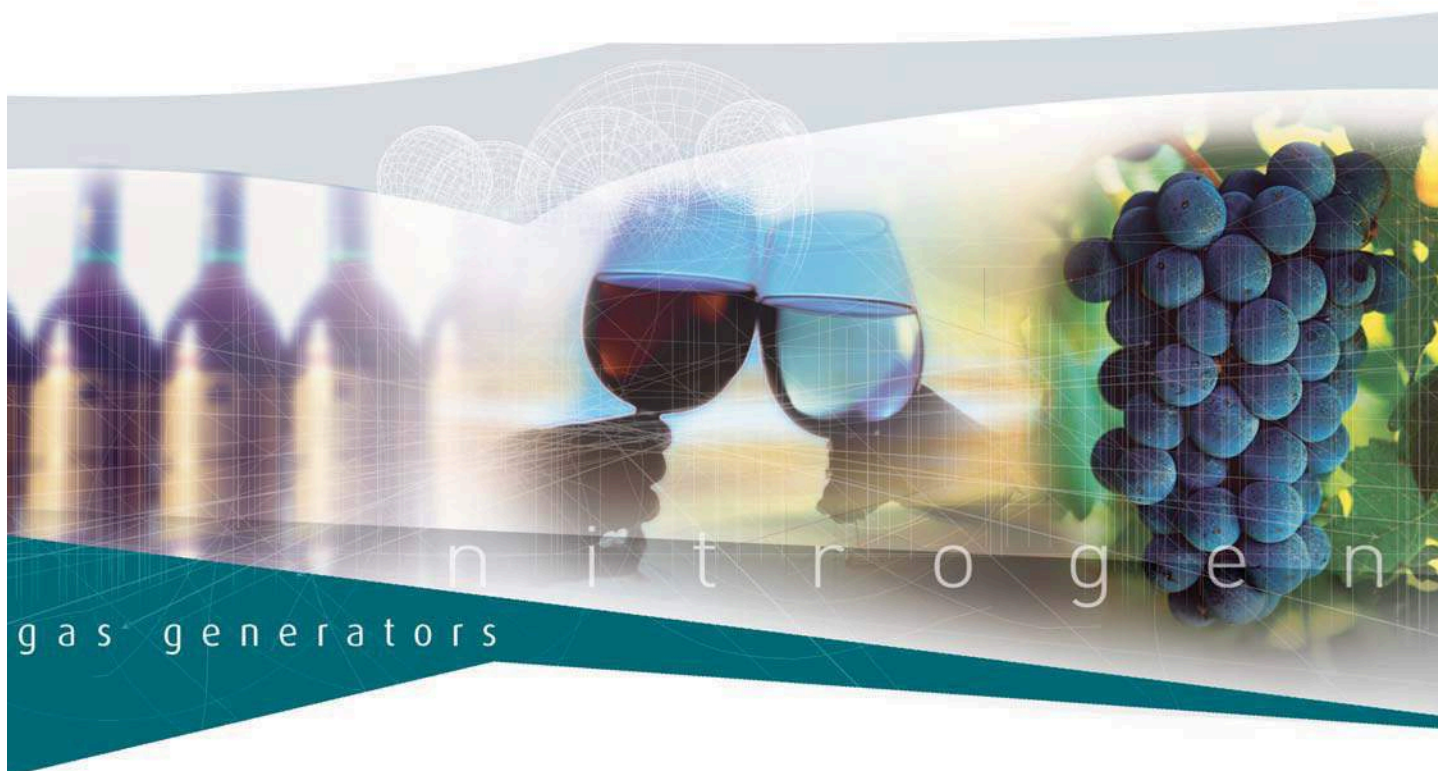




domnick hunter



MAXIGAS Nitrogen Supply for winemaking

www.domnickhunter.com

Winemaking and bottling

Nitrogen in winemaking is used as a method of reducing the presence of oxygen and preventing degradation, it has been widely used by wineries now for over 20 years.

A small degree of oxidation is required to mellow and age some wines, however excessive oxygen can adversely affect wine colour, aroma and taste. Oxidation problems include:

- Enzymatic oxidation - causes browning of wine colour
- Bacterial growth - causes spoilage
- Pinking - affects white wine after fermentation

Oxidation can be controlled through careful management of temperature and pressure, while nitrogen will reduce the level of oxygen to below 1%. Unlike other inert gases, nitrogen has a low solubility and specific gravity, it is also more cost effective. Most wineries will accept a dissolved oxygen content of under 2ppm.

