













# STALAM

Radio Frequency Equipment

Tempering and  
Defrosting

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## Company Profile

Established in 1978, STALAM is the world leader in the development, design and manufacture of equipment where capacitive electromagnetic fields at I.S.M. metric frequencies (RF fields) are exploited for a variety of thermal processing and drying applications on raw materials, intermediate and finished industrial products.

As a member of AEI (Italian Electronic and Electro-technical Association) STALAM cooperates actively with prestigious universities and research institutes for the development of the RF technology both as to generation techniques and to technological applications.

STALAM also co-operates with other leading machinery manufacturers for the development of innovative technologies and for the supply of "turn key" automated and integrated processing lines.

Presently, more than 2600 STALAM Radio Frequency machines are in operation in the world, with rated power values ranging from 3 to 450 kW; from the simple, manually operated machine, to the fully automated line complete with computerised control and supervision systems.

Exporting over 90% of its production to the five continents, STALAM provides professional and prompt commercial and technical assistance in all the relevant areas throughout the world.



2600+  
machines  
in operation



70+  
countries  
global presence

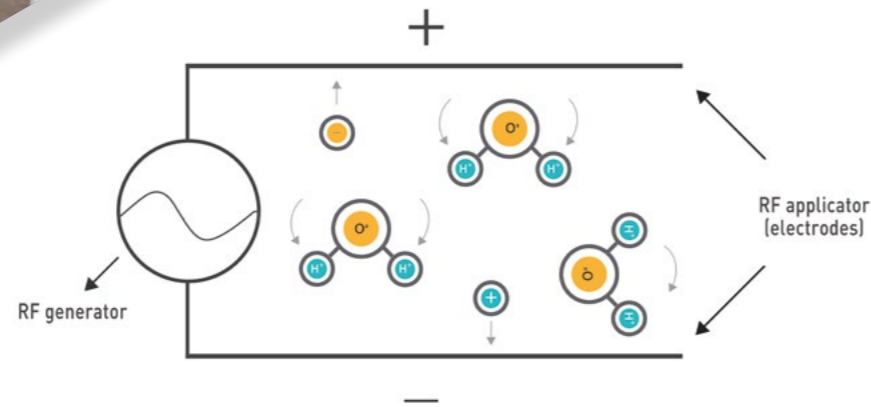
**STALAM**  
Radio Frequency Equipment

# RF Technology

## How it works?

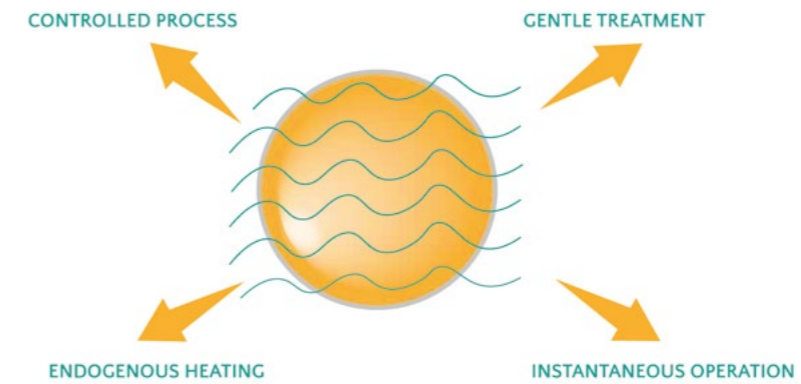
Radio Frequency dielectric heating is a drying and thermal processing technology based on the dissipation of electromagnetic energy within the product. Unlike conventional techniques, where heat is transferred to the product through its surface from an external heat source by conduction, convection or irradiation, a Radio Frequency field generates heat directly inside the entire product mass - that is why the related mechanism is called "endogenous" or "volumetric". The heat generation is instantaneous and allows a rapid, uniform and perfectly controlled process.

The RF heating mechanism, excluding the materials (like metals) which are good conductors of electric current, is related to the so called "dielectric losses". Dielectric losses are caused by the vibration and rotation of polar or polarised molecules and by the polarisation and translation movement of ionic particles inside the material, induced by the quick (several million times per second) polarity reversal of the RF field. This can be interpreted as if the electromagnetic field is absorbed and converted into thermal energy by the effect of the rapid movement of polar(ised) molecules and ions.



Water molecules are highly polar, more than all substrates in which water can normally be found, and many ionic species are usually dissolved in water.

Therefore, RF electromagnetic fields can heat up very quickly materials containing water. In particular, Radio Frequency has the ability to evaporate water rapidly, efficiently and selectively from many substrates, which enables their users to obtain the maximum benefits in terms of product quality, reduced operating costs, high flexibility and reliability.





