XII INTERNATIONAL SYMPOSIUM FOOD TECHNOLOGY

MURCIA Food 25

IBERFLUID INSTRUMENTS

KEOFITT® WORLD LEADERS IN STERILE SAMPLING™

Does sampling play a role in food safety?

How right equipment is important to ensure proper microbiological samples

"It takes many years to build a good brand, but only a tank of bad product to destroy it.

Sampling is not something we talk about and it's something we should talk about a lot more.

Sampling seems like an easy concept to understand, but it's often ignored during equipment design. Perhaps simply, because it is considered laboratory equipment, installed in the process area.

The right team says it all

Small producers, in many cases, will lose a lot of money because they throw away something that was right. It will make sense to invest in proper sampling equipment because you avoid throwing away a healthy product. There are a lot of different places in production where things can go wrong, but if you have the right equipment, things very rarely go wrong.

First Class Valves

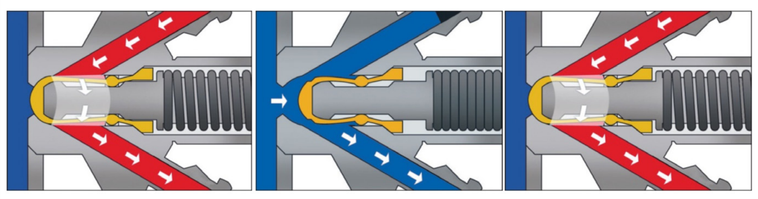
Sanitary conditions are crucial for food processing. And being able to take completely clean samples from storage tanks and process pipes is essential for both chemical and microbiological sampling. That is why, for more than 40 years, KEOFITT has continued to develop and innovate in hygienic, sterile and aseptic sampling. The KEOFITT sterilizable sampling valve combines the two functions. Efficient cleaning and sterilization of the valve can be carried out between random samples, regardless of the stage of the production process and without compromising the process.

The valve is Certified Internal Electropolishing Ra 0.2, 3-A, FDA, Type E1 EHEDG, ADI free-TSE/BSE-free and USP Class VI. For this reason, it is also appreciated, in addition to the agri-food sector, also the Pharma and Biotech industries.

A Unique Valve Design

The sterilization procedure can be performed by rinsing the valve with alcohol or steam, through the steam inlet of the valve. It is the perfect, hygienic design and polish of all product contact surfaces that enable valve sterilization.

According to the EHEDG requirements test, carried out by the Biotechnological Institute in Denmark, just one minute with steam at 121º C/1 bar(g) will be enough to sterilize the valve. Once sterilized, the valve is opened, and the sample is collected through the connection to the lower one.



1.Valve Closed (Sterilization) | 2. Open Valve (sampling) | 3. Closed Valve (Sterilization)

The valve is designed for frequent cleaning and efficient sterilization and representative sampling, without interrupting production.

Electro-polishing of the internal surfaces of the valves

Electro-polishing is an electrochemical process by which surface material is removed from an object immersed in a liquid and subjected to an electric current.

For a sampling valve, it is much more important to have a smooth inner surface than a shiny outer surface. For this reason, Keofitt has developed a method of internal electro-polishing of the connection spouts and the valve chamber, with repeatable and consistent results. The effect takes place when the electric current flows, from the anode + (valve) to the cathode – (electrode).

Electro-polishing principle according to fig.1:

1. Electrolyte
2. Cathode
3. Workpiece to be polished (Anode)
4. Particle moving from the part to the cathode
5. Surface before polishing
6. Surface after polishing (removed peaks and rounded corners)

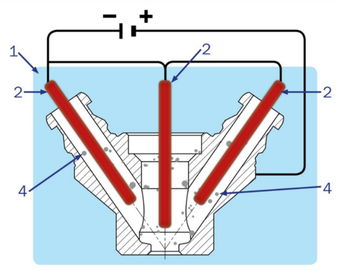


Fig.1

Individual cathodes are placed in the internal cavities, allowing electrical current to flow from the internal surfaces, resulting in the removal of high peaks from these internal surfaces.

The advantages of electro-polishing:

The most important advantage is the reduction of product adhesion and ease of cleaning, because of the improved surface finish.
Other advantages are improved corrosion resistance (surface contaminants are removed and the chemical resistance of the stainless steel surface is improved) and appearance in terms of the glossy surface.

The surface roughness is measured and expressed as the Ra value.
A roughness meter with a stylus is used for this purpose. The surface topography of the object (the vertical movements of the pencil) is recorded and transferred as an electrical signal. From it, a curve is drawn and a midline (CLA) is calculated, fig. 2.

The Ra value is based on the current deviations (blue arrows, peaks, and valleys) of a perfectly flat surface (the CLA midline). The position of the midline is such that the current surface profile is equally represented above and below the midline.

