# Liquid Nitrogen Dosing Application Focus

## Preservation

### Wine Bottling

Chart is known industry wide for its frost-free, vacuum insulated, liquid nitrogen equipment and piping distribution systems. With over 3,000 dosing units installed, Chart has a wealth of application specific knowledge across a wide range of dosing applications.

#### The Challenge

As the wine industry transitions to screw caps, wine makers are presented with new, unique challenges. Although screw caps eliminate the concern of "cork-taint", screw cap bottles have a greater volume of headspace. Wine is exposed to oxygen trapped in the bottle headspace which in turn can result in increased dissolved oxygen levels, even after the cap is applied. Chart can help make this transition a success.

#### The Solution

By introducing liquid nitrogen into the bottle after filling, wine makers reduce headspace $O_2$ content by more than 85%. Typical results are 2.0 - 2.5% $O_2$. Less headspace $O_2$ results in a significant reduction of dissolved $O_2$ pickup. A very small dose of liquid nitrogen is dosed into the filled bottle. One part of liquid nitrogen warms and turns into 700 parts of gas, displacing $O_2$ from the headspace.

#### Partial List of Customers

- **Beringer Winery**
- **Domaine Chandon**
- **Halsey Mobile Bottling**
- **Napa Wine Company**
- **Sonoma Cutrer**
- **Caymus Vineyards**
- **E&J Gallo**
- **Joel Gott**
- **Ryan-McGee Mobile Bottling**
- **Top-It-Off Mobile Bottling**
- **Constellation Wines**
- **G-3 Mobile Bottling**
- **Kendall-Jackson**
- **Signature Mobile Bottling**
- **Ultima Mobile Bottling**

#### Key Benefits

- **Reduce head space oxygen levels** – documented, extended shelf life studies show a 90-95% reduction in headspace oxygen content.
- **Decrease total package oxygen** – a 59% reduction in total package oxygen when compared to a traditional gas purge of headspace.
- **Minimize $SO_2$ requirements** – studies show consistent "Day 1" and "8 Week" headspace and dissolved oxygen levels – allowing winemakers to confidently control the use of sulfer dioxide while maintaining acceptable free sulfer dioxide levels.

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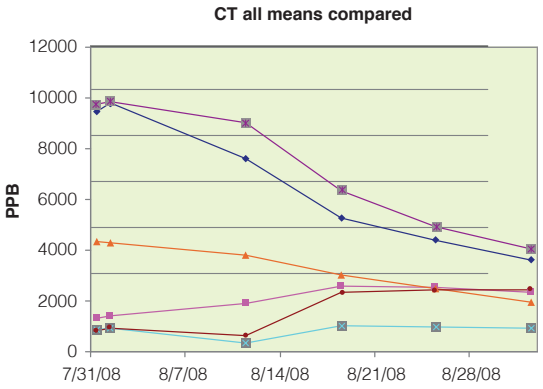
# Pre-Fill and Pre-Cap

## Purging with Liquid Nitrogen



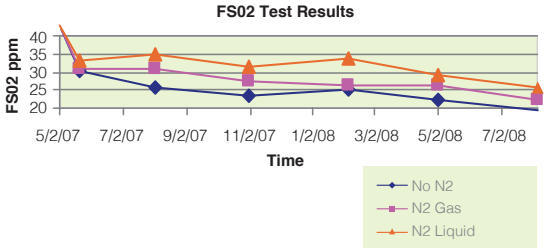

HS = Headspace
DO = Dissolved $O_2$
PC = Pre-cap (Headspace)
PF = Pre-Fill (Empty Bottle)

**Conclusion:**
Lowest HS and DO with pre-cap (headspace) liquid nitrogen purge.

### Inerting with Liquid Nitrogen

- Effectively flushes $O_2$ out of the bottle head space
- Extends shelf-life in screw cap packages
- Keeps the fruit in every pour

# $FSO_2$ Results




**Conclusion:**
Liquid nitrogen dosing best "locks-in" $FSO_2$ levels.

Liquid nitrogen dosing provides winemakers with better diagnostic insights for proper $SO_2$ usage.

### Customer Testimonials

"Fresher, cleaner, brighter best describes wine protected with liquid nitrogen dosing....In my opinion, the addition of a Chart liquid nitrogen dosing system to our bottling line resulted in the single most significant improvement in product quality during my 33 year tenure. You can bet the ranch that a Chart system will be on the equipment list of every bottling line I spec."

— VP, Manufacturing and Winemaking at St. Julian Winery

Paso Robles Wine Country was named 2013 Wine Region of the Year by Wine Enthusiast Magazine. Our customer in that area states that it's "all because of the doser"!

# Dissolved $O_2$ Data

### Nobilo Winery Orca Bay—New Zealand Sauvignon Blanc

Headspace Volume- 30 ml; Nozzle size = 0.050"; Line speed = 80 bpm; Dwell time to capper = 4 sec.; all bottles shaken for 1 min.

### Dissolved Oxygen (ppm)

- Dissolved $O_2$ at filler ..... 0.709
- 0ms $LN_2$ dose control sample ..... 1.86
- 20 ms $LN_2$ dose ..... 1.08
- 30 ms $LN_2$ ..... 0.979
- 40 ms $LN_2$ ..... 0.854
- 50 ms $LN_2$ ..... 0.801
- 60 ms $LN_2$ ..... 0.768

### Chart Services

- Application support
- On-site equipment demonstrations
- System design
- CAD drawings
- Installation and setup
- Technical support
- Maintenance

For more information on any of our products and services please visit us on the Web at: www.chartdosers.com

**Your Local Representative**


Chart Inc.
46441 Landing Parkway • Fremont, CA 94538
Phone +1 800.371.3303 • Fax +1 408.577.1567 • Service +1 408.371.4932
www.chartdosers.com




PN 14936256