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Bid Specifications for Natural Gas Vehicles



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Introduction

Leo Thomason, co-founder of NGVi, has over 30 years of direct natural gas vehicle and fueling infrastructure development experience. He is known world-wide as an expert in natural gas fueling and vehicle technology. A professional trainer and experienced technical consultant, Leo helps fleet managers, technicians and drivers understand the nuances of using natural gas as a transportation fuel. He has worked for dozens of clients to assist them in solving technical and design problems that could not/would not be solved by others. In addition, he has assisted customers in designing and specifying fueling stations and working with them through the proposal selection and construction processes to make sure the stations meet their needs.

Bid Specifications for Natural Gas Vehicles

Fleet managers and their staff are experts at writing vehicle specifications for gasoline and diesel vehicles. Natural gas vehicles (NGVs), on the other hand, are not exactly like their gasoline and diesel counterparts. NGVs have unique characteristics that fleet managers should be aware of that will help ensure successful incorporation of NGVs into the fleet.

In this technical paper, NGVi outlines four considerations unique to compressed natural gas (CNG) that will assist writing bid specifications for NGVs.

1. CNG-powered vehicles have high-pressure fuel storage systems that must be depressurized during some types of maintenance.
2. CNG fuel storage cylinders have a defined useful life that can be specified
3. CNG cylinders come in a variety of types, sizes and weights, and weight can affect vehicle maintenance
4. The number of cylinders affects vehicle cost and range

1. High-Pressure Fuel Storage System

For NGVs fueled with CNG, natural gas is highly compressed and stored onboard vehicles in high-pressure storage containers called CNG fuel storage cylinders or simply CNG cylinders. All CNG-powered vehicles have a high-pressure fuel system onboard the vehicles that enable them to use CNG. These high-pressure systems are safe and are designed and regulated in accordance with [National Fire Protection Association \(NFPA\) Code 52](#) for Vehicular Gaseous Fuel Systems. However, unlike gasoline and diesel fuel systems, CNG fuel systems currently do not come with a standard way to bleed down the high-pressure CNG fuel system should a component in that portion of the fuel system require maintenance. This could pose a potentially dangerous situation for the maintenance team.

Bid Specification Recommendation: To ensure the safety of the fleet maintenance team, the installation of a bleed valve in the high-pressure fuel line is recommended to provide an easy and safe way to reduce pressure prior to loosening and disconnecting a fitting to remove and replace a component. This bleed valve requirement must be specifically stated in your bid.

2. CNG Cylinder Useful Life

CNG fuel storage cylinders have a 10, 15, 20 or 25 year useful life from the date of manufacture and there is no way to extend life of the cylinder past the expiration date. The cylinder's expiration countdown begins from the date it was manufactured and NOT the date it was installed on the vehicle. After the expiration date, cylinders must be properly disposed of and new cylinders purchased and installed to keep the vehicle in service.

Each cylinder is manufactured with a label that clearly displays the expiration date. To see an example of the label and to read our technical bulletin, *CNG Cylinder Life Cannot Be Extended*, [click here](#).

Although cylinder life cannot be extended beyond the expiration date, the desired cylinder life can be specified in the bid specification. Most fleet managers are unaware of this.

Bid Specification Recommendations:

1. Cylinders should be specified to be no more than six months from the date of manufacture at the time of vehicle installation. This will allow for maximum cylinder useful life in fleet service.
2. When specifying the cylinder's useful life (10, 15, 20, or 25 years), it is recommended that a useful life of the cylinder specified for the vehicle be at least equal the expected useful life of the vehicle in fleet service. However, it may benefit you to purchase a cylinder with a useful life beyond the vehicle's life in fleet service in order to maximize the value of the vehicle subsequently sold at auction.

3. CNG Cylinder Weight

CNG fuel storage cylinders are available in four different Types:

- Type 1 are typically lowest in cost per unit of storage volume, but are the heaviest per unit of storage volume.
- Type 2 and 3 cylinders are more expensive per unit of storage volume compared to Type 1, and are lighter weight per unit of storage volume than Type 1.
- Type 4 can be more expensive per unit of storage volume than type 2 or 3, and can be lighter in weight per unit of storage volume than type 2 and 3.
 - It is important to note that there are Type 3 cylinders available that are equal in weight per unit of storage volume as well as price per unit of storage volume to comparable Type 4 cylinders.

Because of the added weight of cylinders, the Type and number of cylinders specified will affect the Gross Vehicle Weight Rating (GVWR) of the natural gas vehicle. It is also important to note that CNG fuel storage cylinders weigh more when full of CNG than when they are empty. This will affect vehicle suspension and brake life, thus impacting the maintenance of the vehicle.

Bid Specification Recommendation: When considering the Type and number of cylinders, consider specifying cylinders that are as light in weight as financially feasible to lessen the impact on vehicle suspension and break life. In addition, the GVW of the vehicle with the specified cylinders full of CNG with the total cargo weight needs to be considered when specifying CNG fuel storage cylinders types and quantities.

4. Vehicle Range

Because the body design of virtually all NGVs currently available in the United States are adapted from gasoline or diesel vehicles, they were not designed to utilize cylindrical fuel storage tanks or vessels that are required to contain the high-pressure CNG. Current vehicle manufacturers or fuel system integrators are faced must find sufficient space on these vehicles to install enough high-pressure CNG storage cylinders to allow the vehicles to travel an acceptable range. In many cases the resulting range of the vehicle powered by CNG can be less than the same vehicle powered by the gasoline or diesel.

Bid Specification Recommendation: When considering the number of cylinders, the vehicle specification should clearly indicate the miles that the vehicle is expected to travel before needing to be refueled with CNG, keeping in mind that extra cylinders means extra weight that can displace payload capacity as mentioned in #3.

NGVi Options

NGVi offers training and consulting services on natural gas as a transportation fuel.

- **NGV Fuel System Specifications**

NGVi can help you determine which vehicles are most applicable for CNG and develop vehicle and fuel system specifications that meet your needs.

- **NGV Technician and Fleet Operations Safety Training**

You will receive detailed training on the safe operation of dispensing equipment and safety systems located at the fueling station and on vehicles. Technicians receive in-depth instruction regarding safe maintenance practices, fire safety systems located at the maintenance facility, the fueling station and on NGVs, as well as safe operation of natural gas dispensing equipment.

For more information about these and other consulting services, contact Leo Thomason at 702-254-4180 or via email at info@ngvi.com.

Helpful Links

National Fire Protection Association (NFPA)

<http://www.nfpa.org/index.asp>

NGVi's technical bulletin

[*CNG Cylinder Life Cannot Be Extended*](#)