PAYBACK SCENARIOS FOR NITROGEN GENERATORS FOR MANUFACTURING & PROCESS APPLICATIONS

THERE ARE THREE PAYBACK SCENARIOS BASED ON A SMALL, MEDIUM, AND MEDIUM TO LARGE PRESSURE SWING ADSORPTION (PSA) NITROGEN GENERATOR SYSTEMS

SCENARIO 1: Based on a small system (CarboTrade model GA10S+) that produces 10.3 Nm³/hr of Nitrogen at a purity of 99.9% at a total complete system cost of $80,000. This shows a payback of 21 months on the purchase of the nitrogen gas generating system.

SCENARIO 2: Based on a medium system (CarboTrade model GA40S+) that produces 29 Nm³/hr of Nitrogen at a purity of 99.9% at a total complete system cost of $140,000. This shows a payback of 17 months on the purchase of the nitrogen gas generating system.

SCENARIO 3: Based on a medium to large system (CarboTrade model GA80S+) that produces 59.8 Nm³/hr of Nitrogen at a purity of 99.9% at a total complete system cost of $210,000. This shows a payback of 13 months on the purchase of the nitrogen gas generating system.

NOTES:
• The complete system includes the specified CarboTrade model of nitrogen generator, and an oil free compressor, dryers and filters etc.
• This payback scenario is based on estimates as at April 2010 and would need to account for exchange rate fluctuations.
• The scenario does not take into account delivery charge, GST, or installation or piping.
• A large range of standard nitrogen generators are available. They include a model with a flow rate up to 142.5 Nm³/hour @ ATP with a nitrogen purity of 99.99%. The same model will provide a flow rate of 997.5 Nm³/hour @ ATP with a nitrogen purity of 95%.
• Custom designed nitrogen generation plants are also available.

FLOW VERSUS PURITY COMPARISON:
Left is a summary table of the flow versus purity for the three models of CarboTrade Nitrogen Generators used in this scenario. It also includes the input air volume required for each generator.

CONTACT ON SITE GENERATING SOLUTIONS TO DISCUSS YOUR NITROGEN GAS REQUIREMENTS AND TO ARRANGE FOR YOUR OWN PAYBACK SCENARIO TO BE PREPARED

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Telephone: +61 3 5367 8277 • Fax: +61 3 5367 6477 • Email: info@onsitegenerating.com • Web: www.onsitegenerating.com
An extensive range of nitrogen generators are available to suit the gas requirements of wineries regardless of their production size. A complete range of high purity gas generators are available to meet the needs of laboratory instruments and equipment.

CARBO TRADE

CarboTrade Nitrogen Generating Plant model GAS500 for delivery.
depressurisation to ambient pressure. The tower is totally regenerated just by
During adsorption in one tower the second tower is totally regenerated. The oxygen enriched off gas leaves the tower. The oxygen is adsorbed on the CMS and nitrogen is removed to the atmosphere. After about one minute of adsorption in one absorption tower the process controller switches over to the second tower and the first one is regenerated.

These nitrogen generators are able to be supplied at various preset purities to meet the requirements of your process. Purities range from 99.999% downwards.

FIGURE 1

An extensive range of nitrogen generators are available to suit the gas requirements of wineries regardless of their production size. A complete range of high purity gas generators are available to meet the needs of laboratory instruments and equipment.

FUNCTIONAL DESCRIPTION

The nitrogen generation plant based on the PSA-process consists of two adsorption towers filled with Carbon Molecular Sieve (CMS). Compressed and purified air is passed through the adsorption towers. Mainly oxygen is adsorbed on the CMS and nitrogen enriched gas leaves the tower. The oxygen concentration can be reduced to almost all required levels.

During adsorption in one tower the second tower is totally regenerated just by depressurisation to ambient pressure. The oxygen enriched off gas with 30 – 35% volume oxygen content is vented to atmosphere. After about one minute of adsorption in one absorption tower the process controller switches over to the second tower and the first one is regenerated.

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FIGURE 1

MIXING & DISPENSING

Our partners, CarboTrade Worldwide have provided nitrogen generation systems for beverage storage, CO2 mixing and beverage transport to breweries and wineries for years.

The low nitrogen flow and constant demand required lends itself ideally to nitrogen generation. Nitrogen has two purposes in the beverage industries:

1. For breweries and microbreweries a nitrogen gas generating plant will provide a reliable, inexpensive replacement to the hassle of constantly replacing cylinders for the inerting of tank head space.
2. Nitrogen is an ideal product propellant to maintain flow of beverages through piping of almost any distance. Nitrogen not only moves product efficiently around the plant, it does so without spoilage or foreign body build up in the pipe.

WINAPPLICATIONS

• Headspace. One of the main reasons to use inert gas in the headspace (village) of a wine storage container is to prevent spoilage by yeast and bacteria in addition to protecting the wine against oxidation.

• Transferring Wine with Nitrogen. The most common way to do this is by using what is referred to as a Bulldog Pup. The Bulldog is used to transfer wine from a barrel or stainless tank to a storage vessel. The Bulldog is made up of a stainless steel wand which has an expandable silicone bung which seals the vessel. Nitrogen is pushed into the vessel using the tube connected to the wand. The nitrogen pushes the wine out of the vessel that you are trying to empty. The wand has an adjustable screw at the bottom which is excellent for transfer and racking. It’s also a great way to top barrels. Bulldogging is preferred because of the little contact with oxygen in addition to being very gentle on the wine.

• Sparging. The sparging technique is used to either increase or decrease the level of a certain gas in the wine. Sparging relies on the principles implied by Dalton’s extension of Henry’s Law, which states...that the amount of any one gas dissolved in a mixture of gases is proportional to its partial pressure, when the gas has reached equilibrium in the liquid.

The effectiveness of sparging depends on the following factors:
• the gasses bubble size,
• contact time of the gas,
• temperature of the wine,
• pressure,
• flow rate of the gas relative to the liquid,
• equipment and systems design, and the
• original amount of gas present in the wine.

• Removal of Oxygen. Sparging with nitrogen can be used to remove oxygen that may have been absorbed during handling. It can also be used in reductive wine making. Other gases such as CO2, H2S, and SO2 can be removed using large quantities of nitrogen gas.

WINEAPPLICATIONS

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NITROGEN USE IN WINE, BEER AND SOFT DRINK

CarboTrade Nitrogen Generating Plant model GAS50 for delivery.

FIGURE 1
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PSA-N₂ UNITS: GA RANGE - FLOW VERSUS PURITY TABLE
N₂ FLOW (Nm³/HR) AT STATED % N₂ PURITY @ ATP

<table>
<thead>
<tr>
<th>MODEL</th>
<th>FLOW</th>
<th>NITROGEN PURITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA10S+</td>
<td>PROD. N₂</td>
<td>2.1</td>
</tr>
<tr>
<td>CA10S+</td>
<td>AIR 10 BAR</td>
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<tr>
<td>CA40S+</td>
<td>PROD. N₂</td>
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</tr>
<tr>
<td>CA80S+</td>
<td>AIR 10 BAR</td>
<td>102.8</td>
</tr>
</tbody>
</table>

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