

## Application report:

# Food Safety by Design – Sensors of hygienic design guarantee safety in food production

*In the production of foods and beverages as well as pharmaceuticals and cosmetic products, the primary concern is hygienically safe production so as not to jeopardize the health of the consumers. This is why there are various guidelines in Europe for machines intended for use in these areas. The EC Directive 2006/42/EC has legal character in this respect. The industry standards DIN EN 1672-2 and ISO 14159 provide recommendations for hygienic design. The sensor equipment manufacturer Baumer developed its new sensors of hygienic design while complying with these standards. The manufacturer is offering a complete solution for hygienic applications with these photoelectric and inductive sensors, together with the corresponding mounting accessories, certified for the first time by the EHEDG.*

### Reducing the potential hazard using hygienic design

Imagine you open the cream cheese that you just bought. It is still sealed securely in its packaging and you enjoy it because the product does not appear to be damaged at first glance. However, two days after eating it, you end up in the hospital with a severe case of food poisoning. The cause: Contamination of the fresh product with undesirable microorganisms during manufacture.



*Fig. 1 Baumer is offering for the first time an EHEDG-certified complete solution for a hygienically perfect automated system*

When processing exposed food, it is very easy to contaminate and spoil it due to impurities or cleaning agent residue. Food residue that, for example, sticks to the sensors and then reenters the production flow contaminated with harmful microorganisms represents a particularly great danger. Consequently, it is essential that the machines for processing and packing food first be easy to clean and second not have any gaps or angles, known as dead spaces, that can harbor residue. Hygienic design, according to the EN 1672-2:2005 standard among others, requires smooth, continuous or sealed surfaces, corrosion-resistant materials and shielded and hygienically flawless fits for detachable connections. The stricter requirements primarily serve to eliminate or reduce the risk of infection, contagion or injury originating from foods.

What does this mean for components like sensors? To satisfy the stated requirements, hygienic sensors are accommodated in a smooth V4A stainless steel housing without grooves. (See Fig. 2.) As a result, they provide no points of adhesion and are easy to integrate into the hygienic design of the system. In addition, they are extremely durable, free of corrosion and resist even the most aggressive cleaning agents and processes such as CIP. As the machines are tested and certified using expensive procedures, the components used must also satisfy current standards and design specifications of, for example, EN 1672, EHEDG or the FDA. (See the box text for an explanation of the concepts.) If they do not do this, the system manufacturer will have a considerably greater cost because he needs to encase the non-compliant sensors to the appropriate hygiene level in particularly critical areas.



*Fig. 2 Photoelectric and inductive sensors of hygienic design*

### **Pre-certified components make life easier for machine builders**

The highest hygienic requirements are placed on sensors used in the food zone. There is a particularly high risk in this area that the sensors will come into contact with exposed product and residue will again be introduced into the production flow. For determining position in the food area, the sensor equipment manufacturer Baumer is offering a hygiene-compliant complete solution with the new photoelectric and inductive sensors and suitable accessories of hygienic design. The sensors and the mounting accessories are the only EHEDG-certified products yet on the market. In addition, they are Ecolab-tested and the materials used are FDA-compliant.

Baumer has had all hygienic products completely checked and certified by the responsible agencies. This is how the manufacturer guarantees that all components meet current regulations. This service greatly simplifies the system certification process for the customer.

The sensors of washdown design, specially suited for use in areas known as splash zones, are also FDA-compliant and Ecolab-tested. In this area, while the sensors may come into contact with food, residue cannot reenter the production flow. For this reason, reduced requirements regarding hygienic design are placed on the sensors. However, they have to withstand demanding cleaning processes here, too. For this reason, they are just as resistant to cleaning agents and high-pressure spray as the sensors of hygienic design. However, they are mounted in the conventional way.



*Fig. 3 Photoelectric and inductive sensors of washdown design*

### **Solutions for all production areas**

The sensors for food areas and splash zones are the optimal complement to the portfolios of the photoelectric and inductive sensors already used in non-food areas. The FxDH photoelectric sensors of hygienic design and FXDR of washdown design are part of the Series 14 housing type. They are available as diffuse sensors with background suppression, SmartReflect background-reflective sensors and retro-reflective sensors.

The SmartReflect sensors open up new possibilities. They do not need a separate reflector but can be referenced to any background at all, whether it is light or dark, made of plastic or metal. Especially for the broad conveyor belts used in food production, the new Series 14 SmartReflect sensors were optimized to a sensing distance of 800 mm with stainless steel as the reference. They can be integrated into the system quickly and simply and machine downtimes due to reflectors destroyed by aggressive cleaning processes are eliminated.



