

सड़क वाहन — संपीड़ित प्राकृतिक गैस  
(सीएनजी)/जैव-संपीड़ित प्राकृतिक गैस  
(जैव-सीएनजी) — ईंधन प्रणाली के  
घटक — दाब रेगुलेटर  
(पहला पुनरीक्षण)

Road Vehicles — Compressed  
Natural Gas (CNG)/Bio-compressed  
Natural Gas (Bio-CNG) — Fuel  
System Components — Pressure  
Regulator  
( First Revision )

ICS 43.060.40

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## 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.

In the formulation of this standard considerable assistance has been derived from the following standards issued by the Automotive Research Association of India and the International Organization for standardization respectively:

ISO 15500-9 : 2020 — Road vehicles — Compressed natural gas (CNG) fuel system components — Part 9: Pressure regulator

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 deviates from ISO 15500-9 : 2020 with respect to following:

The hydrostatic strength test pressure is changed from 100 MPa to four times the working pressure considering Indian climate conditions, the low temperature test of pressure regulator is changed to  $-20\text{ }^{\circ}\text{C}$  instead of  $-40\text{ }^{\circ}\text{C}$  testing at room temperature shall be done at  $27\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$  instead of  $20\text{ }^{\circ}\text{C}$ .

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:

<i>IS No.</i>	<i>Title</i>
IS 15710 : 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — General requirements and definitions ( <i>first revision</i> )
IS 15711 : 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — Performance and general test methods ( <i>first revision</i> )
IS 15712 : 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG), fuel system components — Automatic valve (solenoid valve) ( <i>first revision</i> )
IS 15714 : 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — Gas air mixer

[\(Continued on third cover\)](#)

*Indian Standard*

# ROAD VEHICLES — COMPRESSED NATURAL GAS (CNG)/ BIO-COMPRESSED NATURAL GAS (BIO-CNG) — FUEL SYSTEM COMPONENTS — PRESSURE REGULATOR

( *First Revision* )

## 1 SCOPE

**1.1** This standard specifies definitions, test methods and requirements of pressure regulator of CNG/bio-CNG onboard fuel system components intended for use on motor vehicles defined in IS 14272.

**1.2** 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).

**1.3** 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;
- 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:

<i>IS No.</i>	<i>Title</i>
IS 14272 : 2011	Automotive vehicles — Types — Terminology
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 ( <i>first revision</i> )
IS 15710 : 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — General requirements and definitions ( <i>first revision</i> )
IS 15711 : 2024	Road vehicles — Compressed natural gas (CNG)/bio-compressed natural gas (bio-CNG) fuel system components — Performance and general test methods ( <i>first revision</i> )

## 3 DEFINITIONS

For the purpose of this standard the following definition in addition to those given in IS 15710 shall apply.

**3.1 Lock-up Pressure** — Stabilized outlet pressure of the regulator at zero flow.

## 4 CONSTRUCTION AND ASSEMBLY

**4.1** The pressure regulator shall comply with the applicable provisions of IS 15710 and IS 15711, and with the tests specified in [5](#).

**4.2** A pressure relief valve, if provided, shall be of a type that resets after relieving it is intended that downstream components be protected from exposure to cylinder pressure.

**4.3** A pressure relief valve may be integral to the pressure regulator or not.

To access Indian Standards click on the link below:

[https://www.services.bis.gov.in/php/BIS\\_2.0/bisconnect/knownyourstandards/Indian\\_standards/isdetails/](https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knownyourstandards/Indian_standards/isdetails/)

**4.4** The pressure regulator shall have a factory-set maximum outlet pressure. The maximum outlet pressure rating and the inlet pressure rating shall be marked on the regulator.

## 5 TESTS

### 5.1 Applicability

The tests required to be carried out are indicated in [Table 1](#).

### 5.2 Hydrostatic Strength

**5.2.1** Test the pressure regulator according to the procedure for testing hydrostatic strength specified in IS 15711.

**5.2.2** Test the inlet of the first stage of the pressure regulator using a pressure of four times the working pressure.

