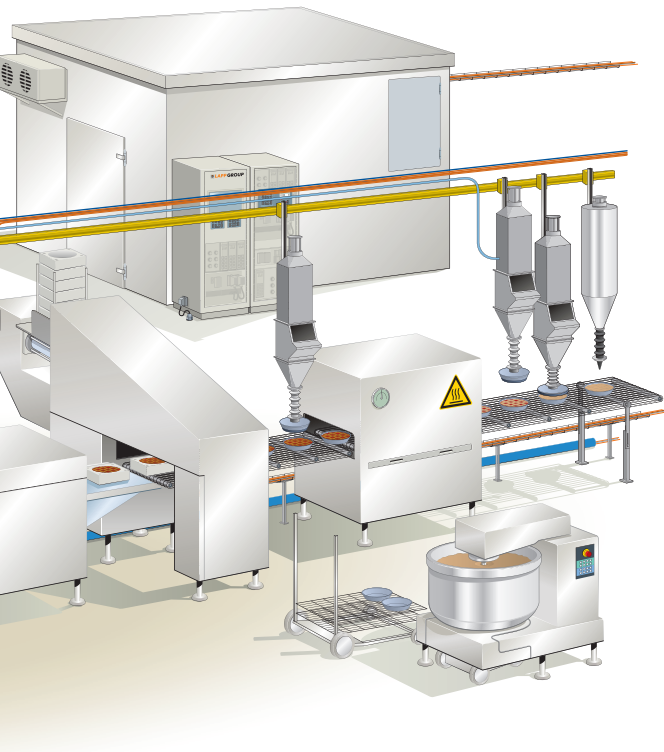


WHITEPAPER

CABLES AND CONNECTORS
FOR THE FOOD AND
BEVERAGE INDUSTRY



CABLES AND CONNECTORS FOR THE FOOD AND BEVERAGE INDUSTRY



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Wherever food is involved, hygiene is at the top of the agenda. Production facilities should therefore be produced according to the principles of Hygienic Design. Cables, connectors and cable glands play an important role in the process.

Minimising downtime, ensuring quality, providing maximum safety for employees – while these are priorities in all industrial sectors, they are particularly important in food production. In the food and beverage industry, if the processing of perishable foodstuffs ceases it not only leads to profit losses but also high costs from waste disposal and recommencing production. Another extremely important factor for the industry is quality – if the quality is inadequate, consumers are not only dissatisfied, they are also at risk of developing health problems.

One of the crucial factors is regular cleaning of production facilities: when the cleaning crews use steam jets and acidic or alkaline cleaning agents to remove dirt and germs, the systems are subjected to high levels of strain. Another considerable burden is the common process of dry cleaning with aggressive cleaning agents or dry ice – which is a rather new trend. Therefore all components need to be designed in a way that makes them permanently sealed and functional, while being made from shapes and materials which do not provide a breeding ground for germs.

THREE HYGIENE ZONES

The first requirement, is always to select and use the right components. Industrial work groups, such as the “Safe Food Factory” in the Benelux states, have compiled recommendations for this requirement. While hygiene is always important, the extent of its importance varies. The closer a component comes to foodstuffs, the higher the requirements.

Three types of hygiene zones are generally distinguished

1 Hygienic Design Zone

these regularly come into contact with foodstuffs. Examples include stirrers, filling nozzles, blades and cutters.