Fig. 4 A SmartReflect background-reflective sensor uses a part of the machine made of stainless steel as the reference

The new IFBR and IFRR inductive sensors, of hygienic and washdown design also fit seamlessly into the existing portfolio of M8, M12 and M18 sensors. They are available in shielded or unshielded versions, with cable or plug connection. Their large temperature range extends from -40 to +80 °C, even up to +100 °C for brief periods. This provides a variety of potential uses in processing deep-frozen products or in areas with CIP processes.

The special V4A stainless steel mounting hardware of hygienic design can be used both for the photoelectric and the inductive sensors. For mounting, they are backward-compatible with standard inductive sensor sizes M8, M12 and M18. This greatly simplifies the subsequent mounting of inductive sensors of hygienic design in place of a standard sensor. In addition, the mounting hardware is self-locking, i.e., it cannot work itself loose and reach exposed food even when subjected to vibrations during system operation. EHEDG-certified reflectors and Ecolab-tested, FDA-compliant cables of protection class IP 69K complete the range of accessories.

### proTect+ – The next step in impermeability

The Baumer company developed the special proTect+ impermeability concept to be able to offer long-lived sensor solutions for applications having demanding environmental conditions such as those in the food industry. Optimized mechanical interfaces and manufacturing processes such as the special design and the selection of high-grade materials provide the outstanding durability and long-term leak resistance of the sensors. The sensors undergo various temperature cycles both in air and in

water during particularly rigorous shock test procedures and are tested to the IP protection class required for the application.

Even after the various temperature cycles, the photoelectric and inductive sensors of hygienic and washdown design still satisfy the requirements of protection class IP 68/IP 69K. The proTect+ impermeability concept thus guarantees maximum reliability and lifetime of the sensors even under continuous temperature changes, cleaning with aggressive cleaning agents and high-pressure spray and water jets.



Fig. 5 Baumer sensors with proTect+ provide outstanding impermeability and an extended lifetime

### Capable complete solution

The photoelectric and inductive sensors of hygienic and washdown design are the optimal supplement to the standard portfolio of Baumer. Together with these new sensors, the sensor equipment manufacturer offers a capable complete solution for all areas in the production of food and beverages, pharmaceuticals and cosmetic products. Thanks to clever solutions and sophisticated accessories, the sensors ensure maximum process safety with the longest lifetime.

	<b>Einzigartiges Dichtkonzept proTect+</b> garantiert 100%ige Dichtigkeit nach vielen Temperaturzyklen, eine hohe Lebensdauer und damit hohe Zuverlässigkeit
	<b>Edelstahlgehäuse V4A mit Schutzart IP 69K</b> für eine hohe Robustheit und eine hohe Lebensdauer
	<b>ECOLAB-geprüft und FDA-konform</b> für sichere Beständigkeit gegen Reinigungsmittel und konsequente Verwendung lebensmittelkonformer Materialien
	<b>Durchgängiges Hygiene-Design</b> von Sensoren und Montagezubehör entspricht Designrichtlinien für Hygieneanwendungen, ermöglicht Einsatz in direkter Nähe zum Lebensmittel und vereinfacht Zertifizierung von Maschinen
	<b>Hoher Temperaturbereich</b> ermöglicht vielseitigen Einsatz und resultiert in langer Lebensdauer, auch bei hohen Temperaturen, z.B. in CIP-Prozessen
	<b>Laser-Beschriftung</b> sorgt dafür, dass der Sensor immer identifizierbar bleibt

Fig. 6 With various features, Baumer ensures that its sensors of hygienic design are particularly reliable and have a long lifetime

Box text:

### **Definitions**

The European consortium EHEDG (European Hygienic Engineering and Design Group) is composed of device manufacturers in the food industry, research institutes and officials from the public health sector. It has prepared various standards. System and component manufacturers can have their products certified according to these standards by designated organizations. In Germany, this is the TU München (Technical University of Munich), Weihenstephan Research Center for Brewing and Food Quality.

The Food and Drug Administration (FDA) is the official agency for monitoring food and drug approvals in the United States. Its task is protecting public health in the USA. To this end, the FDA has published rules for the safety of food processing systems and it checks compliance.

Ecolab Inc. is an international company offering systems and products for all areas of cleaning and disinfection. As an additional service, it tests materials used in the food and beverage industry for compatibility with Ecolab cleaning agents.

CIP (Cleaning in Place) describes cleaning processes in process-based systems wherein the system is cleaned without substantial disassembly of the surfaces that come into contact with product.

The EN 1672-2:2005 standard (Food processing machines – General design principles – Part 2: Hygienic requirements) is a central European document based on the requirements of the machine directive and is directed primarily at the designers of food processing and similar machines.