INTERNATIONAL STANDARD ISO 8709:1995

TECHNICAL CORRIGENDUM 1

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Mopeds — Brakes and braking devices — Tests and measurement methods

TECHNICAL CORRIGENDUM 1

Cyclomoteurs — Freins et dispositifs de freinage — Méthodes d'essai et de mesure

RECTIFICATIF TECHNIQUE 1

Technical Corrigendum 1 to International Standard ISO 8709:1995 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 23, *Mopeds*.

1.1

Add the following to the last paragraph, after "UN-ECE Regulation No. 78":

"(01 series of amendments)"

ICS 43.140 **Ref. No. ISO 8709:1995/Cor.1:1998(E)**

Descriptors: road vehicles, motorcycles, mopeds, braking systems, brakes, specifications, tests, braking tests, static tests, dynamic tests, test result sheets.

1.3

Delete the following from the second list item:

"heat fade tests;"

Pages 3 and 4

Table 1

Replace the heading "Measurand" with "To measure".

In the wet brake test, delete the optional measured quantities "Deceleration" and "Deceleration throughout braking stop" and the corresponding instrument examples.

Delete the heat fade test and the corresponding obligatory and optional measured quantities and instrument examples.

Page 5

Figure 1

Replace "To water tank" with "From water tank".

Page 6

6.2

Delete "and heat fade tests" from the first sentence.

6.4

Delete the last sentence.

6.6.2

In the first sentence, add "v," after "test speed, " and ", a," after "mean fully developed deceleration"

In the second indent after the formula, replace "acceleration" with "deceleration".

Page 7

8.2.3

Delete ", as specified in 7.1".

Page 8

8.3

Replace "moped speed/vehicle loading condition" with "moped speed/loading condition".

9.2.2

In list item d), correct the text to read "at which the test is to be carried out".

Page 12

A.8

Replace “Vehicle condition” with “Moped condition”.

Replace the existing table with the following:

Stop No.	Test speed		Measured performance or			Control force	Remarks
	v_p km/h	v km/h	a m/s^2	L m	L_c m	N	

v_p is the prescribed test speed
v is the recorded test speed
a is the mean fully developed deceleration
L is the recorded stopping distance
L_c is the corrected stopping distance

A.9.1

Replace “Vehicle condition” with “Moped condition”.

Page 13

A.9.1

Replace the existing table with the following:

Condition	Stop No.	Test speed		Measured performance or			Maximum deceleration	Control force	Remarks
		v_p km/h	v km/h	a m/s^2	L m	L_c m	a_{max} m/s^2	N	
Dry brake									Test at 2,5 m/s^2
Wet brake									Test at same control force as above

v_p is the prescribed test speed
v is the recorded test speed
a is the average deceleration between 0,5 s and 1 s after control application
L is the recorded stopping distance
L_c is the corrected stopping distance
a_{max} is the maximum deceleration recorded over the whole stop

A.10

Replace "Vehicle condition" with "Moped condition".

INTERNATIONAL STANDARD

ISO 8709

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Mopeds — Brakes and braking devices — Tests and measurement methods

Cyclomoteurs — Freins et dispositifs de freinage — Méthodes d'essai et de mesure

Reference number
ISO 8709:1995(E)

Contents

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 8709 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 23, *Mopeds*.

Annex A forms an integral part of this International Standard.

Mopeds — Brakes and braking devices — Tests and measurement methods

1 Scope

1.1 This International Standard specifies tests and measurement methods for brakes and braking of mopeds with two or three wheels, as defined in ISO 3833, which are intended for use on public roads, in order to establish uniform worldwide test procedures for braking systems.

Further complementary tests which may assist in the assessment and development of braking systems are also included.

Reference is made to "L-category" vehicles. UN-ECE Regulation No. 78 defines a two-wheeled moped (L_1) and a three-wheeled moped (L_2).[1)]

The values in square brackets [] are taken from UN-ECE Regulation No. 78.

