

## Fruit & vegetable products

**HIGH PRESSURE PROCESSING (HPP)** is a **non-thermal pasteurization** process able to keep fresh attributes of fruit and vegetable products.

Freshly processed fruit and vegetable products are introduced into a high pressure vessel in **their final flexible package**, and subjected to a high level of hydrostatic pressure (isostatic pressure transmitted by water). **Shape and integrity remains unchanged because pressure is identical on every part of the product.**

HPP is an all natural, clean, environmentally friendly technology. HPP machines only require electricity and water, which is recycled.

### Puree, coulis & sauces

HPP is the alternative to heat processing for fruit & vegetable puree, coulis and sauces. It gets a significant shelf life extension, keeping fresh and home-made taste.

One of the most successful commercial HPP application nowadays is definitely preservative-free guacamole (avocado puree with spices) because the process maintains avocado flavour, texture and green colour without sacrificing food safety or shelf life (up to 6 weeks under chilled conditions).



### Ready to eat vegetable meals

HPP controls microbial safety in ready-to eat cooked vegetable meals allowing to develop clean label products. Shelf-life is increased, maintaining all the freshness of natural flavouring ingredients.



**Puree, coulis, sauces, juices, smoothies, chunks, slices, ready-to-eat products**, these are only some examples of a wide range of fruit and vegetable products that can be processed by HPP.

**Premium, natural and/or organic products** maintain **higher sensorial, functional and nutritional values** while improving **shelf life and food safety.**

The process is suitable for bottles, cups, pouches, trays...



### Juices and smoothies

HPP is the best option for keeping fresh flavour of juices and smoothies. This non-thermal process keeps original fruit/vegetable taste and colour, allowing the creation of the highest quality premium range. The real taste of freshly squeezed juice!



### Chunks and slices

With HPP, new convenient pieces and slices with a longer shelflife and higher sensorial qualities can be launched. Pressure can pasteurize with the same efficiency fruit and vegetable halves.

## Effects and benefits

### Elimination of micro-organisms

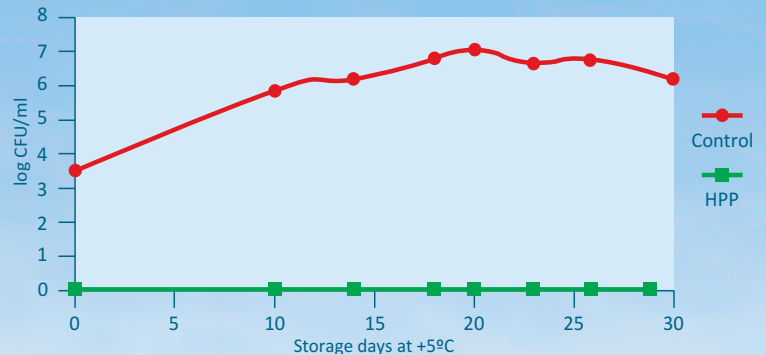
High pressure, between 400 MPa/ 58,000 psi and 600 MPa/ 87,000 psi from 1 to 5 minutes, reduces several logs of spoiling micro-organisms (yeasts, moulds, lactic acid bacteria, psychrotrophic bacteria) and pathogens (*E.coli*, *Listeria*, *Salmonella*, *Cryptosporidium*...) in fruit and vegetable products.



### Shelf-life increase

Shelf-life is multiplied from 3 up to 10 times comparing with the same product without HPP, stored at same temperature. In any case, more than microbial shelf-life, sensorial quality is maintained much longer thanks to micro-organism destruction: no fermentative taste due to yeasts, moulds or lactic acid bacteria. **HPP products stay fresh much longer.**

Total microflora of orange juice control or pressure processed during 1 min at 500 MPa / 72,500 psi



### Functional / Organic foods and beverages

One of the main trends that is making HPP successful is the development of natural, organic, preservative-free, and functional products. HPP as a non-thermal and delicate post-packaging lethality intervention, allows development of **healthier food: rich in vitamins, anti-oxidants and thermosensitive antimutagenic components**, bringing a higher level of functionality to new products.

### HPP advantages

- Post packaging/bottling pasteurization process avoiding any recontamination: > **Secure products.**
- Effective in eliminating spoilage and pathogenic micro-organisms: > **Protect the brand.**
- No impact on sensory, nutritional and functional properties: > **Create organic or functional foods.**
- Increases shelf-life maintaining product freshness: > **Expand markets.**

### Some examples of HPP products in the market

Product type	Product	Country	Pathogens control	Shelf-life increase	Preservative-free	Organic	Functional	Shelf-stable
Juices & smoothies	Citrus juices	France	✓	✓	✓			
	Apple, plum, strawberry, pear juices	Italy	✓	✓	✓			
	Juices and smoothies	Northern Ireland	✓	✓	✓			
	Orange juice and smoothies	Spain	✓	✓	✓			
	Organic apple juices	Portugal	✓	✓	✓	✓		
	Smoothies and organic orange juice	Australia	✓	✓	✓	✓		
	Broccoli & apple, carrot juices	Czech Republic	✓	✓	✓		✓	
	Pomegranate juice	Australia	✓	✓	✓		✓	
	Juices & superfood smoothie	USA	✓	✓	✓	✓	✓	
Purees, coulis & sauces	Avocado pulp & guacamole	Mexico	✓	✓	✓			
	Guacamole regular & organic	USA	✓	✓	✓	✓		
	Mexican style tomato sauces	USA	✓	✓	✓			
	Tofu & dressings	USA	✓	✓	✓	✓		
	Hummus and salsas	USA	✓	✓	✓	✓		
	Fruit puree & coulis	Australia	✓	✓	✓			
	Apple & strawberry jams	Italy	✓	✓	✓			
	Blended apple fruit purees	Canada	✓	✓	✓	✓		✓
Cuts & slices	Avocado halves	Mexico	✓	✓	✓			
	Chopped onions	USA	✓	✓	✓			
Ready-to eat meals	Cooked, mixed vegetable meals	Spain	✓	✓				
	Ready-to eat rice & blend of cereals	Japan	✓	✓	✓			✓

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Natural Safety