



## **Tomato & Fruit Processing System**



**Tomato Processing:  
Paste & Concentrate, Peeled Products**

**Fruit Processing:  
Temperate & Tropical Juice, Puree and Pieces**

# Tomato Processing: Paste and Concentrate Line



## Receiving, Washing, Sorting & Chopping



Tomatoes are delivered to the plant and transferred to flumes through manual, mechanical or hydraulic means. Tomatoes are conveyed through the flumes to the washing and sorting area. Field material is removed from the tomatoes and then manual or electronic systems sort the product.

### Equipment & Process Planning Variables:

- Fresh tomato capacity of the plant
- Harvesting methods
  - Hand
  - Mechanical (type)
- Delivery methods
  - Baskets or boxes
  - Bins
  - Gondolas
- Sorting
  - Manual
  - Electronic
- Input into the break process
  - Chopped
  - Whole tomatoes

### General Planning Information\*

Identify the:

- Hours per day of harvest
- Hours per day of processing
- Length of the operating season
- Plans for additional capacity
- Customers/Markets for each end product
- Local electricity cost per kW/h.
- Local steam generation cost/kg or lb.
- Plant or floor space constraints
- Special circumstances or issues

\*Separate information is required for each product on this equipment line.



## Hot/Cold Break

This procedure provides even heating that inactivates the natural enzymatic process. The choice of hot or cold break depends on the final product to be obtained.

### Equipment & Process Planning Variables:

- Input into the break process
  - Chopped
  - Whole tomatoes
- End Products
  - Soup
  - Juice
  - Concentrate
- Customer requirements for end products
  - Color
  - Texture
  - Consistency
  - Flavor
  - Yield
- Processing below or above 180°F/82°C

## Juice Refining

The juice is refined by removing the peel and seeds from the pulp. This step results in juice that is ready for concentration.

### Equipment & Process Planning Variables:

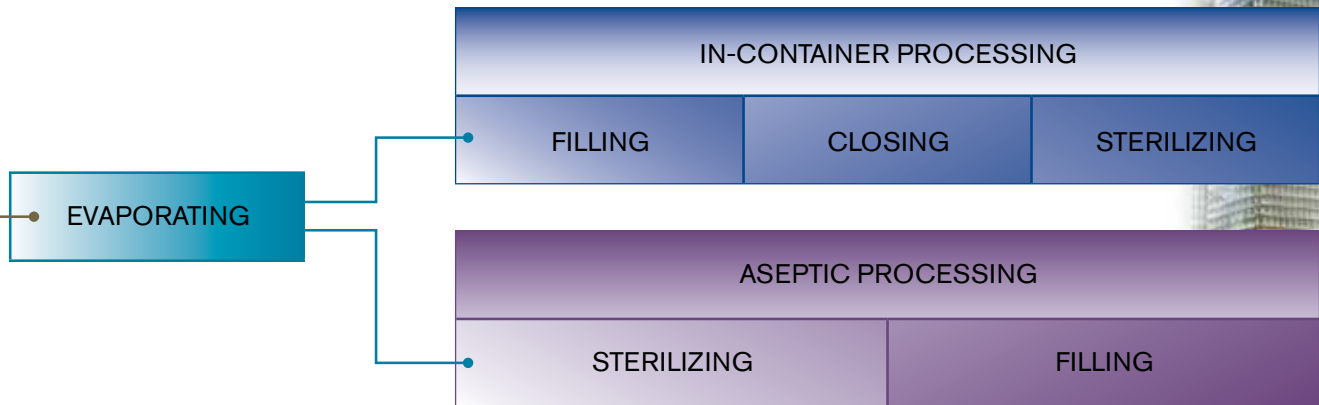
- Screen sizes
- Tonnage or product flow rate (gpm/lph).

## Evaporating

The highest quality paste is obtained by removing the water while preserving the color and organoleptic properties of fresh tomatoes.

### Equipment & Process Planning Variables:

- Lowest anticipated incoming % solids
- Highest anticipated discharge product % solids
- Preferred discharge temperature range
- Break process used
- Boiler capacity, pressure, available volume



### In-Container Filling, Closing and Sterilization

Containers are filled with paste and enter a closing machine where a lid is seamed to the can. Then they are conveyed to a cooker where the product is heated to sterilization temperature, held, cooled and made ready for warehousing.

