locations and protection measures should be evaluated to ensure they are appropriate for each zone as defined by the NSF:

- **Food Zones** – areas, surfaces and utensils exposed to direct food contact and where consumable food or condensation may drain, drip, or splash onto food or food contact surfaces. Materials certified for use in a food zone may also be used in a splash and non-food zones.



### Non-food Zones

Areas not exposed to food or splashes but may be subject to some dirt or debris.



### Splash Zone

Areas adjacent to the food zone that may be exposed to routine splashes and spills but are not surfaces intended for contact with consumable food.



- **Food Zone no contact** – areas that include surfaces not in direct contact with food, but adjacent or in proximity to food contact surfaces. While products used in this zone may not be intended or designed to have contact with food, they can still become a source of contamination. For example, flexible conduit, while not intended to be used for food contact, can be a good solution in this zone. Our installation products with antimicrobial protection are suitable for food zone non-contact areas, providing protection by reducing bacteria levels on the product surface up to 99%. And we're integrating ionic silver antimicrobial protection into a new generation of cable protection and wire and cable management.
- **Splash Zone** – areas adjacent to the food zone that may be exposed to routine splashes and spills, but are not surfaces intended for contact with consumable food. Materials certified for the splash zone are not certified for food zones. However, due to the likelihood contaminants could affect electrical equipment in this zone, products that can withstand cleaning and moisture are a necessity.
- **Non-food Zones** – areas not exposed to food or splashes, but may be subject to some dirt or debris.

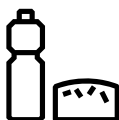
#### Food & Beverage products and applications



Meat / Aquaculture



Dairy



Beverage



Confectionary / Bakery



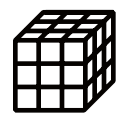
Agriculture / Ingredients



Other F&B



Picking, packing & palletising





### 3 Cleanability

Improving the degree of food safety in a facility can be achieved with proper material selection, correct ratings, and design features that make equipment and components easier to clean, while eliminating places for bacteria, contaminants and food debris to hide.

A huge challenge food and beverage processors face is properly cleaning and sanitizing behind, between and underneath all equipment and components in processing areas. Depending on the type of processing, personnel can also pose a significant threat to cleanability.

## 360°

In addition to the design and 360-degree cleanability of creases, crevices and threads, condensation inside an electrical system can lead to corrosion that can produce bacteria and flaking and pose a safety threat.

For efficiency and thoroughness, F&B manufacturers should aim for smooth, rounded or sloped surfaces to prevent liquid or product accumulation and that meet proper ratings and certifications for application and environment. Avoid the following:

- Exposed threads
- Nicks, scratches, tool marks
- Joining different metal types
- Protruding spaces, gaps, hollows, creases and crevices
- Cable bundling or looping
- Stickers and raised or recessed lettering
- Horizontal catches



**Hygienic** - clean, sanitary, and contributes to health and disease prevention.

**Antimicrobial** - kills or slows the spread of microorganisms.

**Bacteria-resistant** - inhibits growth of bacteria, fungus and mold.

*If you can clean it, you can use it* is a familiar mantra in food processing. A single bacterial outbreak can wipe out decades of consumer trust and confidence.





This means that materials matter and can have a significant influence on speed and ease of cleaning, performance and lifespan of electrical installations including:

- Materials that prolong corrosion and hold up to caustic chemicals.
- Food compatible materials that are non-toxic and will not alter the taste, smell, appearance, or chemical composition of food or beverage if accidental contact is made.
- FDA-compliant material is also a big factor for selection. Title 21 Code of Federal Regulations regulates food contact materials and the conditions for their safe use.<sup>3</sup>

