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Compressed natural gas (CNG) vehicle component and installation

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NOTE

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions.*

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3. *Compliance with a SS or TR does not exempt users from any legal obligations*

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Foreword

This Technical Reference was prepared by the Working Group on Compressed Natural Gas (CNG) Vehicles appointed by the Technical Committee on Engineering Support under the direction of the General Engineering and Safety Standards Committee. It is now endorsed under the national standardisation programme, which is coordinated by the Enterprise Singapore and guided by an industry-led Singapore Standards Council.

This Technical Reference is not to be regarded as a Singapore Standard. It is made available for provisional application over a period of two years, but does not have the status of a Singapore Standard. The aim is to use the experience gained to modify the Technical Reference so that it can be adopted as a Singapore Standard. Users of the Technical Reference are invited to comment on its technical content, ease of use and any ambiguities or anomalies. These comments can be submitted using the feedback form provided at the end of the Technical Reference and will be taken into account in the review of the publication. At the end of the two years, the Technical Reference will be reviewed by the CNG WG to discuss the comments received and to determine its suitability as a Singapore Standard. Submission for approval by the Standards Council as a Singapore Standard will be carried out only upon agreement after review.

This Technical Reference has been compiled from a number of established national and international standards, taking into account the latest technology developments, as well as operating, industrial and regulatory conditions specific to Singapore. To promote international harmonisation, ease of application, and availability and affordability of products, the terminology and requirements have been aligned where possible with the latest relevant ISO standards or the applicable equivalent national standards.

Whilst it is inevitable that there will be discrepancies among different international and national standards, industry experience indicates that they have by and large provided a satisfactory history of safety and performance. Thus this Technical Reference also allows the use of components, systems and assembly methods which vary from those specified in it, but which comply with accepted alternative national and international standards.

In addition, components need not be directly approved in Singapore. Acceptance of foreign approvals, at the discretion of Singapore's natural gas vehicle industry and regulatory authorities, will improve the availability of safe and affordable components from a wide range of supply sources.

It is intended that work on the gas system of CNG vehicles is performed only by certified automotive CNG mechanics and within certified CNG vehicle workshops. These requirements are covered in TR 10 –'Compressed natural gas (CNG) vehicle workshop and personnel requirements'.

This Technical Reference covers a wide range of work activities related to the installation, commissioning, certification and periodic inspection of CNG vehicles.

The terms "normative" and "informative" have been used in this Technical Reference to indicate the status of an annex. A "normative" annex constitutes a provision for mandatory compliance, while an "informative" annex is only for information and guidance.

Attention is drawn to the possibility that some of the elements of this Technical Reference may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

Technical reference for compressed natural gas (CNG) vehicle component and installation

1 Scope and general

1.1 Scope

This Technical Reference specifies requirements for the installation, commissioning, certification and periodic inspection of compressed natural gas (CNG) fuel systems mounted on motor vehicles, either for powering the vehicle or for other purposes, e.g. as a mobile gas storage.

This Technical Reference is intended to cover:

(a) all land-based vehicle types, e.g. rigid chassis and articulated vehicles; and

(b) primarily aftermarket vehicle installations.

Gas systems on original manufacture vehicles may also be installed in accordance with the vehicle manufacturer's design criteria or the alternative standards specified in 4.1.

The selection, design verification, approval, use and inspection of CNG fuel cylinders are major and critical areas of safe CNG practice. They are, however, outside the scope of this Technical Reference.

1.2 Objective

The objective of this Technical Reference is to provide engineers, manufacturers, installers and the regulatory authorities with technical requirements for CNG fuel systems on vehicles so as to provide safe, functional installations.

1.3 Normative references

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ANSI NGV 2	Basic requirements for compressed natural gas vehicle (NGV) fuel containers
ANSI PRD 1	Basic requirements for pressure relief devices for natural gas fuel containers
ANSI NGV 1	Compressed natural gas vehicle (NGV) fueling connection devices
AS/NZS 2430.3	Classification of hazardous areas. Part 3 – Specific occupancies
AS/NZS 2739	Natural gas (CNG) fuel systems for vehicle engines
CSA B51 Part 2	Boiler, pressure vessel and pressure piping code. Part 2: High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles
ISO 11439	Gas cylinders – High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles
ISO 14469	Road vehicles – Compressed natural gas (CNG) refuelling connector

ISO 15500-1	Road vehicles – Compressed natural gas (CNG) fuel system components – Part 1 : General requirements and definitions
ISO 15500-2	Part 2 : Performance and general test methods
ISO 15500-3	Part 3 : Check valve
ISO 15500-4	Part 4 : Manual valve
ISO 15500-5	Part 5 : Manual cylinder valve
ISO 15500-6	Part 6 : Automatic valve
ISO 15500-7	Part 7 : Gas injector
ISO 15500-8	Part 8 : Pressure indicator
ISO 15500-9	Part 9 : Pressure regulator
ISO 15500-10	Part 10 : Gas flow adjuster
ISO 15500-11	Part 11 : Gas/air mixer
ISO 15500-12	Part 12 : Pressure relief valve
ISO 15500-13	Part 13 : Pressure relief devices
ISO 15500-14	Part 14 : Excess flow valves
ISO 15500-15	Part 15 : Gas tight housing and ventilation hose
ISO 15500-16	Part 16 : Rigid fuel line
ISO 15500-17	Part 17 : Flexible fuel line
ISO 15500-18	Part 18 : Filter
ISO 15500-19	Part 19 : Fitting
ISO 15501-1	Road vehicles – Compressed natural gas fuelling systems – Part 1 : Safety requirements
ISO 15501-2	Part 2 : Test methods
SAE J30	Fuel and oil hoses
SAE J 533	Flares for tubing
SAE J1453	Fitting – O-ring face seal
TR 10	Compressed natural gas (CNG) vehicle workshop and personnel requirements
TR 12	Compressed natural gas (CNG) vehicle refuelling stations
ECE R110	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.