भारतीय मानक **IS 15714 : 2024**

Indian Standard

सड़क वाहन — संपीड़ित प्राकृतिक गैस (सीएनजी)/जैव-संपीड़ित प्राकृतिक गैस (जैव-सीएनजी) — ईंधन प्रणाली के घटक — गैस/वायु मिश्रक

(पहला पुनरीक्षण)

Road Vehicles — Compressed Natural Gas (CNG)/Bio-Compressed Natural Gas (Bio-CNG) — Fuel System Components — Gas/Air Mixer

(First Revision)

ICS 43.060.40

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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 definitions, test methods and requirements of gas/air mixer 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.

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

ISO 15500-11 : 2015 — Road vehicles — Compressed natural gas (CNG) fuel system components — Part 11: Gas/air mixer

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)

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 definitions (*first revision*)
IS 15711 : 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — Performance and general test methods (*first revision*)
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*)

(*Continued on third cover*)

Indian Standard

ROAD VEHICLES — COMPRESSED NATURAL GAS (CNG)/ BIO-COMPRESSED NATURAL GAS (BIO-CNG) FUEL SYSTEM COMPONENTS — GAS/AIR MIXER

(First Revision)

1 SCOPE

1.1 This Indian Standard specifies definitions, test methods and requirements of gas/air mixer of CNG/bio-CNG onboard 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 applications 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) Container mounting hardware;
e) Electronic fuel management;
f) Refuelling receptacles;
g) CNG/bio-CNG fuel systems components for the propulsion of marine craft; and
h) 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) settled at 15 °C. Other service pressures could be accommodated by adjusting the pressure by the appropriate factor (ratio). For example, a 25 MPa (250 bar) service pressure system will require pressures to be multiplied by 1.25. All references to pressure are to be considered gauge pressures unless otherwise specified.

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 14272 : 2011	Automotive vehicles — Types — Terminology
IS 15710 : 2024	Road vehicles — Compressed natural gas (CNG)/ bio-compressed natural gas (bio-CNG) fuel system components — General requirements and definitions (*first revision*)
IS 15711 : 2024	Road vehicles — Compressed natural gas (CNG)/ bio-compressed natural gas (bio-CNG) fuel system components — Performance and general test methods (*first revision*)
IS 15958 : 2023	Compressed natural gas (CNG) for automotive purpose — Specification

3 DEFINITIONS

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

4 CONSTRUCTION AND ASSEMBLY

The gas/air mixer shall comply with the applicable provisions of IS 15710 and IS 15711, and with the tests specified in 5.

5 TESTS

5.1 Applicability

There are many types of gas/air mixers available. This standard gives requirement for three different existing designs: positive and negative pressure venturi, which have no moving parts, and variable orifice. As gas/air mixer designs vary, so will the tests required.

The tests required to be carried out are indicated in Table 1.

5.2 Hydrostatic Strength

Test the gas/air mixer according to the procedure for testing hydrostatic strength specified in IS 15711 at four times the working pressure, recommended by its manufacturer or 600 kPA, whichever is greater.

5.3 Leakage

Test the gas/air mixer at the temperatures of - 20 °C (+ 0 °C -5 °C), 27 °C ± 5 °C and 120 °C (- 0 °C + 5 °C) the minimum test pressure shall be either 1.25 times the working pressure or 150 kPa, whichever is greater.

5.4 Continued Operation

If the gas/air mixer's components move repeatedly during engine operation, then it shall undergo 100 000 cycles from minimum to maximum flow. At the completion of this test, the gas/air mixer shall comply with **5.3** at room temperature. The duration of each cycle shall be no less than 10 s.

5.5 Corrosion Resistance

If material or designs susceptible to corrosion are used in the component, then the corrosion resistance test as given in IS 15711 shall be performed.

6 MARKING

6.1 Each gas/air mixer shall be legibly and indelibly marked with the following:

a) Manufacturer's name, trade-mark or symbol;
b) Part No. or unique identification mark; and
c) Date of manufacture or batch number.

6.2 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.

Table 1 Tests Applicable

(*Clause* 5.1)

Sl No.	Test	Applicable Tests on the Component	Tests for which Procedure is Given in IS 1571	Specific Tests/Test Conditions Required for this Standard
(1)	(2)	(3)	(4)	(5)
i)	Hydrostatic strength	X[1)]	X	X (*see* **5.2**)
ii)	Leakage	X	X	X (*see* **5.3**)
iii)	Excess torque Resistance	—	—	—
iv)	Bending moment	—	—	—
v)	Continued operation	X[2)]	X	X (*see* **5.4**)
vi)	Corrosion resistance	X	X	X (*see* **5.5**)
vii)	Oxygen ageing	X	X	—
viii)	Ozone ageing	X	X	—
ix)	Heat ageing	X	X	—
x)	Automotive fluids	X	X	—
xi)	Electrical over-voltages	—	—	—
xii)	Non-metallic material immersion	X	X	—
xiii)	Vibration resistance	X	X[1)]	—
xiv)	Brass material compatibility	X	X	—

[1)] indicates that gas/air mixers that have a working pressure of < 0.1 MPa (1 bar) are not required to be strength tested.
[2)] indicates that gas/air mixer with no moving parts, or with parts that are only moved at the time of installation or servicing, are not required to be tested for continued operation.

7 TECHNICAL INFORMATION TO BE SUBMITTED BY THE COMPONENT MANUFACTURER

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

a) Name of the manufacturer;
b) Manufacturing plant address;
c) Part No.;
d) Type No./model No.;
e) Inlet pressure;
f) Operating temperatures; and
g) Drawings with relevant dimensions and material.

8 NUMBER OF SAMPLES FOR TESTING

Minimum 7 numbers of the gas air mixer assemblies shall be submitted to the test agency for complete type testing along with minimum 10 numbers each of the non-metallic parts used in the gas/air mixer assembly. Each non-metallic part shall be submitted separately in the packets mentioning details like part name, part number and quantity.

9 TYPE TEST (TYPE APPROVAL)

For type approval, gas/air mixer shall meet the requirements as specified in this standard.

10 ACCEPTANCE TEST (CONFORMITY OF PRODUCTION)

For the purpose of acceptance test, gas/air mixer manufactured shall conform to the following test requirements as specified in relevant clauses of this standard:

a) Leakage test;
b) Corrosion resistance test;
c) Non-metallic synthetic immersion test;
d) Oxygen ageing; and
e) Brass material compatibility.

11 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 Certifying Authority. Based on the justification provided by the component manufacturer and reviewed by the certification authority, which has granted type approval.

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*)** 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, Rupnagar	SHRI DHIRAJ KUMAR MAHAJAN 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 DR BHARAT KAPGATE (*Alternate*)

Organization	*Representative*(*s*)
International Centre for Automotive Technology (ICAT), Manesar	SHRI VAIBHAV PRASHANT YADAV SHRI VIJAYANTA AHUJA (*Alternate*)
Mahindra & Mahindra Ltd, Mumbai	SHRI RAJAMANI PARTHIBAN SHRI SHAILESH KULKARNI (*Alternate*)
Mahindra & Mahindra Ltd (Truck and Bus Division), Pune	SHRI V. G. KULKARNI
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 Pv 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*)
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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 15716 : 2024	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*)
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 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.

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Amend No.	Date of Issue	Text Affected

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