INSTRUCTIONS
AND MAINTENANCE MANUAL
31@MI04R - en

MICROFILTRATION UNIT

JU.CLA.S. S.r.l.
Via Mirandola, 49/A – Z.A.I.
37026 Settimo di Pescantina (VR) ITALIA

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Although the figures may not reflect the model, accessories or personalized configuration of your machine, functioning procedures remain valid.

1.0 GENERAL INFORMATION

1.1 Introduction

The microfiltration unit is a system for the cold filtration of wines, including sparkling wines.This manual contains its installation, use, and maintenance instructions.
To make reading easier, from this point onwards the unit twill simply be called the “machine”.
As with other JU.CLA.S machines, it requires care during its use and its maintenance operations in order to achieve good results, during a long-lasting period, and with a high degree of safety for the operators.
For this reason the present manual which contains all instructions for use, for ordinary maintenance, all flow diagrams, electric diagrams, and all other information needed for the machine to function properly is anintegral part of the machine and must be kept in a safe place, protected from humidity and from any other agent which could compromise its integrity.
Good functioning in the best conditions as well as the machine’s life span depend on these instructions being observed. It is therefore compulsory to respect them.
JU.CLA.S declines any responsibility for damages done as a consequence of negligence or failure to follow these instructions.

1.2 Warrantee

Check that the machine is in good shape and that accompanying accessories are complete upon delivery.
Any complaints will have to be made within 8 days of delivery date.
The purchaser will be able to claim warrantee rights only if the conditions mentioned below are respected.
JU.CLA.S. declares that it will provide a warrantee on its products on the following conditions:

- The machine is under warrantee during 12 months from purchase date documented by the delivery sheet which is released by the sales agent; when requesting assistance under warrantee terms, the purchaser must refer to the machine’s registration number.
- The warrantee covers the replacement or repair of any machine part that is recognised to have been originally defective due to a production fault, without any labour being charged.
- Repairs made under warrantee terms will be carried out at the manufacturing plant, or at authorized servicing centres. The machine will be shipped and returned at the purchaser’s risk and expense.
- Repairs made under warrantee terms which are requested to be carried out at the purchaser’s premises will be billed according to the time required to reach the location, the distance travelled, food and lodging expenses according to existing tariffs which the customer care service personnel have. The time required for the actual repair operation and for the spare parts will be free of charge.
- The manufacturer declines all responsibility with respect to damages to persons or to things where the instructions contained in the present manual have not been followed, particularly those concerned with the positioning, the installation and the use of the machine.
- The present warrantee does not cover any direct or indirect damages due to periods of machine malfunction..
- Repairs to be made under warrantee terms are subject to payments being made on time.

In addition to cases foreseen in the contract, **the warrantee is annuled**:

- structions to avoid accidents. These pictograms are to be kept cleanIf damage has taken place during
- If damage has taken place during transport and/or positioning.
- If the damage is attributed to insufficient maintenance.
- If, as a consequence of repairs carried out by the user without JU.CLA.S. consent or due to the use of non-original spare parts, the machine has been modified and the damage can be attributed to such modifications.
- If instructions described in the present manual have not been followed.

- If the machine has been used improperly.

1.3 CE certification

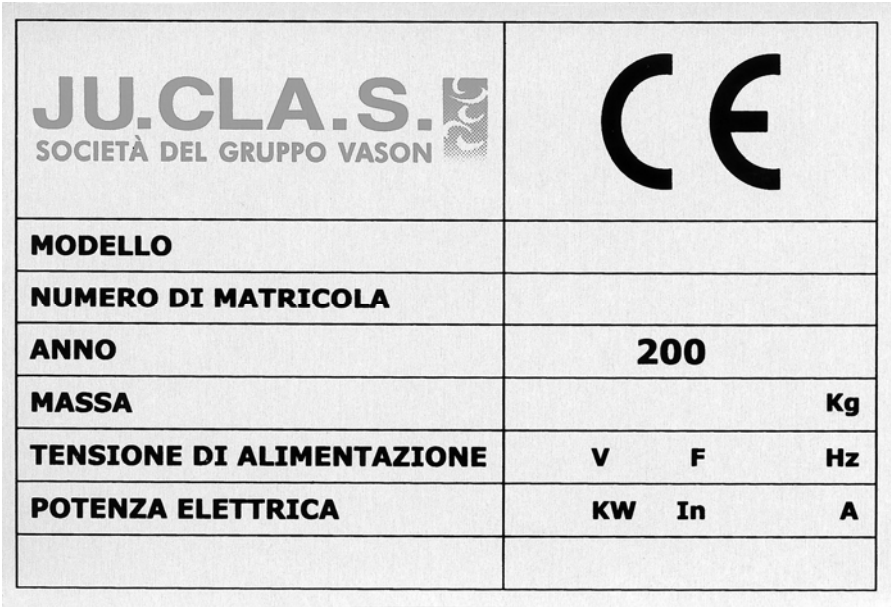
Directive 98/37/CE, commonly known as the “Machines Directive”, describes the conditions under which a machine can be put on the market.
According to this Directive, all machines can be put on the market as long as they bear no risk to the safety and to the health of persons, animals, or goods.
The manufacturer has carried out a careful evaluation of the machine in terms of its fullfilment of the safety and health requisites foreseen under Directive 98/37/CE before introducing it on the market. It bears the CE mark and conformity declaration in released with the machine.
A risk analysis has been carried out to ascertain that the machine was designed and constructed according to its technical specifications and can be used safely under predicted conditions of use, in full respect of applicable norms.

