

Steam Sterilization Pasteurization of herbs, spices, nuts, seeds...

Why steam sterilization?

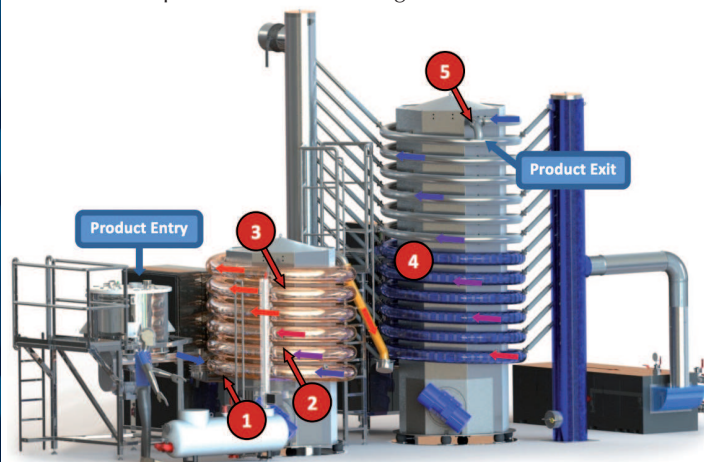
Existing sterilization processes such as ethylene or propylene oxide fumigation or ionization are not compatible with the demands of the final customers, encouraging the development of innovative processes based on traditional steam and heat treatment methods.

How to optimize steam sterilization?

The REVTECH technology uses steam only for its efficiency in eliminating bacteria and clean electric energy in order to heat the product. Overall steam consumption is therefore significantly less than competing technologies, resulting in an improved compromise between bacteria eradication and the preservation of product quality.

Principle of the REVTECH technology

Our steam sterilization units are based on the principle of an **electrically heated and vibrating spiral tube**. The process is the following:



- 1 The product is fed in the spiral tube at a constant flowrate.
- 2 The product is heated up by direct contact with the hot tube and progresses inside the tube under the effect of the vibrations of the tube.
- 3 A very small amount of steam (between 3 and 10%) is then injected to highly reduce the remaining micro-organisms, preserving the organoleptic properties of the product.
- 4 The product is stabilized and cooled down in the second spiral tower by cold, dry and filtered air.
- 5 The product exits at ambient temperature ready for packing.

Our sterilization units operate continuously and the flow rate range **from 200 kg/h** for the smallest up to **10 000 kg/h** for the biggest units (based on a product density of 0.6).

Complete eradication of pathogenic organisms – high reduction of TPC

Yeasts, molds, coliforms, salmonella, E.Coli are completely eradicated and sporular forms are highly reduced. This sterilization is **very homogeneous** thanks to the vibrations of the tube which ensure a perfect mixing of the product. For each unit, the microbiological results can be validated by an independent laboratory.

	Total Plate Count		Enterobacteria		Yeast & Molds	
	raw	treated	raw	treated	raw	treated
Black pepper	1.1 10 ⁷	500	1.0 10 ⁷	<10	1.0 10 ⁴	<10
Cumin seeds	1.9 10 ⁶	360	3.5 10 ⁵	<10	1.0 10 ⁵	<10
Parsley	2.2 10 ⁵	80	5.5 10 ³	<10	4.0 10 ²	<10
Paprika	3.7 10 ⁶	40	-	-	6.0 10 ²	<10
Camomile	1.1 10 ⁷	290	1.7 10 ⁶	<10	1.3 10 ⁵	<10

Some examples of microbiological reduction obtained with a REVTECH unit



Excellent preservation of product qualities

- **Organoleptic properties are preserved:** only a very small amount of steam is needed, the product being heated by the contact with the tube, there is only very little condensation of the steam on the product (unlike autoclave type systems).
- **No visible difference in physical appearance** between treated and untreated products. This is due to the operation at atmospheric pressure and to the absence of belts, mixers, augers and any mechanical conveyance system:
 - No physical damages to products such as almonds, walnuts, cashews.
 - Fragile products, such as oregano or parsley, see their color maintained.



Herbs treated with a Revtech unit

Cutting edge technology for your factory

- **Continuous and fully automated process:** recontamination risks are eliminated.
- **Low power consumption:** about 80 W/kg of product *ie.* a complete 1 ton/h unit would consume around 80 kW.
- **Easy operation of the units:** cleaning time is reduced (about 1h), maintenance costs are negligible and only one operator is needed to run the complete unit.



Almonds
before treatment after treatment

References all around the world

1. Herbs, spices & roots

- **McCormick** - world leader in herbs & spices: pasteurization of herbs and spices, 1200 kg/h.
- **Arkopharma** - European leader in medicinal herbs: pasteurization of medicinal plants, 500 kg/h.
- **VREMYA** - Russian leader in herbs & spices: pasteurization of herbs and spices, 1500 kg/h.
- **Laboratoire Fenioux** - France: pasteurization of medicinal plants, 500 kg/h.
- **Norgine Pharma** - France: pasteurization of Arabic gum, 650 kg/h.

2. Nuts & seeds

- Revtech obtained 'proof of principle' from the **Almond Board of California** TERP committee. During the validation tests, the Revtech system allowed up to **8 log reduction in Salmonella**.
- **Whitworths** (UK) pasteurizes a number of different nuts (almonds, cashew, pistachios, hazelnuts...) with a 2250 kg/h Revtech unit.
- **Haitoglu** (Greece) pasteurizes sesame seeds using a 2000 kg/h Revtech unit.



500 kg/h steam sterilization unit for spices



2250 kg/h nut pasteurization unit

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