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Working Party on Brakes and Running Gear (GRRF)
(Fifty-sixth session, 20-22 September 2004,
agenda item 6.2.)

PROPOSAL FOR A NEW DRAFT REGULATION

UNIFORM PROVISION CONCERNING THE APPROVAL OF TYRES WITH REGARD TO ADHESION ON WET SURFACE

Transmitted by the expert from the European Tyre and Rim Technical Organization (ETRTO)

Note: The text reproduced below has been prepared by the expert from ETRTO in order to rationalize and have a better approach from the regulatory point of view with regard to tyre type approval and tyre sidewall markings (informal document No. GRRF-55-25 presented by ETRTO at the fifty-fifth session), allowing also Contracting Parties to decide whether or not to adopt or to impose a prescription on tyre adhesion on wet surfaces.

Note: This document is distributed to the Experts on Brakes and Running Gear only.

1. SCOPE

This Regulation contains provisions relating to the adhesion performance level of tyres in rolling conditions on wet surfaces.

1.1. This Regulation applies to newly manufactured pneumatic tyres of Class C1 (see paragraph 2.4.1. below) intended to be fitted to road vehicles of category M1, O1 or O2 1/ manufactured on, or after 1 October 1980. It does not, however, apply to:

1.1.1. Tyres designed as "Temporary use spare tyres" and marked "Temporary use only";

1.1.2. Tyres having a nominal rim diameter code lower or equal to 10 (or 254 mm) or higher or equal to 25 (or 635 mm);

1.1.3. Tyres designed for competitions.

1.1.4. Tyres of Classes C2 and C3 (see paragraph 2.4. below) intended to be fitted to road vehicles of categories other than M1 (Note: subsequent amendments will encompass those tyres).

1.1.5. Tyres fitted with additional devices to improve traction properties (e.g. studded tyres).

1.1.6. Tyres with a speed rating less than 80 km/h (speed symbol "F").

2. DEFINITIONS

For the purpose of this Regulation, in addition to the definitions contained in Regulations Nos. 30 and 54, the following definitions apply.

2.1. "Type of tyre" means, in relation to this Regulation, a range of tyres consisting of a list of tyre size designations, brand names and trade descriptions, which do not differ in such essential characteristics as:

2.1.1. the manufacturer's name

2.1.2. the tyre class (see paragraph. 2.4)

2.1.3. the tyre structure

2.1.4. the category of use: normal tyre, special use tyre and snow tyre;

1/ As defined in Annex 7 to the Consolidated Resolution on the Construction of Vehicles (R.E.3) (document TRANS/WP.29/78/Rev.1/Amend.2).

2.1.4.1. in case of snow tyres specify also whether speed category Q (160 km/h) or speed category R and above (≥170 km/h)

2.1.5. the tread pattern (see paragraph. 3.2.1.).

2.2. "Brand name" or "Trade description" means the identification of the tyre as given by the tyre manufacturer. The Brand name may be the same as that of the manufacturer and the Trade description may coincide with the trade mark.

2.3. "Adhesion on wet surfaces" means the relative braking performance, on a wet surface, of a test vehicle equipped with the candidate tyre in comparison to that of the same test vehicle equipped with a reference tyre (SRTT).

2.4. "Tyre Class" means one of the following groupings:

2.4.1. "Class C1 tyres": Tyres conforming to Regulation No. 30.

2.4.2. "Class C2 tyres": Tyres conforming to Regulation No. 54 and identified by a load capacity index in single formation lower or equal to 121 and a speed category symbol higher or equal to "N".

2.4.3. "Class C3 tyres": Tyres conforming to Regulation No. 54 and identified by:

(a) a load capacity index in single formation higher or equal to 122, or

(b) a load capacity index in single formation lower or equal to 121 and a speed category symbol lower or equal to "M".

2.5. "Representative tyre size" means the tyre size which is submitted to the test described in Annex 3 to this Regulation, to assess the conformity for the type approval of the type of tyre.

2.6 "Temporary-use spare tyre" means a tyre different from a tyre intended to be fitted to any vehicle for normal driving conditions; but intended only for temporary use under restricted driving conditions.

2.7 "Tyres designed for competition" means tyres intended to be fitted to vehicles involved in motor sport competition and not intended for non-competitive on-road use.

2.8. "Normal tyre" means a tyre intended for normal, everyday, on-road use;

2.9. "Special use tyre" means a tyre intended for mixed use both on- and off-road or for other special duty.

2.10 "Snow tyre" means a tyre whose tread pattern, tread compound or structure are primarily designed to achieve in snow conditions a performance better than that of a normal tyre with regard to its ability to initiate or maintain vehicle motion.

