Automotive Vehicles Running on Non-Conventional Energy Sources Sectional Committee, TED 26

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Vehicles Running on Non-Conventional Energy Sources Sectional Committee had been approved by the Transport Engineering Division Council.

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 No. 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:

IS No.	*Title*
15711 : 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — Performance and general test methods
15712 : 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — Automatic valve
15713 : 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — Pressure regulator

(*Continued on third cover*)

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)

(First Revision)

1 SCOPE

1.1 This 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.

1.2 This 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).

1.3 This 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

1.4 This 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 standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards:

IS No.	*Title*
IS 14272 : 2011	Automotive vehicles — Types — Terminology (*first revision*)
IS 15061 : 2002	Automotive vehicles — Flammability requirements
IS 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 : 2024	Road vehicles — Compressed natural gas (CNG) fuel system components — General Requirements and definitions

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 60 s from the start of timing and has not burnt more than 50.8 mm (2 inch) 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.

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https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/Indian_standards/isdetails/

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

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

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.

ANNEX 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 cm^{-1} 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 saddler, FDM, nicolet, RAPRA or any other library spectra.

A-3 APPARATUS

Fourier transform infrared spectrometer with wave number range of 7 800 cm^{-1} to 350 cm^{-1}.

A-4 REAGENT

A-4.1 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; and
   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 cm^{-1} 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; and

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.

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Automotive Vehicles Running on Non-Conventional Energy Sources Sectional Committee, TED 26

Organization	*Representative(s)*
Automotive Research Association of India (ARAI), Pune	DR S. S. THIPSE **(*Chairperson*)** SHRI A. D. DEKATE
A B Process Technologies, Pune	SHRI KUNAL CHOPDE
Ashok Leyland Ltd, Chennai	SHRIMATI SUCHISMITA C. SHRI MUTHUKUMAR N. (*Alternate*)
Automotive Component Manufactures Association of India, New Delhi	SHRI SANJAY TANK SHRIMATI SEEMA BABAL (*Alternate*)
Bajaj Auto Ltd, Pune	SHRI MILIND J. PAGARE SHRI ARVIND V. KUMBHAR (*Alternate*)
Bosch Limited, Bengaluru	SHRI BHARADWAJ M. KRISHNAMURTHY SHRI VIKRAM K. (*Alternate*)
Central Institute of Road Transport, Pune	SHRI SAMIR SATTIGERI SHRI V. V. JOSHI (*Alternate*)
Central Pollution Control Board, New Delhi	SHRI A. SUDHAKAR SHRI SUNEEL DAVE (*Alternate* I) SHRI KEDARNATH DASH (*Alternate* II)
CLH Gaseous Fuel Applications Ltd, Gurugram	SHRI SHISHIR AGRAWAL SHRI GAGAN AGRAWAL (*Alternate*)
Delhi Transport Corporation, New Delhi	SHRI VIKAS BATRA
GAIL (India) Limited, New Delhi	SHRI ASHISH KUMAR MITTAL SHRI LOKESH MEHTA (*Alternate*)
Indian Auto LPG Coalition, Faridabad	SHRI SHISHIR AGRAWAL SHRI SUYASH GUPTA (*Alternate*)
Indian Institute of Petroleum, Dehradun	SHRI WITTISON KAMEI SHRI ROBINDRO LAIRENLAKPAM (*Alternate*)
Indian Institute of Science, Bengaluru	PROF R. V. RAVIKRISHNA
Indian Institute of Technology Ropar, Punjab	SHRI DHIRAJ KUMAR MAHAJAN DR DEBAPRASAD MANDAL (*Alternate*)
Indian Oil Corporation Ltd, (R & D Centre), Faridabad	DR M. SITHANANTHAN (*Alternate*)
Indian Rubber Mfrs Research Association, Thane, Mumbai	DR K. RAJ KUMAR DR BHARAT KAPGATE (*Alternate*)
International Centre for Automotive Technology (ICAT), Manesar	SHRI VAIBHAV PRASHANT YADAV SHRI VIJAYANTA AHUJA (*Alternate*)

