



KERONE



MICROWAVES: TECHNOLOGY FOR FOOD SAFETY



In Association with SVCH-Technologii, Moscow (Russia)

ISO 9001-2008 | ISO 9001-2015 | EMS 14001 | OHSAS 18001

 **AGROFOOD**

Food Safety:

Winning solution to production And trade challenges

Consumers are increasingly concerned about food quality, hygiene and safety and given more and more importance to nutritional properties and all those characteristics making a product unique, different from the other ones.

Product quality and safety not only represented a critical factor for success and competitiveness but for also significant for the survival of companies and brands.

Ensuring food quality and safety, through technology and process innovations, allows the reduction of risks associated with food and represents a winning solution to production and trade challenges.

The uses of new process techniques and methodologies permits to:

- **Gain consumer confidence** by providing that food is produced in full safety and hygiene
- **Respect** the primary features of the products
- **Protect consumer health**

Healthy and Safe Products: From Field to Table

Food habits are changing. Nowadays, more and more consumers care about what arrives on their tables. Ensuring high level of safety and quality is also the main **strategy and objective** if companies involved in the agri-food industry.

Biological and microbiological **contamination** is one of the biggest threats for our food products. When purchasing a product, the “aware” consumer demands not only guarantees of safety and hygiene, but also of nutritional and organoleptic sensory characteristics preservation.

Food should preserve and exalt all features of soil, be healthy and without contaminants deriving from chemical treatments.

Research of quality, **implementation of coherent farm-to-table control measures**, constant focus on ethical issues: these are the main efforts of small and medium companies involved in the increasingly safe distribution of organic foods.



The attention to quality pushes consumers to choose healthy and nutritive products free from harmful residues

Between Quality and Innovation

In recent times **organic farming** has aroused considerable interest in the most careful and exigent consumers.

Moreover, companies are also interested in **developing techniques that, despite complying with organic food production standards, permit to reduce production costs.**





The **MISYA** method: an effective and safe answer from scientific research

In order to meet the needs of a market demanding more and more process innovations, **EMitech**, Italian company involved in the research of non-invasive disinfestations techniques in several fields as well as the agri-food sector, has developed the **MISYA method**.

Microwave energy: the clean alternative

The **MISYA method** opens a new era in the food industry applications and organic farming methodologies.

By exploiting the effect of microwaves thermalization, this method allows to disinfest food of vegetable origin like legumes, cereals and dried fruits through a **physical method not affecting the characteristics of products and by respecting the organic agriculture methods**.



EFFECTIVE



The method is effective against biological contaminants in all life stages.

SAFE



No risks of exposure to electromagnetic pollution.

CHEAP



All the absorbed energy is rapidly converted into heat.

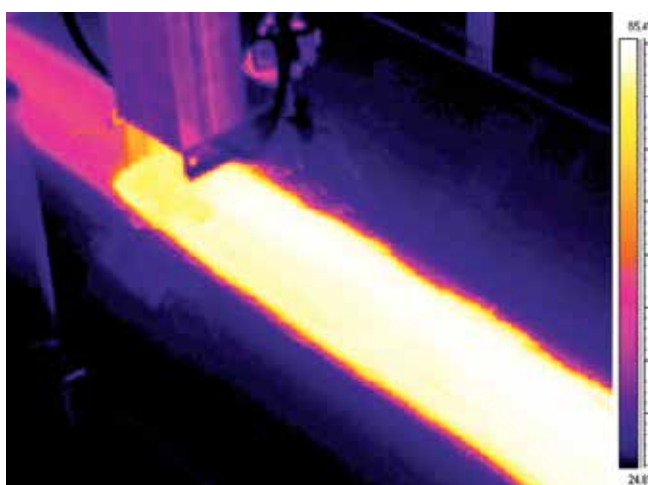
ECO-FRIENDLY



The treatment does not produce any polluting substances.

The disinfestation treatment by microwaves is effective and safe:

it has no significant impacts on the environment and does not leave noxious and dangerous residues in the treated products.



Thermo image recorded during a laboratory test; it shows the temperature distribution on the surface of the treated product coming out from the equipment.



Isotropic sensor for measurement of the electromagnetic field in the area surrounding the device.

MISYA is a physical method that exploits thermalization principle of electromagnetic energy for the dielectric heating of products. Its application requires the construction of apposite continuous devices composed of a shielded reverberation chamber endowed with a system for optimizing the electromagnetic field distribution into the treatment area.

Through this bland thermal treatment, pests reach lethal temperature in the range 57 to 60°C and are killed in every life stage, that is egg, larva, pupa and adult. Physical, chemical and sensory analysis have confirmed that **the microwave treatment, by means of MISYA, does not alter the qualitative characteristics of product which keep maintaining their chemical and organoleptic structure.**

Equipments can have a variable installed power according to the desired throughput. The conveying system is also appositely chosen according to the product type to be treated.

