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| **TECHNICAL SPECIFICATION – FOUR WHEELERS AND ABOVEPART D – BRAKES** |
| **Clause No.** | **Description** |  |
| **D1.0** | **Service brakes :** |  |
| D1.1 | Make |  |
| D1.2  | Type (Mechanical/hydraulic/air/air assisted/vacuum assisted/others) |  |
| D1.3  | Control system & braking wheel |  |
| D1.4  | Schematic layout indicating method of split of brake system, location of valves, reservoirs, ABS components etc. (Attach drawing and indicate the drawing number) |  |
| D1.5  | Anti-Lock braking system Provided (Yes/No/Optional) |  |
| D1.5.1 | If yes, details of ABS |  |
| D1.5.2  | Make |  |
| D1.5.3  | Category of ABS |  |
| D1.5.4  | Nos. of directly controlled wheel(s) |  |
| D1.5.5 | Brief description of failure warning tell–tale  |  |
| D1.5.6 | Wheel Speed Sensors  |  |
| D1.5.6.1 | No. of sensors  |  |
| D1.5.6.2  | Make of sensors  |  |
| D1.5.6.3  | Type of sensors  |  |
| D1.5.7 | Modulator |  |
| D1.5.7.1  | Nos. of Modulators |  |
| D1.5.7.2 | Make of Modulators  |  |
| D1.5.7.3  | Identification No. / Part No. of Modulator  |  |
| D1.5.7.4  | Brief description and features  |  |
| D1.5.8  | Controller |  |
| D1.5.8.1  | Nos. of Controller |  |
| D1.5.8.2 | Make of Controller  |  |
| D1.5.8.3  | Identification No. / Part No. of Controller  |  |
| D1.5.8.4  | Brief description and features  |  |
| D1.5.9 | Height of Center of Gravity (mm)  |  |
| D1.5.9.1  | Un laden condition |  |
| D1.5.9.2  | Laden condition |  |
| D 1.5.10 | Slack adjuster |  |
| D 1.5.10.1 | Front ( Automatic / Manual )  |  |
| D 1.5.10.1.1 | Make of slack adjuster  |  |
| D 1.5.10.1.2 | Model and Type  |  |
| D 1.5.10.2 | Rear ( Automatic / Manual )  |  |
| D 1.5.10.2.1 | Make of slack adjuster  |  |
| D 1.5.10.2.2 | Model and type  |  |
| D 1.6 | The vehicle fulfils the requirement of Annex E of AIS-151 or IS 15986:2015: Yes/No |  |
| **D2.0**  | **Brake lining or pad**  |  |
| D2.1 | Nominal Dimensions, (mm) (Length x Width x thickness)  |  |
| D2.1.1 | Front wheel |  |
| D2.1.2  | Rear wheel  |  |
| D2.1.3 | Others |  |
| D2.1.4 | Type of liner wear indicator (window/ acoustic/ optical/ any other) |  |
| D2.2 | Effective area per axle (cm²)  |  |
| D2.2.1 | Front  |  |
| D2.2.2 | Rear  |  |
| D2.2.3 | Others |  |
| D 2.3 | Make and material designation  |  |
| D2.3.1  | Front wheel / axle  |  |
| D2.3.2  | Rear wheel / axle  |  |
| D2.3.3 | Others |  |
| D2.3.4  | Whether asbestos or asbestos-free  |  |
| **D3.0** | **Brake drum or disc**  |  |
| D3.1 | Front axle ( Disc / Drum )  |  |
| D3.1.1  | Effective Diameter (mm)  |  |
| D3.2 | Rear axle ( Disc / drum )  |  |
| D3.2.1 | Effective Diameter (mm)  |  |
| D3.3  | Other axle ( Disc / Drum )  |  |
| D3.3.1  | Effective diameter (mm)  |  |
| D 3.4 | Material (if the braking surface is not ferrous) | Requirement as per clause 12.2 of Annex A of AIS-150 |  |
| D 3.4.1 | Front wheel |  |
| D 3.4.1 | Rear wheel |  |
| D 3.5 | Others |  |
| **D 4.0** | **Master cylinder or brake valve**  |  |
| D 4.1 | Make |  |
| D 4.2 | Type (only applicable for M2, M3, N and T category of vehicles.) |  |
| D 4.3 | Inner diameter of the master cylinder (mm)  |  |
| D 4.4 | Operating stroke (mm) |  |
| D 4.5 | Type of supply tank (only applicable for M2, M3, N and T category of vehicles.) |  |
| **D5.0** | **Wheel cylinder / Wheel Chamber**  |  |
| D5.1 | Diameter (mm) |  |
| D5.1.1  | Front |  |
| D5.1.2  | Rear |  |
| D5.1.3  | Others |  |
| D5.2 | Type (single acting/double acting)  |  |
| D5.2.1  | Front  |  |
| D5.2.2  | Rear |  |
| D5.2.3  | Others  |  |
| D5.2.4 | Make of wheel cylinder / slave cylinder  |  |
| **D6.0**  | **Booster :** |  |
| D6.1 | Make |  |
| D6.2  | Type |  |
| D6.3  | Boost ratio |  |
| D6.4  | Size of the booster (mm) (diameter) |  |
| **D7.0** | **Vacuum or air assistance**  |  |
| D7.1 | Pressure  |  |
| D7.1.1  | Nominal (P2 as per IS 11852)  |  |
| D7.1.2  | Cut in |  |
| D7.1.3  | Cut out |  |
| D7.2  | Type of vacuum pump or air compressor  |  |