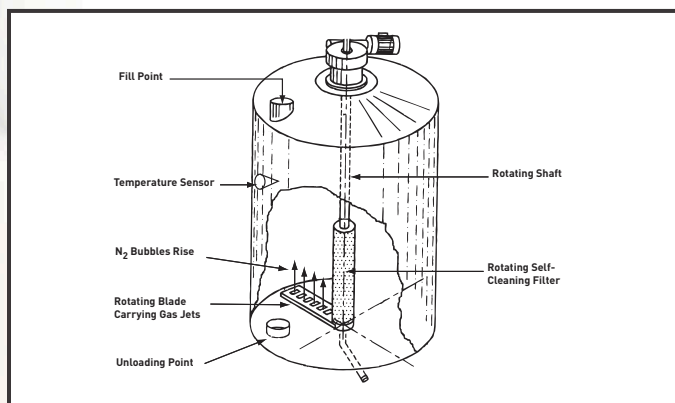
Nitrogen can be of benefit at several stages in the production process, some of which are outlined here.

Wine-making stage	Nitrogen application
Fermentation	Must lifting
De-aeration / CO ₂ adjustment	Sparging
Storage	Tank blanketing
Production	Clarification
	Pressure transfer
	Membrane filter integrity testing
	Centrifuge
	Pressure lock drain doors
	Purging equipment
	De-alcoholisation
Bottling / Packaging	Flushing bottles, casks, boxes
	Drying
	Filling
	Corking
Other	Wine dispensing

Fermentation and nitrogen assisted pigeage

Red wines to a greater or lesser extent, rely on extraction from grape skins and pulp that float on the surface to deepen colour and increase tannin content. Pigeage or cap dipping is the process of stirring and immersing grape solids during fermentation to extract tannins that add colour.

Manual pigeage can be labour intensive and very time consuming. Adding nitrogen gas to the bottom of fermenting vats that have internal stirring arms greatly improves the process. Nitrogen forms bubbles that lower juice density, this causes the juice to rise and the solids to be immersed.



Fermenting Vessel With N₂ Assist

Sparging and N₂ flow rates

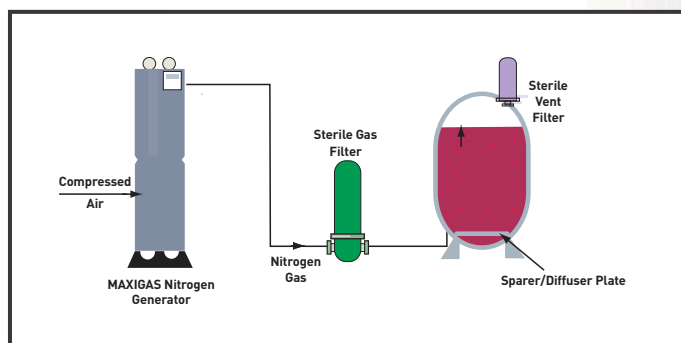
After fermentation it is essential that wine be kept oxygen free to maintain its quality and prevent oxidation. Sparging removes dissolved oxygen and adjusts the carbon dioxide levels of wine, it also ensures the wine does not oxidise excessively after bottling.

The sparging process introduces small nitrogen bubbles to the wine either in pipelines or in process / storage tanks. Oxygen leaves the product and migrates into the nitrogen bubble, as the nitrogen bubbles rise to the surface and escape the liquid, so the gas is vented from the tank.

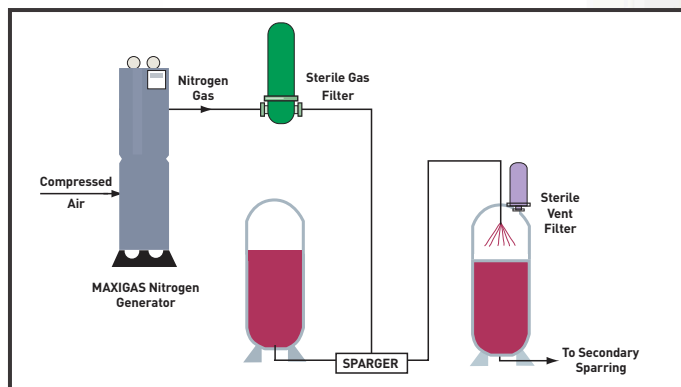
Sparging efficiency depends on:

- Nitrogen bubble size
- Contact time (5 to 30 seconds)
- Wine temperature (15°C to 20°C)
- Pressure (100 to 200 kPa)
- Nitrogen flow rate
- Number of sparging processes

Nitrogen flow rates should normally be between 0.1 and 0.3 volumes, although it can be as high as 0.8 to 1.2. A typical amount of oxygen in bottled wine is 7-10 cc/litre. A single stage sparging process can reduce this to 2-3cc/litre, while a two stage operation can reduce the level to 1-2cc/litre.



