

## Flexible and hygienic expansion joints for dairy products

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Expansion joints are flexible connectors which compensate for vibrations between rigid and movable components in industrial production plants. To prevent contamination of the product, e.g., foods, it is essential that these expansion joints, beginning with their manufacturing, adhere to the strict guidelines regarding their structural shape and materials. While in use at a dairy plant, the installed expansion joints showed high signs of wear. Furthermore, the operating conditions required a time-consuming daily change of the expansion joints. By means of custom-made quick lock expansion joints with a more wear-resistant material, a solution was provided which ideally fulfils the requirements regarding wear while at the same time significantly reducing the changeover time.

In one of Europe's most modern dairy plants in Eastern Germany, round about 2 million tons of milk are processed every year. The manufacturing plant also comprises 12 vibration feeders, each of which is connected to one silo and two pipelines. Expansion joints at the connection points ensure that vibrations are not transferred to the rigid pipe system and the silos.

The change of expansion joints with conventional fasteners causes high downtimes. Especially in applications in which the expansion joint is permanently switched from one connection to another the conversion to an expansion joint with quick lock system pays for itself within a short period of time.

Due to the multitude of silos, the expansion joints need to be switched from one connection to another daily during the filling of the silos. Up until recently, this process involved a time-consuming dismantling and installation. High changeover times resulted in reduced plant availability.

The solution, specifically designed for the customer, is equipped with a new and patented quick lock system, Fig. 1. The change of the expansion joints is now reduced to a few simple steps and takes less than a minute.



Figure 1: New patented quick lock system

Furthermore, the abrasive nature of the lactose together with the mechanical stress caused by the vibration feeder led to a quick wear of the expansion joints. While the pressure requirements for the application are low, the expansion joints must be able to withstand the high temperatures of the cleaning process. When cleaning with acid, temperatures of up to 65 °C can occur. The use of water as cleaning agent can result in the temperature rising as high as 80 °C. The lifetime of the expansion joints amounted to only a couple of months after which a replacement was necessary.

The new quick lock expansion joints were designed to rectify these shortcomings while simultaneously adhering to the strict hygienic and safety requirements in the food industry. To suppress microbial growth and facilitate the daily cleaning by means of CIP/SIP, gaps, and cavities in which the product or cleaning agent can accumulate must be prevented. In addition, the used expansion joint materials must be resistant against the corresponding cleaning agents, in this case a 1.5% solution of nitric acid.

The fabric of the new expansion joint is white nitrile, Fig. 2. The soft material of the quick lock system is heat-proof and abrasion-proof. Due to its high elasticity and wear resistance, the nitrile achieves a long lifetime despite the vibrations. All materials which meet food (Food Contact Material = FCM) were tested according to relevant guidelines such as DIN EN 1935-2004. These guidelines for example stipulate that FCMs may only release substances or absorb product in very small quantities.



Figure 2: Prototype of new quick lock system in application

Apart from the material properties, the cleanability was also improved compared to the previous expansion joint. Regarding the realm of “Hygienic Design”, the size of the area between the flange system and expansion joint in which product can collect was held to a minimum. The obtuse angle at the flanges and the added nose design for safe clamping and reduced formation of crevices reliably prevent accumulation of the product. Furthermore, the quick lock system withstands all cleaning agents in use.