2.11. "Standard Reference Test Tyre (SRTT)" means a tyre that is produced, controlled and stored in accordance with the American Society for Testing and Materials (ASTM) Standard E 1136 - 93 (Re-approved 1998);

2.12. "Candidate tyre" means a tyre, representative of the type, that is submitted for approval in accordance with this Regulation;"

2.13. "Control tyre" means a normal production tyre that is used to establish the wet grip performance of tyre sizes unable to be fitted to the same vehicle as the Standard Reference Test Tyre - see paragraph 2.2.2.16. of Annex 8 to this Regulation;

2.14. "Wet grip index ("G")" means the ratio between the performance of the candidate tyre and the performance of the Standard Reference Test Tyre;

2.15. "Peak Brake Force Coefficient ("pbfc")" means the maximum value of the ratio of braking force to vertical load on the tyre prior to wheel lock-up;

2.16. "Mean fully developed deceleration ("mfdd")" means the average deceleration calculated on the basis of the measured distance recorded when decelerating a vehicle between two specified speeds;

2.17. "Coupling (Hitch) height" means the height when measured perpendicularly from the centre of the articulation point of the trailer towing coupling or hitch to the ground, when the towing vehicle and trailer are coupled together. The vehicle and trailer must be standing on level pavement surface in its test mode complete with the appropriate tyre(s) to be used in the particular test.

3. APPLICATION FOR APPROVAL

3.1. The application for approval of a type of tyre with regard to adhesion performance level on wet surfaces shall be submitted by the tyre manufacturer or by his duly accredited representative. It shall specify:

3.1.1. The manufacturer;

3.1.2. The address of the applicant;

3.1.3. Address(es) of manufacturing plant(s);

3.1.4. Brand name(s), trade description(s), trade mark(s);

3.1.5. Tyre class (Class C1, C2 or C3) (see paragraph 2.4. of this Regulation);

3.1.6. Tyre structure;

3.1.7. Category of use (normal, snow, or special);

3.1.7.1. in case of "snow" specify also if speed category symbol Q or $\underline{\geq}$ R

3.1.8. A list of tyre size designations covered by this application.

3.2. The application for approval shall be accompanied (in triplicate) by:

3.2.1. Details of the major features, with respect to the effects on tyre adhesion on wet surfaces, of the tread pattern(s) to be used on the designated range of tyre sizes. This may be by drawing, photograph or description, but must be sufficient to allow the type approval authority or technical service to determine whether any subsequent changes to the major features will adversely affect the tyre adhesion performances on wet surfaces. The effects of changes to minor details of tyre construction on tyre adhesion on wet surfaces will be evident and determined during checks on conformity of production.

3.2.2. Drawings or photographs of the tyre sidewall, showing the information given in paragraph 3.1.4. above and the approval marking referred to in paragraph 5., shall be submitted once the production has been established, but no later than one year after the date of granting of type approval.

3.3. At the request of the type approval authority, the applicant shall submit samples of tyres for test or copies of test reports from the technical services, communicated as given in paragraph 11. of this Regulation.

3.4. With regard to the application, testing may be confined to a worst case selection, at the discretion of the type approval authority or designated technical service.

4. MARKINGS

4.1. All tyres constituting the type of tyre must be marked as prescribed by either Regulation No. 30 or Regulation No. 54, as applicable.

4.2. In particular tyres must bear:

4.2.1. the manufacturer's name or trade mark

4.2.2. the trade description (see paragraph 2.2.). However, the trade description is not required when it coincides with the trade mark.

4.2.3. the tyre size designation

4.3. Tyres shall provide adequate space for the approval mark as shown in Annex 2 to this Regulation.

4.4. The approval mark shall be moulded into or onto the sidewall of the tyre, shall be clearly legible and shall be located in the lower area of the tyre on at least one of the sidewalls;

4.4.1. However, in the case of tyres identified by the tyre to rim fitment configuration symbol "A", the marking may be located anywhere on the outside sidewall of the tyre.

4.5. The approval mark, when appropriate extension of approval to Regulations Nos. 30 or 54 in order to certify that additional conformity to this regulation has been granted, may be replaced by the approval mark pertaining to those Regulations supplemented with the suffix "W"

5. APPROVAL

5.1. If the representative tyre size of the type of tyre submitted for approval pursuant to this Regulation meets the requirements of paragraphs 6. and 7. below, approval of that type of tyre shall be granted.

5.2. An approval number shall be assigned to the type of tyre approved. The same Contracting Party may not assign the same number to another type of tyre.

