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Draft Indian Standard

Road Vehicles - Liquefied Petroleum Gas (LPG) Specific Equipment – Pressure and/or Temperature Sensor

ICS No. 43.060.40;75.160.30

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FOREWORD
(Formal clauses will be added later)

In the formulation of this standard, considerable assistance has been derived from United Nations ECE Regulation No. 67 (Revision 2 - Amendment 2 : Supplement 8 to the 01 series of amendments: Date of entry into force: 3 February 2008), 'Uniform Provisions Concerning: Part 1 - Approval of Specific Equipment of Motor Vehicles using Liquefied Petroleum Gases in their Propulsion System'.

Following documents may be referred to for latest update on statutory requirements related to use of LPG fuel system in Internal Combustion Engine Vehicles:

Central Motor Vehicle Rules, 1989 (CMVR) (As amended from time to time)
Motor Vehicle Act, 1988 (MVA) (As amended from time to time)

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 2:1960 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

1.1 This standard specifies definitions, general design rules, test methods and requirements of pressure and/or temperature sensor of LPG specific equipment of motor vehicles of category L, M and N as defined in IS 14272 using LPG in their propulsion system.

1.2 This standard is applicable to LPG specific equipment intended to use on vehicles using liquefied petroleum gas (LPG) in accordance with CMVR.

1.3 This Standard is not applicable to the LPG specific equipment used in agricultural tractors and construction equipment vehicles.

2 REFERENCES

The following documents 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:

IS No. / Doc. No.	*Title*
14272: 2009	Automotive Vehicles – Types – Terminology (*under revision*)
Doc: TED 26(732)	Road vehicles – Liquefied Petroleum Gas (LPG) specific equipment – Definitions, Classification and General Requirements
Doc: TED 26(733)	Road vehicles – Liquefied Petroleum Gas (LPG) specific equipment – General Design Requirements, Performance and test methods

3 DEFINITIONS

For the purpose of this standard definitions as given in TED 26(732) shall apply.

4 CLASSIFICATIONS OF COMPONENTS

4.1 The components of pressure and/ or temperature sensor is classified in accordance with Doc: TED 26 (732) according to the maximum operating pressure as given in Table 1 below:

Table 1 Classification of Components
(Clause 4.1)

Classification	Classification Pressure (kPa)	Details of components
Class 1	3000	Pressure and/or temperature sensor for liquid LPG or vapour LPG at vapor pressure or increased vapor pressure up to 3,000 kPa.
Class 1A	2000	Pressure and/or temperature sensor for liquid LPG or vapour LPG at vapor pressure or increased vapor pressure up to 2,000 kPa.
Class 2	450	Pressure and/or temperature sensor for vaporized LPG with a maximum operating pressure below 450 kPa and over 20 kPa above atmospheric pressure.
Class 2A	120	Pressure and/or temperature sensor for a limited pressure range containing vaporized LPG with a maximum operating pressure below 120 kPa and over 20 kPa above atmospheric pressure.

4.2 Design Temperature

The components of pressure and/or temperature sensor shall be designed for temperature of −20 °C to 120 °C. For temperatures exceeding 120 °C, special tests conditions shall be applicable.

5 GENERAL DESIGN REQUIREMENTS

5.1 Following requirements of TED 26 (733) W, as applicable, shall be applicable.
Clause 4.1 - Provisions regarding the electrical insulation.
Clause 4.3.1 - Heat exchange medium (compatibility and pressure requirements).
Clause 4.5.2 - Gas flow prevention

6 CONSTRUCTION AND ASSEMBLY

The pressure and/or temperature sensor shall comply with the provisions of 5 of TED 26 (733) and with the tests specified in **7**.

7 TESTS AND TEST PROCEDURES

7.1 Applicable tests and tests procedures for type approval of class 1, 1A, 2 and/or 2A LPG pressure and/or temperature sensors are given below:

Tests	Procedure (Clause no of IS – TED 26 (733) W)	
	Class 1 / 1A	Class 2 / 2A
Over pressure test	7	7
External leakage	8	8
High temperature	9	9
Low temperature	10	10
LPG compatibility	14 [2)]	14 [2)]
Corrosion resistance	15 [1)]	15 [1)]
Resistance to dry heat	16 [2)]	--
Ozone ageing	17 [2)]	--
Creep	18 [2)]	--
Temperature cycle	19 [2)]	--

[1)] Only for metallic parts.
[2)] Only for non-metallic parts.

8 MARKING

8.1 Each pressure and/or temperature sensor shall be permanently marked with:

a) Manufacturers name, trade-mark if any,
b) Part No. or unique identification mark / Type No. /Model No.,
c) Maximum operating pressure or class,
d) Temperature range

e) Month and Year of manufacture or batch number, and
f) Approval No. or BIS mark

8.2 BIS Certification Marking

Each pressure and/or temperature sensor may also be marked with the BIS Standard Mark.

8.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 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.

9 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./ Type No. / Model No. / Unique Identification mark;
d) Working pressure / operating pressure,
e) Operating temperatures range;
f) Rated voltage of the solenoid coil (if any), and
g) Drawings with relevant dimensions and material with grade.

10 ACCEPTANCE TEST (CONFORMITY OF PRODUCTION)

For the purpose of acceptance test, pressure and/or temperature sensor , manufactured shall conform to the following minimum test requirements as specified in relevant clauses of this standard:

Sl No.	**Applicable Tests**	**Applicable to class**
(1)	(2)	(3)
i)	Overpressure test	Class 1, 1A, 2 and 2A
ii)	External Leakage	Class 1, 1A, 2 and 2A
iii)	Temperature cycle test[1)]	Class 1, 1A
iv)	LPG compatibility[1)]	Class 1, 1A, 2 and 2A

[1)] Only for non-metallic parts.

11 CHANGES IN TECHNICAL SPECIFICATIONS OF A TYPE APPROVED COMPONENT AND EXTENSION OF APPROVAL

11.1 Any functional modification in technical specification declared in accordance with 9 shall be intimated to the test agency

11.2 Testing agency may then consider, whether,

a) the component with modification complies with specified requirements, or
b) any further test / verification is required.

In case of b), checks for those parameters, which are affected by the modifications, only need to be carried out.

In the event of a) or in the case of b)**,** after successful compliance to requirements, the certificate of compliance shall be validated for the modified version.

For deciding whether any further verification/test is required in case of b), guidelines given below shall be followed: -

Serial no	**Parameter / Criteria**	**Whether verification is required.**
1	Change of class from 2 or 2A to 1 (or) 1A, or 1A to 1.	All tests mentioned in 6.1 related to change in pressure to be carried out.
	Change of class 1 to 2 or 2A (or) 1 to 1A.	No verification required
2	Change in material from metallic to non-metallic parts.	1) If there is change in the pressure and /or temperature main body, relevant tests need to be carried out. 2) Otherwise tests related to non-metallic parts only needs to be carried out.
3	Change in material from non-metallic to metallic parts.	1) If there is change in the pressure and /or temperature main body, relevant tests need to be carried out. 2) Otherwise tests related to metallic parts only needs to be carried out.
4	Increase in working pressure within the same class	Overpressure, external leakage, creep and temperature cycles as applicable are required.
	Decrease in working pressure	No tests required.
5	Change in operating temperature range	No tests are required if the change is within the range specified for tests.
6	Addition of parts to change direction of out let or inlet	No verification required
7	Change in material of non-metallic parts	Ozone ageing test, LPG compatibility test and resistance to dry heat, creep tests and temperature cyclic test as applicable

11.3 For any change in parameters mentioned in **8** and not covered in Table above, no re-type approval is required.