Minutes of TED 26-P5 panel meeting: Panel for Ethanol / Methanol / Bio-Diesel / Flex-Fuels

The panel meeting of TED 26 P5 was held virtually on 28th October 2024 (Monday) at 10:30 AM to 11:30 AM under convenorship of Shri Gururaj Ravi (VP, Global regulatory affairs & policy, MSIL, Gurugram). The list of participants are attached in 'Annexure-I'.

Panel Convenor Shri. Gururaj Ravi welcomed all the participants and briefed about background of this working group (TED 26 – P5). He informed that agenda of panel meeting is to examine the international standards for Fuel Injectors and Hoses and determining their viability for adoption as Indian standards.

A. Based on Panel convenor direction, Mr. Rajesh Kumar (AGM, Regulations, MSIL) shared the summary of internationally available standards which may be relevant for India [refer 'Annexure-II'].
    - Primarily Fuel pump, fuel hose & Fuel injectors have been identified under TED-26 scope for which standard need to be made which shall be compatible for following fuels: Ethanol/ FFV, Methanol & Bio-diesel.
    - **Fuel hose:**
        - 02 no ISO standards for Fuel hose identified which may be helpful in deriving Indian Standard: ISO 19013-2:2016 (Methanol compatible) & ISO 19013-1:2019 (Bio-diesel compatible).
        - ISO std. for Fuel hose compatible with Ethanol/ FFV could not be found based on study done so far.
    - **Fuel pump:**
        - 01 no. of Brazilian standard identified for Fuel pump ABNT NBR 15754 compatible with Ethanol/ FFV. For Methanol & Bio-diesel, no Brazilian std identified.
        - No ISO standards have been identified so far for Ethanol/ FFV, Methanol & Bio-diesel
    - **Fuel injectors:**
        - Based on study done so far, no international standards have been identified for Fuel injectors compatible with Ethanol/ FFV, Methanol & Bio-diesel

B. Panel convenor requested members to share their views & comeback with additional relevant international standards (if exist) based on their expertise in the next panel meeting.

C. M/s TML shared that EMS manufacturers may contribute further in formulating these standards based on their internal test procedure on which M/s Bosch shared that they will discuss with their German counterpart & comeback in next panel meeting.

D. Panel convenor requested BIS support in making available the aforementioned standards for detailed study by members.

E. BIS entrusted their full support to members and shared that ISO std. will be made available within two weeks time & Brazilian std will be available by Nov'24 end.

Meeting ended with vote of thanks to the chair

----------End of Minutes----------

Annexure-I (List of participants)

S.N.	Name of Organization	Name of Member
1	M/s Maruti Suzuki India Limited	Shri. Gururaj Ravi (Panel convenor)
2	M/s Maruti Suzuki India Limited	Shri. Arun Kumar
3	M/s Maruti Suzuki India Limited	Shri. Rajesh Kumar
4	M/s Society of Indian Automobile Manufacturers (SIAM)	Dr. Sandeep Garg
5	M/s Bureau of Indian Standard	Shri. Gaurav Jayaswal, Member secretary, TED-26
6	M/s Tata Motors Limited	Shri. Shailendra Dewangan
7	M/s Tata Motors Limited	Shri. Deepak Kulkarni
8	M/s Ashok Leyland	Shri. Faustino V
9	M/s Automotive Component Manufacturer Association (ACMA)	Shri. Sanjay Tank
10	M/s Bosch Limited	Shri. Harshit Saxena

