

**Proposal for amendments to ECE/TRANS/WP.29/2013/63
(Proposal for a global technical regulation on tyres)**

**United States Proposal for Modifications of the Wet
Traction Test in the Tire GTR**

**Part A and Section 3.12 – Test for Adhesion Performance
on Wet Surfaces**

I. Introduction

Countries that regulate vehicle safety under a self-certification regime must establish requirements and test procedures that are clearly defined and understood by regulated entities. Under this regime, car and equipment manufacturers may conduct their own tests to certify their products. The governments may then conduct independent testing without the manufacturer's presence to verify compliance. For this reason, it is important that all aspects of a particular testing procedure be clearly defined to avoid disagreements that may arise due to misinterpretations of the testing procedure.

Preliminary tests of US market tires to the requirement of the GTR have shown that there may be a certain proportion that may not meet the minimum wet traction requirements listed in the GTR. The GTR specifies a minimum wet grip index requirements for "normal" and "snow tires" (not to be confused with "snow tire for use in severe snow conditions") of greater than or equal to 1.1. Many tires in the North American market, which are generally referred to as M+S or All-Season tires, are not of equivalent type to those addressed in the GTR. Therefore, there may be a need to develop and add a different wet traction index value requirement in the GTR for these types of tires.

Accordingly, the United States proposes the following changes to the GTR text:

1. In both the preamble (Part A) and the regulatory text, a note should be inserted that makes it clear that the CPs may choose to implement one or more of the options permitted in the GTR test procedure. This is consistent with discussions at the GRRF on at least two past GTRs - the GTR on motorcycle brakes and on ESC. Examples of options that CP's may limit or choose from include: the method for determining track friction characteristics; the use of a vehicle or trailer; and the method for wetting the test track.
2. To add a new category of tire type specific to those that are found in North America, and perhaps other regions, with a note indicating that limit values (Wet Traction Index) will be developed and added through amendment of the GTR in the future. This should be explained in Part A and directly in the existing table in section 3.12.1.

3. The following changes are proposed to correct errors in the original text, provide better clarity, and propose expanding the testing temperature range. Each sub-proposal is accompanied by an explanatory note below.

II. Proposal

Paragraph 3.12.2.1.1.1., amend to read:

"3.12.2.1.1.1. Standard reference test tyre (SRTT) method

When tested using the SRTT and the method given in paragraph 3.12.3.1. 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:

$$\text{pbfc} = \text{pbfc (measured)} + [0.015 - .0035](t - 20)$$

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;"

Paragraph 3.12.2.3., amend to read:

"3.12.2.3. 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.

[For either wetting method, the ~~The~~ water depth shall be between 0.5 and 1.5 mm."

Paragraph 3.12.2.4., amend to read:

"3.12.2.4. 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 40C] and shall not vary during the test by more than 10 °C."

Paragraph 3.12.3.1.1.5., amend to read:

"3.12.3.1.1.5. 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° [with the water contacting 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 18 litres per second per metre of wetted track surface width."

Paragraph 3.12.3.1.2.3., amend to read:

"3.12.3.1.2.3. 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. The tyre(s) shall not be exposed to direct sunshine during conditioning."

Paragraph 3.12.3.1.2.5., amend to read:

"3.12.3.1.2.5. Shortly before testing, the track shall be conditioned by carrying out [up to ~~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."

Paragraph 3.12.3.1.2.10., amend to read:

"3.12.3.1.2.10. In the case of a new tyre, [at least] 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."

Paragraph 3.12.3.1.2.13., amend to read:

"3.12.3.1.2.13. The average value of peak brake force coefficient (pbfc) shall be calculated over at least six 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 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. [However, if only the candidate tyre(s) test is invalid, the entire test series need not be deemed invalid.]"

III. Justification

1. Paragraph 3.12.2.1.1.1.:

The correction factor (0.015) appears to be incorrect. In other documents covering wet grip (ANNEX V 3.2(b), UN R117, ISO/DIS 23671), a factor of 0.0035 is used instead. Below are the temperature correction formulas from three ECE documents. The first and third ones clearly indicate 0.0035. The second looks similar, but has a dash between the .003 and 5, which might suggest multiplication to get the 0.015 value. This appears to be a typographical error and should be corrected in the GTR as indicated above.

Temperature correction = 0,0035 (t – 20)	ISO/DIS 23671 (2005) 5.1
pbfc = pbfc (measured) + 0.003 · 5(t – 20)	UN R117 (2007) Annex 5 1.1.1.
Temperature correction = 0,0035 × (t – 20)	ANNEX V (COMMISSION REGULATION No 228/2011) 3.2(b)

2. Paragraph 3.12.2.4.:

The surface temperature range (41F to 95F) could be an issue for testing in the West Texas summers on the high end. NHTSA's test track in Texas has higher average temperatures than most of Europe. The average high temperatures for June, July, and August in San Angelo is 33C (92F), 36C (~97F) and 35C (95F) respectively. As an example, the temperatures in Marseille, France are 28C (82F), 30C (86F), and 30C (86F). Record high for those months in San Angelo are 111F, 109F, and 108F. Four other months have records in the 100's. These are all ambient temperatures and not wet surface temperatures. In addition, the wet surface temperature does not always track ambient temperatures and therefore cannot reliably be used to estimate the wet surface temperature. The surface temperatures could be lower, equal or even higher than the ambient. For these reasons, the US recommends changing the upper surface temperature limit to **40C (104F)**.

3. Paragraph 3.12.3.1.1.5.

The second sentence says "...and shall contact the track surface...", where it is the water and not the nozzle that contacts the surface.

4. Paragraph 3.12.3.1.2.3.

The use or interpretation of the word ‘adjacent’ conveys the idea that the vehicle / trailer tire areas are located on or beside the track. This may cause a safety issue because the US track is not designed to safely accommodate stopped vehicles, tire storage, or persons installing tires. The area available for these operations is located approximately ½ a mile away. Also, our experience has shown that driving this distance and conducting two break-in (chirp) runs can bring tires to the stabilized ambient temperature in less than two hours.

5. Paragraph 3.12.3.1.2.5.

Performing this exercise daily (10 run surface conditioning) prior to each test session is not necessary. If the tester moves to a different lane or the lane has seen unusual weather then it may be justified to recondition the surface. However, if the same lane is used each day and the control tire coefficients do not vary greatly, then there may not be a need for conditioning. Requiring pre-condition prior to each test is costly and unnecessarily time consuming.

6. Paragraph 3.12.3.1.2.10.

Running only two test runs may not be enough to remove tire surface contaminants (like mold release) or to equalize the full tire contact surface for wear. As an example, ASTM E1337 requires ten test runs at 20 mph on a dry surface to accomplish the same goal. The proposed modification would allow countries under self-certification to specify exact numbers of runs during the adoption of this provision.

7. Paragraph 3.12.3.1.2.13.

This paragraph or a portion should be better written to clarify the procedure for when there is a non-valid test run or test. ANNEX V 4.2.8.2 has a clearer explanation on when and how much of a test cycle needs to be re-run. When a test cycle of three candidates is run and only one or more candidate tires is/are not valid, the remaining candidates’ wet grip can still be considered valid. However, if a SRTT control run is not valid then whole test cycle (candidates and reference tires) are deemed invalid. The suggested edits to the GTR text above reflect this approach.
