Vehicle Standard (Australian Design Rule 35/00 – Commercial Vehicle Brake Systems) 2006

I, JAMES ERIC LLOYD, Minister for Local Government, Territories and Roads, determine this vehicle standard under subsection 7 (1) of the *Motor Vehicle Standards Act 1989*.

Dated 3 September 2006

[SIGNED]

James Eric Lloyd

Minister for Local Government, Territories and Roads

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35.0. LEGISLATIVE PROVISIONS

35.0.1. NAME OF STANDARD

35.0.1.1. This Standard is the Vehicle Standard (Australian Design Rule 35/00 – Commercial Vehicle Brake Systems) 2006.

35.0.1.2. This Standard may also be cited as Australian Design Rule 35/00 — Commercial Vehicle Brake Systems.

35.0.2. COMMENCEMENT

35.0.2.1. This Standard commences on the day after it is registered.

35.0.3. REPEAL

35.0.3.1. This Standard repeals each vehicle standard with the name Australian Design Rule 35/00 — Commercial Vehicle Brake Systems that is:

(a) made under section 7 of the Motor Vehicle Standards Act 1989; and

(b) in force at the commencement of this Standard.

35.0.3.2. This Standard also repeals each instrument made under section 7 of the Motor Vehicle Standards Act 1989 that creates a vehicle standard with the name Australian Design Rule 35/00 — Commercial Vehicle Brake Systems, if there are no other vehicle standards created by that instrument, or amendments to vehicle standards made by that instrument, that are still in force at the commencement of this Standard.

A. FUNCTION AND SCOPE

The function of this Australian Design Rule is to specify braking requirements under normal and emergency conditions.

B. APPLICABILITY

B.1 This ADR applies to the design and construction of vehicles as set out in the table below.

B.2 All LEG vehicles fitted with a single foot pedal controlling both front and rear service brakes are required to comply with this rule. Other LEG vehicles shall comply with ADR 33/...

35.0.4. Applicability Table

Vehicle Category	ADR Category Code *	UNECE Category Code *	Manufactured on or After	Acceptable Prior Rules
Moped 2 wheels	LA	L1	Not Applicable	
Moped 3 wheels	LB	L2	Not Applicable	
Motor cycle	LC	L3	Not Applicable	
Motor cycle and sidecar	LD	L4	Not Applicable	
Motor tricycle	LE	L5		
	LEM		Not Applicable	
	LEP		Not Applicable	
	LEG		1 July 1992	Nil
Passenger car	MA	M1	Not Applicable	
Forward-control passenger vehicle	MB	M1	1 July 1988	Nil
Off-road passenger vehicle	MC	M1	1 July 1988	Nil
Light omnibus	MD	M2		
up to 3.5 tonnes '*GVM*' and up to 12 seats	MD1		1 July 1988	Nil
up to 3.5 tonnes *'GVM'* and more than 12 seats	MD2		1 July 1988	Nil
over 3.5 tonnes and up to 4.5 tonnes *'GVM'*	MD3		1 July 1988	Nil
over 4.5 tonnes and up to 5 tonnes *'GVM'*	MD4		1 July 1988	Nil
Heavy omnibus	ME	M3	1 July 1988	Nil
Light goods vehicle	NA	N1	1 July 1988	Nil
Medium goods vehicle	NB	N2		
over 3.5 tonnes up to 4.5 tonnes *'GVM'*	NB1		1 July 1988	Nil
over 4.5 tonnes up to 12 tonnes *'GVM'*	NB2		1 July 1988	Nil
Heavy goods vehicle	NC	N3	1 July 1988	Nil
Very light trailer	TA	O1	Not Applicable	
Light trailer	TB	O2	Not Applicable	
Medium trailer	TC	O3	Not Applicable	
Heavy trailer	TD	O4	Not Applicable	

35.1. DEFINITIONS

35.1.1. Not used.

35.1.2. *'Audible Indicator'* - a device incorporated in a *'Brake Power Unit 35/00'* system which indicates to the operator by an intermittent or

* The category code may also be in the format L_1, L_A etc.

continuous audible signal that the supply pressure of the working fluid in the system has fallen below a predetermined level.

35.1.3. Not used.

35.1.4. '*Average Operating Pressure'* - the arithmetic average of the '*Manufacturer's*' specified maximum and minimum pressures in the operating pressure range.

35.1.5. Not used.

35.1.6. '*Brake Power Unit 35/00'* - a device installed in a brake system that stores the energy required to actuate the brakes and provides the energy either directly or indirectly through an auxiliary device, with the operator action consisting only of modulating the energy application level.

35.1.7. Not used.

35.1.8. Not used.

35.1.9. Not used.

35.1.10. Not used.

35.1.11. '*Initial Brake Control Location'* - the location of the brake '*Control'* within the first 3 mm of travel of the centre of the brake pedal pad.

35.1.12. '*Lightly Loaded Test Mass 35/00'* - the mass of the unladen vehicle with a full capacity of lubricating oil and coolant and not less than 75 per cent of full fuel capacity, but without goods, occupants or options except those options which are essential for the test procedures specified, plus additional loading distributed in the seating position adjacent to the driver's seating position so that the mass of such loading plus the mass of the driver and instrumentation mounted in the vehicle is 155 ± 30 kg. In the case of a vehicle in "cab-and-chassis" condition an additional load not exceeding 7.5 per cent of the 'GVM' shall be located with its centre of mass within 200 mm of the 'Manufacturer's' designated load centre, measured in a horizontal plane.

35.1.13. '*Lock Actuator*' - a device which ensures braking operating of the parking brake by mechanically locking the brake piston rod.

35.1.14. '*Maximum Laden Vehicle Speed*' - the speed attainable at 1.6 km from a standing start under maximum acceleration with the vehicle at '*Maximum Loaded Test Mass*', established by either test or calculation.

35.1.15. '*Maximum Loaded Test Mass 35/00'* - the mass of the laden vehicle loaded to '*GVM*' rating with the load so distributed over the load bearing area of the vehicle as not to exceed the '*Manufacturer's*' nominated individual '*Axle Loads*'.

35.1.16. '*Parking Brake System 35/00*' - a system that, through the medium of a '*Control*' independent of the service brake '*Control*', applies a restraining force to 2 or more road wheels of the vehicle to either prevent or restrict rotation of the braked wheels.

35.1.17. '*Parking Mechanism 35/00*' - for the purposes of this Rule a component or sub-system of the drive train that locks the drive train when the transmission control is placed in the park position.

35.1.18. '*Pedal Effort 35/00*' - the force applied to any foot operated brake '*Control*', measured in the direction of pedal movement.