Quality, research and technology for innovation



Germinability trials on chickpea seed
There are no differences between treated and untreated seeds

Research and development of innovative processes are the key factors to enhance the competitiveness of a company.

EMitech considers research a mainstay. Surveys and studies conducted for several years in collaboration with important research centers have been constantly accompanied by lab tests that EMitech has carried out to determine and widen the knowledge of the MISYA method effects on various kinds of products. The method allows a rapid heating of pests infesting food without altering the product's specific properties: as an example, in order to emphasize the absence of significant differences between untreated legumes and the ones treated with the MISYA method.

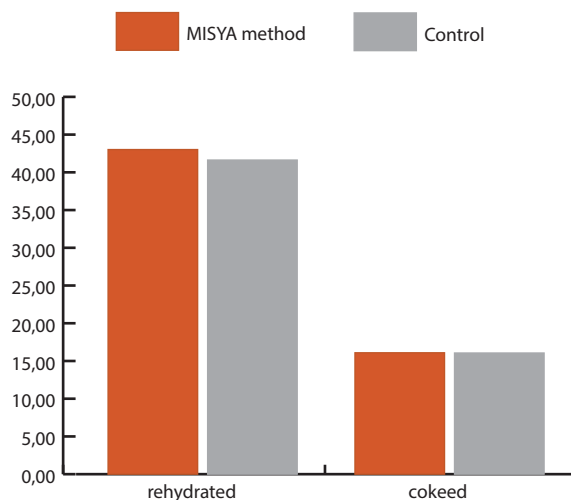
	MISYA method	control	MISYA method	control	MISYA method	control
epidermis of dry legume	53.14	53.99	6.03	6.33	12.34	13.63
epidermis of rehydrated legume	52.91	52.86	3.17	3.71	17.91	18.46
epidermis of cooked legume	50.92	50.59	3.33	2.57	15.66	16.28
rehydrated water	30.80	30.87	0.19	0.23	-0.10	-0.17
cooked water	36.77	36.75	0.18	0.19	0.73	0.88

Interesting outcomes have been found in terms of:

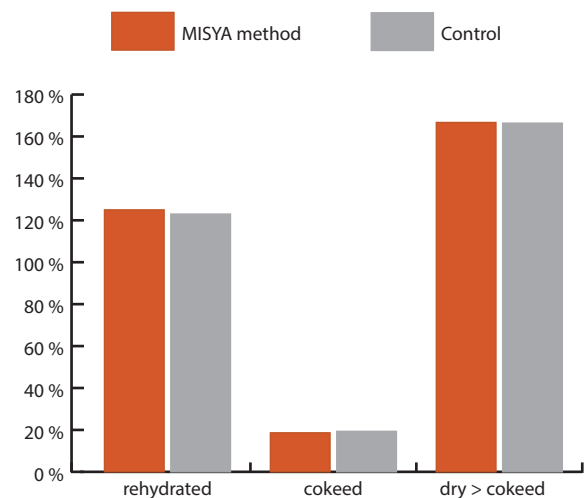
- Color of epidermis (from dry to rehydrated and cooked legumes)
- Hardness of integument after rehydration and cooking
- Weight increase after rehydration and cooking
- Rehydration and cooking water

Colorimetric test

The average values of epidermis and water of rehydration and of cooking remains almost unchanged



Tests on the integument hardness of legumes subject to rehydration and cooking. Results do not show any significant differences



Tests on the weight increase of legume samples subject to rehydration and cooking and to the passage from dry to cooked. Results do not show any significant differences.

EMitech is a leading company in the activities of research, design and construction of multimode reverberation chambers and microwave devices for industrial uses.

Thanks to a multidisciplinary know-how, the company owns several patents in different application fields. Its branches of business bear the name of these sectors:

✿ **ART**

✿ **FOOD**

✿ **PACKAGING**

✿ **ENVIRONMENT**

Attention and constant dialogue are the pillars of EMitech's philosophy aiming to develop new applications in those fields where alternative energy sources, like the electromagnetic one, can be used.



Certified company



ELECTRO MAGNETIC innovative technologies

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MISYA AH-36-T



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AGROFOOD

MISYA AH-36-T

Technology and innovation at your service

MISYA is a non-invasive disinfestations method using electromagnetic energy for the postharvest treatment of legumes and cereals. It is the innovative and eco-friendly solution replacing chemical treatments. The key principle is the exploitation of electromagnetic energy thermalization effects into proper reverberation chambers. The main characteristics of the model **MISYA AH-36-T** are:

- ✦ **Helicoidal conveyor system** suitable for seeds and grains. The mixing obtained during the conveyance helps the homogeneity of the heating ensuring an effective treatments;
- ✦ **PLC** for the automatic control and management of the process;
- ✦ **Sensors** to verify the well-functioning of the disinfestations process;
- ✦ **Data logger** to collect data during the production cycles.