2 Spray zone

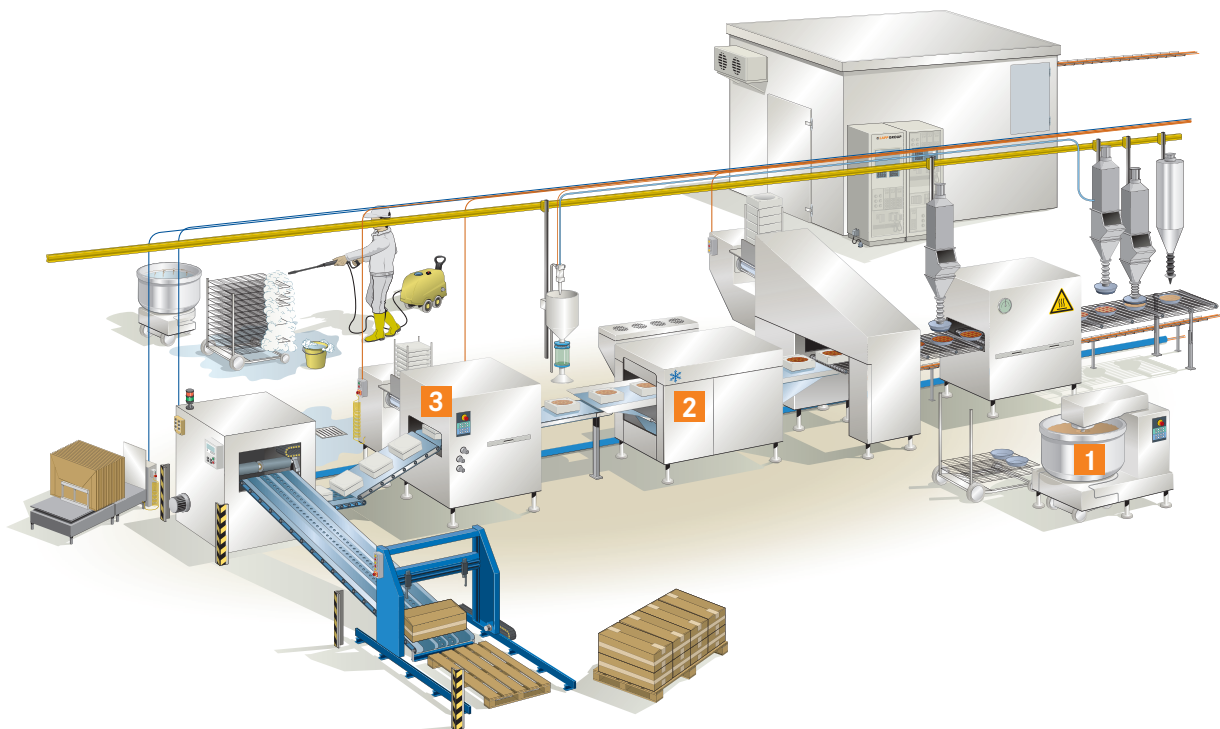
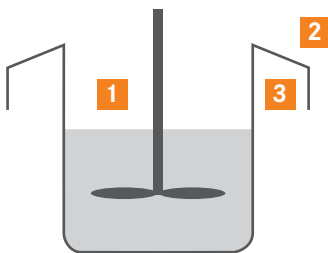
these are areas and machines which come into contact with foodstuffs, for example through spraying. Generally, a surveyor or the producer conducts a risk assessment to determine whether the food can return to the Hygienic Design Zone.

3 Non-product zone

these include all areas and facilities in a factory which do not come into direct contact with the foodstuffs. However, these areas are often cleaned together with the more sensitive areas, which in turn may result in high chemical and mechanical stresses.



INFO



RESISTANT TO CLEANING AGENTS

In the spray zone and the Hygienic Design Zone, the most stringent hygiene requirements apply. These zones need to be cleaned particularly frequently and thoroughly. This is generally the responsibility of the cleaning crews who work at piece rates and use strong cleaning agents such as corrosive acids and alkalis in different concentrations – or they may clean surfaces by wiping them dry, or they might use hot steam jets.

A relatively new trend is dry-ice-cleaning. It is an alternative for those who want to work without aggressive cleaning agents. Dry-ice-particles -78°C cold, are blasted onto heavily soiled surfaces such as tanks, boilers, or ovens, at pressures between 2 and 6 bar. Dirt freezes and gets brittle, which makes it easy to remove.

Few materials are able to withstand all of these various strains in the long term. Stainless steel is a very popular material for use in the Hygienic Design Zone, as it is unaffected by the strains described. Plastics and other materials which are frequently used for cables or seals of components present some particularly tough challenges. If plastics or elastomers are used when they are not suitable for frequent cleaning, there is a danger that, for instance, some system parts will lose their protection rating or a cable will lose its insulation properties. An extreme example in a bakery, outgassing from the dough had caused a cable sheath to swell and become brittle. The employees were therefore in acute danger because there was the risk of short circuiting and electric shocks. The quality of the products was also jeopardised because the plastic could have fallen into the dough.



In the food and beverage industry, cables and cabling components are subjected to particularly strenuous conditions. If unsuitable components are used, as shown in the image above, dangerous situations can quickly arise.



Loops along the cables trap dirt and are tough to clean and therefore should be avoided in food production.

LOOSE CABLING WORKS BETTER

Beyond this, another one of the main challenges is the installation type: cables are often bundled more tightly together than they ought to be, or they are not easily accessible. Loose cabling with a bit of “play” would be ideal for easy cleaning. However, technical inspectors normally place great importance on the use of fixed installation – a happy medium needs to be found. The Safe Food Factory participants recognised that overly long cables represent a problem: cables are often installed with some excess length so that there is a reserve – while this is a comfortable approach, it is also problematic, firstly in terms of electrical engineering (keyword bundling) and secondly because the loops that form are often tough to clean and dirt gets trapped in them. The participants generally established that the cables should ideally be installed in such a way that they are as far away as possible from the intensive cleaning processes. Additionally, hybrid cables can be used. If several cables are combined into one, then there is less cable space and less intermediate space in which impurities can accumulate.

