

Informal document No. 14  
(54th GRRF, 6-8 October 003,  
agenda item 6.2)

**Proposal of the informal group concerning amendments to Regulation No.30 in order to incorporate requirements for wet grip**

At the meeting of the informal group held in London on 10 and 11 September 2003, it was agreed to submit the following proposals for changes to the present 02 Series of Amendments to Regulation No.30 in order to incorporate requirements for wet grip performance of all future tyres approved in accordance with this Regulation.

The requirements are a substantial change to the existing Regulation and the group recommends that, following acceptance of these proposals, the Regulation is consolidated and issued as the 03 Series of Amendments. The resulting revised marking of “[30R] 03-----“ on the sidewall of the tyre will give an immediate indication that a particular tyre has been approved in respect of its wet grip performance.

The justification for the incorporation of wet grip performance requirements is to safeguard present levels of wet grip performance against any detrimental change to the tyre performance parameters compromise to take account of recently issued requirements to limit tyre to road noise emissions.

## PROPOSALS

Add Annex 8 to list of Contents:

Annex 8 Procedure for wet grip performance tests

Paragraph 1, Scope, insert additional paragraph to read:

It does not apply to studded tyres as defined in paragraph 2.2.1 but does apply to the base tyre into which studs can be fitted.

Paragraph 1, Scope, insert additional paragraph to read:

~~Additionally, the requirements of paragraph 6.4 with regard to wet grip performance shall not apply to temporary use spare tyres, and “T type” temporary use spare tyres as defined in paragraphs 2.3.5 and 2.3.6 of this Regulation. Marked as per paragraph 3.1.11.~~

Paragraph 2.1 amend to read:

2.1 “Type of pneumatic tyre” means a pneumatic tyre, or range of pneumatic tyres, which does, ~~or do,~~ not differ in certain essential characteristics as given in paragraph 4;

Paragraphs 2.1.1 to 2.1.7 should be deleted

Insert new paragraph 2.2.1 to read:

2.2.1 “Studded tyre” means a snow tyre, ~~usually a snow tyre,~~ fitted with studs inserted in holes provided for that purpose in the tread area of the tyre. The studs are of a hard material, usually metal, and project some distance from the surface of the tread.

Insert new paragraph 2.32 to read:

2.32 “Standard Reference Test Tyre (SRTT)” means a tyre that is produced, controlled and stored in accordance with ~~an~~the American Society for Testing and Materials (ASTM) Standard E 1136 – 93 (Re-approved 1998);

Insert new paragraph 2.33 to read:

- 2.33 “Candidate tyre” means a tyre **representative of the type** that is submitted for approval in accordance with this Regulation;

Insert new paragraph 2.34 to read:

- 2.34 “Control tyre” means a normal production tyre **subjected to specification of paragraph 2.2.2.16 to 2.2.2.16.5 of Annex 8** 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;

Insert new paragraph 2.35 to read:

- 2.35 “Wet grip index (G)” means the **comparison ratio** between the performance of the candidate tyre and the performance of the Standard Reference Test Tyre;

Insert new paragraph 2.36 to read:

- 2.36 “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 **[(trailer method)]**;

Insert new paragraph 2.37 to read:

- 2.37 “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 **[(vehicle method)]**.

Paragraph 4.1 amend to read:

- 4.1 The application for approval of a type of pneumatic tyre shall be submitted by the manufacturer or by his duly accredited representative. It shall specify:

Insert new paragraph 4.1.1 to read:

- 4.1.1 The manufacturer;

**Replace ~~insert new~~ paragraph 4.1.2 to read:**

- 4.1.2 The address of the manufacturer;

Insert new paragraph 4.1.3 to read:

- 4.1.3 The [name and] address of the manufacturing plants in which the tyre is to be produced;

Insert new paragraph 4.1.4 to read:

