

BUREAU OF INDIAN STANDARDS

DRAFT FOR COMMENTS ONLY

(Not to be reproduced without permission of BIS or used as an Indian Standard)

भारतीय मानक प्रारूप

सड़क वाहन - संपीडित प्राकृतिक गैस (सीएनजी) / जैव-संपीडित प्राकृतिक गैस (बायो-सीएनजी) / तरल पेट्रोलियम गैस (एलपीजी) ईंधन प्रणाली घटक - सीएनजी / जैव-सीएनजी / एलपीजी नाली (वेंटिलेशन नली / पाइप)
(आई एस 15715: 2008 का संशोधन)

Draft Indian Standard

ROAD VEHICLES — COMPRESSED NATURAL GAS (CNG) / BIO- COMPRESSED NATURAL GAS (BIO- CNG) / LIQUEFIED PETROLEUM GAS (LPG) FUEL SYSTEM COMPONENTS — CNG / BIO- CNG / LPG CONDUIT (VENTILATION HOSE / PIPE)
(REVISION OF IS 15715: 2008)

ICS: 43.060.40

Not to be reproduced without permission
of BIS or used as standard

Last date for receipt of comments
is 17/07/2023

FOREWORD

(Formal Clause to be added later)

This standard was first published in 2008 to specify definitions, test methods and requirements of conduit (ventilation hose /pipe), of CNG onboard fuel system components, intended for use on motor vehicles defined in IS 14272. In this Revision, Bio- CNG is added to the scope of this standard keeping in view the technological advancements that have taken place since its last Publication. The new scope also covers Liquefied Petroleum Gas (LPG) to incorporate the Amendment-1 to earlier Standard.

In the formulation of this standard considerable assistance has been derived from the following AIS Standards issued by the Automotive Research Association of India:

AIS 024(Rev.1) (Part A):- Safety and Procedural Requirements for Type Approval of Gaseous Fuelled Vehicles - Part A (Automotive Application).

AIS 024(Rev.1) (Part B):- Safety and Procedural Requirements for Type Approval of Gaseous Fuel Agricultural Tractors - Part B (Agricultural Tractors Application).

AIS 024(Rev.1) (Part C):- Safety and Procedural Requirements for Type Approval of Gaseous Fuel Vehicles - Part C (CEV's Application).

AIS 028(Rev.1) (Part A):-Code of Practice for Use of Gaseous Fuels in Internal Combustion Engine Vehicles - Part A (Automotive Application)

AIS 028(Rev.1) (Part B):-Code of Practice for Use of Gaseous Fuels in Internal Combustion Engine Agricultural Tractors - Part B (Agricultural Tractors Application)

AIS 028(Rev.1) (Part C):-Code of Practice for Use of Gaseous Fuels in Internal Combustion Engine Construction Equipment Vehicles (CEV's) - Part C (CEV's Application).

AIS-025 (Version 3): Safety and Procedural requirements for Type Approval of LPG Operated Vehicles

AIS 026 (Version 3): Code of Practice for use of LPG Fuel in Internal Combustion Engine to Power 4 Wheeled Vehicles

AIS 027 (Version 3): Code of Practice for use of LPG Fuel in Internal Combustion Engine to Power 2 & 3 Wheeled Vehicles.

This standard is one of the series of Indian Standards published on CNG/Bio-CNG/LPG onboard fuel system components. Other standards in the series are:

<i>IS No.</i>	<i>Title</i>
15710: XXXX ¹⁾	Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG) fuel system components – General requirements & definition.
15711: XXXX ¹⁾	Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG) fuel system components – Performance and general test methods
15712: XXXX ¹⁾	Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG) fuel system components – Automatic valve
15713: XXXX ¹⁾	Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG) fuel system components – Pressure regulator
15714: XXXX ¹⁾	Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG) fuel system components – Gas Air mixer
15716: XXXX ¹⁾	Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG) fuel system components – CNG / Bio-CNG high pressure fuel line (rigid) with end connections (having pressure exceeding 2.15 MPa)
15717: XXXX ¹⁾	Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG) / Liquefied Petroleum Gas (LPG) Fuel system components – Petrol valve (Automatic/Manual)
15718: XXXX ¹⁾	Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG) fuel system components – CNG/Bio-CNG high Pressure fuel line (flexible hose) with end connections (having pressure exceeding 2.15 MPa)
15719: XXXX ¹⁾	Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG)/ Liquefied Petroleum Gas (LPG) fuel system components – Electrical Wiring kit
15720: XXXX ¹⁾	Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG) /Liquefied Petroleum Gas (LPG) fuel system component – Compartments sub- Compartments
15721: XXXX ¹⁾	Road vehicles - Compressed natural gas (CNG) / Bio-Compressed natural gas (Bio-CNG)/ Liquefied Petroleum Gas (LPG) fuel system components – Fire retardant material for seat, upholstery, roof and side lining
15722: XXXX ¹⁾	Road vehicles - Compressed natural gas (CNG) / Bio-Compressed natural gas (Bio-CNG) fuel system components - CNG /Bio-CNG flexible fuel line with or without end connections (having pressure not exceeding 2.15 MPa)

