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| **TECHNICAL SPECIFICATION – FOUR WHEELERS AND ABOVE PART C - ENGINE** |
| **Clause No.** | **Description** |  |
| **C1.0** | **Description of Engine:** |  |
| C1.1 | Type (Compression Ignition / Positive Ignition) |  |
| C1.1.1 | Compliance sought for emission norms (BS-III /BS -IV /Any other) |  |
| C1.2  | Make  |  |
| C1.3  | Name and address of the engine manufacturing plant  |  |
| C1.4  | Working principle: (Four / two stroke), (DI / IDI ) (NA/TC/TCIC/ Any other ) |  |
| C1.5 | Model name and identification |  |
| C1.6 | Type of fuel used |  |
| C1.7  | No.& Layout of cylinders & firing order |  |
| C1.8  | Swept volume cc |  |
| C1.9  | Bore (mm) |  |
| C1.10  | Stroke (mm) |  |
| C1.11 | Compression ratio (specify tolerance) |  |
| C1.12 | Engine performance (declared by the manufacturer): |  |
| C1.12.1 | Max. Net power of engine on bench (kW @ rpm)(Specify standard and tolerance) |  |
| C1.12.2 | Maximum net torque on bench (Nm @ rpm) **Note** : In case of diesel engines the max. Power and max. Torque shall be specified as per conditions given in Chapter 6 of Part IV of Doc. MoRTH / CMVR / TAP-115 / 116 Issue No.3 |  |
| C1.13 | Location of engine (Front / Rear) |  |
| C1.13.1 | Engine Oil grade |  |
| **C2.0** | **Combustion System:** |  |
| C2.1  | Type of combustion chamber (Hemispherical/ squish/others) |  |
| C2.2  | Drawing(s) of combustion chamber and piston crown (Enclose the drawing & Mention the drawing no. & Part no.) |  |
| C2.3 | Minimum cross section area of ports |  |
| C2.3.1 | Inlet (cm2) |  |
| C2.3.2  | Outlet (cm2) |  |
| **C3.0** | **Ignition System (Spark Ignition engines only):** |  |
| C3.1 | Type |  |
| C3.2 | Nominal Voltage |  |
| C3.3 | Operating Principle |  |
| C3.4 | CDI |  |
| C3.5 | Table of Combination for EMI test |  |
| C3.6 | Ignition advance curve (specify tolerance) & enclose the curve |  |
| C3.7 | Ignition timing (specify tolerance) |  |
| C3.8 | Contact point gap and dwell angle (specify tolerance) |  |
| C3.9 | Type and make of distributor |  |
| C3.10 | Sparking plugs |  |
| C3.10.1 | Make  |  |
| C3.10.2 | Type and designation |  |
| C3.10.3 | Spark-gap setting |  |
| C3.10.4 | Nominal resistance (kilo ohm) (if resistive type) |  |
| C3.11 | Ignition coil |  |
| C3.11.1 | Make |  |
| C3.11.2 | Type |  |
| C3.11.3  | Identification |  |
| C3.12 | Ignition condenser |  |
| C3.12.1 | Make |  |
| C3.12.2  | Type |  |
| C3.12.3  | Identification |  |
| C3.13  | EMI suppressor cap / Device / Electronic unit |  |
| C3.13.1  | Make |  |
| C3.13.2  | Type (Resistive/Capacitive) |  |
| C3.13.3  | Identification |  |
| C3.13.4 | Nominal resistance (kilo ohm) |  |
| C3.13.5  | Terminology and Drawing of interference Suppression equipment |  |
| C3.14  | H.T. Cable |  |
| C3.14.1  | Make and Place  |  |
| C3.14.2 | Type (Resistive/Non-resistive) |  |
| C3.14.3 | Length mm (if resistive type) |  |
| C3.14.4  | Outside dia. mm (if resistive type) |  |
| C3.14.5 | Nominal resistance kilo ohm, (if resistive type) |  |
| **C4.0**  | **Cooling system :** |  |
| C4.1 | Liquid cooling system |  |
| C4.1.1 | Nature of liquid  |  |
| C4.1.2 | Circulating pump yes/no |  |
| C4.1.3 | Characteristics of Circulating pump or make(s) & type(s) |  |
| C4.1.3.1 | Drive ratio |  |
| C4.1.4 | Nominal temperature setting of the engine temperature control mechanism |  |
| C4.1.5 | Radiator drawing(s) |  |
| C4.1.5.1 | Make(s)  |  |
| C4.1.5.2 | Type(s) |  |
