



ETRTO

The European Tyre and Rim
Technical Organisation

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Agenda item 7 (c)

New design C3 SRTTs

GRBP 78th session
August 2023

Agenda

- 1. Background**
regulatory framework & reason for changing the current C3 SRTTs

- 2. New Design C3 SRTTs concept**

- 3. SNOW test campaign**
 - a. Overview

 - b. Analysis of test results

 - c. Proposed approach / Correlation Factor

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 - a. Overview, Analysis of the Results and proposed approach

- 5. Timeline**



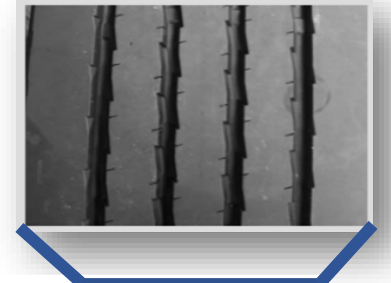
Background

Regulatory framework

The current C3 SRTTs 19.5 and 22.5 are used as reference tyres for snow grip and wet adhesion performance in UN Reg.117:

- F2871-16 for the size 245/70R19.5 and referred to as "SRTT19.5"
- F2870-16 for the size 315/70R22.5 and referred to as "SRTT22.5".

Snow grip index threshold for C3 (1.25) shall be passed to type approve a tyre for use in severe snow conditions, according to an acceleration test method (Annex 7)



Class of tyre	Snow grip index (brake on snow method) ^(a)		Snow grip index (spin traction method) ^(b)	Snow grip index (acceleration method) ^(c)
	Ref.s = SRTT14, SRTT16	Ref. = SRTT16C	Ref. = SRTT14, SRTT16	Ref.s = SRTT19.5, SRTT22.5
C1	1.07	No	1.10	No
C2	No	1.02	1.10	No
C3	No	No	No	1.25

Wet Grip index threshold for C3 shall be passed to type approve a tyre

Category of use		Wet grip index (G)	
		Other	Traction tyres
Normal tyre		≥ 0.80	≥ 0.65
Snow tyre		≥ 0.65	≥ 0.65
	Snow tyre for use in severe snow conditions	≥ 0.65	≥ 0.65
Special use tyre		≥ 0.65	≥ 0.65

Background

Reason to change the existing C3 SRTTs

Rib design of the tread pattern of current C3 SRTTs with limited snow performance capabilities

→ High performance variation depending on the track surface conditions during testing

- high performance variations in the evaluation of candidate tires
- poor correlation between different test providers and/or proving grounds

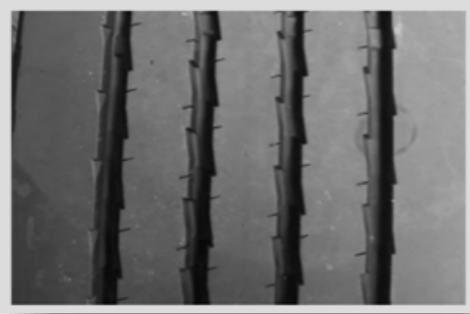
Need to improve reproducibility of the SNOW test results (i.e., reduce the uncertainty of the test), while not deteriorating the Wet Grip reproducibility



New Design of C3 SRTTs

- New pattern designs with sipes (blades) assures higher performance stability on snow test method, and not deteriorating the wet grip test method reproducibility

Current Design



New Design (22.5)



New Design (19.5)



Validation Tests campaigns

- Snow test campaigns were performed by ETRTO and JATMA members during 3 winter seasons (years from 2019 to 2022)
- Wet Grip test campaign was performed over 3 years at different locations and in different conditions
- → SRTT 22.5 current design vs. SRTT 22.5 new design
- → SRTT 19.5 current design vs. SRTT 19.5 new design

SNOW test campaign

Overview

- 3 winter seasons
- 4 different temperature ranges (for ambient and surface)
- 9 participating companies / test locations
- 20 different vehicles (SRTT19.5 and SRTT22.5)
- 176 tests results: 68 for SRTT 19.5 & 108 for SRTT 22.5