5.3. Notice of approval or extension of approval or refusal of approval of a type of tyre pursuant to this Regulation shall be communicated to the Parties to the Agreement, which apply this Regulation by means of a form conforming to the model in Annex 1 to this Regulation.

5.4. In the space referred to in paragraph 4.3. and in accordance with the requirements of paragraph 4.4. there shall be affixed to every tyre size, conforming to the type of tyre approved under this Regulation, an international approval mark consisting of:

5.4.1. a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval 2/, and

5.4.2. the approval number placed to the right (or below) the circle prescribed in paragraph 5.4.1.

5.4.3. When the provisions of paragraph 4.5. are satisfied, it is not required to mark on the tyre sidewalls the approval mark relevant to this Regulation

5.5. If the tyre conforms to type approvals under one or more other Regulations annexed to the Agreement in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 5.4.1. need not be repeated. In such a case the additional numbers and symbols of all the Regulations under which approval has been granted in the country which has granted approval under this Regulation shall be placed adjacent to the symbol prescribed in paragraph 5.4.1. above.

5.6. Annex 2 to this Regulation gives examples of arrangements of approval marks.

6. SPECIFICATIONS

6.1. The wet grip performance will be based on a procedure that compares either peak brake force coefficient ("pbfc") or mean fully developed deceleration ("mfdd") against values achieved by a Standard Reference Test Tyre (SRTT). The relative performance shall be indicated by a Wet grip index (G).

6.2. When tested in accordance with either procedure given in Annex 3 to this Regulation the tyre shall meet the following requirements:

2/ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain, 10 for Serbia and Montenegro, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 (vacant), 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal, 22 for the Russian Federation, 23 for Greece, 24 for Ireland, 25 for Croatia, 26 for Slovenia, 27 for Slovakia, 28 for Belarus, 29 for Estonia, 30 (vacant), 31 for Bosnia and Herzegovina, 32 for Latvia, 33 (vacant), 34 for Bulgaria, 35 (vacant), 36 for Lithuania, 37 for Turkey, 38 (vacant), 39 for Azerbaijan, 40 for The former Yugoslav Republic of Macedonia, 41 (vacant), 42 for the European Community (Approvals are granted by its Member States using their respective ECE symbol), 43 for Japan, 44 (vacant), 45 for Australia, 46 for Ukraine, 47 for South Africa, 48 for New Zealand, 49 for Cyprus and 50 for Malta. Subsequent numbers shall be assigned to other countries in the chronological order in which they ratify or accede to the Agreement Concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, and the numbers thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.

6.2.1. In the case of an ordinary (road type) tyre, the Wet grip index (G) shall be ≥ 1.1;

6.2.2. In the case of a Snow tyre that bears a speed symbol indicating a maximum permissible speed not greater than 160 km/h ("Q"), the Wet grip index (G) shall be ≥ 0.9;

6.2.3. In the case of a snow tyre that bears a speed symbol indicating a maximum permissible speed greater than 160 km/h ("R" and above, plus "H") the Wet grip index (G) shall be ≥ 1.0."

7. MODIFICATIONS OF THE TYPE OF PNEUMATIC TYRE AND EXTENSION OF APPROVAL

7.1. Every modification of the type of tyre, approved with respect to adhesion performance on wet surfaces in accordance with this Regulation, shall be notified to the type approval authority which approved the type of tyre. The authority may either:

7.1.1. Consider that the modifications are unlikely to have any appreciable adverse effect on the adhesion performance on wet surfaces and that the tyre will comply with the requirements of this Regulation; or

7.1.2. Require further samples to be submitted for test or further test reports from the designated technical service.

7.1.3. Confirmation or refusal of approval, specifying the modifications, shall be communicated by the procedure given in paragraph 5.3. of this Regulation to the Parties to the Agreement which apply this Regulation.

7.1.4. The type approval authority granting the extension of approval shall assign a series number for such an extension which shall be shown on the communication form.

8. CONFORMITY OF PRODUCTION

The conformity of production procedures shall comply with those set out in the Agreement, Appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2) with the following requirements:

8.1. Any tyre approved under this Regulation shall be so manufactured as to conform to the adhesion performance on wet surfaces of the type of tyre approved and satisfy the requirements of paragraph 6. above.

8.2. In order to verify conformity as prescribed in paragraph 8.1. above, a random sample of tyres bearing the approval mark required by this Regulation shall be taken from the series production. The normal frequency of verification of conformity of production shall be at least once every two years.

8.3. Production shall be deemed to conform to the requirements of this Regulation if the levels measured comply with the limits prescribed in paragraph 6.1. above, with an

additional allowance of 2 per cent for possible mass production variations and variability of test conditions.

9. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

9.1. The approval granted in respect of a type of tyre pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 8. above are not complied with, or if any tyre of the type of tyre exceeds the limits given in paragraph 8.3. above.

9.2. If a Party to the Agreement, which applies this Regulation, withdraws an approval, it has previously granted, it shall forthwith notify the other Contracting Parties applying this Regulation by means of a copy of the approval form conforming to the model in Annex 1 to the Regulation.

10. PRODUCTION DEFINITELY DISCONTINUED

If the holder of an approval completely ceases to manufacture a type of pneumatic tyre approved in accordance with this Regulation, he shall so inform the authority, which granted the approval. Upon receiving the relevant communication that authority shall inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.

11. NAMES AND ADDRESSES OF TECHNICAL SERVICES CONDUCTING APPROVAL TESTS AND OF ADMINISTRATIVE DEPARTMENTS

The Parties to the Agreement which apply this Regulation shall communicate to the United Nations Secretariat, the names and addresses of the technical services conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or extension of approval or refusal or withdrawal of approval, issued in other countries, are to be sent.

The Parties to the Agreement which apply this Regulation may use laboratories of tyre manufacturers and may designate, as approved test laboratories, those among them which are situated on their territory or on the territory of another Party to the Agreement subject to a preliminary agreement to this procedure by the competent administrative department of the latter.

11.3. Where a Party to the Agreement applies paragraph 11.2. above, it may, if it so desires, be represented at the tests by one or more persons of its choice."

12. INTRODUCTORY PROVISIONS

12.1. As from the date of entry into force of this Regulation, Contracting Parties applying this Regulation shall not

(a) refuse to grant UNECE approval for a type of tyre under this Regulation, or

(b) prohibit the sale or entry into service of a tyre if the tyre falls within the scope of this Regulation and complies with the requirements of this Regulation.

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Annex 1

COMMUNICATION

(maximum format: A4 (210 x 297 mm))

Issued by: Name of administration:
.....

concerning: 2/ APPROVAL GRANTED
APPROVAL EXTENDED
APPROVAL REFUSED
APPROVAL WITHDRAWN
PRODUCTION DEFINITELY DISCONTINUED

of a type of tyre with regard to adhesion performance on wet surfaces pursuant to Regulation No. XXX.

Approval No. .... Extension No. ....

1. Manufacturer's name and address(es):

2. If applicable, name and address of manufacturer's representative:

3. "Tyre class" and "category of use" of the type of tyre:

4. Brand(s) name(s) and/or Trade description(s) of the type of tyre:

5. Technical service and, where appropriate, test laboratory approved for purposes of approval or of verification of conformity tests:

6.

7. Number of report issued by that service:

8. Date of report issued by that service:

9. Reason(s) of extension (if applicable):

1/ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation)

2/ Strike out what does not apply

10. Any remarks:

11. Place:

12. Date:

13. Signature:

14. Annexed to this communication are:

14.1. A list of documents in the approval file deposited at the Administration services having delivered the approval and which can be obtained upon request.

14.2. A list of the tread-pattern designations (specify trademark or brand name and trade description) and the list of the tyre size designations constituting the type of tyre with regard to this Regulation.

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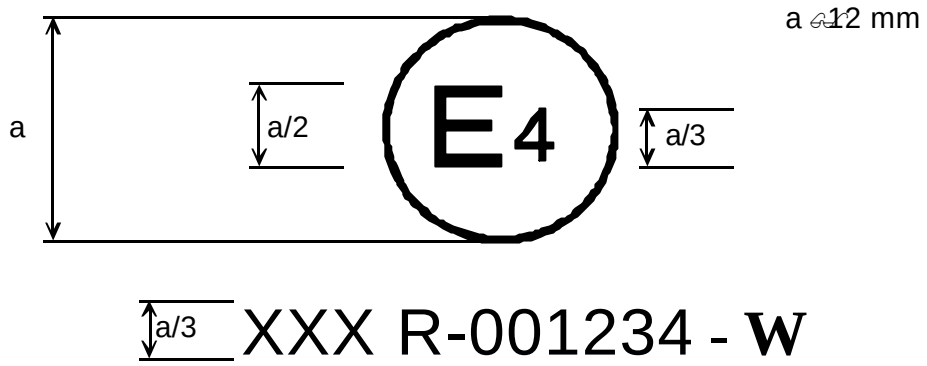
Annex 2