- 4.1.4 A list of all Brand Names, Trade Names, Trade Descriptions or Trade Marks to be applied to the tyre **type** (Note: this information is to register all names under which the approved tyre is to be marketed, that is, to take account of the practice of “own branding”);

Renumber existing paragraph 4.1.1 as 4.1.8

Renumber existing paragraph 4.1.3 as 4.1.5

Insert new paragraph 4.1.5.1 to read:

- 4.1.5.1 The category of use with regard to the requirements for wet grip performance **(see paragraph 6.4)**, that is, ordinary (road type) or snow tyre (marked M+S, M.S or M&S) and having a speed capability up to and including 160km/h **(speed symbol Q)** or snow tyre (marked M+S, M.S or M&S) and having a speed capability greater than 160km/h **(speed symbol R and above, plus H)**;

Renumber existing paragraph 4.1.4 as 4.1.6

Insert new paragraph 4.1.7 to read:

- 4.1.7 The tyre cross section, that is the ~~general arrangement of beads, plies and belt(s) within the tyre carcass~~envelop of the inflated tyre mounted on the measuring rim showing the relevant dimensions (see paragraph 6.1.1 and 6.1.2);

Renumber existing paragraphs 4.1.5 to 4.1.15 inclusive as 4.1.9 to 4.1.19 respectively

Insert new paragraph 4.1.20 to read:

- 4.1.20 [The tyre type identification for the purpose of paragraph 6.4 to which the type pertains and the references to the relevant test report.] A list of tyre size designations, speed category symbols, load capacity indices or ply rating numbers in the case of diagonal ply tyres to indicate the range of tyres, within the definition of type given in paragraph 4.3.1, to be covered by the approval with respect to wet grip performance, see paragraph 6.4.

Paragraph 4.2 amend to read:

- 4.2 The application ----- submitted for approval. The details shall be sufficient to allow the Type Approval Authority or Technical Service to assess the effect of any changes on the wet grip performance of the tyre. The effect of any minor changes will normally be apparent during Conformity of Production checks. It shall also be accompanied either by the test report(s) issued by approved Test Laboratories or by samples of the tyre type, at the discretion of the ----- competent authority. Drawings or ----- type approval.

Renumber existing paragraph 4.3 as 4.5

Insert new paragraph 4.3 to read:

- 4.3 For the purposes of defining “type” with respect to compliance with the requirements of paragraphs 6.1 to 6.3 inclusive, the tyre shall not differ in such essential characteristics as those given in the information required by paragraphs 4.1.1, ~~and 4.1.5,~~ 4.1.6 and 4.1.8 to 4.1.13 inclusive.

Insert new paragraph 4.3.1 to read:

- 4.3.1 For the purposes of defining “type” with respect to compliance with the requirements of paragraph 6.4, the range of tyres shall not differ in such essential characteristics as those given in the information required by paragraphs 4.1.1, 4.1.5.1, 4.1.6 and the tread pattern(s) as indicated by the information required by paragraph 4.2.

Paragraph 4.4 amend to read:

- 4.4 Where a tyre ----- it is not considered necessary for the purposes of compliance with the requirements of paragraph 6.2, to carry out ----- range. Worst case ----- approval authority.

For the purposes of compliance with paragraph 6.4, the type approval authority may make a worst case selection from the range of tyres covered by the information required by paragraph 4.1.20.

Paragraph 5.1 amend to read:

- 5.1 If the [candidate] pneumatic tyre ----- shall be granted.

Paragraph 5.2 amend to read:

- 5.2 An approval number in the form “[30R] 03XXXX” shall be assigned to each type approved with reference to paragraph 4.3 also conforming to paragraph 6.4. The first two digits following “[30R]” [(at present 03)] shall ----- approval. The same ---- this Regulation.

[Insert new paragraph 5.2.1 to read:

- 5.2.1 02 in case of tyres not conforming to paragraph 6.4].