Comparison C3-SRTT old vs. New-Design - Result Summary Table

Test No.	Vehicle Report	Test Location	Test Type	Test Name	Test Date	Temp. Range		Snow		SRTT 19.5 old Design		SRTT 22.5 old Design		SRTT 19.5 New Design		SRTT 22.5 New Design		SRTT 19.5 old Design		SRTT 22.5 old Design		SRTT 19.5 New Design		SRTT 22.5 New Design			
						Min	Max	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max
1	Mercedes-Benz	Mercedes-Benz	Land	Mercedes-Benz	2023	1	-2	2	2	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00

Agreed for RRT	Segment 1	Segment 2	Segment 3	Segment 4
ambient temperature	-2°C -7°C	< -7°C -15°C	< -15°C ... -21°C	< -21°C
snow temperature	-4°C -9°C	< -9°C -15°C	< -15°C ... -21°C	< -21°C



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 %

1. High Coefficient of Variation coefficient (Std Dev.) of the current SRTTs confirmed → **low reproducibility**
2. New Design C3 SRTTs (both 19.5 and 22.5) shows higher stability, with lower coefficient of variations → **improved reproducibility**
3. New Design C3 SRTTs perform much better than current C3 SRTTs
→ **correlation factor to be introduced in the regulation** when test is performed vs new design C3 SRTTs (see following pages)

SNOW test campaign

Analysis of test results: equivalence of the new design SRTTs (19.5 and 22.5)

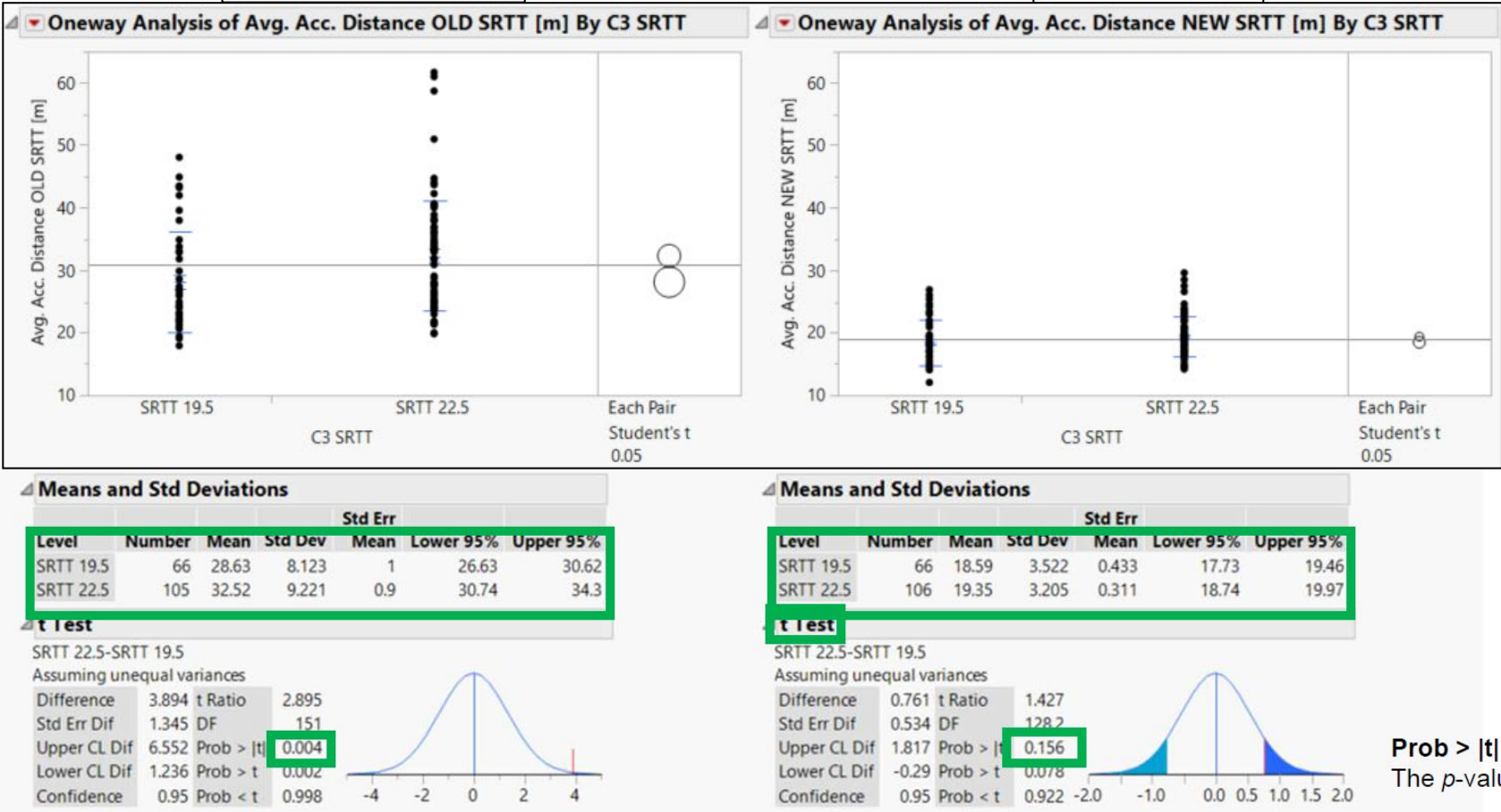
Statistically the New SRTT 22.5" and New SRTT 19.5" are equivalent in their performance

