



# Liquid Nitrogen Dosing Capabilities

## **Chart Inc. has been mastering liquid nitrogen (LN<sub>2</sub>) dosing for over 25 years.**

Based on the physical characteristic that one part of liquid nitrogen warms and expands into 700 parts of gaseous nitrogen, Chart dosing systems are used to pressurize and/or inert (N<sub>2</sub> flush) products and its packaging. As new packaging technology and products evolve, so has a demand for refined dosing results. Chart has met the challenge with innovation, key partnerships and detailed application analysis.

### **Pressurization in Packaging Applications**

A precise dose of liquid nitrogen is delivered immediately before capping or seaming. The trapped LN<sub>2</sub> quickly vaporizes, pressurizing the container. In hot fill applications, the nitrogen pressure counteracts the vacuum created when a hot product cools.

### **Preservation Applications**

An exact dose of liquid nitrogen is introduced seconds before the seamer or capper. The small dose of liquid nitrogen gasifies, 700 times its volume, in the process. The large volume of gaseous nitrogen pushes the oxygen out of the container.

### **Freezing Applications**

A dose of liquid nitrogen is introduced to “lock in” and surface freeze the product (novelty ice cream) before it’s transferred to a traditional tunnel or spiral freezer. Recently, Chart has been partnering with retail ice cream shops to fast freeze customized desserts with liquid nitrogen to enhance the taste and texture.

### **Modified Atmosphere Packaging (MAP) Applications**

A large dose of liquid nitrogen is introduced into the package seconds before the seamer or capper. The dose of LN<sub>2</sub> gasifies, 700 times its volume, in the process. The large volume of gaseous nitrogen pushes the oxygen out of the container.



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## **Partial List of Dosed Products**

- Almond Butter
- Automobile Oil
- Bar Mixes
- Baby Formula
- Coffee
- Cooking Wine
- Energy Shots
- Flax Seed Oil
- Dipped Ice Cream Cone
- Juices (Hot & Ambient Fill)
- Malt Beverages
- Mayonnaise
- Mustard
- Nuts
- Olive Oil
- Syrups
- Teas
- Trail Mix
- Vinegar
- Bottled Water
- Wine

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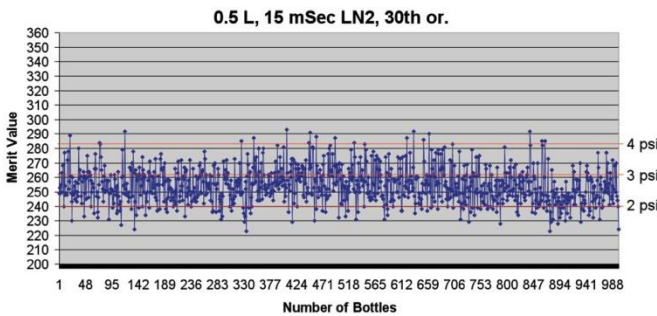
## **Chart Successes**

- 2006 Dupont Packaging Innovation Award for our contribution to PET hot filling
- 2010 PAC Green Den Participant for our contribution to packaging sustainability efforts
- Approved liquid nitrogen dosing system vendor for major beverage companies

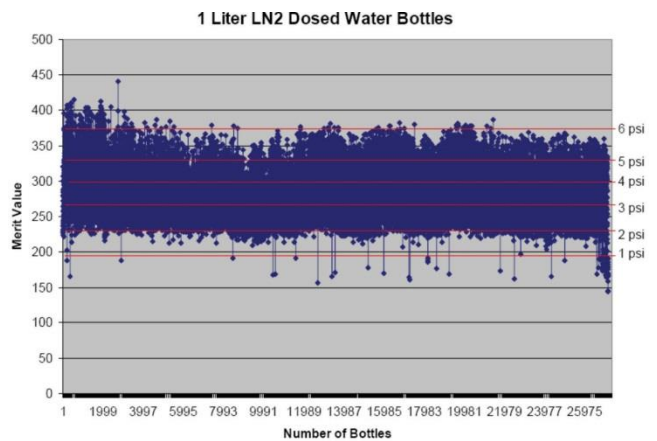
# MicroDose™ Technology



MicroDose™ technology was developed in response to market demands to precisely dose LN<sub>2</sub> into ultra light weight packaging to comply with tight container pressure specifications. Utilizing various sensors to detect filling line speed, pocket detection, bottle presence, inputs independent of the filler and electronic adjustments for fine tuning, 3 +/-1 psig internal bottle pressure is achieved at the 99% level.



Findings:  
 Sample size 1,000  
 99% - 2 to 4 psi  
 56% - 3 psi



Findings:  
 Sample size 27,000  
 96.5% - 2 to 5 psi  
 67% - 3 to 4 psi

# SoftDose™ Technology

The SoftDose™ places or sprays the liquid nitrogen on the surface of the product rather than penetrating the product surface essentially eliminating any product splash and delivering consistent container pressure. Various options are tailored to a specific product, package or application.



## Diverging Nozzle

- Narrow to wide mouth openings
- Recommended Application: Discrete dosing hot fill liquids



## Regar Nozzle

- Wide mouth openings
- Recommended Application: Discrete dosing dried goods



## Side Chute

- Narrow to wide mouth openings
- Recommended Application: Continuous dosing powders



## Ventelator Nozzle

- Narrow to wide mouth openings
- Moderate to high performance lines
- Recommended Application: Continuous dosing hot fill liquids



## Hot Chute

- Narrow to wide mouth openings
- Discrete dosing up to 400 cpm
- Recommended Application: Discrete dosing with limited space near capper

**CRYOGAS**

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