Insert new paragraphs 6.4, 6.4.1, 6.4.1.1, 6.1.4.2 and 6.4.1.3 to read:

- 6.4 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 comparative** performance shall be indicated by a Wet Grip Index (G).
- 6.4.1 When tested in accordance with **either the** procedures given in **Appendix 2-Annex 8** the tyre shall meet the following requirements:
- 6.4.1.1 In the case of an ordinary (road type) tyre, the Wet grip index (G) shall be  $\geq 1,1$ ;
- 6.4.1.2 In the case of a Snow tyre, that is, a tyre marked in accordance with paragraph 3.1.5 and that bears a speed symbol indicating a maximum permissible speed not greater than 160km/h ("Q"), the Wet grip index (G) shall be  $\geq 0,9$ ;
- 6.4.1.3 In the case of a Snow tyre, that is, a tyre marked in accordance with paragraph 3.1.5 and that bears a speed symbol indicating a maximum permissible speed greater than 160km/h ("R" and above, plus "H") the Wet grip index (G) shall be  $\geq 1,0$ .

Paragraph 7.1 amend to read:

- 7.1 Every modification of the type of pneumatic tyre or change to the information given in the Application for Approval, paragraph 4, shall be notified ----- pneumatic tyre. The department --- either:

Paragraph 7.2 amend to read:

- 7.2 A modification ----- paragraph 6.2 of this Regulation.

Paragraph 8.2 amend to read:

- 8.2 The authority ----- facility. For each ----- frequency of verification checks with respect to the requirements given in paragraphs 6.1 to 6.3 inclusive, shall be at least once every two years.

Insert new paragraph 8.2.1 to read:

- 8.2.1 In the case of verifications with regard to approvals in accordance with paragraph 6.4, the type approval authority shall satisfy itself that all tyres falling within an approved type comply with the approval requirement. **These verifications shall be performed with the same method (trailer or vehicle) adopted for the original type approval.** The assessment shall be based upon [0,005%] of total annual production at each manufacturing facility or a minimum of [20] tyres but no more than [50] tyres. Where the test procedure involves testing a number of tyres at the same time, for example a set of four tyres for the purpose of testing wet grip performance in accordance with the Standard Vehicle procedure given in Annex 8 to this Regulation, then the set shall be considered as being one unit for the purposes of calculating the percentage of production or number of tyres.

Paragraph 11.1 amend to read:

- 11.1 Contracting Parties applying this Regulation shall be permitted to accept existing approvals granted by **any-its** type approval authority in accordance with the 02 series of amendments **subsequent to the amendments made by Supplement 4**, as evidence of compliance with paragraphs 6.1 to 6.3 inclusive. Provided that tyres meet the additional requirements of paragraph 6.4, approval to the 03 series of amendments can be granted and an appropriate new approval number issued.

Paragraph 11.2 amend to read:

11.2 From the date of entry into force of the 03 series of amendments a Contracting Party applying this Regulation shall be permitted to refuse a tyre approved to previous series of amendments. **[Contracting parties may continue to issue and accept type approvals with the 02 series in case of new tyre types destined to contracting parties not imposing the wet grip (03 series)]**

Paragraphs 11.3, 11.3.1 and 11.3.2 should be deleted

Paragraph 12.2 amend to read:

12.2 The Parties ----- laboratories for the purpose of establishing compliance with paragraphs 6.1 to 6.3 inclusive. [Where this provision is applied, the Party may, if it so desires, be represented at the tests by one or more persons of its choice.]

[Paragraph 12.3 amend to read:

12.3 For the purpose of establishing compliance with paragraph 6.4 the laboratories and test facilities of the tyre manufacturer may be used by the type approval authority, but any tests carried out shall be overseen and witnessed by the type approval authority.]

Annex 1, items 1 and 2 amend to read:

1 All Brand Names, Trade Names, Trade Descriptions or Trade Marks to be applied to the tyre **type** (Note: this information is to record all names under which the approved tyre **type** is to be marketed, that is, to take account of the practice of “own branding”):  
.....  
.....