(the 2 sizes show very similar average distance/acceleration)

→ Confirmed possibility of using both new SRTTs (19.5 and 22.5) as reference tyre irrespective of the size of candidate tyre

Current SRTTs

New SRTTs



SNOW test campaign

Proposed approach: correlation Factor

Similar approach used to manage the SRTT14 discontinuation and its replacement with SRTT16 (ref. UN Reg117.02 Supplement 13):

- Keep the existing threshold (1,25 vs existing SRTT)
- Apply a correlation factor (fixed by regulation) when test is performed vs new designed C3 SRTTs
 - Correlation factor can be established by the analysis of the snow test campaign, considering
 - the equivalence of the 2 SRTTs
 - that vast majority of the C3-tyre sizes are tested vs. the SRTT 22.5
 - the worst cases testing (regulatory change can be managed by a supplement of UN R117)

$$SG_{current\ SRTT} = \frac{Candidate}{current\ SRTT} = \frac{\cancel{new\ SRTT}}{Current\ SRTT} \cdot \frac{Candidate}{\cancel{new\ SRTT}} = 1.67 \cdot SG_{new\ SRTT}$$

- $SG_{current}$ snow grip index of candidate vs. SRTT current
- SG_{new} snow grip index of candidate vs. SRTT new
- **1,67** correlation factor fixed by regulation = "new" vs. "current"
- candidate weighted ave. acceleration of candidate tire
- New SRTT weighted ave. acceleration of new SRTT
- Current SRTT weighted ave. acceleration of current SRTT



WET grip test campaign

Target

- Confirm the stability of new C3 design SRTT also for WET performance
- Assess whether a correlation factor needs to be introduced also for WGI test

Overview

- 3 years testing
- Different conditions (temp., track friction, vehicle)
- 9 testing companies / locations
- More than 70 tests results

