



Vehicle Standard (Australian Design Rule 33/00 – Brake Systems for Motorcycles and Mopeds) 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 29 May 2006

[SIGNED]

James Eric Lloyd

Minister for Local Government, Territories and Roads

CONTENTS

1.	LEGISLATIVE PROVISIONS.....	3
2.	FUNCTION.....	3
3.	APPLICABILITY	3
33.1.	DEFINITIONS	4
33.2.	DESIGN REQUIREMENTS	4
33.3.	PERFORMANCE REQUIREMENTS.....	7
33.4.	GENERAL TEST CONDITIONS	9
33.5.	PARTICULAR TEST CONDITIONS.....	10
33.6.	ALTERNATIVE STANDARDS FOR DEMONSTRATION OF COMPLIANCE TO WET BRAKING REQUIREMENTS	14

1. LEGISLATIVE PROVISIONS

1.1. NAME OF STANDARD

1.1.1. This Standard is the Vehicle Standard (Australian Design Rule 33/00 – Brake Systems for Motorcycles and Mopeds) 2006.

1.1.2. This Standard may also be cited as Australian Design Rule 33/00 — Brake Systems for Motorcycles and Mopeds.

1.2. COMMENCEMENT

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

1.3. REPEAL

1.3.1. This Standard repeals each vehicle standard with the name Australian Design Rule 33/00 — Brake Systems for Motorcycles and Mopeds that is:

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

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

1.3.2. 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 33/00 — Brake Systems for Motorcycles and Mopeds, 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.

2. FUNCTION

The function of this vehicle standard is to ensure safe braking under normal and emergency conditions.

3. APPLICABILITY

3.1. Applicability Summary

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

3.1.2. All LEP and LEG vehicles fitted with separate controls for front and rear service brakes are required to comply with this national standard. Other LEP vehicles must comply with ADR 31/... and other LEG vehicles must comply with ADR 35/... .

3.2. Applicability Table

Vehicle Category	ADR Category Code	UNECE Category Code	Manufactured on or After	Acceptable Prior Rules
Moped 2 wheels	LA	L1	1 July 1988	Nil
Moped 3 wheels	LB	L2	1 March 1991	Nil
Motor cycle	LC	L3	1 July 1988	Nil
Motor cycle and sidecar	LD	L4	1 July 1988	Nil
Motor tricycle	LE	L5		
	LEM		1 July 1992	Nil
	LEP		1 July 1992	Nil
	LEG		1 July 1992	Nil
Passenger car	MA	M1	N/A	
Forward-control passenger vehicle	MB	M1	N/A	
Off-road passenger vehicle	MC	M1	N/A	
Light omnibus	MD	M2	N/A	
Heavy omnibus	ME	M3	N/A	
Light goods vehicle	NA	N1	N/A	
Medium goods vehicle	NB	N2	N/A	
Heavy goods vehicle	NC	N3	N/A	
Very light trailer	TA	O1	N/A	
Light trailer	TB	O2	N/A	
Medium trailer	TC	O3	N/A	
Heavy trailer	TD	O4	N/A	

33.1. DEFINITIONS

33.1.1. Refer to Vehicle Standard (Australian Design Rule Definitions and Vehicle Categories) 2005.

33.2. DESIGN REQUIREMENTS

33.2.1. Service Brake System

33.2.1.1. The vehicle must be equipped with either a '*Split Service Brake System*' or independently actuated service brake systems. Vehicles which have independently actuated service brake systems must have 2 independent brake systems, one capable of acting on the front wheel and the other on the rear wheel(s).

33.2.1.2. Failure of any component in a mechanical service brake system must not result in a loss of braking ability in the other service brake system.

33.2.1.3. A leakage type failure in a hydraulic service brake system must not result in a loss of braking ability in the other service brake system. Each vehicle equipped with a '*Hydraulic Brake System*' must meet the requirements of clause 33.2.5.

