

**DECISION**  
**approving the Technical Code for Compressed Natural Gas for Vehicles (CNGV)**

Taking into account the provisions of art. 8 let. d) and of art. 75 par. (2) of Gas Law No. 351/2004 with subsequent amendments.

On the basis of the provisions of art. 10 par. (4) and (5) of Gas law No. 351/2004 with subsequent amendments,

**the president of the National regulatory Authority in the Natural Gas Sector** issues the present decision.

Art. 1. – The Technical Code for Compressed Natural Gas for Vehicles (CNGV) is approved and included in the annex which is an inherent part of the present decision.

Art. 2. - The specialized compartments within the National Regulatory Authority in the Natural Gas Sector, State Inspection for Control of Boilers, Pressure Recipients and Hoisting Equipment and the “Auto Romanian Register” Autonomous National Company, as well as the economic operators performing activities of production, storage, distribution and supply of compressed natural gas and authorized natural persons performing activities in this field will enforce the provisions of the present decision.

Art. 3. – The present decision is published in Romania’s Official Journal, Part I.

The President of the National Regulatory Authority in the Natural Gas Sector,  
**Stefan Cosmeanu**

Bucharest, 14 March 2006.  
No. 277

ANNEX

**TECHNICAL CODE**  
**for Compressed Natural Gas for Vehicles**

**1. Subject matter and objectives. Scope**

**1.1. Subject matter**

- 1.1.1. The Technical Code for Compressed Natural Gas for Vehicles (CNGV), hereinafter called the *Technical Code for CNGV*, aims to promote the minimum technical requirements specific to compressed natural gas for vehicles used as fuel, as well as to define the state authorities having according to the legislation in force, responsibilities and competences in the field of CNGV production, storage, distribution and supply, of CNGV storage containers and respectively in the field relating to equipment and installations installed on the vehicles using this type of fuel.
- 1.1.2. The minimum technical requirements for CNGV production, storage, distribution and supply are based on European and international norms and standards.
- 1.1.3. The technical requirements specified by the Technical Code for CNGV aim to provide the regulatory framework needed for introducing on Romanian territory vehicles using

compressed natural gas as a fuel whilst observing the conditions relating to safety, stability and economic efficiency.

- 1.1.4. The Technical Code for CNGV is drawn up by the National Regulatory Authority in the Natural gas Sector (*ANRGN*) in cooperation with the State Inspection for Control of Boilers, Pressure Recipients and Hoisting Equipment (*ISCIR*) and the “Auto Romanian Register” Autonomous National Company (*RAR*).
- 1.1.5. Annex No. 1 includes definitions of abbreviations and terms used in the present technical code, as well as several terms specific to GNCV sector.

## **1.2. Objectives**

Technical Code for CNGV has the following objectives:

- a) Establishing the technical requirements for the basic activities related to the infrastructure for CNGV production, store, distribution and supply;
- b) Establishing the general quality conditions for the natural gas used as fuel for vehicles;
- c) Establishing the general framework for authorization and licensing in CNGV sector;
- d) Specifying the general conditions regarding the measuring of CNGV amounts;
- e) Establishing the technical requirements for placing on Romanian market vehicles using CNGV as a fuel;
- f) Delivery of information from authorizations/licenses holders to competent authorities;
- g) Specifying the ways of performing the control and inspection in CNGV sector.

## **1.3. Scope**

- 1.3.1. The provisions of the Technical Code for CNGV are applicable on a mandatory basis to:
  - Companies performing CNGV production, storage, distribution and supply activities;
  - Authorized natural persons performing activities in the CNGV sector;
- 1.3.2. The Technical Code for CNGV refers also to related activities, namely:
  - Manufacturing of equipment for using CNGV as a fuel for vehicles;
  - Trading the equipment related to the use of CNGV;
  - Maintenance, repairs, periodical verifications of equipment related to the use of CNGV;
  - Authorization and use of vehicles using CNGV as a fuel.
- 1.3.3. The present Technical Code for CNGV aims to support Romanian or foreign investors by facilitating them to obtain information in the way of a single document concerning technical regulations applicable to the use of CNGV.