1.2 This International Standard does not cover mopeds which are

— controlled by a pedestrian

— designed for the special use of handicapped persons.

1.3 This International Standard sets out the following types of tests:

— static tests;

— dynamic tests:

  basic tests,

  wet brake tests,

  heat fade tests;

— parking brake tests (where applicable).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3779:1983, *Road vehicles — Vehicle identification number (VIN) — Content and structure.*

ISO 3833:1977, *Road vehicles — Types — Terms and definitions.*

ISO 6726:1988, *Mopeds and motorcycles with two wheels — Masses — Vocabulary.*

1) Definitions from UN-ECE Regulation No. 78:

Category L_1: Two-wheeled vehicles with an engine cylinder capacity not exceeding 50 cc and a maximum design speed not exceeding 50 km/h.

Category L_2: Three-wheeled vehicles with an engine cylinder capacity not exceeding 50 cc and a maximum design speed not exceeding 50 km/h.

ISO 7116:1995, *Mopeds — Measurement of maximum speed.*

ISO 9132:1990, *Three-wheeled mopeds and motorcycles — Masses — Vocabulary.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 Braking system and components

3.1.1 braking system: Combination of parts (other than the engine) the function of which is progressively to reduce the speed of a moving moped, bring it to a halt and keep it stationary if it is already halted, consisting of

— the control,

— the transmission(s),

— the brake(s).

3.1.2 control: Part operated directly by the rider to supply to the transmission the energy required for braking or controlling the moped.

3.1.3 transmission: Combination of components which provide the functional link between the control and brake.

3.1.4 brake: Parts of the braking system in which the forces opposing the movement of the moped are developed.

3.2 Types of braking systems

3.2.1 independent braking system

(1) [in the case of two-wheeled mopeds (L_1)]: System which acts on only one wheel.

(2) [in the case of three-wheeled mopeds (L_2)]: System which acts on one or two wheels.

3.2.2 combined braking system

(1) [in the case of two-wheeled mopeds (L_1)]: System whereby at least two brakes on different wheels are actuated by the operation of a single control.

(2) [in the case of three-wheeled mopeds (L_2)]: System which operates on all the wheels.

3.3 Moped loading

3.3.1 laden moped: Moped laden so as to reach its manufacturer's maximum total mass as defined in ISO 6726 or ISO 9132, including the mass of the rider and the equipment or instrumentation as described in 5.3, with the mass distribution(s) on the axles as stated by the moped manufacturer.

3.3.2 unladen moped: Moped in the condition vehicle kerb mass as defined in ISO 6726 or in the condition bare chassis mass in working order as defined in ISO 9132, to which are added the mass of the rider, the equipment and instrumentation as described in 5.3.

3.4 maximum speed: Speed which the moped can attain when tested in accordance with ISO 7116.

3.5 Test parameters

3.5.1 test speed, v: Moped speed measured at the moment that the rider begins to actuate the braking system control(s).

3.5.2 mean fully developed deceleration, a: Average deceleration measured (or calculated) from the moment that the brake force is fully developed until the moment that the moped comes to a stop.

3.5.3 stopping distance, L: Distance covered by the moped, measured from the moment that the rider begins to actuate the braking system control until the moment that the moped comes to a stop.

4 Test site conditions

4.1 Test surface

The test surface shall be dry, substantially level (i.e. it shall not have a gradient in excess of 1 %) and shall be free from extraneous materials. The surface shall afford good adhesion (for example: dry asphalt or a surface with a coefficient of friction which exceeds 0,75).

NOTE 1 The parking brake hill-holding test is conducted on a specified gradient.

4.2 Wind speed

The average wind speed shall not exceed 5 m/s.

4.3 Ambient temperature

The ambient temperature shall be between 0 °C and 40 °C.

