Concept method to demonstrate equivalence of tyre abrasion methods [DRAFT]

UNECE Task Force on Tyre Abrasion (39th session). Brussels, 04-12-2025

Note to the UNECE Secretariat:

The author and the speaker of this presentation confirm that they have authorization to use all content including photos and visual elements.
The material is either copyright-free or the author/speaker hold the necessary copyright or permission.
The UNECE will remove any material from its events and supporting websites if there is unlawful use of copyrighted material.
The author/speaker takes responsibility for any infringement on copyright and holds the UNECE harmless to this effect.

Rationale and background

- Concept method is proposed as an EC-JRC contribution to the '**technical proposal, based on available test results, to secure inclusion of both the vehicle test method on public roads and the indoor drum test method**' – part of the draft UN Regulation on tyre abrasion, due for adoption during GRBP 83.
- The method addresses the issue of ensuring testing method *equivalence* (i.e., beyond correlation), through legally binding criteria, for existing and new facilities wishing to test tyre abrasion. This enables the application of one set of limits interchangeably for both candidate methods.
- Incorporates the notion of **technology neutrality** (same equivalence criteria apply to each test facility, regardless of the testing method).
- Ensures equivalence is maintained now and in the future, through periodic verification.

Rationale and background

- Concept method is open for further discussion during TF TA 39, in particular with regard to critical aspects identified by stakeholders:
  - Adjusting testing burden (how much to test and how to ensure a fair distribution of efforts?)
  - Defining governance (who is responsible for verifying equivalence is achieved and maintained?)
  - Ensuring full compatibility with the 1958 agreement
  - Clarifying the interaction with ISO 17025 accreditation
  - Limiting periodic verifications of equivalence

- A draft ‘UNR Annex on method equivalence’ text is also proposed, for the consideration of TF TA

Rationale and background

- Earlier versions of the concept method were discussed with contracting parties and key TF TA stakeholders. Following their feedback, the following changes were made:
  - Equivalence exercise was simplified (fewer facilities, no need to store tyres between exercises)
  - Period for verification extended from [2] to [3] years
  - Some elements borrowed from French proposal (TA-39-3, with very similar aim but technical differences worth discussing in depth)

Equivalence concept proposal

Steps

1. Selection of tyres and participating facilities
2. Abrasion tests at participating facilities to **establish baseline** (reference values)
3. Application of technology neutral criteria to **establish equivalence** (existing or new facilities)
4. Periodic **verification of equivalence** (every [3] years, following a new selection of tyres and/or facilities)

Definitions

Facility: Circuit or Drum

- **ED:** Equivalent Drum, i.e. Drum that has proven equivalence in the previous exercise
- **EC:** Equivalent Circuit, i.e. Circuit that has proven equivalence in the previous exercise
- **AD:** Assessed Drum that wants to prove equivalence
- **AC:** Assessed Circuit that wants to prove equivalence

Baseline value (for each tyre): The average ALI of the equivalent facilities (EC, ED) that tested this tyre. Note that the value is recalculated after removal of tyres that their absolute difference is [>0.25] from the baseline.

ALI: Abrasion level index (i.e. only ratio of candidate to reference tyre abrasion level)

Transfer function for Drums

All indoor drum facilities (both equivalent and under assessment) shall apply the following transfer function to their results :

ALI(vehicle) = a [ALI(drum) – 1] + 1

Where a = [1] *

** Note: The exact value shall be determined by the TF TA*

Step 1. Selection of tyres and participating facilities

The participating [≥3] facilities shall include at least [1] indoor drum and [1] convoy vehicles circuit facility that have proven equivalence. At least [1] facility shall be different compared to the previous exercise.

Note: Facilities can participate in more than one such exercise.

The same [≥6] candidate tyres shall be tested by all participating facilities. The selected tyres shall fulfil the following criteria: at least one 3PMSF and one normal tyre with expected ALI < [0.9] and one 3PMSF and one normal tyre with expected ALI > [1.3]. At least [4] tyres shall be different from the last exercise

Tyres shall be selected by [the participating facilities].

Tyres from the same batch shall be shipped to all participating facilities.