1.4 Symbols / Initials / Abbreviations / Acronyms

#	=	number
<	=	less than
>	=	greater than
≤	=	equal or less than
≥	=	equal or greater than
÷	=	range
~	=	approximatly
°C	=	degrees centigrade (temperature)
±	=	more or less
bar	=	fluid pressare unit (1 bar 0 100 kPa)
cm^3	=	cubic centimeters
d.c.	=	direct current
giri/min	=	revolutions/ minute
kg	=	kilograms
kW	=	kiloWatt
l	=	litres
Nm	=	Newton-meter (1 Nm = 0,1 kgm)
V	=	Volt (electric current)
W	=	Watt (elettric power)
Ø	=	diameter
pH	=	pH measure
CE	=	European Certification
%	=	percentage
dB	=	decibel (sound unit of measure)
display	=	liquid cristal display
Vessel	=	container for filtering cartridge
Hz	=	Hertz (electric frequency)
inch	=	english unit (1 inch = 25,4 mm)
mm	=	metric unit
LpA	=	sound pressure at the operator's work station
LpAm	=	average equivalent ponderated level of sound pressure
LwA	=	conventional level of sound pressure
DPI	=	personal protection gear
RSPP	=	Person responsible for Prevention and Protection
H_2O	=	water

1.5 Machine identification

To be found on the front electric panel (if present) or on a special plate affixed on the machine's frame, the machine's identification plate is replicated hereafter.
The identification plate must remain firmly affixed to the machine and must not be removed for any reason.



JU.CLA.S. SOCIETÀ DEL GRUPPO VASON	CE
MODELLO	
NUMERO DI MATRICOLA	
ANNO	200
MASSA	Kg
TENSIONE DI ALIMENTAZIONE	V F Hz
POTENZA ELETTRICA	KW In A

1.6 Description of the machine

1.6.1 Principle of function

Filters have an important role in every industrial field. Filtration means to separate particles of a fluid (liquid, gas or vapour) by making the fluid cross a permeable barrier (i.e. a material which contains holes or pores through which fluids can pass). Where particles are a significant portion of the fluid, the process can be described as solid collection. Where they represent only a small part of the total (0,01% or less), the process is term fluid clarification. In most cases, filters are used to remove particles of sizes which can vary between fractions of a micron up to 40 microns and beyond. The diameter of the smallest point a human eye can see directly is about 40 microns.

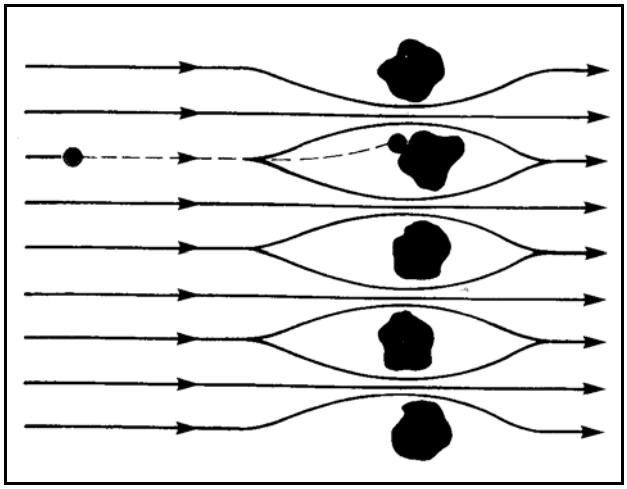
One micrometer is one million part of a millimeter. It is commonly abbreviated as "micron", and its symbol in the IMS (International Metric System) is "μm".

1.6.2 Filtration mechanisms

Suspended solids can be separated from fluids via three mechanisms: impact by inertia, withholding by diffusion and direct withholding. The relative weight and the role of each of the three mechanisms varies depending on the filter type and on the nature of the fluid.

Impact by inertia

In a fluid current, particles with a mass have a speed, and therefore a given amount of movement. When a liquid, and the particles suspended in it, are forced through a filtering barrier, the liquid tends to flow through the path of less resistance which are the pores. To the contrary, the particles, because of their movement, will tend to go straight and, as a consequence become impacted on the surface of the barrier. This mechanism is illustrated in the figure.

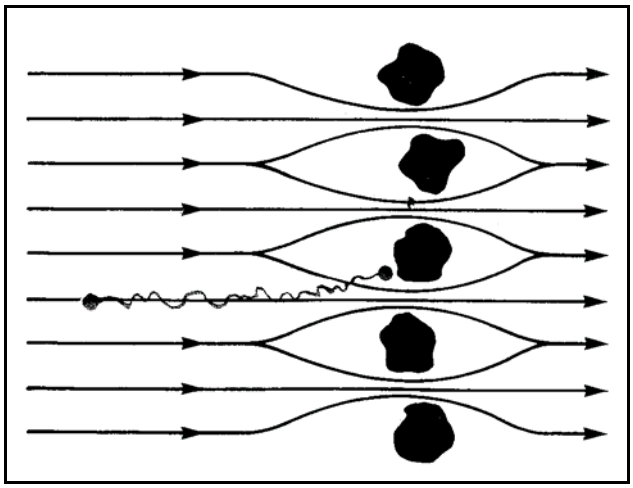


Impact by inertia

In the example shown in the figure, the fluid current indicated with the smooth lines flows around the filter fibres, while the particles tend to maintain their direction, indicated with dashed lines, and impinge upon the fibres.
Generally, the tendency to preserve the direction of movement is greater in particles with greater sizes than in smaller ones which tend to follow the flow.
Where the specific weight difference between particles and fluid is very low, the deviation from the line of flow is far less, and the inertia impact mechanism plays a minor role in filtration.

