BEVERAGE PROCESSING

Fruit Juice Processing

From the fruit's character to a carefully controlled beverage.



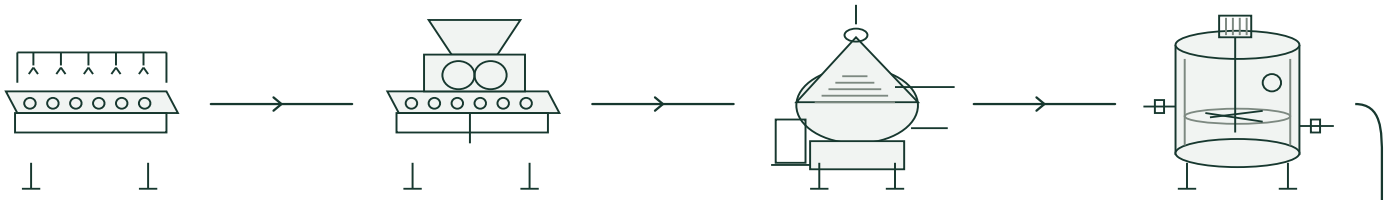
Fruit juice and raw ingredients.

Photo / Zlatko Duric

MATERIAL ROUTE / EQUIPMENT / BRANCHES

The fruit determines the processing route.

Sound fruit / extracted juice / selected finishing route



Reception and washing

Inspection; remove unsuitable fruit

Crop-specific extraction

Pressing or juice extraction

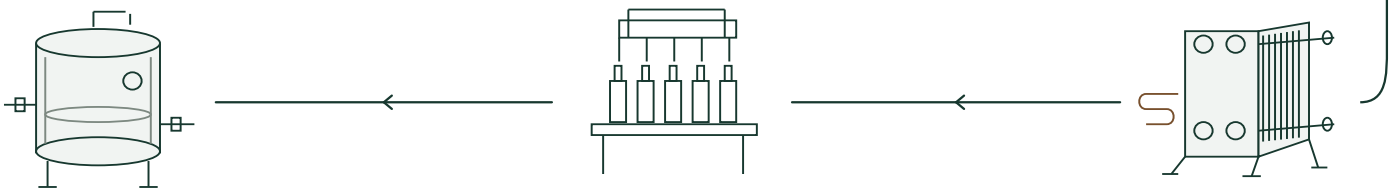
Pulp adjustment

Retain cloudy juice or clarify

Standardisation

Recipe, soluble solids and acidity

Main product route / follow the connected material path.



Storage and distribution

Chilled or ambient, as validated

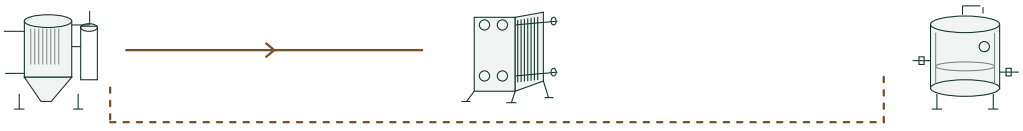
Hygienic filling

Treatment-compatible packaging

Thermal treatment

Validated holding and cooling

Concentrate branches before final packaging; NFC omits concentration.



Concentration

Vapour condensation

Concentrate storage

SonFlow Free Flow / pulp-bearing heat duty; sanitary exchanger / juice treatment; ABEL CM / qualified fruit-preparation transfer.

PROCESS STUDY / 01

Extraction follows the fruit

A juice line begins with reception, sorting and washing. Extraction then follows the fruit: citrus requires control of peel and oil carryover, while apples or other fruits use a different crushing and pressing route. Screening removes unwanted coarse material, but a cloudy juice may retain a deliberately defined pulp fraction. A clear-juice route can need additional enzymatic treatment and clarification. Pumps should be specified for each stream rather than for 'juice' in general. The unrefined mash, pulp-bearing juice and clarified liquid differ in particle size, abrasiveness and viscosity. Preserve those distinctions when choosing heating channels or planning a trial.



Fresh fruit: the starting material.

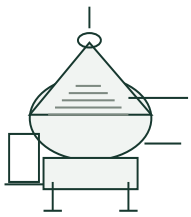
Photo / Mae Mu

PROCESS STUDY / 02

Separate quality targets from shelf life

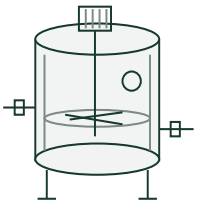
Blending sets the desired composition and soluble-solids level. Deaeration may reduce dissolved oxygen before thermal treatment, while the heat process must address the relevant product and microbiological target. Product acidity, pulp, viscosity and packaging route govern the validated treatment; there is no single pasteurisation condition for all juices. A suitable sanitary plate arrangement can serve a defined liquid duty, whereas particulate or high-viscosity streams may need wider channels or another exchanger technology. NFC juice and concentrate follow different routes. Concentration removes water and may include aroma recovery; reconstitution later restores the formulation using controlled water and ingredient quality.

