

Technical Guideline for National Safety Mark (NSM) Compliance

PRODUCED FOR:
CANADIAN NATURAL GAS VEHICLE ALLIANCE

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Executive Summary

This report documents the options for proving compliance with Canada Motor Vehicle Safety Standard 301.2, *CNG Fuel System Integrity* in order to apply for a National Safety Mark (NSM) from Transport Canada. The required documentation and the process of applying for the NSM will be described. The application of a NSM on a compliance label on a vehicle so modified would allow the modifying company to sell the vehicle in Canada as a new vehicle. In addition, the report will outline the emissions requirements associated with multi-stage manufactured natural gas vehicles (NGVs).

Compressed natural gas (CNG) vehicles will be addressed in detail in this report, however, as there is no current Canada Motor Vehicle Safety Standard (CMVSS) that addresses liquefied natural gas (LNG) vehicles and issues related to cryogenic fuel storage systems, the LNG part of the current situation must be considered as having a “To Be Determined” status.

Transport Canada’s NSM application policy allows Canadian companies that have been authorized by Transport Canada to apply a NSM for “fuel system conversion” to vehicles that they manufacture (i.e. by modifying the fuel system) to apply their assigned NSM to any new vehicle they manufacture. The NSM and accompanying compliance label essentially state that the vehicle complies with all applicable CMVSS in effect at the time of manufacture of the vehicle and the company applying the NSM is responsible for the compliance of vehicle at the time it leaves their hands.

This NSM process adopted by Transport Canada under the authority of the Motor Vehicle Safety Act (Act) and attendant regulations provide an important avenue for manufacturers to provide **new** CNG-equipped vehicles to the market place without requiring provincial certification for the CNG system, i.e. natural gas vehicles that are brought to the market using the NSM process are treated as new vehicles that fall under Transport Canada’s jurisdiction, so Canadian Registration Numbers (CRNs) are not required on the CNG fuel cylinders. In addition, the vehicles can be moved between provinces and be in compliance with all federal requirements. A vehicle manufacturer is provided the authority under the Act to take responsibility for the manufacturing (modifications) that they have performed and the NSM applied to the vehicle indicates this.

The application process involves providing Transport Canada with a package as defined in their “*National Safety Mark Application for Vehicles Manufactured in Multiple Stages.*” The documentation requested in this application provides Transport Canada with proof that the company is a legal Canadian entity and that they can prove that the modifications they perform on new vehicles result in vehicles that are fully compliant with the CMVSS.

Depending on how new vehicles are brought to the market, a National Emissions Mark (NEM) may also be required demonstrating compliance with emissions requirements. If new vehicles are converted within Canada, a NEM is required to transport the vehicles within Canada. In most cases the engines and emission system being used likely have a US Environmental Protection agency (EPA) emissions certificate, which is valid in Canada per Environment Canada regulations which align with those of the USA. However, if such a certificate is not available, then the engine and emissions system must be tested as per the EPA regulations and the company must apply to Environment Canada for an NEM that must be applied to any vehicle with the subject engine. If a vehicle has an EPA certificate and is sold in the USA, then the same vehicle can be imported into Canada on the basis of EPA compliance and the vehicle is then subject to the certification and in-use standards referred to in the EPA certificate.

Finally, it must be pointed out that the NSM application process described here has been used by one Canadian company as of the writing of this report and this company has successfully obtained an NSM for “fuel system conversion” on new vehicles.

Introduction

This report documents the options for proving compliance with CMVSS 301.2, *CNG Fuel System Integrity* in order to apply for a NSM from Transport Canada. The required documentation and the process of applying for the NSM will be described. The application of a NSM on a compliance label on a vehicle so modified would allow the modifying company to sell the vehicle in Canada as a new vehicle. In addition, the report will outline the emissions requirements associated with multi-stage manufactured natural gas vehicles (NGVs).

Compressed natural gas (CNG) vehicles will be addressed in detail in this report, however, as there is no current CMVSS that addresses liquefied natural gas (LNG) vehicles and issues related to cryogenic fuel storage systems, the LNG part of the current situation must be considered as having a “To Be Determined” status.

This technical guideline will explain how multi-stage manufactured NGVs can be manufactured in or imported into Canada and be treated as new vehicles. Transport Canada’s program with regards to the NSM or with regards to importation of vehicles from the USA, outlines how companies that modify new factory built vehicles in order to install CNG fuels systems can be authorized to certify these NGVs indicating that the modified vehicle complies with CMVSS. All new domestically manufactured or imported vehicles must also comply with Canadian emissions standards, so the guideline will also identify compliance pathways related to vehicle emissions.

Being identified as a new vehicle based on receiving an NSM or an imported Canadian compliance label allows the vehicle to be sold anywhere in Canada. If the vehicle is considered an aftermarket product, the company will need to attain CRNs for fuel storage cylinders within each province in which the vehicle will be sold increasing the cost and complexity of deployment.