## **1.4. Main characteristics of CNGV**

- 1.4.1. CNGV is produced by compressing at pressures in the range of 20 – 25 MPa (200-250 bar) natural gas taken from gathering pipelines, transmission or distribution pipelines.
- 1.4.2. Romanian natural gas has the Wobbe index in the range of 37.8 and 56.6 MJ/m<sup>3</sup>.
- 1.4.3. The octane number corresponding to methane (CH<sub>4</sub>) is in the range of 125 and 130.
- 1.4.4. Maximum pressure of CNGV storage into the tank of the vehicle is 20 MPa (200 bar).
- 1.4.5. Relative density of Romanian natural gas is in the range of 0.55 and 0.7 kg/ m<sup>3</sup>.
- 1.4.6. Auto-ignition temperature is about 540° C.

## **1.5. Main advantages of using CNGV**

- 1.5.1. The experience of European Community countries (Italy, France, Germany) and of several countries of America (Argentina, USA, Canada) show the opportunity and advantages related to introducing in Romania vehicles that use CNGV as a fuel. Annex No. 2 includes a comparative presentation of the characteristics of the following fuels: gas oil, diesel oil, liquefied petroleum gas, CNGV.
- 1.5.2. The experience gained in over 20 years of use of this type of fuel, as well as the technological progress of equipment producers have shown the following main advantages of using CNGV as compared to the use of other types of fuel:
  - Good resistance to shock due to conditions imposed on containers, tanks and pipelines;
  - Easier making of the ignition mixture easier as compared to traditional fuels;
  - Slow combustion and low noise;
  - High protection to ignition of installations in vehicles;
  - Non-toxic fuel;
  - Simple chemical composition and less polluting emissions (reduction of CO<sub>2</sub> emissions by about 25%)
  - Lower density as compared to the air which makes it easy to detect accidental leakage; natural evacuation is made through natural ventilation systems;
  - High degree of dilution in air, in case of accidental fuel leakage;
  - Removal of possibilities of explosion of the CNGV container-tank due to the protection systems.
- 1.5.3. The program drafted by the European Commission foresees that, by 2020, 10% of the vehicles in Europe will use CNGV.
- 1.5.4. In order to meet this goal, it is necessary to ensure the infrastructure needed for supplying vehicles with CNGV on all European roads, including Romanian ones.

## **2. Establishing technical requirements for basic activities related to infrastructure for CNGV production, storage, transmission, distribution and use**

- 2.1. Annex No. 3 includes the relevant legislation, the list of non-mandatory standards applicable and a part of the bibliography related to CNGV.
- 2.2. The infrastructure needed for CNGV production, storage, distribution and supply comprises the following elements:
  - a) Hook-up pipeline to natural gas gathering/transmission/distribution pipelines, as the case may be;
  - b) Natural gas adjustment-measuring station;
  - c) Natural gas compression unit;
  - d) CNGV storage unit;
  - e) Pump for supplying the container-tanker of the vehicle with CNGV;
  - f) Cylinder containers battery for transporting CNGV.
- 2.3. Installations designed for CNGV production, storage, and distribution are made with new equipment
- 2.4. only.
- 2.5. Hooking-up to natural gas pipelines is performed according to the regulations in force, both from the point of view of access to the systems and from the point of view of design and building of necessary undertakings in the natural gas sector.
- 2.6. Natural gas adjustment-measuring unit/station shall be designed and built in compliance with specific regulations.