| C4.1.5.3  | Relief valve pressure setting |  |
| C4.1.6  | Fan characteristics (Fan power, kW) Enclose the fan power curve corresponding to full load (v/s engine speed) of viscous fan. |  |
| C4.1.6.1  | Make(s)  |  |
| C4.1.6.1.1 | No. of blades |  |
| C4.1.6.1.2 | Material of blades ( metal / plastic ) |  |
| C4.1.6.2  | Type(s) [Fixed / Viscous / Electrical driven] |  |
| C4.1.6.3 | Drive ratio |  |
| C4.1.6.4 | Fan diameter (mm) |  |
| C4.1.6.5 | Max. Speed of fan (in rev/min) |  |
| C4.1.7 | Radiator core open area (cm²) |  |
| C4.2 | Air Cooling system |  |
| C4.2.1 | Blower characteristics |  |
| C4.2.1.1  | Make |  |
| C4.2.1.2  | Type(s) |  |
| C4.2.1.3 | Drive ratio(s) |  |
| C4.2.2 | Air ducting (std production) |  |
| **C5.0** | **Temperature permitted by manufacturer in 0C for liquid cooling (Location of measurement be specified)** |  |
| C5.1 | Max. temp. at engine outlet |  |
| **C6.0**  | **Temperature permitted by manufacturer in 0C for Air cooling (Location of measurement be specified )** |  |
| C6.1 | Reference point |  |
| C6.2  | Max. temperature at reference point |  |
| C6.3  | Max. Temperature of the intercooled-air(Location of measurement be specified) |  |
| C6.4 | Max. Exhaust temperature (in case of diesel engines, at the point in the exhaust pipe(s) adjacent in outlet flange(s) of exhaust manifolds), Specify the distance from the outlet flange. |  |
| **C7.0** | **Fuel temperature 0C: (for diesel engines at the injection pump inlet)** |  |
| C7.1 | Minimum |  |
| C7.2 | Maximum |  |
| **C8.0**  | **Lubricant Temperature 0C (Location of measurement be specified )** |  |
| C8.1 | Minimum |  |
| C8.2 | Maximum |  |
| **C9.0** | **Intake system : (Attach drawing, mention Drawing No. & Part No.)** |  |
| C9.1 | Supercharger / Turbocharger - yes/no |  |
| C9.1.1 | Description of system |  |
| C9.1.2 | Make(s)  |  |
| C9.1.3 | Type(s) |  |
| C9.1.4 | Description of system (e.g. Charge pressure @ max. power and torquespeed, waste gate, if applicable) |  |
| C9.2  | Intake manifold (Enclose drawing with drawing No. & Part No.) |  |
| C9.2.1 | Description |  |
| C9.2.2 | Identification No / Part No./ Drawing No. |  |
| C9.2.3  | Schematic dimensional drawing |  |
| C9.3  | Air filter |  |
| C9.3.1 | Make |  |
| C9.3.2 | Type |  |
| C9.3.3 | Identification No / Part No./ Drawing No. |  |
| C9.3.4 | Schematic dimensional drawing |  |
| C9.4 | Intake silencer |  |
| C9.4.1 | Make |  |
| C9.4.2 | Type / Description |  |
| C9.4.3 | Identification No / Part No./ Drawing No. |  |
| C9.4.4 | Schematic dimensional drawing of inlet pipe and their accessories (dash pot, heating devices, additional air intake etc.) |  |
| C9.5 | Inter cooler |  |
| C9.5.1 | Make |  |
| C9.5.2 | Identification No / Part No./ Drawing No. |  |
| C9.5.3 | Air pressure drop across the inter-cooler |  |
| **C10.0**  | **Fuel feed: (By carburetor)** |  |
| C10.1 | Number |  |
| C10.2 | Make |  |
| C10.3 | Type |  |
| C10.4 | Adjustments (specify tolerance) |  |
| C10.4.1 | Jets |  |
| C10.4.2 | Ventures |  |
| C10.4.3  | Float-chamber level |  |
| C10.4.4 | Mass of float  |  |
| C10.4.5 | Float needle |  |
| C10.5 | Dimensions of mixture duct |  |
| C10.6 | Choke: Type (Manual/automatic) and closure setting |  |
| C10.7 | Feed pump |  |
| C10.7.1 | Pressure (specify tolerance) or characteristic diagrams |  |
| C10.7.2 | Type of fuel feed pump |  |
| **C11.0** | **Fuel feed: {By fuel injection}** |  |
| C11.1  | Injection system description |  |