ARRANGEMENT OF APPROVAL MARKS

Example 1

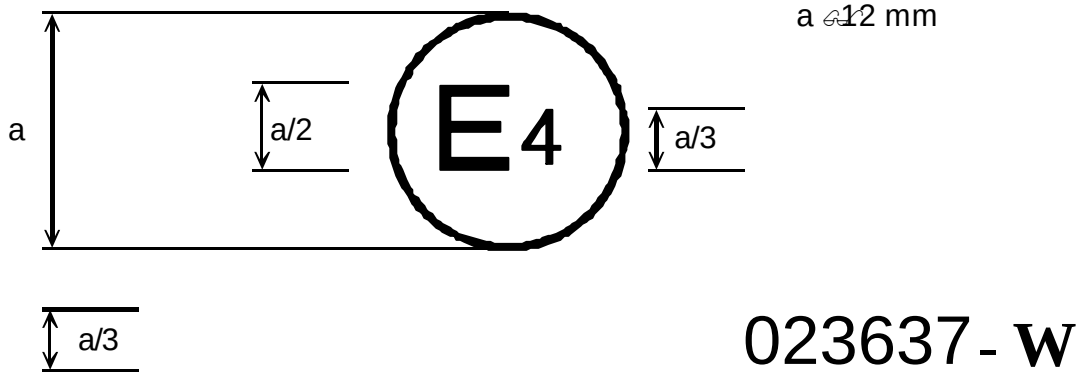


The above approval mark, affixed to a pneumatic tyre shows that the tyre concerned has been approved in the Netherlands (E4) pursuant to Regulation No. XXX (-W) under approval number 001234. The first two digits of the approval number (00) indicate that the approval was granted according to the requirements of this Regulation in its original form.

Example 2

(see paragraph 4.5. of the Regulation)

The approval mark, shown below, shows that the tyre concerned has been approved in the Netherlands (E4) pursuant to Regulation No. 30 with approval number 3637. The first two digits of the approval number indicate that, at the dates when the respective approval was granted, Regulation No. 30 included the 02 series of amendments. The additional suffix "W" shows that approval to Regulation 30 has been extended by the Netherlands to include certification of conformity to this Regulation. The additional suffix "-W" may be placed either after or just below the approval number.



Annex 3

TEST PROCEDURE FOR MEASURING WET GRIP
(Note: based on the text as Annex 8 on document TRANS/WP29/GRRF/2004/9)

1. General Test Conditions

1.1. Track Characteristics

The track shall have a dense asphalt surface with a gradient in any direction not exceeding 2 per cent. It shall be of uniform age, composition, and wear and shall be free of loose material or foreign deposits. The chipping size shall be between 8 and 13 mm and the sand depth measured as specified in ASTM E-965 shall be 0.7 ± 0.3 mm.

The surface friction value for the wetted track shall be established by one or other of the following methods:

1.1.1. Standard Reference Test Tyre (SRTT) method

When tested using the SRTT and the method given in 2.1. the average peak brake force coefficient (pbfc) shall be between 0.6 and 0.8. The measured values shall be corrected for the effects of temperature as follows:

Pbfc = Pbfc (measured) + 0.003 5(t – 20) where "t" is the wetted track surface temperature in degrees Celsius.

The test shall be conducted using the lanes and length of the track to be used for the wet grip test.

1.1.2. British Pendulum Number (BPN) method

The averaged British Pendulum Number (BPN) of the wetted track, measured in accordance with the procedure given in the American Society for Testing and Materials (ASTM) Standard 303-93 (Re-approved 1998) and using the Pad as specified in ASTM Standard E 501 - 94, shall be between 40 and 60 after temperature correction. Unless temperature correction recommendations are indicated by the pendulum manufacturer, the following formula can be used:

BPN = BPN (Measured value) + $0.34t - 0{,}0018\ t^2 - 6.1$ where "t" is the wetted track surface temperature in degrees Celsius

In the lanes of the track to be used during the wet grip tests, the BPN shall be measured at intervals of 10 m along the length of the lanes. The BPN shall be measured 5 times at each point and the coefficient of variation of the BPN averages shall not exceed by 10 per cent.

1.1.3. The type approval authority shall satisfy itself of the characteristics of the track on the basis of evidence produced in test reports.

1.2. Wetting conditions

The surface may be wetted from the track-side or by a wetting system incorporated into the test vehicle or the trailer.

If a track-side system is used, the test surface shall be wetted for at least half an hour prior to testing in order to equalize the surface temperature and water temperature. It is recommended that track-side wetting be continuously applied throughout testing.

The water depth shall be between 0.5 and 1.5 mm.

1.3. The wind conditions shall not interfere with wetting of the surface (Wind-shields are permitted).

The wetted surface temperature shall be between 5°C and 35°C and shall not vary during the test by more than 10°C.