The Safe Food Factory recognised a further challenge involving contradictory requirements in the USA: on the one hand, companies wishing to export to the USA face the NFPA requirements for maximum fire protection. On the other hand, the FDA is critical of cables with reduced flame-propagation since some fire-retardant additives are prone to outgassing and can therefore contaminate raw materials. This too needs to be considered on an individual basis.

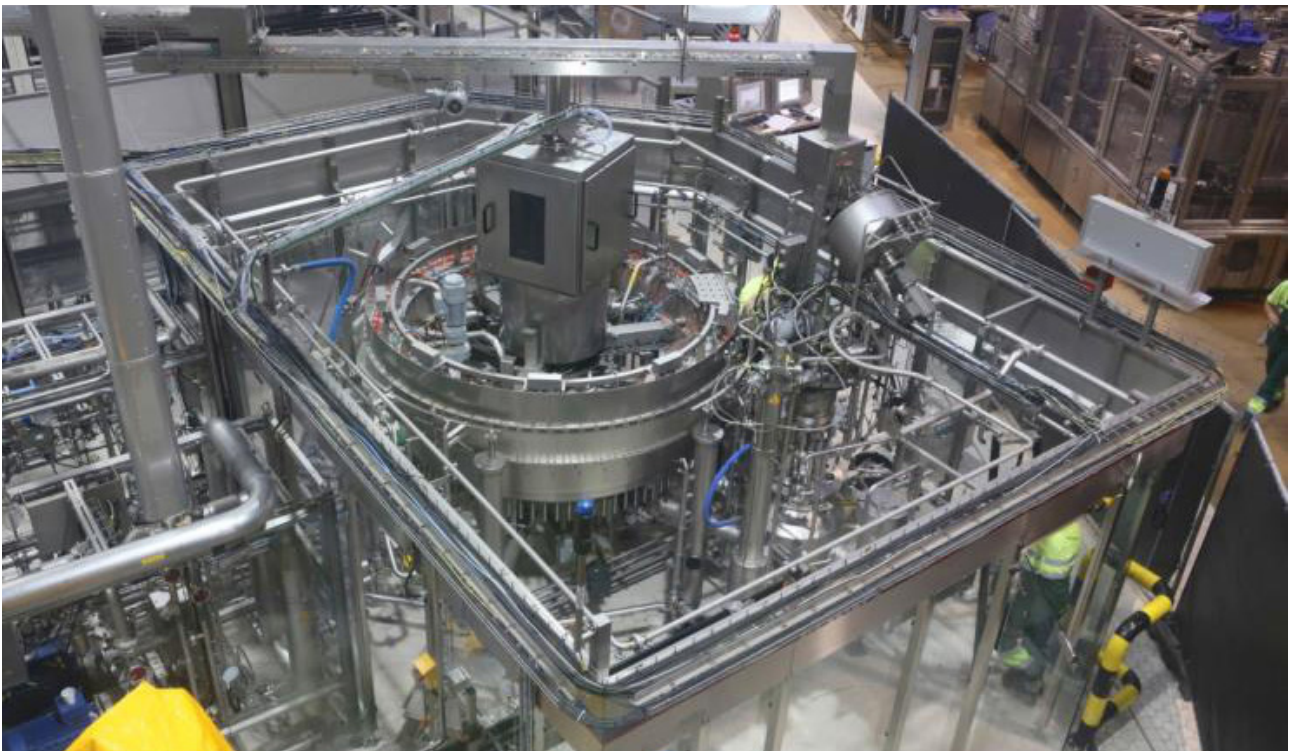
THE INDIVIDUAL APPLICATION COUNTS

If cables are installed in the Hygienic Design Zone, for example for a temperature or level sensor in a fermenter, they need to be particularly well protected – by installing them either in stainless steel pipes, or in protective conduits, which can be far more cost effective. There is a further complication for applications with large temperature fluctuations, as condensation can form and collect in the protective conduit – this too is unhygienic in the long term. In this case, the better option is to use an openly installed and highly durable cable in connection with an appropriate cable gland which follows the principles of hygienic design.

This example highlights that there is no universally applicable best solution – each case needs to be individually assessed, and the application consultants at Lapp help customers to find the best solution. For end users it is crucial to also consider the interaction between components. It is therefore advisable to choose a supplier that can offer competent counselling about all aspects of connection technology and a very broad portfolio of connection solutions including cables, connectors and accessories which fulfil the requirements of hygienic design.

