



Engineered Systems

Equipment for Cryogenic Service

CONSULTING | SYSTEM DESIGN | MANUFACTURING | INSTALLATION | COMMISSIONING | TRAINING



Engineered Systems Catalog
www.ChartEngineeredSystems.com

TABLE OF CONTENTS

About Chart Inc.	3
Engineered Systems Applications	4-5
Engineered Systems Solutions	6-7
Vacuum Insulated Pipe	8-9
Why Chart. Why Now.	10



Innovative Design, Technology & Reliability

Across Chart, we pride ourselves on designing innovative products with advanced technology and high reliability to enhance customer value. Our understanding of our customer's business needs and end-use applications has helped us achieve a wide product portfolio of solutions. We provide the right product for the application – driving a competitive advantage for our customer and our company.



Consulting / Engineering Design

Our team of cryogenic experts work closely with you to provide the best solution for your application. A Chart cryogenic system is designed and engineered to specifically match the project requirements, insuring maximum return on your investment capital.



Chart Bulk Storage Systems are manufactured to ISO 9001:2008 and 14001:2004, insuring quality of the highest standards. Leveraging 50+ years of cryogenic experience, lean manufacturing practices and project management oversight insure your system will be delivered on schedule.



Installation / Commissioning

Our Engineered Systems team is dedicated to assuring that the installation of your system and the commissioning process are flawless.

Our Project Managers - dedicated to your project - oversee all the necessary details to ensure a successful installation and commissioning.



Training

Complete technical service and onsite training are available once the system is installed. Our Engineered Systems team and technical engineering staff are readily available for support.

When you choose Chart, you get single-source accountability.

What is an Engineered System?

A Chart Engineered System is a custom, application-focused cryogenic solution that utilizes Chart products as the basis of design. System components may include Chart bulk cryogenic storage tanks, Thermax vaporizers, Chart Vacuum Insulated Piping (VIP), system automation and pressure control stations.

Examples of various applications include:

Nitrogen Applications

- Inerting
- Modified Atmosphere Packaging (MAP)
- Instrumentation
- Liquid Nitrogen Purge Systems for LNG
- Nitrogen Injection for Natural Gas
- Nitrogen Refrigeration Cycle
- Test Chambers
- Testing, Research & Development
- Aerospace
- Oil & Gas Industry Applications
- Electronics Manufacturing
- Molecular Beam Epitaxy (MBE)
- Food Freezing
- Cryobiological Storage
- Other Liquid & Gaseous Nitrogen Applications



Argon Applications

- Purging
- Inerting
- Steel & Metals Manufacturing
- Welding
- Laser Applications

Ethylene Applications

- Refrigeration Loop Cycle
- Polypropylene Manufacturing
- Ripening Fruit



CO₂ Applications

- Food Freezing & Processing
- Beverage Carbonation
- Water Treatment
- Greenhouse Growing
- Pulp & Paper
- Welding & Metal Fabrication
- Reduced Oxygen Packaging (ROP)
- Flash Freezing
- Fire Suppression



Oxygen Applications

- Healthcare
- Mobile Hospital
- Pharma & Biotechnology
- Water & Wastewater Treatment Plants (Ozone)
- Steel & Metal Manufacturing
- Cutting, Welding & Metal Fabrication
- Pulp & Paper
- Aerospace
- Chemical Formulation
- Energy Sector Applications
- Glass Manufacturing
- Fish Farms



LNG Applications

- Heating & Boiler Systems
- Pipeline Back Up
- Transportation
- Fueling Stations
- Regasification
- Furnace & Generator Operation
- Power Generation Distribution
- Oil & Gas Exploration