Withholding by diffusion

For very small particles (i.e. particles with a very small mass),withholding can occur by diffusion. In this mechanism, the particles collide with the molecules of the fluid: frequent collisions mean that the suspended particles move in a disorderly fashion amidst the fluid's flow lines.
This movement, which can be seen through a microscope and is known as "Brownian motion", makes the smaller particles deviate from the fluid's flow lines and thus increases the probability of them colliding with the full parts of the filter, and therefore being removed.

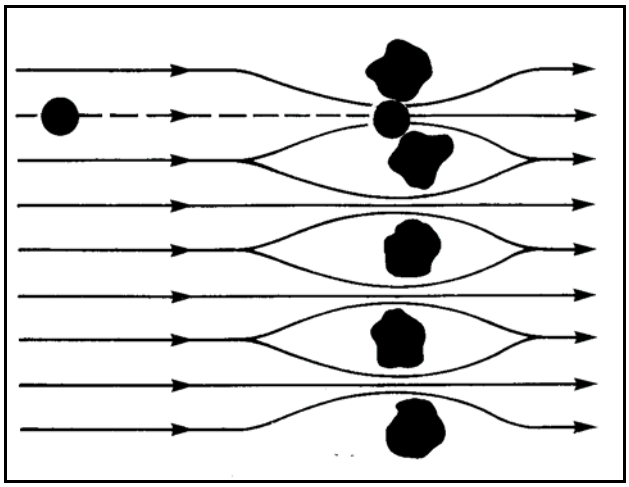


Withholding by diffusion

In the example of the figure, the path followed by a particle undergoing Brownian motion until its impaction on the barrier's fibers is shown by the squiggly line. Withholding by diffusion has a minor role in the filtration of liquids, but it has an important role in gas filtration.

Direct witholding

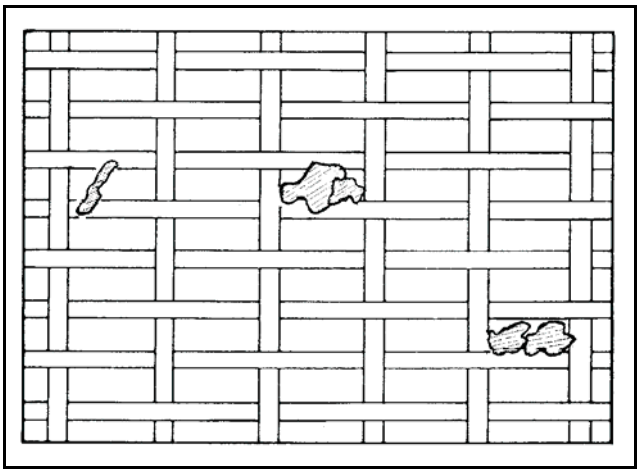
While impact by inertia and withholding by diffusion are not as effective in the treatment of liquids as they are in the treatment of gases, direct withholding is effective to the same degree in both situations and is the best mechanism to separate particles from liquids mechanically.
When referring to a filter, it is best to speak of a set of fibers rather than of a single fiber. THis is what defines the size of the pores through which the fluid flows.
If the particles in the fluid are larger than the pores they will be withheld on the filter's surface as a result of direct withholding, as shown in the figure.



Direct withholding

The direct withholding mechanism is easy to understand in the case of a filter made of a single sheet of interlaced fibers with pores of uniform size and a small thickness or depth.
Once a particle has gone through a pore, it should continue downflow without finding any further obstacles. In reality, this type of filter withholds a significant number of particles that have a smaller diameter than the filter's pores.

Many factors come into play in this particle withholding process and they are illustrated in the figure and listed hereafter.



Withholding mechanism for particles that are smaller than the filter's pore size

- Even though they are very small seen from certain angles, most suspended particles have highly irregular shapes and as such they can partly obstruct a pore by forming a bridge across it.
- This "bridge effect" can also occur where two or more particles reach a pore simultaneously.
- If a particle has stopped at a pore, that pore is partially obstructed, and a s a consequence, that pore can withhold smaller particles from the flow of liquid.
- Specific superficial interactions can cause small diameter particles to adhere to the internal surface of pores. This happens when the particles and pore internal surfaces bear electrical charges of opposite polarity.
  Other possible interactions can take place such as "hydrogen bonds" or Van der Waals interactions. Direct withholding can also take place in filters the porosity of which can vary –within controlled limits- within the filter's thickness.

Particle release under pulsing flow conditions

As written earlier, there are numerous ways in which a filter can capture particles. Under certain conditions, where a filter is poor, some particles can detach from it and go downstream.
For example, if a filter with a variable porosity has collected particles under constant flow conditions at low velocity and the flow velocity is sensibly increased, some of these particles will probably detach and move downstream.
In order to quantify this detachment one can deliberately generate "pulses" in the flow conditions (rapid variations of flow rate and pressure) and then gather the detached particles with a finer filter downstream, for counting and analysis.
Even with a gradual and not very great pressure increase, particle detachment will probably take place if the filter is of a structure such that it permits pore widening. Filters available on the market which allow this type of problem, known as "discharge", are made of numerous fibers which are not rigidly attached to one another and which deform when subjected to a pressure increase.
In conclusion, both impact by inertia and withholding by diffusion are far less effective with liquids than they are with gases.
Given that the specific weight of a particle typically resembles more that of a liquid than that of a gas, particles in suspension will tend to follow the flow lines of the liquid and thus their probability of "colliding" with the filter's structure will be low.
Furthermore, in many systems, impact by inertia is not followed by an effective withholding on the filter's surface.
Withholding by diffusion is very limited in liquids because the brownian motion is not as pronounced as in gaseous suspensions. In a well-designed filter, particles larger than the pores do not migrate downstream from the filter.

