

## **FILTER MEDIA**

### **DIRECTIONS FOR EFFECTIVE USE OF FILTER SHEETS**

#### **Storage**

Filter sheets have to be stored in a place which is dry, cool and free from strong odours. We recommend that filter sheets be used within 36 months from the date of production, although when stored in the correct conditions shelf life can be much longer.

#### **Preparation for Filtration**

All Carlson sheets have a rough inlet side; in most instances the smooth outlet side is marked with the grade and batch number. This allows identification of the sheet at any time. Insert the sheets with inlet side (rough side) against the inlet plate or, in the case of a plate and frame filter, the frame and the smooth side (branded side) against the outlet plate. The filter sheet should overlap the edges of the filter plate all the way round by a few millimetres. Ensure this is done very carefully and that all sheets are inserted correctly into the filter. Never use damaged or torn sheets.

#### **Wetting Out the Filter Sheets**

Close the filter press gently and then open the inlet valve for the rinsing water. Close the outlet valve marginally to build up a differential pressure of approximately 20kPa (=0.2 bar) and wet the sheets thoroughly for 5 minutes, so that water flows out on all sides of the filter elements. Allow the sheets to soak during this length of time. Shut off the water by closing the inlet valve and then close the press as tightly as possible. In small filters the sheets may also be wetted out manually with water

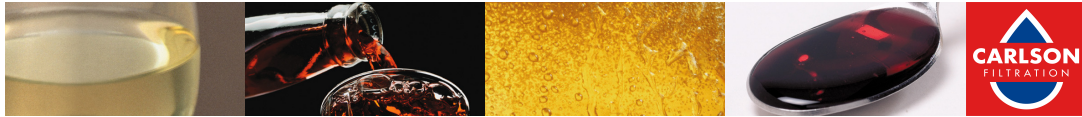
#### **Rinsing the Filter Sheets**

The filter is now ready to be rinsed for 10 to 15 minutes. The flow rate of water should be slightly more than the flow rate anticipated to be used during product filtration. Check the rinsing water at the outlet for paper taint/taste. If the rinse water is clear and has no so-called "paper taste", drain the filter and then gently start the filtration of the product or start sterilisation. If required, start the sterilisation of the complete filter with hot water or steam. Rinsing is not carried out for non-aqueous liquids since the filter sheets will not swell in such products. Therefore the filter can be tightened from the beginning of the filtration cycle. To eliminate possible filtrate contamination with small fibres and/or kieselguhr particles, the initial filtrate should be re-circulated.

#### **Filtration Protocols**

Retention and adsorptive forces, which are built up between the filter media and turbid matter, are low. To guarantee a secure and economical filtration the following should be observed:

- Avoid use of positive displacement pumps if at all possible
- Start filtration smoothly with low differential pressure
- Control the flow rate for a given product and filter stage
- Avoid pressure surges/shocks
- Do not exceed the recommended flow rate and differential pressure for the given process
- Do not change the flow rate abruptly
- Avoid intrusion of air. If this is not possible, continually bleed off any entrained air.



Ideally the filtration i.e. the flow through the filter should never be interrupted. This means that abrupt changes of the flow of the medium through the filter should never occur. Interruption of filtration may cause changes of the binding relations between the filter sheet and the captured particles which may result in these particles getting into the filtrate after the restart of filtration. In addition the pH value of aqueous solutions (eg wine) may easily shift towards the neutral point and thus reduce the action of electrostatic and electrokinetic forces (zeta potential). When the filtration is restarted later, these loose particles are washed out of the filter sheet. Therefore it is necessary to carry out a short recirculation after each necessary interruption of filtration. If filtration leads directly into the filler, we recommend installing a re-circulation loop back to the feed or buffer tank or to the inlet of the feed pump. Thus the filtrate is led into circular bypass when bottling / downstream flow is interrupted.

### **Sterilisation**

To perform a successful sterile filtration, all parts which come into contact with the product must be sterilised as well as the downstream system, eg pipework, fittings, filter, etc.

The sterilisation of the filter press is always carried out in the direction of filtration.

#### **a. Hot water sanitation**

Hot water sanitation is preferred to steam as hot water at 85°C to 95°C, is safer and gentler for a filter press, the filter sheets and gaskets. Using water also ensures that the filter press is fully filled with water; with steam the creation of air pockets is possible leading to inefficient sterilisation. Depending on available infrastructure, the sterilisation of filter equipment can be done with circulating hot water or with a heat exchanger. Circulating the hot water saves energy.

