# Proposal of additional test campaign

IWG WGWT

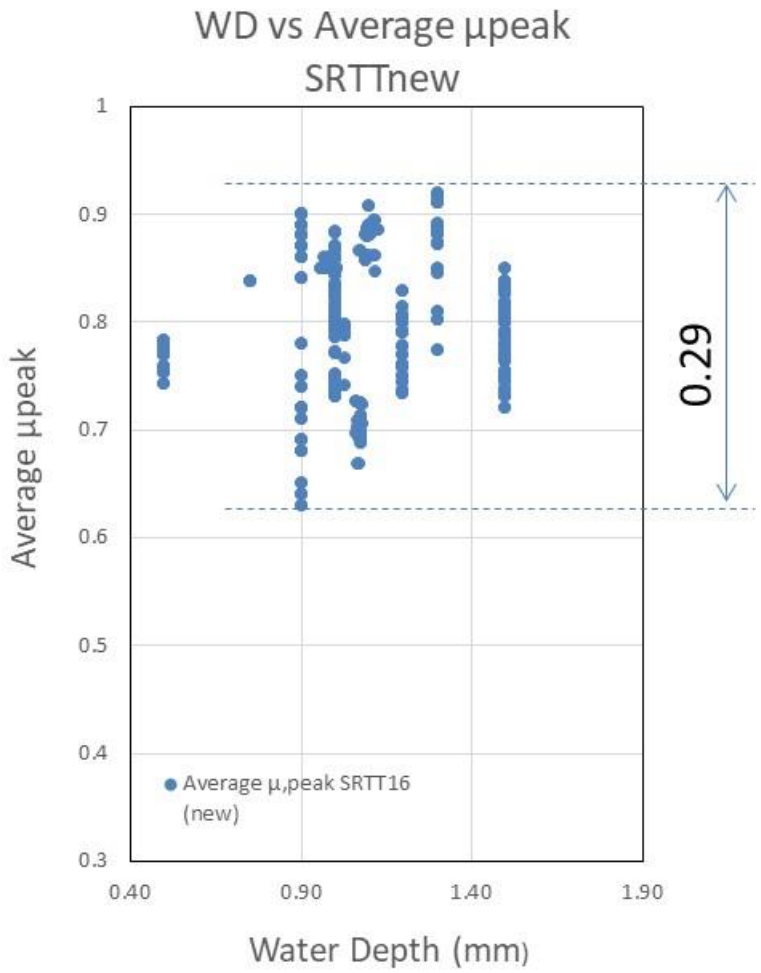
3 December 2021

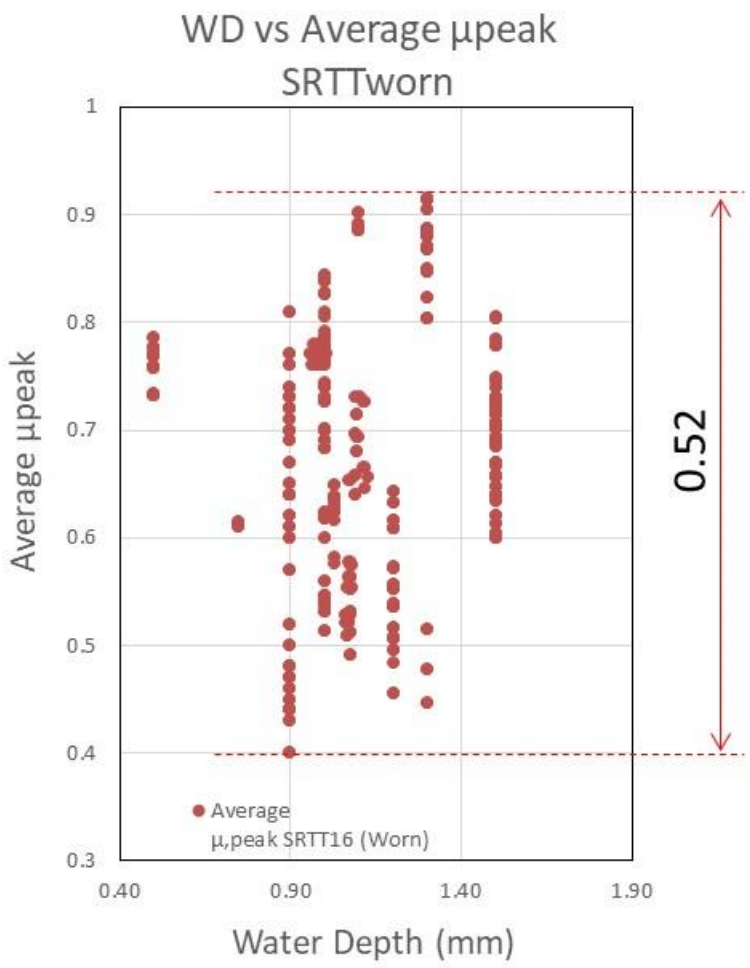
JAPAN AUTOMOBILE STANDARDS INTERNATIONALIZATION CENTER

