

Guide to Safe CNG Vehicle Conversions

Once you decide to convert an existing vehicle to run on compressed natural gas (CNG) or to buy a vehicle that has previously been converted to run on CNG, you should take steps to assure conformance with relevant federal and state regulations and the safety codes for natural gas vehicles contained in NFPA 52, Vehicular Natural Gas Fuel Systems Code. Converting a vehicle to operate on natural gas includes installing high-pressure systems and therefore should only be performed by a licensed mechanic that has received certification or training to perform CNG vehicle conversions.

Consumers should understand that most state and local governments do not independently regulate businesses that perform conversions. Consumers, therefore, must shop and buy wisely in order to obtain a safe and durable CNG vehicle or conversion system that meets your needs and expectations. The checklist provided below includes some things that you should consider doing:

CHECK LIST:

1. Are you buying a new vehicle? If so, check out the factory OEM CNG offerings before buying a gasoline or diesel vehicle to convert.
2. If purchasing a new vehicle that you plan to have converted, specify a gaseous-fuel-prepared engine if that option is available to be assured of normal engine durability.
3. Do you have highly regarded conversion shops in your area? If so, go to these first. Ask for a list of customer references with whom you can speak.
4. Ask if the engine conversion system is certified, compliant, or approved by EPA or CARB. Conversion systems installed on newer model vehicles must be certified to EPA standards or approved by the California Air Resources Board in some cases. Older vehicles do not have to be certified but still must be compliant with U.S. EPA emission regulations. If the engine conversion system is not compliant then find another shop that abides by federal law.
5. Ask for proof of that the conversion system is certified, compliant, or approved by EPA or CARB for the specific vehicle that you own or are purchasing (e.g., Model Year 2020 Ford F-150). Providing a copy of the EPA certificate or CARB Executive Order should not be difficult for conversion shops as these documents are only 1 or 2 pages in length and are readily available. For older intermediate-aged or outside-useful-life vehicles, EPA and CARB identify compliant systems on their websites, and the manufacturer should be able to demonstrate their system is listed there. See detailed information below for the specific web addresses.
6. Request to see proof that the person who will perform the conversion is a licensed mechanic and has received certification or training to perform CNG vehicle conversions.

7. When receiving a vehicle that has been converted, check to make sure the vehicle upfitter has installed the proper EPA label under the hood and the label at the fuel door indicating the expiration date of the cylinder and the date of inspection if it is an older cylinder.
8. Converted vehicles that have been altered in accordance with National Highway Traffic Safety Administration regulations must have an alterer's label at the driver's door. Selling a new CNG vehicle to be titled for the first time that does not bear either an alterer's label or an OEM window label identifying it as an OEM CNG vehicle is a violation of federal law.
9. Find out what will be the remaining useful life of the CNG cylinders to be installed. New CNG cylinders typically have a useful life of 15–20 years. See below for more information about used cylinders.
10. Make sure that the conversion contract provides that:
 - a. The conversion kit will be certified, compliant, or approved by EPA or CARB for the vehicle model and engine.
 - b. The vehicle will comply with all applicable federal and state regulations as certified by the dealer doing the conversion.
 - c. The vehicle system will comply fully with the current edition of NFPA 52 (MY2010 or later) or other applicable codes such as the International Fire Code.
 - d. The CNG cylinders will be labeled, tested and certified in accordance with FMVSS 304.
 - e. If used cylinders will be installed, make sure that the cylinders have been recently inspected by a certified cylinder inspector and be good for your intended life of the vehicle. Decide how many years you need.

DETAILED INFORMATION:

Consider a new CNG vehicle that is fully certified in accordance with all safety and emissions regulations. If you do not already own the vehicle in question, you should investigate whether the vehicle is already available as a new CNG vehicle. Several OEMs work with aftermarket companies to make available NGVs that can be ordered directly from the dealership and upfitted at the dealership or by arrangement before delivery to the customer. Vehicle OEMs sometimes work with approved vehicle modifiers to install and test the CNG system, and the vehicle would be certified in accordance with FMVSS 303 for full confidence of CNG fuel system integrity. In some cases, the vehicle OEM works with an approved vehicle modifier who will add the CNG fuel system before it is offered for first sale. In this situation, the National Highway Safety Administration (NHTSA) requires an additional alterer's label at the driver's door that certifies that the alterations do not take the vehicle out of compliance with Federal Motor Vehicle Safety Standards. This label assures you that the original crashworthiness of the gasoline system is matched by the added CNG system.

If a needed vehicle does not come factory equipped with a CNG system, there are necessary steps to make sure that you buy a safe and legal converted vehicle. There are well-developed safety standards for the fuel system on vehicles converted to CNG but in most states there is no effective regulation of conversion shops or aftermarket outfitters to assure compliance with these standards. The quality, safety and durability of your converted vehicle will depend on your choice of converter and the requirements of your purchase agreement.

Pick a conversion shop or aftermarket outfitter with experience and satisfied customers. Think of this as if you were picking a contractor to do major work on your house.

Purchase only conversion systems for your vehicle that are certified, compliant, or approved by EPA or CARB. While a variety of unvetted systems are sometimes sold online and/or offered by some automotive shops, EPA's position is that installation of these systems is "tampering with a federally approved emission control system," and a federal violation punishable by a substantial financial penalty. Installation of such systems can also cause a vehicle to fail emissions inspection or lead to performance problems if the systems has not been specifically designed and tested to work on your vehicle. You can be more confident in a shop that offers only legally certified, approved, or compliant conversions. For older intermediate-aged or outside-useful-life vehicles, refer to EPA's lists of compliant or approved conversion systems at <https://www.epa.gov/ve-certification/lists-epa-compliant-alternative-fuel-conversion-systems#certified> or CARB's lists at <https://www.arb.ca.gov/msprog/aftermkt/altfuel/altfuel.htm>. Note that EPA certification does not include the high-pressure storage system (i.e., the CNG cylinders).