- 33.2.1.4. The service brake system must be installed so that the lining thickness of drum brake shoes may be visually inspected, either directly or by the use of a mirror without removing the drums, and so that disc brake friction lining thickness may be visually inspected without removing the pads.
- 33.2.1.5. Except where the requirements of clauses 33.2.2.1 and 33.5.13 apply, a Category LD vehicle is only required to meet the requirements of this rule with the side-car detached.
- 33.2.1.6. The ‘*Controls*’ by which brakes are actuated must be located so that they are readily accessible to the driver in the normal driving position.
- 33.2.1.7. The service brake system must incorporate devices which compensate for any increased movement of its components arising from wear. Such devices must 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.
- 33.2.1.8. Where separate methods of actuation are provided for any of the functions of the brake system, the actuation of one function must not cause the operation of another function.
- 33.2.2. Parking Brake System for LB, LD and LE Vehicles Only
- The vehicle must be equipped with a parking brake system such that in the applied position retention is effected by a mechanical means, and the braking effect of which is effected by the frictional force developed between friction surfaces.
- 33.2.3. Service Brake Failure Indicator Lamps
- 5.3.0. Vehicles equipped with a ‘*Split Service Brake System*’ must have one or more brake failure indicator lamps mounted in front of and in clear view of the driver.
- 33.2.3.1. The indicator lamp must be activated whenever any of the following conditions occur whilst the ignition switch is in the “engine on” position:
- 33.2.3.1.1. in the case of a service brake system not incorporating a ‘*Brake Power Unit 31/00*’, when a pressure failure occurs in any part of the service brake system except for pressure failure caused by:
- 33.2.3.1.1.1. a structural failure of a brake master cylinder body in a split integral body type master cylinder system;
- 33.2.3.1.1.2. a structural failure of a service brake system failure indicator body; or
- 33.2.3.1.1.3. failure of a vacuum component of a vacuum ‘*Brake Power Assist Unit*’.
- 33.2.3.1.1.4. In the event of such failure, for the purpose of this clause the lamp activation requirement will be met if the lamp is activated before or upon application of line pressure of not more than 1.38 MPa measured at a master cylinder outlet or at a slave cylinder outlet if the master cylinder controls a slave cylinder at a booster unit, or before or upon application of a ‘*Braking Effort*’ of not more than 90 N;
- 33.2.3.1.2. in the case of a service brake system with a single ‘*Brake Power Unit 31/00*’, when the supply pressure in the unit drops to less than half the operating pressure;

- 33.2.3.1.3. in the case of a service brake system with 2 or more independent '*Brake Power Units 31/00*' when the supply pressure in any one unit is depleted;
- 33.2.3.1.4. a drop in the level of brake fluid in a master cylinder reservoir, without application of '*Braking Effort*', to less than the '*Manufacturer's*' recommended safe level or to less than one half of the fluid reservoir capacity in any reservoir compartment, whichever is the greater; or
- 33.2.3.1.5. a total electrical failure in an '*Antilock System*' or '*Variable Proportioning Brake System*'.
- 33.2.3.2. The indicator lamp must be so designed that it is activated when the ignition switch is turned:
 - 33.2.3.2.1. from the "off" to the "on" position; or
 - 33.2.3.2.2. from the "off" to the "start" position.
- 33.2.3.3. Unless a failure of the type described in clause 33.2.3.1 exists in the service brake system, the indicator lamp must be deactivated:
 - 33.2.3.3.1. in the case of a lamp designed in accordance with clause 33.2.3.2.1 when the lamp has been activated for a period of not less than 5 seconds and not more than 10 seconds; or
 - 33.2.3.3.2. in the case of a lamp designed in accordance with clause 33.2.3.2.2 when the ignition switch returns to the "on" position.
- 33.2.3.4. The indicator lamp system must be so designed that once having been activated to signal a brake failure it must be activated whenever the ignition switch is in the "on" position and the fault remains uncorrected. For the purpose of this clause an activated lamp may be steady-burning or flashing.
- 33.2.3.5. Each indicator lamp must have a red lens labelled with the words "BRAKE FAILURE" on or adjacent to it in letters not less than 2.3 mm high which when illuminated is legible to the seated driver under daylight conditions.
- 33.2.4. Brake System Audible Indicator. In cases where the vehicle is fitted with a single '*Brake Power Unit 31/00*' an audible device shall be provided. Such device must emit a continuous or short period intermittent signal at all times when the service brake failure indicator lamp is activated by a failure as specified in clause 33.2.3.1.2.
- 33.2.5. Reservoirs
 - 33.2.5.1. Where the service brake system incorporates a master cylinder, separate reservoir compartment shall be provided for each service brake system serviced by the master cylinder and a loss of brake fluid from one compartment shall not result in a complete loss of fluid from another compartment.
 - 33.2.5.2. The capacity of each sub-system reservoir compartment must be not less than one and one half times the fluid displacement resulting when all the wheel cylinders or calliper pistons serviced by the reservoir move from a new lining, fully retracted position, to a fully-worn, fully-applied position. For the purposes 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:

- 33.2.5.2.1. level with rivet or bolt heads on riveted or bolted linings;
- 33.2.5.2.2. within 0.8 mm of shoe or pad mounting surface on bonded linings or pads; or
- 33.2.5.2.3. the limit recommended by the '*Manufacturer*'.
- 33.2.5.3. A statement specifying the type of fluid to be used in the brake system, and the warning "Clean filler cap before removing" must be permanently affixed, stamped, engraved or embossed either on or within 100 mm of each brake fluid reservoir filler plug or cap, in lettering at least 2.3 mm high. If not stamped, engraved or embossed, the lettering must be of a contrasting colour to that of the background.
- 33.2.5.4. Each '*Brake Power Unit 31/00*' must have a reservoir of capacity not less than the total capacity of the reservoirs required under the requirements of clause 33.2.5.2 plus the fluid displacement necessary to charge the piston(s) or accumulator(s) provided for the purpose of storing energy.
- 33.2.6. Protection of System using '*Stored Energy*'
- 33.2.6.1. Any device for storing energy for the operation or to assist in the operation of the brake system must be so protected that failure of the generating power unit of a '*Brake Power Unit 31/00*' supplying the energy does not result in depletion of the '*Stored Energy*'.
- 33.2.6.2. In cases where the generating power unit of a '*Brake Power Unit 31/00*' supplies energy to other units the design shall be such that the '*Brake Power Unit 31/00*' is preferentially charged.
- 33.2.6.3. In the case of a service brake system with a single '*Brake Power Unit 31/00*' the design must be such that the device for storing energy must preferentially service the brake system if such device also services other systems. In the case of a service brake system with 2 or more independent '*Brake Power Units 31/00*' the design must be such that at least one device for storing energy must preferentially service the brake system.

33.3. PERFORMANCE REQUIREMENTS

- 33.3.1. The vehicle must be capable of meeting the range of performance tests set out in the following Table 1, subject to the general test conditions of Part 33.4 and the particular test conditions of Part 33.5 except where the '*Maximum Motor Cycle Speed*' is equal to or less than 50 km/h and in the case of mopeds, it is not necessary to test in accordance with the requirements of clauses 33.5.6, 33.5.7, 33.5.8 and 33.5.9. The sequence of testing must be in the order set out in Table 1 except that the Parking Brake Test may be conducted at any time within the sequence.