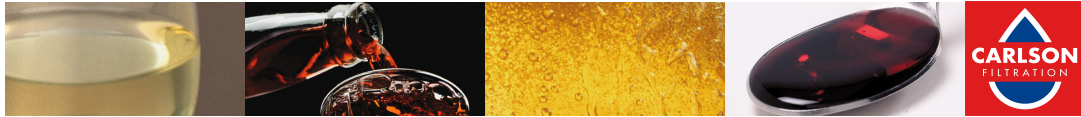
In both cases the following procedure is suggested:

- Sterilisation of new sheets: close filter press very gently
- Repeated sterilisation (used sheets) and plastic frames: open the filter slightly
- Connect hot water pipe, open all valves slightly
- Heat the filter with the hot water until the recommended temperature is reached at all outlet valves. Check the temperature and keep it for 20 minutes at 85°C
- Then close all outlet valves (Keep inlet valve open)
- Stop hot water delivery
- Connect fresh water hose, cool filter to room temperature. Alternatively the filter can be left overnight to cool with vent valves open

#### **b. Steam sterilisation**

Low pressure steam at 60 kPa (0.6bar) and 112°C is most suitable. Steam >60 kPa is usually too hot and affects gaskets and fittings

- Sterilisation of new sheets: always close filter press very gently
- Repeated sterilisation: always open filter slightly



Follow the instructions:

- Connect steam hose, open every valve slightly
- Adjust steam quantity to have a visible bleed of steam of 10cm at the outlet of each valve
- Drain all condensate
- Control steaming for 20 minutes at this level
- Then close all outlet valves (Keep inlet valve open)
- Stop steam delivery
- Connect fresh water hose, cool filter down to room temperature

### **Chemical Disinfecting**

Carlson recommends only the use of products which are regarded as “safe” in the foodstuff industries, e.g. sulphur dioxide (SO<sub>2</sub>) at 0.2% dissolved in water, or 0.2% peracetic acid.

Do not use disinfectants which contain active chlorine or chlorine dioxides. Those products attack and will eventually destroy the silicone rubber gaskets of the filter elements

### **End of Filtration**

The end of a filtration process is reached when either all the feed product has been filtered or a high differential pressure across the filter has been reached (normally not exceeding 1.5 bar). Residual product in the filter press can either be displaced with suitable water, if the process allows, or drained via the drain valves and collected, if required, via the drip tray. Caution should be taken in displacing product into the filtrate line as any shocks could cause small amounts of contaminant breakthrough.

### **Regeneration**

It is possible to extend the life of all types of filter sheet by means of regeneration. This is very dependent on the type of product and solids being retained and also the time in which regeneration is carried out. A good example would be when solids are being retained which will dissolve when flushed with hot water and a flushing process is carried out when only a low differential pressure is reached.

Regeneration falls into 2 main categories: Forward flushing only or Backflushing (a forward flush would be carried out prior to back flushing). Again the choice of regeneration is very dependent on the product, solids retained and also stage of filtration. Backflushing is rarely used on sterile grades of filtration as the flushing product needs to be clean so that contaminants are not left on the outlet surface of the filter sheet. Backflushing is also not advisable when a frame is used as this gives no support to the filter sheet in the reverse flow direction.

#### **Forward Flushing:**

Flush with ambient water and then hot water in the forward direction at approximately 1.5 times the normal filtration flowrate. Carry out each stage for 10 to 15 minutes each.

#### **Back Flushing:**

If backflushing is required this is done with the flow in the opposite direction from effective filtration. This can be done with either ambient or hot water (dependant on product) but this water must be clean since any contamination in the flushing water will be retained on the outlet side of the filter sheet. For back flushing to be effective it is recommended to back flush early and not allow a high pressure difference to build across the filter sheets. In this way several back flushing cycles can be achieved. The back flushing conditions are normally restricted to a differential pressure of 0.5 bar and 1.5 times the filter flow rate.



Before starting back flushing it is recommended to open the press slightly. Always use clean water free from impurities.

Regenerate the sheets every day or after every cycle as follows:

- Forward flush for 15 minutes using cold (ambient) water at 1.5 times the normal filtration flow rate. Repeat the forward flushing with warm water (40 to 45degC). If proteins have been filtered do not increase this temperature above 50 degC as trapped protein solids could denature (solidify) in the filter sheet prior to being flushed out.
  - Back flush for 15 minutes using cold (ambient) water. As per forward flush, but in the opposite direction of flow (not for plate and frame filters)
- After regeneration:
- Sterilise with hot (85~90 °c) water. (See hot water sterilisation above)
  - Cool the filter with cold (chilled, de-aerated, sterilised) water. This step should also take place at filtration rate in forward flow.

After regeneration and sterilisation, the filter should be kept flooded with water at an ambient temperature with vent open until the next usage. If the next filtration does not take place within 24 hours, the filter sheets should be re-sterilised before their next use.

### **Safety and Disposal**

Used under the correct conditions Carlson filter sheets have no known negative effects and can be disposed of through normal route, observing local and official regulations. Consult MSDS for further information.

### **Remarks**

All Carlson filter sheets are manufactured in accordance with BfR recommendation XXXV1/1 (regulations regarding paper and board designed for contact with foodstuffs) and EC Regulation No 1935/2004 (materials and articles intended to come into contact with food) All our products are made according to the rules of Quality Management System EN ISO 9001:2008.

We provide information and advice to the best of our knowledge. This information cannot be binding in every case due to the variety of applications, work methods and operating conditions. Therefore, we cannot assume liability for improper use.

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