35.1.19. '*Secondary Brake System*' - either:

35.1.19.1. a system which, in the event of failure of any fluid connected component of the service brake system, remains operative and capable of imparting a retarding force to the vehicle; or

35.1.19.2. one circuit of a '*Split Service Brake System'*, except if the vehicle is fitted with only one '*Brake Power Unit 35/00*'.

35.1.20. '*Spike Stop 35/00*'

35.1.20.1. Not used.

35.1.20.2. in the case of service brake system without a '*Brake Power Unit 35/00*' a stop resulting from the application of a '*Pedal Effort 35/00*' of a least 885 N on the service brake '*Control*' attained within 500 milliseconds from the instant at which the '*Control*' leaves the initial brake '*Control*' location.

35.1.21. Not used.

35.1.22. Not used.

35.1.23. '*Stopping Distance 35/00*' - the distance travelled by a vehicle from its position at the instant the brake '*Control*' leaves the initial brake '*Control*' location to the position at which the vehicle is brought to rest.

35.1.24. Not used.

35.1.25. Not used.

35.1.26. Not used.

35.1.27. '*Visible Indicator*' - a device incorporated in a service brake system which indicates to the operator by a visible signal within his forward field of view (as specified in clause 35.2.1.2.5) a failure of a critical item or component of the system as specified in clause 35.2.1.2.1.

35.2. DESIGN REQUIREMENTS

35.2.0 General

35.2.0.1 This Rule does not apply to combinations of drawing vehicle and trailer (including '*Semi-Trailer*').

35.2.0.2 A vehicle comprising 2 or more non-separable articulated units shall be considered as a single vehicle for the purposes of this Rule.

35.2.1. Service Brake System

35.2.1.1. The vehicle shall be equipped with a service brake system operable on all road wheels through the medium of a single '*Control*' so placed that it can be actuated by the operator from the normal driving position.

35.2.1.2. The vehicle shall have one or more service brake failure '*Visible Indicators*'.

35.2.1.2.1. The '*Visible Indicator*' shall operate whenever any of the following conditions occur whilst the ignition or electrical control switch is in the

"engine on" position and also whenever any of the following conditions occur whilst the engine is running:

35.2.1.2.1.0.1 for a service brake system incorporating an hydraulic brake circuit and no '*Brake Power Unit 35/00*' in that hydraulic circuit, condition 35.2.1.2.1.1 or optionally condition 35.2.1.2.1.2;

35.2.1.2.1.0.2 for a service brake system incorporating one or more '*Brake Power Units 35/00*' in any section of the service brake system, condition 35.2.1.2.1.3.

35.2.1.2.1.0.3 Where the requirements of this clause (35.2.1.2) necessitate the provision of more than one system failure sensor, the sensors may be interconnected to actuate only one '*Visible Indicator*';

35.2.1.2.1.1. When a pressure failure occurs in any part of the service brake system, except for pressure failure caused by either:

35.2.1.2.1.1.0.1 a structural failure of a housing that is common to two or more sub-systems; or

35.2.1.2.1.1.0.2 failure of a component of a '*Brake Power Assist Unit*'

35.2.1.2.1.1.0.3 In the event of such failure, for the purpose of this clause (35.2.1.2.1) the indicator operation requirement shall be deemed to be satisfied if the indicator operates before or upon application of:

35.2.1.2.1.1.0.3.1 a differential line pressure of not more than 1.55 MPa between the active and failed brake systems;

35.2.1.2.1.1.0.3.2 a '*Pedal Effort 35/00*' of 225 N in the case of unassisted service brake systems; or

35.2.1.2.1.1.0.3.3 a '*Pedal Effort 35/00*' of 115 N in the case of service brake systems with a '*Brake Power Assist Unit*'.

35.2.1.2.1.1.0.3.4 For the purposes of this clause (35.2.1.2.1.1.0.3), differential line pressure shall be measured either at a master cylinder outlet, or at a slave cylinder outlet if the master cylinder controls a slave cylinder at a booster unit.

35.2.1.2.1.2. When a drop in the level of brake fluid occurs in the reservoir(s), either to less than the '*Manufacturer's*' designated minimum level or to less than 25 per cent of the reservoir(s) fluid capacity whichever is the greater volume remaining.

35.2.1.2.1.3. When the supply pressure in any one '*Brake Power Unit 35/00*' drops to or below 65 per cent of the '*Average Operating Pressure*'.

35.2.1.2.2. In the case where a master cylinder reservoir also contains fluid for the use of a system other than the brake system, the indicator system and the reservoir shall be so designed that the indicator lamp will not be activated when there are any variations in the fluid level in that part of the reservoir provided exclusively for the use of the system other than the brake system.

35.2.1.2.3. As a check of function the '*Visible Indicator*' shall be so designed that it operates when:

35.2.1.2.3.1. the ignition or electrical control switch is turned from the "engine off" position to the "engine on" position, and the engine is not operating, and (unless a failure of the type described in clause 35.2.1.2.1 exists in the brake system, or in the event of an electrical failure of the '*Antilock System*') it shall not operate when the engine is running;

35.2.1.2.3.2. the ignition or electrical control switch is in the "engine start" position, and (unless a failure of the type described in clause 35.2.1.2.1 exists in the brake system, or in the event of an electrical failure of the '*Antilock System*') it shall not operate after the return of the ignition or electrical control switch to the "engine on" position;

35.2.1.2.3.3. the ignition or electrical control switch is in a position between the "engine on" position and the "engine start" position, which is designated by the '*Manufacturer*' as a check position, and (unless a failure of the type described in clause 35.2.1.2.1 exists in the brake system, or in the event of an electrical failure of the '*Antilock System*') it shall not operate after the return of the ignition or electrical control switch to the "engine on" position; or

35.2.1.2.3.4. the engine start circuit is energised and (unless a failure of the type described in clause 35.2.1.2.1 exists in the brake system or in the event of an electrical failure of the '*Antilock System*') it shall not operate when the "engine start" circuit is not energised.

35.2.1.2.3.5. Where an '*Antilock System*' is fitted the '*Visible Indicator*', as a check of function, may continue to operate for up to 10 seconds following the activation as a check of function; or

35.2.1.2.3.5.1 Notwithstanding the requirements of clause 35.2.1.2.3.1, the '*Visible Indicator*' shall light up when the '*Antilock System*' is energised and be extinguished at the latest when the vehicle reaches a speed of 10 km/h.

35.2.1.2.3.6. For the purpose of this clause (35.2.1.2.3), for vehicles equipped with an automatic transmission, the operation as a check of indicator function is not required when the transmission control lever is in a "forward" or "reverse" drive position.