Background & Definitions

Canada’s Motor Vehicle Safety Act (Act) was first enforced in 1971. The NSM for Canadian vehicle manufacturers has been in place over a similar timeframe. Prior to 2003, enforcement of the Act and of regulations on the multi-stage vehicle manufacturing industry was mostly limited to the Original Equipment Manufacturers (OEMs), even though other manufacturers modifying vehicles before first retail sale were covered in the regulations from the beginning.

In 2003, in an effort to enhance enforcement, Transport Canada updated the regulations to add additional administrative requirements to the multi-stage industry in order to better define and identify the subsequent manufacturers to the OEMs. To this end, the following definitions were

adopted and requirements identified for each manufacturer involved in the various stages of manufacturer of multi-stage manufactured vehicles¹:

“Completed vehicle”

A “completed vehicle” means a vehicle that needs no further manufacturing operations to perform its intended function, other than the addition of readily attachable components, such as mirrors or tire and rim assemblies, or minor finishing operations such as painting; (véhicule complet)

“Incomplete vehicle”

An “incomplete vehicle” means a vehicle:

(a) other than a vehicle imported temporarily for special purposes, that is capable of being driven and that consists, at a minimum, of a chassis structure, power train, steering system, suspension system and braking system in the state in which those systems are to be part of the completed vehicle, but requires further manufacturing operations to become a completed vehicle, or

(b) that is an incomplete trailer; (véhicule incomplet)

“Incomplete vehicle manufacturer”

An “incomplete vehicle manufacturer” means a company that manufactures an incomplete vehicle by assembling components none of which, taken separately, constitutes an incomplete vehicle; (fabricant de véhicules incomplets)

“Intermediate manufacturer”

An “intermediate manufacturer” means a company, other than an incomplete vehicle manufacturer or final-stage manufacturer that performs manufacturing operations on an incomplete vehicle; (fabricant intermédiaire)

“Final-stage manufacturer”

A “final-stage manufacturer” means a company that performs the manufacturing operations on an incomplete vehicle that turn the incomplete vehicle into a completed vehicle; (fabricant à l’étape finale)

¹ Motor Vehicle Safety Regulation, Section 2, “*Interpretation*”

In addition, when referring to an “alterer”, Transport Canada is actually referring to companies that alter vehicles between the time they are certified as complete or final manufacture has been completed and certified, and the first retail sale per Motor Vehicle Safety Regulations (MVSR), Section 9:

“Altered Vehicle”

9. (1) If a company alters a vehicle, other than an incomplete vehicle or a truck tractor not fitted with a fifth wheel coupling, that was in conformity with these Regulations in such a manner that its stated GVWR and GAWR are no longer accurate, or if the company alters the vehicle otherwise than by the addition, substitution or removal of readily attachable components such as mirrors or tire and rim assemblies or by minor finishing operations, the company shall:

(a) ensure that the compliance label and information label, if applicable, remain on the vehicle;

(a.1) respect the gross axle weight ratings and gross vehicle weight rating of the vehicle recommended by the original manufacturer or, where the company increases the ratings, ensure that they are:

(i) increased in accordance with the original manufacturer’s written recommendations, or

(ii) within the load-carrying capacity of the vehicle’s components when the altered vehicle is loaded for its intended use;

(b) ensure that the vehicle conforms to the standards referred to in subsection 5(2), in respect of the work carried out by the company to alter the vehicle; and

(c) subject to subsection (2), apply to the vehicle an additional label displaying:

(i) the words “THIS VEHICLE WAS ALTERED BY / CE VÉHICULE A ÉTÉ MODIFIÉ PAR” followed by the name of the company that altered the vehicle,

(ii) the month and year during which the alteration of the vehicle was completed,

(iii) the drawing referred to in paragraph 6(1)(c),

(iv) in accordance with paragraph 6(1)(e), the new gross vehicle weight rating and gross axle weight ratings of the vehicle as altered, where they differ from those shown on the original compliance label,

(v) in accordance with paragraph 6(1)(f), the type of vehicle, where it differs from the type shown on the original compliance label, and

(vi) in the case of a multi-purpose passenger vehicle or bus manufactured from a cutaway chassis, a motor home or a recreational trailer, the information referred to in subsection 6(8).

(2) The drawing referred to in paragraph (1)(c) may be displayed on a label applied to the vehicle beside the compliance label.

(3) In the case of a motor home or a recreational trailer, the information referred to in subparagraph (1)(c)(vi) may be displayed on a separate label applied to the vehicle beside the compliance label or in a conspicuous or readily accessible location.