Annexure-II

TED-26:P5-Panel for Ethanol / Methanol / Bio-Diesel / Flex-Fuels

Panel convenor:
Gururaj Ravi, MSIL
1st meeting: 28th Oct'24

Background

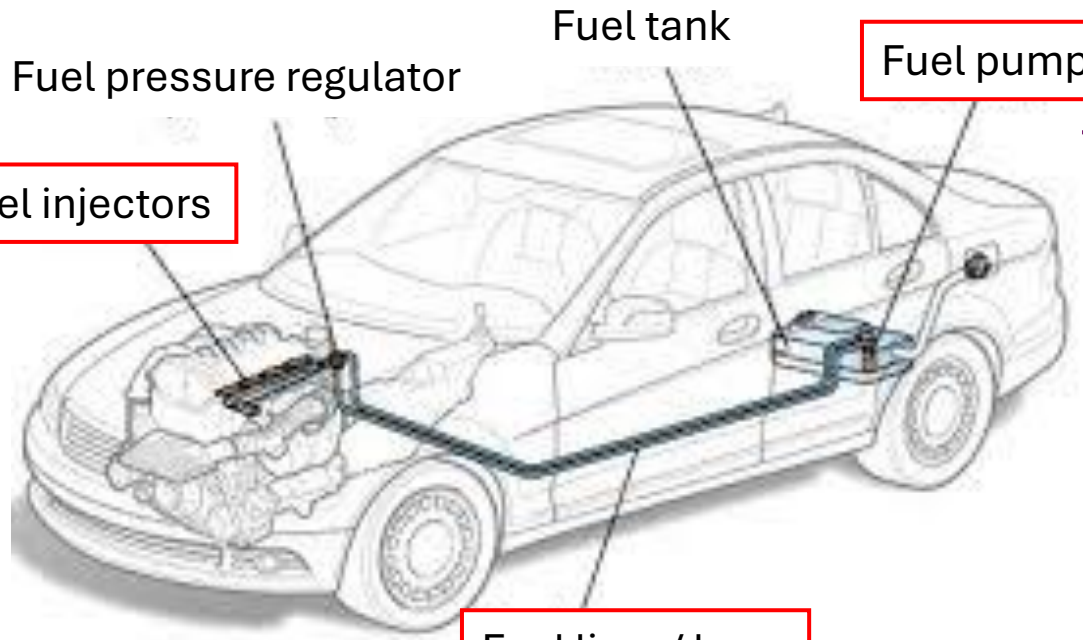
- During 26th TED-26 meeting dtd. 26th Sep'23, based on direction of committee chairman, Mr. Thipse, a panel was formed to look after the:
  - Examination of international standards for Fuel Injectors and Hoses and determining their viability for adoption as Indian standards
  - Examination of ISO Ballots related to Ethanol / Methanol / Bio-Diesel / Flex-Fuel system components
- Mr. Gururaj Ravi, MSIL was appointed as panel convener for the said purpose.
- Accordingly, 1st panel meeting is being called on 28th Oct'24 to discuss the subject at length

Internationally available Std for fuel lines

ISO 8984-1:1993: Hand-lever-operated testing and setting apparatus for CI engine

ISO 8984-2:1993: Testing of fuel injectors for CI engines

ISO 22561:2020: Installation of injectors to the GDI engine



ABNT NBR 15754: Electric fuel pump for otto cycle engines – technical requirements- Brazil

ISO 4008-3:1987/Amd 1:2002: Application and test procedures for CI engines

ISO 21042:2018: installation of HP pump to GDI engine

ISO 19013-1-2016: Rubber hoses & tubing for Diesel fuels & up to **20% bio-diesel**

ISO 19013-2-2016: Rubber hoses & tubing for Gasoline fuels Containing Methanol compatability (15- 100%)

	Ethanol/ FFV	Methanol	Bio-diesel
Fuel hose	X	ISO	ISO
Fuel pump	Brazil	X	X
Fuel injector	X	X	X

X: Not available

Rubber hose: ISO Standards

- Hoses are dealt by **ISO/TC/ 45/SC 1** committee which look after Rubber & plastics hoses & hose assemblies
- ISO std. exist for Rubber hoses & tubing for fuel circuits for Gasoline & Diesel vehicles
- For Diesel fuel, ISO std covered Bi0-diesel blending up to 20% however for Gasoline, it does not specify ethanol blending %.

Standard	Description	
ISO 19013-2:2016	Rubber hoses and tubing for fuel circuits for internal combustion engines- Specification Part 2: Gasoline fuels	• It specifies the requirements for rubber tubing and hoses used in gasoline fuel circuits for IC engines. • The gasoline fuels covered include those containing oxygenates such as **methanol and fuels** that have become oxidized ("sour gas"). • It covers the requirements to be met upon when subjected to mixture of methanol (15 to 100%)
ISO 19013-1:2019	Rubber hoses and tubing for fuel circuits for internal combustion engines — Specification Part 1: Diesel fuels	• It specifies the requirements for rubber tubing and hoses used in diesel fuel circuits for IC engines. • The diesel fuels covered include "**bio-diesels**" which consist of the methyl ester of rape seed oil at levels **up to 20 % by volume** in conventional diesel fuels.