35.2.1.2.4. The '*Visible Indicator*' system shall be so designed that once having become operative to signal a brake failure it shall operate whenever the ignition or electrical control switch is in the "engine on" position and the fault remains uncorrected.

35.2.1.2.5. The '*Visible Indicator*' may take the form of an indicator lamp or of a mechanical signalling device. At the option of the '*Manufacturer*' where an indicator lamp is used the lamp shall be labelled with at least the word "BRAKE" or, the symbol for "BRAKE FAILURE" specified as No. 4.31 in International Standard ISO 2575-1982(E) - "Road Vehicles Symbols for controls indicators and tell-tales" [#] , placed either directly on the lens or adjacent to it in such a way that the label is illuminated by the same light source as the lens. The letters of the label shall be not less than 3 mm high and shall be of a contrasting colour to their background when

[#] NOTE: Or as subsequently amended, endorsed by ATAC and included in Part 5 of the "ADR Definitions".

illuminated. If the label is directly on the lens the colour of either label or lens shall be red and if the label is not on the lens the colour of the lens shall be red. An illuminated lamp may be either steady-burning or flashing. Where a mechanical signalling device is used, it shall display at least the word "BRAKE" in letters not less than 10 mm high when the signal is deployed. Letters and background shall be of contrasting colours, one of which is red.

35.2.1.2.6. The service brake failure '*Visible Indicator*' and its specified label or display shall be totally located forward of a transverse vertical plane through the point representing the intersection of the steering wheel axis of rotation and the plane of the steering wheel, and totally within the space bounded by:

35.2.1.2.6.1. the right-hand internal side wall;

35.2.1.2.6.2. a vertical plane along the longitudinal centreline of the vehicle;

35.2.1.2.6.3. a horizontal plane through a point on the lower edge of the instrument panel; and

35.2.1.2.6.4. a horizontal plane 150 mm above the highest point on the windscreen glass.

35.2.1.3. Where the service brake system incorporates a single '*Brake Power Unit 35/00*' an '*Audible Indicator*' shall be provided. Such device shall operate at all times when the service brake failure '*Visible Indicator*' operates as specified in clause 35.2.1.2.1.3.

35.2.1.4. Where separate methods of actuation are provided for any of the functions of the brake system, the actuation of one function shall not cause the operation of another function.

35.2.1.5. Each service brake system shall incorporate devices which compensate for any increased movement of its components arising from wear. Such devices shall themselves contain provision for securing them throughout their working range in any position in which they may be adjusted to or to which they may themselves automatically adjust.

35.2.2. '*Parking Brake System 35/00*'

35.2.2.1. The vehicle shall be equipped with a '*Parking Brake System 35/00*' such that in the applied position retention is effected by mechanical means, and the braking effect is achieved by either:

35.2.2.1.1. the frictional force developed between 2 friction surfaces; or

35.2.2.1.2. the frictional force developed between two friction surfaces, together with a '*Parking Mechanism 35/00*' as defined in clause 35.1.17.

35.2.2.2. The parking brake '*Control*' shall be separate from the service brake '*Control*' and incorporate a device to retain it in the "brake on" position, and it shall be designed to minimise the possibility of inadvertent release of the brake. This requirement shall be deemed to be satisfied if at least 2 separate and distinct movements are necessary to disengage the parking brake.

35.2.2.3. Parking Brake Indicator Lamp

35.2.2.3.1. The vehicle, if not fitted with a '*Spring Brake System*' or '*Lock Actuators*', shall be provided with a lamp which indicates that the parking brake is engaged. At the option of the *'Manufacturer'* the lamp may be common with or distinct and separate from any service brake failure '*Visible Indicator*' lamp. In the case of a common lamp, the lamp shall be labelled with the word "BRAKE"; or the symbol for "BRAKE FAILURE" - specified as Number 4.31 in the ISO document referred to in clause 35.2.1.2.5. In the case of a distinct and separate lamp the lamp shall be labelled with at least the words "PARK BRAKE" or "PARKING BRAKE"; or the symbol for "PARKING BRAKE" specified as Number 4.32 in the ISO document referred to in clause 35.2.1.2.5 placed either directly on the lens or adjacent to it in such a way that the label is illuminated by the same light source as the lens. The letters of the label shall be not less than 3 mm high and shall be of contrasting colour to their background when illuminated. If the label is directly on the lens the colour of either label or lens shall be red and if the label is not on the lens the colour of the lens shall be red.

35.2.2.3.2. The parking brake indicator lamp and its specified label shall be located within the space boundaries specified in clause 35.2.1.2.6.

35.2.2.4. The *'Parking Brake System 35/00'* shall incorporate devices which compensate for any increased movement of its components arising from wear. Such devices shall themselves contain provision for securing them throughout their working range in any position in which they may be adjusted to or to which they may themselves automatically adjust.

35.2.2.5. The '*Controls*' by which the '*Parking Brake System 35/00*' is actuated shall be located so that they are readily accessible to the driver in the normal driving position.

35.2.3. '*Secondary Brake Systems*'

35.2.3.1. The vehicle shall be equipped with a '*Secondary Brake System*'.

35.2.3.2. Hydraulic service brake systems shall be '*Split Service Brake Systems*'.

35.2.3.3. The vehicle, if equipped with one or more '*Brake Power Units 35/00*', shall incorporate a '*Secondary Brake System*' that is capable of application through the medium of a '*Control*'.

35.2.3.4. The '*Control*' of the '*Secondary Brake System*' shall be capable of releasing and applying the secondary brake after its first application. The '*Control*' shall be so placed that it can be operated by the driver in the normal driving position.

35.2.3.5. A '*Secondary Brake System*' may utilise elements of the service brake system.

35.2.3.6. Where the 'Secondary Brake System' is a 'Spring Brake System':

35.2.3.6.1. in a single circuit service brake system, the energy supply system for maintaining the secondary brake in its released position shall include a '*Stored Energy*' device that does not service any other device or equipment;

35.2.3.6.2. in the event of failure of the energy supply to any one circuit of a service brake system employing two or more independent circuits, the energy requirements for retaining the secondary brakes in the released position shall be supplied from the '*Stored Energy*' device(s) of the other circuits or optionally from an independent '*Stored Energy*' device; and

35.2.3.6.3. with the '*Stored Energy*' device charged to its '*Average Operating Pressure*' it shall have sufficient capacity to permit the '*Secondary Brake System*' to be applied and released not fewer than 2 times when the brakes are adjusted so that the distance travelled by the device which directly actuates the brake shoe or pad is a maximum or optionally 3 times when the brakes are adjusted to the '*Manufacturer*'s' specifications.