15723: XXXX¹⁾

Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG) /Liquefied Petroleum Gas (LPG) fuel system components – Current Limiting devices

Note — Standards Marked with superscript '1)' are under the process of Revision. The year of publication of these standards will be updated at the time of printing of this draft standard.

The composition of the Committee responsible for the formulation of this standard is given at Annex B (Will be added later).

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (revised)' . The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

ROAD VEHICLES — COMPRESSED NATURAL GAS (CNG) / BIO-COMPRESSED NATURAL GAS (BIO-CNG) / LIQUEFIED PETROLEUM GAS (LPG) FUEL SYSTEM COMPONENTS — CNG / BIO-CNG / LPG CONDUIT (VENTILATION HOSE / PIPE)

1 SCOPE

1.1 This **draft** standard specifies definitions, test methods and requirements of conduit (ventilation hose / pipe), of CNG / Bio- CNG/ LPG onboard fuel system components, intended for use on motor vehicles defined in IS 14272.

1.1.1 This **draft** standard is applicable to CNG / Bio- CNG/LPG fuel system components intended to be used on vehicles using compressed natural gas / Bio- compressed natural gas /Liquefied petroleum gas in accordance with IS 15320 Part 1 (mono-fuel or bi-fuel or dual fuel applications as applicable).

1.1.2 This **draft** standard is not applicable to the following:

- a) Liquefied natural gas (LNG) fuel system components located upstream of, and including, the vaporizer;
- b) Fuel containers;
- c) Stationary gas engines; and
- d) CNG / Bio- CNG/LPG fuel systems components for the propulsion of marine craft.
- e) Hydrogen Natural Gas Blend (HCNG) Fuel system components

1.1.3 This **draft** standard is based upon a service pressure for compressed natural gas / Bio-compressed natural gas as a fuel at 20 MPa (200 bar) and liquefied petroleum gas as a fuel at 2 MPa (20 bar) settled at 15°C.

2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below

<i>IS No.</i>	<i>Title</i>
14272:2011	Automotive Vehicles — Types — Terminology
15061:2002	Automotive Vehicles – Flammability requirements
15320 : Part 1:2012/ ISO 15403-1 : 2006	Natural gas - Natural gas for use as a compressed fuel for vehicles: Part 1 designation of the quality (First Revision)
IS 15710 : XXXX ²⁾	Road Vehicles — Compressed Natural Gas (CNG) / Bio-

Note — Standards Marked with superscript '2)' are under the process of Revision. The year of publication of these standards will be updated at the time of printing of this draft standard.

3 DEFINITIONS

For the purpose of this standard definitions given in IS 15710 shall apply.

3.1 Self-Extinguishing/No Bum Rate (SFJNBR) — The material stops burning before it has burnt for 60s from the start of timing and has not burnt more than 50.8 mm (2 in) from the point where the timing was started.

4 TYPE TESTS (TYPE APPROVAL)

The material of the conduit used for ducting shall be sufficiently strong to resist mechanical damage, preserve venting integrity, protect the piping or hose within it, shall not support combustion and shall meet the following minimum criteria.

4.1 Pressure Test

4.1.1 The conduit shall withstand an internal pressure of 30 kPa.

4.1.2 The conduit shall not suffer sufficient damage to permit leakage when tested by applying a 60 kgf static force applied through 20 mm diameter, in the following manner:

- a) Applied to a free length of conduit (minimum length of 500 mm) , and
- b) With the conduit connection clamped up in position, the force then applied 5 mm from the end of this coupling so as to place the connection in tension.