2 For each Brand Name, Trade Name, Trade Description or Trade Mark, the tyre type designation used for the tyre type approved:  
.....  
.....

**Annex 1, items 6, 7, and 8 amend as follows:**

**\_\_\_\_\_ Add plurals for technical service(s), test laboratory(ies), report(s), number(s).**

Annex 2 amend as follows:

The approval number example shown in the illustration below the international approval mark “E4” within the circle should read:

**[30R] 032439**

The “Note” should be amended to read:

Note: The first two digits following **[“30R”]** of the ----- the 03 series of amendments.

Insert new Annex 8 to read:

Annex 8

TEST PROCEDURE FOR MEASURING WET GRIP

**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%. It shall be of uniform age, composition, and wear and shall be free of loose material or foreign deposits.

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:

$Pbfc = Pbfc \text{ (measured)} + 0,0035(t - 20)$  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 :

$BPN = BPN \text{ (Measured value)} + 0,34t - 0,0018 t^2 - 6,1$  where "t" is the wetted track surface temperature in degrees Celsius

The BPN shall be measured at intervals of 10m along the length of the lanes and at 200mm intervals across the width of the lanes of the track to be used during the wet grip tests. The BPN shall be measured 5 times at each point and the coefficient of variation of the BPN averages shall not exceed by 10%.

1.1.2.1 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 equalise 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 (RE 3) contained in document TRANS/WP.29/78/Rev.1.)

### 2.1 Trailer or special purpose tyre evaluation vehicle procedure

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  $65 \pm 2$  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  $\pm 0,5^\circ$  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  $[5^\circ]$ . The longitudinal distance from the centre line of the articulation point of the coupling to the transverse centre line of the axle of the trailer shall be at least ten times the loaded radius of the test tyre.

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 25mm beyond the width of the tyre contact patch. The nozzle(s) shall be directed downwards at an angle of  $20^\circ$  to  $30^\circ$  and shall contact the track surface between 250mm and 450mm in front of the centre of the tyre contact patch. The height of the nozzle(s) shall be 25mm or the minimum to avoid any obstacles on the track surface without exceeding a maximum of 100mm. Water delivery rate shall ensure a water depth of 0,5mm to 1,5mm and shall be consistent throughout the test to within  $\pm 10\%$ . Note that a typical rate for testing at 65km/h will be  $18\text{ls}^{-1}$  per metre of wetted track surface width.

The system shall be able to deliver the water at least 0,5s before the start of braking.

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 180kPa in the case of the SRTT and standard load tyre or 210kPa 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 stabilised at the ambient temperature of the test track area.

- 2.1.2.4 The tyre shall be loaded to:
- between 445kg and 508kg in the case of the SRTT and
  - between 70% and 80% 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 2.1.2.2.
- 2.1.2.7 The test speed shall be between 63km/h and 67km/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 0,2s and 0,5s 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%. 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:  
of the SRTT 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:
- $G = \text{pbfc of candidate tyre} \div \text{pbfc of SRTT}$
- 2.2 Standard vehicle procedure
- 2.2.1 The vehicle shall be a standard M1 Category vehicle, capable of a minimum speed of 90km/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 220Pa 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 stabilised at the ambient temperature of the test track area.
- 2.2.2.4 The static load on the tyre shall be:
- between 381kg and 572kg in the case of the SRTT and
  - between 60% and 90% 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% 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 90km/h to 20km/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 2.2.2.2.
- 2.2.2.7 Starting from an initial speed of between 87km/h and 83km/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 80km/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 80km/h and 20km/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 80km/h and 20km/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%. 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.

The results shall be invalid if the initial and repeat tests of the SRTT are not within 2,5% 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:

$G = \text{average mfdd of candidate tyre} \div \text{mfdd of SRTT}$

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.

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 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  $G1 \times G2$ .

- 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  $\pm 5^{\circ}\text{C}$ . 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.