35.2.3.7. In a vehicle equipped with a '*Brake Power Assist Unit*' normally supplied with high pressure fluid by an engine driven pump, a back-up system shall be regarded as a '*Secondary Brake System*' if the back up source of power assistance is immediately energised by a pump driven independently of the vehicle engine.

35.2.3.8. Every motor vehicle used to haul a trailer (including a '*Semi-trailer*') shall be so equipped that its brake system shall remain operative and have the performance of the Laden Secondary Brake Test (item 7 of clause 35.3.3) in the event of the trailer becoming disconnected, howsoever caused.

35.2.4. Special Provisions for All Vehicles with *'Hydraulic Brake Systems'*

35.2.4.1. In cases where the service brake system incorporates a master cylinder, each service brake sub system serviced by the master cylinder shall have either:

35.2.4.1.1. a reservoir which contains fluid exclusively for the use of that service brake sub-system; or

35.2.4.1.2. a reservoir which contains fluid for the use of 2 or more service brake sub-systems, in which case that part of the reservoir capacity provided exclusively for the use of each service brake sub-system shall be not less than the volume displaced by the master cylinder piston servicing the sub-system, during a full stroke of the piston.

35.2.4.2. The capacity of each reservoir shall be not less than the fluid displacement resulting when all the wheel cylinders or caliper pistons serviced by the reservoir move from a new-lining, fully- retracted position, as adjusted according to the '*Manufacturer's*' recommendations to a fully-worn, fully-applied position. For the purpose of this clause, "fully-worn, fully-applied" means that the lining is worn to whichever of the following conditions allows the greatest shoe or pad movement:

35.2.4.2.1. the limit recommended by the '*Manufacturer*';

35.2.4.2.2. level with rivet or bolt heads on riveted or bolted linings;

35.2.4.2.3. within 3 mm of the pad mounting surface on bonded pads; or

35.2.4.2.4. within the following distance of the shoe mounting surface on bonded linings:

Nominal bonded Lining thickness	≤5 mm	>5 mm ≤10 mm	>10 mm ≤13 mm	>13 mm ≤19 mm	>19 mm
Worn thickness	0.8 mm	3 mm	5 mm	6 mm	7 mm

35.2.4.3. Each '*Brake Power Unit 35/00*' shall be provided with a reservoir of capacity not less than the total capacity of the reservoirs required under the requirements of clause 35.2.4.2 plus the fluid displacement necessary to charge the piston(s) or accumulator(s)) provided for the purpose of storing energy.

35.2.4.4. A statement specifying the type of fluid to be used in the brake system and displaying at least the words "WARNING. Clean filler cap before removing" shall be permanently affixed, stamped, engraved or embossed with letters not less than 3 mm high, either on or partially within 150 mm of one brake fluid reservoir filler plug or cap and totally within 300 mm of all reservoir filler plugs or caps. If not stamped, engraved or embossed, the lettering shall be of a contrasting colour to that of the background.

35.2.5. Special Provisions for Systems Using *'Stored Energy'* (except *'Spring Brake Systems'*)

35.2.5.1. Any '*Stored Energy*' device for the operation or to assist in the operation of the braking system, shall be so protected that failure of the device generating the energy does not result in depletion of the '*Stored Energy*'.

35.2.5.2. Where the device generating the energy for a '*Brake Power Unit 35/00*' supplies energy to other devices the design shall be such that the '*Brake Power Unit 35/00*' is preferentially charged.

35.2.5.3. For systems incorporating '*Brake Power Units 35/00*', the combined volume of all '*Stored Energy*' devices at positive pressure shall be not less than 12 times the combined volume of all service brake chambers at maximum travel of the pistons or diaphragms.

35.2.5.4. Any device generating energy at positive pressure for a '*Brake Power Unit 35/00*' shall be of sufficient capacity to increase the pressure in the '*Stored Energy*' device(s) from 85 per cent of the '*Average Operating Pressure*' to the '*Average Operating Pressure*' with the vehicle's engine operating at the '*Manufacturer*'s' recommended maximum engine speed within a time given by the expression:

$$\frac{\text{Actual '}\textit{Stored Energy}\text{' capacity} \times 25 \text{ (seconds)}}{\text{Required '}\textit{Stored Energy}\text{' capacity}}$$

35.2.5.5. For service brake systems incorporating '*Brake Power Units 35/00*' and operating at positive pressure a gauge(s) shall be fitted to indicate the pressure in each independent storage system. The gauge(s) shall be visible to the driver when seated in the normal driving position and shall be accurate to within ± 7 per cent of the cut-out pressure of the pressure limiting device fitted to the energy source.

35.2.5.6. For systems incorporating '*Brake Power Assist Units*', the combined volume of all '*Stored Energy*' devices shall be such that with no

replenishment of '*Stored Energy*' the performance prescribed for the Laden Secondary Brake Test in clause 35.5.7 shall be achieved:

35.2.5.6.1. where the energy source is a pump, on the eighth actuation of the service brake '*Control*', after 7 actuations with vehicle stationary, either to full stroke or to the application of a '*Pedal Effort 35/00*' not less than 685 N whichever occurs first; or

35.2.5.6.2. where the energy source is the engine of the vehicle, on the fourth actuation of the service brake '*Control*', after 3 actuations with vehicle stationary, either to full stroke or to the application of a '*Pedal Effort 35/00*' not less than 685 N, whichever occurs first.

35.2.5.7. An energy generating device producing energy at negative pressure shall be capable of achieving the volume-pressure relationship required to satisfy the conditions specified in clause 35.2.5.6 within a time not exceeding 3 minutes with:

35.2.5.7.1. the engine operating at not greater than 65 per cent of speed corresponding to either maximum power output or governed speed where the energy generating device is a vacuum pump; or

35.2.5.7.2. the engine operating at idle speed with the gear selector in "neutral" position where the engine itself is the energy generating device.

35.2.5.8. In the case of a service brake system with a single '*Brake Power Unit 35/00*', the design shall be such that the '*Stored Energy*' device shall preferentially service the braking system if it also services other systems. In the case of a service brake system with 2 or more independent '*Brake Power Units 35/00*', the design shall be such that at least one '*Brake Power Unit 35/00*' shall preferentially service the brake system.