To make particle release minimal filters should have pores that do not widen under pressure and a thickness such that virtually all particles should be withheld within the first 10÷20% of the filter's entire thickness, under normal conditions of use.

1.7 Technical characteristics

Each machine is constructed according to specifications provided by the customer. Data below are meant to provide an indication only.

Description	Measurement unit	Value
Hight	mm	1800
Width	mm	1000
Length	mm	2000
Overall weight	kg	250

1.8 Sound level

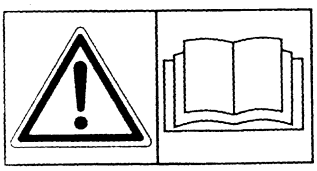
The machine has been subjected to sound tests to ascertain the level of sound emitted in the air. Recordings were made in conformity with existing norms and provided a value of continuous ponderated equivalent A sound pressure at the work station of less than 70 dB (A).

2.0 SAFETY NORMS AND ACCIDENT PREVENTION

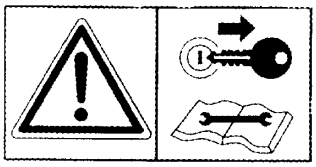
2.1 Safety signals

The machine bears adhesive labels (pictograms), some of which give instructions concerning operator safety or machine integrity, others prescribe the use of personal protective gear (DPI); and they are replicated and commented on hereafter in order to permit clear comprehension.

WARNING: **(Black on yellow background labels)**



Read instructions for use and maintenance manual carefully before starting to operate the machine.

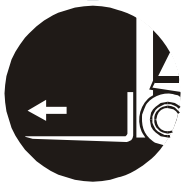


Stop the machine before carrying out any maintenance operation, remove electric supply (if plug present) and consult instructions for use and maintenance manual.

PRESCRIPTION: **(White on blue background labels)**

Use overalls
(see **2.5 Clothing**).

Use gloves
(see **2.5 Clothing**).



To lift the machine insert fork lift in indicated points.

2.2 Dangers levels

Where indicated pay attention to the signal, and respect safety instructions specified in this manual.

There are three levels of safety signals:

DANGER

This signal indicates that the operations, if not done properly, can carry risks for health, can cause serious injury or even death.

WARNING

Read the following norms carefully. Failure to apply such norms can cause damage to people or to the machine.

CAUTION

This signal indicates that the operations, if not done properly, can damage the machine or parts thereof.

The manufacturer declines any responsibility for damage caused by failure to observe the safety and accident prevention norms described hereafter.

2.3 General warnings

The operator must read very carefully the information in this manual, with special attention to caution and warnings concerned with safety, as described hereafter:

- Use the machine only after having read this manual.
- Do not use the machine if you are not in normal psycho-physical conditions.
- Do not allow persons who are not competent or have not received proper training to use the machine.
- It is advised to become familiar with command mechanisms and functions before starting the work.
- Keep the working area clean and orderly.
- Do not remove or circumvent the machine's safety devices.
- Check the integrity of the safety devices before using the machine (devices meant to protect pressure tools, pressure reducers, pressure valves, closure collars, manometers..etc).
- Do not remove or tamper with manufacturer's labels affixed on the machine.
- It is indispensable to carry out general machine cleaning after each working period.
- Check proper functioning of valves, both manual and automatic valves, regularly.

- Do not modify the length of tubing or of cables provided by manufacturer.

Use detergents and sanitizing agents indicated by the manufacturer and respect provisions on the container's labels.

- With respect to wash water processing, respect limits imposed by laws in force in the country in which the machine is in use.

2.4 Operators

The machine has been designed to be used by one operator.
The personnel using the machine must have the requisites described hereafter (or should receive training sufficient to fulfill such requisites), and should know the contents of this manual and of all information concerned with safety:

- General and technical knowledge sufficient to understand the manual's content and interpret the figures properly.
- Knowledge of hygiene, accident prevention and technology norms.
- Overall knowledge of the machine and of the premises in which it operates.
- Specific experience involving technology in enological processing.
- Know how to behave in case of an emergency, where to find individual protection gear and how to use it properly.

In addition to requisites mentioned above, personnel in charge of maintenance must also have proper technical training.

2.5 Clothing

The operator must always wear a coat or overalls that can prevent sprays of product or of dangerous substances to come into contact with clothing.
The operator must also wear:

- Rubber gloves made of a food grade material, to avoid direct contact with dangerous substances.
- Well-tied safety shoes; and in case dangerous substances are used, rubber boots.
- Protective goggles.
- Breathing mask or better, helmet with forced aeration.

WARNING

All clothing and individual protection gear must be in perfect state. If needed, request immediate replacement.

2.6 Environmental considerations

Respect norms in force in the country in which the machine is used with respect to the use and disposal of lubrication and washing products, and follow closely instructions given on the product container's labels.

2.7 Safe use

N.B. During all phases involved with loading, transportation, unloading, positioning, and hydraulic and electrical connection, it is compulsory to follow general safety and accident prevention norms in force in the country in which the machine is used.
WARNING: It is forbidden to subject the machine to temperatures under **5 °C** or above **60 °C**.
The system's parts can be damaged by freezing or by overheating of liquid residues.