DOT week code of the reference tyre	Candidate tyre	DOT week code (candidate)	Vehicle model	Axle configuration (L,R,3)	Rear Axle fitment: Single (2 tyres) or Dual (4 tyres)	Max mass associated with the load capacity index of the tyre Q _r [kg]	Inflation pressure marked on the sidewall P _r [kPa]	Load per axle (Front) [kg]	Load per axle (Rear) [kg]	Inflation Pressure Pt [kPa]	Rim Size	Max mass associated with the load capacity index of the tyre Q _r [kg]	Inflation pressure marked on the sidewall P _r [kPa]	Load per axle (Front) [kg]	Load per axle (Rear) [kg]	Inflation Pressure Pt [kPa]	Rim Size	Temperature wet surface (candidate)	Air Temperature (candidate)	Water depth [mm]	MTD	Track mu peak SRTT16*	BPN (for reference only)	Braking BFC reference (Ra)	Braking BFC candidate (Ta)	CoV	WGI
0518	C3W new	0518	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	11	14	1.1	0.8	57	0.409	0.411	2.04	1.00	
0518	C3W new	0518	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	7	10	1.3	0.8	54	0.418	0.422	1.64	0.99	
0519	C3W new	0519	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	13	12	1.2	0.8	56	0.448	0.465	2.14	1.04	
0519	C3W new	0519	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	13	12	1.2	0.8	56	0.438	0.444	2.14	1.01	
0519	C3W new	0519	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	13	11	1.2	0.8	56	0.422	0.421	2.14	1.00	
0519	C3W new	0519	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	13	11	1.2	0.8	56	0.416	0.418	2.14	1.00	
0519	C3W new	0519	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	17	18	1.2	0.8	56	0.441	0.446	1.34	1.01	
0519	C3W new	0519	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	17	18	1.2	0.8	56	0.448	0.457	1.34	1.02	
0519	C3W new	0519	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	15	13	1.2	0.8	56	0.440	0.449	1.34	1.02	
0519	C3W new	0519	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	15	13	1.2	0.8	56	0.443	0.452	1.34	1.02	
0519	C3W new	0519	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	16	16	1.2	0.8	56	0.452	0.456	2.74	1.01	
0519	C3W new	0519	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	16	16	1.2	0.8	56	0.449	0.455	2.74	1.01	
0519	C3W new	0519	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	15	17	1.2	0.8	56	0.440	0.457	2.74	1.04	
0519	C3W new	0519	RENAULT 450DXI	1	Single	3750	900	6320	6356	720	22.5 x 9	3750	900	6320	6356	720	22.5 x 9	15	17	1.2	0.8	56	0.442	0.457	2.74	1.03	
5016	C3W new	3519	ACTROS 185L	1	Single	3750	900	5800	5800	653	9.0x22.5	3750	900	5800	5800	653	9.0x22.5	5.2	6.4	1.5	0.93	0.85	0.488	0.473	0.94	1.06	
4218	C3W new	3519	ACTROS 185L	1	Single	3750	900	5800	5800	653	9.0x22.5	3750	900	5800	5800	653	9.0x22.5	5.2	6.4	1.5	0.93	0.85	0.481	0.475	0.94	0.99	
5016	C3W new	3519	ACTROS 185L	1	Single	3750	900	6720	6720	785	9.0x22.5	3750	900	6720	6720	785	9.0x22.5	6.1	6.1	1.5	0.93	0.85	0.450	0.472	0.54	1.05	
4218	C3W new	3519	ACTROS 185L	1	Single	3750	900	6720	6720	785	9.0x22.5	3750	900	6720	6720	785	9.0x22.5	6.1	6.1	1.5	0.93	0.85	0.481	0.470	0.54	0.98	
0618	C3W new	3519	ACTROS 185L	1	Single	3750	900	5800	5800	653	9.0x22.5	3750	900	5800	5800	653	9.0x22.5	10.2	7.0	1.5	0.93	0.85	0.502	0.514	1.64	1.02	
4218	C3W new	3519	ACTROS 185L	1	Single	3750	900	5800	5800	653	9.0x22.5	3750	900	5800	5800	653	9.0x22.5	10.2	7.0	1.5	0.93	0.85	0.526	0.514	1.64	0.98	
0618	C3W new	3519	ACTROS 185L	1	Single	3750	900	6720	6720	785	9.0x22.5	3750	900	6720	6720	785	9.0x22.5	10.3	11.8	1.5	0.93	0.85	0.478	0.507	0.86	1.06	
4218	C3W new	3519	ACTROS 185L	1	Single	3750	900	6720	6720	785	9.0x22.5	3750	900	6720	6720	785	9.0x22.5	10.3	11.8	1.5	0.93	0.85	0.496	0.506	0.82	1.02	
0618	C3W new	3519	ACTROS 185L	1	Single	3750	900	5800	5800	653	9.0x22.5	3750	900	5800	5800	653	9.0x22.5	16.1	22.3	1.5	0.93	0.85	0.467	0.484	0.74	1.03	