4.4 Test lane for basic tests and wet brake tests

The test area immediately after the point at which the test is to commence shall be marked with a lane of sufficient length for the moped to be brought to a stop.

In the case of two-wheeled mopeds (L_1), this lane shall be 2,5 m wide. In the case of three-wheeled mopeds (L_2), this lane shall have a width of 2,5 m plus the moped track.

5 Moped preparation

5.1 Tyres

The tyres shall be inflated to the moped manufacturer's recommended pressure levels.

5.2 Rider and masses carried

The minimum mass of the rider and any test equipment and instrumentation carried on the moped shall be 85 kg.

The mass distribution on the axles for laden moped tests shall be in accordance with the moped manufacturer's specifications and shall be noted in the test report.

5.3 Instrumentation

The moped shall be prepared for the tests specified in table 1 by the provision and/or calibration of existing instruments, as required.

Optional instruments may be added to provide data but care shall be taken to ensure that any equipment does not significantly affect the braking system performance or the dynamic characteristics of the moped.

Table 1 — Tests and instrumentation

Test	Measurand		Example of instrument
	obligatory	optional	
Static test	Control force		Force meter
		Control travel	Linear potentiometer
		Force in transmission	Hydraulic pressure transducer; cable tension transducer
Basic test	Speed		Calibrated speedometer, photoelectronic measuring systems
	Brake temperature		Rubbing thermocouple, infrared "gun"
	Control force		Force meter
	Stopping distance		Chalk-pellet gun, third wheel, ink jet marker
	Motorcycle mass		Load cells, weighbridge
		Deceleration	Motometer, third wheel, recording deceleration meter
		Force in transmission	Hydraulic pressure transducer; cable tension transducer
		Control travel	Linear potentiometer

Test	Measurand		Example of instrument
	obligatory	optional	
Wet brake test [1]	Speed		Calibrated speedometer, photoelectronic measuring systems
	Brake temperature		Rubbing thermocouple, infrared "gun"
	Control force		Force meter
	Mass		Load cells, weighbridge
		Stopping distance	Chalk-pellet gun, third wheel, ink jet marker
		Deceleration	Motometer, third wheel, recording deceleration meter
		Deceleration throughout braking stop	Motometer, third wheel, recording deceleration meter
		Force in transmission	Hydraulic pressure transducer; cable tension transducer
		Control travel	Linear potentiometer
Heat fade test	Speed		Calibrated speedometer, photoelectronic measuring systems
	Brake temperature		Rubbing thermocouple, infrared "gun"
	Control force		Force meter
	Stopping distance		Chalk-pellet gun, third wheel, ink jet marker
	Mass		Load cells, weighbridge
	Time		Stopwatch
		Deceleration	Motometer, third wheel, recording deceleration meter
		Force in transmission	Hydraulic pressure transducer; cable tension transducer
		Control travel	Linear potentiometer
Parking brake test	Time		Stopwatch
	Control force		Force meter
		Control travel	Linear potentiometer

1) Where this test result depends on the analysis of a deceleration trace provided by a recording system, the system shall have damping and frequency-response characteristics such that the behaviour of the vehicle under braking is faithfully reproduced.

5.4 Preparation for wet brake test

5.4.1 The equipment shall continuously wet the brake(s) throughout each test run at a flowrate of [15] l/h distributed equally on both sides of each brake.

