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Draft Indian Standard

Road Vehicles - Liquefied Petroleum Gas (LPG) Specific Equipment – Fuel Rail

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 IS2:1960 '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 requirements, performance and test methods of fuel rail 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 Doc: TED 26(732) shall apply.

4 CLASSIFICATIONS OF FUEL RAIL

4.1 LPG fuel rail is classified in Doc- TED 26(732) according to the maximum operating pressure, as given in table 1.

Table 1 Classification of LPG Fuel Rail
(Clause **4.1**)

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

5 DESIGN TEMPERATURES

The components of fuel rail shall be designed for temperatures of −20 °C to 120 °C. For temperatures exceeding 120 °C, special test conditions shall be applicable.

6 CONSTRUCTION AND ASSEMBLY

The fuel rail shall comply with the provisions of 5 of Doc: TED 26 (732) and with the tests specified in **7**.

7 TESTS AND TEST PROCEDURES

7.1 Applicable tests and test procedures for type approval parts of Class 1, 1A, 2 and/or 2A are given in Table below:

Tests	Procedure (Clause nos. of IS----TED26 (733)F)	
	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 fuel rail shall be permanently and legibly marked with the following information:

a) Manufacturers name or trade-mark if any;
b) Part No. or unique identification mark / Type No. / Model No.;
c) Maximum operating pressure or class;
d) Month and Year of manufacture or codes thereof or batch number; and
e) Approval No. or BIS mark.

8.2 BIS Certification Marking

8.2.1 Each fuel rail may also be marked with the BIS Standard Mark.

8.2.2 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 information:

a) Name and address of the manufacturer;
b) Manufacturing Plant address;

c) Part No./ Unique Identification mark / Type No. / Model No.;
d) Maximum operating pressure;
e) Operating temperature range; and
f) Drawings with relevant dimensions and material with grade.

10 ACCEPTANCE TEST (CONFORMITY OF PRODUCTION)

For the purpose of acceptance test, each fuel rail 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)	
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 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: -

Sl 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 7.1 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	If there is change in the material of fuel rail body, relevant tests need to be carried out.
3	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.
4	Change in operating temperature range	No tests are required if the change is within the range specified for tests.
5	Addition of parts to change direction of out let or inlet	No verification required

11.3 For any change in parameters mentioned in 9 and not covered in Table above, no re-type approval is required.