DANGER

It is forbidden to perform any hydraulic connections while the machine is functioning.

2.8 Safe maintenance

In order to guarantee safe maintenance of the machine, it imperative to follow the following provisions:

- Check the integrity and good function of safety devices regularly.
- Do not remove or tamper with safety devices.
- Remove the power supply plug (if present) from the power supply frame if you need to make a repair or carry our maintenance operations.
- Maintenance should be performed only by qualified personnel, following the instructions in this manual.
- Maintenance should be performed scrupulously, replacing any damaged or worn-out part with original spares of the same type.
- The pictograms (labels) affixed on the machine give the essential instructions to avoid accidents. These pictograms are to be kept clean at all times and are to be replaced if they are even partially removed, or if they are damaged. It is strictly forbidden to operate the machine if even a single pictogram is missing from the position in which the manufacturer applied it.

3.0 MACHINE SET-UP

3.1 Loading and unloading

Loading and unloading operations must be done with frontal fork-lift that can carry at least 1000 kg.

WARNING

Special labels are affixed on the machine to indicate the points at which the forks of the fork-lift should be inserted in order to lift the machine (see 2.1 Safety signals).

3.2 Shipping and moving

Transportation must be done by qualified personnel.
The machine's protections and doors must all be properly closet and blocked, and shock absorbing devices should be installed between the machine and the carrier, to avoid collisions or abrupt movements of the machine.
The machine must be solidly anchored to the carrier, in its functioning position.

3.3 Required services

The following services are required for the machine's function:
- Cold and warm sanitary water outlet.

3.4 Ambient conditions

The machine does not require special ambient conditions but it must be installed within a sufficiently large industrial building, well aerated and will a solid and level floor.
Ambient temperature shifts must be within 5 e 40 °C (with humidity not exceeding 50% at 40 °C or 90% at 20 °C).
The work space lighting must conform with the norms in force in the country in which the machine will be used and must allow good visibility in any point, without dangerous reflections and allowing clear reading of control instruments.

3.5 Positioning

Positioning must be performed by authorised personnel.
The choice of position must be made such that access will be free for normal function operations and for maintenance operations.

CAUTION

The machine must be level on a stable and well-floored surface.

Preliminary operations
Before positioning the machine check that technical facilities in the winery are appropriate, i.e:
- Static pressure of the hydric plant must not exceed 4 bar (≈ 40 m of the water column); if this is not so, install a pressure-reducing valve.

3.6 Installation

Before installing the machine, check that none of its parts have been damaged during transportation.

WARNING

The following set-up, regulating, and testing operations must all absolutely be performed by authorised and responsible personnel who can garantee that operating will be conform with mechanical, electrotechnical and hydraulic safety norms. If such personnel is not available, call the manufacturer.

WARNING

Read all instructions written below carefully; should any doubts arise call manufacturer directly. The manufacturer declines any responsibility for damage caused by failure to observe the safety and accident prevention norms described in this manual.

3.7 Hydraulic connections

For ease of use we recommend flexible tubing made of non compressible, food grade rubber, with an internal diameter of at least 40 mm, sized in such a way to resist a pressure of 3 bar. The connection must be carried out by authorised personnel.

3.8 Long term inactivity

In case of long term inactivity, the machine must be kept in a closed area, protected from movement, humidity and large temperature shifts.
Do not allow the machine to come into contact with corrosive substances.

3.9 Disposal

Should it become necessary to dispose of the machine, one can make a distinction between the various materials it is made of.
All materials which make up the main frame and the product flow tubing are made of stainless steel; membranes and connectors between them are made of non toxic, food grade, plastic; the electrical panel and all the electrical components may be entirely recycled.
All materials must be sent to waste recycling centers as per norms in force.

3.10 Processing

During the working process, some of the substances generated must be collected, recycled or disposed of according to the norms in force in the country in which the machine is in use.
Substances produced during the working process may be:

- Wash water
- Processing aqueous solutions
- Working discarded product (watered-down wine)

4.0 INSTRUCTION FOR USE

4.1 Predicted use

The machine is designed and constructed for the cold microfiltration of wines, including sparkling wines.

4.2 Use counterindications

The machine must not be used for any use other than its predicted use.
It must not be used in atmospheres in which there is a risk of fire, or in conditions of weather exposure, or with its safety devices unactivated.

4.3 Danger zones

The machine does not present mechanical risks since no moving parts are exposed to accidental contact.
The “danger zones” are therefore areas involved in the manual connection to energy sources (electrical power, water).

4.4 Residual risks

During the normal working cycle and during maintenance, operators are exposed to residual risks which, by the operations’ very nature, cannot be entirely eliminated.

Chemical risks

Additional risks can be linked to the use of chemical products.
If managing the various washing process phases involves specific products, the latter must be handled in respect of the provisions written on the labels attached to the products’ containers.
Machine operators must be properly trained and informed about chemical risks even if they are provided with individual protection gear.

4.5 Starting the machine and the manual mode

4.5.1 Before starting the machine.

Preparatory machine operations before the first start must be performed by a technician nominated by the manufacturer, if possible together with the technician of the purchaser so that he can learn the steps needed to carry out later maintenance operations.

WARNING

In order to obtain maximal results and to make sure that the cartridges will last long, we summarise hereafter a few good practice norms for the machine's use.