Series of Tests and Procedures	Initial Vehicle Speed km/h	Minimum Average Deceleration m/s ²
Instrumentation check	50 (max.)	N.A.
First effectiveness test 'LMCM' - All service brake systems	'Max. Motor Cycle Speed' ## 45-50 95-100	5.45 5.45 5.45
Effectiveness test - independently actuated service brake systems	'Max. Motor Cycle Speed' ## 45-50 95-100	2.40 2.40 2.40
First burnish procedure	'Max. Motor Cycle Speed' ## 45-50	N.A. N.A.
Second effectiveness test - All service brake systems	'Max. Motor Cycle Speed' ## 45-50 95-100 125-130 See text	6.85 6.85 6.35 6.05 5.45
First base line check	45-50	See text
Fade test	95-100	See text
Fade recovery procedure	45-50	See text
Fade recovery test	45-50	See text
Second burnish procedure	'Max. Motor Cycle Speed' ## 45-50	N.A. N.A.
Third effectiveness test - All service brake systems	'Max. Motor Cycle Speed' ## 45-50 95-100 125-130 See text	6.85 6.85 6.35 6.05 5.45
Partial failure	'Max. Motor Cycle Speed' ## 45-50 95-100	3.0 3.0 3.0
Parking brake test	N.A.	N.A.
Second base line check	45-50	See text
Test with brakes subject to wetting	'Max. Motor Cycle Speed' ## 45-50	See text See text

33.3.1.1. In the above Table, the following comments apply:

33.3.1.1.1. N.A. means no condition applicable

33.3.1.1.2. ## Applicable only to motor cycles having a 'Maximum Motor Cycle Speed' equal to or less than 50 km/h and to mopeds.

33.3.2. No parts of a brake system shall be replaced during testing nor shall adjustments be made to a brake system unless otherwise stated.

33.3.3. A vehicle will be deemed to meet the range of performance tests if it meets the requirements of each particular test and completes the range of tests without component failure. For the purpose of this rule, "component failure" means:

33.3.3.1. detachment of brake linings from the shoes or pads;

- 33.3.3.2. detachment or fracture of any components of the brake system; or
- 33.3.3.3. visible evidence of leakage of brake fluid or lubricant at any wheel cylinder, master cylinder reservoir, cover, seal or retention device, or at fluid line junctions.

33.4. GENERAL TEST CONDITIONS

- 33.4.1. The vehicle must be operated at the '*Laden Motor Cycle Mass*'.
- 33.4.2. The ambient temperature at the test site must be within the range of 0 to 40° Celsius.
- 33.4.3. The ignition timing, engine idle speed and adjustable speed governor, if fitted, must be set to the '*Manufacturer's*' recommendation.
- 33.4.4. If provision for manual disengagement is provided, all stops must be made with the engine disengaged from the transmission.
- 33.4.5. The tyres fitted to the vehicle must be inflated to the pressure recommended by the '*Manufacturer*' for the '*Laden Motor Cycle Mass*'.
- 33.4.6. Decelerations must be conducted on a test track or roadway that meets the following requirements:
 - 33.4.6.1. in the case of Fade Tests, the surface must be substantially level and any effective upward gradient between the start and end of the test must not exceed one percent; and
 - 33.4.6.2. in the case of all other deceleration tests, the upward gradient must not exceed one percent.
- 33.4.7. For all effectiveness and partial failure tests:
 - 33.4.7.1. no part of the vehicle must move outside a straight lane 2.5 metres in width in the case of 2-wheeled vehicles, and '*Overall Width*' plus 1.55 metres in the case of 3-wheeled vehicles. The vehicle must be positioned at the centre of the lane at the commencement of the deceleration; and
 - 33.4.7.2. lockup must not occur on any wheel unless such lockup results from the proper functioning of an '*Antilock System*'.
- 33.4.8. Except when conducting Burnish Procedures decelerations must 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.
- 33.4.9. If the vehicle is not capable of attaining the initial vehicle speed requirements specified for a particular deceleration test, then, unless otherwise specified, the initial vehicle speed must be a speed within 15 km/h of the '*Maximum Motor Cycle Speed*'.
- 33.4.10. Unless otherwise specified the '*Braking Effort*' required for any deceleration mode must be within the limits of 20 N to 250 N in the case of hand-operated controls, and within the limits of 40 N to 405 N in the case of foot-operated controls.
 - 33.4.10.1. Application of '*Braking Effort*' must be:
 - 33.4.10.1.1. in the case of hand-operated '*Controls*' not less than 30 mm from the end of the brake lever. The direction of the force must be perpendicular to

the centreline of that portion of the handle grip on which the brake lever is mounted and must be parallel to the plane in which the brake lever rotates; and