Organization	*Representative(s)*
Mahindra & Mahindra Ltd, Mumbai	SHRI RAJAMANI PARTHIBAN SHRI SHAILESH KULKARNI (*Alternate*)
Mahindra & Mahindra Ltd (Truck and Bus Division), Pune	SHRI V. G. KULKARNI (*Alternate*)
Maruti Suzuki India Limited, Gurugram	SHRI GURURAJ RAVI SHRI ARUN KUMAR (*Alternate*)
Minda Emer Technologies Limited, Gurugram	SHRI VIVEK JAIN SHRI BIBHUTI KUMAR (*Alternate*)
Ministry of New and Renewable Energy, New Delhi	SHRI DIPESH PHERWANI
Petroleum and Explosive Safety Organization, Nagpur	SHRI D. K. GUPTA SHRI VIVEK KUMAR (*Alternate*)
Petronet LNG Ltd, New Delhi	SHRI PANKAJ WADHWA (*Alternate*)
Prodair Air Products India Private Ltd, Pune	SHRI RAVI SUBRAMANIAN SHRI ARUN KURUVANGATTIL (*Alternate*)
Renault India Private Limited, Mumbai	SHRI RAJENDRA KHILE SHRI VIJAY DINAKARAN (*Alternate*)
Rohan BRC Gas Equipment Pvt Ltd, Ahmedabad	SHRI STEFANO DE CAROLIS SHRI PARTHIV SHUKLA (*Alternate*)
Society of Indian Automobile Manufacturers, New Delhi	SHRI P K BANERJEE DR SANDEEP GARG (*Alternate*)
Swagelok – Bombay Fluid System components Pvt Ltd, Mumbai	SHRI SACHIN KOULGI SHRI HARISH TAKKE (*Alternate*)
Tata Motors Ltd, Pune	SHRI P. S. GOWRISHANKAR SHRI SHAILENDRA DEWANGAN (*Alternate*)
TVS Motor Company Ltd, Hosur	SHRI V. PATTABIRAMAN SHRI K. M. SRIKANTH (*Alternate*)
Vanaz Engineers Ltd, Pune	SHRI S. J. VISPUTE SHRI J. S. DHUMAL (*Alternate*)
Volkswagen India Pvt Ltd, Mumbai	SHRI JOREG BOUZEK SHRI PANKAJ GUPTA (*Alternate*)
BIS Directorate General	SHRI DEEPAK AGARWAL, SCIENTIST 'F'/ SENIOR DIRECTOR AND HEAD (TRANSPORT ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI GAURAV JAYASWAL
SCIENTIST 'C'/DEPUTY DIRECTOR
(TRANSPORT ENGINEERING), BIS

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IS No.	*Title*
15714 : 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — Gas air mixer
15715: 2024	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)
15716: 2024	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: 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG)/ liquefied petroleum gas (LPG) Fuel system components — Petrol valve (automatic/manual)
15718: 2024	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: 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG)/ liquefied petroleum gas (LPG) fuel system components — Electrical Wiring kit
15720: 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG)/ liquefied petroleum gas (LPG) fuel system component — Compartments sub-compartments
15721: 2024	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: 2024	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: 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG)/ liquefied petroleum gas (LPG) fuel system components — Current Limiting devices

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

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 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

भारतीय मानक **IS 15715 : 2024**

Indian Standard

सड़क वाहन — संपीड़ित प्राकृतिक गैस (सीएनजी)/जैव-संपीड़ित प्राकृतिक गैस (जैव-सीएनजी) — ईंधन प्रणाली के घटक — सीएनजी/जैव-सीएनजी/एलपीजी नाली (वेंटिलेशन नली/पाइप)

(पहला पुनरीक्षण)

Road Vehicles — Compressed Natural Gas (CNG)/Bio-compressed Natural Gas (Bio-CNG) — Fuel System Components — Automatic Valve (Solenoid Valve)

(First Revision)

ICS 43.060.40

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