

BUREAU OF INDIAN STANDARDS

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भारतीय मानक प्रारूप

सड़क वाहन - संपीडित प्राकृतिक गैस (सीएनजी) / जैव-संपीडित प्राकृतिक गैस (बायो-सीएनजी) / तरल पेट्रोलियम गैस (एलपीजी) ईंधन प्रणाली के घटक – इलेक्ट्रिकल वायरिंग किट
(प्रथम संशोधन)

Draft Indian Standard

**ROAD VEHICLES — COMPRESSED NATURAL GAS (CNG) / BIO- COMPRESSED
NATURAL GAS (Bio- CNG) / LIQUEFIED PETROLEUM GAS (LPG) FUEL
SYSTEM COMPONENTS — ELECTRICAL WIRING KIT
(First Revision)**

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

FOREWORD

This Indian Standard 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 tests and requirements of Electrical Wiring Kit of CNG on board fuel system components, intended to 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 revised version also incorporates the Amendments issued to the 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.

JIS C 3406:1993 — Low voltage cables for automobiles

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:

<i>IS No.</i>	<i>Title</i>
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
15714: XXXX ¹⁾	Road vehicles - Compressed natural gas (CNG) /Bio-Compressed natural gas (Bio-CNG) fuel system components – Gas Air mixer
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: XXXX¹⁾ 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: XXXX¹⁾ 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 standard is given at 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.

Draft Indian Standard

**ROAD VEHICLES — COMPRESSED NATURAL GAS (CNG) / BIO- COMPRESSED
NATURAL GAS (Bio- CNG) / LIQUEFIED PETROLEUM GAS (LPG) FUEL
SYSTEM COMPONENTS — ELECTRICAL WIRING KIT**

1 SCOPE

1.1 This Indian standard specifies definitions, test methods and requirements of electrical wiring kit of CNG / Bio- CNG/ LPG 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/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 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; and
- d) CNG / Bio- CNG/LPG fuel systems components for the propulsion of marine craft.
- e) Hydrogen Natural Gas Blend (HCNG) Fuel system components

2 REFERENCES

The following standards 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 editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
2465:1984	Specification for cables for motor vehicles (Second Revision)
10810 (Part-5):1984	Methods of test for cables: Conductor resistance test
10810 (Part-44):1984	Methods of test for cables: Spark test
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 and definitions

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 standard definitions given in IS 15710 shall apply.

4 REQUIREMENTS OF ELECTRICAL WIRING KIT:

4.1 General

All wiring shall be properly installed, taped, clipped or contained in a loom along its length.

4.2 Conductor Resistance Test

The wiring cables for motor vehicles when tested as per 13 of IS 10810 (Part 5) for conductor resistance test shall comply with the requirements specified in Table 1.

Table 1 Conductor Resistance of Cables
(Clause 4.2)

Sl. No. (1)	Nominal Sectional Area (mm ²) (2)	Conductor Resistance (20°C) Ω/m, Max (3)
i)	0.5 f ¹⁾	0.0369
ii)	0.5	0.0327
iii)	0.75 f ¹⁾	0.0244
iv)	0.85	0.0208
v)	1.25 f ¹⁾	0.0147
vi)	1.25	0.0143
vii)	2	0.00881
viii)	3	0.00559
ix)	5	0.00352
x)	8	0.00232
xi)	15	0.00138
xii)	20	0.000887
xiii)	30	0.000520
xiv)	40	0.000428
xv)	50	0.000337
xvi)	60	0.000287
xvii)	85	0.000215
xviii)	100	0.000168

¹⁾ f in nominal sectional area indicates flexible.