# COLDWAVE+

## Tempering and Defrosting



### Defrost in minutes, improve quality and yield

STALAM has developed COLDWAVE+, a rapid in-line defrosting equipment based on the Radio Frequency technology that allows a significant reduction of drip losses and minimises product deterioration due to bacterial growth. This fast, uniform and controlled method offers great flexibility in production scheduling and is the ideal solution for many tempering, softening and defrosting processes.

#### How it works?

The product is placed on the machine's conveyor belt and is transferred continuously through the RF unit (tunnel) passing between upper and lower metal plates. These plates (also called electrodes) form an electrical capacitor and the product in between becomes the dielectric element of that capacitor.

The electrode plates are connected to a Radio Frequency generator oscillating at a frequency of 27 million cycles per second.

When the RF generator applies high frequency alternating voltage between the capacitor plates, the dipolar water molecules of the frozen product will vibrate and rotate attempting to align themselves according to the fast changing opposite plates polarities.

This phenomenon causes intermolecular friction, which will in turn generate heat rapidly and uniformly within the whole product mass regardless of its size, weight, shape and thermal conductivity.

The amount of heat generated inside the product and the defrosting time are accurately controlled through the voltage applied on the electrode plates and the speed of the conveyor belt.



# Benefits



## Defrosting in minutes

Defrosting is achieved in minutes rather than hours or days, even for large product blocks and, if necessary, directly inside packaging used for storage or retail distribution (carton boxes, polyethylene liner/bags, plastic crates, etc.).

## No product degradation

The process speed and uniformity minimise the risk of product degradation (deterioration of sensorial, chemical and physical characteristics, bacteria growth, etc.), thus helping to preserve at its best the product quality.

## Higher product yield

Tempering to  $-3^{\circ}/-1^{\circ}$  can be achieved with no drip loss, that means eliminating completely the weight losses (up to 8%) caused by conventional defrosting methods. The improved yield brings immediate economic benefits that allow for an RF equipment pay-back period as short as 6 to 12 months.

## Uniform and controlled treatment

The product can be obtained at the correct temperature needed for the next process. Also, weather and external ambient conditions do not affect the treatment, so that it can be controlled accurately and consistently.

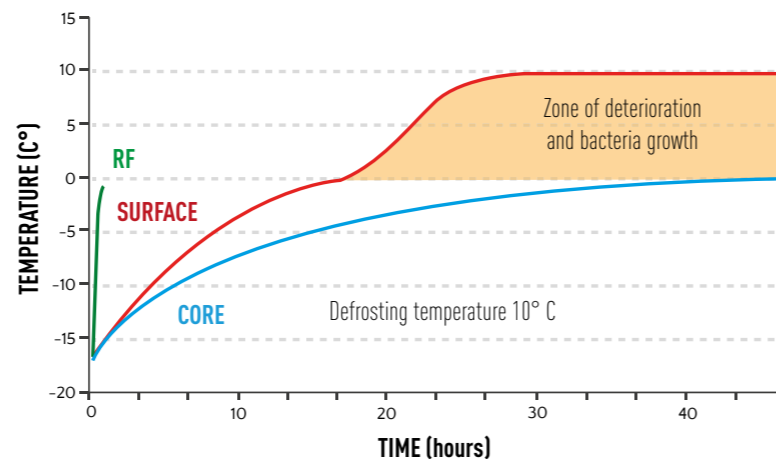
## Less floor space, reduced process cost

Radio Frequency equipment requires much less floor space compared to the traditional, large defrosting rooms or equipment; defrosting costs are also reduced drastically, thanks to the absence of energy losses to the ambient.

## In-line process

Thanks to the high process speed, Radio Frequency defrosting can be carried out continuously, with significant logistic advantages in product handling and production scheduling. The production can be organised according to "just-in-time" criteria - a great advantage in the case of sudden orders, last-minute changes in the order under processing, etc.

Up to 8% saving in weight



RF vs. conventional defrosting of a 12 cm thick block of deboned beef meat.





# Meat



COLDWAVE+ ensures the rapid and uniform tempering of large meat blocks or individual pieces (cuts), improving the product yield by minimising the drip loss.

The product can be obtained at the correct temperature needed for the next process: grinding, cutting, slicing, portioning, forming, dicing, mincing, flaking, tumbling, marinating, deboning, etc.

RF defrosting is highly efficient on all kinds of meat, regardless of its shape, size and fat content.