- Do not use the machine before the tanks are completely filled with liquid.
- Never cool the machine down with wine.
- Never wash wine residues with hot water.
- Never rinse out the machine after using BIOCIDA V 05 with hot water.
- Avoid excessive thermal shifts on the cartridges, never exceed a delta of T di 40°C.
- Do not wash or regenerate the cartridges by inverting the current.
- Avoid contact between the cartridges and chloro-alkaline detergents.

4.5.2 Preparing for microfiltration (starting the work)

- Completely empty all sanitizing solutions from the microfiltration plant and the bottle filler, then rinse with cold microfiltered water during about 10 minutes to remove residues.
- In order to heat the inspection circuits and tubing gradually, send hot water at 70-80°C through; empty the hot water and start sending in steam. Keep all condensation vents open in order to avoid a "plug" effectfrom condensation in vertical tubing and in siphons if these are present. Dry saturated steam sterilization must last at least 20 minutes from the moment in the temperature inside the machine reaches 121°C (1,1 bar).
- If there is no steam a sanitizing treatment can be achieved by using hot water at 80°C during 30 minutes.
- Cool immediately by using warm microfiltered water (if for some reason this is not possible immediately pressurize the bottle filler with microfiltered nitrogen), followed by cold microfiltered water. This is in order to respect graduality in temperature shifts.
- In the meantime, perform the "integrity test" on testable filtering elements; the test is done at 20°C by gradually pressurising upstream filtering elements that have first been wet with cold water. Upstream valves must be shut while downstream valves must be open (make sure that there isn't a retention valve between the filtering elements and the first downstream valve as this would invalidate the result; after a few seconds necessary for the pressure to stabilize around 1000 mbar, bring pressure to 1240 mbar and then measure 600 seconds with a chronometer. During this period the pressure must remain constant or within the tolerance limits which depend on the housing volume and on the number of filtering elements. This information will be provided by our technicians and could be changed since the continuous update of our materials doesn't exclude, in principle, that the values may change without the filtering system changing.

As an example, one housing with one 750 mm nylon 66 filtering element of 0,45 µm thickness must not be subjected to any variation, while 11 filtering elements of the same sort located in a single housing could undergo an 85 mbar pressure decrement, approximately. (see also 4.6.3.).

If the test shows the pressure to be constant during that time frame, as described above, bottling can start with the certainty that the filtering elements' integrity is present.

WARNING

Once the integrity test is finished, the system must be de-pressurized.

4.5.3 Microfiltration and bottling

- Gradually change the housings content from water to wine and start sending the wine to the bottle filler. If the lay-out permits this, send cold microfiltered water to the rinser, after you've opened the safety valve that is located in the by-pass.

4.5.4 End of bottling

- Once bottling is finished, or rather once the supply to the biological stabilization plant is finished, one needs to bottle the wine present in the tubing and housings. For this purpose, start sending in nitrogen upstream from the first filter.
- Once the above operation is finished, start washing the bottle filler and regenerating the filtering elements using cold microfiltered water (if the amount of water available is not sufficient to wash all parts at the same time, proceed step by step starting with the bottle filler and then moving on to the filtering elements). Rinsing must last at least 10 minutes, with flow rates greater or equal to that of the wine and without pouring waste water from one housing to the next, but rather emptying it out. This type of washing is termed " parallel washing".
- Empty out the washing water, send a luke-warm 1,5-2 % aqueous solution of V SANEX (chloro-alkaline detergent) only into the bottle filler. In the meantime, start regenerating the filtering elements by sending hot microfiltered water at 60-70°C into them, making sure that you empty the used water from each housing.
- Once the filter regeneration is over, start colling them down with cold microfiltered water.
- When the machine has reached room temperature, send a 0,2 % solution of BIOCIDA V05 **in rigorously cold water** through all the microfiltration units' circuits.
- The machine can be kept filled with the solution until the next working period, as long as the inactivity period does not exceed 7-10 days. If it does, we advise replacing the sanitizing solution (as it tends to loose its efficacy over time).

5.0 PRE-BOTTLING CHECKS

5.1 Checking wine filterability

- The degree of filterability of the wine is an extremely important aspect for the success of filtration involving a cold biological stabilization system.
- Several methods allow one to obtain an index which reflects this property. The one we follow is the result of our experiments in collaborations with the University of Udine.
- To carry out the test, collect at least 700 ml of the wine as it is prepared for bottling taking care that the sample is representative of the average product. This wine will need to be conditioned at 20°C and devoid of carbon dioxide; the test will consist in filtering the wine through a 0,65 micron cellulose ester membrane (this is the only material which garantees constance in pore distribution) of 25 mm diameter and surface area 3,9 $cm^{2,}$ via a push from upstream with pressurised air at a pressure greater than the membrane's bubble point (about 2 bar).
- The delays between three consecutive 200 ml volumes of filtered wine are calculated in seconds, and the data collected are processed according to the formulae in the table hereafter:

Indexes		Optimal values
FI (filterability index)	**FI= T2- 2 T1**	**FI between 0 and 10**
MFI (modified filterability index)	**MFI= (T3-T1) - 2 (T2-T1)**	**MFI between 0 and 10** **MFI ≅ FI**
Vmax (maximal filterable volume)	**$Vmax = \frac{400\ T1}{FI} + 400$**	**Vmax > 3000**

- Where T1 is time in seconds from 0 to 200 ml
- T2 is time in seconds from 200 to 400 ml
- T3 is time in seconds from 400 to 600 ml
- If FI and MFI are far apart this is a sign that the product tends to clog or that the operator did not perform the test properly.