4218	C3W new	3519	ACTROS 185L	1	Single	3750	900	5800	5800	653	9.0x22.5	3750	900	5800	5800	653	9.0x22.5	16.1	22.3	1.5	0.93	0.85	0.488	0.484	0.74	0.99	
0618	C3W new	3519	ACTROS 185L	1	Single	3750	900	5800	5800	653	9.0x22.5	3750	900	5800	5800	653	9.0x22.5	16.8	15.5	1.5	0.93	0.85	0.472	0.497	0.84	1.05	
4218	C3W new	3519	ACTROS 185L	1	Single	3750	900	5800	5800	653	9.0x22.5	3750	900	5800	5800	653	9.0x22.5	16.8	15.5	1.5	0.93	0.85	0.503	0.500	0.84	0.99	
4218	C3N new	3419	ATEGO 1330L	1	Single	2240	760	3300	3300	532	7.5x19.5	2240	825	3300	3300	532	7.5x19.5	6.7	6.7	1.5	1.00	0.84	0.452	0.494	1.14	1.09	
4816	C3N new	3419	ATEGO 1330L	1	Single	2240	760	4200	4200	701	7.5x19.5	2240	825	4200	4200	701	7.5x19.5	6.9	6.2	1.5	0.93	0.85	0.473	0.490	1.34	1.04	
4816	C3N new	3419	ATEGO 1330L	1	Single	2240	760	4200	4200	701	7.5x19.5	2240	825	4200	4200	701	7.5x19.5	8.2	8.2	1.5	0.93	0.85	0.473	0.495	0.94	1.05	
4816	C3N new	3419	ATEGO 1330L	1	Single	2240	760	4200	4200	701	7.5x19.5	2240	825	4200	4200	701	7.5x19.5	10.1	13.1	1.5	0.93	0.85	0.478	0.501	1.14	1.05	
4816	C3N new	3419	ATEGO 1330L	1	Single	2240	760	4200	4200	701	7.5x19.5	2240	825	4200	4200	701	7.5x19.5	10.7	17.4	1.5	0.93	0.85	0.412	0.443	2.54	1.07	
3619	C3N new	3419	ATEGO 1330L	1	Single	2240	760	3300	3300	532	7.5x19.5	2240	825	3300	3300	532	7.5x19.5	20.2	23.5	1.5	1.00	0.84	0.420	0.429	0.85	1.02	
3619	C3N new	3419	ATEGO 1330L	1	Single	2240	760	4200	4200	701	7.5x19.5	2240	825	4200	4200	701	7.5x19.5	20.7	17.4	1.5	0.93	0.85	0.382	0.382	1.84	1.00	
4218	C3W new	3519	ATEGO 1330L	1	Single	2240	760	3300	3300	532	7.5x19.5	2240	825	3300	3300	532	7.5x19.5	19.6	26	1.5	1.00	0.84	0.390	0.400	1.44	1.03	
4218	C3W new	3519	ATEGO 1330L	1	Single	2240	760	4480	4480	630	9.0x22.5	3750	900	4480	4480	630	9.0x22.5	19.8	24.3	1.5	0.93	0.85	0.443	0.449	0.74	1.01	
4218	C3N new	3419	ATEGO 1330L	1	Single	2240	760	4480	4480	630	9.0x22.5	3750	900	4480	4480	630	9.0x22.5	20.2	23.5	1.5	0.93	0.85	0.454	0.444	0.84	0.98	
4218	C3N old	4918	cedes Actros 18.53.1	1	Single	3750	900	4480	4480	630	9.0x22.5	2240	760	4480	4480	630	9.0x22.5	19.1	21.8	1.5	0.93	0.85	0.442	0.456	0.64	1.03	
3519	C3N new	3419	ATEGO 1330L	1	Single	2240	760	4480	4480	630	9.0x22.5	2240	825	4480	4480	630	9.0x22.5	20.2	23.5	1.5	0.93	0.85	0.446	0.444	0.84	1.00	
3117	C3N new	3419	HINO-RANGER	1	Single	2240	760	2784	3162	532	19.5x6.75	2240	825	2784	3162	532	19.5x6.75	24.9	22.2	1.3	0.61	-	55	0.533	0.560	1.64	1.05
4218	C3W new	3519	ISUZU-GIGA	1	Single	3750	900	5228	5334	630	22.5x9.00	3750	900	5228	5334	630	22.5x9.00	30.4	26.1	1.3	0.61	-	55	0.464	0.520	2.04	1.12
3920	C3W new	3619	cedes Actros 18.53.1	1	Single	3750	900	4400	4400	630	9.00 x 22.5	3750	900	4400	4400	630	9.00 x 22.5	25.2	22.0	1.1		0.808	53.1	0.487	0.486	0.444	1.00
3920	C3N old	4918	cedes Actros 18.53.1	1	Single	3750	900	4400	4400	630	9.00 x 22.5	2240	760	4400	4400	630	9.00 x 22.5	25.9	23.0	1.1		0.808	53.1	0.487	0.482	0.614	0.99
3920	C3N new	3419	cedes Actros 18.53.1	1	Single	3750	900	4400	4400	630	9.00 x 22.5	2240	825	4400	4400	630	9.00 x 22.5	26.5	24.0	1.1		0.808	53.1	0.486	0.488	0.404	1.00
3920	C3W new	3619	cedes Actros 18.53.1	1	Single	3750	900	4400	4400	630	9.00 x 22.5	3750	900	4400	4400	630	9.00 x 22.5	18.6	17.0	1.1		0.808	53.1	0.488	0.488	0.314	1.00
3920	C3N old	4918	cedes Actros 18.53.1	1	Single	3750	900	4400	4400	630	9.00 x 22.5	2240	825	4400	4400	630	9.00 x 22.5	20.0	17.0	1.1		0.808	53.1	0.487	0.482	0.349	0.99
3920	C3W new	3419	cedes Actros 18.53.1	1	Single	3750	900	4400	4400	630	9.00 x 22.5	2240	760	4400	4400	630	9.00 x 22.5	20.3	19.0	1.1		0.808	53.1	0.487	0.480	0.324	0.99
3417	C3N new	3419	ATEGO 1229	1	Single	2240	760	3488	3488	532	7.5x19.5	2240	825	3488	3488	532	7.5x19.5	26.1	22.4	1.3	0.91	-	55	0.5			