- 2.7. The compression natural gas unit comprises depending on capacity one or several compressors, aspiration and pressing pipelines, automation-protection systems and expansion vessels.
- 2.8. The storage unit is meant to store the CNGV compressed at 25 MPa (250 bar), with a view to ensuring the quick filling of the tank-containers of vehicles.
- 2.9. The storage is done in:
- a) Containers constructed and certified as per Government Decision No. 584/2004 with subsequent amendments establishing the requirements for placing on the market pressure equipment;
  - b) Metallic transportable cylinder containers, frames and batteries of metallic transportable cylinder containers constructed and certified as per Government Decision No. 941/2003 with subsequent amendments establishing the requirements for placing on the market and repeated use of pressure equipment.
- 2.10. Tasks and competences related to authorization regime, periodical technical inspection of exploitation and repair of containers, metallic transportable cylinder containers, frames and batteries of metallic transportable cylinder containers, as well as of installations related to CNGV production, storage, distribution (with the exception of natural gas supplying installation, including filtration and measuring installation, compressor and supplying pumps of vehicles) are incumbent on ISCIR which elaborates the specific technical norms for this category of pressure equipment.
- 2.11. With a view to obtaining an optimum supply of vehicles and limiting the numbers of stopping-starting cycles CNGV storage cylinders shall be connected through appropriate pipelines and computer operated valves.
- 2.12. CNGV distribution stations can be:
- Mother distribution station – with direct connection to gathering, transmission and/or distribution pipelines. The theoretical diagram of such CNGV supplying station is presented in Annex No. 4;
  - Daughter distribution station - without connection to natural gas gathering, transmission and/or distribution pipelines.
- 2.13. Daughter distribution station supplies CNGV from storage cylinders taken from mother supplying station. Transportation of storage cylinders by road is done in compliance with the provisions of Government Ordinance No. 48/1999 on transportation of dangerous goods by road approved with amendments by Law No. 122/2002.
- 2.14. CNGV distribution stations shall be equipped with appropriate measuring systems, flexible couplings with cut-out cock and connection piece to the CNGV tank of the vehicles.
- 2.15. The norms and procedures concerning the setting/installing/fitting of pressure equipment destined to equipping of installations meant for CNGV production, storage, distribution shall be placed under the tasks and competences of ISCIR.
- 2.16. Technical norms concerning the design and construction of the infrastructure related to CNGV distribution stations shall be drawn up by taking into consideration the provisions of the specific European legislation and shall be approved by the institutions responsible according to the legislation in force (Ministry of Administration and Internal Affairs – General Inspectorate for Emergency Situations etc.).

### **3. General quality conditions for compressed natural gas used as a fuel for vehicles**

- 5.1. Natural gas taken from gathering/transmission/distribution pipelines has to meet at the entry into compression stations the quality conditions stated by SR EN ISO 15403 standard, Natural

gas - Description of the quality of natural gas for its use as compressed natural gas for vehicles”.

#### **4. Environmental protection requirements**

- 4.1. When designing, building and operating the undertakings related to CNGV production, storage, and distribution the provisions of the Romanian and European legislation on environmental protection, specific to CNGV shall be observed.

#### **5. Authorization and licensing in CNGV sector**

##### **5.1. Legal regime of authorization of undertakings and licensing of companies performing CNGV production, storage, distribution and supply commercial activities**