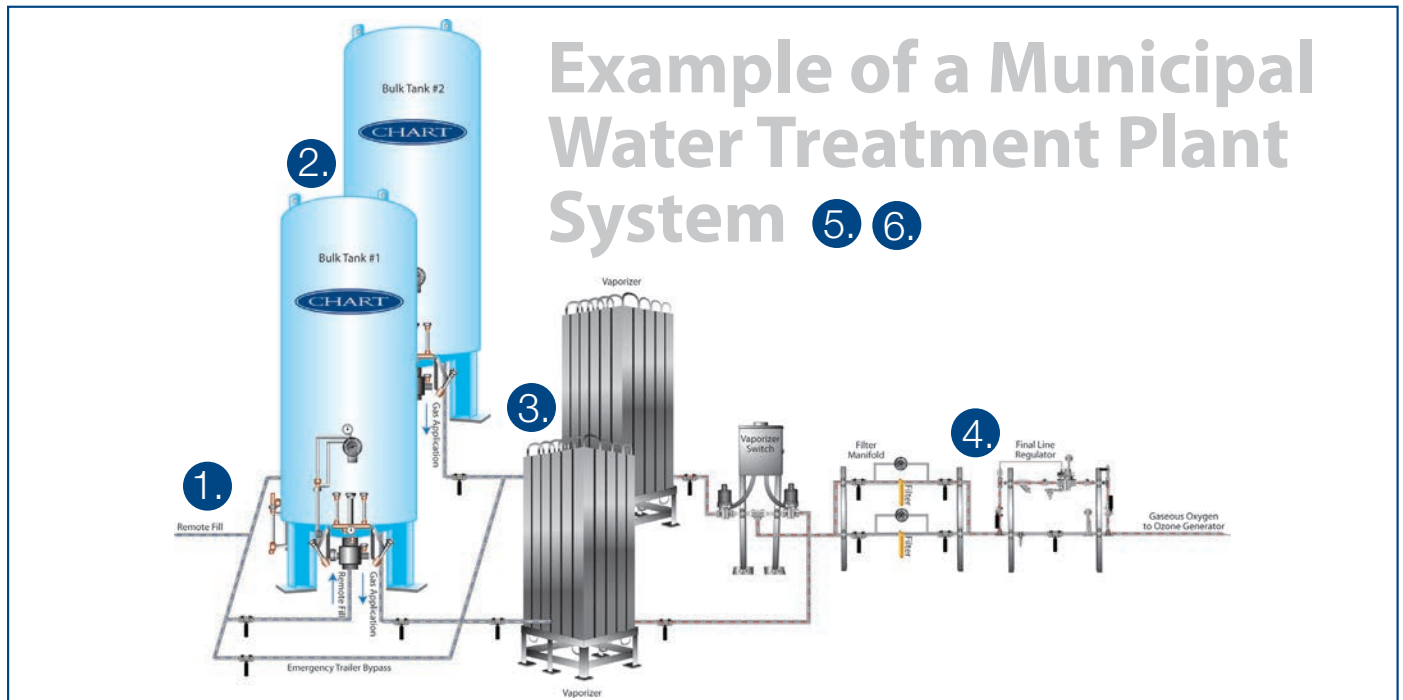
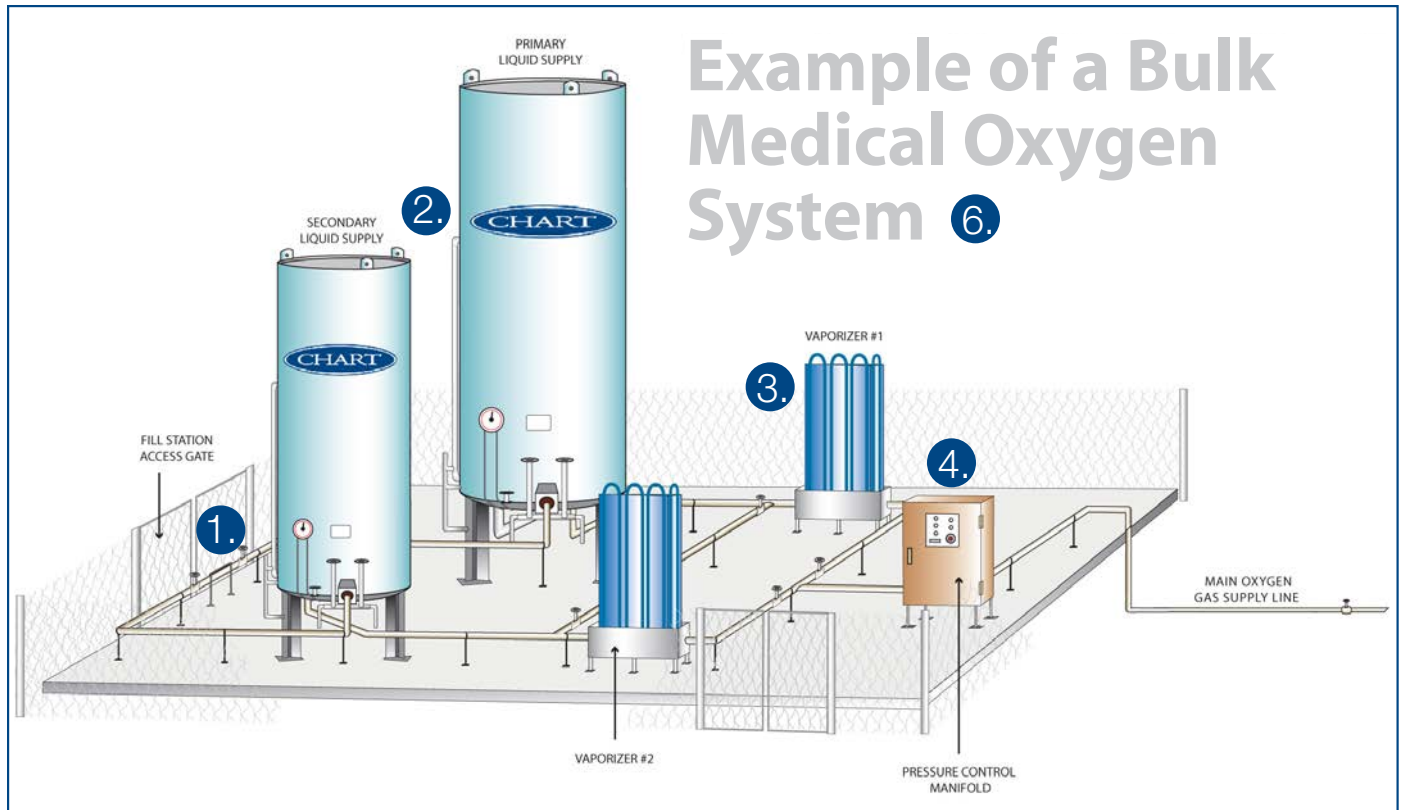