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	Stdev	CoV	Average	Stdev	CoV	Average	Stdev	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%

1. Coefficient of variation of Current C3 SRTT and New Design C3 SRTTs (BFC or mu) are similar → **stability on wet is comparable**
2. Differently from Snow case, Current and New SRTTs are not so distant in terms of wet performance; the available data show anyhow a **slight improvement of new design SRTTs** Same as snow case, based on the data collected so far, **statistically the New SRTT 22.5” and New SRTT 19.5” are equivalent** (comparable average deceleration/mu peak)

WET grip test campaign

Proposed approach: unique correlation Factor

Same approach proposed to manage the Snow case:

- Keep the existing thresholds (vs current SRTT)
- Apply a correlation factor (fixed by regulation) when test is performed vs new design C3 SRTTs:
 - Correlation factor can be established by the analysis of the WGI test campaign results, considering:
 - the equivalence of the 2 SRTTs (19.5 and 22.5)
 - the worst cases testing (regulatory change can be managed by a supplement of UN R117)

→ Proposed correction factor is **1.04** for both 19.5 & 22.5, for both trailer and vehicle methods

$$WGI_{\text{current SRTT}} = \frac{\text{Candidate}}{\text{current SRTT}} = \frac{\cancel{\text{new SRTT}}}{\text{Current SRTT}} \cdot \frac{\text{Candidate}}{\cancel{\text{new SRTT}}} = 1.04 \cdot WGI_{\text{newSRTT}}$$

- WGI_{current} wet grip index of candidate vs. SRTT current
- WGI_{new} wet grip index of candidate vs. SRTT new
- **1,04** correlation factor fixed by regulation = "new" vs. "current"
- candidate BFC/mu of candidate tire
- New SRTT BFC/mu of new SRTT
- Current SRTT BFC/mu of current SRTT

