Utilization of Filter sheets for the clarification of wine...

(DE and DE Free Filter sheets)

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Filter Sheet History, “101”

- 1947: Production of depth filter sheets from asbestos and cellulose

- Since 1974: Production of sterile depth filter sheets from cellulose and kieselguhr/perlite (minerals)

- 1988: Complete change to DE/PERLITE production

- 2008 – Time to go “green”- DE FREE!
Flow sheet of wine production

- Mill
  - Enzyme Dosage
- Warming
  - Cooling 20°C
- Mash
  - enzymization 2-4 hours
- Pressing
- Must
  - enzymization 2-4 hours
- Separation
- Fermentation
- Bottling
  - tank
- Cartridge filtration
- Sheet sterile filtration
- Storage tank
- Sheet fine filtration
- Kieselguhr filtration
- Sluge filtration
- Fining
Importance of Filtration with Filter sheets

- Gentle wine preparation for bottling
- Low cost of filtration
- Wine filtered through depth filter sheets, has a special brilliance
- Effective and economical protection of membranes at the final filtration step
Advantages of using Filter Sheets

- High contaminat removal capacity
- Low tendency to blockage
- High flexibility by a wide spread program of filtersheets
- Size and throughput of the filter can be changed by increasing or decreasing the number of filter plates
- A multi step filtration is possible by the installation of a change-over plate
Filtration

Separation of particles from liquids

Different filtration mechanisms
How Depth Filter sheets work:

DE filled and 100% Cellulose

- **Depth Filtration**
  Separation of particles and microorganisms inside the matrix of the sheet

- **Adsorption**
  Separation of particles and microorganisms due to different elektrocinetical charges of the sheet material and the particles and microorganisms of the wine to be filtered out

- **Surface Filtration**
  Separation of particles on the surface because of size
Three *degrees* of sheet filtration

- **Surface Filtration**
- **Adsorption**
- **Depth Filtration**
Filtration Mechanisms

Surface Filtration
Filtration Mechanisms

Mechanical (depth) Separation

- Particle size
- "size of mesh" of the sieve
Filtration Mechanisms

Adsorptive Separation

Cellulose fiber
Filtration Mechanisms

Adsorptive Separation

Cellulose fiber
Filtration Mechanisms

Adsorptive Separation

Cellulose fiber
Filtration Mechanisms

Adsorbtive Separation
Filtration Mechanisms

Adsorbtive Separation

Cellulose fiber

ZETA POTENTIAL
More reasons to use Filter sheets:

- Aroma and colour protective filtration of white and red wine
- High contaminant removal capacity of colloidal substances
- Maximum biological security
- Protection of membrane cartridges
- Reliable removal of yeast and bacteria
Depth Filter sheets - Typical micron range and purpose

**Sterile Filtration**
Removal of Yeast and Bacteria

**Sterile Filtration**
Removal of Yeast

**Fine Filtration**
Pre Filtration

Conditions: $\Delta p = 100$ kPa (1 bar). medium: water at 20 °C
Maximum Differential Pressure and... speed kills!

<table>
<thead>
<tr>
<th>Step of Filtration</th>
<th>Maximum Differential Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1\text{st} filtration and fine filtration</td>
<td>3 bar</td>
</tr>
<tr>
<td>Sterile filtration</td>
<td>1.5 bar</td>
</tr>
</tbody>
</table>
20cm X 20cm sheet filter
40cm X 40cm sheet filter
Recommendations for packing of filter

- Prior to packing, check filter sheets for any damage
- Downstream side of filter sheet (BECO mark) must always face the filtrate plate
- Remove any loose fibres
- Thighten filter slightly and rinse from the outside
- Increase pressure of filter to max. 4 bars to test for any leakage
- Rinse filter with cold water until neutral taste is obtained
Technical Information
Sterilization with Steam

- In reverse direction of product flow (longer sterilization time)
- **Requirement:** Particle free steam
- **Temperature of Sterilization:** Max. 105 °C (0,5 bar)
- **Time of Sterilization:** At least 20 min. after steam escape from all filter outlets
- **Counter Pressure:** Approx. 0,5 bar (adjust via outlet valve)
- To avoid damage by steam pressure shocks, open all condensation valves
Technical Information
Regeneration

- Replace product by water or CO₂
- Forward flush with cold water, for approx. 5 min.
- Reverse flush with hot water
  - **Temperature:** 75 - 80 °C
  - **Time:** approx. 20 min.
  - **Counter Pressure:** 0.1 - 1 bar (adjust at outlet valve)
  - **Flowrate:** at least flowrate of product, better double flowrate
  - If possible - diagonal flushing
- Do not flush via buffer tank (germs will be set free - danger of infection
The evolution of filter sheets..
Time to go green!!

Presenting the world’s only DE free and all natural filter sheet...
Pure. Nothing else.
BECOPAD

Components

- Only certified cellulosic
- No synthetic fibres
- Targeted application of a special cellulose based on the special bepure processing method
- No inorganic components
- White depth filter sheet with outstanding purity
BECOPAD

Results

- Unlimited availability of raw materials

- Regenerative raw materials

- Improved purity

- 100% Bio-degradable
Why a DE free Filter Sheet is important to the Winemaker:

- **Product quality**
  - High microbiological safety (even at higher differential pressures)
  - Value-preserving filtration
  - Drip losses reduced to a minimum
    - Mold growth reduced by 99%
  - Hygiene

- **Process optimization**
  - Significantly improved handling during packing and unpacking
  - Reduction of rinsing volume (50% less water needed)
  - Reduction of backwashing volume (30% less water needed)
  - **100% biodegradable and compostable – a Green product**
Results

- Economic efficiency

  - Enhanced economic efficiency through
    - Reduction of energy costs (electricity/water)
      ✔
    - Reduction of personnel costs
      - faster loading/unloading of filter
      - longer filtration runs → less changing of filters
        ✔
    - Longer filter service life
      ✔
    - Reduction of disposal costs
      BECOPAD is compostable (DIN EN 13432 and ISO 14855)
      → “greenomic” filtration
      ✔
Flavor savings: DE filter sheet vs 100% Cellulose
Results

Wet bursting strength

Wet bursting strength after steaming for 3 hours at 121 °C
BECOPAD

Hygienic risks (mold) eliminated
The advantage of a DE free Filter Sheet

(R)evolution GREENOMIC
Thank you for your attention!