Production facilities which are constructed according to the principles of Hygienic Design represent a huge step forward in terms of optimising quality, safety and ultimately efficiency in the food and beverage industry. They are constructed in such a way that they do not allow germs to settle and can be cleaned easily. They are also particularly robust.

According to the Safe Food Factory, cables should ideally be installed in such a way that they are as far away as possible from the intensive cleaning processes.





Specialised cabling solutions developed specially for the industry such as SKINTOP® HYGIENIC and ÖLFLEX® ROBUST are designed to satisfy even the most stringent requirements of the industry.

NO GERMS ALLOWED

The Lapp products that meet the particularly stringent requirements of Hygienic Design include, for instance, the cable gland SKINTOP® HYGIENIC. It follows the general design principles of DIN EN 1672-2 for the food and beverage industry and is certified according to the latest EHEDG testing. Furthermore, the cable entry – just like the cable conduit SILVYN® FG NM and the ÖLFLEX® ROBUST cable – meets the ECOLAB® requirements relating to resistance to cleaning agents and disinfectants. The SKINTOP® HYGIENIC does not provide any surfaces for contaminants to attack. All seals are fixed tightly to the cable and connection point with no gaps. Instead of an O-ring, it has a radial moulded seal above the connection thread, a sealing ring below the domed cap nut and a specially formed conduit sealing ring on the cable. It has smooth surfaces and no edges, meaning that remaining food cannot settle there and can easily be washed off. The cable gland, as well as the SILVYN® FG NM protective conduit, or the ÖLFLEX® ROBUST cables also fulfil the ECOLAB® requirements for durability against widely used cleaning agents.

In terms of product development, there is no need to keep reinventing the wheel. A pragmatic approach makes sense. This means that often it is not necessary to develop expensive special products, instead existing products from mechanical and plant engineering can often be used in the food industry as well. One example of this is the classic “ÖLFLEX® Robust”, a series of cables that resist both machine oil in industrial production and cleaning agents in food production. This also applies for a wide selection of accessories and other cables with sheaths made from PVC, TPE, or PUR, some of which have undergone ECOLAB® testing. It is especially important for the end user to know the exact requirements of the application in question and select adequate solutions. Good, comprehensive counselling by experts who know the industry is extremely valuable here.



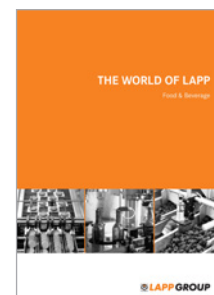
INFO

With its cables, connectors and accessories, Lapp also provides an extensive product portfolio which meets these requirements and is increasingly in demand in the food industry. A feature that distinguishes Lapp from many other suppliers: as a manufacturer of all required cable technology components, Lapp is the only supplier with all the necessary knowledge.

[more](#)



FLYER



Find all Lapp solutions for Food & Beverage

SIGNAL COLOUR BLUE PROTECTS AGAINST LOSSES

When installing cables in the product and spray zones, one alternative to using rigid and expensive stainless steel pipes is using SILVYN® FG NM, a flexible and dimensionally stable protective conduit made from soft PVC with an internal spiral, along with the accompanying conduit gland SILVYN® HYGIENIC. Both are suitable for contact with foodstuffs – and thus for use in the Hygienic Design Zone – and are easy to clean. The conduit, for instance, has no grooves in which residue can settle, unlike conduits used in mechanical engineering. It is blue, as the sector requires it to be. If a piece of plastic were to somehow fall into the food, it would be easier to detect this way because in nature there are no materials with such an intense blue colour. This is also the case for the cable ties, which Lapp provides especially for the food industry. They are blue as well and also contain an admixture of metal. This means that a missing cable tie can be retrieved very easily using a metal detector or an X-ray unit.



WORKING GROUP

Working Group Safe Food Factory

In the Benelux states, a work group called “Safe Food Factory” was established in order to compile recommendations for selecting and installing systems and components in the food and beverage industry. A variety of industry representatives form a sub-group for a certain topic, where they work on special questions.

For the topic of cabling, the participants included Bosch Packaging Technology, Gouda Holland/Niedax Group, Rittal, Lapp Benelux, Anamet Europe, NIZO, food and beverage manufacturers FrieslandCampina and Heineken, as well as several cleaning service providers.

At over ten meetings they discussed best practices, carried out practical tests and developed recommendations. Prior to being published, the new standard was checked by a commission of representatives from potential user companies such as BAT, Jacobs Douwe Egberts, Nestlé and Unilever. The Safe Food Factory (SFF) is an initiative of Dutch companies and the EHEDG. The SFF aims to act as an international platform that brings together industry, standards and practice.



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