Other Engineered Systems applications are available for Hydrogen, Helium, and Nitrous Oxide. If your requirement is not listed specifically, please call Chart Engineered Systems at 888-877-3093 for more information.

Engineered for Efficiency— Built to Last

Chart's Systems Approach

Chart works closely with each customer to ensure that the system is designed properly, ensuring every system is built to operate at peak efficiency. Built for long-term integrity, our system components and product designs provide the highest levels of performance at the lowest operating costs.





1. Remote Fill Manifolds

Provides ability to fill multiple bulk tanks in a given system with a single CGA-compliant trailer connection.

CGA = Compressed Gas Association



2. Storage Vessel Options

Orientation: Vertical or Horizontal.

Component and Piping Materials: Brass/Bronze Components with T304 Welded Stainless Steel Interconnecting Pipe & Tubing (Standard), or T314L/316L Welded or Seamless Stainless Steel Components & Interconnecting Pipe & Tubing (Option).



3. Vaporizers

Intended for gas use applications or for applications requiring significant pressure building capability. We will customize a vaporization design ensuring functionality year-round.



4. Pressure Control Manifolds (PCM)

A custom Chart PCM is designed to provide the flow you require and the pressure necessary for your application. Custom options include automation controls, filtration or cabinets to accommodate any environment.