Major test required:

- Burst pressure I Proof pressure I Adhesion I Ozone resistance I Resistance to fuels I Fuel permeability

Aforementioned std. may be useful for deriving IS for hose for Methanol & bio-diesel blended fuels however ISO std for hose doesn't exist for higher ethanol blending with Gasoline

Fuel pumps: Brazil standard

- 'Brazilian National Institute of Metrology and Quality' regulates issues regarding quality certification known as **INMETRO** parts certification.
- Auto parts falling under INMETRO 301/2011 further amended by INMETRO ordinance 16/2013 & 455/2014, must be manufactured according to performance criteria mentioned in standard mentioned below:
- It includes:
  - Dual fuel type pump which operates on **hydrated ethyl alcohol fuel, gasoline, or any mixture thereof** &
  - Type C gasoline type pump which operates only with Type C gasoline

Standard	Description
ABNT NBR 15703	Motor road vehicles- Fuel pump assembly for Otto cycle engines- terminology
ABNT NBR 15754	Motor road vehicles- Electric fuel pump for otto cycle engines – technical requirements

- **Requirements as per ABNT NBR 15754:**

Major test required	Product safety requirements
○ Characteristics curve & temperature vibration resistance test ○ **Start-up test after swelling** ○ **Accelerated durability test on aggressive fuel** ○ Extreme wear test & Wear resistance (durability with impurities) ○ Leakage protection & EMI	• Harmful materials such as cadmium, asbestos, mercury, and lead can not be used for building pumps • Pumps must have a relief valve with a opening pressure of 100-950 kPa added to the nominal system pressure

ABNT NBR 15754 std. covers **hydrated ethyl alcohol fuel, gasoline, or any mixture thereof,** may be helpful in deriving Indian Standard

Fuel pumps: ISO standards

- Fuel Pumps & Injectors are dealt by **ISO/TC/ 22/SC 34** committee which look after propulsion powertrain & powertrain fluids
- Unlike Diesel engines, ISO standard for Pump testing for Gasoline engine does not exist
- Since, Pump specifications are varied, so, it is tested based on manufacturers' recommendations

Standard	Description	Brief Scope
ISO 4008-3:1987 Amd 1:2002	Road vehicles- Fuel injection pump testing — Part 3: Application and test procedures for CI engines	• This document is used in the workshop. • Part 1 & 2 deals with the requirements & characteristics of Test benches suitable for calibrating fuel pumps. • Part 3 defines test conditions which are mandatory to the performance of fuel injection pump tests in conformity with the International Standard, such as calibrating injectors, high pressure pipes, environment condition, verification of equipment etc. • Characteristics of the pump are checked in comparison with permissible operating envelope & basic data
ISO 21042:2018	Gasoline engines with direct fuel injection (GDI engines)- Installation of the high pressure fuel pump to the engine	• This document specifies dimensions required for the installation and integration of the high pressure fuel pump in gasoline (GDI) engines. • The location of the fuel connections and the dimensions of the pump outside shape are not defined since they vary according to the manufacturer of the pump and to the particular application

Fuel Injectors: ISO standards

- Unlike for diesel engines, ISO standard for Gasoline injector testing does not exist

Standard	Description	Brief Scope
ISO 8984-1:1993	Diesel engines- Testing of fuel injectors- Part 1: Hand-lever-operated testing and setting apparatus	• It Specifies minimum requirements for hand-lever-operated testing and setting apparatus to perform certain tests on fuel injectors [fuel delivery of up to 300 mm^3/(injection × cylinder))] • These tests are detailed in ISO 8984-2
ISO 8984-2:1993	Diesel engines- Testing of fuel injectors- Part 2: Test methods	• It specifies tests which may be performed on fuel injectors for diesel engines (fuel delivery of up to 300 mm^3/(injection × cylinder) at full load) using hand-lever-operated testing and setting apparatus, as specified in ISO 8984-1. • **These tests are: nozzle opening pressure, chatter (atomization), spray pattern, seat leakage, back-leakage**
ISO 22561:2020	Gasoline engines with direct fuel injection (GDI engines)- Installation of the injectors to the engine	• This document specifies the dimensions required for the installation and integration of the fuel injectors in gasoline (GDI) engines. • It also describes the interface of the fuel injector cup within the fuel rail to the individual injector.

ISO std. for Injector doesn’t exist for Methanol/ Ethanol blending

Way forward

- Till date, very limited standards available for performance assessment of Fuel lines system.
- Few standards have been identified, however, panel members are requested to deep dive into the subject & share the relevant standards for further deliberation.
- These standards are publicly not available, hence BIS is requested to kindly share the relevant standard to all panel members for detailed deliberations
- Relevant std required:

Components	Std required
Fuel pump	ABNT NBR 15754 & ABNT NBR 15703
Fuel hose	ISO 19013-2:2016 (Methanol compatibility)
	ISO 19013-1:2019 (Bio-diesel)

ISO std. for Injector doesn’t exist for Methanol/ Ethanol blending

Thank You