Q.F.T. - Quality Filtration Test

- The clogging and filterability indexes as proposed by J. Laurenty, elaborated by J.J. Descout and collaborators, and perfected by M. Gaillard are presently the only parameters that can provide a valid basis for the evaluation of a liquids' filterability. Several methods and apparatuses have been developed over the years to measure these indexes but they presented a number of inconvenients of various sorts, and this may explain the large number of failures linked to the use of these parameters.
- Enologica VASON's research and years of experience in the filtration field have lead them to design an advanced system for the evaluation and for the control of the filterability of liquids and especially of clear beverages: the QUALITY FILTRATION TEST®.
- The QUALITY FILTRATION TEST® is an instrument which can establish and automatically calculate *the filterability index* (FI), *the modified filterability index* (MFI) and the *maximum filterable volume* (Vmax); the results, which are highly reproducible due to the high degree of standardisation which the instrument is capable of, are visualised on a liquid crystal display and are printed on paper. This function is important because in allows one to produce a written report of the process, which can be put on file.

- The QUALITY FILTRATION TEST® is used to evacuate the efficiency of various filtration systems: in continuous filtration, depth filtration, tangential filtration and other filtration systems.
- For further information contact our technicians.

5.2 The integrity test (Fig. 3)

How reliable filtration is in terms of removing micro-organisms depends on cartridge integrity. In order to be certain that the membrane final filtration system is performing as required, several tests can be performed. The test of greatest interest is the "**integrity test**" or pressure holding test; because it is not destructive and it can be carried out directly on the line. If performed properly the test offers an absolute garantee that the membrane is in good shape (integrity). The integrity test, based on air being diffused through a membrane that has previously been wet (Fick's law), allows one to obtain a clear and unequivocal indication of the efficiency of the filtering system: the integrity test is closely correlated to the filter's performance. It consists in pressurising the housing (with the membranes very wet) with air or nitrogen, to a test value that is well defined for each filtering system. The latter is efficient if the pressure drop attributable to diffusion is less than a predetermined value after a period of 10 minutes.

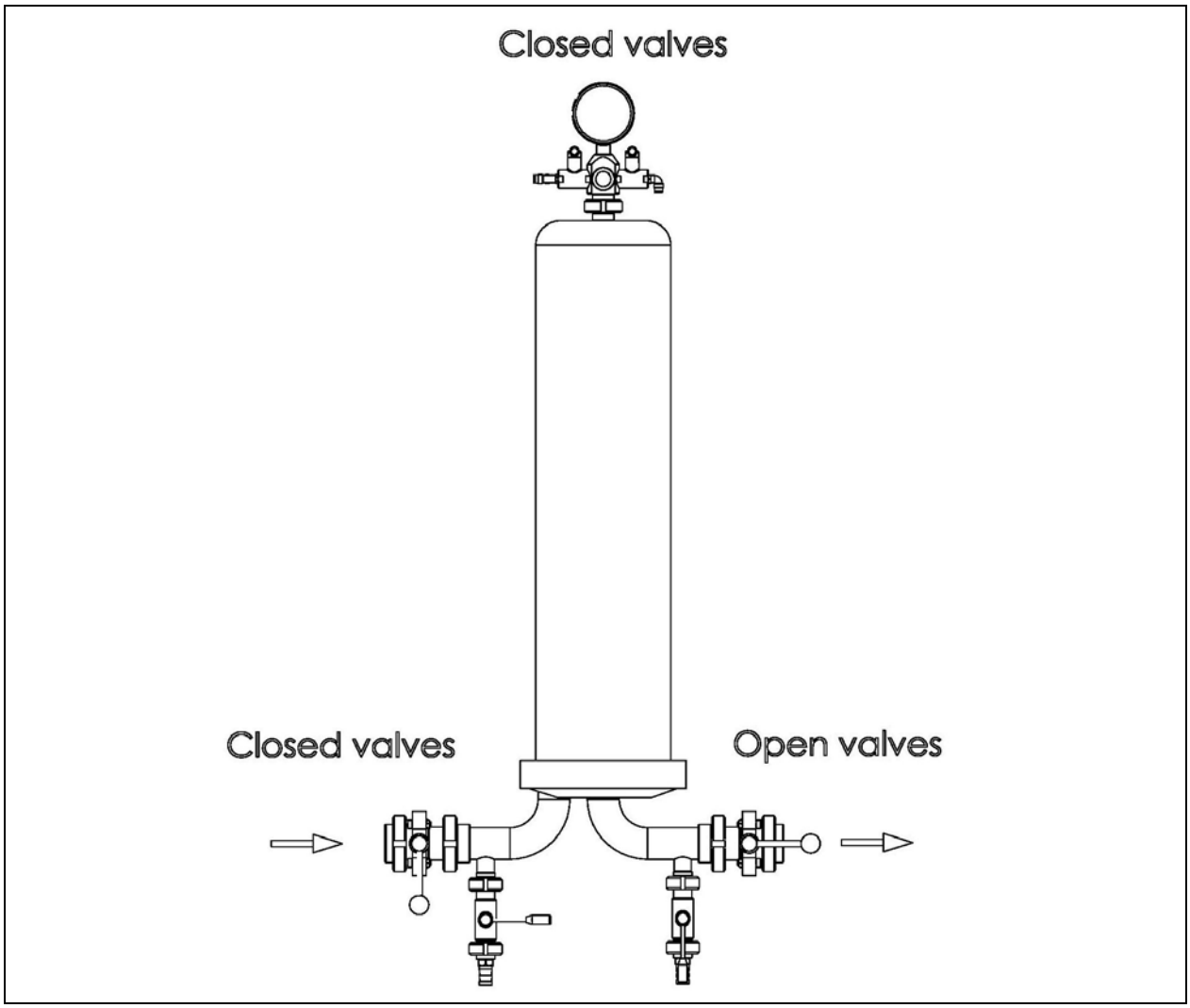


Fig. 3

The integrity test can be summarised with the following temporal diagram (Fig. 4):