# 1. JASIC findings - Water depth (WD) vs SRTT Average µpeak

(Shown at the IWG WGWT on 29 July)

*Data includes results of screening and analytical tests.
Trailer method (Sequence A & B)



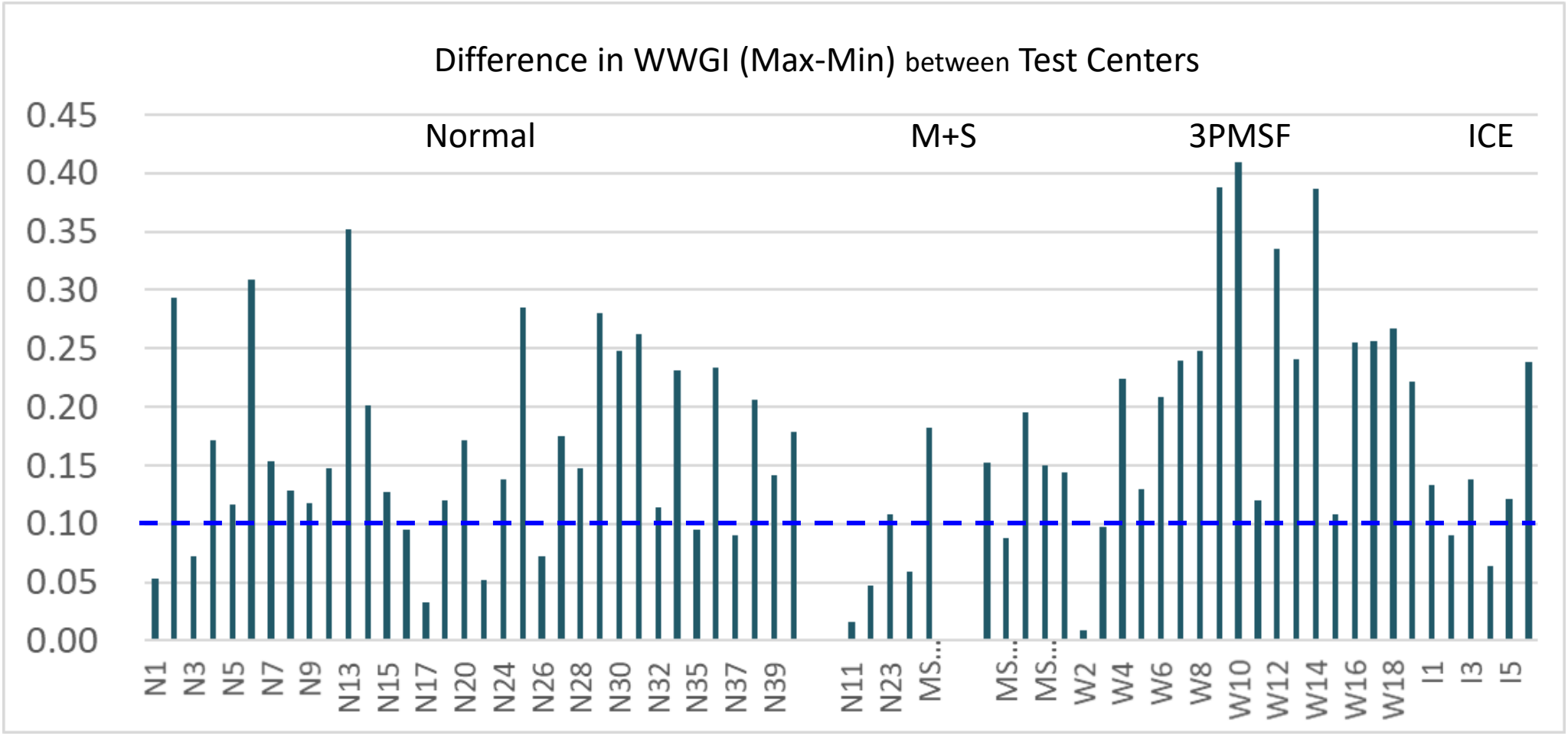




µ of SRTTworn spread about twice as wide as that of SRTTnew regardless the influence of water depth

**Variation of SRTT must be reduced.**

# 1. JASIC findings - Difference in WWGI (Max-Min) between Test Centers

Note: Limit values for new tyres (Normal: 1.10, 3PMSF: 1.00 or 0.90)




There are **78%** (53/68) cases that the WWGI difference between laboratories exceeds 0.1*.
**This level of precision also must be reduced.**

* Threshold difference in R117.

# 2. Concept of Additional Assessement

Factors which may cause the variability of the μpeak value of worn tyres:

- Use of buffed SRTTworn as reference tyre
- Water depth
- Road surface roughness
- Test speed
- Accuracy of tread depth measurement
- Tyre surface roughness

→ JASIC proposes to assess testable variation factors from above.

■ Purpose of the assessment

To improve precision of formulas, JASIC would like to

-Re-conduct test campaign

-Eliminating the influence of buffing process by assuming the use of Molded SRTTworn

# 2. Concept of Additional Assessement

Factors which may cause the variability of the μpeak value of worn tyres:

- Use of Molded SRTTworn as reference tyre
- Water depth
- Road surface roughness
- ~~Test speed~~
- ~~Accuracy of tread depth measurement~~
- ~~Tyre surface roughness~~

■ Goal of the assessment

