

**Food Safe ball bearing KleenTec coating**

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Food and beverage companies continuously face challenges to meet strict FDA regulations and provide safe products. Processing equipment, which commonly includes ball bearings, is frequently washed with high pressure water and chemicals to maintain a clean, disinfected production environment. This type of environment is extremely tough on bearings. Using knowledge gained from a long history of providing corrosion resistant bearings for food and beverage applications, ABB engineers have developed a new Food Safe bearing designed to thrive in this type of environment. Every aspect of the Food Safe bearing has been optimized for the harsh, washdown environment in which they will be installed. In this white paper, we will take an in depth look at the corrosion resistant KleenTec coating used for the new Food Safe bearing.



**Figure 1: Dodge Food Safe ball bearing insert**

ABB offers a complete portfolio of Dodge wash down bearings with different combinations of base materials and coatings. See Table 1 showing product groups and features.

<b>Product</b>	<b>E-Z Kleen</b>	<b>Ultra-Kleen</b>	<b>Food Safe</b>
Insert Base Material	Carbon Steel	Stainless Steel	Stainless Steel
Coating	TDNC (Nickel/Chrome)	None	KleenTec

Table 1. Dodge Wash Down bearing offerings

The Food Safe bearing insert is uniquely designed to provide the highest level of corrosion resistance in the industry. Unlike other product offerings, a stainless insert is plated with the new proprietary, KleenTec coating system. Ideally, stainless inserts would be made from a 300 series stainless steel, but this material does not have the strength or hardness necessary to accommodate high stresses generated in the race ways of ball bearings. For this reason, a form of stainless that contains some carbon is used for stainless inserts which provides strength and durability. This introduction of carbon has an effect on the corrosion resistant properties of the stainless material. For this reason the KleenTec coating was developed to outperform current stainless inert offerings.

ABB worked with third party plating experts to develop the new coating in order to achieve the required adhesion to the stainless parts and provide superior corrosion resistance. The KleenTec coating developed for the Food Safe bearing is a new proprietary formulation based on 25 years of bearing plating technology. The plating technique is a multistep process that utilizes chemical, electromechanical, and mechanical finishing techniques that provide superior corrosion resistant properties. Many sacrificial coatings offer some level of protection but chemical composition has a grain structure which provides a path for corrosion to the base metal. The KleenTec plating deposit itself is an alloy, and the result is truly amorphous, meaning it has no grain structure, which prevents the harsh alkaline and acid cleaning solutions found in wash down applications from reaching the base metal of the bearing components preventing corrosion. A sealer is then applied to the coating, enhancing its rust preventative properties.

The KleenTec coating has the most advanced chemistry and the bonding process on the market which results in a bonding strength exceeding 61,000psi. The unique chemical formulation forms a compressive bond with the base metal which prevents flaking unlike other coatings that form a tensile bond. The result is an extremely durable adhesion to the base metal.

The Food Safe bearing coating was tested against competitive bearings to evaluate how each brand performed when exposed to various chemicals and acids commonly used in washdown environments. Many of the competitive bearings may have performed well in some chemicals but poorly in others, while the Food Safe bearing excelled in all. The results from exposure to two of the more extreme chemicals, Phosphoric acid and the cleaning agent, Vortex, are shown below.

### **Phosphoric Acid**



Dodge Food Safe



Competitor 1



Competitor 2



**Vortex (.26% concentration)**

Dodge Food Safe



Competitor 1



Competitor 2



Dodge Food Safe



Competitor 1



Competitor 2



The new Dodge Food Safe bearing with KleenTec coating technology is ABB's most advanced offering for food and beverage companies, providing unsurpassed protection in high pressure, caustic wash down environments. For more information on the KleenTec coating or the new Food Safe bearing, contact ABB Motors & Mechanical technical support at 864-284-5700 or [brgpttechsupport@abb.com](mailto:brgpttechsupport@abb.com).