In 2012, the first application was delivered to Transport Canada by a Canadian company requesting a NSM for the purpose of installing a natural gas fuel system in a light complete vehicle under the requirements of CMVSS 301.2, *CNG Fuel System Integrity*. That company was the first to be granted a NSM under the categories:

- Intermediate Stage - fuel system conversion
- Vehicle Alterer - fuel system conversion

Prior to this application, much of the history of NGV use in Canada has been based on aftermarket converted vehicles that have been brought to the market by systems converters certifying their products through provincial regulatory agencies responsible for pressure vessel and gas installation certifications. While this situation is starting to change for medium- and heavy-duty trucks and buses as more than 50 different factory-built models are now available in North America, there is an ongoing market development challenge due to the limited number of NGVs available compared to conventional diesel- or gasoline-powered vehicles.

Although the provincially-based system associated with aftermarket conversions has provided some level of assurance that safe systems are going on vehicles, it is not in keeping with the the Act and its attendant MVSR, including CMVSS 301.2, *CNG Fuel System Integrity*. In fact, CMVSS 301.2 specifically exempts companies that manufacture vehicles under the authority of the Act from:

- a) “any requirement to obtain an approval from, or to act under the supervision of, an authority having jurisdiction or the boiler and pressure vessel inspection authority of a province or territory; and”
- b) “any requirement respecting inspection, service or repair after the main assembly of the vehicle has been completed.”²

The Act provides for self- certification to the requirements of the Regulations by companies who manufacture vehicles in Canada, are dealers or agents for manufacturers of vehicles in Canada, or who import new vehicles into Canada for sale in Canada.

The Need for a National Safety Mark

The NSM as defined in the Act and detailed in the Regulations under Schedule I, is a national trade mark and the property of the Queen. Thus, use of the NSM is only permitted to companies under the authorization of Transport Canada and those companies must be registered companies in Canada who:

- a. Manufacture vehicles in Canada; or
- b. Act as dealers or agents of a manufacturer of vehicles in Canada; or
- c. Import vehicles into Canada.

Use of the NSM is spelled out in the Regulations under Sections 6, 7 and 9. The NSM is essentially a statement by the vehicle manufacturer, whether OEM, intermediate or final stage manufacturer, or alterer prior to first retail sale, that the vehicle complies with all applicable CMVSS as per Schedule III of the MVSR.

Manufacturers who are authorized and apply the NSM to vehicles that they manufacture or alter need not seek additional third-party certification for systems or components installed by them on those vehicles. They are rightfully taking on responsibility for the compliance of the vehicles with the applicable CMVSS.

A vehicle without an NSM may be imported from the USA, however the importer must apply to bring the vehicle into Canada via applicable processes as defined in the Act and Regulations. If the vehicle complies with the US Federal Motor Vehicle Safety Standards and is labeled as such, it may come through the Registrar of Imported Vehicles (RIV), however it must be brought into

² CMVSS 301.2, Section (3)

compliance with all applicable CMVSS. Changes made to the vehicle to comply with all applicable CMVSS must be made by the importer and these changes do not require the importer to have the authorization to apply the NSM, since the RIV takes the responsibility for the vehicle in Canada.

If on the other hand, the vehicle is manufactured compliant with CMVSS and is so labeled, the Canadian importer of record for the vehicle must seek approval from Transport Canada through approved channels and the same documentation must be provided as for a Canadian company applying for an NSM. The key element is that Transport Canada wants to be confident that the company importing the vehicle is familiar with the requirements of the Act and Regulations, just as a manufacturer is.

Federal Regulations that Apply

Motor Vehicle Safety Act

The Act was enacted to provide the Minister of Transport with the authority to ensure that vehicles entering the Canadian marketplace to be used on Canadian roads meet a minimum level of safety. To this end, the Minister is provided powers through the Act to promulgate regulations and standards through the Transport Canada Road Safety Directorate. Enforcement, penalties and recall requirements are also provided for in the Act. The overarching principle behind the Act is to improve highway safety across Canada by requiring a minimum level of safety for all vehicles on those highways.

Act Sections 3 & 4 and Schedule II: National Safety Mark

Sections 3 and 4 of the Act read as follows:

NATIONAL SAFETY MARKS

National trade-marks

3. (1) The national safety marks are hereby declared to be national trade-marks and, except as provided in this Act, the exclusive property in and right to the use of those marks are vested in Her Majesty in right of Canada.

Use of marks

(2) A company authorized by the Minister in the prescribed manner may, subject to the provisions of this Act, apply a national safety mark, in the prescribed form and manner and on the prescribed place, to a vehicle or equipment of a prescribed class.

Prohibition

(3) No person shall use a national safety mark except as authorized by this Act.

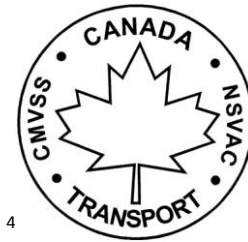
Confusing marks

(4) No person shall use a mark other than a national safety mark in such a manner that it is likely to be mistaken for a national safety mark.

Interprovincial shipments

4. Except as otherwise provided by the regulations, no company shall ship from one province to another, or deliver to any person for the purpose of being so shipped, any vehicle or equipment of a prescribed class manufactured in Canada unless it has a national safety mark applied to it in accordance with section 3.³

Schedule I of the Motor Vehicle Safety Regulations provide the format of the NSM:



The NSM with a registration number in the centre of the maple leaf can typically be seen on a compliance label on the door-jam of any OEM automobile or truck in Canada.