| C11.2  | Working principle: intake manifold/ direct injection / indirect injection / swirl chamber/others |  |
| C11.3 | Fuel Pump |  |
| C11.3.1  | Make(s)  |  |
| C11.3.2  | Type(s) |  |
| C11.3.3 | Pressure / characteristic diagram |  |
| C11.4 | Delivery mm3/ per stroke at max net power speed in case of Diesel Engine& specify delivery in kg/h at max net power speed in case of gas engines(specify tolerance) and enclose characteristic diagram (specify tolerance).If boost control is supplied, state the characteristics fuel delivery andboost pressure versus engine speed. |  |
| C11.5  | Calibration Method (on engine/pump bench) |  |
| C11.6 | Static Injection timing |  |
| C11.7 | Injection advance curve (Diagram be enclosed) |  |
| C11.8 | Injection advance (specify the tolerance) |  |
| C11.9 | Injector (s) |  |
| C11.9.4  | Injection piping |  |
| C11.9.4.1 | Length mm |  |
| C11.9.4.2 | Internal diameter mm |  |
| **C 12.0** | **Device for recycling crank-case gases** |  |
| C12.1 | Description & drawings |  |
| **C13.0**  | **Governor** |  |
| C13.1 | Type(s) |  |
| C13.2 | Speed at which Cut off starts under load (rev/min) |  |
| C13.3 | Max. speed without load (rev/min) |  |
| C13.4 | Idle Speed (rev/min) |  |
| **C14.0** | **Cold start device (starting aid)** |  |
| C14.1  | Make |  |
| C14.2 | Type(s) |  |
| C14.3  | System description |  |
| **C15.0** | **Starting System :** |  |
| C15.1 | Type(s) |  |
| C15.2 | System description |  |
| **C16.0** | **Valve timing / Port timing or equivalent data** |  |
| C16.1  | Max. lift of valves |  |
| C16.1.1 | Inlet mm |  |
| C16.1.2 | Exhaust mm |  |
| C16.2 | Angle of valves / port (w.r.t. top dead center) |  |
| C16.3 | Inlet |  |
| C16.3.1 | Opening |  |
| C16.3.2 | Closing |  |
| C16.4 | Exhaust |  |
| C16.4.1 | Opening |  |
| C16.4.2  | Closing |  |
| C16.5 | Transfer |  |
| C16.5.1 | Opening |  |
| C16.5.2 | Closing |  |
| C16.6 | Reference or setting ranges |  |
| C16.7 | Valve gap (Hot or Cold as applicable) |  |
| C16.7.1 | Inlet |  |
| C16.7.2 | Exhaust |  |
| C16.8  | Distribution by ports |  |
| C16.8.1 | Volume of crank-case cavity with piston at TDC |  |
| C16.8.2  | Reed valve fitted ( Yes / No ) |  |
| C16.8.3 | Description of inlet ports, scavenging and exhaust ports with corresponding timing. |  |
| **C17.0**  | **Lubrication system** |  |
| C17.1  | Description of system |  |
| C17.2 | Position of lubricant reservoir |  |
| C17.3 | Feed system (pump, injection in to intake mixing with fuel etc.,) |  |
| C17.4 | Lubricating pump |  |
| C17.4.1 | Type |  |
| C17.5 | Mixture with fuel: yes/no, and if yes % ( for 2 stroke engines ) |  |
| C17.6 | Oil cooler : yes/no, and if yes Enclose dimensional drawings, make(s) & type(s) |  |
| **C18.0** | **Electrical equipment** |  |
| C18.1  | Generator/alternator characteristics (specify tolerance) or  |  |
| C18.1.1 | Make |  |
| C18.1.2 | Identification No / Part No./ Drawing No. |  |
| **C19.0** | **Other engine driven auxiliaries** |  |
| C19.1  | Enumeration & brief description, if necessary |  |
| **C20.0** | **Idling System:** |  |
| C20.1 | Idling speed (rpm) (specify the tolerance) |  |
| C20.2 | Description of settings and relevant requirements |  |
| C20.3  | Carbon monoxide and HC content by volume in the exhaust gas with the engine idling, per cent (for SI engines only) (manufacturer’s standard) |  |
| C20.4 | High Idle (2500 ± 200 rpm) Lambda value(For petrol driven four wheeled vehicles only) (1± 0.03 or as specified by the vehicle manufacturer) |  |
