

Chapter 13

TEST PROCEDURE FOR ON BOARD DIAGNOSTICS – I (OBD-I)

1. INTRODUCTION

This chapter applies to the Type Approval procedure for on-board diagnostic I (OBD I) system for the motor vehicles.

2. DEFINITIONS

2.1 **'OBD I'** means an on-board diagnostic system for emission control, which shall have the capability of identifying the likely area of malfunction by means of fault codes stored in computer memory as specified in section 5.1 below of this chapter. For all subsequent references in this chapter OBD implies OBD I.

2.2 **'Vehicle type'** means a category of power-driven vehicles, which do not differ in such essential engine and OBD system characteristics.

2.3 **'Vehicle family'** means a manufacturer's grouping of vehicles, which through their design, are expected to have similar exhaust emission and OBD system characteristics. Each vehicle of family shall have complied with the requirement of this document as defined in Annexure III to this Chapter.

2.4 **'Emission control system'** means the electronic engine management controller and any emission-related component in the exhaust system, which supplies an input to or receives an output from this controller.

2.5 **'Malfunction indicator (MI)'** means a visible or audible indicator that clearly informs the driver of the vehicle in the event of a malfunction of any emission-related component connected to the OBD system, or the OBD system itself.

2.6 **'Circuit discontinuity' (CD)** means disconnection of only those components (sensors/actuators) which are monitored by EMS/ECU/Computer, by physically removing corresponding connector or cutting / separating wire(s) of corresponding sensor or actuator.

2.7 **'A driving cycle'** consists of engine start-up, driving mode where a malfunction would be detected if present, and engine shut-off.

3. APPLICATION FOR TYPE APPROVAL

3.1 The application for type approval of a vehicle model with regard to OBD of the vehicles shall be submitted by the vehicle manufacturer along with duly filled OBD specification sheet (refer annexure 1 for format) for components monitored by EMS/ECU/Computer & OBD flow chart application table (refer annexure 2 for format).

- 3.2 A vehicle representative of the vehicle model to be type approved shall be submitted to the test agency responsible for conducting tests for compliance to the requirements referred in Para 5 of this chapter.

4. TYPE APPROVAL

For the purpose of type approval, manufacturer can choose one of the below mentioned options (4.1 or 4.2)

- 4.1 The vehicle submitted for type approval shall be tested for maximum four discontinuity demonstration tests selected by the test agency out of the OBD parameters as declared by the vehicle manufacturer, subject to condition mentioned in clause 4.3.
- 4.2 Alternatively, the vehicle can be tested for all OBD parameters for discontinuity demonstration tests, subject to condition mentioned in clause 4.3.
- 4.3 If discontinuity demonstration test is conducted on any vehicle model for a particular OBD parameter, demonstration test for such OBD parameter need not be conducted once again in the new vehicle model of same vehicle family submitted for type approval. In this case the vehicle manufacturer has to fill the vehicle model in which the demonstration test was carried out and date of testing (in DEMO column of annex 2).
- 4.4 If the submitted vehicle meets the requirements of Para 5 below when tested as per the procedure described in Para 6 below for circuit discontinuity of parameters in Table in 5.1, approval of that vehicle model shall be granted.

5. REQUIREMENTS

- 5.1 Vehicle submitted for type approval shall contain the OBD monitoring system. Please refer Table – II for Positive Ignition Engine vehicles & Table – III (for Compression ignition Engine Vehicles) of GSR 84 (E) dated 9th Feb-2009 for OBD – I monitoring system.
- 5.2 The vehicle manufacturer shall submit a test vehicle along with necessary equipments, which can simulate the discontinuity of OBD parameters as declared by the manufacturer for testing.
- 5.3 Activation of malfunction indicator (MI).
- 5.3.4 Distance traveled since MIL is ‘ON’ shall be recorded.
- 5.3.5 The OBD system shall incorporate a malfunction indicator readily perceivable to the vehicle operator. The MI must not be used for any other purpose except to