35.3. PERFORMANCE REQUIREMENTS

35.3.1. The vehicle shall be capable of meeting the range of performance tests set out in Table 1 of clause 35.3.3, subject to the general test conditions of Section 35.4 and the particular test conditions of Section 35.5. The sequence of testing may be in the order to set out in the Table. Where the sequence of testing is not in the order set out in the Table, the sequence shall satisfy the following requirements: Items 1 & 2, if conducted, must precede all other items; Items 3-10 must be in sequence; Items 11-13, if applicable, must be in sequence; Items 14-15 must be in sequence; and Items 16-17 may be conducted at any time between or after the above sequences, except that in the case where service brake fade testing is carried out in accordance with clause 35.5.9.2, Item 9 is not subject to the above sequence requirements.

35.3.2. Not used.

35.3.3. Table 1

Item No.* Tests and Procedures	Vehicle Category	Initial Speed (km/h)	Minimum *'Average Deceleration'* (m/s^2)	Vehicle Mass	Gear Selector	Maximum *'Control'* Force (N)
1. Pre-test Instrumentation Check	All	40 max.	See text	—	—	—
2. Service Brake Burnishing Procedure (optional)	All	65 max.	See text	—	—	—
3. Service Brake Lightly Laden Effectiveness Test						
3.1 First Mode	MB,MC,MD,ME NA NB NC	30 35 25 20	3.03) 2.97) 2.62) 2.38)	L	N	685
3.2 Second Mode	MB,MC,MD,ME NA NB NC	60 70 50 40	3.78) 3.55) 3.29) 3.09)	L	N	685
3.3 Third mode	MB,MC,MD,ME NA,NB,NC	100 100	4.19) 3.78)	L	N	685
4 .Lightly Laden Secondary Brake Test	MB,MC,MD,ME NA NB NC	60 70 50 40	2.10) 2.0) 1.85) 1.80	L	N	590 (hand) 685 (foot)
5. Lightly Laden Partial Failure Test	MB,MC,MD,ME NA NB NC	60 70 50 40	2.10) 2.0) 1.85) 1.80)	L	N	685
6. Service Brake Laden Effectiveness Test						
6.1 First Mode	MB,MC,MD,ME NA NB NC	30 35 25 20	3.03) 2.97) 2.62) 2.38)	M	N	685
6.2 Second Mode	MB,MC,MD,ME NA NB NC	60 70 50 40	3.78) 3.55) 3.29) 3.09)	M	N	685
6.3 Third Mode	MB,MC,MD,ME NA,NB,NC	100 100	4.19) 3.78)	M	N	685
7. Laden Secondary Brake Test	MB,MC,MD,ME NA NB NC	60 70 50 40	2.10) 2.0) 1.85) 1.80)	M	N	590 (hand) 685 (foot)
8 . Laden Partial Failure Test	MB,MC,MD,ME NA NB NC	60 70 50 40	2.10) 2.0) 1.85) 1.80)	M	·N	685
9. Service Brake Fade Test	All	See text	See text	M	D	See text

Item No.* Tests and Procedures	Vehicle Category	Initial Speed (km/h)	Minimum *'Average Deceleration'* (m/s^2)	Vehicle Mass	Gear Selector	Maximum *'Control'* (N)
10. Service Brake Fade Effectiveness Check	MB,MC,MD,ME NA NB NC	60 70 50 40	3.02) 2.84) 2.63) 2.47)	M	N	685
11. Service Brake Water Conditioning Procedure	MB, MC, MD1	See text	—	M	D & R	—
12. Service Brake Water Recovery Procedure	MB, MC, MD1	See text	—	M	D	685
13. Service Brake Water Effectiveness Check	MB,MC,MD1	60	2.27)	M		685
14. Service Brake *'Spike Stop 35/00'* Procedure	A11	40	-	M	N	Refer clause 35.1.20
15. Service Brake *'Spike Stop 35/00'* Effectiveness Check (applicable only to vehicles without *a 'Brake Power Unit 35/00'*)	MB,MC,MD,ME NA NB NC	60 70 50 40	3.02) 2.84) 2.63) 2.47)	M	N	685
16. Parking Brake Test	All	—	—	M	N	590(hand) 685(foot)
17. Service Brake Actuating time test	See text	NA	NA	NA	NA	See text

Time Test

* Item No. also corresponds to clause number of Section 35.5
"M" means *'Maximum Loaded Test Mass 35/00'*.

"L" means 'Lightly Loaded Test Mass 35/00'.

"D" means transmission control in "drive" position appropriate to test speed.

"N" means transmission control in "neutral" position.

"R" means transmission control in "reverse" position.

"NA" means not applicable.

35.4. GENERAL TEST CONDITIONS

35.4.1. The ambient temperature at the test site shall be within the range of 0 to 40 °C.

35.4.2. The following adjustments shall be checked before commencing tests, and set to vehicle '*Manufacturer's*' recommendations:

35.4.2.1. injection or ignition timing;

35.4.2.2. engine idle speed;

35.4.2.3. engine governed speed if adjustable governor is fitted; and

35.4.2.4. all brake adjustments.

35.4.3. The tyres fitted to the vehicle shall be of the size and type specified by the vehicle '*Manufacturer*' as original equipment for the vehicle, and shall be inflated to pressures not less than those recommended by the vehicle '*Manufacturer*'.

35.4.4. The '*Friction Elements*' of the vehicle brakes shall be of the make and grade specified by the vehicle '*Manufacturer*'.

35.4.5. Decelerations shall be conducted on sections of a test track or roadway that meets the following requirements:

35.4.5.1. in the case of the Vehicle Service Brake Fade Test, the surface shall be substantially level and any effective upward average gradient between the start and end of each deceleration test section shall not exceed one per cent. The requirements of this clause shall be deemed to be met if it is demonstrated that over the total number of brake applications of the Vehicle Service Brake Fade Test sequence of clause 35.5.9.1 the total effective contribution to vehicle retardation of the deceleration test section gradients is not greater than the vehicle retardation which would result from an average upward gradient of not more than one per cent;

35.4.5.2. in the case of other deceleration tests, the upward gradient, if any, shall not exceed one per cent.

35.4.6. Except when conducting burnishing procedures, decelerations shall be conducted in a direction such that the component of wind velocity opposite to the direction of travel of the vehicle does not exceed 15 km/h.

35.4.7. Where a test requires that the gear selector be in "drive" the transmission selector control shall be in the control position recommended by the '*Manufacturer*' as appropriate to the speed of the vehicle at the commencement of the deceleration mode.

35.4.8. If the vehicle is not capable of attaining the initial speed requirement specified for a particular deceleration test, then, unless otherwise specified, the initial speed shall be within 10 km/h of the '*Maximum Laden Vehicle Speed*'. The '*Average Deceleration*' so required shall be determined from the expressions:

$$s = K_1\left(0.15V + \frac{V^2}{K_2}\right)$$

and

$$a = \frac{u^2}{2s}$$

where:

s = 'Stopping Distance 35/00', in metres

V = initial speed, in km/h.