In-tank sparging



In-line sparging

Tank blanketing

Introducing nitrogen to the headspace (ullage) of processing and storage tanks reduces atmospheric oxygen to prevent oxidation and protects against spoilage by yeast and bacteria.

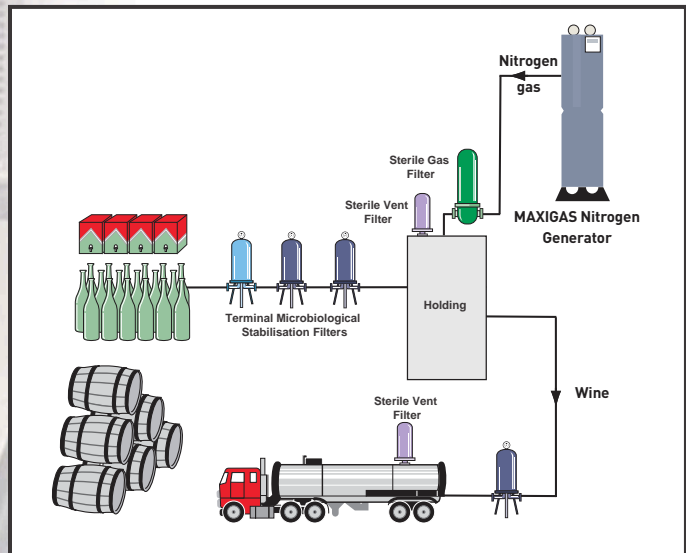
Must storage

Use of sulphur dioxide to stabilise must during extended storage is common practice. This depresses microbiological growth and dissolved oxygen but can lead to undesirable flavour components. Sparging with nitrogen reduces the amount of sulphur dioxide required for stabilisation.

Pressure transfer

Many liquids are difficult to pump or are degraded by conventional mechanical pumping methods.

High-pressure nitrogen is applied to the headspace of tanks to assist pump transfer of must and wine from one tank, along lines, to other vessels and road tankers that have been purged to provide a suitably oxygen free atmosphere during transportation to other processing sites.



Pressure Transfer

Purging

Equipment and pipelines are subject to microbiological contamination and oxygen pick-up, purging with nitrogen that has a high purity will reduce oxygen and limit the growth of bacteria and other micro organisms.

Wine mixing

Introducing nitrogen to a tank through a perforated manifold provides an effective alternative to mechanical stirring devices, which require thorough and regular sterilisation.

Bottle flushing/drying

Flushing with pure clean dry nitrogen gas is much more effective than sterilisation alone since nitrogen gas can reduce water usage and purges oxygen from the bottle prior to filling.

Bottle filling

During bottling, oxygen pick-up from entrained air as the bottle is filled can be a problem. Increased dissolved oxygen and resultant oxidative degradation can be eliminated by purging the bottle with nitrogen prior to filling.

On-site gas mixing

Carbon dioxide prevents wine from becoming flat and adds to its bouquet. CO₂ purifiers from domnick hunter can be fully integrated with MAXIGAS to provide the optimum gas mixture for red and white wines on-site. The pressure of both gases should be in the range 400 to 600 kPa.

“ Our objective was to find a safe system of putting extra pressure onto the delivery pipeline. Moving the juice and skins using a pump alone has caused problems in the past.