**Equipment & Process Planning Variables:**

- Container types
- Container sizes
- Required cpm
- Minimum initial product temperature
- Maximum final shaken and unshaken product temperatures
- Preferred heating medium
  - Steam
  - Water
- Cooling water source and temperature range
  - Ground water
  - Cooling tower
  - Chilled



### Aseptic Sterilization and Filling

Quality improves when commercial sterility can be obtained with minimal heat damage. In a closed system tomatoes are heated, held at temperature to obtain commercial sterility, and aseptically cooled to ambient temperature. The sterilized paste is then filled into aseptic bags. 300 gallon/1000 liter bags are filled in a box. 55 gallon/200 liter bags are either filled flat and then placed in a drum or filled directly inside the drum. Drums or bins are labeled and ready for shipment and/or storage at ambient temperatures.

**Equipment & Process Planning Variables:**

**Infeed to Sterilizer**

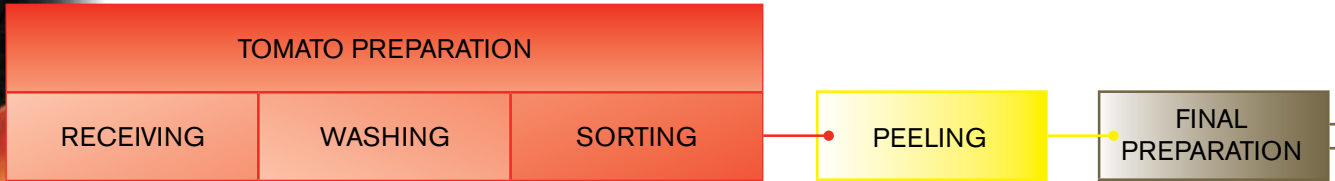
- Product feed temperature
- Product sterilization process
- Product filling temperature
- Product flow rate (gpm/lph)

**Filler Discharge**

- Type(s) and size(s) of outer container(s)
  - Drums
  - Bins
  - Other
- Ambient storage temperature range



# Tomato Processing: Peeled Products



## Receiving, Washing & Sorting



Tomatoes are delivered to the plant and transferred to flumes through manual, mechanical or hydraulic means. Tomatoes are conveyed through the flumes to the washing and sorting area. Field material is removed from the tomatoes and then manual or electronic systems sort the product.

### Equipment & Process Planning Variables:

- Fresh tomato capacity of the plant
- Harvesting methods
  - Hand
  - Mechanical (type)
- Delivery methods
  - Baskets or boxes
  - Bins
  - Gondolas
- Basic Sorting
  - Manual
  - Electronic

### General Planning Information\*

Identify the:

- Hours per day of harvest
- Hours per day of processing
- Length of the operating season
- Plans for additional capacity
- Customers/Markets for each end product
- Local electricity cost per kW/h
- Local steam generation cost/kg or lb
- Plant or floor space constraints
- Special circumstances or issues

\*Separate information is required for each product on this equipment line.

## Peeling

Lye, steam and/or hot water is used to separate skins from the whole tomato. Scrubbers and/or pinch bed systems finish the peeling process. Usable by-products are often recovered from the non-lye processes for concentrate and/or topping media.