The key element of these sections of the Act is that the NSM is the property of the Queen and is essentially a statement of compliance from the manufacturer or importer,

³ Canadian Motor Vehicle Safety Act, Sections 3 & 4

⁴ National Safety Mark (NSM)

who has been authorized by Transport Canada to apply the NSM to their vehicles, i.e. the Canadian company applying the NSM is firmly stating that the vehicle complies with all applicable regulations under the Act.

It is important to note that although Section 4, *Interprovincial Shipments*, above implies that an NSM is not required by Transport Canada if the new vehicle does not cross provincial boundaries during the first retail sale transaction. If the vehicle has an NSM applied by any manufacturer during the multi-stage process, then subsequent manufacturers or alterers must apply their NSM and compliance label to the vehicle to maintain the vehicle's compliance with the Act and MVSR regardless of whether the vehicle crosses provincial boundaries or not during the first retail sales transaction.

Act Section 6 & 7: Importation

These sections define the provisions for importing vehicles into Canada and cover what vehicle are allowed to be imported and how. The key element is that if the new vehicle is manufactured for the Canadian market it must comply with the regulations and all applicable CMVSS.

Canadian Motor Vehicle Safety Regulations

The Canadian MVSR provides the detail of the requirements mandated by the Act. In particular, the MVSR describes the standards that each prescribed vehicle must meet and how the compliance label and NSM needs to be applied by the vehicle manufacturer or importer to the vehicle to indicate that the vehicle is compliant.

MVSR Sections 6, 7 & 9: Labeling and Documentation Requirements

Sections 6, 7 and 9 outline the documentation and labeling requirements for all prescribed new vehicles. Of particular interest to this report are sections 6.1 through 6.6, section 7 and section 9.

Sections 6.1 through 6.6 cover the labeling and documentation requirements for the multi-stage manufacturing industry, where the OEM provides an incomplete vehicle (e.g. chassis cab, cut-away chassis, stripped chassis, etc), and the subsequent intermediate stage and final stage manufacturer(s) add equipment and/or modify the vehicle to create the final vehicle for its intended vocation with the end user. These sections recognize the complexity of the vocational truck manufacturing sector. The requirements seek to ensure that each company involved in the process is easily identified by the label they install on the vehicle and that they maintain appropriate records regarding their part in the assembly of the final vehicle.

Sections 6.1 and 6.2 identify the obligations of the incomplete vehicle manufacturer (i.e. the OEM), including the need for an Incomplete Vehicle Document (IVD) and an appropriate label.

Sections 6.3 and 6.4 identify the obligations of the intermediate stage manufacturer (e.g. crane installer or fuel system installer), including addendums to the OEM IVD and appropriate additional labeling.

Section 6.5 and 6.6 identify the obligations of the final stage manufacturer, who typically is the last party to perform any manufacturing operations on the vehicle before it reaches the end user. This manufacturer keeps the OEM IVD, all previous addenda and their own addendum. They also add an appropriate label.

Section 7 spells out the specific general requirements of all of the labels in the regulations, i.e. “*shall*

- a) be permanently attached to the vehicle;
- b) be resistant to or protected against any weather condition to which the label may be exposed;
- c) have lettering that is
 - i. clear and indelible,
 - ii. indented, embossed or in a colour that contrasts with the background colour of the label, and
 - iii. in block capitals and numerals not less than 2 mm in height; and
- d) have metric units identified by the appropriate name or symbol.”

Section 9 identifies the obligations of vehicle alters, who take a complete vehicle and perform modifications prior to the vehicle being delivered to the end user. These requirements are similar to requirements for all other manufacturers in the process.

MVSR Section 11 Importation Document & 12 Importation of a Vehicle Purchased in the United States

These sections outline the detailed requirements for importing various vehicles into Canada. Transport Canada has various policies and procedures developed under these regulations to cover the import of vehicles, however new vehicles manufactured for the Canadian market must comply with the CMVSS as noted earlier.

CMVSS 105, 121 & 135 Brake Systems

The standard most likely to be affected by a natural gas fuel system modification by an intermediate or a final stage manufacturer, or an alterer, assuming they do not perform any other manufacturing processes, is the applicable brake system standard.

- CMVSS 105 applies to electric brake systems, or hydraulic brake systems for medium to heavy duty vehicles.
- CMVSS 121 applies to air brake systems, which are the typical system on a heavy duty vehicle.
- CMVSS 135 applies to brake systems for passenger cars and other light duty vehicles.

It is not identified directly in the standards as to why the vehicle brake system may be affected by vehicle up-fitters, who do not directly modify any of the brake system. The misconception is that these requirements are met by the OEM and that compliance is passed through to the various subsequent manufacturers, so long as those manufacturers do not modify or in some way tamper with the brake system. This is hardly the case, however.