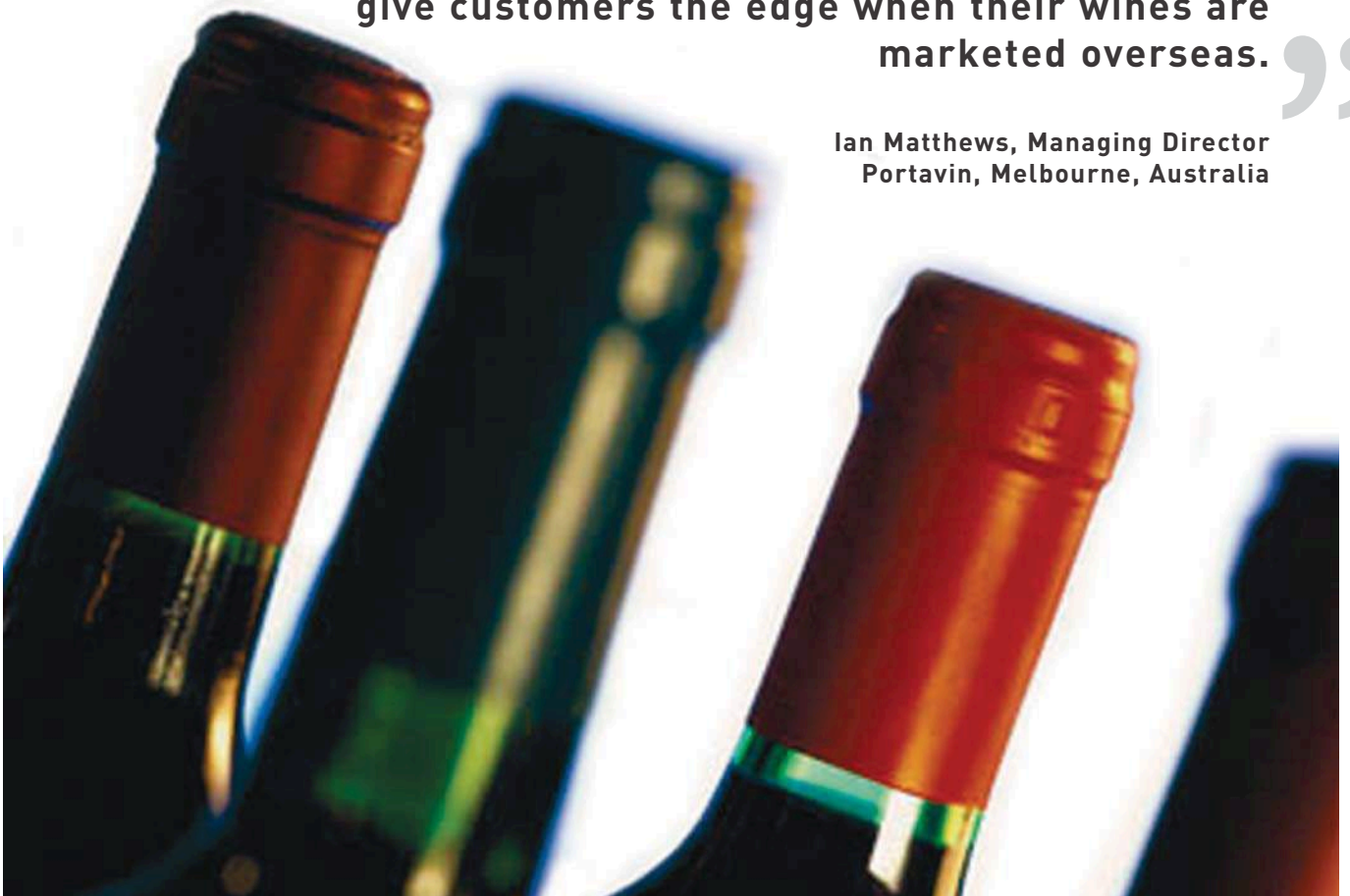
The introduction of the MAXIGAS nitrogen generator has taken a lot of the strain off the pump and was very economical.”

Chris Roux, Co-operative Manager
Wamakersvallei Winery, South Africa

“ All of our bottling plants have a compressed air installation, we utilise MAXIGAS to capitalise on this resource and do away with continual purchases of cryogenic gas.

Our aim is to maximise production efficiencies whilst ensuring high standards that give customers the edge when their wines are marketed overseas.”

Ian Matthews, Managing Director
Portavin, Melbourne, Australia





MAXIGAS
model N2MAX116

MAXIGAS is a cost effective alternative to other gas sources with no on-going costs such as refills, order processing or delivery charges.

It is also a safer alternative as manhandling of high-pressure cylinders is eliminated.

Production downtime is minimised due to the permanent availability of an on-demand nitrogen supply.

Maxigas gives manufacturers increased control over flow rates and requires minimal maintenance. It can also bring valuable space saving advantages.

MAXIGAS deliverables

- Nitrogen purity of up to 10 PPM oxygen content
- On-demand nitrogen
- Increased control
- No reliance on gas deliveries in remote or congested areas
- Modular space saving design
- Ability to add extra banks of generators
- Simplicity
- Innovative regeneration feature requires minimal maintenance
- domnick hunter global service and support
- Easily retrofitted
- Industry experience - over 40 vineyard installations



How it works

MAXIGAS is constructed from pairs of extruded aluminium columns filled with carbon molecular sieve (CMS) and operates on the pressure swing adsorption (PSA) principle to produce a continuous stream of nitrogen gas from compressed air. Oxygen and other trace gases are preferentially adsorbed by the CMS, allowing nitrogen to pass through.

Carbon molecular sieve differs from ordinary activated carbons in that it has a much narrower range of pore openings. This allows small molecules such as oxygen to penetrate the pores and be separated from the air stream. The larger molecules of nitrogen by-pass the CMS and emerge as the product gas.

After a pre-set time when the online bed is almost saturated with adsorbed gases, the system automatically switches to regenerative mode, venting the contaminants from the CMS. The second CMS bed then comes online and takes over the separation process. The pair of CMS beds switch between separation and regeneration modes to ensure continuous and uninterrupted nitrogen production.



Carbon molecular sieve