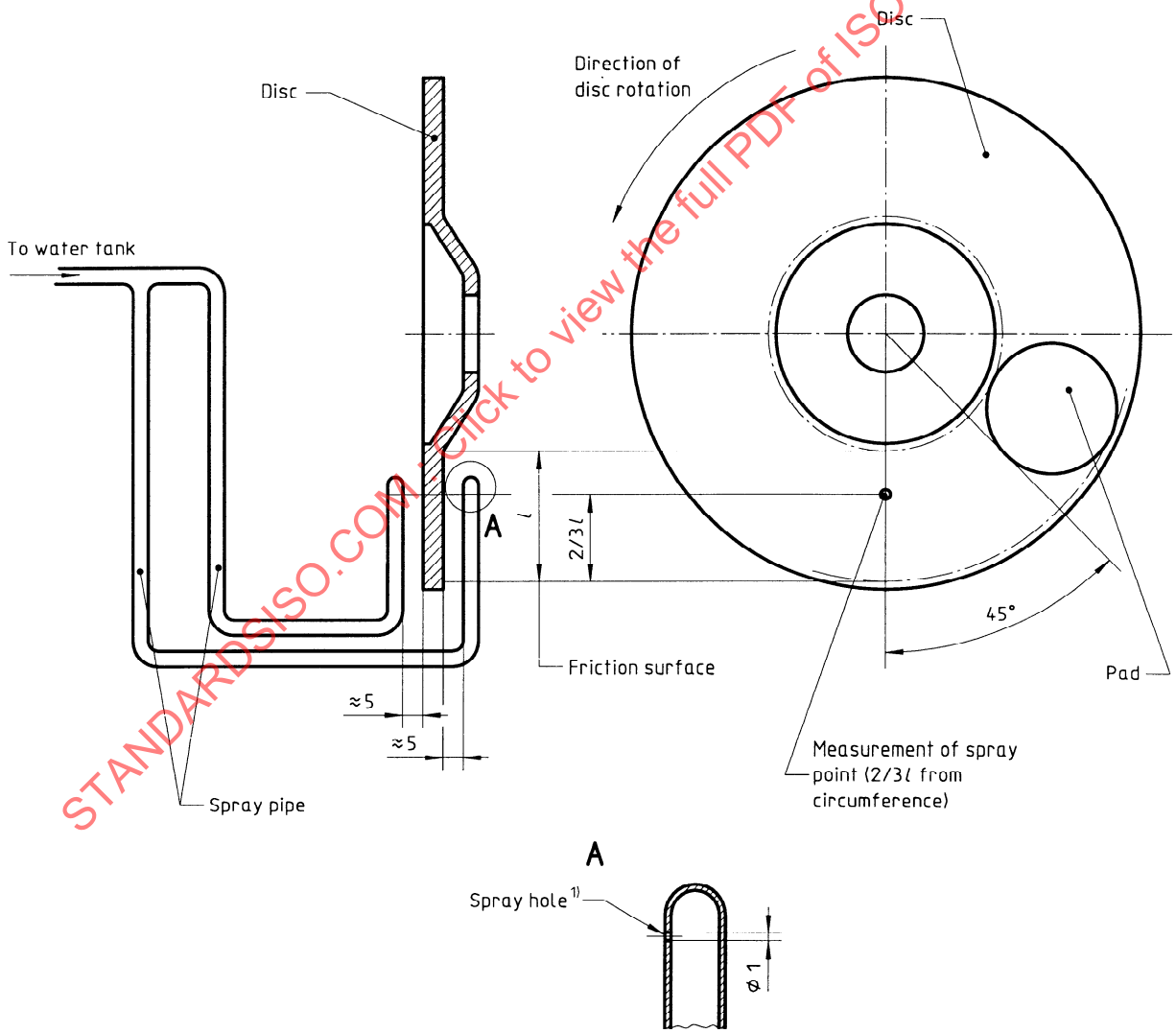
NOTE 2 Two brakes fitted on one wheel are to be treated as two brakes.

5.4.2 For exposed or partly exposed disc brakes, the prescribed quantity of water shall be directed on the rotating disc in such a manner as to be equally distributed over the disc surface swept by the friction pad(s).

For fully exposed disc brakes, the water shall be directed over the disc surface(s) 45° in advance of the friction pad(s); for partly exposed disc brakes, the water shall be directed over the disc surface(s) 45° in advance of the shield or baffle.