| **C 21.0**  | **Requirements for engine test** |  |
| C21.1 | Maximum permitted depression of air intake at characteristic place in kPa (Specify location of measurement)) |  |
| C21.2 | Exhaust back pressure at maximum net power and location of measurement (kPa) |  |
| C21.3 | Effective volume of exhaust-system (specify the tolerance & range) liters (from exhaust manifold / TC outlet to tail pipe end), Enclose the exhaust system dimensional drawing and indicate the volume of each parts clearly. |  |
| C21.4 | Moment of inertia of combined flywheel & transmission at condition when no gear is engaged |  |
| C21.5  | Maximum rated speed (Specify the tolerance) |  |
| C21.6 | Minimum rated speed (Specify the tolerance) |  |
| C21.7 | Max. Net Torque on bench ……. Nm at ……..rpm ( specify tolerance ) |  |
| C21.8 | Max. net Power on bench, ……. Nm at ……..rpm ( specify tolerance ) |  |
| C21.9 | Engine Performance Declared speed and powers of the engine submitted for type approval) (Speeds to be agreed with the testing agency) |  |
| C21.9.1  | Engine Speeds (For ESC & ELR cycles) |  |
| C21.9.2 | Low Speed (nlo) (rpm) |  |
| C21.9.3  | High Speed (nhi) (rpm) |  |
| C21.9.4 | Speed A (rpm) |  |
| C21.9.5 | Speed B (rpm) |  |
| C21.9.6  | Speed C (rpm) |  |
| C21.9.7  | **Engine Power Table** |
| **Measurement point\*** | **Engine speed Rpm** | **New Power kW\*\*** |
| (1) |  |  |
| (2) |  |  |
| (3) |  |  |
| (4) |  |  |
| (5) |  |  |
| (6) |  |  |
|  |  |  |
|  |  |  |
|  \* See Chapter 3 of Part IV of Doc.MoRTH/CMVR/TAP115/116 Issue No.4\*\* Net power according to Chapter 6 of Part IV of Doc.MoRTH/CMVR/TAP115/116 Issue No.4.**Note**: In case, if data regarding the Moment of Inertia, is required by the test agency for carrying out the Full Throttle performance test for both the CI / SI engines, the same shall be provided by the manufacturer. |
| **C22.0**  | **Exhaust system** |  |
| C22.1  | Silencer |  |
| C22.1.1  | Type |  |
| C22.1.2  | Make |  |
| C22.1.3 | Number |  |
| C22.1.4  | Silencer identification No. / Part No.  |  |
| C22.2 | Internal diameter of exhaust pipe (mm) |  |
| C22.3  | Description with general arrangement of exhaust system along with its routing indicating the lengths of exhaust pipe, tail pipe and exhaust outlet location, indicated in a Schematic dimensional drawing. |  |
| C22.4 | Minimum distance between exhaust pipe(s) and the fuel line |  |
| C22.5 | Auxiliary Noise shields for compliance to IS 3028 and / OR AIS-020 (If Provided) |  |
| C22.5.1 | Material |  |
| C22.5.2 | Layout of noise shield / Photographs / Diagram Showing arrangements indicating fitment on vehicle. |  |
| **C23.0** | **Additional emission control devices, such as catalytic converter etc.(if any & if not covered by another heading)** |  |
| C23.1 | Catalyzer make, number  |  |
| C23.2 | Identification No / Part No./ Drawing No. |  |
| C23.3  | Type of catalytic action (One/two/three way) |  |
| C23.4 | Total charge of precious metal (g/vehicle) |  |
| C23.5 | Relative concentration (%) |  |
| C23.5.1 | Platinum |  |
| C23.5.2  | Rhodium |  |
| C23.5.3 | Palladium |  |
| C23.6  | Substrate (Monolithic metal/ Ceramic/ honeycomb) |  |
| C23.6.1 | Cell density (cells per sq. inch / cm) |  |
| C23.7  | Type of casing for catalyzer |  |
| C23.8 | Diagram indicating the arrangement and position of catalytic converter w.r.t. exhaust manifold) |  |
| C23.9 | Lambda Sensor |  |
| C23.9.1 | Make |  |
| C23.9.2 | Type / Part No. |  |
| C23.9.3 | Identification No / Part No./ Drawing No. |  |