The product conveyance occurs by means of an helicoidal system

Steel cover for microwave generators protection against drop, dump and dust

Forced air cooling device for the microwave generators cover



The device is endowed with six microwave generators, directly connected to the treatment chamber



Temperatures of the product, coming out from the treatment chamber, are constantly monitored by means of infra-red sensors

TECHNICAL CHARACTERISTICS

Supply voltage	380 V three-phase – 50Hz
Primary auxiliary circuit voltage	240 V – 50 Hz
Secondary auxiliary circuit voltage	24V _{dc} – 6 A
Maximum RF power	36 kW
Absorbed electrical power	72 kW
Throughput per Hour	2-2,5 t/h*
Pneumatic circuits operation pressure	Max 6 bar
Water flow rate of the microwave generators cooling circuit	25 lt/min at 25°C
Weight	1.300 Kg

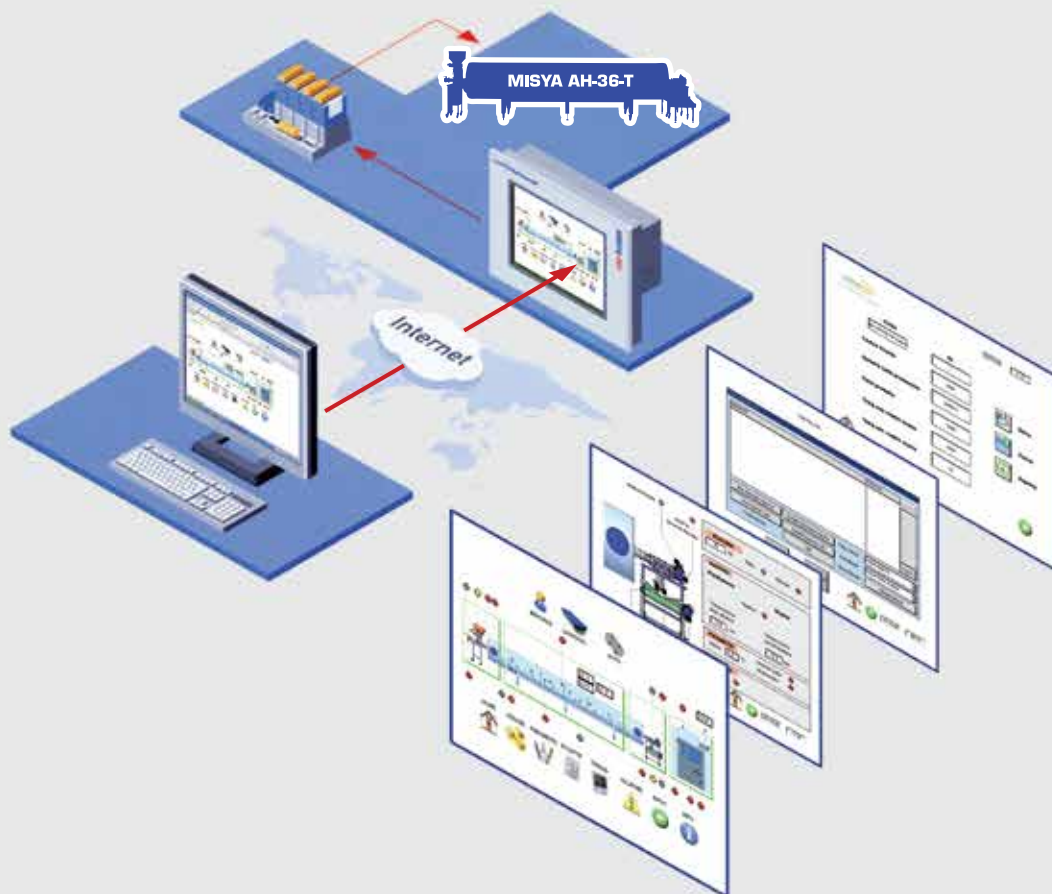
1800 mm

1750 mm

9700 mm



Lateral view of the device composed of loading unit, treatment unit and uploading unit. It is design to operate on a stand-alone basis or in line with preexisting devices. Cleaning operations are facilitated thanks to the rapid access to all components.



MISYA AH-36-T is endowed with a web-based interface. Unlike conventional control panels, this interface allows the visualization of management process parameters on the PC by using a simple web browser (Internet Explorer, Mozilla, Opera, safari, etc.) Thanks to it, users do not need to recur to proprietary control panels, to install any special software and to purchase costly licenses. The access is allowed through 4

levels of authentication (administrator, production manager, worker and maintenance worker).

The interface enables the following operations:

- **Setting of the process parameters** (temperature, microwave generators power, initial speed, etc.)
- **Recording and uploading of treatment schedules** according to specific lots and characteristics of the products to be treated (initial

temperature, humidity, density)

- **Selection of one equipment's** unit in order to check the state of the sensors and/or relative analogical values.
- **Visualization of the online trend** of process parameters (temperature, flow rate, etc.)
- **Monitoring of the equipment state** and alarms and/or anomalies.



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