| D 7.2.1 | Air compressor cubic capacity (cc) |  |
| D 7.2.2 | Free air delivery, l/min |  |
| D7.3  | Type of pressure regulator  |  |
| D7.4 | No. of tanks  |  |
| D7.5  | Tank Capacity (l) Description Capacity |  |
| D7.5.1  | Tank 1 |  |
| D7.5.2  | Tank 2 |  |
| D7.5.3  | Tank 3  |  |
| D7.5.4 | Tank 4 |  |
| D7.6 | **Brake Chamber** | **Front** | **Rear** | **Parking** |  |
| D7.6.1 | Make and type |  |  |  |  |
| D7.6.2 | Size mm |  |  |  |  |
| D7.6.3 | Inner diameter mm |  |  |  |  |
| D7.6.4  | Stroke mm |  |  |  |  |
| **D8.0**  | **Brake hose (if Hydraulic)**  |  |
| D8.1 | Make, and Identification No.  |  |
| D8.1.1 | Type of expansion (HL / HR) |  |
| D8.2  | Free Length of hoses  |  |
| D8.3  | Thickness of lining (mm)  |  |
| D8.4  | Nominal bore dia. (mm)  |  |
| **D9.0** | **Failure Warning device for braking**  |  |
| D9.1  | Type (Visual display/ audible/others)  |  |
| D9.2  | Operation pressure (kg/cm2 / bar / kPa)  |  |
| D9.3  | Type of safety device  |  |
| **D10.0**  | **Parking brake**  |  |
| D10.1 | Make  |  |
| D10.2  | Type (mechanical/spring brake)  |  |
| D10.3 | Acting on Transmission/wheel  |  |
| D10.4 | Control System & Braking wheel  |  |
| D10.5 | Lining/pad  |  |
| D10.6  | Name of producer  |  |
| D10.7  | Dimension (mm) |  |
| D10.8  | Area (cm 2)  |  |
| D10.9  | Material  |  |
| D10.10  | Diameter of brake drum/disc (mm)  |  |
| **D11.0**  | **Secondary brake**  |  |
| D11.1  | Type  |  |
| D11.2 | Description  |  |
| **D12.0** | **Additional retarding devices**  |  |
| D12.1 |  Type  |  |
| D12.2  | Description |  |
| D12.3 | Deceleration at 30 km/h, m/s2  |  |
| **D13.0**  | **Brake fluid**  |  |
| D13.1 | Make |  |
| D13.2  | Trade name  |  |
| D13.3  | Specification/ grade as per Indian standard  |  |
| D 13.4 | Brake fluid level indicator (Yes/No) |  |
| D 13.5 | Brake adjustment |  |
| D 13.5.1 | Type (Manual/Auto) Front and Rear |  |
| D 13.5.2  | Lever length |  |
| D 13.6 | Pneumatic Brake Actuator |  |
| D 13.6.1 | Type (as per IS) |  |

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| **D14.0** | **Load distribution :** |
|  | **Laden kg** | **Unladen kg** | **Unladen F/R Ratio** |
| Front axle |  |  |  |
| Rear axle |  |  |  |
| Other axle |  |  |  |
| Total |  |  |  |
| **D15.0**  | **Proportioning valve**  |  |
| D15.1  | Make  |  |
| D15.2  | Characteristics  |  |
| D15.3 | Identification |  |
| **D16.0**  | **Apportioning valve**  |  |
| D16.1  | Make  |  |
| D16.2  | Characteristics |  |
| D16.3 | Identification  |  |
| **D17.0**  | **Load sensing valve**  |  |
| D17.1  | Make  |  |
| D17.2  | Characteristics  |  |
| D17.3  | Identification  |  |
| **D18.0**  | **Valve**  |  |
| D18.1  | Make  |  |
| D18.2  | Characteristics |  |
| D18.3 | Identification  |  |
| **D19.0** | **Other valves**  |  |
| D19.1 | Function  |  |
| D19.2 | Make |  |
| D19.3 | Characteristics |  |
| D19.4 | Identification |  |
| **D 20.0** | **TECHNICAL SPECIFICATION ADDITIONAL INFORMATION FOR M1 AND N1 CATEGORY OF VEHICLES**  |  |
| D 20.1 | Tyre dimensions |  |
| D 20.1.1 | Temporary-use spare wheel/tyre dimensions: |  |
| D 20.1.2 | Vehicle meets the technical requirements of AIS 110: Yes/No |  |
| D 20.2 | Brake Assist System (Fitted : Yes/No) |  |
| D 20.2.1 | Category of Brake Assist System A / B |  |
| D 20.2.1.1 | For category A systems, define the force threshold at which the ratio between pedal force and brake pressure increases |  |
| D 20.2.1.2 | For category B systems, define the brake pedal speed which must be achieved in order to activate the Brake Assist System (e.g. pedal stroke speed (mm/s) during a given time interval) |  |
| D 20.3 | Adequate documentation according to annex G (Complex electronics vehicle control systems) provided in respect of the following system(s): ........... Yes / No / Not applicable |  |
| D 20.3.1 | List of complex functions covered: |  |
| D 20.3.2 | Manufacturer’s documents contain information showing the interaction of complex braking functions with other vehicle systems and/or how the system directly controls output variables. |  |