WET grip test campaign

Additional topics under investigation at ETRTO

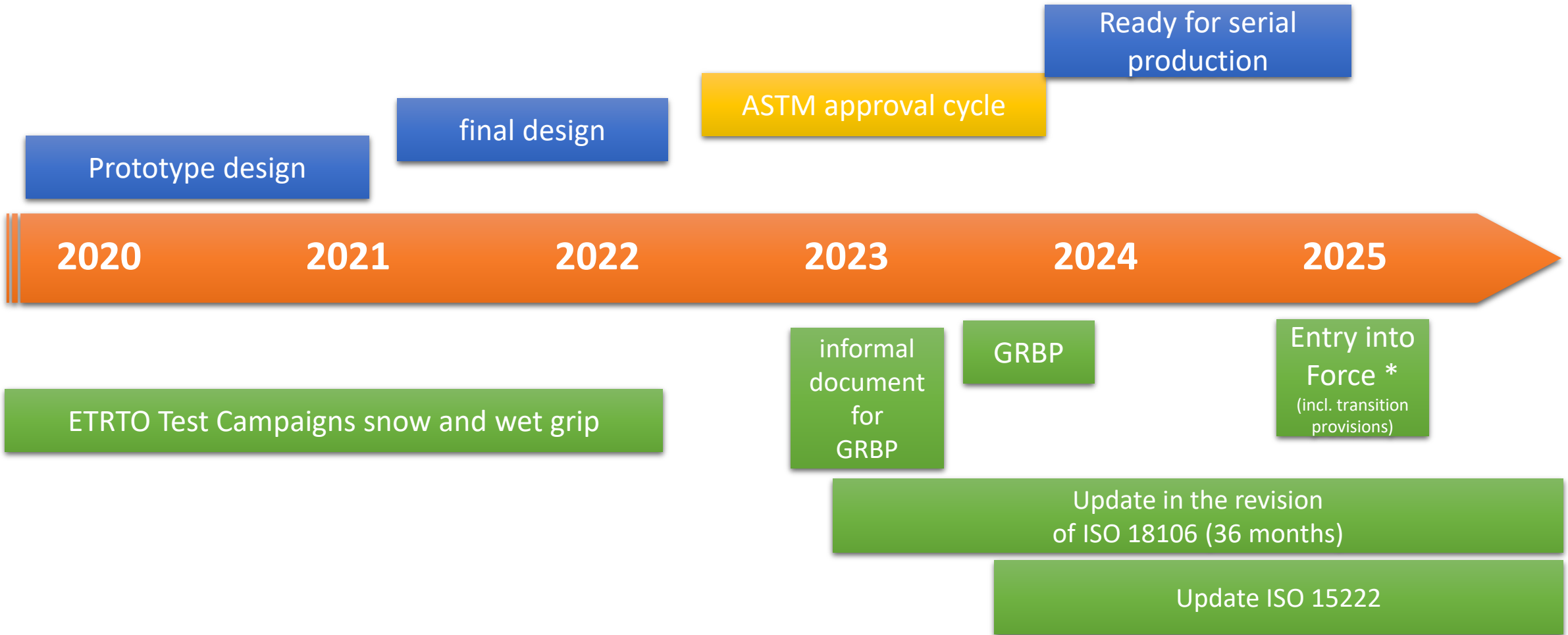
a) **possibility of using both new SRTTs (19.5 and 22.5) as reference tyre irrespective of the size of candidate tyre**

Same as snow case, based on the data collected so far, statistically the SRTT 22.5" and SRTT 19.5" are equivalent (very similar average decel./mu peak)

b) **possibility to improve the track friction range definition for C2&C3 WGI test method**

Ref. to appendix for preliminary information

Timeline for introducing new C3 SRTT's



Harmonization with other standards / regulations to be granted

* Transitional provisions to be introduced: usage of both current & new C3 SRTTs allowed for a certain period





ETRTO

The European Tyre and Rim
Technical Organisation

Thank You

SRTT C3N or C3W usage for WGI

REGULATORY FRAMEWORK

- Differently from Snow test, SRTTs C3N and C3W are currently not interchangeable for WGI test: choice depends on the section width of the candidate → burden for testing (possibility to fit SRTT and candidate under the same vehicle)

In order to cover the range of the tyre sizes fitting the commercial vehicles, the Standard Reference Test Tyres (SRTT) shall be used to measure the relative wet index as shown in the following table:

For class C3 tyres	
Narrow family $S_{\text{Nominal}} < 285 \text{ mm}$	Wide family $S_{\text{Nominal}} \geq 285 \text{ mm}$
SRTT19.5	SRTT22.5
For class C2 tyres SRTT16C	
$S_{\text{Nominal}} = \text{Tyre nominal section width}$	

