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भारतीय मानक मसौदा

सड़क वाहन - संपीडड़त प्राकृततक गैस (सीएनजी) /जैव-संपीडड़त प्राकृततक गैस (बायो-सीएनजी) ईंधन प्रणाली के घटक - गैस/वायु मिश्रक

(पहला पुनरीक्षण)

Draft Indian Standard

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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B U R E A U O F I N D I A N S T A N D A R D S
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Automotive Vehicles Running on Non-Conventional Energy Sources Sectional Committee, TED 26

FOREWORD
(Formal Clause to be added later)

In the formulation of this draft 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).

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

This draft 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*
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
15715: XXXX[1)]	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: 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: XXXX[1)]	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 draft standard is given at Annex A.

For the purpose of deciding whether a particular requirement of this draft 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 draft standard.

Draft Indian Standard

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

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 draft 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 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;
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.

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

IS No.	*Title*
IS 15958 : 2012	Compressed Natural Gas (CNG) for Automotive Purpose – specification
IS 14272:2011	Automotive Vehicles – Types – Terminology

15710: XXXX[2)]	Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG) fuel system components – General requirements & definition.
15711: XXXX[2)]	Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG) fuel system components – Performance and general test methods

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 draft 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 draft 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 600kPA, 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 150kPa, 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 10s.

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.

Table 1 Tests Applicable
(*Clause* **5.1**)

Sl No. **(1)**	**Test** **(2)**	**Applicable Tests on the component** **(3)**	**Tests for which Procedure is given in IS 15711** **(4)**	**Specific Tests/Test Conditions required for This draft standard** **(5)**
i)	Hydrostatic Strength	X[3)]	X	X (*see* **5.2**)
ii)	Leakage	X	X	X (*see* **5.3**)
iii)	Excess torque Resistance	--	--	--
iv)	Bending moment	--	--	--
v)	Continued operation	X[4)]	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[3)]	--
xiv)	Brass material compatibility	X	X	--

NOTES —

1) Superscript ‘3)’ indicates that Gas/Air mixers that have a working pressure of < 0.1 MPa (1 bar) are not required to be strength tested; and
2) Superscript ‘4)’ 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.

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

Each gas/air mixer may also be marked with the Standard Mark.

6.2.1 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 the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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 draft 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 draft 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 test Certifying Authority, which has granted type approval.

ANNEX A
(*Foreword*)

COMMITTEE COMPOSITION

AUTOMOTIVE VEHICLES RUNNING ON NON-CONVENTIONAL ENERGY SOURCES SECTIONAL COMMITTEE, TED 26

Will be Added Later.