OPERATION STUDY / SELECTED PROCESS DETAILS



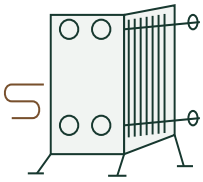
Pulp adjustment

Separate or retain suspended material to meet the product brief.



Standardization

Set the formulation and required juice characteristics.



Thermal treatment

Apply the validated heat treatment and required cooling.

Explanatory equipment studies / configuration, controls and treatment conditions follow the selected product route.

PROCESS STUDY / 03

Keep fruit structure when it matters



Juice filling at Noyan, Armenia.

Photo / Narek Avetisyan (Narek75) / CC BY-SA 4.0 / cropped & resized

Fruit preparations and juice are related but distinct products. Whole or large fruit pieces in a preparation need gentle transfer and a passage arrangement that preserves the intended structure. ABEL explicitly identifies CM for fruit preparations, making it a relevant candidate for this branch after confirming food-contact construction, valve passage and cleaning. Smooth juice can instead be assessed for an S-FP centrifugal duty. For concentrate, check the actual viscosity at transfer temperature and the tank outlet conditions. Hygienic filling and the selected storage regime complete the route. A transfer pump, condenser or plate exchanger does not provide the complete aseptic packaging system.

SONFLOW / FREE FLOW PLATE HEAT EXCHANGER

Allow room for pulp and fibres

A pulp-bearing stream demands a different channel assessment from a clear juice. SonFlow Free Flow is designed for media containing particles, fibres and higher viscosity. Define the size and concentration of solids before deciding whether the selected channel geometry suits the juice.

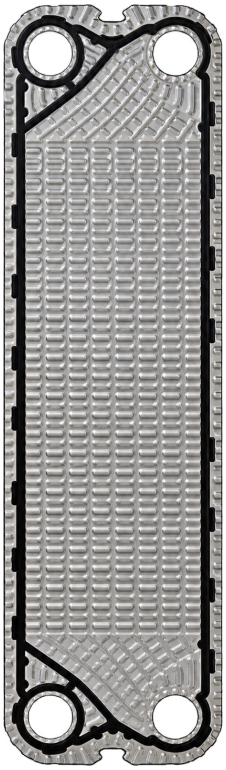
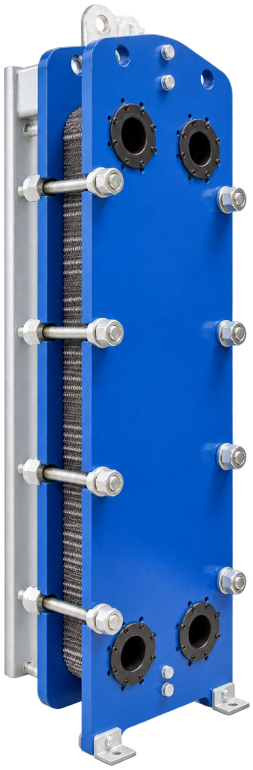


PLATE / FLOW PASSAGE



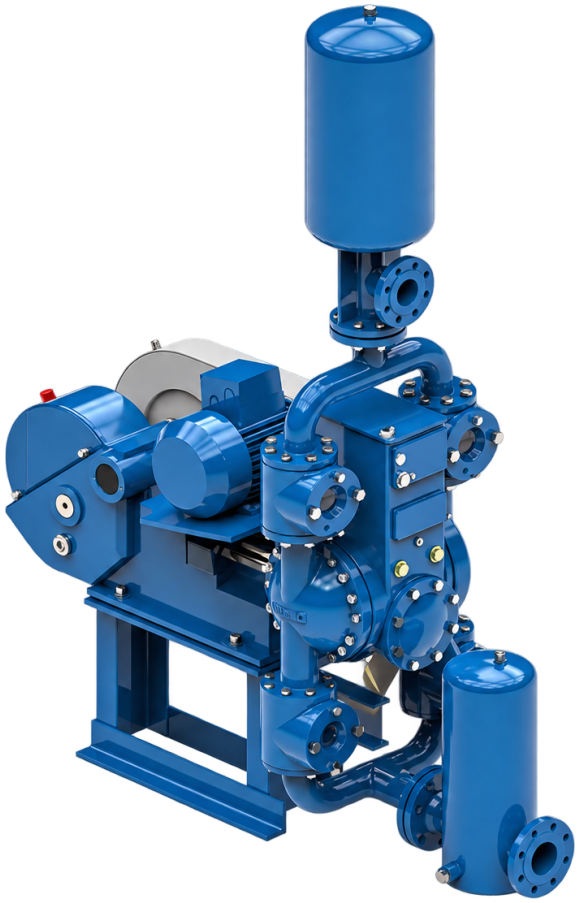
FRAME / COMPLETE UNIT

Free Flow is not a universal fruit-mash processor. Confirm particle passage, hygienic construction, fouling and cleaning for the specific medium.

