CHART aerospace

Engineered Systems
For Aerospace Applications

DESIGN | ENGINEERING | MANUFACTURING | PROJECT MANAGEMENT | INSTALL | COMMISSIONING | TRAINING | LIFECYCLE MAINTENANCE

www.ChartAerospace.com

Engineered Solutions for Aerospace Applications

Your Partner for Liquid Oxygen, Liquid Hydrogen and Liquefied Natural Gas Cryogenic Propellant Systems

- The use of liquid cryogenic LOX and LH_2 propellants for space launch has been around for many years. Recently, liquefied natural gas is replacing RP-1 and solid rocket propellants due to the abundant supply of natural gas in the US market and the cost per launch profile it provides.
- Chart has 55+ years of experience in design, manufacture, test and assembly of advanced cryogenic system equipment in our US-based and global facilities.
- Our team works closely with each of our customers to ensure that the system is designed properly, will function at its peak performance, and will reduce risk to the operator.
- Built for long-term integrity, our system components and product designs provide the highest level of performance at the lowest operating costs.

Launch Site & Support Equipment

- Liquid cryogenic propellant storage, LOX, LH_2, LNG
- Engine test run tanks
- Siphon vessel designs for pumping applications
- High purity cleaning to KSC-C-123J and IEST-STD-1246E standards – stringent particulate and non-volatile residue (NVR) levels
- Liquid conditioning systems including saturation, subcooling and boil off management through auxiliary liquid nitrogen recondencing systems for zero loss applications
- Large liquid withdrawal flow rates with designs to mitigate vortexing (gas ingestion into fluid stream)
- Fast vent systems to support aborted launch scenarios while maintaining safe vessel operating pressures
- Boil off free vent systems for liquid storage/stand by conditions
- Vacuum jacketed withdrawal lines and piping to minimize heat input to propellant during loadings/off loadings
- Advanced FEA analysis on blast loadings, cyclic loadings (pressure and temperature cycles), and acoustical effects
- Cryogenic shop function and proof testing with helium post tanking cold leak test capability
- Helium purge points for subcooled LOX applications
- Ambient pressure builders designed to support liquid withdrawal rates and interconnecting piping nozzle loadings
- Close tolerance customer connection points for ease of installation
- Made in the USA

MADE IN U.S.A.

CHART®

New Prague, MN Facility
Mission Critical to Mission Success

Engineered for Efficiency— Built to Last

Cryogenic Systems Projects

Chart has successfully supplied cryogenic propellant storage tanks, vacuum insulated piping, pump, and control systems as turnkey packages to many governmental, research, and aerospace clients.

Propellant Storage

Vacuum Insulated Pipe

Cryogenic Umbilical Hoses

Ambient Vaporizers/Pressure Builders

Thermax

ULA CAPE CANAVERAL LAUNCH SITE SLC-41

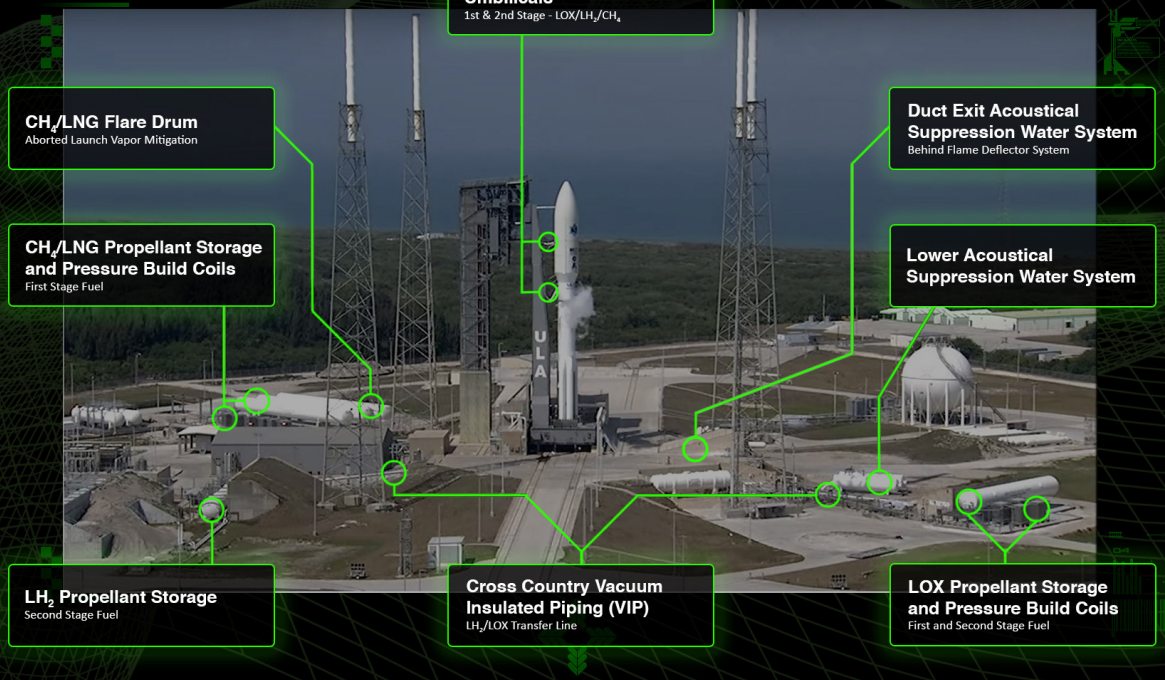

CHART aerospace

Chart Industries designs mission critical equipment for a number of different end markets. Explore our aerospace offerings at

www.chartaerospace.com

Scan the code and take a digital tour of Chart City.

Clients & Customers

National Aeronautics and Space Administration (NASA)
Jet Propulsion Lab
Space Exploration Technologies Corporation (SpaceX)
Blue Origin, LLC
United Launch Alliance (ULA)
Lockheed Martin Corporation
Oak Ridge National Lab
Ball Aerospace & more

Chart Inc.
www.chartindustries.com

407 7th Street NW, New Prague, MN 56071
Phone 888.877.3093
Fax 952-243.8275
Worldwide 952.243.4484

 P/N 21304247

Construction Codes

Stationary Storage: ASME Section VIII - Div 1
Portable/Transportable Storage: DOT, TC, ADR, IMDG
Pressure Piping: ASME B31.3, B31.12, B31.1
NFPA: 2, 55, 59A
CGA: 1.3, 4.1, G-5.5
IEST-STD-1246E: Product Cleanliness Levels - Applications, requirements, and determination
KSC-C-123: Specification for Surface Cleanliness of Ground Support Equipment Fluid Systems
Air Force Space Command (AFSPC) Manual 91-710: Eastern & Western Range Safety Regulations

Certificates / Facility Registrations

ASME: U-8377
National Board: R-1429
ISO 9001:2015
ISO 14001:2015
OHSAS 18001:2007