

# The ABCs of filtration and what works for you

At this time of year there are always lots of questions regarding filtration. Here are some of the more common ones:

## What is the difference between Absolute versus Nominal filter ratings?

Nominal micron rating indicates the ability of a filter to retain a nominal amount, or remove a minimum percentage (usually 50-90%) of material, of the rated pore size.

Absolute micron rating indicates the actual pore or opening size of the filter medium and thus indicates the size of the smallest particle that will be removed by the filter.

## What is the difference between depth and surface filtration?

Depth filters are not absolute filters because they do not have a precisely defined pore size or structure. They remove particles that are larger than the aperture or pore size of the filter by mechanical retention of the particles, by adsorption, or by an electric charge that can attract and trap smaller particles. They are used for high solids removal and high throughput, with diatomaceous earth, perlite and cellulose pads falling into this category. Today many are bypassing depth filtration and using clarification techniques such as centrifugation or flotation, or cross-flow filtration.

Surface filters are generally absolute filters with precisely defined maximum pore sizes, and include 0.65 and 0.45 µm or 'sterile' filtration. They remove particles like a sieve, with larger particles retained on the surface of the filter which gradually blocks the flow. Absolute filtration is useful for sterile filtration at the bottling line and at times when you need guaranteed removal of microorganisms. Prior filtration with a depth filter and other surface sacrificial filters at a higher pore size is usually required to prevent clogging the surface of a membrane filter.

## Can I use cross flow for sterile filtration?

Cross flow filtration is a surface filter that allows high throughput due to the tangential nature of the filter that continually cleans the filter surface. Most cross flow membranes are only nominally rated at 0.2 µm which is theoretically tight enough for sterile filtration but as it is only a nominal rating, and can't be pressure tested for integrity before use, wineries will still need to use a membrane filter if they want to achieve a sterile filtration.

Wine type	Brilliant	Turbid
White wine	<1.1	>4.4
Rose wine	<1.4	>5.8
Red wine	<2.0	>8.0

## What NTU level do I need for filtration?

Many contract bottling facilities require wine to be provided ready for bottling and with a certain level of clarity. The AWRI generally recommends using turbidity as an indication of clarity although some producers also use filterability tests to gain an indication of how the wine will react with the filtration media. If using filterability tests, it's important to ensure that the filters used in the test are identical to those used in the cellar.

Correspondence between turbidity measurements (NTU) and

appearance is shown in the table below adapted from Ribéreau-Gayon et al. 2006. Some bottlers will require tighter turbidity clarification levels for filtration at bottling.

## What level of filtration do I need?

The following table collates typical filtration media supplier recommendations for NTU levels against their filter and nominal micron rating, and is intended as a guide only. If you know the NTU of a wine then it should be easy to determine which filter pore size to use. Contact the filter manufacturer for more detail.

Filtration purpose	NTU	Cuno sheets <sup>1</sup>	Seitz sheets <sup>2</sup>	Ekwip grade <sup>3</sup>
First racking	35 -<100	5H (5.0µm) 10H (2.0µm)	K900 (8µm)	Z3 (2.0µm) Z5 (1.0µm)
Second racking	12-35	30H (1.0µm) 50H (0.8µm)	K250 (4µm)	Z5 (1.0µm) Z6 (0.8µm)
Final filtration for dry wines	1.0-3.0	50H (0.8µm) 60H (0.5µm)	K200 (3.0µm) K150 (2.0µm)	Z6 (0.8µm) Z7 (0.6µm)
Filtration for sweet, higher risk or final polish pre-membrane filtration	<1.0	70H (0.3µm) 90H (0.2µm)	KS50 (0.5µm) EK (0.4 µm)	Z7 (0.6µm) Z8 (0.4µm)

1. Cuno <http://www.3mpurification.com.au>
2. Seitz <http://www.pall.com>
3. Ekwip <http://winequip.com.au/Filtration>

## Does filtration strip out colour and flavour?

It is a long-held belief in the wine industry that tight filtration such as membrane or sterile filtration below 0.45 µm will strip the aroma and colour from big red wines. For this reason, many winemakers avoid the use of sterile filters in wine production, which can cause uncertainty in microbial stability of the finished wine.

Surprisingly there have been few studies investigating different levels of filtration on wine colour and impact on sensory quality.

The question of whether the colour would drop out anyway over time is also raised. A study at UC Davis is currently investigating if filtration strips out colour and has any impact on flavour over time (Bohanan et al. 2011). Current results after six months show no sensory or chemical differences between control and filtered red wines. The AWRI in turn is investigating wine texture and the role of macromolecules, and if these are removed by filtration.

For more information on filtration, contact the AWRI Winemaking Services team at [winemakingservices@awri.com.au](mailto:winemakingservices@awri.com.au) or 08 8313 6600.

## References

1. Ribéreau-Gayon, P.; Glories, Y.; Maujean, A.; Dubourdieu, D. (2006b) Handbook of Enology Second Edition Volume 2: The Chemistry of Wine Stabilisation and Treatments. Chichester: John Wiley & Sons Ltd.
2. Bohanan, L. Strekas, J. Boulton, R. Heymann, H. Block, D.E. Evaluating the effects of membrane filtration on sensory and chemical properties of wine. [http://stream.ucanr.org/fps\\_wine\\_research\\_2011/Block/](http://stream.ucanr.org/fps_wine_research_2011/Block/)