### Equipment & Process Planning Variables:

- Importance of by-product recovery

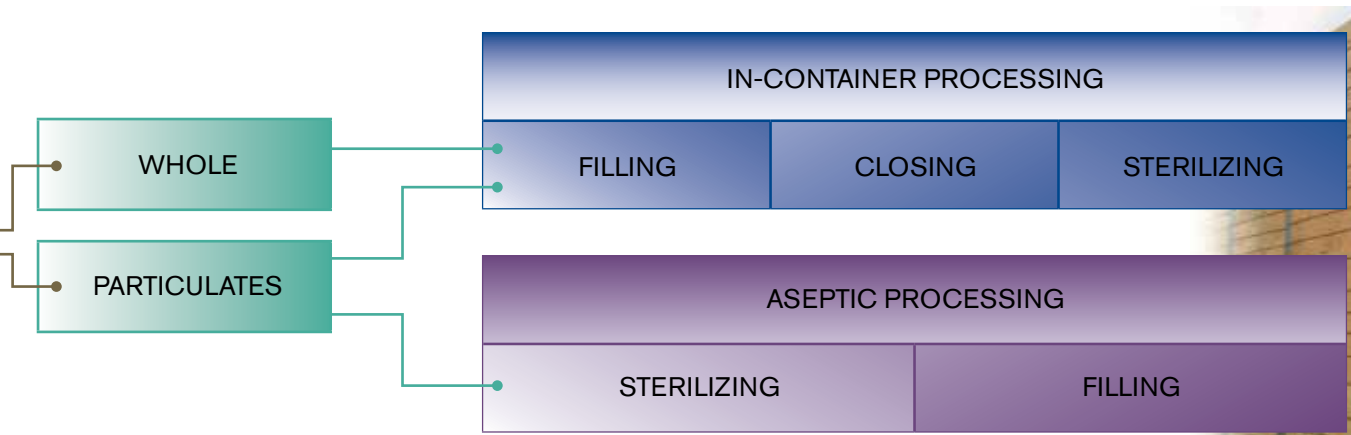
## Final Preparation

After peeling, tomatoes are again sorted, graded and directed toward final preparation. As tomatoes are directed toward final processing they either remain whole or are cut and reduced in size. Calcium chloride is an option used in certain regions to maintain the shape and firmness of cut tomatoes.

### Equipment & Process Planning Variables:

- Infeed Sorting & Grading
  - Manual
  - Electronic
- Particulates
  - Slice
  - Wedge
  - Crush
  - Dice
  - Other





### In-Container Filling, Closing and Sterilizing

Whole tomatoes or tomato particulates are conveyed to a filling machine that is typically designed for cans or jars.

Juice is added to the container before it enters a closing machine where a lid is attached and hermetically sealed. The closed containers are conveyed to a sterilizer where the product is heated, held, cooled and made ready for labeling and warehousing.

**Equipment & Process Planning Variables:**

- Container types
- Container sizes
- Required cpm
- Minimum initial product temperature
- Maximum final shaken and unshaken product temperatures
- Preferred heating media/process  
Steam or water  
Atmospheric or pressure
- Cooling water source and temperature range
  - Ground water
  - Cooling tower
  - Chilled
- Closing or other equipment compatibility issues



### Aseptic Sterilization and Filling

Quality improves when commercial sterility can be obtained with minimal heat damage. In a closed aseptic system, particulate tomatoes in a carrier media are heated, held at temperature to obtain commercial sterility, and aseptically cooled to ambient temperature. The sterilized particulates are then filled into aseptic bags. 300 gallon/1000 liter bags are filled in a box.

55 gallon/200 liter bags are either filled flat and then placed in a drum, or filled directly inside the drum. Drums or bins are labeled and ready for shipment and/or storage at ambient temperatures.

**Equipment & Process Planning Variables:**

**Infeed to Sterilizer**

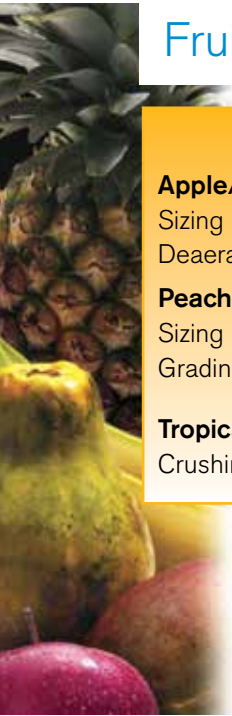
- Product feed temperature
- Product sterilization process
- Product filling temperature
- Product flow rate (gpm/lph)

**Filler Discharge**

- Type(s) and size(s) of otter container(s)
  - Drums
  - Bins
  - Other
- Ambient storage temperature range



# Fruit Processing: Continental & Tropical - Juice, Puree & Pieces



**FRUIT PREPARATION**

**Apple/Pear**  
Sizing + Peeling + Coring + Slicing + Deaerating + Sorting

**Peach**  
Sizing + Pitting + Repitting + Peeling + Grading + Sorting

**Tropical Fruit**  
Crushing + Refining + Deaerating

**JUICE**

**PUREE**

**WHOLE PIECES PARTICULATES**

**EVAPORATION**

## Receiving, Washing, Grading, Preparation & Sorting



Fruit is delivered to the plant and transferred to flumes or conveyers through manual, mechanical or hydraulic means.

Fruit is conveyed to the washing and sorting area. Field material is removed from the fruit and then the product is initially sorted by manual or electronic systems.

The appropriate combination of preparation processes depends on the type of fruit to be processed and whether the end product includes juice, particulates, whole pieces or puree. Typically, fruit preparation includes a combination of peeling, coring, pitting, repitting, crushing, slicing, deaerating and refining as well as additional grading and sorting.

### Equipment & Process Planning Variables:

- Fresh fruit capacity of the plant
- Harvesting methods
  - Hand
  - Mechanical (type)
- Delivery methods
  - Baskets or boxes
  - Bins
  - Gondolas
- Basic Sorting Manual Electronic
- Type(s) of Fruit
- Preparation Processes
  - Peeling
  - Coring
  - Pitting/Repitting
  - Crushing
  - Slicing
  - Deaerating
  - Refining
  - Additional grading and/or sorting

## Evaporating

Water is removed from the juice stream to concentrate the product. The specific evaporation method to be used depends on the desired final product. The highest quality is obtained by removing the water while preserving the color and organoleptic properties of the fresh fruit.