| C23.9.4 | Location |  |
| C 23.10 | Regeneration systems/method of exhaust after-treatment systems, description: |  |
| C 23.10.1 | The number of Type I operating cycles, or equivalent engine test bench cycles, between two cycles where regenerative phases occur under the conditions equivalent to Type I test (Distance "D" in figure 1 in Chapter 15 of TAP Document) : |  |
| C 23.10.2 | Description of method employed to determine the number of cycles between two cycles where regenerative phases occur: |  |
| C23.10.3 | Parameters to determine the level of loading required before regeneration occurs (i.e. temperature, pressure etc.): |  |
| C23.10.4 | Description of method used to load system in the test procedure described in paragraph 3.1., ( Refer Chapter 15 of TAP Document) : |  |
| C 23.11 | Oxygen sensor: type |  |
| C 23.11.1 | Location of oxygen sensor: |  |
| C23.11.2 | Control range of oxygen sensor: |  |
| C 23.11.3 | Regeneration system/method - Description and drawing: |  |
| C23.12 | Electronic Control Unit (ECU) |  |
| C23.12.1  | Make  |  |
| C23.12.2 | Identification mark |  |
| C23.12.3 | Calibration Identification No. |  |
| C23.12.4  | Adjustment possibilities ( Yes / No ) |  |
| C23.13  | Secondary Air Injection |  |
| C23.13.1 | Make |  |
| C23.13.2 | Identification mark |  |
| C23.14  | Exhaust Gas Re-circulating System |  |
| C23.14.1 | Brief description of the system |  |
| C23.14.2  | Type ( Cooled / Non-cooled/Progressive/ On-Off/ Any Other ) |  |
| C23.14.3  | EGR Valve |  |
| C23.14.3.1 | Make |  |
| C23.14.3.2 | Type |  |
| C23.14.3.3  | Identification No / Part No./ Drawing No. |  |
| C23.14.4 | EGR Electronic Control Unit |  |
| C23.14.4.1  | Make |  |
| C23.14.4.2 | Identification No / Part No./ Drawing No. |  |
| **C24.0** | **Additional information for evaporative emission** |  |
| C24.1 | Evaporative emission control system |  |
| C24.2 | Type |  |
| C24.3 | Make |  |
| C24.4 | Complete detailed description of devices and their state of tune |  |
| C24.5 | Drawing of the evaporative control system |  |
| C24.6 | Drawing of the fuel tank with indication of capacity and material |  |
| C24.7 | Canister |  |
| C24.7.1  | Working capacity |  |
| C24.7.2 | Make |  |
| C24.7.3 | Identification No / Part No./ Drawing No. |  |
| C24.7.4 | Schematic diagram |  |
| C24.7.5 | Canister bed volume (1) |  |
| **C 25.0** | **On Board Diagnosis (OBD )**  |  |
| C 25.1 | Written description and/or drawing of the Malfunction Indicator(MI). |  |
| C 25.2 | List and purpose of all components monitored by the OBD system. |  |
| C 25.3 | Written description (general working principles) for ; |  |
| C 25.3.1 | Positive-ignition engines. |  |
| C 25.3.1.1 | Catalyst monitoring |  |
| C 25.3.1.1.1 | Misfire detection |  |
| C 25.3.1.1.2 | Oxygen sensor monitoring |  |
| C 25.3.1.1.3 | Other components monitored by the OBD system |  |
| C 25.3.1.2 | OBD family declaration following list of basic parameters which are common, |  |
| C 25.3.1.2.1 | The methods of OBD monitoring. |  |
| C 25.3.1.2.2 | The methods of malfunction detection. |  |
| C 25.3.2 | Compression-ignition engines |  |
| C 25.3.2.1 | Catalyst Monitoring  |  |
| C 25.3.2.1.1 | Particulate trap monitoring |  |
| C 25.3.2.1.2 | Electronic fueling system monitoring |  |
| C 25.3.2.1.3 | deNox system monitoring |  |
| C 25.3.2.1.4 | Other components monitored by the OBD system |  |
| C 25.4 | Criteria for MI activation (fixed number of driving cycles or statistical method) |  |
