

MANUAL FILTERABILITY APPARATUS

STANDARD OPERATING PROCEDURE

BACKGROUND

Filterability testing is a simple way to identify wines that have the potential to clog final membrane filters, such as those used for sterile filtration on the packaging line. Filterability testing should be conducted after cellar filtration once the wine is ready to be packaged. Testing should be conducted **as close as possible to packaging**.

Filterability testing uses a sample of the wine that will be packaged in conjunction with the same membrane material that will be used in the final filter. A sample of wine is pressurized as it passes through a 25 mm membrane filter disc (provided by the manufacturer and **made of the same material** as the membrane filter). The test measures the volume of wine filtered (mLs) over time (seconds) and a filterability index value can be calculated.

FILTERABILITY INDEX (FI)

$$FI = T_{400} - 2T_{200}$$

MODIFIED FILTERABILITY INDEX (MFI)

$$MFI = (T_{600} - T_{200}) - 2(T_{400} - T_{200})$$

WHERE:

- T_{400} = time (in seconds) it takes to filter 400 mLs of wine
- T_{200} = time (in seconds) it takes to filter 200 mLs of wine
- T_{600} = time (in seconds) it takes to filter 600 mLs of wine

INTERPRETING THE RESULTS:

- If $FI > 20$, filtration problems may occur
- If $FI \leq 20$, no filtration problems are expected
- If $FI \approx MFI$ and ≤ 20 , no filtration problems are expected
- If $FI \ll MFI$, filtration problems may occur, especially as filtration progresses
- If $FI \gg MFI$ and ≤ 20 , no filtration problems are expected

Note, filterability testing is not fully representative of what happens on the packaging line, and filtration can be impacted by factors such as the volume of wine to be filtered, membrane and pre-membrane condition, etc. For example, extremely large volumes of wine with moderate FI measurements could still clog membranes.

IMPORTANT CONSIDERATIONS

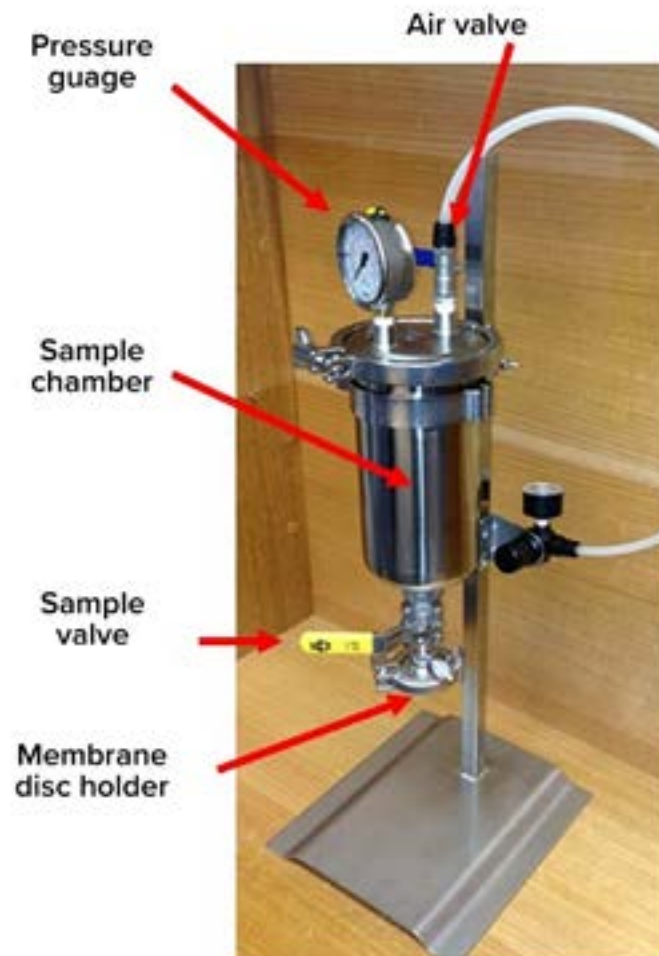
- Filterability testing can only be conducted on membrane media. This test is not intended to predict performance of depth (pre-filtration) material such as pads, lenticular modules, or depth cartridges.
- Filterability should be measured **as close as possible** to the packaging event. If packaging will take place over the course of several days, filterability should be determined daily.
- The temperature of the filterability sample should **match** the temperature that the wine will be on the packaging line.
- Samples should be analysed in **duplicate** to ensure data integrity.



This equipment is pressurized. Ensure that pressure is released from the system prior to opening the wine chamber. This can be done using the pressure release valve on the top of the pressure chamber.

**APPARATUS AND COMPONENTS:**

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**ADDITIONAL MATERIALS NEEDED:**

- RO or distilled water in a squeeze bottle
- Wine to be analyzed – 750 mL
- Tweezers for handling membrane discs (oils from your fingers can impact the filter performance)
- 25 mm membrane test disc – identical to the packaging membrane in use
- Stopwatch
- Graduated cylinder capable of measuring at least 600 mLs (with graduations at 200 mLs, 400 mLs, and 600 mLs)

**PROCEDURE**

1. Ensure the unit is clean.
2. Ensure the sample chamber is securely mounted with enough clearance to position the graduated cylinder underneath.
3. Ensure correct orientation of the membrane disc.
4. Using membrane tweezers, place the membrane disc in the membrane disc holder, wet the membrane with a small amount of distilled water and reassemble the disc holder back onto the apparatus.
5. Remove the lid from the pressure vessel, close the sample valve, and fill the sample chamber with 700 – 750 mL wine.
6. Open the sample valve briefly to run a small volume (~5 – 10 mL) of wine through the apparatus to expel any air in the system. Discard the small amount of filtrate.
7. Place the lid on the sample chamber and seal.
8. Connect a suitable compressed air source to the pressure regulator and regulate the inlet pressure to the sample chamber to 2.0 bar (30 psi).
9. Place the measuring cylinder below the outlet of the membrane disc holder to catch the filtrate.
10. Simultaneously open the disc ball valve and start the stopwatch.
11. Record the time (in seconds) for filtration of 200 mLs, 400 mLs and 600 mLs of wine.
 - **If the assay is incomplete after 10 minutes**, the sample has likely failed the filterability test.
 - **If the test does not fail and has collected 600 mLs of wine**, then you will be able to determine both the FI MFI values using the formulas on page 1.
12. Turn off the sample tap.
13. Open the pressure relief valve to ensure that all pressure is released.
14. Disassemble and rinse the membrane disc holder to examine the test disc. Identify if the membrane disc was correctly seated. If it was not, the test must be repeated.





15. Remove the pressure chamber triclamp and lid.
16.
 - **If the same wine must be remeasured**, proceed with the next measurement without rinsing.
 - **If a different wine must be measured**, wash down the vessel with distilled water from a squirt bottle before rinsing with the new sample. Proceed with the next measurement.
17. After all tests have been conducted for the day, clean the apparatus:
 - Close the sample tap and fill the vessel with warm water up into the top of the pressure vessel and then drain. Repeat at least once.
 - Ensure that instrument and its surroundings are cleaned of any wine spills.
18. Close the tap on the main supply of gas to the apparatus.

CLEANING PROCEDURE

Every few days of use or before storage clean the entire apparatus with diluted dish soap or detergent. Fill a large beaker with warm water and add a few drops of dish soap or detergent. Place all fittings inside the beaker and allow to soak. Scrub gently, rinse, and allow to dry (use canned air to dry the membrane support disc).