- 5.1.1. Setting up new undertakings related to CNGV production, storage and distribution, operation and modification of existing capacities are performed by companies after they are granted the authorizations specified in the regulations in force, issued by ANRGN.
- 5.1.2. The applicants shall be legal Romanian or foreign persons, with headquarters in Romania.
- 5.1.3. Authorizations shall include, if appropriate, provisions regarding:
- rights granted by way of authorization;
  - conditionings, limitations and restrictions concerning the continuity and levels of operation of authorized undertakings;
  - interdictions and tasks concerning safety of persons, property and environmental protection, impact on activities of public interest;
  - delimitation of protection and safety zone;
  - contents of servitude in compliance with the legal provisions in force;
  - technical data regarding the authorized objective.
- 5.1.4. In order to perform CNGV production, storage, distribution and supply commercial activities, companies shall be licensed by ANRGN.
- 5.1.5. Licensees have the obligation to perform commercial activities according to the rights granted by license whilst observing the conditions referring to safety, economic efficiency and environmental protection.
- 5.1.6. Licenses granted by ANRGN to companies specify the validity conditions specific to each type of license.
- 5.1.7. The validity conditions of the license comprise as the case may be, the following main provisions:
- Rights granted to licensee;
  - Interdictions and tasks concerning safety of persons, property and environmental protection, impact on activities of public interest;
  - Ensuring equal treatment for players on CNGV market;
  - Preserving a normal competitive environment by avoiding disbalances on CNGV market and anti-competitive practices;
  - Obligation of licensees to observe the performance standards related to the quality of services for supplying CNGV to consumers and to submit annual reports on fulfilling the specific requirements specified by performance standards;
  - Obligation of licensees to submit information to competent authorities;
- 5.1.8. ANRGN together with the institutions with responsibilities in CNGV sector (RAR, ISCIR, Ministry of Administration and Internal Affairs – Commandment for Emergency Situations etc.) shall draft the Regulation on granting authorizations for the setting up, function and modification of undertakings related to CNGV production, storage and distribution and

licenses for performing CNGV production, storage, distribution and supply commercial activities.

## **5.2. *Authorization and verification of the staff performing activities in CNGV sector***

- 5.2.1. Natural persons which design, build and operate undertakings in the field of CNGV production, storage and distribution are authorized by ANRGN within the confines of the competences given by law.
- 5.2.2. Authorization is performed according to the provisions of a regulation drawn up by ANRGN.
- 5.2.3. Authorization of the staff is done on the basis of an examination.
- 5.2.4. Participants to examination must fulfill certain conditions related to education and professional experience in designing, building and operating in the natural gas sector.
- 5.2.5. The candidate admitted by examination is qualified as an authorized CNGV installer, as per a certification.
- 5.2.6. ISCIR shall draw up regulations concerning authorization of the staff performing design, construction, operation, maintenance, repair and periodical verification of CNGV cylinder containers.
- 5.2.7. RAR shall draw up regulations concerning authorization of the staff performing design, construction, operation, maintenance, repair and periodical verification of installations and equipment placed on vehicles using CNGV as fuel.

## **6. Measuring of CNGV**

- 6.1. Measuring of CNGV amounts will be performed in compliance with European regulation in force.
- 6.2. The amounts of CNGV are expressed in mass units [kg] and/or, as the case may be, in energy units.
- 6.3. The measuring system used in the distribution station shall be equipped with devices indicating the unitary price, and the overall amount to pay.
- 6.4. In order to be used in commercial transactions, the measuring devices and systems shall meet the conditions imposed by the metrology-related legislation in force.

## **7. Vehicles using CNGV fuel**

- 7.1. There are two categories of vehicles that use CNGV:
  - a) New vehicles equipped by the manufacturer with the equipment needed in order to use CNGV as fuel;
  - b) Vehicles modified in order to use CNGV by installing new equipment.
- 7.2. Vehicles from the category referred to at point 7.1. let. a) are certified according to Regulation No. 110 EEC-UN, part II.
- 7.3. Vehicles from the category referred to at point 7.1. let. b) are equipped with CNGV supplying installations certified according to Regulation No. 115 EEC-UN or certified by RAR. The certified installations are composed of devices certified as per Regulation No. 110 EEC-UN, part I.
- 7.4. Norms and procedures concerning production, import, sale, installation, maintenance, repair, periodical verification and use of equipment for vehicles using CNGV as fuel are placed under the competence and responsibility of RAR.

## **8. Control in CNGV sector**

- 8.1. Authorities competent for control in CNGV sector are according to their specific competence and responsibility: ANRGN, ISCIR and RAR. competence
- 8.2. The control performed by ANRGN is done in compliance with a regulation specific to CNGV.
- 8.3. ISCIR and RAR shall draw up specific regulations for control in CNGV sector that fall under the competence and responsibility of each authority.

