## Standard units

<table>
<thead>
<tr>
<th>Units</th>
<th>Extractor type</th>
<th>Loading system</th>
<th>Raw material processed</th>
<th>Extraction type</th>
<th>Filtration type</th>
<th>Solvent recovery from spent material</th>
<th>Residue discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>330</td>
<td>Non-agitated Extractor</td>
<td>Tiered grids and fully opening hatch</td>
<td>Flowers / Chips / Stalks</td>
<td>Non-agitated or recirculation</td>
<td>Gravity settled</td>
<td>Steam stripping</td>
<td>Most material from above</td>
</tr>
<tr>
<td>340</td>
<td>Floating Filter Extractor (FFE)</td>
<td>In bulk from above with fully opening hatch</td>
<td>Powders / Granules / Resins</td>
<td>Agitated from below - turbulence induced</td>
<td>Floating filter washes</td>
<td>Steam stripping</td>
<td>Suspension liquid with bottom-drain breaking or wide aperture valve</td>
</tr>
<tr>
<td>355</td>
<td>Filtration Extractor (FFE)</td>
<td>In bulk from above with self-adjustable or dedicated equipment</td>
<td>Powders / Granular materials</td>
<td>Agitated from above - vertically adjustable, extraction with counter-current, heated blade system</td>
<td>Nitrogen pressurised, or steam or air or vacuum break, or vacuum drying, or natural drain</td>
<td>Never drying, the filter medium</td>
<td>Dry powder with including bottom or wide aperture break hatch</td>
</tr>
</tbody>
</table>

**Characteristics:**
- Construction materials: High quality stainless steel (304L and 316L)
- Capacity and dimensions: from 30L to 5,000L (standard versions 300L, 1,500L, 3,000L, 5,000L)
- Certification and standards: EU regulations / PED Directive / French CODEP construction code for pressurised equipment

**Auxiliary equipment:** Tournaire can offer optional extras:
- Steam generator (electric, gas or oil powered)
- Grinder, roller, chopper
- Support framework
- Residue processing
- Discharge conveyor
- Screw conveyor

**300L extraction pilot**

**Subcritical extraction pilot**

**YOUR TAILOR-MADE SOLUTION IS OUR STANDARD**

Our customers say:

“Our recent 2 x 5,000L extraction and project with Tournaire has become the group’s benchmark project.”

Thierry Bodin, Robertet

See also our rectification technical datasheet.

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**EXTRACTION SOLID / LIQUID**

**APPLICATIONS**

- PARFUMS AND FLAVOURS
- FOOD INGREDIENTS
- PHARMACEUTICALS AND HEALTH
- COSMETICS
- CHEMISTRY

- 180 years of extraction process expertise.
- Constant innovation to meet every need.
- Support from a team of experts in all phases of the project.
- More than 1000 complete units for natural material processing, supplied since 1833.
Found in 1833, Tournaire came into being alongside the first perfume plant distilleries in Grasse. Originally a coppersmith, then a manufacturer of stills, modern extractors and copper aluminium containers, Tournaire has continually acquired new expertise with the evolution of the perfume industry, and to meet the specific needs of its customers.

- Associate Member of the IFSEA - since 2018.

Tournaire added value

Tournaire has developed a complete range of Solid / Liquid batch extractors suitable for a wide range of raw materials, to produce extracts with high added value. To follow its non-agitated extractors and floating filter extractors (FFE), Tournaire designed and developed the filtering bottom extractor (BF2).

The filtering bottom extractor (BF2) has become, after more than 20 years, the market reference for natural extracts. Its versatility, its industrial capacity and performance, and its reliability all come from constant improvements to the technology, linked to changing regulations and an increasingly demanding market seeking optimised production capacity and top-quality extracts.

Tournaire offers a pre-project engineering assessment for complete turnkey units. These complete units feature processes optimised using new automation functionalities that comply with the latest European regulations (PED/ATD), while limiting environmental impact through energy consumption and waste control systems.

The Tournaire EF2 extractor is the product of long experience with a great variety of natural extracts. This continuous experience goes back decades and enables Tournaire to provide its customers with the best performance and service.

These units include evaporation and concentration systems, as well as mechanisms for transforming concretes to absolutes.

### Extraction Solid / Liquid

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1833</td>
<td>TSA founded</td>
</tr>
<tr>
<td>1960</td>
<td>1st Floating Filter Extractor (FFE) for extracting powders and gums</td>
</tr>
<tr>
<td>1992</td>
<td>Complete Automated Floating Filter Extractor</td>
</tr>
<tr>
<td>2000</td>
<td>Complete turnkey Automated unit with monitoring</td>
</tr>
<tr>
<td>2010</td>
<td>TSA-patented Subcritical Extraction pilot</td>
</tr>
<tr>
<td>2020</td>
<td>FDA operational and traceability parameters developed Remote support</td>
</tr>
</tbody>
</table>

### Non-agitated Extractor

- Designed for extraction and maceration of bulk large-particle-size products or sensitive materials like flowers.
- Loading and discharge using hinged grids.
- Residual solvent recovery from spent material using steam stripping.

This is the equipment used for traditional maceration and extraction of a wide range of products for perfumes, flavours and pharmaceuticals.

### Floating Filter Extractor

- Designed for extraction from bulk or powdered raw materials with a tendency to clump, such as gins and resins.
- A powerful turbo-agitator at the bottom of the tank is used for mixing and grinding.
- Macella separation from the solid phase is achieved with a filter piston linked to a suction pump, its downward movement driven by a sealed float.
- The residual solvent is recovered using steam stripping.
- Residues are removed in liquid suspension through a bottom-drain valve.

### Filtering Bottom Extractor

The latest generation solid/liquid extractor designed to:

- Reduce solvent quantities used.
- Reduce the number of washes to reduce evaporation volumes and reduce energy consumption.
- Reduce loading and discharge times.
- Optimise the extraction, filtration and drying kinetics to reduce production times.
- Limit residual solvent content of residues.

#### Evaporation Unit

- Separate evaporator and condenser

#### Integrated Evaporation and Condenser

- Vacuum drying
- After extraction the residual solvent in the material is recovered with vacuum drying of the residue.
- The entire system is heated. The body, filtering bottom, dust filter and agitator mechanism.
- Very low residual solvent content.
- The dust filter is designed to capture the finest particles efficiently, with automated desludging.

#### Process Automation

Various phases of the process are automated:

- Nitrogen resealing
- Raw material and solvent loading
- Cold, hot or reflux extraction
- Vacuum or pressurised filtration
- Vacuum drying
- Residue discharge through lateral hatch or swivelling bottom
- In-place cleaning