The water shall be directed in a continuous jet, in a direction perpendicular to the disc surface, from single jet nozzles so positioned as to be between the inner extremity and a point two-thirds of the distance, l, from the outer extremity of that part of the disc swept by the friction pads (see figure 1).

Dimensions in millimetres



1) Spray water shall not be dispersed.

Figure 1

5.4.3 For fully enclosed disc brakes, the water shall be directed on to both sides of the shield or baffle.

Where the nozzle(s) would be coincident with a ventilation or inspection port, the water shall be applied 45° in advance of the said port.

5.4.4 Where it is not possible to apply the water in the position specified in 5.4.2 and 5.4.3 owing to the presence of some moped fixed part, the water shall be applied at the first point, exceeding 45°, where uninterrupted application is possible.

5.4.5 For drum brakes, the prescribed amount of water shall be distributed equally on either side of the drum brake unit (on the stationary back plate and on 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, provided always that no nozzle shall be within 15° of, or coincident with, a ventilation or inspection port.

5.5 Preconditioning

In submitting a vehicle for tests, the presenter shall state what preconditioning measures have been taken in respect of any of the braking system components.

6 Test requirements

6.1 Brakes

Brakes and braking systems shall not be adjusted at any time during the dynamic tests.

6.2 Moped and brakes

For the basic tests and heat fade tests

a) the moped and the brake(s) to be tested shall be substantially free from moisture;

b) the brake(s) shall be cold (100 °C or less) at the start of the test, measured on the disc or on the outside of the drum.

6.3 Application of control forces

The control forces shall be applied rapidly, up to the prescribed level and then be maintained constant during the stop.

6.4 Test sequence

The mopeds may be submitted to either an individual test or a complete series of tests. When the complete series of tests is conducted, the sequence should be followed for subsequent tests in order to obtain repeatability. For the same reason and to minimize variations, it is recommended that the heat fade test is the final dynamic test.

6.5 Rider

During every dynamic test, the rider shall be seated on the saddle as for normal driving and shall maintain the same position throughout the test run.

6.6 Performance

6.6.1 The measured performance of the braking system(s) shall be obtained without wheel(s) locking.

6.6.2 For dynamic tests, the performance of a braking system shall be determined either by measuring the stopping distance, L, in metres, in relation to the test speed, or by measuring the mean fully developed deceleration for the stop.

The two methods are nominally related to one another through the following equation

$$L = [0,1]v + \frac{v^2}{25,92a}$$

where

v is the test speed, in kilometres per hour;

a is the mean fully developed acceleration, in metres per second squared.

However one method should be adhered to during a test series and for the comparison of results.

6.7 Test speed tolerance and correction factor

6.7.1 The speeds specified are subject to a tolerance of ± 5 km/h.

6.7.2 If the results are expressed in terms of stopping distance, L, in metres, a correction factor shall be applied to take account of any differences between the recorded test speed, v, and the prescribed test speed, v_p. The corrected stopping distance, L_c, in metres, shall be determined from the equation

$$L_c = \left[\frac{v_p}{v}\right]^2 \times L + \frac{tv_p}{3,6}$$

where

v_p is the prescribed test speed, in kilometres per hour;

v is the (recorded) test speed, in kilometres per hour;

L is the (recorded) stopping distance, in metres;

t is the time, in seconds, from the moment when the rider begins to actuate the braking system control until the moment when the marking (or recording) system begins to mark (or record) on the test surface (or recording paper).

6.8 Test report

The following information shall be recorded in the relevant test report(s) (see annex A):

a) the test condition details (e.g. speeds, control forces, ambient conditions, vehicle identification, moped loading conditions, relevant tyre information, etc.);

b) the results of each test (e.g. mean fully developed deceleration, stopping distance, residual performance, etc.);

c) the sequence in which the tests were performed, where applicable;

d) any deviation of the vehicle from its course, any abnormal vibration, noise, behaviour, etc.

7 Procedure for static test

7.1 Load tests

Each of the load tests (7.1.1 and 7.1.2) shall be performed twice.