## **9. Exchange and delivery of information**

### ***9.1. Notification to ANRGN***

- 9.1.1. Companies operating in the sector of CNGV production, storage, distribution and supply have the obligation to submit to ANRGN the information needed in order to perform their activities in an appropriate manner.
- 9.1.2. Holders or applicants of authorizations and/or licenses as the case may be have the obligation to submit to ANRGN information in compliance with the provisions of the regulations in force.
- 9.1.3. ANRGN may request any information, records and papers of the holders of authorizations and/or licenses, whilst observing the legal regime thereof, information that it considers as relating to their business and activities in the field of CNGV production, storage, distribution and supply, with a view to ensuring the fulfillment of the validity conditions of authorizations and/or licenses.
- 9.1.4. ANRGN shall use this information only to the purpose it has been provided for, committing itself to ensure its confidentiality.
- 9.1.5. Delivery by companies of incorrect, incomplete or wrong information shall be considered infringement and shall be sanctioned according to the legislation in force unless it was performed in such a way as to be considered according to the law offence.
- 9.1.6. Any notification, acceptance, confirmation or other requested information will be made in written and submitted by fax or e-mail, provided that the original is sent by messenger or mailed to ANRGN or to the holder or applicant of authorization and/or license.

### ***9.2. Notification to RAR and ISCIR***

ISCIR and RAR shall draw up their own regulations concerning the delivery by companies of information regarding activities of design, construction, operation, maintenance, repair, periodical verification of pressure equipment used to equip the installations destined to CNGV production, storage and distribution and respectively for equipment installed on vehicles using CNGV as fuel.

## **10. Transitional and final provisions**

- 10.1. Holders of authorizations/licenses in CNGV sector, as well as natural persons authorized by ANRGN shall perform their activity in compliance with the provisions of the present Technical Code and of the specific regulations.
- 10.2. Holders of authorizations/licenses in CNGV sector and interested economic operators may propose technical norms to be approved by ANRGN.
- 10.3. The present Technical Code becomes effective as of its publishing in Romania's Official Journal, Part I.

10.4. The present Technical Code may be revised, updated and amended by ANRGN together with ISCIR and RAR, after previous consultations with companies operating in CNGV sector, on a periodical basis or any time a relevant legislative event arises.

10.5. Annexes No. 1 - 4 are an inherent part of the present Technical Code.

ANNEX No. 1  
to the Technical Code for CNGV

## **TERMINOLOGY AND ABBREVIATIONS**

### **1. Terminology used in CNGV sector**

*Burst pressure* – pressure leading to failure and consequential fluid loss through the roof

*Break-away device* – device installed on the CNGV dispenser which stops gas flow in case of break-away of the vehicle

*Cascade dispensing sequence* – means allowing for an efficient use of the gas storage facility by dividing it into banks operating at different pressure levels

*Compression unit* – unit that compresses the natural gas consisting of one or several compressors, including all piping and equipment

*Compressor* – machine which increases the pressure of gas from a low to a higher level

*Cylinder* – pressure container used for compressed natural gas storage and transportation

*Maximum allowed working pressure* – maximum pressure the equipment was design to be used at under safety conditions

*Dispenser* – equipment through which the compressed natural gas is supplied to the vehicle

*Dryer* – system leading to the removal of the water content of natural gas prior to compression unit

*Filling station* – location at which natural gas is dispensed into a cylinder container

*Flexible fuel lines* – flexible tubing or hose through which natural gas flow

*Gas/air mixer* – device for introducing CNGV into the engine intake manifold (carburetor or injector)

*Hazardous area* – area in relation to which there is the possibility that a certain negative effect emerges during a certain period of time and below which the gaseous atmosphere is not explosive

*Low explosive limit (LEL)* – concentration of gas or vapors in air below which the gas atmosphere is not explosive.