#### **Material selection considerations for effective cleaning:**

- **Hygienic properties** such as antimicrobial and bacteria-resistant materials and surfaces that inhibit the growth of bacteria, fungus and mold.
- **Offset ability** to separate conduit, equipment and pipes from walls and allow for 360-degree access and clean around such as spacers. To properly clean equipment and prevent bacteria from forming requires everything attached to the walls inside food processing areas to be offset. The components used to offset need to also be considered. In response to this need, ABB's SuperClean™ wall offset spacers are the industry's first bacteria resistant wall offset spacers that are made from Ag+ FDA-compliant material containing silver ions to inhibit bacterial growth on the surface of the spacer.
- **Liquid ingress protection** that keeps liquid out of the electrical system is one of the most important

ways to prevent unscheduled downtime. Proper ingress protected components does not mean you have a proper ingress protected system. The T&B Liquidtight Systems™ offer conduit protection that is IP69 rated. To test products in the environment in which they will be installed, ABB was an industry leader in building an F&B washdown lab.

- **Chemical resistant products** that can stand up to cleaning with harsh chemicals and may be required for use with acidic foods, alcohol or additives.
- **Flexible conduit** and fasteners that offer options for securing and protecting cables and cords for modular designs or movable equipment. Options include materials that resist bacteria and are easy to clean such as ABB's Adaptaflex™ antimicrobial conduits.
- **Cable protection** and wire management such as drop-ins prevent cables from running across the facility or creating hazards.
- **Corrosion resistant** items made of materials that help prevent bacteria, oxidation, rust and flaking such as stainless steel, silicone gaskets and re-sealed configurations. NACE International, the world's leading corrosion control organization, estimates that more than \$2.1 billion is spent annually in the F&B industry on corrosion-related costs such as replacing equipment and components.<sup>4</sup>
- **Compatibility of components**, joints and metals can help safeguard against leaks and contaminants and allow for cleaning at higher psi or temperatures.
- **Testing for reliability** and meeting rating, maintenance and inspection requirements for its intended use.



## 4 Detectability

**In food and beverage processing, detection is prevention.** From raw ingredients to ready cut items, all F&B manufacturers must have at least one type of detection equipment such as metal or x-ray technology. Many producers use a combination of detection methods including:

- **Vision systems** such as cameras, monitoring and physical quality checks.
- **Metal detectors** and magnets.
- **X-ray technology** is increasingly used to identify glass, metal, porcelain, and bone fragments in meat and poultry.



Fasteners are found at each stage of F&B processing and handling and throughout facilities, connecting everything from conveyor belts to system wiring. While some manufacturers use welded steel rings and loop systems, cable ties made of nylon and polypropylene material are also widely used in food, beverage and pharmaceutical processing. The cable tie market is estimated to grow by \$1.48 billion during 2020-2024, fueled in part by demand for detectable ties.<sup>5</sup>

Recognizing that just because something is detectable, doesn't mean it's easily detected was a catalyst for innovation at ABB. To improve visual and metal detectability, ABB introduced detectable Ty-Rap® cable ties in 2006. Continued innovation has resulted in Ty-Rap heat-reactive cable ties that change color to warn of potentially dangerous high temperatures in equipment and distinctive blue-colored ties that have buoyancy for easy visual detection in batters and liquids. ABB also introduced antimicrobial ties for food and beverage processing. The team continually engages with food, beverage and pharmaceutical partners on solutions for specific needs and applications, including resistance to various chemicals, non-metallic products and color coding by zone.

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In food and beverage processing, detection is prevention.



The scope of sustainability is shifting and applies to the product and the process in the Food & Beverage sector.



## 5 Sustainability

**Empowered with knowledge and influence, consumers are insisting on sustainability** and transparency across the food production process. Both sustainability and safety are top areas of focus for F&B processors.