When any mass is either added to or deducted from a vehicle, the braking performance of that vehicle is changed. All OEM vehicle manufacturers include in their IVD under the appropriate brake system section, a statement which outlines an envelope within which the Centre-of-Gravity (C of G) of the vehicle, including passengers, fluids and payload, must be maintained.

In order for an intermediate stage manufacturer, final stage manufacturer or alterer to know if the vehicle they have worked on still meets the OEM requirements, they need to perform calculations to: (a) determine weight distribution; (b) analyse allowable payload; and (c) determine the C of G vertical height. As long as the results of this analysis fall within the allowance provided in the OEM IVD⁵, the vehicle remains compliant and does not require further testing. If however, the analysis results do not fall within the OEM envelope, then either the OEM must be consulted and requested to allow a greater C of G, or the modifying manufacturer must perform the appropriate dynamic testing per the standard.

⁵ An alterer must request the IVD information from the OEM or final stage manufacturer as the IVD is not provided to them, but is required in order to verify compliance.

CMVSS Standard 301.2, CNG Fuel System Integrity

CMVSS 301.2, *CNG Fuel System Integrity*, provides the minimum standards by which CNG can be installed by a company under the authority of an NSM. There are basically two options for certifying a vehicle equipped with CNG fuel per the standard:

1. Crash tests
2. Fuel system compliance with CSA B109, *Natural Gas for Vehicles Installation Code* Section 4, and compliance of the natural gas fuel cylinder(s) with either:
 - a. Canadian Standards Association Standard CSA B51, Part 2, *High-Pressure Cylinders for the Onboard Storage of Natural Gas as a Fuel for Automotive Vehicle*, or;
 - b. American National Standard ANSI/AGA - NGV2, *Basic Requirements for Compressed Natural Gas Vehicle (NGV) Fuel Containers*

For light vehicles where a high volume of sales may be anticipated, the crash test method may be cost effective and from a compliance perspective and is straight forward, especially if very few vehicle models are involved. The documentation that must be maintained is essentially the test report(s).

For medium to heavy vehicles and low volume production, compliance with the requirements of CSA B109, and B51 or NGV2 for fuel storage cylinders, may be the only reasonable alternative.

Per CMVSS 301.2, the following is required, if a crash test is not performed:

(3) Instead of complying with subsection (1), a vehicle, other than a school bus, that is equipped with a fuel system that uses CNG as a source of energy for its propulsion may comply with section 4 of the version of Canadian Standards Association Standard CSA B109, *Natural Gas for Vehicles Installation Code*, that is in effect 24 months before the date of the last manufacturing operation performed by the manufacturer who installed the fuel system, as shown on the manufacturer's information label, or the date of manufacture of the completed vehicle, as shown on the compliance label, or a more recent version of that Standard, except that the following requirements do not apply:

- a) any requirement to obtain an approval from, or to act under the supervision of, an authority having jurisdiction or the boiler and pressure vessel inspection authority of a province or territory; and
- b) any requirement respecting inspection, service or repair after the main assembly of the vehicle has been completed.

(4) Only a CNG cylinder that is marked in accordance with the marking requirements in one of the following standards to indicate that the cylinder complies with that standard may be installed on a vehicle that is equipped with a fuel system that uses CNG as a source of energy for its propulsion:

(a) the version of Canadian Standards Association Standard CSA B51, Part 2, *High-Pressure Cylinders for the Onboard Storage of Natural Gas as a Fuel for Automotive Vehicles*, that is in effect 24 months before the date of the last manufacturing operation performed by the manufacturer who installed the fuel system, as shown on the manufacturer's information label, or the date of manufacture of the completed vehicle, as shown on the compliance label, or a more recent version of that Standard; or

(b) the version of American National Standard ANSI/AGA - NGV2, *Basic Requirements for Compressed Natural Gas Vehicle (NGV) Fuel Containers*, that is in effect 24 months before the date of the last manufacturing operation performed by the manufacturer who installed the fuel system, as shown on the manufacturer's information label, or the date of manufacture of the completed vehicle, as shown on the compliance label, or a more recent version of that Standard.