| D 20.3.3 | Manufacturer’s documents explain the functionality and safety concept of the system and describe how the operational status may be checked. |  |
| D 20.3.4 | A list of input and output variables, including their working range, is provided. |  |
| D 20.3.5 | Documentation includes an inventory of components, outlines the function of each unit, its interconnection/interaction with other systems and defines signal flow priorities. |  |
| D 20.3.6 | Each unit of the system is clearly identified in a manner which defines clearly the hardware and software version as appropriate. |  |
| D 20.3.7 | Safety concept statement verifies that the system will not prejudice the safe operation of the braking system under non-fault conditions. |  |
| D 20.3.8 | System architecture, design methods and tools identified. |  |
| D 20.3.9 | Information regarding design provisions in case of failure is provided including any error messages, warning signals, partial performance conditions, back-up modes and/or removal of high-level functions. |  |
| D 20.3.10 | Additional material and analysis (FMEA, FTA) of fault conditions made available for inspection and maintained by the manufacturer. |  |
| D 20.3.11 | Document reference and date of inspection: |  |
| D 20.3.12 | Vehicle complies with all other performance requirements of IS 15986 : 2015 and meets manufacturer’s specifications under non-fault conditions. |  |
| D 20.3.13 | Under fault conditions, vehicle response corresponds to that described in the manufacturer’s documents / failure analysis and safety concept is verified. |  |
|  | (see annex 4 of this report for test data) |  |
| D 20.4 | Electronic Stability Control system as per AIS:133 (Fitted : Yes/No) |  |
| D 20.4.1 | If yes, details of ESC |  |
| D 20.4.2 | ESC System Technical Documentation. To ensure a vehicle is equipped with an ESC system that meets the definition of "ESC System" in paragraph 2.0, the vehicle manufacturer shall make available to the test agency, upon request, the documentation specified below. |  |
| D 20.4.3 | System diagram identifying all ESC system hardware. |  |
| D 20.4.4 | A brief written explanation sufficient to describe the ESC system basic operational characteristics. |  |
| D 20.4.4.1 | Logic diagram |  |
| D 20.4.4.2 | Understeer information. |  |
| D 20.4.4.3 | Static Stability Factor |  |
| D 20.4.4.4 | Make and Country of manufacturer(if imported) |  |
| D 20.4.5 | Software Id / version |  |
| D 20.4.6 | Hardware Id |  |
| D 20.4.7 | Brief description of failure warning tell–tale |  |
| D 20.4.8 | Control function (Directional / Roll / Directional and Roll) |  |
| D 20.4.9 | Steering Angle Sensor |  |
| D 20.4.9.1 | Make and Country of manufacturer(if imported) |  |
| D 20.4.9.2 | Identification No. / Part No. |  |
| D 20.4.9.3 | Brief description and features |  |
| D 20.4.10 | Yaw Rate Sensor |  |
| D 20.4.10.1 | Make and Country of manufacturer(if imported) |  |
| D 20.4.10.2 | Identification No. / Part No. |  |
| D 20.4.10.3 | Brief description and features |  |
| D 20.5 | Additional Component details, if any |  |
| D 20.5.1 | Component 1 |  |
| D 20.5.1.1 | Make and Country of manufacturer(if imported) |  |
| D 20.5.1.2 | Identification No. / Part No. |  |
| D 20.5.2 | Component 2 |  |
| D 20.5.2.1 | Make and Country of manufacturer(if imported) |  |
| D 20.5.2.2 | Identification No. / Part No. |  |
| D 20.5.3 | Component 3 |  |
| D 20.5.3.1 | Make and Country of manufacturer(if imported) |  |
| D 20.5.3.2 | Identification No. / Part No. |  |
| **D 21.0** | **TECHNICAL SPECIFICATION – ADDITIONAL INFORMATION FOR OTHER THAN M1 CATEGORY OF VEHICLES** |  |
| D 21.1 | Motor Vehicle stability function information document |  |
| D 21.1.1 | System |  |
| D 21.1.2 | System variants  |  |
| D 21.1.3 | System options |  |
| D 21.1.3.1 | Control function (directional/roll-over/both) including an explanation of the basic function and/or philosophy of the control |  |
| D 21.1.4 | System configurations (where appropriate) |  |