**5.2.3** Test the inlet or inlets of the downstream stage or stages at four times the working pressure.

**5.2.4** Test the outlet chamber, port and all outlet fittings at four times the working pressure, or 0.4 MPa (4 bar), whichever is the greater.

### 5.3 Leakage

Test the pressure regulator at the temperatures and pressures given in [Table 2](#).

**Table 1 Test Applicable**

(Clauses [5.1](#) and [10](#))

SI No.	Tests	Applicable Tests on the Component	Tests for Which Procedure is Given in IS 15711	Specific Tests/Test Conditions Required for this Standard
(1)	(2)	(3)	(4)	(5)
i)	Hydrostatic strength	X	X	X ( <i>see</i> <a href="#">5.2</a> )
ii)	Leakage	X	X	X ( <i>see</i> <a href="#">5.3</a> )
iii)	Excess torque resistance	X	X	—
iv)	Bending moment	X	X	—
v)	Continued operation	X	X	X ( <i>see</i> <a href="#">5.4</a> )
vi)	Corrosion resistance	X	X	—
vii)	Oxygen ageing	X	X	—
viii)	Electrical over-voltages	X	X	—
ix)	Non-metallic synthetic immersion	X	X	—
x)	Vibration resistance	X	X <sup>1)</sup>	—
xi)	Brass material compatibility	X	X	—
xii)	Insulation resistance	X	—	X ( <i>see</i> <a href="#">5.5</a> )
xiii)	Minimum opening voltage	X	—	X ( <i>see</i> <a href="#">5.6</a> )
xiv)	Pressure impulse	X	—	X ( <i>see</i> <a href="#">5.7</a> )
xv)	Water jacket freezing	X	—	X ( <i>see</i> <a href="#">5.8</a> )

#### NOTES

**1** Superscript '1)' indicates that the vibration resistance test in IS 15711 is not applicable if the pressure regulator is engine mounted.

**2** The tests electrical over voltages, insulation resistance, and minimum opening voltage are applicable only, if the regulator has integrated solenoid valve.

**Table 2 Test Temperatures and Pressures**

(Clause 5.3)

SI No.	Temperature (°C)	Stage	Test Pressure Factor	
			First Test	Second Test
(1)	(2)	(3)	(4)	(5)
i)	- 40 or - 20	Inlet to 1	0.75	0.025
ii)	20		0.025	1.5
iii)	120		0.05	
iv)	- 40 or - 20	Chambers downstream of inlet to 1	0.75	0.025
v)	20		0.025	1.5
vi)	120		0.05	

NOTE — Test pressure = Test pressure factor \* working pressure.

#### 5.4 Continued Operation

The regulator shall be able to withstand 50 000 cycles without any failure when tested according to the following procedure. Where the stages of pressure regulation are separate, the service pressure in (a) to (f) is considered to be the working pressure of the upstream stage:

- a) Recycle the regulator for 95 percent of the total number of cycles at room temperature and at the service pressure. Each cycle shall consist of flow until stable outlet pressure has been obtained, after which the gas flow shall be shut-off by a downstream valve within 1 s, until the downstream lock-up pressure has stabilized. Stabilized outlet pressures are defined as set pressure  $\pm$  15 percent for at least 5 s. The regulator shall comply with 5.3 at room temperature at intervals of 20 percent, 40 percent, 60 percent, 80 percent and 100 percent of room temperature cycles;
- b) Cycle the inlet pressure of the regulator for 1 percent of the total number of cycles at room temperature from 100 percent to 50 percent of the service pressure. The duration of each cycle shall be not less than 10 s. The regulator shall comply with 5.3 at room temperature at the completion of this test;
- c) Repeat the cycling procedure of (a) at 120 °C at the service pressure for 1 percent of the total number of cycles;
- d) Repeat the cycling procedure of (b) at 120 °C at the service pressure for 1 percent of the total number of cycles. The regulator shall comply with 5.3 at 120 °C at the completion of this test;
- e) Repeat the cycling procedure of (a) at - 20 °C and 50 percent of service pressure for 1 percent of the total number of cycles;
- f) Repeat the cycling procedure of (b) at - 20 °C and 50 percent of service pressure for 1 percent of the total number of cycles. The regulator shall comply with 5.3 at - 20 °C at the completion of this test; and
- g) At the completion of the cycles, the lock-up pressure downstream of the regulator shall not exceed the lock-up pressure.