2. Test Procedure

The comparative wet grip performance shall be established using either:

- a trailer or special purpose tyre evaluation vehicle, or

- a standard production passenger carrying vehicle (M1 category as defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3) contained in document TRANS/WP.29/78/Rev.1.)

2.1. <u>Trailer or special purpose tyre evaluation vehicle procedure</u>

2.1.1. The trailer, together with the towing vehicle, or the tyre evaluation vehicle shall comply with the following requirements:

2.1.1.1. Be capable of exceeding the upper limit for the test speed of 67 km/h and of maintaining the test speed requirement of 65 ± 2 km/h at the maximum level of application of braking forces;

2.1.1.2. Be equipped with an axle providing one test position having an hydraulic brake and actuation system that can be operated from the towing vehicle if applicable. The braking system shall be capable of providing sufficient braking torque to achieve the peak brake force coefficient over the range of tyre sizes and tyre loads to be tested;

2.1.1.3. Be capable of maintaining longitudinal alignment (toe) and camber of the test wheel and tyre assembly throughout the test within ± 0.5° of the static figures achieved at the test tyre loaded condition.

2.1.1.4. In the case of a trailer, the mechanical coupling device between the towing vehicle and trailer shall be such that, when the towing vehicle and trailer are coupled together, the drawbar, or part of the drawbar, of a trailer that incorporates the braking force measurement sensing is horizontal or slopes downwards from rear to front at a maximum angle of 5°. The longitudinal distance from the centre line of the articulation point of the coupling (hitch) to the transverse centre line of the axle of the trailer shall be at least ten times the coupling (hitch) height.

2.1.1.5. In the case of vehicles that incorporate a track wetting system, the water delivery nozzle(s) shall be such that the resulting water film is of uniform section extending at least 25 mm beyond the width of the tyre contact patch. The nozzle(s) shall be directed downwards at an angle of 20° to 30° and shall contact the track surface between 250 mm and 450 mm in front of the centre of the tyre contact patch. The height of the nozzle(s) shall be 25 mm or the minimum to avoid any obstacles on the track surface without exceeding a maximum of 100 mm. Water delivery rate shall ensure a water depth of 0.5 mm to 1.5 mm and shall be consistent throughout the test to within ± 10 per cent. Note that a typical rate for testing at 65 km/h will be 18l s^{-1} per metre of wetted track surface width.

The system shall be able to deliver the water such that the tyre, and track surface in front of the tyre, is wetted before the start of braking and throughout the duration of the test.

2.1.2. Test procedure

2.1.2.1. The test tyre shall be trimmed to remove any moulding protrusions that are likely to affect the test.

2.1.2.2. The test tyre shall be mounted on the test rim declared by the tyre manufacturer in the approval application and shall be inflated to 180 kPa in the case of the SRTT and standard load tyre or 210 kPa in the case of a Reinforced or Extra Load tyre.

2.1.2.3. The tyre shall be conditioned for a minimum of two hours adjacent to the test track such that it is stabilized at the ambient temperature of the test track area.

2.1.2.4. The tyre shall be loaded to:

- between 445 kg and 508 kg in the case of the SRTT and

- between 70 per cent and 80 per cent of the load value corresponding to the Load Index of the tyre in any other case.

2.1.2.5. Shortly before testing, the track shall be conditioned by carrying out at least ten braking tests on the part of the track to be used for the performance test programme but using a tyre not involved in that programme.

2.1.2.6. Immediately prior to testing, the tyre inflation pressure shall be checked and reset, if necessary, to the values given in paragraph 2.1.2.2.

2.1.2.7. The test speed shall be between 63 km/h and 67 km/h and shall be maintained between these limits throughout the test run.

2.1.2.8. The direction of the test shall be the same for each set of tests and shall be the same for the test tyre as that used for the SRTT with which its performance is to be compared.

2.1.2.9. The brakes of the test wheel assembly shall be applied such that peak braking force is achieved within 0.2 s and 0.5 s of brake application.

2.1.2.10. In the case of a new tyre, two test runs shall be carried out to condition the tyre. These tests may be used to check the operation of the recording equipment but the results shall not be taken into account in the performance assessment.

2.1.2.11. For the evaluation of the performance of any tyre compared with that of the SRTT, the braking test shall be carried out from the same point and in the same lane of the test track.

2.1.2.12. The order of testing shall be:

R1 – T – R2 where

R1 is the initial test of the SRTT, R2 is the repeat test of the SRTT and T is the test of the candidate tyre to be evaluated,

A maximum of three candidate tyres may be tested before repeating the SRTT test, for example:

R1–T1 – T2 – T3 – R2

2.1.2.13. The average value of peak brake force coefficient ("pbfc") shall be calculated over at least [four] valid results.