To identify the factors which should be controlled, in order to have the new formula measuring Molded SRTTworn and Candidate tyres with sufficient precision for the introduction of the regulation.

# 2. Concept of Additional Assessement

■ Tyres and items for evaluation

- Buff SRTTworn, Molded SRTTworn, SRTTnew, Candidate tyres

- Test precision
  - ✓ Intra-test center variability
  - ✓ Inter-test center variability

# 3. Evaluation Factors

- Molded SRTTworn: Evaluate its performance.

- Water depth / road surface roughness: Evaluate the relationship between water depth and road surface roughness (MTD).

  ✓ Water depth/water flow volume: Evaluate the sensitivity to μ at 4 levels
  (0.5 mm, 1.0 mm, 1.5 mm, 2.0 mm)

  ✓ MTD : Evaluate the difference in μpeak between test centers at wider range of MTD
  (Select test centers to cover wide MTD range)

- Tyre surface roughness: Assessment results already available.
  From μpeak vs. number of uses, determine the maximum number of uses for Molded SRTTworn.

## ■ Test tyres :

Molded SRTTworn

Provided from Michelin to each test center.

Buffed SRTTworn *1

Using existing products already distributed to each test center.

Candidate tyre

Category : Normal and 3PMSF *2

Using existing products already distributed to each test center.

*1 May need to prepare extra Buffed SRTTworn, as tread depth of existing Buffed SRTTworn may reach 1.6 mm.

*2 In the first test campaign, we did not have enough M+S tyres to calculate the equations. For this reason, in order to conduct a minimum volume of necessary assessments, M+S tyres are not included in the Candidate for this plan.