7.1.1 Hand-operated brakes

Subject hand lever(s) for braking system(s) to a force of 400 N, applied to a point on the lever's forward surface in a direction normal to a plane defined between the central axis of the fulcrum of the lever and its extreme outer point.

The point shall be [50] mm from the outer end of the lever.

7.1.2 Foot-operated brakes

Subject brake pedal(s) to a force of 750 N, applied at right angles to, and in the centre of, the foot pad.

7.2 Performance

After the load tests, the braking system(s) shall be examined for signs of damage and permanent distortion.

8 Procedure for basic tests

8.1 General

The moped shall be tested [laden] and [unladen].

For each control, a separate test shall be performed.

The prescribed test speed shall be [90] % of the maximum speed of the vehicle, or [40] km/h, whichever is the lower of the two values.

8.2 Test

8.2.1 Approach the starting point for each test at such a speed that the rider can apply the control at the prescribed test speed and at the point at which the test is to commence.

8.2.2 For the approach, select a gear suitable for the prescribed test speed.

8.2.2.1 For mopeds with a manual gearbox or an automatic transmission where the gearbox can be disengaged manually, immediately before passing the point at which the test is to commence, disengage the drive and enter the centre of the lane. Then keep the drive disengaged for the remainder of the test.

8.2.2.2 For mopeds with a fully automatic transmission, immediately before passing the point at which the test is to commence, fully close the throttle and enter the centre of the lane. Then carry out the remainder of the test under normal operating conditions for the automatic transmission.

8.2.3 After the front wheel has passed the point at which the test is to commence, actuate the control, as specified in 7.1.

8.2.4 Bring the moped to a smooth, safe stop without deviating at any point from the lane marked on the test area.

8.3 Performance

The mean fully developed deceleration and/or stopping distance shall be measured for each moped speed/vehicle loading condition, without wheel-locking and without exceeding the maximum permitted control forces:

[200] N for hand controls;

[350] N for foot controls.

9 Procedure for wet brake test

9.1 General

The moped shall be tested [laden] and [unladen].

For each control a separate test shall be performed, where relevant.

NOTE 3 Alternative tests for drum brakes and fully enclosed disc brakes are described in 9.3.

The prescribed test speed for both parts of each wet brake test shall be [90] % of the maximum speed of the moped, or [40] km/h, whichever is the lower of the two values.

9.2 Test

9.2.1 Each wet brake test is performed in two parts:

a) the first part is a (dry) basic test (as prescribed in clause 8) in which the control force is such that a mean fully developed deceleration of [2,5] m/s^2 ± 5 % is achieved;

b) the second part is a similar test carried out with the same control force but with the relevant brake(s) wetted in accordance with 5.4.

9.2.2 To ensure correct wetting of the brake(s) for the second part of the test, the moped shall be driven:

a) with the wetting equipment functioning continuously as prescribed in 5.4;

b) at the test speed prescribed in 9.1;

c) without operating the braking system to be tested;

d) for a distance of not less than 500 m prior to the point at which the test is to carried out.

9.2.3 Carry out the same procedure as in 8.2.

9.3 Alternative test for drum brakes and fully enclosed disc brakes

As an alternative test, drum brakes and fully enclosed disc brakes may be submitted to the wetting procedure described in 5.4.5 and 9.2.2, and then be dismantled within 5 min of completing the wetting procedure.

If no water is found inside the drum or the disc brake enclosure, on the inner surfaces of the stationary back plate nor on the brake shoe(s) or discs, a complete series of wet brake tests is deemed to be unnecessary.

If this alternative test method is used, it shall be recorded in the test results.

9.4 Performance

The performance of the wet brake(s) shall be assessed in terms of deceleration achieved in the period of [0,5] s to [1] s after control application for both the dry and wet brake tests (9.2.1), recording the average deceleration achieved. In addition the maximum decelerations achieved during the stops shall be recorded.