For results to be considered to be valid, the coefficient of variation as determined by the standard deviation divided by the average result, expressed as a percentage, shall be within 5 per cent. If this is cannot achieved with the repeat testing of the SRTT, the evaluation of the candidate tyre(s) shall be discarded and the entire order of testing shall be repeated.

2.1.2.14. Using the value of the average "pbfc" for each series of test runs:

In the case of the order of testing R1 – T – R2, the "pbfc" of the SRTT to be used in the comparison of the performance of the candidate tyre shall be taken to be:

(R1 + R2)/2 where:

R1 is the average "pbfc" for the first series of test runs of the SRTT and R2 is the average "pbfc" for the second series of test runs of the SRTT

In the case of the order of testing R1 – T1 – T2 – R2, the "pbfc" of the SRTT shall be taken to be:

2/3R1 + 1/3R2 for comparison with the candidate tyre T1 and

1/3R1 + 2/3R2 for comparison with the candidate tyre T2

In the case of the order of testing R1 – T1 – T2 – T3 – R2, the "pbfc" of the SRTT shall be taken to be:

3/4R1 + 1/4R2 for comparison with the candidate tyre T1;

(R1 + R2)/2 for comparison with the candidate tyre T2 and

1/4R1 + 3/4R2 for comparison with the candidate tyre T3

2.1.2.15. The wet grip index (G) shall be calculated as:

G = "pbfc" of candidate tyre ÷ "pbfc" of SRTT

2.2. Standard vehicle procedure

2.2.1. The vehicle shall be a standard M1 Category vehicle, capable of a minimum speed of 90 km/h and equipped with an anti-lock braking system (ABS).

2.2.1.1. The vehicle shall not be modified except:

- to allow the fitting of an increased range of wheel and tyre sizes

- to allow mechanical (including hydraulic, electrical or pneumatic) operation of the service brake control. The system may be operated automatically by signals from devices incorporated in, or adjacent to, the track.

2.2.2. Test procedure

2.2.2.1. The test tyres shall be trimmed to remove any moulding protrusions that are likely to affect the test.

2.2.2.2. The test tyre shall be mounted on the test rim declared by the tyre manufacturer in the approval application and shall be inflated to 220 Pa in all cases.

2.2.2.3. The tyre shall be conditioned for a minimum of two hours adjacent to the test track such that it is stabilized at the ambient temperature of the test track area.

2.2.2.4. The static load on the tyre shall be:

- between 381 kg and 572 kg in the case of the SRTT and

- between 60 per cent and 90 per cent of the load value corresponding to the Load Index of the tyre in any other case.

The variation in load on tyres on the same axle shall be such that the load borne by the more lightly loaded tyre shall not be less than 90 per cent of that of the tyre bearing the greater load.

2.2.2.5. Shortly before testing, the track shall be conditioned by carrying out at least ten braking tests from 90 km/h to 20 km/h on the part of the track to be used for the performance test programme but using tyres not involved in that programme.

2.2.2.6. Immediately prior to testing, the tyre inflation pressure shall be checked and reset, if necessary, to the values given in paragraph 2.2.2.2.

2.2.2.7. Starting from an initial speed of between 87 km/h and 83 km/h, a constant force sufficient to cause operation of the ABS on all wheels of the vehicle and to result in stable deceleration of the vehicle prior to the speed being reduced to 80 km/h, shall be applied to the service brake control and this force shall be maintained until the vehicle has been brought to rest.

The braking test shall be carried out with the clutch of a manual transmission disengaged or with the selector of an automatic transmission in the neutral position.

2.2.2.8. The direction of the test shall be the same for each set of tests and shall be the same for the candidate test tyre as that used for the SRTT with which its performance is to be compared.

2.2.2.9. In the case of new tyres, two test runs shall be carried out to condition the tyres. These tests may be used to check the operation of the recording equipment but the results shall not be taken into account in the performance assessment.

2.2.2.10. Each SRTT shall be discarded after a maximum of 60 braking test runs.

2.2.2.11. For the evaluation of the performance of any tyre compared with that of the SRTT, the braking test shall be carried out from the same point and in the same lane of the test track.

2.2.2.12. The order of testing shall be:

R1 – T – R2 where

R1 is the initial test of the SRTT, R2 is the repeat test of the SRTT and T is the test of the candidate tyre to be evaluated,

A maximum of three candidate tyres may be tested before repeating the SRTT test, for example:

R1–T1 – T2 – T3 - R2

2.2.2.13. The mean fully developed deceleration (mfdd) between 80 km/h and 20 km/h shall be calculated for at least three valid results in the case of the SRTT and 6 valid results in the case of the candidate tyres.