- indicate emergency start-up or limp-home routines to the driver. The MI shall be visible in all reasonable lighting conditions. When activated, it shall display a symbol in conformity with ISO 2575. A vehicle shall not be equipped with more than one general purpose MI for emission-related problems. Separate specific purpose telltales (e.g. brake system, fasten seat belt, oil pressure, etc.) are permitted. The use of red color for an MI is prohibited.
- 5.3.6 The MI shall activate when the vehicle's ignition is in the "key-on" position before engine starting or cranking and de-activate before engine starting after few seconds (or 'on' till engine is started) if no malfunction has previously been detected.
- 5.3.7 For meeting the requirements of 5.1, the manufacturer shall take appropriate steps to demonstrate that the OBD system will indicate a fault when discontinuity occurs.
- 5.4 The OBD system shall be capable of recording the fault code(s) indicating the status of the emission control system.
- 5.4.1 The distance traveled by the vehicle while the MI is activated must be available at any instant through the serial port on the standard link connector.
6. TEST PROCEDURE
- 6.1 The test Vehicle shall be mounted on the chassis dynamometer along with necessary equipments of test agency for carrying out test (OBD Scan tool and related accessories need to be provided by manufacturer)
- 6.2 Initial check
- 6.2.1 Switch "ON" the ignition and check for MIL "ON". MIL shall be "ON" for few seconds and then may turn "OFF" (in case of vehicle models with such design of MIL operation) or may continue to glow.
- 6.2.2 Start the engine and check for MIL "OFF".
- 6.2.3 Switch "OFF" the engine and ignition key to "OFF" position.
- 6.3 Circuit Discontinuity check
- 6.3.1 Vehicle soaking for 6 hours, if necessary for certain OBD parameters as specified by vehicle manufacturer.
- 6.3.2 Open or disconnect the circuit for the OBD parameter to be checked for circuit discontinuity.
- 6.3.3 Switch "ON" the ignition. Check for MIL "ON".

6.3.4 Start the engine and check for MIL “ON”.

6.3.4.1 If the OBD parameter requires engine to be driven for MIL activation, vehicle shall be driven as per driving cycle (modified Indian Driving Cycle); including key ‘ON’ ‘OFF’ cycles, vehicle can be considered meeting circuit discontinuity when the MIL activates within maximum of 10 driving cycles.

6.3.4.2 If the OBD parameter does not require vehicle to be driven for MIL activation, vehicle can be considered meeting circuit discontinuity for the tested OBD parameter.

6.3.4.3 The DTC code shall be retrieved by the OBD Scan tool or any other method as mutually agreed between test agency and vehicle manufacturer.

6.3.5 Procedure from 6.3.1 to 6.3.4 shall be repeated for other OBD parameters to be checked for circuit discontinuity.

6.4 The requirement of distance traveled since MIL “ON” shall be checked along with one of the circuit discontinuity tests for OBD parameters as specified by vehicle manufacturer by running the vehicle on chassis dynamometer or on road as per driving cycle preferred by the vehicle manufacturer.

6.5 The process flow is shown in the figure 1 of this chapter.

7. Modifications of the vehicle model

7.1 Every modification in the essential characteristics of the vehicle model shall be intimated by the vehicle manufacturer to the test agency which type approved the vehicle model. The test agency may either,

7.2 Consider that the vehicle with the modifications made may still comply with the requirement, or require a further test to ensure further compliance.

7.3 In case of 7.2 above, the testing agency shall extend the type approval covering the modified specification or the vehicle model shall be subjected to necessary tests as per the guidelines for extension of approval (clause 8). In case, the vehicle complies with the requirements, the test agency shall extend the type approval.

8. Guidelines for Extension of Approval of the vehicle for OBD.

8.1 Approval granted to a vehicle type with respect to the OBD system may be extended to different vehicle types belonging to the same vehicle-OBD family as described in Annex III. The engine emission control system must be identical to that of the vehicle already approved and comply with the description of the OBD engine family given in Annex III, regardless of the following vehicle characteristics:

- engine accessories,
- tyres,
- equivalent inertia,
- cooling system,
- overall gear ratio,
- transmission type,
- type of bodywork.

8.2 In a vehicle model, which is previously approved for OBD parameter, if there is any change in OBD parameter, then the discontinuity testing for the changed OBD parameter only needs to be conducted as mutually agreed between the test agency and vehicle manufacturer if manufacturer can prove that changed OBD parameter don't have any interaction with other OBD parameters.