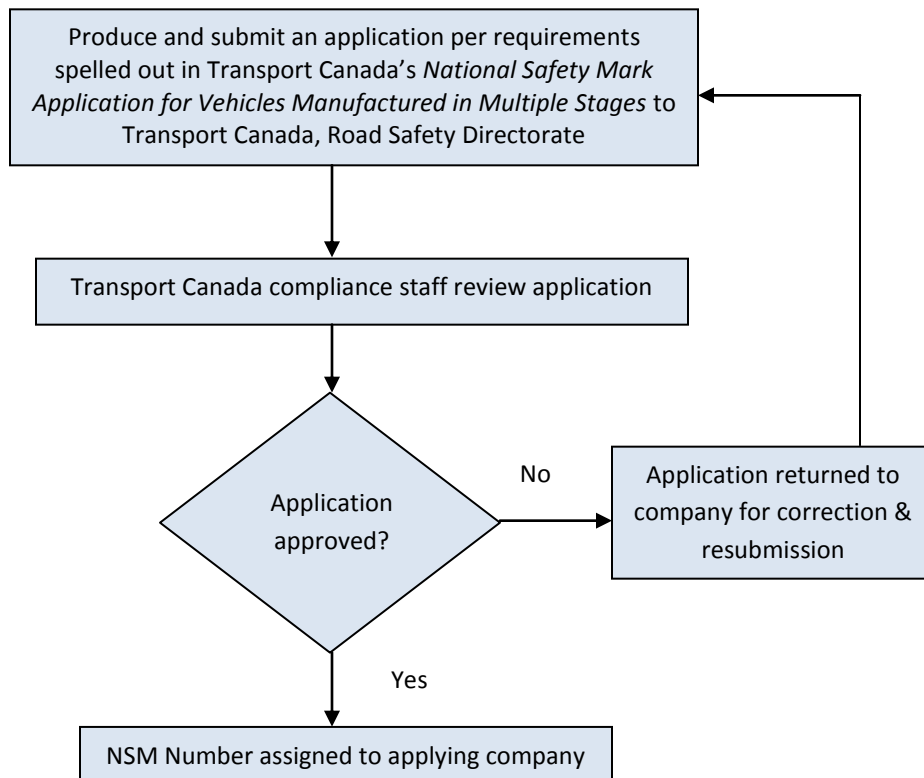
Therefore to prove compliance with this option a report would have to be submitted and maintained, which addressed each subsection of CSA B109-01, Section 4, *System Requirement*. All 43 subsections must be addressed with either an appropriate statement regarding the subsection, supplier compliance or with test documents for the components referred to in the subsection, photographs of the components showing installation and appropriate markings, third party test documents or the manufacturer's own test documents, whichever is most appropriate for the subsection.

In addition each section of B51, Part 2 or NGV2 would have to be treated similarly.

NSM Application Process

The “*Transport Canada National Safety Mark Application for Vehicles Manufactured in Multiple Stages*” can be found in Appendix I. This document outlines the requirements Transport Canada has established for applying for a NSM. Typically, this same documentation is required to prove compliance for each configuration of vehicle certified by the manufacturer on an ongoing basis and will be requested at any audit of a manufacturer performed by Transport Canada in future.

Essentially, the application process is as follows⁶:



⁶ The Canadian Transportation Equipment Association (CTEA) has been providing NSM application guidance and review services since 2003 in an effort to assist members in successfully applying for their NSM. For further information the CTEA staff can be consulted at 519-631-0414 or on-line at www.ctea.ca.

This process has taken anywhere from two weeks to three months depending on the volume of work that Transport Canada staff are experiencing and the level of staffing the directorate has at the time. The key elements of the application are:

- Proof that the company is a legal Canadian company, including Letters Patent and blank GST/HST remittance form.
- Contact information for a person within the company who is capable of fielding any questions from Transport Canada related to the act and regulations.
- Sample labels per the MVSR filled out properly to establish that the company understands the requirements of sections 6, 7 and 9 of the regulations.
- Evidence of compliance with all applicable regulations and CMVSS affected by the company, i.e. compliance calculations for brake standards and reports proving compliance with CMVSS 301.2, etc.
- Copies of addendums to be added to the OEM IVD addressing the compliance with the affected CMVSS.

The objective of Transport Canada with these requirements and associated processes is to have a level of confidence that the applying company has capability of meeting their obligations under the Act and understand the requirements within the Act and MVSR.

When considering importation of vehicles manufactured for the Canadian market, the importer of record must provide, in concert with the foreign manufacturer, the same information as outlined above and is considered by Transport Canada to be on par with a Canadian vehicle manufacturer as far as their responsibility under the Act and their obligations with respect to regulations for the imported vehicle in Canada.

Emissions Compliance

Until recently, the conversion of an OEM gasoline or diesel powered vehicle to natural gas operation has largely been carried out by an aftermarket NGV conversion company. In this case, a customer owns a gasoline vehicle and pays a conversion company to alter the vehicle to natural gas operation, either as a dedicated CNG vehicle or as a bi-fuel vehicle which will operate either on natural gas or gasoline. A conversion company may also purchase a new OEM gasoline vehicle from a dealer, convert it to natural gas operation, and offer it for sale as a natural gas vehicle. In both cases, two invoices are involved; one from the dealer to the conversion company for purchase of the original unconverted vehicle, and one from the conversion company to the customer for the conversion to natural gas. In both of these instances, the vehicle is altered after its first retail sale and therefore is considered to be an aftermarket conversion.