EXPLORE SONFLOW /

ABEL / CM / FOOD-CONTACT CONFIGURATION

Keep the fruit in the preparation.



ABEL / CM COMPACT DIAPHRAGM FAMILY

A food-configured ABEL CM is a candidate for the fruit-preparation branch, particularly when the intended product retains substantial fruit pieces. Keep this duty separate from smooth juice transfer.

Confirm stainless wetted construction, valve passage, seals, cleanability and permissible pressure. The illustration shows the family; the supplied food configuration is specified for the duty.

EXPLORE ABEL /

SONFLOW / SANITARY PLATE HEAT EXCHANGER

Heat transfer for the actual juice

SonFlow identifies fresh juice, prepared juice and juice concentrate among its processed media. For a sanitary thermal duty, specify the juice at its operating temperature and concentration. Select the exchanger and cleaning regime around the product's properties rather than its commercial name.

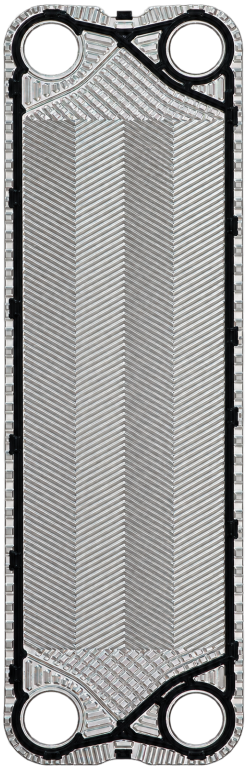


PLATE / FLOW PASSAGE



FRAME / COMPLETE UNIT

The validated thermal process also needs residence-time control and appropriate instrumentation. No generic pasteurization temperature is prescribed.

EXPLORE SONFLOW /

CONTROL THE PROCESS OUTCOME

Define cloud and flavour.

Specify soluble solids, acidity, pulp distribution, colour and aroma alongside microbiological acceptance. Oxygen exposure, thermal history and peel-derived components can alter flavour. Cloud stability and a clear appearance are different product targets; clarification should not remove a fraction that the recipe intends to retain. Verify cleaning across fruit changes, including allergens where relevant. Product quality must be checked after the full treatment and packaging sequence.



Packaged juice at the Noyan factory, Armenia.

Photo / Narek Avetisyan (Narek75) / CC BY-SA 4.0 / cropped & resized

VERIFY AT THE RELEASE POINT

Fruit is received, inspected and washed before size reduction or crop-specific extraction. Separation and clarification establish the required pulp content. Standardization and thermal treatment prepare the juice for filling. A concentrate route adds water removal and associated vapour handling; that branch is unnecessary for a single-strength product.

THE AUXILIARY ROUTE

Use each fraction intentionally.

Peel, pomace and separated pulp can enter different recovery routes if collection preserves their suitability. Evaporation and aroma recovery create separate condensate streams. Determine quality before returning any water to production. SonFlow Free Flow can be investigated for selected pulp-bearing heat duties; a condenser can serve a specified concentration vapour duty. Include cleaning water, reject fractions and concentrate storage energy in the balance.



CONDENSER / PLATE AND EXCHANGER STUDIES

Cloudy or clear juice; NFC or concentrate; and fruit preparations are distinct branches. Each has a different thermal, transfer and finishing specification.

EXPLORE THE RELATED EQUIPMENT /

TURN THE ROUTE INTO A USEFUL ENQUIRY

Specify the material. Define the duty.

Provide the crop range, Brix, viscosity at temperature, fibre length and pulp fraction. Add the chosen filling and storage route, required production window and cleaning method. Seasonal availability matters: equipment should meet the peak harvest duty while remaining suitable for the other juices processed through the same line.

01 Fruit and extraction route

02 Pulp distribution and final cloud target

03 Acidity and validated heat process

04 Concentrate viscosity and aroma recovery

05 Packaging, oxygen and storage specification

RESEARCH BASIS / SELECTED PRIMARY REFERENCES

https://www.alfalaval.com/industries/food-dairy-beverage/beverage-processing/fruit-and-vegetable-processing/ / https://www.alfalaval.com/globalassets/documents/industries/food-dairy-and-beverage/beverage/fruits-and-vegetable-processing/foodec_for_fruit_juice.pdf / https://sonflow.eu/industries/sanitary / https://sonflow.eu/plate-heat-exchangers/sanitary-heat-exchangers / https://sonflow.eu/plate-heat-exchangers/free-flow-heat-exchangers / https://sonflow.com.au/media/pelbtcki/s-fp-pumps_uk_0224_small.pdf

PHOTOGRAPHIC REFERENCES

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BEGIN THE CONVERSATION

Let us begin with your process.

Tell us about your stream, the operating conditions and the result you want to achieve.

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