- 33.4.10.1.2. in the case of foot-operated '*Controls*' in the centre of the foot contact pad of the brake pedal. The direction of the force must be perpendicular to the surface of the foot contact pad and must be parallel to the plane in which the brake pedal rotates.
- 33.4.10.2. Except in the case of the Wet Brake Recovery Test each test procedure may be preceded by a series of not more than 10 decelerations from not more than 50 km/h during which the deceleration must not at any time exceed 3.1 m/s².

33.5. PARTICULAR TEST CONDITIONS

- 33.5.1. Instrumentation Check. The number of decelerations for the purpose of instrumentation checks must not exceed 20. Such decelerations must be made from a speed of not more than 50 km/h during which the deceleration must not exceed 3.1 m/s².
- 33.5.2. First Effectiveness Test - All Service Brake Systems. The vehicle will be deemed to pass this test if all the parameters specified for each set of conditions in clause 33.3.1 are met on at least one deceleration mode within a number of deceleration modes which must not exceed 6.
- 33.5.3. Effectiveness Test - Independently Actuated Service Brake Systems
The vehicle will be deemed to pass this test if, when each service brake system is tested individually, all the parameters for each set of conditions specified in clause 33.3.1 are met on at least one deceleration mode within a number of deceleration modes which must not exceed 6.
- 33.5.4. First Burnish Procedure
- 33.5.4.1. This must be conducted by making not more than 200 decelerations under the conditions specified in clause 33.3.1 such that deceleration must not at any time exceed 3.7 m/s². The '*Braking Interval*' between successive decelerations must be not more than 1.6 km. The vehicle must be accelerated at the maximum rate to the specified initial vehicle speed after each deceleration mode and maintained at that speed until initiating the next deceleration mode.
- 33.5.4.2. On completion of the First Burnish Procedure, the brakes may be adjusted in accordance with the '*Manufacturer's*' recommendation.
- 33.5.5. Second Effectiveness Test - All Service Brake Systems
The vehicle will be deemed to pass this test:
- 33.5.5.1. if all the parameters for each of the first 3 sets of conditions specified in clause 33.3.1 are met on at least one deceleration mode within a number of deceleration modes which must not exceed 6 for the first 2 sets of conditions and 4 for the third set of conditions; and
- 33.5.5.2. in the case where the motor cycle has a '*Maximum Motorcycle Speed*' equal to or greater than 150 km/h, if the parameters for the fourth set of conditions are met on at least one deceleration mode within a number of

deceleration modes which must not exceed 4, when testing is carried out for an initial vehicle speed within 15 km/h of '*Maximum Motorcycle Speed*'.

33.5.6. First Base Line Check Procedure

Under the conditions specified in clause 33.3.1, 3 stops must be made during which the deceleration must be maintained within the range of $3.2 \pm 0.2 \text{ m/s}^2$. The maximum force applied to each service brake '*Control*' must be recorded for each stop. The average of the maximum forces must be calculated for each service brake '*Control*'.

33.5.7. Fade Test

Ten stops must be conducted such that the sustained deceleration of each stop is not less than 4.55 m/s^2 . The sustained deceleration must be attained in the minimum possible time and must be maintained for not less than three-quarters of the total '*Stopping Distance 33/00*' for each stop. The '*Braking Interval*' must not be more than 650 metres.

The vehicle will be deemed to pass if the required deceleration can be achieved on all stops under the conditions specified in clause 33.3.1.

33.5.8. Fade Recovery Procedure

Immediately upon completion of the Fade Test, the vehicle must be conditioned by driving it at 45-50 km/h for not more than 1.6 km.

