

A new flexible and gentle steam sterilization system for herbs, spices, seeds and nuts

REVTECH company in France has developed a new highly efficient **continuous steam sterilization system** ideally adapted to aromatic herbs and spices. This sterilization system has also recently been independently validated for the sterilization of almonds and peanuts with a 5 to 6 log bacteria reduction. The process is based on the use of an electrically heated stainless steel tube through which products flow by vibration. Steam is injected into the tube in order to sterilize the product. The complete system operates at atmospheric pressure.

The same sterilization line can also be easily and quickly configured for a roasting process of various nuts such as almonds, peanuts, pistachios, sesame and hazelnuts by increasing the tube temperature and by stopping injection of steam into the tube.

The industrial process uses much less steam than competing technologies such as autoclave with as a result **significantly improved color and flavor**. Steam is produced at atmospheric pressure in a REVTECH boiler that requires only simple maintenance and presents no security risks. Typical steam consumption is well under 80kg/h for a product flow rate of 1500kg/h. All types of bacterial populations are reduced after treatment. Sensitive bacteria populations such as enterobacteria, coliforms, yeasts and molds, salmonella and E.Coli are totally eradicated. Spore forms can also be reduced in accordance with the different process parameters.

	Total plate count		Enterobacteria		Yeast & molds	
	Before	After	Before	After	Before	After
Black pepper	1 10 ⁷	500	1 10 ⁷	<10	1 10 ⁴	<10
Cumin	1.9 10 ⁶	500	1.7 10 ⁶	<10	3 10 ⁶	<10
Coriander	1.4 10 ⁵	570	2.7 10 ⁵	<10	2 10 ⁵	<10
Marjoram	4.9 10 ⁶	380	5 10 ⁴	<10	1.5 10 ³	<10
Oregano	2.6 10 ⁵	350	4.5 10 ³	<10	2 10 ³	<10
Parsley	2.2 10 ⁵	80	5.5 10 ³	<10	4 10 ²	<10

Industrial units



ARKOPHARMA: 400kg/h of medicinal plants



McCORMICK: 1300kg/h of black pepper



The smoothly vibrating transport system enables perfect homogeneity of treatment thanks to constant mixing of the particles with no breakage, even with the most fragile products.

REVTECH produces a range of **complete autonomous steam sterilization units between 100 kg/h and 2500 kg/h**. Each unit is supplied with all necessary auxiliary equipment such as boilers, cooling and filtration equipment, hoppers, feeders etc. and requires only an electrical connection and a water supply. Overall power consumption is **between 60 kW/Ton and 100 kW/Ton**. Each unit is completely assembled and tested in our French plant before being shipped to our customers.

Robust and efficient design means that **maintenance costs are negligible** when compared to competing technology. No complicated or dangerous operations are required to keep the unit running 24 hours per day 365 days per year.

Cleaning time is minimized to one hour for the complete line due to the absence of dead zones inside the system and of elements to be dismantled. The machine is easily cleaned using an automated CIP system.

DUCROS, the major French herb and spice distributor, **VREMYA**, the major Russian herb and spice distributor, **ARKOPHARMA**, the French leader in Europe for medicinal plants or **LIRA** the major Greek herb and spice distributor use complete steam sterilization systems designed and built by REVTECH.

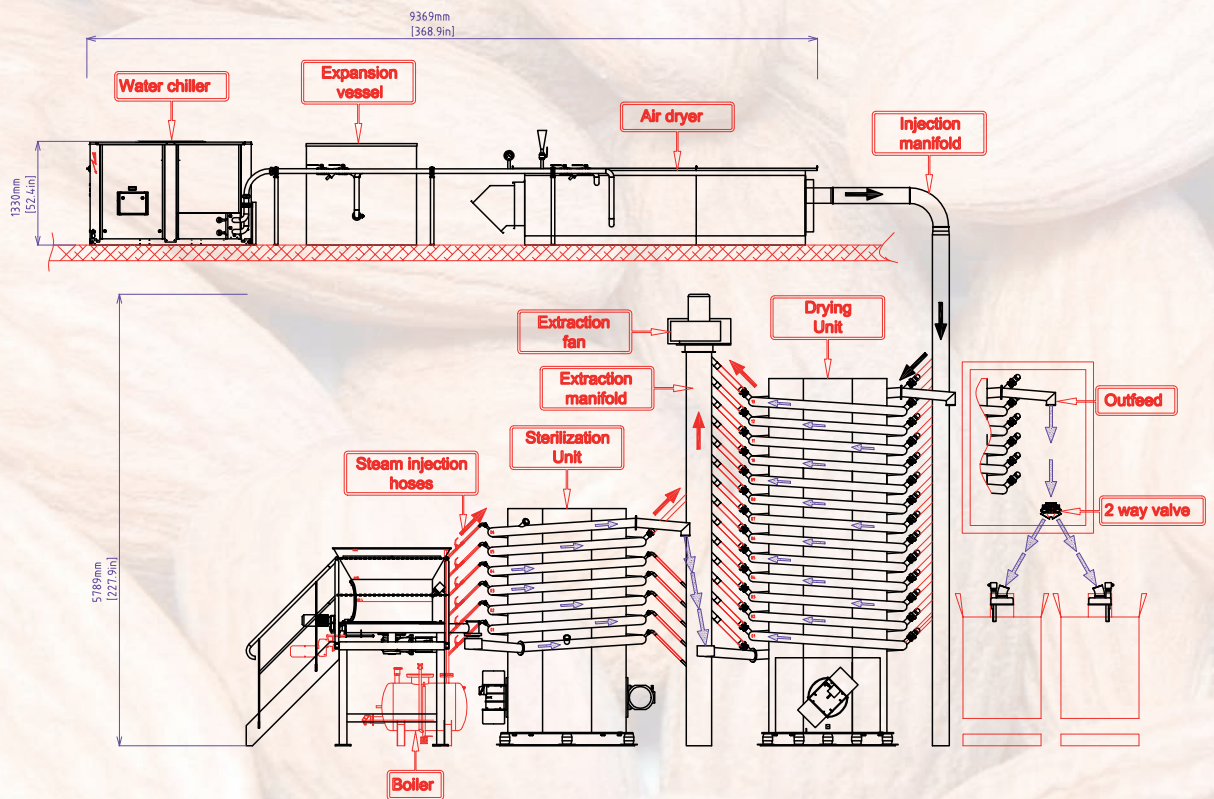
DUCROS, now a subsidiary of the **McCORMICK** group, made the ambitious gamble to invest in the innovative REVE process over seven years ago when concerns first arose about the future in Europe of processes involving radiation and the well-known disadvantages of autoclave systems such as significant leaching of flavours and browning effect. The industrial unit installed includes two REVE devices for the sterilization under superheated steam, and the drying and cooling to ambient temperature of a wide range of spices and aromatic herbs.

The drying and cooling section of the REVTECH system allows rapid and efficient stabilization when compared to competing technologies. Final moisture content is easily adjusted to the required level. Dry air is used at atmospheric pressure, eliminating variations due to climatic conditions, while the amount of drying required is significantly lower due to the small amounts of steam used for sterilization.



*LIRA industrial units:
500 kg/h of spices and herbs*

Process diagram for typical steam sterilization unit



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