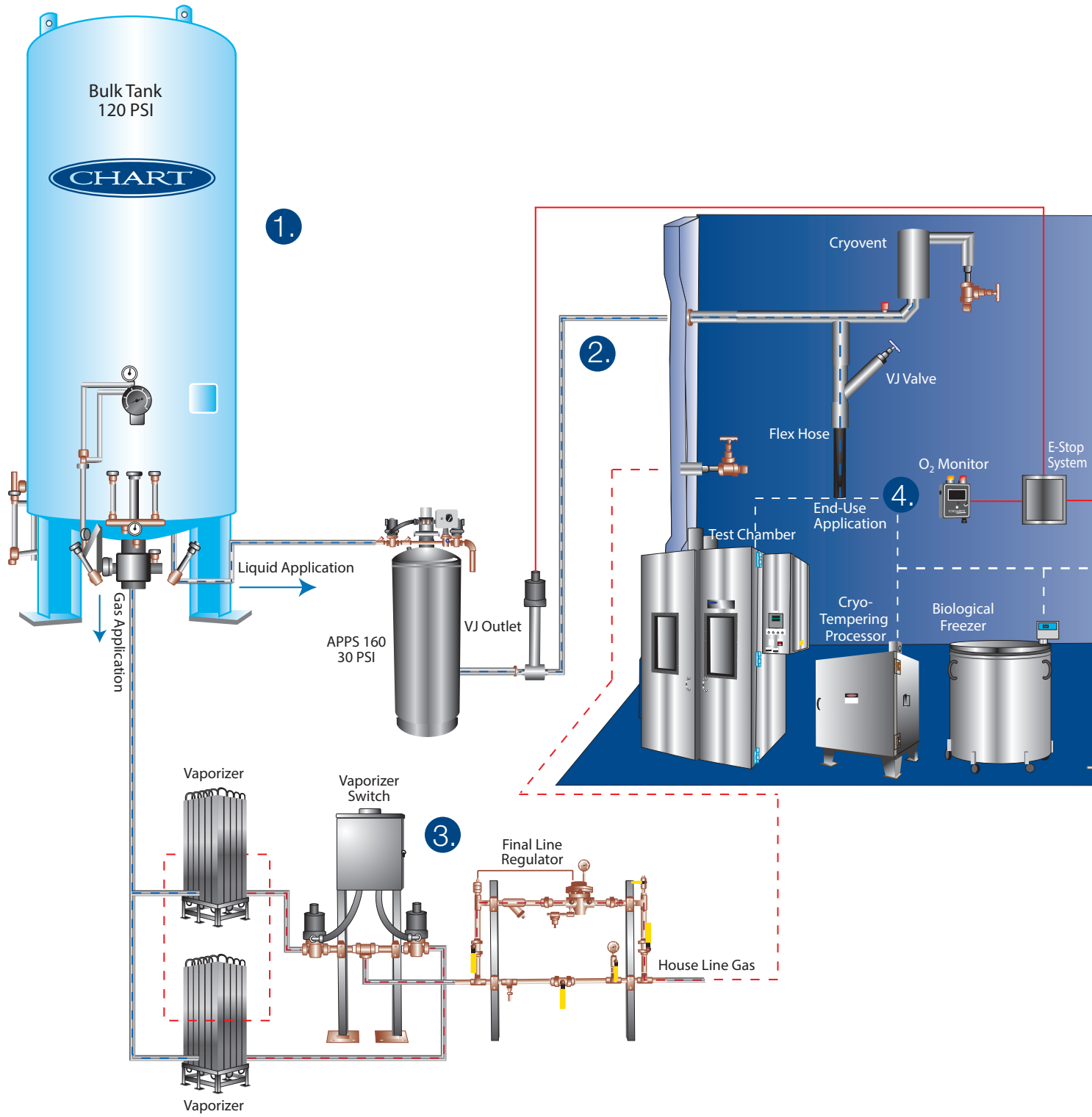
5. Programmable Logic Controls (PLC)

A PLC system automates the system functionality with the use of transmitting devices and actuated valves giving the site automatic control including HMI interfaces to easily adjust the parameters to your ever changing business needs.

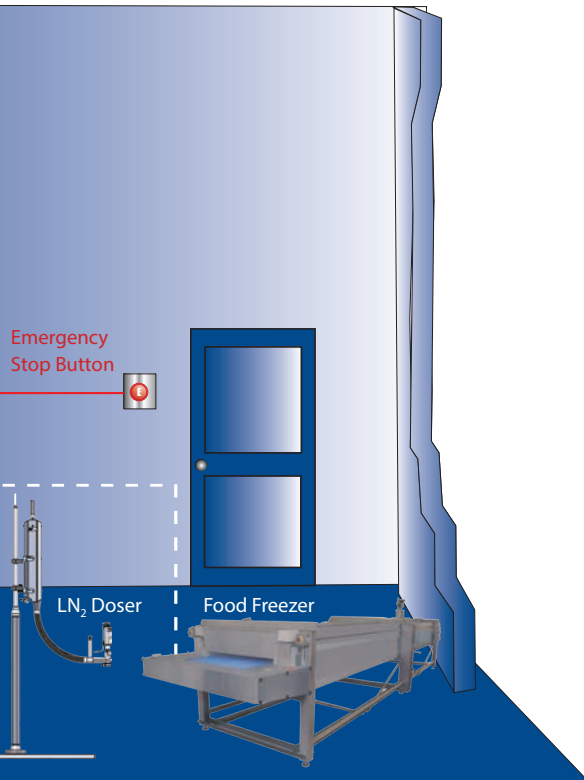


6. Engineered System Commissioning and Training Services

Chart will provide commissioning and training services to ensure the effective operational and functional transition from the Chart team to your team. Just let us know what your needs are, and we will provide this within the scope of our Engineered System project.