| D 21.1.5 | System identification including software level identifier |  |
| D 21.2 | Applications: |  |
| D 21.2.1 | List of motor vehicles by description and configuration that are covered by the information document |  |
| D 21.2.2 | Schematic diagrams of the respective configurations installed on the motor vehicles defined in item 2.1. above with consideration given to the following: |  |
| D 21.2.2.1 | Lift axles |  |
| D 21.2.2.2 | Steering axles |  |
| D 21.2.2.3 | Anti-lock braking configurations |  |
| D 21.2.3 | Scope of application with respect to suspension: |  |
| D 21.2.3.1 | Air |  |
| D 21.2.3.2 | Mechanical |  |
| D 21.2.3.3 | Rubber |  |
| D 21.2.3.4 | Mixed |  |
| D 21.2.3.5 | Anti-roll bar |  |
| D 21.2.4 | Additional information (if applicable) to the application of the directional control and roll-over control functions, for example: |  |
| D 21.2.4.1 | Wheelbase, track, centre of gravity height |  |
| D 21.2.4.2 | Wheel type (single or twin) and tyre type (e.g. structure, category of use, size) |  |
| D 21.2.4.3 | Gearbox type (e.g. manual, automated manual, semi-automatic, automatic) |  |
| D 21.2.4.4 | Drive train options (e.g. retarder) |  |
| D 21.2.4.5 | Differential type/differential lock(s) (e.g. standard or self-locking, automatic or driver selected) |  |
| D 21.2.4.1 | Management of the engine or any other source(s) of motive power e.g.Torque Management, control of fuel supply etc. |  |
| D 21.3 | Component description: |  |
| D 21.3.1 | Sensor(s) External to the Controller |  |
| D 21.3.1.1 | Function |  |
| D 21.3.1.2 | Limitations on the location of the sensors |  |
| D 21.3.1.3 | Identification (e.g. part numbers) |  |
| D 21.3.2 | Controller(s) |  |
| D 21.3.2.1 | General description and function |  |
| D 21.3.2.2 | Functionality of internal sensors (if applicable) |  |
| D 21.3.2.3 | Hardware identification (e.g. part numbers) |  |
| D 21.3.3.4 | Software identification  |  |
| D 21.3.3.5 | Limitations on the location of the controller(s) |  |
| D 21.3.3.6 | Additional features |  |
| D 21.3.3 | Modulators |  |
| D 21.3.3.1 | General description and function |  |
| D 21.3.3.2 | Hardware identification (e.g. part numbers) |  |
| D 21.3.3.3 | Software identification (if applicable) |  |
| D 21.3.3.4 | Limitations |  |
| D 21.3.4 | Electrical Equipment |  |
| D 21.3.4.1 | Circuit diagrams |  |
| D 21.3.4.2 | Powering methods |  |
| D 21.3.5 | Pneumatic circuits |  |
| D 21.3.6 | Safety aspects of the electronic system in accordance with Annex S of IS 11852 |  |
| D 21.3.6.1 | List of complex functions covered: |  |
| D 21.3.6.2 | Manufacturer’s documents contain information showing the interaction of complex braking functions with other vehicle systems and/or how the system directly controls output variables. |  |
| D 21.3.6.3 | Manufacturer’s documents explain the functionality and safety concept of the system and describe how the operational status may be checked. |  |
| D 21.3.6.4 | A list of input and output variables, including their working range, is provided. |  |
| D 21.3.6.5 | Documentation includes an inventory of components, outlines the function of each unit, its interconnection/interaction with other systems and defines signal flow priorities. |  |
| D 21.3.6.6 | Each unit of the system is clearly identified in a manner which defines clearly the hardware and software version as appropriate. |  |
| D 21.3.6.7 | Safety concept statement verifies that the system will not prejudice the safe operation of the braking system under non-fault conditions. |  |
| D 21.3.6.8 | System architecture, design methods and tools identified. |  |
| D 21.3.6.9 | Information regarding design provisions in case of failure is provided including any error messages, warning signals, partial performance conditions, back-up modes and/or removal of high-level functions. |  |
| D 21.3.6.10 | Additional material and analysis (FMEA, FTA) of fault conditions made available for inspection and maintained by the manufacturer. |  |