### Equipment & Process Planning Variables:

- Lowest anticipated incoming % solids
- Highest anticipated discharge product % solids
- Preferred discharge temperature range
- Products being concentrated
- Desired Finishes
  - Coarse
  - Fine
  - Clarified
  - Custom
- Boiler capacity, pressure and available volume

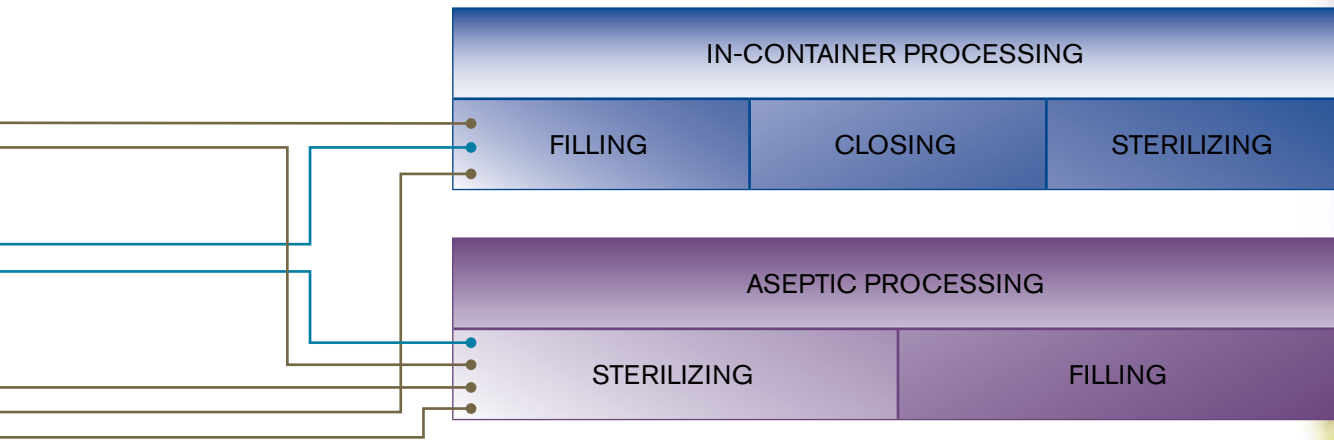


### General Planning Information\*

Identify the:

- Hours per day of harvest
- Hours per day of processing
- Length of the operating season
- Plans for additional capacity
- Customers/Markets for each end product
- Local electricity cost per kW/h
- Local steam generation cost/kg or lb.
- Plant or floor space constraints
- Special circumstances or issues

\*Separate information is required for each product on this equipment line.



### In-Container Filling, Closing and Sterilization

Fruit and juices are conveyed to the appropriate types of filling machines where containers are filled at predetermined ratios. The container then enters a closing machine where a lid is attached and sealed to the can. Closed containers are conveyed to a cooker where the product is heated to sterilization temperature, held, cooled and made ready for labeling and warehousing.

**Equipment & Process Planning Variables:**

- Container types
- Container sizes
- Required cpm
- Minimum initial product temperature
- Maximum final shaken and unshaken product temperatures
- Preferred heating media/process
  - Steam or water
  - Atmospheric or pressure
- Cooling water source and temperature range
  - Ground water
  - Cooling tower
  - Chilled
- Closing or other equipment compatibility issues



### Aseptic Sterilization and Filling

Quality improves when commercial sterility can be obtained with minimal heat damage. In a closed aseptic system the fruit is heated, held at temperature to obtain commercial sterility, and aseptically cooled to ambient temperature. Certain fruits are cooled and/or stored below ambient temperatures to inhibit chemical changes which affect appearance. The sterilized product is then filled into aseptic tanks or aseptic bags. 300 gallon/1000 liter bags are filled in a box. 55 gallon/200 liter bags are either filled flat and then placed in a drum or filled directly inside the drum. Drums or bins are labeled and ready for shipment and/or storage at ambient temperatures.

**Equipment & Process Planning Variables:**

**Infeed to Sterilizer**

- Product feed temperature
- Product sterilization temperature
- Product filling temperature
- Product flow rate (gpm/lph)

**Filler Discharge**

- Type(s) and size(s) of outer container(s)
  - Drums
  - Bins
  - Other
- Ambient storage temperature range

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