ALI: Abrasion level index (i.e. only ratio of candidate to reference tyre abrasion level)

Step 2. Abrasion tests to establish baseline

Testing shall fulfil [this] regulation.

[It is recommended that the test average temperature will be 3°C higher from the lower boundaries and 3°C lower from the higher boundaries.]

For each of the tyres, a *baseline value* shall be established as the average of the facilities that have proven equivalence (excluding the facility confirming equivalence or trying to prove equivalence). For every tyre the individual points shall be within [0.25] of the baseline.

If the absolute difference of any tyre is [>0.25] than the baseline value, it will be excluded and the average shall be re-calculated from the remaining. This will be repeated until all values are within [±0.25]

Note: The circuit of the excluded tyre needs to assess the reasons, take any necessary measures, re-test and re-establish the equivalence. However, no past results are invalidated.

Step 3. Application of criteria to establish equivalence

Any equivalent drum (after applying the transfer function) or circuit shall fulfil the following criteria:

A) For each tyre, the difference from the baseline value shall be within [± 0.25].

B) The R^2 for all tyres shall be [>0.85]

The drum facility has proven equivalence for the specific parameters that were applied during the equivalence tests (e.g. 3rd body flow rate, drum surface etc.)

Documentary evidence for the equivalence exercise shall be made available to [responsible authorities].

Note: The exercise should be blinded if possible

Step 4. Periodic verification of equivalence

All equivalent facilities shall confirm (demonstrate) equivalence at least every [3] years.

All facilities (existing or new; with indoor drums or carrying out convoy vehicle tests at a circuit) shall prove equivalence by following the previous procedure (see previous slides for details):

- Testing [≥6] tyres and comparing the results with the average of another [≥3] equivalent facilities.
- They fulfil the equivalence criteria A) and B)

Note: Inter-facility exercises are independent from each other.

Need for a periodic verification of equivalence

Until the technical specifications are robust enough, there is a need of a procedure to demonstrate equivalence of facilities. This does not apply only to new Drums, but also to new Circuits. Furthermore, EC proposes to have a periodic demonstration of the existing facilities equivalence.

The proposal is intended as an Annex to the working document until the root causes of the differences have been found and it has been demonstrated that the technical specifications are robust enough.

Discussion

- Equivalence exercises can be independently conducted, depending on needs and availability (simplified governance).
  - For example, a new drum (or circuit) could test 6 tyres, and ask 3 equivalent facilities to test the same 6 tyres, proving its equivalence
  - For example, 4 equivalent facilities test the same 6 tyres sharing the expenses and demonstrating the continuity of their equivalence
  - For example, the above two tests could be combined (4 equivalent facilities and a new drum)
- The first EC proposal required all facilities to test the same tyres every two years to establish the baseline. However, this might be challenging as the number of facilities increases. The new proposal addresses this issue, but with the cost of a less robust baseline.
- The cost of this proposal should be reasonable for the facilities, as ISO 17025 accredited laboratories participate in round robins. These tests could be part of their ISO testing.

Discussion

- Tyre selection is key (to cover a broad range of expected ALI).
  - The [6] tyres require 2 convoys. More tyre will increase the cost, but on the other hand will ensure better market coverage.
  - Tyre selection may change with every inter-facilities exercise(no need to create additional reference tyres).
- Baseline is based on the **average** of measurements from several facilities (mix of circuit and drum).
  - Correlation of one facility with another one is not robust enough due to the uncertainties of both facilities.
  - No ‘golden drum’ or ‘golden circuit’ necessary. Every facility must meet the equivalence criteria in technology neutral terms.

Discussion

- Criteria to demonstrate equivalence with baseline apply equally to all facilities (drum or circuit) equivalent or not. Testing burden is fairly distributed.
    - Note: in the first EC proposal the new facilities had to pass stricter and more criteria to prove equivalence compared to equivalent facilities to demonstrate equivalence
- Exercise is validated periodically, supporting improvement and continued alignment between the two methods. This is necessary until robust technical specifications are introduced in the regulation and adequate testing has been carried out.
- All points in brackets need further discussion.

Thank you

This document has not been approved by the Commission and is subject to review and approval by the Commission before it can be considered as representing the official position of the Commission.