More recently, over the last decade, conversion companies have pursued other strategies including partnering with OEMs to offer vehicles that are sold through OEM dealers and that may also include OEM approval and endorsement. Ford Motor Co. has, for example, used the term Quality Vehicle Modifier (QVM) for such CNG conversions where quality requirements (QS 9000) are imposed on the conversion company⁷. These conversions are considered new natural gas vehicles if only a single invoice is involved in the transaction of selling the converted vehicle to the customer, but they can result in two different levels of responsibility for emissions compliance.

- ii. OEM Holds Emissions Certificate -The unconverted vehicle is shipped to an OEM-approved conversion facility. The converted NGV is then shipped to participating OEM dealerships for sale to the customer. In this case, the OEM takes responsibility as the manufacturer of record, is fully responsible for emissions compliance, obtains a certificate of conformity from EPA, and applies an EPA label to the vehicle with the OEM's name on the label.
- iii. Converter Holds Emissions Certificate -The converter obtains a "ship through" status from the OEM. This means that the unconverted vehicle is shipped to a conversion facility and the conversion company converts the vehicle to an NGV. The conversion company takes full responsibility for emissions compliance, and obtains a certificate of conformity from EPA. An EPA Vehicle Emissions Control Information (VECI) label is applied to the vehicle with the converter's name on the label, and the vehicle is shipped to a participating OEM dealership for sale to the customer or sold directly by the conversion company.

In both cases, the converted vehicles are considered to be new OEM or OEM-supported NGVs. In some cases, a conversion company may have pre-ordered NGVs from identified customers through an OEM dealership, but they remain OEM vehicles provided only one invoice is involved.

Emissions Regulations for Complete and Incomplete Vehicles

Manufacturers altering a complete gasoline vehicle to operate on natural gas must test the completed NGV for emissions compliance with the whole vehicle running on a chassis dynamometer over a regulated chassis test cycle. Emissions are measured in grams /mile to be compared against the emissions standards.

In the case of incomplete vehicles and multi-stage manufactured vehicles, many vehicle configurations may result from the final stage of manufacturing. Therefore, the incomplete vehicle is always certified for emissions compliance using an engine test on an engine

⁷ Other OEMs have similar programs, although naming and requirements will vary by OEM.

dynamometer. When a manufacturer converts an incomplete chassis (cut-away chassis, chassis cab) to natural gas operation he must test the natural gas engine on an engine dynamometer to demonstrate compliance of criteria emissions components in grams /brake-horsepower hour against the emissions standards. The vehicle completed in the final stage of manufacturing is never tested for emissions. The manufacturer of record taking responsibility for emissions compliance can be anyone in the multi-stage manufacturing process, but is almost always the natural gas installer who created the engine calibration for natural gas operation.

No alteration to emissions critical components can be made in the final stage of manufacturing. Any such alterations must be reported to the manufacturer of record, and unless deemed to have no emissions impact, corrective action would be required, or the final stage manufacturer will take full responsibility for emissions compliance as the manufacturer of record.

Applicability of a Canadian National Emissions Mark

The On-Road Vehicle and Engine Emission Regulations (Regulations) under the Canadian Environmental Protection Act, 1999 (CEPA 1999) establish national emission standards and test procedures for on-road vehicles and engines that are manufactured in Canada, or imported into Canada, on or after January 1st, 2004. These standards and test procedures are aligned with those of the U.S. EPA and are incorporated by reference. All new NGVs as defined above are considered manufactured vehicles and subject to these regulations.

In addition to demonstrating EPA emissions compliance and holding an EPA certificate of conformity, there are certain requirements to affix a NEM to the converted vehicle depending on the origin of the conversion. The conditions under which a NEM is required are as follows.

- i. An NGV alteration by an OEM or OEM-supported converter where the manufacturing process is completed in Canada.

If the manufacturing process is completed in Canada, then the manufacturer would be required to affix the NEM to allow its transport within Canada. Subsection 153(1) of CEPA 1999 requires a vehicle to which an NEM has been applied to conform to the requirements of the Regulations. Conformity with the Regulations is normally demonstrated by holding an EPA certificate. The manufacturer of record shown on the EPA certificate is then responsible for the NEM, and the vehicle can be transported within Canada.

A manufacturer could also apply for a NEM without an EPA certificate, but he would then have to demonstrate compliance with EPA requirements which would be equivalent to obtaining an EPA certificate.

- ii. An OEM or OEM-supported NGV installation where the vehicles are concurrently sold in Canada and the U.S and imported into Canada with either the OEM or the OEM-supported converter as the manufacturer of record.

This is where the NGV is being sold in the U.S. with an EPA certificate and there is intent to import the same vehicle into Canada. If the vehicle is imported into Canada, then subsection 153(1) requires that it conforms to the requirements of the Regulations as a condition for its importation. Since the Canadian standards are aligned with those of the EPA, EPA certification can be used as a means to demonstrate conformity to the emission standards. Pursuant to subsection 19(1) of the Regulations, a vehicle that is covered by an EPA certificate of conformity and sold concurrently in Canada and the United States is required to conform to, instead of the standards set out in sections 11 to 17 of the Canadian Regulations, the certification and in-use standards referred to in the EPA certificate. In this case, there is no requirement to present evidence of conformity prior to importation. In this situation, the importer could be requested to provide the evidence of conformity as set out in section 35 of the Regulations within 40 days of a request by the Minister.