## ■ Participants :

1) Assess day to day variation of Molded SRTTworn and equations of calculations

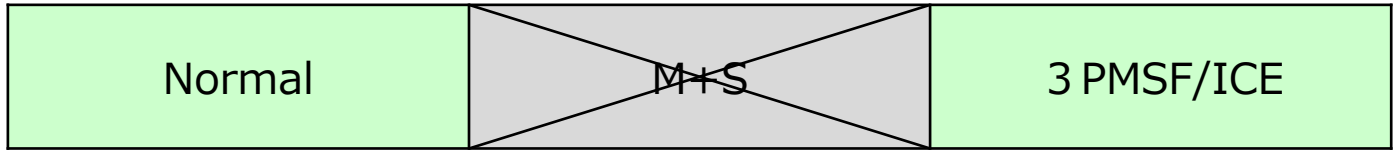
**All test centers**

2) Water depth / road surface roughness

**Test center which performed water depth evaluation of analytical plan**

## 1) Assess day to day variation of Molded SRTTworn and equations of calculations

■ Candidate tyres: All Normal and 3PMSF tyres provided to test centers in the first test campaign




M+S tyres are excluded from 2nd test campaign

■ Participants : All Test centers

■ Test sequence :

Basic sequence

Molded SRTTw – Buffed SRTTw – Candidate 1 – Candidate 2 – Molded SRTTw – SRTTn – Candidate 3 – Candidate 4 – Molded SRTTw

⋮

To assess day to day variation, the Normal tyre and the 3PMSF tyre with the lowest μpeak value among each category in the first test campaign are tested for 4 consecutive days.

| | |
|---|---|
| Day 1 | Molded SRTTw – Candidate Normal (lowest μpeak) – Candidate 3PMSF (lowest μpeak) – Molded SRTTw |
| Day 2 | Molded SRTTw – Candidate Normal (lowest μpeak) – Candidate 3PMSF (lowest μpeak) – Molded SRTTw |
| Day 3 | Molded SRTTw – Candidate Normal (lowest μpeak) – Candidate 3PMSF (lowest μpeak) – Molded SRTTw |
| Day 4 | Molded SRTTw – Candidate Normal (lowest μpeak) – Candidate 3PMSF (lowest μpeak) – Molded SRTTw |

## 2) Water depth / road surface roughness

■ Participants : Test center which performed water depth evaluation of analytical plan

■ Test sequence :

Day1 Water depth 0.5mm

Molded SRTTw – Buffed SRTTw – Candidate A – Candidate B – Molded SRTTw – SRTTn-Candidate C – Molded SRTTw

Day2 Water depth 1.0mm

Molded SRTTw – Buffed SRTTw – Candidate A – Candidate B – Molded SRTTw – SRTTn-Candidate C – Molded SRTTw

Day3 Water depth 1.5mm

Molded SRTTw – Buffed SRTTw – Candidate A – Candidate B – Molded SRTTw – SRTTn-Candidate C – Molded SRTTw

Day4 Water depth 2.0mm

Molded SRTTw – Buffed SRTTw – Candidate A – Candidate B – Molded SRTTw – SRTTn-Candidate C – Molded SRTTw

# 5. Necessary quantity of Molded SRTT worn

JASIC recommend to produce Molded SRTT worn : **146 tyres**

1.5 time number of 1st test campaign*

+ additional spare (1 set/lab) for emergency purpose

* In the first test campaign, 50% of the sequences were performed on Buffed SRTTworn reference and 50% on SRTTnew reference. Since the additional test campaign JASIC proposes is only for the Molded SRTTworn reference, the number of Molded SRTTworn runs is 1.5 times the number of Buffed SRTTworn runs in the first test campaign. Therefore, the number of Molded SRTTworn needs to be 1.5 times the number of Buffed SRTTworn used in the first test campaign.

| | Trailer method | Vehicle method | Sub total |
|---|---|---|---|
| Number of participated test center | 9 | 5 | - |
| Number of 1st test campaign | 18 | 57 | - |
| Necessary quantity for additional test campaign | 27 | 90 | 117 |
| Spare (1 set per lab) | 9 | 20 | 29 |
| Total | | | **146** |