The mean fully developed deceleration (mfdd) is given by:

AD = 231.48 / S where:

S is the measured stopping distance between 80 km/h and 20 km/h

For results to be considered to be valid, the coefficient of variation as determined by the standard deviation divided by the average result, expressed as a percentage, shall be within 3 per cent. If this cannot be achieved with the repeat testing of the SRTT, the evaluation of the candidate tyre(s) shall be discarded and the entire order of testing shall be repeated.

The results shall be invalid if the initial and repeat tests of the SRTT are not within 2.5 per cent of each other.

The average of the calculated values of "mfdd" shall be determined for each series of test runs.

2.2.2.14. Using the value of the average "mfdd" for each series of test runs:

In the case of the order of testing R1 – T – R2, the "mfdd" of the SRTT to be used in the comparison of the performance of the candidate tyre shall be taken to be:

(R1 + R2)/2 where;

R1 is the average "mfdd" for the first series of test runs of the SRTT and R2 is the average "mfdd" for the second series of test runs of the SRTT.

In the case of the order of testing R1 – T1 – T2 – R2, the "mfdd" of the SRTT shall be taken to be:

2/3R1 + 1/3R2 for comparison with the candidate tyre T1 and

1/3R1 + 2/3R2 for comparison with the candidate tyre T2

In the case of the order of testing R1 – T1 – T2 – T3 – R2, the "mfdd" of the SRTT shall be taken to be:

3/4R1 + 1/4R2 for comparison with the candidate tyre T1;

(R1 + R2)/2 for comparison with the candidate tyre T2 and

1/4R1 + 3/4R2 for comparison with the candidate tyre T3

2.2.2.15. The wet grip index (G) shall be calculated as:

G = average "mfdd" of candidate tyre ÷ "mfdd" of SRTT

2.2.2.16. In the case where the candidate tyres cannot be fitted to the same vehicle as the SRTT, for example, due to tyre size, inability to achieve required loading and so on, comparison shall be made using intermediate tyres, hereinafter referred to as "control tyres", and two different vehicles. One vehicle shall be capable of being fitted with the SRTT and the control tyre and the other vehicle shall be capable of being fitted with the control tyre and the candidate tyre.

2.2.2.16.1. The wet grip index of the control tyre relative to the SRTT (G1) and of the candidate tyre relative to the control tyre (G2) shall be established using the procedure in paragraphs 2.2.2.1. to 2.2.2.15.

The wet grip index of the candidate tyre relative to the SRTT shall be the product of the two resulting wet grip indices, that is G1 x G2.

2.2.2.16.2. The track, and the portion of the track, shall be the same for all of the tests and the ambient conditions shall be comparable, for example, the surface temperature of the wetted track shall be within ± 5°C. All tests shall be completed within the same day.

2.2.2.16.3. The same set of control tyres shall be used for comparison with the SRTT and with the candidate tyre and shall be fitted in the same wheel positions.

2.2.2.16.4. Control tyres that have been used for testing shall subsequently be stored under the same conditions as required for the SRTT, that is, in accordance with
ASTM E 1136 – 93 (Re-approved in 1998).

2.2.2.16.5. Control tyres shall be discarded if there is irregular wear or damage or when the performance appears to have deteriorated."

Annex 3 – Appendix 1

TEST REPORT

Part 1 - Report

1. Type approval authority or Technical Service: ……

2. Name and address of applicant: ……

3. Test report No.: …….

4. Manufacturer and Brand Name or Trade description: ..…….

5. Tyre Class (C1, C2 or C3): ……...……

6. Category of use: ……

7. Adhesion coefficient on wet surfaces relative to SRTT: …...…….…

8. Comments (if any): ……

9. Date: ……...…

10. Signature: ……...……

Part 2 – Test data

1. Date of test: …..…….

2. Test vehicle (Make, model, year, modifications, etc. or trailer identification): ……

……

3. Location of test track: …..……..

3.1. Test track characteristics: ……..……..

3.2. Issued by: ……..……..

3.3. Method of certification: ……..

4. Test tyre details:……..

4.1. Tyre size designation and service description: ..…….

4.2. Tyre brand and trade description: ……

4.3. Reference inflation pressure: kPa …….……

4.4. Test data ……

4.5. Test rim width code: …..……

4.6. Temperature measurement sensor type: ……

4.7. Identification of the SRTT: ..……..

5. Valid Test results: ……..…….

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Annex 3 appendix 2 (if required)

SPECIFICATIONS FOR THE STANDARD REFERENCE TEST TYRE (SRTT)

Same as per ISO xxxxx (ASTM E 1136)

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