ETRTO TASK

- Investigating if and how this constrain can be eliminated

ETRTO DIRECTION

- Fix a shift factor by regulation** to switch from one SRTT to the other SRTT (e.g. performance ratio C3W vs C3N)

$$WGI_{C3N} = \frac{\text{Candidate}}{C3N} = \frac{C3W}{C3N} \cdot \frac{\text{Candidate}}{C3W} = [\text{Shift factor}] \cdot WGI_{C3W} \quad (*)$$

- Preliminary results show no significant difference between C3N and C3W (Shift factor = 1?) → analysis ongoing**

(*) Concept already present in regulation (when SRTT and candidate cannot be fitted under the same vehicle and other SRTT is used as «bridge»), but defined at local level and to be checked periodically

C2 & C3 track friction ranges

REGULATORY FRAMEWORK

- Not only C1, but also C2&C3 tracks friction ranges are today defined using C1 SRTT16 μ -peak values on trailer
 → Logistic constrains (C1 trailer needed, not easy to drive with the trailer on the C2-C3 tracks braking lines)

Class	Trailer method	Vehicle method
C1	μ peak C1 SRTT16 [0.65-0.90]	BFC C1 SRTT16 [0.57-0.79]
C2&C3	μ peak C1 SRTT16 [0.65-0.90]	

ETRTO is considering how to improve the current C2&C3 track friction range definition

ETRTO DIRECTION

- C2 track to be defined using C2 SRTT16C
- C3 track to be defined using the C3 SRTT (C3N or C3W)
- Use μ -peak for trailer method and average deceleration (BFC) for vehicle method
- Transition period to be considered

	Trailer method	Vehicle method
C1	μ peak C1 SRTT16 [0.65-0.90]	BFC C1 SRTT16 [0.57-0.79]
C2	μ peak C2 SRTT16C [xx,xx]	BFC C2 SRTT16C [xx,xx]
C3	μ peak C3 SRTT [xx,xx]	BFC C3 SRTT [xx, xxx]



New C3 SRTTs

Harmonization with other Standards / Regulations (1/2)

Country	Regulation	Test method(s)	SRTT22.5	SRTT19.5	Remarks
UN	R109.00.10	Snow performance	ASTM F2870-16	ASTM F2871-16	
UN	R117.02.15	Wet grip, snow performance	ASTM F2870-16	ASTM F2871-16	
UN	R117.03.01	Wet grip, snow performance	ASTM F2870-16	ASTM F2871-16	
UN	R117.04.00	Wet grip, snow performance	ASTM F2870-16	ASTM F2871-16	
EU	2020/740	Wet grip, snow performance			through reference to UN R117
GCC	GSO ECE 117:2016	Wet grip	ASTM F2870-11	ASTM F2871-11	
Saudi Arabia	SASO2857:2016	Wet grip			Reference to SASO GSO ECE 117 and SASO GSO ISO 15222
Brazil	INMETRO 379/2021	Wet grip			Through reference to ISO 15222:2011 and UN R117, Annex 5
USA	USTMA TISB No. 50, Vol 3.	Snow performance	ASTM F2870	ASTM F2871	Test method refers to ISO 18106:2016; References to ASTM are undated



New C3 SRTTs

Harmonization with other Standards / Regulations (2/2)

Country	Regulation	Test method(s)	SRTT22.5	SRTT19.5	Remarks
China	GB/T 35163-2017	Wet grip	T-CMA-HG 012-2016	T-CMA-HG 011-2017	315/70R22.5 154/150L, 245/70R19.5 136/134M conforming to requirements of relevant Chinese associations (“ASTM F2870, ASTM F2871 ... are not referenced, since there are corresponding standards in China”)
China	GB/T 33830-2017	Snow grip	T-CMA-HG 012-2016	T-CMA-HG 011-2017	
India	AIS-142 (2019)	Wet grip, snow performance	ASTM F2870-11	ASTM F2871-11	
Korea	Energy Efficiency Reg.	Wet grip	ASTM F2870	ASTM F2871	References are undated
Thailand	TIS2721:2560	Wet grip, snow performance	ASTM F2870-11	ASTM F2871-11	
ISO	15222:2021	Wet grip	ASTM F2870	ASTM F2871	References are undated
ISO	18106:2016	Snow performance	ASTM F2870	ASTM F2871	References are undated