4.2 Flammability Test

When tested for horizontal burning rate as per Annex A of IS 15061, the material shall be Self-Extinguishing/ No Burn Rate (SE/NBR).

4.3 Resistance to Ultraviolet Degradation

When tested as per Annex A of this standard, presence of stabilizer for ultraviolet degradation shall be confirmed.

5 MARKING

5.1 In case conduit (ventilation hose/pipe) is not permanently marked, then the package of conduit shall have tag/sticker with the following details:

- a) Manufacturer's name, trade-mark or symbol;
- b) Part No. or unique identification mark;
- c) Size; and
- d) Batch number.

5.2 BIS Certification Marking

Each conduit (ventilation hose / pipe) may also be marked with the Standard Mark.

5.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 TECHNICAL INFORMATION TO BE SUBMITTED BY THE COMPONENT MANUFACTURER

Technical information to be submitted by the component manufacturer for component type approval / type test shall contain at least following information:

- a) Name of the manufacturer;
- b) Manufacturing plant address;
- c) Part number;
- d) Inner diameter (ID);
- e) Outer diameter (OD); and
- f) Drawings with relevant dimensions and materials.

7 NUMBER OF SAMPLES FOR TESTING

Minimum 6 number of 500 mm length conduits (ventilation hose/pipe) along with end plugs and hose/pipe clips shall be submitted to the test agency for testing. One end plug shall have provision to connect pneumatic pipe of 8 mm inner diameter.

8 CHANGES IN TECHNICAL SPECIFICATIONS OF A TYPE APPROVED COMPONENT AND EXTENSION OF APPROVAL

Any modification in technical specification of already type approved component shall require re-type test / extension of approval at the discretion of test agency, based on the justification provided by the component manufacturer and reviewed by the test agency, which has granted type approval

ANNEXURE A

(Clause 4.3)

TEST METHOD TO DETERMINE THE PRESENCE OF ULTRAVIOLET DEGRADATION AGENT (UV STABILIZER)

A-1 SCOPE

This test method is intended to provide a general technique to determine the presence of ultraviolet degradation agent (UV stabilizer) present in the samples. This method is useful in performing a qualitative analysis.

A-2 SUMMARY OF THE TEST PROCEDURE

This test method consists of a method in which the acetone extract of the sample under test is prepared in the form of thin film or capillary film and its spectrum is collected over IR range of 4 000 to 400 cm⁻¹. The spectrum is then compared with any internationally available library, such as Atlas of Hummel Polymer Library spectra or with the Enhanced Polymer

Additives Library such as Sadtler, FDM, Nicolet, RAPRA or any other library spectra.

A-3 APPARATUS

Fourier transform infrared spectrometer with wave number range of 7800 to 350 cm⁻¹.

A-4 REAGENTS

Acetone.

A-5 PROCEDURE

The representative test quantity of sample is extracted with acetone solvent for 16 h. The extract is dried and then subjected to FTIR spectrometer test.

The sample prepared from the above techniques is mounted to a suitable sample holder and kept inside sample compartment of optical bench of IR spectrometer and its infrared spectrum is collected keeping the following instrumental parameters according to the nature of the sample:

- a) The environmental conditions for equipment are maintained. They are as follows:
 - 1) Room temperature: 0°C to 35°C
 - 2) Relative humidity: 20 percent to 80 percent
- b) The optical bench is switched on and is allowed to initialize.
- c) The resolution is set to 4.0 cm⁻¹, No. of scans to 40, Apodization to Happ-Ganzel and wave number range from 4 000 to 400 cm⁻¹.
- d) Background spectrum is collected without the sample in the compartment.

e) The sample spectrum is collected with the prepared sample in the compartment after collecting background spectrum.

f) The sample spectrum collected is baseline corrected and normalized to compare with the standard spectrum from the library using search commands.

A-6 REPORT

The obtained FTIR spectrum is searched in any internationally available library, such as Atlas of Hummel Polymer Library spectra or with the Enhanced Polymer Additives Library such as Saddtler, FDM, Nicolet, RAPRA or any other library spectra for best matching spectrum of ultraviolet stabilizer.