*Mobile storage* – battery of cylinder container or pressure container permanently installed on a special vehicle for transportation by road used for the transportation of CNGV to other refueling stations

*Mother-daughter station* - a distribution station not connected to a natural gas supplying pipeline where CNGV is supplied by road transport from a mother distribution station connected to a natural gas supplying pipeline

*On site filling* – alternative filling where several vehicles are supplied at the same time for several hours

*Recovery vessel* – vessel that recovers gas from the compressor and its ancillaries and which may also serve to damp out pressure pulsations in the compressor inlet.

*Safety distance* – minimum distance between the filling station, its components and structures and the other installations and structures in the proximity. This distance reduces the degree of danger in case of incidents.

## 2. Abbreviations

1.	ANRGN	National Regulatory Authority in Natural Gas Sector
2.	ISCIR	State Inspection for Control of Boilers, Pressure Recipients and Hoisting Equipment
3.	RAR	Romanian Auto Register
4.	CNGV	Compressed Natural Gas for Vehicles

*ANNEX No. 2<sup>\*</sup>)*  
*to the Technical Code for CNGV*

### Comparative characteristics of main fuels

<b>Fuel</b>	<b>Gas oil</b>	<b>Diesel oil</b>	<b>LPG</b>	<b>CNGV</b>
<b>Characteristics</b>				
State of aggregation	Liquid	Liquid	Liquid/gaseous	Gaseous
Density relative to air [%]	4	variable>4	1.55	0.55
Auto-ignition threshold (% gas/air mixture)	1.2÷7.6%	-	1.9÷9%	5÷15%
Auto-ignition temperature [°C]	280	235	420÷480	540
Tank pressure [bar]	1	1	4÷5	540
Octane number	95/98	-	92/96	25/130
Inferior calorific power	11.7	11.4	12.8	12.5÷13.8

## RELEVANT LEGISLATION FOR CNGV

### *1. Romanian legislation*

Cr. No.	Legislation	Name
1.	GD No. 584/2004	Establishing the conditions for placing on the market pressure equipment (transposing Directive 97/23/EC)
2.	GD No. 95/2003	Control of activities that may cause major-accident hazards involving dangerous substances (transposing Directive 96/82/EC)
3.	GO No. 48/1999 approved by Law No. 122/2002	Transportation of dangerous goods by road (transposing Directive 94/55/EC)
4.	GD No. 941/2003	Establishing the conditions for placing on the market and repeated use of transportable pressure equipment
5.	GO No. 80/2000 amended by GO No. 34/2005 approved by Law No. 375/2005	Certification of equipment, spare components and materials for exploitation used by road vehicles, as well as conditions for the marketing and use thereof
6.	Order No. 2135/2005 of the Ministry of Transport, Constructions and Tourism	Approving the Regulations on certification of products and materials for exploitation used by road vehicles, as well as conditions for the placing on the market thereof – RNTR 4

### *2. International Regulations*

No.	Legislation	Name
1.	EEC-United Nations Regulation No. 110	Uniform provisions concerning the approval of: I. Specific components of motor vehicles using compressed natural gas (CNG) in their propulsion system. II. Vehicles with regard to the installation of specific components of an approved type for the use of compressed natural gas (CNG) in their propulsion system.
2.	EEC-United Nations Regulation No. 115	Uniform provisions concerning the approval of: I. Specific LPG (liquefied petroleum gases) retrofit systems to be installed in motor vehicles for the use of LPG in their propulsion system II. Specific CNG (compressed natural gas) retrofit systems to be installed in motor vehicles for the use of CNG in their propulsion systems