The performance of a moped with (a) wet brake(s) shall be expressed as a percentage of its performance with (a) dry brake(s), using the average decelerations recorded above.

In case of doubt the average deceleration shall be calculated by integrating the function defined by the trace of the deceleration between 0,5 s and 1 s.

The maximum deceleration figure of a moped with (a) wet brake(s) shall be expressed as a percentage of its maximum deceleration with (a) dry brake(s) using the maximum decelerations recorded above.

NOTE 4 An alternative method of assessing the wet brake(s) performance is described in 11.2.

10 Procedure for parking brake test (where applicable)

10.1 General

The moped shall be tested:

a) [unladen], as defined in 3.3.2;

b) [unladen], but without the rider;

c) [laden], as defined in 3.3.1;

d) [laden], but without the rider;

e) facing up the test gradient;

f) facing down the test gradient.

10.2 Test

Park the moped on the specified test gradient [18] % with the engine disconnected.

For each loading condition, apply the parking brake using the maximum permitted control force ([400] N by hand, [500] N by foot).

10.3 Performance

During the test, observe the behaviour of the moped and record it in the test report. The moped shall remain stationary for at least 1 min.

11 Complementary tests

The following complementary tests may be carried out in addition to the previous tests.

11.1 Basic tests operating both braking systems together and simultaneously

In these tests, the moped shall be tested as prescribed in clause 8. However all brake controls shall be applied together and simultaneously to allow the tester to get a feel for the maximum braking performance of the moped.

11.2 Wet brake test procedure: alternative assessment of wet performance

The performance of the wet brake(s) can also be assessed in terms of the stopping distance for the whole stop.

For both the dry and the wet brake (9.2.1) tests, the stopping distance achieved over the whole stop shall be recorded.

The performance of a moped with (a) wet brake(s) shall be expressed as a percentage of its performance with (a) dry brake(s), using the stopping distances recorded above.

Annex A
(normative)

Specimen format for test result sheet

Report No. .....

A.1 Test moped

Manufacturer: .....

Model: ..... Year: .....

Category: ..... VIN (see ISO 3779): .....

Submitted by: .....

Engine type: ..... Capacity: ..... cm^3

Power rating: .....

No. of gears and selection means: .....

Maximum speed (ISO 7116): ..... km/h

A.2 Brake details

	Front	Rear
Brake type:	.....	.....
Transmission type:	.....	.....
Brake size:	.....	.....
Friction material (make + type):	.....	.....
Disc/drum material:	.....	.....
Disc/drum treatment (holes, slots, plating, etc.):	.....	.....

Brake system layout: .....

Special features: .....

Preconditioning: .....

A.3 Tyre details

	Front	Rear
Manufacturer:	.....	.....
Size:	.....	.....
Rating:	.....	.....
Type:	.....	.....
Pressure laden:	.....	.....
Pressure unladen:	.....	.....

A.4 Test masses

Test rider: ..... kg

Equipment and instrumentation: ..... kg

Unladen:	Total: ..... kg;	Front: ..... kg;	Rear: ..... kg
Laden:	Total: ..... kg;	Front: ..... kg;	Rear: ..... kg

A.5 Test equipment

Test equipment and instrumentation fitted: .....

Odometer reading, where fitted:

— start: .....

— finish: .....

— total: .....

A.6 Test conditions

Date of test: .....

Rider's name (optional): .....

Observer's name (optional): .....

Test site: .....

Ambient temperature: ..... °C

Wind speed: ..... m/s

Other weather conditions: .....

Road surface and condition: .....

Name of test organization: .....

Date(s) of tests: .....

Date of report: .....

A.7 Static test results

Test No.: .....

Test date: .....

Odometer reading: .....

Force applied to hand lever: ..... N

Force applied to pedal: ..... N

Test performed twice: yes/no

Examine condition of braking system and report: .....

.....

.....