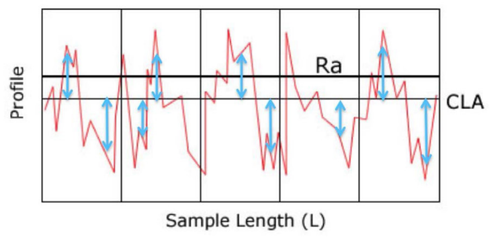
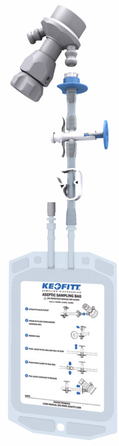


Fig.2

Mechanical Polishing vs. Polishing Electrochemical:

Many mechanically polished products claim low roughness figures, such as, Ra-0.4, which is possible by spending a lot of time polishing with fine diamond paste. But the internal areas and ducts will be difficult to polish due to mechanical constraints. In addition, mechanical polishing tends to round the peaks rather than remove them, which could facilitate unwanted bio-film buildup. In addition, it leaves many fine "scratches" on the surface, hygienically inadequate, despite an acceptable Ra value.

The first big step was to move from inlet/outlet outlets welded to the valve body, to machined one-piece bodies.



A great advantage of electro-polishing over mechanical polishing, is to remove any "loose" molecules, such as iron, chromium, carbon or nickel, that are not chemically bonded to the steel alloy and can dissolve in the product and contaminate it.

With the electro-polished inner surface, it is very difficult for any substance to adhere, reducing the risk of cross-contamination. At the same time, the time required for cleaning/disinfection is minimal.

Serial Number:
Internally electro-polished valve bodies are marked with an "E" in front of the serial number: E12345678. Roughness as a single number is expressed as maximum acceptable roughness, such as Ra - 0.8 µm or Ra - 0.5 µm. However, the average value of Ra in a batch could also be 0.6 or 0.4 µ; all of them meet the only criterion of being less than 0.8 µ. However, if the average is 0.4 µ, most items will have high roughness just below the 0.5 µ limit and you will most likely have to discard a considerable number of valves above 0.5 µ, in order to live up to the max. 0.5 specification.

Keofitt relies on the average Ra value at 0.2 µ and at the same time indicates the standard deviation, as an indicator of how far from the average roughness a given valve is. This is achieved through a combination of: a) optimized machining on high-quality machining centers and b) final internal electro-polishing.

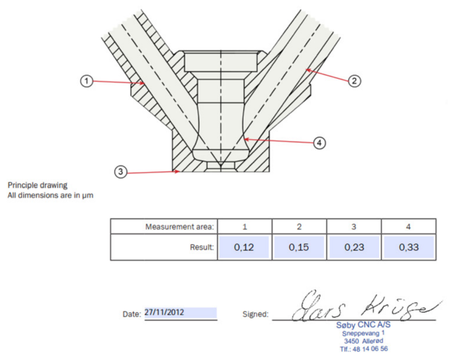
As an example: In a production batch of 100 valve bodies, the Ra value is measured on each piece and the average is 0.2 µ. The standard deviation (sigma) is calculated at 0.08 µ. This low standard deviation is due to rigorous process control. Ensuring that more than 97% of all valves have a Ra value below 0.36 µ (average + 2 x sigma).

Keofitt presents:

* Ra (max.) = 0,5 µ
* Ra (average) = 0.2 µ
* Ra (standard deviation) = 0.08 µ

• The individual certificates (such as the lower cutout) of each valve declare the measured roughness on 3 internal surfaces and 1 external surface (in contact with the product):

1. Interior entrance
2. Interior exit
3. Contact surface of the valve body with the product
4. Inner valve chamber



"Sampling School" in situ.

A hands-on sampling point and procedure evaluation session in customer processing plants. Followed by a training course and points of improvement in sampling/ cleaning/sterilization. Replacement of non-hygienic devices, mapping of microbiological samples, etc. As well as training in maintaining hygienic sampling equipment. Diplomas for attendees.

Sample Handling and Transport

It is not enough to have the right equipment and correct handling to be successful and completely reliable in the sample. To this end, KEOFITT provides the widest range of products and accessories. Highlighting the Portable Aseptic Sampling System with bottles, as well as the "sampling bags": three types of transportable sampling bags: "spike", sterile and aseptic.

Single-use, pre-sterilized, pharmaceutical-grade, to collect samples from 250 cc to 2L, for microbiological analysis. They can be cold transported to any laboratory with the guarantee that the microbiological sample will be representative, maintaining its integrity.

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Ecosistema de Innovación NUTRIALITEC (ECO-20241004), subvencionado por el CDTI y que ha sido apoyado por el Ministerio de Ciencia, Innovación y Universidades del Gobierno de España