As the scope of sustainability broadens beyond the source, quality and healthiness of ingredients, F&B manufacturers are demonstrating more than a desire for compliance in methods and materials. To align with national and international environmental protection guidelines and their own sustainability objectives, many are choosing recycled materials and products designed for reliability over a longer operating lifetime. The clear shift from focusing on upfront expense to consideration of equipment replacement costs and avoidance of waste is also leading more producers to move to long-term, sustainable solutions:

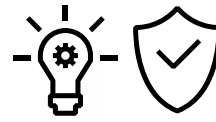
- **Supporting clean-in-place (CIP)** sanitation processes with high-performance electrical systems.
- **Increasing** operational equipment effectiveness (OEE) and extending the plant lifecycle.
- **Designing sustainable processes** and systems to reduce energy, water and travel distance for delivery.
- **Simplifying** and fostering use of recycled and reusable packaging.
- **Reducing capital expenditures** and waste by choosing materials like stainless steel that save money over the lifetime of the product.



**Simplifying** and fostering use of recycled and reusable packaging.



Identifying a material or process at any point in the manufacturing cycle that can lead to a recall can be a huge wake-up call.



**Innovation** and higher standards of safety and sustainability are going into every aspect of food and beverage production, helping to avoid potential contamination risk in the industry.



## 6 Harmonization

**Today, innovation and higher standards of safety and sustainability are an element in every aspect of food and beverage production, helping to avoid potential contamination risk in the industry.** However, the accelerated pace to incorporate technology across everything from tools to transportation has led some manufacturers to put in place short-term solutions or fragmented systems.

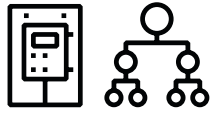
Quick fixes and mating together disparate electrical components can pose significant threats in the washdown and processing areas. For example, if two IP69 components do not mate correctly, this will lead to liquid ingress. For this reason, an IP69 flexible conduit system will perform and hold up much better than an IP69 fitting alone. Because products from different manufacturers are not configured to work well together, it can make it more challenging to identify potential issues early, thereby increasing the likelihood of outages and downtime. F&B has a need to standardize on one manufacturer that can supply them with all their electrical system needs.

Instead of trying to piece things together, F&B manufacturers should take into consideration the benefits of installing complete systems – including safety, energy efficiency, production continuity and support of digitization efforts. Integrating education and team training further enhances productivity and effectiveness of food safety measures as automation changes, not eliminates, jobs.

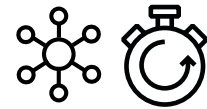
With so much at stake, F&B producers can no longer take a trial and error approach and need to prioritize the selection of the correct products from the right manufacturer. Ensuring that all electrical elements, from conduit and cable to fittings and fasteners, work in concert to enable the highest levels of safety and productivity is how ABB is helping protect this critical industry at every phase. Not only do we look at the whole facility, but we leverage ABB expertise across the entire food and beverage processing spectrum. From farm to fork and every point in between, ABB Installation Products are needed in each F&B segment and application.

When F&B processors focus on harmonizing electrical solutions and consistently maintaining, testing and training as a strategic part of their reliability playbook, the result is improved compliance, food safety and uptime.





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## References

- <sup>1</sup> PMMI, '2017 Trends in Food Processing Operations,' *PMMI.org*, Herndon, Va., January 2017, <https://www.pmmi.org/report/2017-trends-food-processing-operations>
- <sup>2</sup> NSF International, 'Food Equipment Certification,' *NSF.org*, Ann Arbor, Mich., <https://www.nsf.org/testing/food/food-equipment-appliances/food-equipment>
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- <sup>4</sup> NACE International, 'The AMPP Podcasts Series' by the Association for Materials Protection and Performance, *nace.org*, Houston, Texas, 2015, <https://www.nace.org/resources/general-resources/nace-podcasts>
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**US**

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**About ABB Installation Products**

**ABB Installation Products Division**, formerly Thomas & Betts, is a global leader in the design, manufacture and marketing of products used to manage the connection, protection and distribution of electrical power in industrial, construction and utility applications. With more than 200,000 products under more than 38 premium brand names, ABB Installation Products solutions can be found wherever electricity is used.