In all other cases, a company would have to present evidence of conformity (i.e. documentary proof that the vehicle conforms to the standards) before importing the vehicle or affixing the NEM.

Comparison with Compliance Requirements for Aftermarket Conversions

In the U.S, anti-tampering provisions of the Clean Air Act prevent any alteration to a vehicle which will affect its emissions performance and its compliance with emissions regulations. Natural gas vehicle conversions fall under these provisions.

The EPA has since enacted a Notification Program for new vehicle installations, intermediate stage installations, and outside useful life conversions which allows NGV installers or converters to demonstrate to EPA that the conversion has not caused the vehicle emissions to exceed those for which the vehicle was originally certified. EPA certificates of conformity are not required for intermediate and outside useful life vehicles, only for vehicles up to two years old.

In Canada, there are no federal anti-tampering provisions. Modification of a motor vehicle after its first retail sale falls under provincial and territorial jurisdiction. Most provinces have enacted anti-tampering regulations for on-road vehicles which prohibit the removal or disabling of emission control devices fitted to the vehicle or engine by the original manufacturer. A natural

gas vehicle installation or conversion falls under these regulations since it uses replacement emissions control systems and components.

In Ontario, for example, Regulation 361/98 (Motor Vehicles) made under the Ontario Environmental Protection Act governs the use of replacement emissions systems and components. Replacement parts must be approved by either the California Air Resources Board (CARB) or the U.S. EPA. However, at the provincial level, there is no enforcement of these requirements for aftermarket NGVs and vehicles are often converted without obtaining an EPA certificate.

In general, tampering with emissions control systems is intended to be detected through the various provincial “Drive Clean”-types of programs requiring emissions testing at inspection stations. Correction of any major non-compliance issues relative to the emissions standards is required before licence plate renewal or ownership transfer. However, most conversions in Canada are bi-fuel NGVs, which are tested on gasoline only.

It should be noted that, unlike emissions systems alterations, approval for CNG fuel storage cylinders in the form of CRNs must be secured from provincial pressure vessel authorities in order to use the cylinders on a converted vehicle.

Conclusion

The existence of CMVSS 301.2, *CNG Fuel System Integrity*, within the Canadian Motor Vehicle Safety Regulations means that the only appropriate way to install a CNG system into a new vehicle prior to retail sale, be it by the OEM, an intermediate or final stage manufacturer or an alterer, is for that company to have a NSM issued to them by Transport Canada or be a foreign manufacturer registered with Transport Canada having a Canadian Importer of Record, also registered with Transport Canada. Proof of compliance with CMVSS 301.2 must be maintained by the NSM holder or by the Importer of Record.

Under the CMVSS Act, Section (5), a company may not sell a vehicle which originally has an NSM affixed, without ensuring that compliance is maintained throughout subsequent manufacturing, i.e. per the MVSR the subsequent manufacturers must apply their own labeling, including their NSM to any new vehicle that they have modified prior to retail sale. Since all OEMs apply their Canadian companies’ NSM when manufacturing new vehicles for the Canadian market, those vehicles must maintain compliance and therefore subsequent manufacturers or alters must apply their NSM as well.

Canadian Importers as described above have the same obligations and therefore must either apply for an NSM or must seek approval from Transport Canada through appropriate procedures as outlined and modified by Transport Canada from time to time.

From an emissions perspective, all new vehicles that are modified in order to operate on natural gas must comply with CEPA 1999 regulations which establish national emission standards and test procedures for on-road vehicles that are aligned with those of the U.S. EPA, and are incorporated by reference.

If the vehicle manufacturing process was completed in Canada, then the manufacturer is also required to affix the NEM to allow its transport within Canada and to conform to the requirements of the Regulations above.

If the vehicle is imported into Canada, EPA certification can be used as a means to demonstrate conformity to the emission standards. A vehicle covered by an EPA certificate and sold concurrently in Canada and the United States is required to conform to, instead of the CEPA Regulations, the certification and in-use standards referred to in the EPA certificate. In this case, there is no requirement to present evidence of conformity prior to importation. However, it is recommended that Environment Canada be informed of such importation and EPA compliance.

As there are no federal anti-tampering emissions provisions in Canada, aftermarket NGV conversions come under provincial jurisdiction and must follow the anti-tampering emissions requirements of each Province. However, there is little to no enforcement of these requirements at the provincial level at present.

Appendix I:

**Transport Canada National Safety Mark Application for Vehicles
Manufactured in Multiple Stages**

Appendix II:

Sample Incomplete Vehicle Document (IVD)

Appendix III:

Sample IVD Addendum