

Japan proposal for GRBP-2024-06, -07, -09

6-9 February 2024



JAPAN AUTOMOBILE STANDARDS INTERNATIONALIZATION CENTER

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based on GRBP-78-28-Rev.1
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1. Background

Document : ECE-TRANS-WP.29-GRBP-2024-06, -07, -09

ETRTO submitted the proposal for adopting the new design C3 SRTTs, and introducing correction factors to the calculation of the wet grip index and to the calculation of the snow grip index.

Proposal : Paragraph 2.18.

"Standard Reference Test Tyre" or "SRTT" means a tyre that is produced, controlled and stored in accordance with the standards of ASTM International:

- (a) *E1136 – ~~1719~~ for the size P195/75R14 and referred to as "SRTT14",*
- (b) *F2493 – ~~2023~~ for the size P225/60R16 and referred to as "SRTT16",*
- (c) *F3611 – ~~22e1~~ for the size P225/60R16 in worn state and referred to as "moulded SRTT16 worn",*
- (d) *F2872 – ~~1619~~ for the size 225/75R16C and referred to as "SRTT16C",*
- (e) *F2871 – ~~1623~~ for the size 245/70R19.5 and referred to as "SRTT19.5",*
- (f) *F2870 – ~~1623~~ for the size 315/70R22.5 and referred to as "SRTT22.5",*
- (g) *F3678 – 23 for the size 245/70R19.5 and referred to as "SRTT19.5 siped",*
- (h) *F3677 – 23 for the size 315/70R22.5 and referred to as "SRTT22.5 siped"."*

1. Background

Proposal : Wet grip (Annex 5)

Part (B), Paragraph 1.1.1.

<i>Tyre class</i>	<i>SRTT</i>	<i>Trailer method</i> $\mu_{\text{peak range}}$	<i>Vehicle method</i> <i>BFC range</i>
C2, C3	SRTT16	0.65 – 0.90	-
C2	SRTT16C	0.44 – 0.77	0.36 – 0.69
C3	SRTT19.5, SRTT22.5	0.51 – 0.67	0.35 – 0.61
C3	SRTT19.5 siped, SRTT22.5 siped	0.53 – 0.70	0.36 – 0.64

Part (B), Paragraph 2.1.2.14.

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

$$\text{Wet grip index (G)} = \frac{\mu_{\text{peak,ave}}(\text{T})}{\mu_{\text{peak,ave}}(\text{R})}(\text{G}) = f \cdot \frac{\mu_{\text{peak,ave}}(\text{T})}{\mu_{\text{peak,ave}}(\text{R})}$$

where

<i>For class C2 tyres</i> SRTT16C	
f = 1	
<i>For class C3 tyres</i>	
<i>SRTT19.5, SRTT22.5</i>	<i>SRTT19.5 siped, SRTT22.5 siped</i>
f = 1	f = 1.04

f: correction factor depending on used SRTT

It represents the relative wet grip index for braking performance of the candidate tyre (T) compared to the reference tyre (R)."

1. Background

Proposal : Wet grip (Annex 5)

Part (B), Paragraph 2.2.2.7.5.

Table 7

Configuration C1: candidate tyres on both axles	$G = f \cdot \frac{BFC(T)}{BFC(R)}$
Configuration C2: candidate tyres on front axle and reference tyres on rear axle	$G = f \cdot \frac{BFC(T) \cdot [a+b+h \cdot BFC(R)] - a \cdot BFC(R)}{BFC(R) \cdot [b+h \cdot BFC(T)]}$
Configuration C3: reference tyres on front axle and candidate tyres on rear axle	$G = f \cdot \frac{BFC(T) \cdot [-a-b+h \cdot BFC(R)] + b \cdot BFC(R)}{BFC(R) \cdot [-a+h \cdot BFC(T)]}$

where

<i>For class C2 tyres</i> SRTT16C	
$f = 1$	
<i>For class C3 tyres</i>	
<i>SRTT19.5, SRTT22.5</i>	<i>SRTT19.5 siped, SRTT22.5 siped</i>
$f = 1$	$f = 1.04$

Where (see also Figure 1):

f : correction factor depending on used SRTT

1. Background

Proposal : Snow performance (Annex 7)

Paragraph 4.8.4.

Calculation of the relative snow grip index of the tyre

The snow grip index represents the relative performance of the candidate tyre compared to the reference tyre.

$$SG(T_n) = f \cdot \frac{\overline{AA_{T_n}}}{wa_{SRTT}}$$

where $\overline{AA_{T_n}}$ is the arithmetic mean of the average accelerations of the n-th candidate tyre

and f is given in the following table

<i>Reference tyre</i>	<i>Factor</i>
SRTT19.5, SRTT22.5	$f = 1.000$
SRTT19.5 siped, SRTT22.5 siped	$f = 1.670$

2. Consideration of correction factors based on GRBP-78-28-Rev.1

Japan respects ETRTO proposal for the new design C3 SRTTs.

However, according to the test results which is reported in informal document GRBP-78-28-Rev.1, the correction factor (f) for the wet grip index in new state (G) has variation depending on used SRTT and test method; From 1.01 for SRTT22.5 trailer method to 1.04 for SRTT19.5 vehicle method.