### 3. List of standards applicable in CNGV sector

#### Romanian

Cr. No.	Type of standard and number	Name
1.	SR EN ISO 11114-1:2003/AC:2003	Transportable gas cylinders. Compatibility of cylinder and valve materials with gas contents -- Part 1: Metallic materials
2.	SR EN ISO 11114-2:2003/AC:2003	Transportable gas cylinders. Compatibility of cylinder and valve materials with gas contents -- Part 1: Non-metallic materials
3.	SR EN ISO 11114-3:2003/AC:2003	Transportable gas cylinders -- Compatibility of cylinder and valve materials with gas contents -- Part 3: Autogenous ignition test in oxygen atmosphere
4.	SR EN ISO 11439:2003	Gas cylinders -- High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles
5.	SR EN ISO 11116-1:2003	Gas cylinders -- 17E taper thread for connection of valves to gas cylinders -- Part 1: Specifications
6.	SR EN ISO 11116-2:2003	Gas cylinders -- 17E taper thread for connection of valves to gas cylinders -- Part 2: Inspection gauges
7.	SR EN ISO 15403:2005	Natural gas - Designation of the quality of natural gas for use as a compressed fuel for vehicles
8.	SR EN 60079-10:2004	Electrical apparatus for explosive gas atmospheres -- Part 10: Classification of hazardous areas

#### International

No.	Standard type and number	Name
1.	ISO 11114-4:2005	Transportable gas cylinders -- Compatibility of cylinder and valve materials with gas contents -- Part 4: Test methods for selecting metallic materials resistant to hydrogen embrittlement
2.	ISO 11117:1998	Gas cylinders -- Valve protection caps and valve guards for industrial and medical gas cylinders -- Design, construction and tests
3.	ISO 11119-1:2002	Gas cylinders of composite construction -- Specification and test methods -- Part 1: Hoop wrapped composite gas cylinders
4.	ISO 11119-2:2002	Gas cylinders of composite construction -- Specification and test methods -- Part 2: Fully wrapped fibre reinforced composite gas cylinders with load-sharing metal liners
5.	ISO 11119-3:2002	Gas cylinders of composite construction -- Specification and test methods -- Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners
6.	ISO 11191:1997	Gas cylinders -- 25E taper thread for connection of valves to gas cylinders -- Inspection gauges
7.	ISO 11622:2005	Gas cylinders -- Conditions for filling gas cylinders
8.	ISO 13338:1995	Determination of tissue corrosiveness of a gas or gas mixture
9.	ISO 14469-1:2004	Road vehicles -- Compressed natural gas (CNG) refuelling connector -- Part 1: 20 MPa (200 bar) connector
10.	ISO 14469-2	Road vehicles - Compressed natural gas(CNG) refueling connector size 2
11.	ISO 14469-3	Road vehicles - Compressed natural gas (CNG) refueling connector 250 bar.
12.	ISO 15500-1	CNG Fuel System Components: Part 1 - General requirement and definitions

13.	ISO 15500-2	CNG Fuel System Components: Part 2 - Performances and general test methods
14.	ISO 15500-3	CNG Fuel System Components: Part 3 - Check valve
15.	ISO 15500-4	CNG Fuel System Components: Part 4 - Manual valve
16.	ISO 15500-5	CNG Fuel System Components: Part 5 - Manual cylinder valve
17.	ISO 15500-6	CNG Fuel System Components: Part 6 - Automatic valve
18.	ISO 15500-7	CNG fuel System Components -- Part 7: Gas injector
19.	ISO 15500-8	CNG Fuel System Components: Part 8 - Pressure indicator
20.	ISO 15500-9	CNG Fuel System Components: Part 9 - Pressure regulator
21.	ISO 15500-10	CNG Fuel System Components: Part 10 - Gas flow adjustor
22.	ISO 15500-11	CNG Fuel System Components: Part 11 - Gas/air mixer
23.	ISO 15500-12	CNG Fuel System Components: Part 12 - Pressure relief valve
24.	ISO 15500-13	CNG Fuel System Components: Part 13 - Pressure relief device
25.	ISO 15500-14	CNG Fuel System Components: Part 14 - Excess flow valve
26.	ISO 15500-15	CNG Fuel System Components: Part 15 - Gas tight housing and ventilation hose
27.	ISO 15500-16	CNG Fuel System Components: Part 16 - Rigid fuel line
28.	ISO 15500-17	CNG Fuel System Components: Part 17 - Flexible fuel line
29.	ISO 15500-18	CNG Fuel System Components: Part 18 - Filter
30.	ISO 15500-19	CNG Fuel System Components: Part 19 - Fittings
31.	ISO 15500- 20	CNG fuel system components - Part 20: Rigid fuel line made of material other than stainless steel.
32.	ISO 15501-1:2001	Road vehicles -- Compressed natural gas (CNG) fuel systems -- Part 1: Safety requirements
33.	ISO 15501-2:2001	Road vehicles -- Compressed natural gas (CNG) fuel systems -- Part 2: Test methods
34.	ISO/DIS 19078	Gas cylinders-Inspection of the cylinder installation, and requalification of high pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles
35.	ISO /DIS 11439:2000	Gas cylinders - High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles

#### 4. Bibliography

No.	Regulation	Name
1.	prEN 13638	Draft European standard for NGV filling stations - at polling stage
2.	prEN 13945	Draft European standard for NGV refuelling appliances - at polling stage
3.	International Organisation for Legal Metrology – CT 8	Compressed Gaseous Fuel Measuring Systems for Vehicles
4.	NFPA 30	Flammable & Combustible Liquids Code
5.	NFPA 52	Compressed Natural Gas (CNG) Vehicular Fuel Systems Code 1998 Edition
6.	NFPA 54	National Fuel Gas Code
7.	NFPA 55	Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks
8.	NFPA 69	Standard on Explosion Prevention Systems
9.	NFPA 77	Recommended Practice on Static Electricity
10.	NFPA 88A	Standard for Parking Structures
11.	NFPA 99C	Standard on Gas and Vacuum Systems
12.	NFPA 274	Standard Test Method to Evaluate Fire Performance Characteristics of Pipe Insulation
13.	NFPA 306	Standard for the Control of Gas Hazards on Vessels
14.	NFPA 329	Recommended Practice for Handling Releases of Flammable and Combustible

		Liquids and Gases
15.	NFPA 385	Recommended Practice for Handling Releases of Flammable and Combustible Liquids and Gas
16.	NFPA 497	Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
17.	NFPA 551	Guide for the Evaluation of Fire Risk Assessments
18.	NFPA 921	Guide for Fire and Explosion Investigations
19.	CGA C-6.4-1998	Methods for External Visual Inspection of Natural Gas Vehicle Fuel Containers and Their Installations
20.	FMVSS 304	Compressed Natural Gas (CNG) Fuel Container Integrity
21.	FMVSS 303	CNG vehicle fuel system integrity
22.	ANSI NGV1-1994 (with 1997 and 1998 addenda)	- Compressed Natural Gas Vehicle Fueling Connection Devices
23.	ANSI NGV2-2000	Basic Requirements for Compressed Natural Gas Vehicle Fuel Containers
24.	ANSI NGV4.1/CSA 12.5 -1999	NGV Dispensing Systems
25.	ANSI NGV4.2/CSA 12.52 -1999	Hoses for NGVs and Dispensing Systems
26.	ANSI NGV4.4/CSA 12.54 -1999	Breakaway Devices for Natural Gas Dispensing Hoses and Systems
27.	ANSI NGV4.6/CSA 12.56 -1999	Manually Operated Valves for Natural Gas Dispensing Systems
28	J1616	Recommended Practice for Compressed Natural Gas Vehicle Fuel

### Theoretical diagram of a CNGV distribution station

1	Natural gas pipeline
2	Dryer
3	Meter
4	Isolating valve
5	One way valve
6	Safety valve
7	Compressor
8	Liquids separator
9	Control system
10/11/17	Storage containers
12	Pressure control valve
13	Supplying pump
14	Filling pistol
15	Expansion vessel (optional)
16	Compressor (optional)
18	Manometer indicator