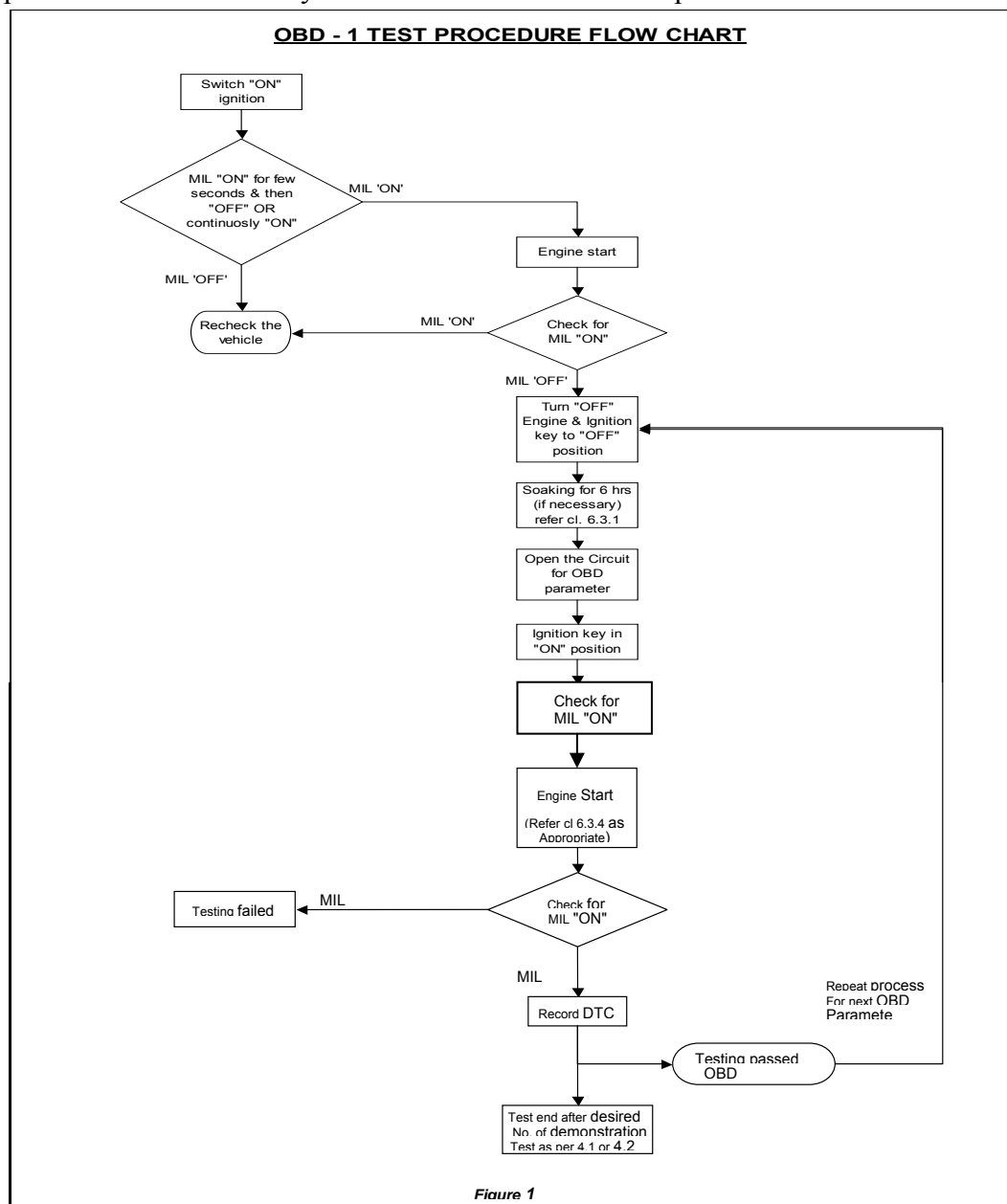


Figure 1

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Annexure 2 - OBD Flow Chart Application Table Format

Function	DEMO	DTC	TYPE	CONFIGURATION

DEMO: The monitoring system simulated for the purpose of the type-approval is marked with the tested vehicle & date.

Annexure 3

ESSENTIAL CHARACTERISTICS OF THE VEHICLE FAMILY

1. PARAMETERS DEFINING THE OBD FAMILY

The OBD family may be defined by basic design parameters, which must be common to vehicles within the family. In some cases there may be interaction of parameters. These effects must also be taken into consideration to ensure that only vehicles with similar exhaust emission characteristics are included within an OBD family.

2. To this end, those vehicle types whose parameters described below are identical are considered to belong to the same engine-emission control/OBD system combination.

Engine:

- combustion process (i.e. positive-ignition, compression-ignition, two-stroke, four-stroke),
- method of engine fuelling (i.e. carburetor or fuel injection).
- fuel type (i.e petrol, diesel, NG, LPG, bi-fuel petrol/NG, bi-fuel petrol/LPG)

Emission control system:

- type of catalytic converter (i.e. oxidation, three-way, heated catalyst, other),
- type of particulate trap,
- secondary air injection (i.e. with or without),
- exhaust gas recirculation (i.e. with or without)

OBD parts and functioning:

- the methods of OBD functional monitoring, malfunction detection and malfunction indication to the vehicle driver.
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