K_1, K_2 = constants, dependent on test and category, see chart below

u = initial speed, in m/s

a = 'Average Deceleration', in m/s^2

35.4.9. For all effectiveness, secondary brake and partial failure tests, no part of the vehicle shall move outside a straight lane not exceeding 3.7 metres in width, the vehicle being positioned at the approximate centre of the lane at the commencement of the deceleration.

35.4.10. Except in the case of the Parking Brake Test, the Service Brake Water Recovery Procedure and the Service Brake Water Effectiveness Test, each test procedure may be preceded by a series of stops or decelerations, provided the temperature measured at the surface of the disc or drum

does not exceed 100°C immediately prior to the commencement of the test.

TEST	CATEGORY	K_1	K_2
Service Brake Effectiveness Tests	MB, MC, MD, ME	1.0	130
	NA, NB, NC	1.0	115
Secondary Brake Tests	MB, MC, MD, ME	1.0	65
	NA, NB, NC	1.67	115
Water Effectiveness Check	MB, MC, MD1	1.67	130
		1.67	115
Fade and '*Spike Stop 35/00*' Effectiveness Checks	MB, MC, MD, ME	1.25	130
	NA, NB, NC	1.25	115

35.4.11. Except as permitted by clause 35.5.2 brakes shall not be adjusted during testing. Automatic brake adjusters, if fitted, may be rendered inoperative prior to commencement of the optional Service Brake Burnishing Procedure. In cases where this option is exercised, adjusters shall remain inoperative for the duration of the test programme.

35.4.12. Except where clause 35.4.8 applies any vehicle speed specified in clause 35.3.3 shall be achieved within a tolerance of + 5, - 1 km/h.

35.5. PARTICULAR TEST CONDITIONS

35.5.1. Pre-test Instrumentation Check

35.5.1.1. The number of decelerations for the purpose of instrumentation checks shall not exceed 20. Such decelerations shall be conducted from a speed of not more than 40 km/h and any instantaneous deceleration shall not exceed 3 m/s^2.

35.5.2. Service Brake Burnishing Procedure

35.5.2.1. Burnishing, if conducted, shall consist of any desired number of decelerations at the '*Manufacturer's*' option.

35.5.2.2. On completion of the burnishing procedure, if conducted, the brake system may be adjusted in accordance with the '*Manufacturer's*' recommendation.

35.5.3. Service Brake Lightly Laden Effectiveness Test. A series of test modes shall be conducted in the sequence as described in clause 35.3.3 (Item 3). The vehicle shall be deemed to satisfy the requirements of a mode if all the parameters of that mode are met on at least one test within a number of tests that shall not exceed 6.

35.5.4. Lightly Laden Secondary Brake Test

35.5.4.1. Where the secondary brake is not applied by the service brake control, the vehicle shall be decelerated using only the '*Secondary Brake System*' and deemed to satisfy the requirements of this test, if all the parameters specified in clause 35.3.3 (Item 4) are met in at least one test within a number of tests that shall not exceed 6.

35.5.4.2. Where the secondary brake is applied by the service brake '*Control*', the vehicle shall be decelerated using the '*Secondary Brake System*' and

deemed to satisfy the requirements of this test if all the parameters specified in clause 35.3.3 (Item 4) are met in at least one test within a number of tests that shall not exceed 6 for each single failure of a fluid system, including where appropriate:

35.5.4.2.1. each sub-system of a '*Split Service Brake System*'; and

35.5.4.2.2. failure of energy assistance in a '*Brake Power Assist Unit*'.

35.5.5. Lightly Laden Partial Failure Test. The requirements of this clause shall only apply to a vehicle fitted with a brake system where the secondary brake is applied by the service brake '*Control*'. The vehicle shall be deemed to satisfy the requirements of this test if all the parameters specified in clause 35.3.3 (Item 5) are met on at least one deceleration mode within a number of deceleration modes which shall not exceed 6 for each single type of partial failure, including:

35.5.5.1. inoperative 'Antilock System'; and

35.5.5.2. inoperative 'Variable Proportioning Brake System'.

35.5.5.3. One single failure shall be induced prior to each set of deceleration modes and the vehicle shall be restored at the completion of each set.

35.5.6. Service Brake Laden Effectiveness Test. A series of test modes shall be completed in the sequence of clause 35.3.3 (Item 6). The vehicle shall be deemed to satisfy the requirements of a mode if all parameters for that mode are met for at least one test within a number of tests that shall not exceed 6.

35.5.7. Laden Secondary Brake Test. The test procedure and determination of compliance shall be as specified in clause 35.5.4, except that the vehicle shall be at '*Maximum Loaded Test Mass 35/00*'.

35.5.8. Laden Partial Failure Test. The test procedure and determination of compliance shall be as specified in clause 35.5.5, except that the vehicle shall be at '*Maximum Loaded Test Mass 35/00*'.

35.5.9. Service Brake Fade Test

35.5.9.0 Service Brake Fade Testing shall be carried out in accordance with the requirements of either clauses 35.5.9.1 or clause 35.5.9.2

35.5.9.1. Vehicle Service Brake Fade Test

35.5.9.1.1.1. Successive deceleration modes shall be conducted in accordance with the following:

Vehicle Category	Initial speed (km/h)	Final speed at end of deceleration (km/h)	Minimum stabilizing time at initial speed (seconds)	Maximum interval between applications (seconds)	Minimum number of applications
MB,MC,MD,NA	100	50	10	55	15
ME,NB,NC	60	30	10	60	20

35.5.9.1.1.2. Tests may be conducted at initial and final speeds which differ from those specified above, provided that for each deceleration mode it can be shown that:

$(V_1^2 - V_2^2) > 7{,}500$

for vehicles in categories MB, MC, MD and NA ; and

$(V_1^2 - V_2^2) > 2{,}700$

for vehicles in categories ME, NB AND NC

where: V_1 is the initial speed in km/h and V_2 is the final speed in km/h at the end of the deceleration mode.

35.5.9.1.1.2.1 The variables in the foregoing expression are not related to those specified in the formulae of clause 35.4.8.

35.5.9.1.1.3. If the vehicle is not capable of attaining the initial speed required by clause 35.5.9.1.1.1 or clause 35.5.9.1.1.2, then the speed employed in each mode for the initial speed shall be not less than 80 per cent of the '*Maximum Laden Vehicle Speed*' and the final speed shall not be greater than half the initial speed.

