*भारतीय मानक* **IS 15716 : 2024**

***Indian Standard***

# सड़क वाहन — संपीड़ित प्राकृतिक गैस (सीएनजी)/जैव-संपीड़ित प्राकृतिक गैस (जैव-सीएनजी) — ईंधन प्रणाली के घटक — अंतिम कनेक्शन के साथ उच्च दबाव ईंधन लाइन (कठोर) [2.15 एमपीए (21.5 बार) से अधिक दबाव होना]

*( पहला पुनरीक्षण )*

# Road Vehicles — Compressed Natural Gas (CNG)/Bio-Compressed Natural Gas (Bio-CNG) — Fuel System Components — High Pressure Fuel Line (Rigid) with End Connections [Having Pressure Exceeding 2.15 MPA (21.5 Bar)]

*( First Revision )*

ICS 43.060.40



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

**November 2024** **Price Group 4**

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 2006 to specify the definitions, test methods and requirements of CNG high pressure fuel line (rigid) with end connections having pressure exceeding 2.15 MPa (21.5 bar), of CNG on board fuel system component intended for use on motor vehicles as 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.

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 (Revision 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)

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

| *IS No.* | *Title* |
|---|---|
| IS 15710 : 2024 | Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — General requirements and definition |
| IS 15711 : 2024 | Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — Performance and general test methods |
| IS 15712 : 2024 | Road vehicles — Compressed natural gas (CNG) /bio-compressed natural gas (bio-CNG) fuel system components — Automatic valve (solenoid valve) (*first revision*) |
| IS 15713 : 2024 | Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — Pressure regulator (*first revision*) |
| IS 15714 : 2024 | Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — Gas air mixer (*first revision*) |

(*Continued on third cover*)

*Indian Standard*

# ROAD VEHICLES — COMPRESSED NATURAL GAS (CNG)/ BIO-COMPRESSED NATURAL GAS (BIO-CNG) — FUEL SYSTEM COMPONENTS — HIGH PRESSURE FUEL LINE (RIGID) WITH END CONNECTIONS [HAVING PRESSURE EXCEEDING 2.15 MPA (21.5 BAR)]

*( First Revision )*

## 1 SCOPE

**1.1** This standard specifies definitions, test methods and requirements of CNG/bio-CNG high pressure fuel line (rigid) with end connections having pressure exceeding 2.15 MPa (21.5 bar), of CNG/bio-CNG on board fuel system components, intended for use on motor vehicles defined in IS 14272.

**1.1.1** This standard is applicable to CNG bio-CNG fuel system components intended to use on vehicles using compressed natural gas/bio-compressed natural gas in accordance with IS 15320 (Part 1) (mono-fuel or bi-fuel or dual fuel applications).

**1.1.2** 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;

d) CNG/bio-CNG fuel systems components for the propulsion of marine craft; and

e) Hydrogen natural gas blend (HCNG) fuel system components.

## 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 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 edition of these standards:

| *IS No.* | *Title* |
|---|---|
| IS 9000 (Part 11) : 1983 | Basic environmental testing procedures for electronic and electrical items: Part XI Salt mist test |
| IS 14272 : 2011 | Automotive vehicles — Types — Terminology (*first revision*) |
| IS 15320 (Part 1) : 2012 | 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)/ bio-compressed natural gas (bio-CNG) fuel system components — General requirements and definition |

## 3 DEFINITIONS

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

## 4 TYPE TESTS (FOR TYPE APPROVAL)

### 4.1 Material

Rigid piping and its end connections for use with pressures exceeding 2.15 MPa (21.5 bar) shall be made up of cold drawn steel/SS for use with CNG/bio-CNG.

### 4.2 Burst Pressure

Rigid piping and its end connections shall have a minimum burst test pressure of 70 MPa (700 bar).

### 4.3 Salt Mist Test

CNG/bio-CNG high pressure fuel line with end connections shall be effectively protected against corrosion. When tested for 24 h in accordance with the procedure given in IS 9000 (Part 11) (except damp heat test), the piping with fittings shall not show any sign of corrosion.

## 5 ACCEPTANCE TEST (CONFORMITY OF PRODUCTION)

For the purpose of acceptance test, rigid piping manufactured shall conform to requirements as specified in **4.1** to **4.3**.

## 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 or unique identification mark;

d) Pipe inner diameter (ID);

e) Pipe outer diameter (OD); and

f) Drawings with relevant dimensions and materials.

## 7 NUMBER OF SAMPLES FOR TESTING

Minimum 3 numbers of 1 m length CNG/bio-CNG high pressure fuel line (rigid) with end connections shall be submitted to the test agency for testing.

## 8 CHANGES IN TECHNICAL SPECIFICATIONS OF A TYPE APPROVED/CERTIFIED COMPONENT AND EXTENSION OF APPROVAL/ CERTIFICATION

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

## 9 MARKING

**9.1** Each CNG/bio-CNG high pressure fuel line (rigid) with end connections shall be legibly and indelibly marked with the following for every 1 m length:

a) Manufacturers name, trade-mark or symbol;

b) Part number or unique identification mark;

c) Working pressure; and

d) Date of manufacture or batch number.