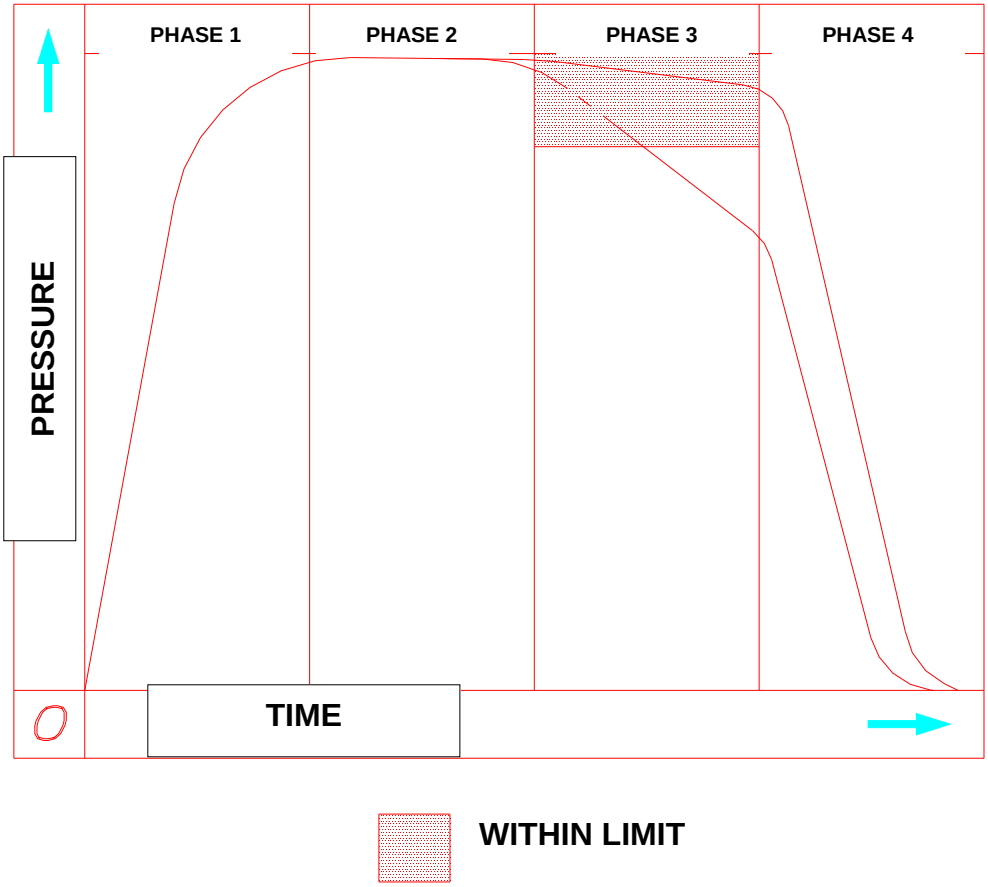


Fig. 4

In figure 4. the typical temporal phases of the integrity test are shown:

- *Phase 1 Pressurisation*
- *Phase 2 Stabilisation*
- *Phase 3 Diffusion control*
- *Phase 4 Venting*

6.0 EXTRAORDINARY CHECKS

6.1 Premise

- The microfiltration unit is subject to “wear and tear”!
- All the valve, footing and connector gaskets, in spite of their high chemical and thermal inertia, can give over time.
- These changes can lead to slight leakage of the valves and it is best ot detect such defects early on in order to be able to garantee the best possibile function of the machine and the ease of sanitising operations, which is indispensable to ensure sterility.

6.2 Checking the housings

- It is good practice to regularly check that each housing does not present any leakage which could be due to the housing gaskets or to the valve gaskets.
- This check can only be done by filling the housing with water, checking that the water level is maximum, i.e at the vent level; with all valves shut, microfiltered nitrogen is introduced through the gas inlet on each housing’s manometer. Test pressure is 5,0 bar.
- The set pressure must be maintained.
- For microfiltration systems with more than one housings the test must be done keeping the housing separate. This operation can be done by keeping the bypass valves open.
- Avoid leaving housings under pressure without surveillance or without a signal infoming on the state in which they are (eg. DEVICE UNDER PRESSURE – DO NOT TOUCH).
- At the end of the check allow for slow venting through the top venting valve. The cartridges’ present inside the filter do not jeopardise the result or introduce any bias whatsoever into the test.

6.3 Checking the valves

- Valve integrity is checked with the same modalities as are described above, working in such a way that the valve under scrutiny will be subjected to atmospheric pressure on one side and to 5,0 bar on the other side.This allows one to detect gasket problems immediately.
- One then proceeds step by step so as to check every valve.

7.0 MAINTENANCE

The machine does not require frequent maintenance operations.
In order to guarantee efficiency and good shape we recommend carrying out careful external cleaning regularly.
Regularly (every 60 days) check the proper function and good retaining capability of the valves.
In case of malfunction or if the group of filters needs replacement, we recommend calling our authorised technical personnel.

8.0 ATTACHMENTS

8.1 CE mark declaration and declaration of conformity