| C 25.5 | List of all OBD output codes and formats used (with explanation of each). |  |
| C 25.6 | The following additional information shall be provided by the vehicle manufacturer for the purposes of enabling the manufacture of OBD-compatible replacement or service parts and diagnostic tools and test equipment, unless such information is covered by intellectual property rights or constitutes specific know-how of the manufacturer or the OEM supplier(s). |  |
| C 25.6.1 | A description of the type and number of the pre-conditioning cycles used for the original type approval of the vehicle. |  |
| C 25.6.2 | A description of the type of the OBD demonstration cycle used for the original type-approval of the vehicle for the component monitored by the OBD system. |  |
| C 25.6.3 | A comprehensive document describing all sensed components with the strategy for fault detection and MI activation (fixed number of driving cycles or statistical method), including a list of relevant secondary sensed parameters for each component monitored by the OBD system. A list of all OBD output codes and format used (with an explanation of each) associated with individual emission related power-train components and individual non-emission related components, where monitoring of the component is used to determine MI activation. In particular, a comprehensive explanation for the data given in service $05 Test ID $21 to FF and the data given in service $06 must be provided. In the case of vehicle types that use a communication link in accordance with ISO 15765-4 “Road vehicles, diagnostics on controller area network (CAN) – part 4: requirements for emissions-related systems”, a comprehensive explanation for the data given in service $06 Test ID $00 to FF, for each OBD monitor ID supported, must be provided. This information may be defined in the form of a table, as follows: |
| **Component** | **Fault code** | **Monitoring strategy** | **MI activation criteria** | **Secondary parameters** | **Pre-conditioning** | **Demon-striation test** |
| Catalyst | P0420 | Oxygen sensor 1 and 2 signals | 3rd cycle | Engine speed, engine load, A/F mode, catalyst temperature | Two type 1 cycles | Type 1’ |
| C 25.7 | Torque limiter (yes/No) (for vehicles with GVW above 3500 kg) |  |
| C25.7.1 | Description of the torque limiter activation |  |
| C25.7.2 | Description of the full load curve limitation |  |
| C 26.0 | Particulate trap ( Yes / No) |  |
| C 26.1 | Dimensions and shape of the particulate trap (capacity): |  |
| C 26.2 | Type of particulate trap and design: |  |
| C 26.3 | Location of the particulate trap (reference distances in the exhaust system): |  |
| C 26.4 | Regeneration system/method - Description and Drawing: |  |

|  |  |  |
| --- | --- | --- |
| C 26.4.1 | The number of Type I operating cycles, or equivalent engine test bench cycle, between two cycles where regeneration phases occur under the conditions equivalent to Type I test (Distance 'D' in figure 1 in Chapter 15 of TAP Document) : |  |
| C 26.4.2 | Description of method employed to determine the number of cycles between two cycles where regenerative phases occur: |  |
| C 26.4.3 | Parameters to determine the level of loading required before regeneration occurs (i.e. temperature, pressure, etc.): |  |
| C 26.4.4 | Description of method used to load system in the test procedure described in paragraph 3.1., Chapter 15 of TAP Document : |  |
| C 26.4.5 | Any other declaration from manufacturer  |  |