- Individual pieces (cuts) and blocks
- Thin and thick products
- "Naked" and packaged products (carton boxes, polyethylene liner/bags, plastic crates, etc.)
- Bone-in and boneless cuts
- Lean and fat meat
- Squared and irregular shapes

Beef tongue

Pork cheeks

Pork trimming 20% fat

Bone-in chicken legs

Chicken breast

Pork silverside

Boneless lamb loins

Beef chunks

Beef muscles

Turkey breast



# Fish and seafood

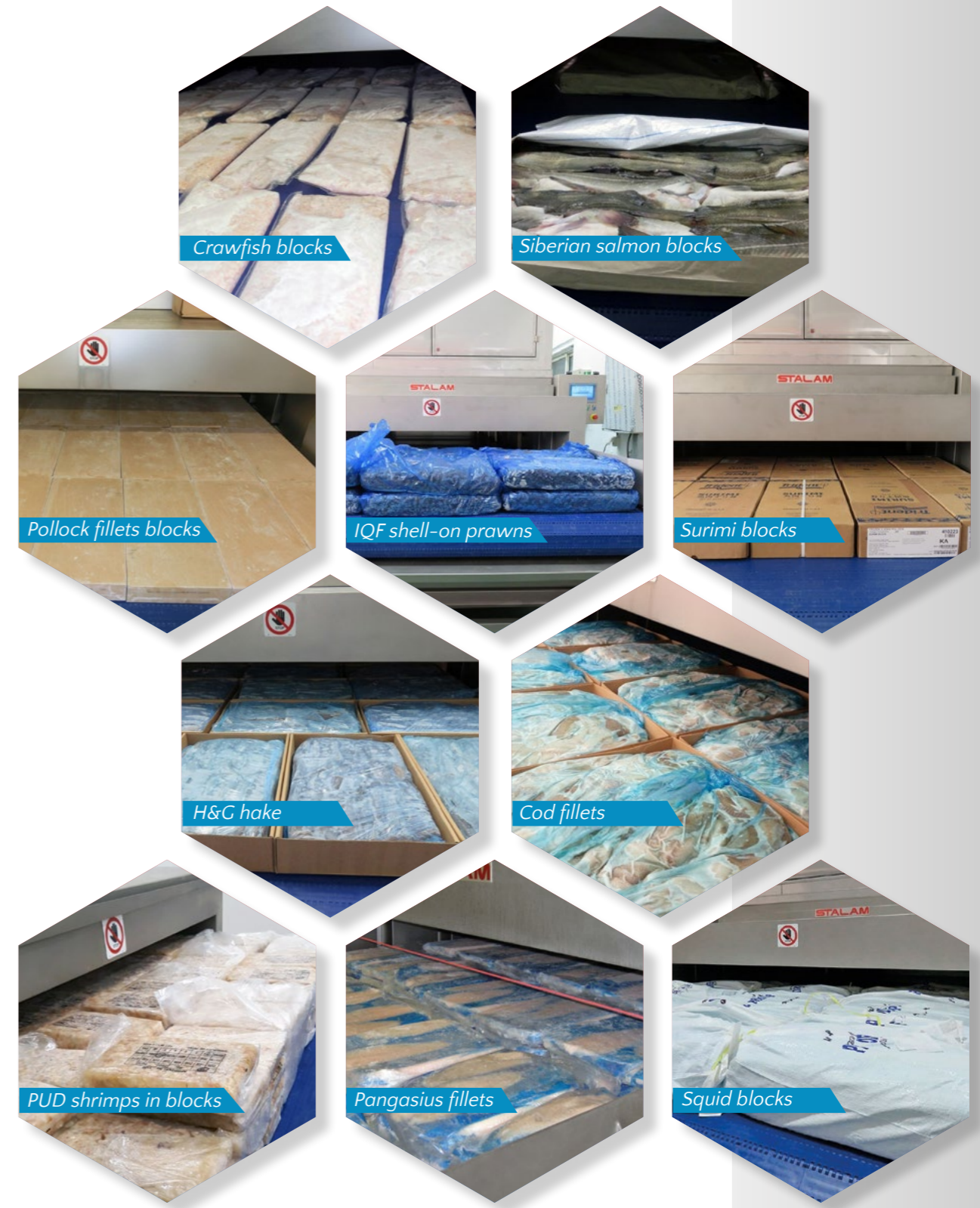


Thanks to the rapid and gentle Radio Frequency tempering process, the physical, biological and nutritional integrity of fish and seafood is preserved at best, thus ensuring the product freshness and healthiness.

The product can be obtained at the correct temperature needed for the next process: re-packing, sawing, cutting, portioning, grinding, forming, gutting, cooking, marinating, supermarket chains supply, etc.

It can be applied to all kinds of fish, seafood, shellfish, molluscs etc.