### 9.2 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 products may be marked with the Standard Mark.

## ANNEX A

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

| *Organization* | *Representative(s)* |
|---|---|
| Mahindra & Mahindra Ltd (Truck and Bus Division), Pune | SHRI V. G. KULKARNI |
| Mahindra & Mahindra Ltd, Mumbai | SHRI RAJAMANI PARTHIBAN<br>SHRI SHAILESH KULKARNI (*Alternate*) |
| Maruti Suzuki India Limited, Gurugram | SHRI GURURAJ RAVI<br>SHRI ARUN KUMAR (*Alternate*) |
| Minda Emer TechnologiesLimited, Gurugram | SHRI VIVEK JAIN<br>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<br>SHRI VIVEK KUMAR (*Alternate*) |
| Petronet LNG Ltd, New Delhi | SHRI PANKAJ WADHWA (*Alternate*) |
| Prodair Air Products India Private Ltd, Pune | SHRI RAVI SUBRAMANIAN<br>SHRI ARUN KURUVANGATTIL (*Alternate*) |
| Renault India Private Limited, Mumbai | SHRI RAJENDRA KHILE<br>SHRI VIJAY DINAKARAN (*Alternate*) |
| Rohan BRC Gas Equipment Pvt Ltd, Ahmedabad | SHRI STEFANO DE CAROLIS<br>SHRI PARTHIV SHUKLA (*Alternate*) |
| Society of Indian Automobile Manufacturers, New Delhi | SHRI P. K. BANERJEE<br>DR SANDEEP GARG (*Alternate*) |
| Swagelok – Bombay Fluid System components Pvt Ltd, Mumbai | SHRI SACHIN KOULGI<br>SHRI HARISH TAKKE (*Alternate*) |
| Tata Motors Ltd, Pune | SHRI P. S. GOWRISHANKAR<br>SHRI SHAILENDRA DEWANGAN (*Alternate*) |
| TVS Motor Company Ltd, Hosur | SHRI V. PATTABIRAMAN<br>SHRI K. M. SRIKANTH (*Alternate*) |
| Vanaz Engineers Ltd, Pune | SHRI S. J. VISPUTE<br>SHRI J. S. DHUMAL (*Alternate*) |
| Volkswagen India Pvt Ltd, Mumbai | SHRI JOREG BOUZEK<br>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

(*Continued from second cover*)

| *IS No.* | *Title* |
|---|---|
| IS 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) (*first revision*) |
| IS 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) (*first revision*) |
| IS 15718 : 2024 | Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — High pressure fuel line (flexible hose) with end connections [(having pressure exceeding 2.15 MPa (21.5 bar)] (*first revision*) |
| IS 15719 : 2024 | Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG)/ liquefied petroleum gas (LPG) fuel system components — Electrical wiring kit (*first revision*) |
| IS 15720 : 2024 | Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (Bio-CNG)/liquefied petroleum gas (LPG) — Fuel system components — CNG/ bio-CNG/LPG compartment/sub-compartments (*first revision*) |
| IS 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 (*first revision*) |
| IS 15722 : 2024 | Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components flexible fuel line with end connections [CNG fuel line having pressure not exceeding 2.15MPa (21.5 bar)] (*first revision*) |
| IS 15723 : 2024 | Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) and liquefied petroleum gas (LPG) — Fuel system components — Current limiting devices (*first revision*) |

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

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.

**Bureau of Indian Standards**

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

**Copyright**



**Review of Indian Standards**

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: TED 26 (15014).

## Amendments Issued Since Publication

| Amend No. | Date of Issue | Text Affected |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**BUREAU OF INDIAN STANDARDS**

**Headquarters:**

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
*Telephones*: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

| **Regional Offices:** | | *Telephones* |
|---|---|---|
| Central | : 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002 | 2323 7617 |
| Eastern | : 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091 | 2367 0012<br>2320 9474 |
| Northern | : Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019 | 265 9930 |
| Southern | : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113 | 2254 1442<br>2254 1216 |
| Western | : 5th Floor/MTNL CETTM, Technology Street, Hiranandani Gardens, Powai Mumbai 400076 | 25700030<br>25702715 |

**Branches** : AHMEDABAD, BENGALURU, BHOPAL, BHUBANESHWAR, CHANDIGARH, CHENNAI, COIMBATORE, DEHRADUN, DELHI, FARIDABAD, GHAZIABAD, GUWAHATI, HARYANA (CHANDIGARH), HUBLI, HYDERABAD, JAIPUR, JAMMU, JAMSHEDPUR, KOCHI, KOLKATA, LUCKNOW, MADURAI, MUMBAI, NAGPUR, NOIDA, PARWANOO, PATNA, PUNE, RAIPUR, RAJKOT, SURAT, VIJAYAWADA.

Published by BIS, New Delhi