4.3 Spark Test

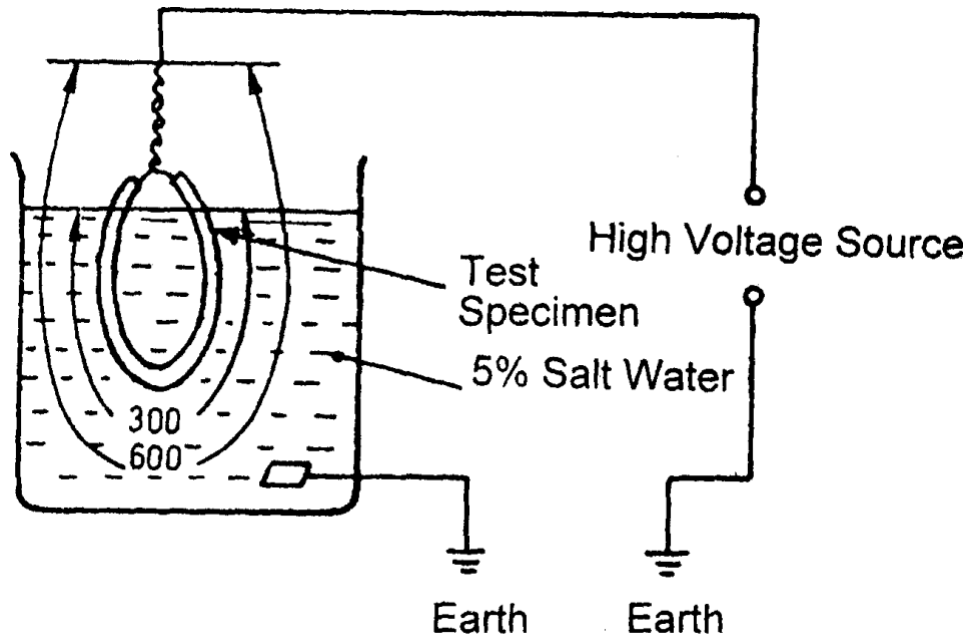
4.3.1 The cable when tested for spark test as per IS 10810 (Part 44) shall withstand 5000 V for 0.15s or more. Immersion Test

For the immersion test the following procedure shall be followed:

A test specimen about 600 mm in length shall be taken for the immersion test from a lot of

cable which has passed the spark test. The insulator at both the ends for a length of about 25 mm of the specimen shall be torn off and the bare conductor twisted and as shown in Fig. 1, the central part of the specimen for a length of 300 mm shall be immersed in 5 percent salt solution.

After immersion for 5 min, an ac voltage of 50 to 60 Hz cycles/sec and nearly sinusoidal wave shall be applied between the conductor and earth. The voltage shall be gradually increased up to 1000 V and cable shall withstand this voltage for 1 min.



All dimension in millimetres.

Fig.1 Immersion Test Plan

4.4 Flammability Test

The fire-retardant material of the electrical wiring when tested as per 13 of IS 2465 shall conform to 22 of IS 2465.

5 MARKING

5.1 Each Electrical wiring kit shall be legibly and indelibly marked with the following:

- Manufacturer's name or trade-mark or symbol,
- Part No. or unique identification mark, and
- Date of manufacturer or Batch No.

5.2 BIS Certification Marking

Each wiring kit for CNG / Bio-CNG/LPG vehicles may also be marked with the Standard Mark.

5.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standard is 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,

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 of the wiring kit;
- b) Wiring kit manufacturing plant address;
- c) Part number of wiring kit (as allotted by the manufacturer]
- d) Batch number;
- e) Identification code number (allotted by the supplier/trader, if any);
- f) Details of the vehicles for which the wiring kit is intended for use such as 2W, 3W, 4W goods/passenger, HCV/LCV/CEV/ AT , etc.;
- g) Make and model of the vehicle for which the wiring kit is intended for use;
- h) Name of the manufacturer of the wires used in the wiring kit;
- j) Wire manufacturing plant address;
- k) Name of the material of the conductor and wire insulation;
- m) Manufacturing date and batch number of the wires; and
- n) Drawings with relevant dimensions.

7 NUMBER OF SAMPLES FOR TESTING

Minimum one electrical wiring kit sample shall be submitted to the test agency for testing. In case any wire in the kit is less than 2 m long then manufacturer shall submit additional sample of the same wire 2 m in length, declaring it as a representative sample.

8 TYPE TEST (TYPE APPROVAL)

Electrical wiring kit shall meet the requirements of this standard for type approval.

9 ACCEPTANCE TEST (CONFORMITY OF PRODUCTION)

Electrical wiring kit approved under this standard shall be so manufactured as to conform test requirements as specified in 4.

10 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 agency, based on the justification provided by the component manufacturer and reviewed by the certifying agency, 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.