| D 21.3.6.11 | Document reference and date of inspection: |  |
| D 21.3.6.12 | Vehicle complies with all other performance requirements of IS 15986:2015 and meets manufacturer’s specifications under non-fault conditions. |  |
| D 21.3.6.13 | Under fault conditions, vehicle response corresponds to that described in the manufacturer’s documents / failure analysis and safety concept is verified. |  |
|  | (see annex 4 of this report for test data) |  |
| D 21.3.7 | Electro-magnetic compatibility  |  |
| D 21.3.7.1 | Documentation demonstrating compliance with AIS-004(Part 3). |  |
| **D 22.0** | **TECHNICAL SPECIFICATION – ADDITIONAL INFORMATION (For other than M1 and N1)** |  |
| D 22.1 | Name of manufacturer |  |
| D 22.2 | System name |  |
| D 22.3 | System variations  |  |
| D 22.4 | Control function (directional/roll-over/both) including an explanation of the basic function and/or philosophy of the control |  |
| D 22.5 | System configurations (where appropriate) |  |
| D 22.6 | System identification |  |
| D 22.7 | Additional information (if applicable) to the application of the directional control and/or the roll-over control function(s)  |  |
| D 22.8 | Component description |  |
| D 22.9 | Sensors external to the controller(a) Function;(b) Limitations on the location of the sensors;(c) Identification, e.g. part numbers. |  |
| D 22.10 | Controller(s)(a) General description and function;(b) Identification e.g. part numbers;(c) Limitations on the location of the controller(s);(d) Additional features. |  |
| D 22.11 | Modulators(a) General description and function;(b) Identification;(c) Limitations. |  |
| D 22.12 | Electrical equipment(a) Circuit diagrams;(b) Powering methods. |  |
| D 22.13 | Pneumatic circuitsSystem schematics including anti-lock braking configurations associated with the trailer types defined in paragraph 6.2.1. of this annex. |  |
| D 22.14 | Safety aspects of the electronic system in accordance with Annex S of IS 11852  |  |
| D 22.14.1 | List of complex functions covered: |  |
| D 22.14.2 | Manufacturer’s documents contain information showing the interaction of complex braking functions with other vehicle systems and/or how the system directly controls output variables. |  |
| D 22.14.3 | Manufacturer’s documents explain the functionality and safety concept of the system and describe how the operational status may be checked. |  |
| D 22.14.4 | A list of input and output variables, including their working range, is provided. |  |
| D 22.14.5 | Documentation includes an inventory of components, outlines the function of each unit, its interconnection/interaction with other systems and defines signal flow priorities. |  |
| D 22.14.6 | Each unit of the system is clearly identified in a manner which defines clearly the hardware and software version as appropriate. |  |
| D 22.14.7 | Safety concept statement verifies that the system will not prejudice the safe operation of the braking system under non-fault conditions. |  |
| D 22.14.8 | System architecture, design methods and tools identified. |  |
| D 22.14.9 | Information regarding design provisions in case of failure is provided including any error messages, warning signals, partial performance conditions, back-up modes and/or removal of high-level functions. |  |
| D 22.14.10 | Additional material and analysis (FMEA, FTA) of fault conditions made available for inspection and maintained by the manufacturer. |  |
| D 22.14.11 | Document reference and date of inspection: |  |
| D 22.14.12 | Vehicle complies with all other performance requirements of IS 15986 : 2015 and meets manufacturer’s specifications under non-fault conditions. |  |
| D 22.14.13 | Under fault conditions, vehicle response corresponds to that described in the manufacturer’s documents / failure analysis and safety concept is verified.  |  |
| D 22.15 | Electro-magnetic compatibility |  |
| D 22.16 | Documentation demonstrating compliance with AIS-004(Part 3). |  |
| D 23.0  | Vehicle is/ is not equipped to tow a trailer with electric braking system (Yes/No) |  |