35.5.9.1.2. During all deceleration modes the lowest numerical overall drive ratios as specified in clause 35.4.7 shall be continuously engaged. Deceleration modes shall be conducted from the initial speed to the final speed. During acceleration periods the drive train shall be employed to regain the initial speed in the shortest possible time. Notwithstanding the foregoing requirements, changes of vehicle direction essential to testing and negotiation of curved sections of track may be undertaken at constant vehicle speed. If the vehicle's performance characteristics are such as to preclude it from maintaining the specified maximum interval between successive brake applications, the time interval may be increased to the minimum time required by the vehicle to achieve the specified initial speed and to maintain it for 10 seconds before each successive deceleration mode.

35.5.9.1.3. Vehicles shall attain a sustained deceleration of not less than 3 m/s^2 during the first deceleration mode. Subsequent deceleration shall be conducted employing a '*Control*' force not less than that established during the first deceleration mode without regard to the actual deceleration achieved.

35.5.9.1.4. The Service Brake Fade Test shall be followed immediately by the Service Brake Fade Effectiveness Check.

35.5.9.2. Dynamometer Service Brake Fade Test

This test may be applied to brake systems using air at positive pressure and is based on the relevant conditions and procedures of Federal Motor Vehicle Safety Standard 121 - 36 F.R. 3817, February 27, 1971 "Air Brake Systems" issued by the National Highway Traffic Safety Administration of the United States Department of Transportation up to and including amendments shown in Federal Register Vol. 42 No. 126 of 30 June 1977.

35.5.9.2.1. Testing shall be carried out in accordance with the conditions and requirements specified in Section 35.6

35.5.10. Service Brake Fade Effectiveness Check

35.5.10.1. This procedure is not applicable to vehicles with brake assemblies which have been tested in accordance with the requirements of clause 35.5.9.2.

35.5.10.2. The vehicle shall be accelerated over a distance not exceeding 1.6 km from the final speed attained at the conclusion of the deceleration mode of the Service Brake Fade Test to the initial speed specified in clause 35.3.3 (Item 10) and the test carried out in accordance with that Item. The vehicle shall be deemed to satisfy the requirements of this test if the deceleration achieved is not less than that specified in clause 35.3.3 (Item 10).

35.5.11. Service Brake Water Conditioning Procedure

35.5.11.1.0. For Forward-control Passenger Vehicles (MB), Off-road Passenger Vehicles (MC) and Light Omnibus up to 3.5 tonne *'GVM'*, up to 12 seats (MD1):

Service brake water conditioning shall be carried out in accordance with the requirements of either clause 35.5.11.1 or clause 35.5.11.2.

35.5.11.1. Water Immersion The vehicle shall be driven with the service brake released through water of depth of not less than 60 per cent of the '*Static Loaded Tyre Radius*' of the tyres fitted, for a period of at least 2 minutes. During such period, the vehicle speed shall not exceed 10 km/h and for at least one minute, shall not be less than 5 km/h. For the purpose of this clause changes from "drive" to "reverse" and "reverse" to "drive" shall be considered as continuous driving.

35.5.11.2. Water Spray The braking surfaces of all brake assemblies fitted to the vehicle shall be simultaneously and continuously wetted for a period of not less than 5 minutes. The rate of delivery of water to each brake assembly shall not be less than 25 litres per minute. In the case of drum brake assemblies the water flow shall be introduced through an aperture in the brake backing plate.

35.5.12. Service Brake Water Recovery Procedure

35.5.12.0 For Forward-control Passenger Vehicles (MB), Off-road Passenger Vehicles (MC) and Light Omnibus up to 3.5 tonne *'GVM'*, up to 12 seats (MD1).

35.5.12.1. Immediately upon completion of the Service Brake Water Conditioning Procedure the vehicle shall be accelerated and the drive train shall be employed to attain initial speed appropriate to its category as specified in clause 35.5.10. Continue at this speed until the total distance not exceeding 1.6 km has been travelled and then decelerate at a sustained deceleration of not less than 2.0 m/s2 until stationary. This sequence shall be repeated 3 times without interruption. The brakes shall not be applied except for the deceleration specified.

35.5.12.2. The Service Brake Water Recovery Procedure shall be followed immediately by the Service Brake Water Effectiveness Check.

35.5.13. Service Brake Water Effectiveness Check

For Forward-control Passenger Vehicles (MB), Off-road Passenger Vehicles (MC) and Light Omnibus up to 3.5 tonne *'GVM'*, up to 12 seats (MD1):

This check shall be a repetition of the Service Brake Fade Effectiveness Check as specified in clause 35.5.10 except that the vehicle shall be deemed to satisfy the requirements of this check if the deceleration achieved is not less than that specified in clause 35.3.3 (Item 13).

35.5.14. Service Brake '*Spike Stop 35/00*' Procedure

For service brake systems without a 'Brake Power Unit 35/00':

Ten '*Spike Stops 35/00*' shall be conducted as specified in clause 35.3.3 (Item 14) and the '*Control*' force for each stop shall be maintained until the vehicle is stationary.

35.5.15. Service Brake '*Spike Stop 35/00*' Effectiveness Check

For service brake systems without a 'Brake Power Unit 35/00':

The vehicle shall be deemed to pass this check if all the parameters specified for each set of conditions listed in clause 35.3.3 (Item 15) are met on at least one deceleration mode within a number of deceleration modes which shall not exceed 6.

35.5.16. Parking Brake Test

35.5.16.1. This test shall be conducted on a gradient of at least 18 per cent, where the vertical rise is expressed as a per centage of the horizontal distance travelled to achieve this rise. The vehicle shall be positioned on the gradient such that its longitudinal axis is parallel to the direction of the gradient. The '*Parking Mechanism 35/00*' (if fitted) shall be disengaged. The service brake shall be applied, transmission disengaged, and parking brake shall be applied by a single application of the force specified, except that a series of applications to achieve the specified force may be made in the case of a parking brake design that does not allow the application of the specified force in a single application. The service brake shall be released, for a period of not less than 5 minutes. The vehicle shall then be parked in the reverse position on the gradient for not less than 5 minutes with the vehicle in condition described above.

35.5.16.2. The vehicle shall be deemed to pass this test if:

35.5.16.2.1. for each of the 5 minute periods it remains stationary on the gradient; and

35.5.16.2.2. the force required to actuate the parking brake does not exceed 685 N in the case of a foot operated parking brake, and does not exceed 590 N applied at the centre of the handgrip, or not closer than 35 mm from the free end of the actuation lever, in the case of a hand-operated parking brake.

35.5.16.3. If the vehicle does not remain stationary re application of the service brake to hold the vehicle stationary, with re-application of the specified force to the parking brake '*Control*' (without release of the ratcheting or

other holding mechanism of the parking brake) may be used twice to attain a stationary position.