Immediately after this conditioning 4 stops must be made during which the deceleration must be maintained within the range of $3.2 \pm 0.2 \text{ m/s}^2$ under the conditions specified. After each stop the vehicle must immediately be subjected to maximum acceleration to the specified initial vehicle speed and maintained at that speed until initiating the next stop. The '*Braking Interval*' must not be more than 1.6 km.

33.5.9. Fade Recovery Test

Immediately upon completion of the Fade Recovery Procedure, the vehicle must be subjected to maximum acceleration to the specified initial vehicle speed and within 1.6 km from the start of the test the vehicle must be decelerated such that the deceleration is maintained within the range of $3.2 \pm 0.2 \text{ m/s}^2$. The vehicle will be deemed to pass if the maximum force applied to each service brake '*Control*' is within + 90 N and - 45 N of the average of the maximum '*Control*' force recorded for that '*Control*' determined for First Base Line Check Procedure (clause 33.5.6).

33.5.10. Second Burnish Procedure

This must be a repeat of the First Burnish Procedure (clause 33.5.4), except that:

33.5.10.1. the number of decelerations must be 35; and

33.5.10.2. brakes may be adjusted at completion only if no tools are used.

33.5.11. Third Effectiveness Test - All Service Brake Systems

The vehicle will be deemed to pass this test:

- 33.5.11.1. if all the parameters for each of the first 3 sets of conditions specified in clause 33.3.1 are met on at least one deceleration mode within a number of deceleration modes which must not exceed 6 for the first 2 sets of conditions and 4 for the third set of conditions; and
- 33.5.11.2. in the case where the vehicle has a '*Maximum Motorcycle Speed*' equal to or greater than 150 km/h, if the parameters for the fourth set of conditions are met on at least one deceleration mode within a number of deceleration modes which must not exceed 4, when testing is carried out from an initial vehicle speed within 15 km/h of '*Maximum Motorcycle Speed*'.
- 33.5.12. Partial Failure Test
- 33.5.12.1. The vehicle will be deemed to pass this test if all the parameters specified in clause 33.3.1 are met on at least one deceleration mode within a number of deceleration modes, which must not exceed 6 for each single type of potential failure including:
- 33.5.12.1.1. each sub-system of the split system;
- 33.5.12.1.2. inoperative '*Antilock System*'; and
- 33.5.12.1.3. inoperative '*Variable Proportioning Brake System*'.
- 33.5.12.2. One single failure must be induced prior to each set of deceleration modes and the vehicle restored at the completion of testing.
- 33.5.13. Parking Brake Test (for LB, LD and LE Vehicles Only)
- 33.5.13.1. The parking brake must be tested by positioning the vehicle on a gradient of at least 30 per cent where the vertical rise is expressed as a percentage of the horizontal distance travelled to achieve this rise, such that the longitudinal axis of the vehicle is parallel to the direction of the gradient. The parking brake must be applied, the transmission disengaged and the service brakes released, for a period of not less than 5 minutes. The position of the vehicle on the gradient must then be reversed and the vehicle again parked for a period of not less than 5 minutes.
- 33.5.13.2. The vehicle will be deemed to pass this test if:
- 33.5.13.2.1. for each of the 5 minute periods it remains stationary on the gradient, or in the case where the test is carried out on a clean, dry, smooth Portland cement concrete surface there is no rotation of the wheel(s) to which the parking brake is applied; and
- 33.5.13.2.1.1. the force required to apply the parking brake does not exceed 405 N in the case of a foot-operated system or 245 N in the case of a hand-operated system.
- 33.5.14. Second Base Line Check Procedure
- This procedure is the same as that specified in clause 33.5.6 as the First Base Line Check Procedure except that:
- 33.5.14.1. the deceleration must be maintained within the range of $3.0 \pm 0.2 \text{ m/s}^2$; and