GRBP-78-28-Rev.1
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WET grip test campaign Analysis of test results

	Method	CURRENT SRTT (Average BFC or mu-peak)			NEW DESIGNED SRTT (Average BFC or mu peak)			C3 New SRTT WGI (%)		
		Average	Stddev	CoV	Average	Stddev	CoV	Average	Stddev	CoV
SRTT19.5	VEHICLE	0.456	0.052	11.4%	0.473	0.058	12.1%	1.04	0.03	3.2%
	TRAILER	0.652	0.108	16.5%	0.662	0.111	16.7%	1.02	0.01	0.5%
SRTT22.5	VEHICLE	0.463	0.036	7.7%	0.473	0.036	7.7%	1.02	0.03	3.0%
	TRAILER	0.620	0.099	16.0%	0.625	0.081	12.9%	1.01	0.04	4.1%

In order to minimize the relaxation or tightening of requirement, the correction factor (f) depending on used SRTT for the wet grip index in new state (G) should be replaced to 1.02 instead of 1.04, for both of vehicle method and trailer method.

Proposal : Correction factors for the wet grip index(G)

<i>For class C3 tyres (vehicle method and trailer method)</i>	
<i>SRTT19.5, SRTT22.5</i>	<i>SRTT19.5 siped, SRTT22.5 siped</i>
<i>$f = 1$</i>	<i>$f = 1.02$</i>

2. Consideration of correction factors based on GRBP-78-28-Rev.1

According to the test results which is reported in informal document GRBP-78-28-Rev.1, two different correction factor (f) depending on used SRTT for the snow grip index (SG) could be considered; 1.53 for SRTT 19.5 and 1.67 for SRTT 22.5.

GRBP-78-28-Rev.1

: Slide 7

SNOW test campaign

Analysis of test results: variation of SRTTs acceleration distance

C3 SRTT	Avg. Acc. Distance <u>OLD</u> SRTT [m]			Avg. Acc. Distance <u>NEW</u> SRTT [m]			C3 New SRTT SGI (%)	
	Mean	Std Dev	CV	Mean	Std Dev	CV	Mean	CV
SRTT 19.5	28.14	8.01	28.48 %	18.48	3.66	19.83 %	152.97	17.73 %
SRTT 22.5	32.32	8.83	27.31 %	19.38	3.11	16.07 %	167,32	18.62 %

In order to avoid any relaxation or tightening of requirement, two different correction factor (f) depending on used SRTT for the snow grip index (SG) should be introduced as following table.

Proposal : Correction factors for the snow grip index(SG)

<i>Reference tyre</i>	<i>Factor</i>
SRTT19.5, SRTT22.5	f=1.000
SRTT19.5 siped	f=1.530
SRTT22.5 siped	f=1.670

3. Japan proposal to amend GRBP-2024-06, -07, -09

Document : GRBP-79-07, GRBP-79-08, GRBP-79-09

Proposal : Wet grip (Annex 5)

Part (B), Paragraph 1.1.1.

<i>Tyre class</i>	<i>SRTT</i>	<i>Trailer method</i> <i>μ_{peak} range</i>	<i>Vehicle method</i> <i>BFC range</i>
C2, C3	SRTT16	0.65 – 0.90	-
C2	SRTT16C	0.44 – 0.77	0.36 – 0.69
C3	SRTT19.5, SRTT22.5	0.51 – 0.67	0.35 – 0.61
C3	SRTT19.5 siped, SRTT22.5 siped	0.53 – 0.70 0.52 – 0.68	0.36 – 0.64 0.36 – 0.62

Part (B), Paragraph 2.1.2.14.

<i>For class C2 tyres</i> SRTT16C	
$f = 1$	
<i>For class C3 tyres</i>	
<i>SRTT19.5, SRTT22.5</i>	<i>SRTT19.5 siped, SRTT22.5 siped</i>
$f = 1$	$f = 1.04$ 1.02

3. Japan proposal to amend GRBP-2024-06, -07, -09

Document : GRBP-79-07, GRBP-79-08, GRBP-79-09

Proposal : Wet grip (Annex 5)

Part (B), Paragraph 2.2.2.7.5.

<i>For class C2 tyres</i>	
<i>SRTT16C</i>	
$f = 1$	
<i>For class C3 tyres</i>	
<i>SRTT19.5, SRTT22.5</i>	<i>SRTT19.5 siped, SRTT22.5 siped</i>
$f = 1$	$f = 1.041.02$

3. Japan proposal to amend GRBP-2024-06, -07, -09

Document : GRBP-79-07, GRBP-79-08, GRBP-79-09

Proposal : Snow performance (Annex 7)

Paragraph 4.8.4.

<i>Reference tyre</i>	<i>Factor</i>
SRTT19.5, SRTT22.5	$f = 1.000$
SRTT19.5 siped, SRTT22.5 siped	$f = 1.670$ 1.530
SRTT22.5 siped	$f = 1.670$

4. Justification

(1) Annex 5 “Correlation factor for the wet grip index”

According to the test results which is reported in informal document GRBP-78-28-Rev.1, the correction factor (f) depending on used SRTT for the wet grip index in new state (G) should be replaced to 1.02 instead of 1.04 in order to minimize the relaxation or tightening of requirement.

(2) Annex 7 “Correlation factors for the snow grip index”

According to the test results which is reported in informal document GRBP-78-28-Rev.1, two different correction factor (f) depending on used SRTT for the snow grip index (SG) should be introduced in order to avoid any relaxation or tightening of requirement.

<i>Reference tyre</i>	<i>Factor</i>
SRTT19.5, SRTT22.5	f=1.000
SRTT19.5 siped	f=1.530
SRTT22.5 siped	f=1.670