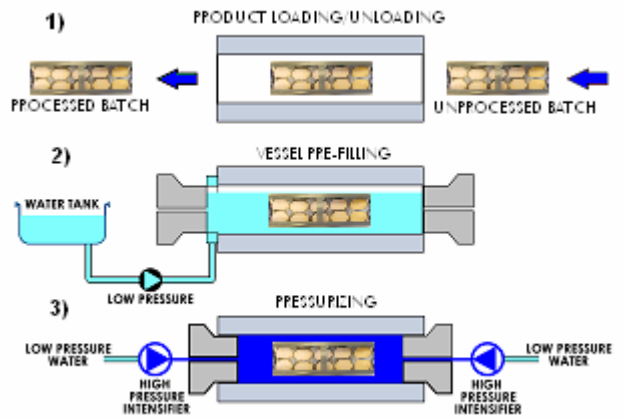


HIGH PRESSURE PROCESSING (HPP): INNOVATION FOR FOOD INDUSTRY

HIGH PRESSURE PROCESSING (HPP) is a non-thermal pasteurization method for food processing.

Food products are introduced to a high pressure vessel in their final flexible package, and subjected to a high level of hydrostatic pressure (isostatic pressure transmitted by water). Product shape and integrity remains unchanged.



HPP is an all natural, clean, environmentally friendly technology.

HPP MAKES THE DIFFERENCE

- Wide range of HPP processed products: meat products, fruit juices & smoothies, seafood, dairy products, RTE meals...
- Reduces drastically the overall microbiological contaminant flora and pathogens (*Listeria*, *E.coli*, *Salmonella*, etc): greater food safety
- Extends shelf life keeping sensorial and nutritional properties of products
- No need for additives and preservatives
- Innovative products can be launched
- Texture of food can be modified and the performance of current processes can be improved

NC HYPERBARIC: INDUSTRIALIZING HIGH PRESSURE

NC Hyperbaric designs, manufactures and markets industrial HPP equipment for the food industry. It is the World leader in High Pressure Industrial equipment for food since 2005.

NC Hyperbaric equipment are already operating in four continents (Europe, North America, Asia and Oceania) in meat, seafood, vegetable and dairy product processing plants.

A RANGE THAT MEETS ALL YOUR NEEDS



MODEL	Vessel Diameter (mm / inches)	Useful Volume (litres / Am. Gallons)	Production capacity
Wave 6000/55	200 mm / 7.9"	55 l / 14.5 gal	170 Kg – 374 lbs/h*
Wave 6000/135	300 mm / 11.8"	135 l / 36gal	400 Kg – 880 lbs/h*
Wave 6000/300	300 mm / 11.8"	300 l / 79 gal	850 Kg – 1870 lbs/h*
Wave 6000/300T	2 x 300 mm / 2 x 11.8"	600 l / 158 gal	2000 Kg – 4400 lbs/h*
Wave 6000/420	380 mm / 15 "	420 l / 111 gal	1900 Kg – 4200 lbs/h*

*Calculations based on a 50% filling factor and a processing time of 3 min at 6,000 bar / 87,000p.s.i.
* Calculations based on a 63.5% filling factor and a processing time of 3 min at 6,000 bar / 87,000 p.s.i.

- Horizontal design
- Different volumes & capacities
- Automatic in-line processing
- Safe, ergonomic and reliable
- Easy integration in production line
- Specially designed for food industry
- Clean, environmentally friendly

HPP IN MEAT PRODUCTS

SAFETY, INNOVATION AND EXPORT DEVELOPMENT



A wide range of meat products can be processed by HPP: sliced ham, turkey or chicken cuts, ready-to-eat products, whole pieces of cured ham ... HPP extends shelf-life keeping freshness because it takes place at ambient or chilled temperature.

With HPP new, convenient, ready-to-eat meat products with a longer shelf-life and higher sensorial qualities can be developed.

New, safe, natural, dietetic products – such as low salt, no preservative, low fat products – can be marketed and exports can be expanded to the most quality demanding countries (USA, Japan...).

A 6 minute process at up to 600 MPa of whole pieces of dry cured ham extends shelf-life up to 120 days. During this period, the organoleptic properties are maintained without production of gas, sour smell or off flavours. In high pressure processed samples, the population of *Enterobacteriaceae* and *E. coli* were below the detection levels.

There was no presence of *Listeria monocytogenes* during all shelf life period.

Note: Technical data regarding shelf life are for guidance only and depend on the product



HPP cured ham

SOME EXAMPLES OF HPP PRODUCTS IN THE MARKET

Country (year)	Product	Process	Packaging	Shelf-life	Achievements of high pressure and comments
Spain (1998)	Delicatessen : Cooked sliced ham and turkey, "tapas" (pork and poultry cuts), "pinchitos"...	400 MPa / 58,000 psi 10 min	Darfresh vacuum- packed and gas-packed	60 days	Sanitization without colour and taste modifications.
USA (2001)	Cooked sliced ham, chicken, turkey, beef and Parma ham	586 MPa / 85,000 psi	Vacuum- packed	90 days	Sanitization without colour and taste modifications. <i>Listeria</i> destruction.
USA (2001)	Poultry ready-to-eat products	586 MPa / 85,000 psi	Gas-packed plastic pouches	60 days	Sanitization without colour and taste modifications. <i>Listeria</i> destruction.
USA (2002)	Fajitas kits with spicy sliced precooked chicken and beef	595 MPa / 86,300 psi	Vacuum- packed	21 days	Sanitization without colour and taste modifications. <i>Listeria</i> destruction. The Fajitas kit is made of HPP meat but also HPP onions, peppers and guacamole..
Spain (2002)	Thick sliced ham, chicken and turkey products. Cooked and Serrano ham, Chorizo	500 Mpa / 72,500 psi	Vacuum- packed Darfresh	60 days for cooked products	Sanitization without colour and taste modifications. <i>Listeria</i> destruction. Increase of shelf-life and additives reduction.
Italy (2003)	Parma ham (Prosciutto)	595 MPa / 86,300 psi	Vacuum - packed	60 days	Sanitization without colour and taste modifications. <i>Listeria</i> destruction. Increase of shelf-life. Products for USA and Japan exports.
Japan (2005)	Nitrate-free cooked pork products: ham, sausages and bacon	595 MPa / 86,300 psi	Vacuum - packed	30 days	Sanitization. Increase of shelf-life.
Germany (2005)	Smoked German ham : whole, sliced and diced products	595 MPa / 86,300 psi	Modified atmosphere	60 days	Sanitization. <i>Listeria</i> destruction. Products for USA export.
USA (2006)	"Natural", minimally processed cooked range: turkey, pork	586 MPa / 85,000 psi	Resealable vacuum pouch	120 days	Natural appeal, no artificial ingredients, long shelf-life
Canada (2006)	RTE complete meals: chicken or beef plus rice/pasta/vegetables	586 Mpa / 85,000 psi	Vacuum skin pack	60 days	Fresh appearance, complete meal, reduction of additives, long shelf-life
USA (2007)	Roasted chicken: whole birds, breasts, thighs, drumsticks	595 MPa / 86,300 psi	Vacuum packed	50 days	Natural range, long shelf-life
USA (2007)	Poultry products	595 MPa / 86,300 psi	Modified atmosphere	60 days	Natural, clean label, long shelf-life
Spain (2007)	Sliced cured ham	595 MPa / 86,300 psi	Skin pack	35 days	Storage at room temperature, out of the fridge