- 33.5.14.2. independent brake tests must be performed in the case of vehicles where the front and rear brakes can be applied separately.
- 33.5.15. Tests With Brakes Subject to Wetting
- 33.5.15.1. The tests must be carried out under the same conditions as the tests with dry brakes. There must be no adjustment or alterations of the brake system other than fitting the equipment to allow brake wetting. In the case of vehicles where the front and rear brakes can be applied separately, the brakes must be tested independently.
- 33.5.15.2. The test equipment must continuously wet the brakes for each test run at a flow rate of 15 litres/hour for each brake. Two disc brakes on one wheel will be considered as 2 brakes.
- 33.5.15.3. For exposed or partly exposed disc brakes the prescribed amount of water must be directed onto the rotating disc in such a manner that it is equally distributed on the surface or surfaces of the disc swept by the friction pad or pads.
- 33.5.15.3.1. For fully exposed disc brakes the water must be directed onto the surface(s) of the disc one-quarter of a revolution in advance of the friction pad(s).
- 33.5.15.3.2. For partly exposed disc brakes the water must be directed onto the surface(s) of the disc one quarter of a revolution in advance of the shield or baffle.
- 33.5.15.3.3. The water must be directed onto the surface(s) of the disc(s) in a continuous jet, in a direction perpendicular to the surface of the disc, from single jet nozzles so positioned as to be between the inner extremity and a point two-thirds of the distance from the outer extremity of that part of the disc swept by the friction pad(s) (see Figure 1).
- 33.5.15.4. For fully enclosed disc brakes the water must be directed onto both sides of the shield or baffle at a point in a manner corresponding with that described in clauses 33.5.15.3.1 and 33.5.15.3.3. Where the nozzle would be coincident with a ventilation or inspection port, the water must be applied one-quarter of a revolution in advance of the said port.
- 33.5.15.5. Where in the preceding clauses 33.5.15.3 and 33.5.15.4 it is not possible to apply the water in the position specified owing to the presence of some fixed part of the vehicle, the water must be applied at the first point, exceeding one-quarter of a revolution, where uninterrupted application is possible.
- 33.5.15.6. To ensure correct wetting of the brakes, the vehicle must be driven with the wetting equipment operating for a distance of not less than 1.0 km at the test initial vehicle speed prior to the application of the brakes being tested.
- 33.5.15.7. For drum brakes the prescribed amount of water must be distributed equally on either side of the braking device (that is, on the stationary back plate and the rotating drum) from nozzles so positioned as to be two-thirds of the distance from the outer circumference of the rotating drum to the wheel hub.

- 33.5.15.8. Subject to the requirements of clause 33.5.15.7 and to the requirement that no nozzle must be within 15° of or coincident with a ventilation or inspection port on the stationary back plate, the test equipment for drum brakes must be so positioned as to obtain the optimum uninterrupted application of water.
- 33.5.15.9. Performance Level Attained with Brake Subject to Wetting
- 33.5.15.9.1. Each independently actuated service brake must be tested in accordance with the procedures laid down in clause 33.5.14 “Second Base Line Check Procedure”.
- 33.5.15.9.2. The mean deceleration attained with wet brake(s) between 0.5 and 1.0 second after application must be at least 60 per cent of that attained with dry brake(s) during the Second Base Line Check when the same ‘Control’ force is applied. The ‘Control’ force used, which must be applied as quickly as possible, must be equivalent to that required to attain an ‘Average Deceleration’ of $3.0 \pm 0.2 \text{ m/s}^2$ with dry brake(s).
- 33.5.15.9.3. At no time during the wet brake test must the deceleration exceed 120 per cent of that attained with dry brakes.

33.6. ALTERNATIVE STANDARDS FOR DEMONSTRATION OF COMPLIANCE TO WET BRAKING REQUIREMENTS

The technical requirements in ECE R 78/01, read together with Corr. 1 to the 01 series of amendments which entered into force on 1 July 1992 or ECE R 78/02 read with supplement 1 to the 02 series of amendments which entered into force on 21 March 1995 are deemed to be equivalent to the technical requirements of this rule.

FIGURE 1