35.5.16.4. In cases where the '*Parking Brake System 35/00*' does not utilize the service brake '*Friction Elements*', the '*Friction Elements*' of the system may be burnished to the vehicle '*Manufacturer's*' recommendation prior to the test.

35.5.17. Service Brake Actuating Time Test

35.5.17.1. This test is applicable only to vehicles using air at positive pressure as the operating fluid and incorporating one or more '*Brake Power Units 35/00*'. The test is conducted while the vehicle is stationary.

35.5.17.2. Before commencing the test the '*Stored Energy*' device(s) shall be charged to not more than the '*Average Operating Pressure.*'

35.5.17.3. The service brake '*Control*' shall be operated through a full working stroke by an operator seated in the normal driving position. The vehicle shall be deemed to satisfy the requirements of this test if the pressure at the brake chamber terminating the longest brake pressure line from the service brake '*Control*' attains a level not less than 65 per cent of the '*Average Operating Pressure*' within a period not exceeding 600 milliseconds measured from the instant the '*Control*' leaves the '*Initial Brake Control Location*'.

35.5.17.4. A vehicle equipped to tow a trailer which uses air at positive pressure as the brake operating fluid shall satisfy the test parameters specified in clause 35.5.17.3, but with the pressure measured at the end of a pressure vessel (used for test only) of not less than 13 mm internal diameter and not less than 2.5 metres long connected to the trailer control line coupling point of the drawing vehicle.

35.6. DYNAMOMETER SERVICE BRAKE FADE TEST

35.6.0 When tested under the conditions of clause 35.6.1, brake assemblies shall meet the requirements of clause 35.6.2.

35.6.1. Dynamometer Test Conditions

35.6.1.1. The dynamometer inertia for each wheel shall be not less than that determined from the expression:

$I = MR^2$

where:

I = dynamometer inertia, in kg.m2

M = mass supported by the wheel at the *'Maximum Loaded Test Mass 35/00'*, in kg

R = *'Static Loaded Tyre Radius*' of the tyre, as specified by the tyre manufacturer, in metres.

35.6.1.2. The ambient temperature shall be between 23.8 and 37.8°C.

35.6.1.3. Ambient air shall be directed continuously over the brake drum or disc at a velocity of not more than 11.2 m/s.

35.6.1.4. The temperature of each brake shall be measured by a single plug-type thermocouple installed in the centre of the lining surface of the most heavily loaded shoe or pad. The thermocouple shall be outside any centre groove.

35.6.1.5. The rate of brake drum or disc rotation on a dynamometer corresponding to the rate of rotation on a vehicle at a given speed shall be calculated by assuming a tyre radius equal to the '*Static Loaded Tyre Radius*' specified by the tyre manufacturer.

35.6.1.6. Burnishing, if conducted, shall consist of:

35.6.1.6.1. not more than 200 stops such that any instantaneous deceleration does not exceed 3.1 m/s^2 from a maximum speed of 65 km/h. The initial brake temperature for each stop shall be not less than 157°C and not more than 197°C; and

35.6.1.6.2. not more than 200 additional stops from a maximum speed of 65 km/h at a deceleration not exceeding 3.1 m/s^2. The initial brake temperature for each stop shall be not less than 232°C and not more than 288o 0C.

35.6.1.6.3. After burnishing, the brakes shall be adjusted in accordance with the *'Manufacturers'* recommendations.

35.6.1.7. Brake temperature shall be increased to the specified level by conducting one or more stops from not more than 65 km/h at a deceleration not exceeding 3.1 m/s^2, or decreased to a specified level by conducting one or more stops from not more than 65 km/h at a deceleration not exceeding 3.1 m/s^2, or decreased to a specified level by rotating the drum or disc at a constant speed not exceeding 50 km/h.

35.6.1.8. Speeds, decelerations and times specified in clause 35.6.2 shall be achieved within the following tolerance limits:

Speeds: + 5, - 1 km/h

Decelerations: + 0.25, - 0.25 m/s^2

Times: + 5, - 5 seconds

35.6.2. Dynamometer Test Requirements

35.6.2.1. When mounted on an inertia dynamometer, each brake shall be capable of making 10 consecutive decelerations at an average rate of 2.75 m/s^2 from 80 km/h to 24 km/h at equal intervals of 72 seconds, and shall be capable of decelerating to a stop from 32 km/h at an average deceleration rate of 4.25 m/s^2 one minute after the 10th deceleration. The series of decelerations shall be conducted as follows:

35.6.2.1.1. with an initial brake temperature between 65^{o}C and 94^{o}C for the first brake application, and the drum or disc rotating at a speed equivalent to 80 km/h, apply the brake and decelerate at an average deceleration rate of 2.75 m/s^2 to 24 km/h. Upon reaching 24 km/h accelerate to 80 km/h and apply the brake for a second time 72 seconds after the start of the first application. Repeat the cycle until 10 decelerations have been made. The service line air pressure shall not exceed 690 kPa during any deceleration;

35.6.2.1.2. one minute after the end of the last deceleration required by clause 35.6.2.1.1 and with the drum or disc rotating at a speed of 32 km/h decelerate to a stop at an average deceleration rate of 4.24 m/s^2; and

35.6.2.2. starting 2 minutes after completing the tests required by clause 35.6.2.1 the brake of a vehicle other than either front *'Axle'* brake of a *'Prime Mover'* shall be capable of making 20 consecutive stops from 48 km/h at an average deceleration rate of 3.65 m/s^2 at equal intervals of one minute measured from the start of each brake application. The service line air pressure needed to attain a rate of 3.65 m/s^2 shall be not more than 586 kPa and not less than 137 kPa for a brake not subject to the control of an '*Antilock System'* or 82 kPa for a brake subject to the control of an *'Antilock System'*

35.7. ALTERNATIVE STANDARDS

The technical requirements of ECE R 13/01 to 13/06 "Braking" shall be deemed to be equivalent to the technical requirements of this rule, provided that forward control passenger vehicles (MB) and off-road passenger vehicles (MC) comply with ECE vehicle category M1 requirements, and subject to the following :

35.7.1. The requirements of clause 35.2 (except clauses 35.2.3.6.3, 35.2.5.6 and 35.2.5.7) shall be met.

35.7.2. In the case of vehicle categories MB, MC and MD1, the requirements of clauses 35.5.11, 35.5.12 and 35.5.13 shall be met.

35.7.3. In the case of service brake systems without a '*Brake Power Unit 35/00'*, the requirements of clauses 35.5.14 and 35.5.15 shall be met.