- *IQF and blocks*
- *Whole fish, fillets, portions and minced fish*
- *Flat and round fish*
- *For further processing and for retail*
- *With and without packaging*










# Vegetables, fruit and more



Radio Frequency tempering minimises the drip loss of frozen fruits and vegetables, which therefore retain their texture, flavour and freshness.

The product can be obtained at the correct temperature needed for the next process or immediate use.

- 
*All kinds of vegetables, fruits, butter, margarine, liquid egg*
- 
*Ready meals for catering and retail*
- 
*Fruit purees, juices and vegetable soups*
- 
*IQF and blocks*
- 
*Bulk and packaged products*



IQF strawberries



Carrot juice



Pineapple juice



Chives



Margarine blocks



Cooked vegetables mix



Spinach blocks



IQF zucchini dice



Edamame



Ready meals

# Technical data

## Technical specifications

Technology	Radio Frequency at 27,12 MHz
IP Protection	IP65 with outer protection boxes of the RF generator made of insulating sandwich-type panels with sheeting and frame in AISI 304 stainless steel
Structure	AISI 304 stainless steel submitted to anti-corrosion treatments (passivation, pickling) and shot-peening finish
Conveyor belt	Certified food-grade rigid polypropylene modules (for packaged products) or solid surface polymer (for "naked" products)
Washing system	Built-in conveyor belt & tunnel rinsing facilities (patented) and full internal access for cleaning through the multiple side panel doors
PLC	PLC control system for multiple product recipes

## Models available

Model	RF generator cooling system	Dimensions LxWxH (m)	Belt width (m)	Additional module length (m)	Throughput* (kg/h)	
					to -6/-4°C	to -3/-1°C
7 kW Easy	air	4,1/5,1 x 1,1 x 2,6	0,6	not available	250-300	150-200
7 kW Coldvawe+	air	4,2/5,0 x 1,4 x 2,6	0,6	not available	250-300	150-200
20 kW Coldvawe+	air	5,7 x 2,0 x 3,6	1,4	not available	800-1000	400-600
40 kW Coldvawe+	air or water	7,7 x 2,0 x 3,7	1,4	not available	1500-2000	800-1200
85 kW Coldvawe+	water	9,2 x 2,4 x 3,7	1,8	5,0	3000-4000	1500-2000
105 kW Coldvawe+	water	9,2 x 2,4 x 3,8	1,8	5,0	3000-5000	1500-3000

\*90% vl beef trimming blocks 55x35x18 cm, 27 kg at -18°C

\* Production capacities may vary depending on the type and weight of product to be defrosted and the final temperature required. Multiple modules can be combined to increase the production capacity even at a later stage as production requirements increase with business growth.



Conveyor belt washing system



Washing system drainage



## After-sale services

Supplying and successfully installing a Radio Frequency equipment is, at the same time, the result and the starting point of several pre- and after-sale activities. STALAM strives to establish strong, trustworthy, mutually rewarding and long-term business relationships with its prospect and existing customers by providing them the best possible technical assistance, aimed first to prove the outstanding benefits of the RF technology and then to make sure that the equipment provided will maintain its performance and profitability in the years to come.

### Spare parts available in stock

Availability in stock of at least 80% of standard mechanical and electrical components of the RF equipment manufactured in the last 20 years.

### Fast shipping

Shipment of spare parts available in stock at the latest within 24 hours from the order (generally, orders confirmed before h. 12:00 noon time are dispatched through selected courier services on the same day before h. 16:00). Spare parts not available in stock are manufactured in-house or procured in the shortest possible time.

### On-call assistance

On-call assistance through a dedicated phone line, or via fax / E-mail, by an English speaking trouble-shooting engineer available full time during office working hours.

### Prompt on-site assistance

On-site mechanical, electrical & software assistance by servicing engineers departing from STALAM or its overseas servicing centres within 12-48 hours for interventions within Europe and 48-72 hours for interventions outside Europe.





## Test & Demo facilities



The STALAM testing lab is an integral part of our R&D and engineering departments. Through testing and analysis of the results, our experts can study in details the characteristics and behaviour of a product submitted to the Radio Frequency field, thus assessing the technical and economic feasibility of drying and thermal processes on specific substrates, based on customers' requirements. In the same way, our engineers can identify the best process parameters and the technical specifications of the most suitable RF equipment to perform such processes.

STALAM's R&D lab is equipped with a wide range of pilot machines available for product testing and demos. Such tests and demos can be performed in our company or at our customers' facilities as appropriate. Some of these machines are also available for rental for product and process development purposes or systematic testing sessions. Our highly qualified technical team will assist customers to develop better, more profitable and innovative process solutions.



## Contacts

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