Require the converter to show that the installed system is certified, compliant, or approved by EPA or CARB. Anyone can claim to be a vehicle converter; know that EPA and CARB require that conversion system suppliers provide appropriate documentation and instructions to installers of their systems. CNG vehicle conversions must only be performed by qualified technicians. A vehicle that has been upfitted with an EPA-certified or compliant conversion system will include an EPA-approved label under the hood with specific information about the system. A supplemental label installed on the vehicle will identify the name of the corporation, address, and phone number of the conversion manufacturer.

Require that the converter certify that the vehicle conversion complies with the most recent version of NFPA 52. Conversions should be done according to the National Fire Protection Association's Vehicular Natural Gas Fuel Systems Code (NFPA 52). It is strongly recommended that the fuel system and conversion system installed on a natural gas vehicle comply with NFPA 52. Many states recognize and incorporate this standard into their fire protection safety codes. Properly installed CNG systems are safe and economical, with the vehicle operating almost exactly like a gasoline or diesel vehicle. However, CNG systems rely on high-pressure compressed natural gas for fuel, and high-pressure gases require specialized components and technical skills for installation.

Use a licensed conversion shop where there are such regulations. Some states such as Texas and Oklahoma have licensing requirements and the California Highway Patrol (CHP) in California has regulations for CNG vehicles. Just like a building permit for construction, make sure your conversion will meet local and state codes.

Buy a vehicle with the durability you expect. Engine designs that are durable when operated on gasoline or diesel may experience rapid valve wear when operated on natural gas. OEM certified CNG vehicles have special components (such as hardened valve seats and valves), but most converted vehicle engines do not. Generally speaking, OEM engine manufacturers may not honor the engine warranty against wear of valves in gasoline engines that are converted to CNG. If you expect to operate the vehicle under heavy load or accumulate high mileage, an engine that is designed to operate on natural gas is the smarter choice. An OEM dealer should be able to look up the VIN for your vehicle and determine whether it is configured with a “hardened” or “gaseous-prep” engine option. Understand the warranty for the conversion since the conversion equipment will not be covered under the vehicle’s original warranty, and any damage to other engine components that are caused by the conversion systems installation or use likely may not be covered by the OEM warranty.

Verify that the CNG cylinders are labeled in accordance with Federal Motor Vehicle Safety Standard 304. Be sure your cylinders are safe and legal. CNG cylinders must carry labels showing they meet the applicable US Department of Transportation standard (FMVSS 304) by the symbol “DOT” on the label. The label will show an expiration date, after which the cylinder may not be safely used. Some very old converted vehicles may be equipped with so-called “DOT” cylinders that are intended for shipping oxygen and other gases. These DOT cylinders are not FMVSS-legal CNG cylinders.

Your cylinders must be labeled in accordance with FMVSS 304 as follows:

1. CNG fuel container manufacturer's name, address, and telephone number.
2. The month and year of manufacture of the CNG fuel container.
3. Service pressure **3600 psig**
4. The symbol **DOT**, constituting a certification by the CNG container manufacturer that the container complies with all requirements of this standard.
5. The container designation (e.g., **Type 1, 2, 3, 4**).
6. **“CNG Only”**
7. “This container should be visually inspected for damage and deterioration after a motor vehicle accident or fire, and either (a) at least every 12 months when installed on a vehicle with a GVWR greater than 4,536 kg, or (b) at least every 36 months or 36,000 miles, whichever comes first, when installed on a vehicle with a GVWR less than or equal to 4,536 kg.”
8. **“Do Not Use After _____”** inserting the month and year that mark the end of the manufacturer's recommended service life for the container.

Be cautious about buying CNG conversion equipment or cylinders online. Choose only reputable suppliers and converters. Avoid imported CNG cylinders that are not labeled as certified to FMVSS 304 and expired cylinders that are illegal to refuel. Many of these illegal cylinders are also rated with a service pressure of 3,000 psi and should not be refilled at U.S. stations which have been designed to provide fuel for vehicles equipped with cylinders that are rated at 3,600 psi.

Know the inspection status and remaining life of your cylinders. The minimum inspection interval for CNG cylinders is dependent upon the vehicle's gross vehicle rating (GVWR). For detailed guidance, see: <https://ngvamerica.org/wp-content/uploads/2022/03/NGV-System-Inspection-Guide-3.7.22.pdf>. CNG cylinders should also be inspected if they are removed from one vehicle and moved to another. If your converter intends to install used cylinders, require that they be inspected before installation and make sure that their remaining life is at least as long as you intend to use the vehicle (replacement cylinders are not inexpensive). Converters and vehicle owners should have documentation that this safety inspection has been done and both the cylinders and vehicle must be labeled with the next inspection due date.

Educate yourself about your converted CNG vehicle. OEM CNG vehicles are delivered with an owner's manual for information on the operation, inspection, and maintenance of the CNG system. Your converter should provide a manual supplement for the converted parts of the vehicle. Study the manual when you take delivery and be sure to ask questions about anything that is unclear.

Notices and Disclaimer

NOTICES AND DISCLAIMER:

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