#### 5.5 Insulation Resistance

This test is designed to check for a potential failure of the insulation between the two-pin coil assembly and the pressure regulator casing. Apply 1 000 V d.c. between one of the connector pins and the housing of the pressure regulator for at least 2 s. The minimum allowable resistance shall be 240 k $\Omega$ .

#### 5.6 Minimum Opening Voltage

The minimum opening voltage at room temperature shall be  $\leq$  6 V for a 12 V system and  $\leq$  16 V for a 24 V system.

#### 5.7 Pressure Impulse

- a) Subject the pressure regulator with its first stage valve rendered fully open to a sudden application of its service pressure at its inlet. The pressure regulator shall retain or release the pressure without any permanent deformation; and
- b) Record the lock-up pressure of the regulator.

### 5.8 Water Jacket Freezing

- a) Fill the regulator or water jacket, which normally contains an anti-freeze solution, with water to normal capacity and expose it at – 20 °C for 24 h. Attach 1m sections of coolant hose to the coolant inlet and outlet of the regulator or water jacket; and
- b) Following the freezing conditioning, conduct an external leakage test at room temperature according to [5.3](#).

A separate sample maybe used for this test.

### 6 MARKING

**6.1** Each Pressure regulator shall be legibly and indelibly marked with the following:

- a) Manufacturer's name, trade-mark or symbol;
- b) Part No. or unique identification mark;
- c) Working pressure and temperature range or service pressure; and
- d) 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..

### 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 information:

- a) Name of the manufacturer;
- b) Manufacturing plant address;
- c) Part number;
- d) Type No./model No.;
- e) Number of pressure reduction stages in the regulator;
- f) Working pressure of each stage;
- g) Rated voltage of the solenoid coil (if any);

- h) Operating temperatures; and
- j) Drawings with relevant dimensions and material.

### 8 NUMBER OF SAMPLES FOR TESTING

Minimum 7 numbers of the CNG/bio-CNG pressure regulator 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 CNG/bio-CNG pressure regulator assembly. Each non-metallic part shall be submitted separately in the packets mentioning detail like part name, part numbers and quantity.

### 9 TYPE TEST (TYPE APPROVAL)

For type approval CNG/bio-CNG pressure regulator shall meet the requirements as specified in this standard. For type approval automatic valve (solenoid valve) shall meet the requirements as specified in this standard.

### 10 ACCEPTANCE TEST (CONFORMITY OF PRODUCTION)

For the purpose of acceptance test, CNG/bio-CNG pressure regulators manufactured shall conform to following test requirements as specified in relevant clauses of this standard (*see Table 1*):

- a) Hydrostatic strength test;
- b) Leakage test;
- c) Corrosion resistance test;
- d) Non-metallic synthetic immersion test;
- e) Oxygen ageing;
- f) Brass material compatibility; and
- g) Over voltage test.

### 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 certification 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

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

**IS 15713 : 2024**

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

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



[\(Continued from second cover\)](#)

<i>IS No.</i>	<i>Title</i>
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) ( <i>first revision</i> )
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)) ( <i>first revision</i> )
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) ( <i>first revision</i> )
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))] ( <i>first revision</i> )
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 ( <i>first revision</i> )
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 ( <i>first revision</i> )
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 ( <i>first revision</i> )
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)] ( <i>first revision</i> )
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 ( <i>first revision</i> )

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.