Our TOTAL SYSTEM SOLUTION



- 1. Liquefied gases are stored at ultra-cold temperatures in a vacuum insulated tank.**
Controls on the tank keep the pressure of the liquid at optimum levels to assure proper liquid delivery to the application.
- 2. Vacuum insulated pipe connects the tank's liquid withdrawal to the application equipment.**
The pipe is the foundation for the system's heat-loss efficiency and long-term integrity. It must be engineered to work with the associated controls and accessories.
- 3. Chart manufactures equipment that controls and provides gas to other applications within the facility.** Our engineers can help provide proper sizing for vaporizers, control manifolds, etc. to serve both a liquid and gas application from a single bulk tank liquid source.
- 4. The application equipment is designed to utilize liquid at specific properties.** The system design must take careful consideration of the application and equipment requirements and specifications.

VIP FOR LNG

Vacuum Insulated Pipe (VIP) offers a long list of proven LNG distribution advantages over the commonly used mechanically insulated pipe (MIP). Although MIP has a lower purchase price, the savings end there. With its double-wall design, VIP heat leakage is 90% less than MIP. VIP is also easy to install, maintain and expand upon, while lasting for decades instead of only a few years. All of this results in a significantly lower total cost of ownership.

As a leading global manufacturer of products, systems and services for cryogenic and gas processing applications, Chart provides flexible, integrated VIP solutions for almost any LNG bulk transport configuration imaginable — whether over water, overhead, underground, at grade or in any combination. We offer the broadest portfolio of standard and custom-engineered products. Our VIP Design Services team also applies 50 years of experience toward ensuring the safest, most reliable and most cost-efficient installations for every customer, over the long term.



PHOTO COURTESY DARWIN LNG
21,000 feet of VIP distributing LNG

Why Chart.



why now.

Chart – The best value in Cryogenic Equipment and Cryogenic Engineered Systems

The critical factor in a Chart designed and supplied system starts with our ability to stack our technology and critical pieces of equipment into your process flow.

This allows for seamless integration that we understand as it is engineered by us and manufactured by us. And it gives Chart Engineered Systems the unique ability to make your project the new definition of success.

- **Extensive Product Line** – Chart is the largest manufacturer in the world of cryogenic equipment. Our extensive line of cryogenic products insures that your engineered system is constructed to specifically match your application.
- **Sales Support** – Support of your Chart system does not stop after the product ships. Our sales team can provide continued support by assisting you with future Chart engineered system requirements.
- **Engineering Support** – A full staff of knowledgeable and professional technical personnel is available to discuss your overall scope and what Chart can do for the unique project(s) and the specific requirements.
- **System Technical Training** – As the owner of a Chart engineered system, Chart can commission the system and train your team on its operation, preventive maintenance, and troubleshooting.
- **Installation & Repairs Services** – As a function of working with the Chart engineered systems members, we can move beyond the equipment, install and commissioning package. Our field services team is available for on-site repairs and maintenance programs.
- **New Products** – Chart is continually responding to the new cryogenic applications that growing and ever-changing markets present. We can work with you to develop the cryogenic solutions for LIN, LAR, LOX, CO₂, ethylene and LNG.
- **Repair Parts** – At www.chartparts.com, you will conveniently find the exact OEM part you need at any time. A full-service staff can assist you in selecting the right part(s), ship your part out as fast as the same day, and keep you running 24/7!
- **Warranty** – We stand behind our products with the best warranties in the industry.





Chart Inc.

www.ChartEngineeredSystems.com

407 7th Street NW, New Prague, MN 56071

Phone 888.877.3093

Fax 952.758.8490

Worldwide 952.758.4484

©2016 Chart Inc. P/N 20753698