Informal Joint Working Group of GRB and GRRF

Geneva 16-17 November 2009

3rd STD meeting

Use of RR coefficient value

- Regulation on CO^2
  - 692/2008 (Euro 5 & Euro 6)
    - Annex I appendix 3 § 6.6.1 *(Ref. to ISO 28580)*
    - Annex III § 3.5 *(Ref. to ISO 28580)*
    - Annex XVIII § 6.6.1 *(Ref. to ISO 28580)*
    - Annex XIX § 6.6.1 *(Ref. to ISO 28580)*
  - R101 draft amendment ECE/TRANS/WP.29/2009/76
    - Annex 6 § 1.3.5 *(Ref. to ISO 28580)*

- Regulation Labelling of Tyres
  - ST14024/09 - 2009/10/02&05
    - Annex I Parts A *(Ref. to R117)*

- GSR
  - 661/2009
    - Annex II Parts B *(Ref. to ISO 28580)*

France proposal

- Make only reference to R117 and not ISO
  - Comitology ?
- In amendment of R117-Rev1
  - Only test methodology in the main text of R117 as in other regulations
- If needed
  - Annex 8 on Interlaboratory comparison procedure (informative)
  - Annex 9 on alignment procedure (informative)
- In justification document
  - GRFF sub-group : TSG (Technical Services Group)

DIFFERENCES ISO / FRENCH PROPOSAL

- **ISO requests a reference laboratory:**

  Proposal: The 1958 agreements recognizes the Technical Services as equivalents, then no leadership can exist.

  For this reason we suggest to refer (if needed) to assigned consensus values agreed by the Technical Services through an interlaboratory comparison.

- **ISO defines four methods for measuring the rolling resistance:**

  Proposal: No change.

- **ISO defines the characteristics of the machine:**

  Proposal: No change, nevertheless the load values for measuring the parasitic losses have to be confirmed.

- **ISO defines the test conditions:**

  Proposal: No change
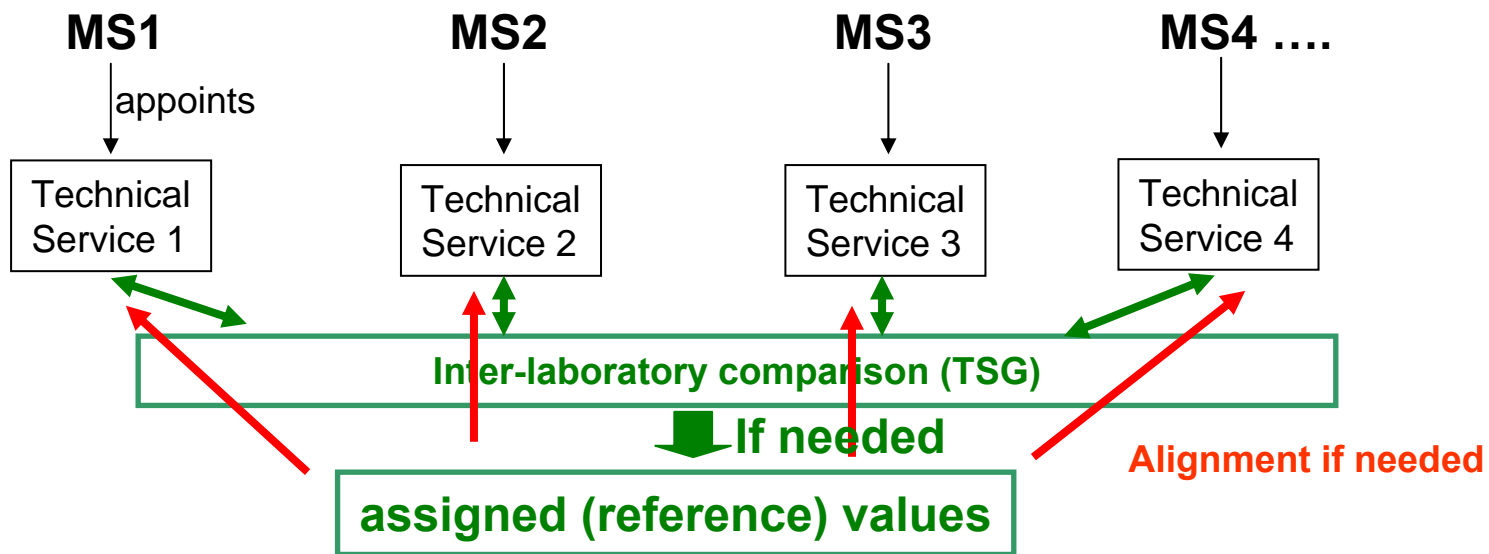
DIFFERENCES ISO/FRENCH PROPOSAL

- **ISO has a requirement on the « reproducibility » for the reference laboratory and another for the candidate laboratory:**
  Proposal: Only one value is kept σm = 0.075 for passenger car and 0.06 for larger trucks and buses tyres.

- **ISO requests a number of measurements more than 1 if the reproducibility value is not fulfilled :**
  Proposal: No change

- **ISO defines a method of alignment between the reference laboratory and a candidate laboratory:**
  Proposal: No technical changes except:
  - **Interlaboratory comparison and alignment procedure in informative annexes of R117**
  - **The reference laboratory is replaced by reference to assigned consensus values agreed by the Technical Services through an interlaboratory comparison.**
  - **The number of tyres could be higher [at least 2] in order to cover a large range of rolling resistance coefficients including some « steady » tyres used for monitoring the drift of the machine.**

  Note: This alignment method can also be used to align a candidate laboratory to any Technical Service.

Annex 8 (informative) Interlaboratories tests

France proposal

- Principle

MS1

appoints

MS2

MS3

MS4 ….

Technical Service 1

Technical Service 2

Technical Service 3

Technical Service 4

Inter-laboratory comparison (TSG)

If needed

assigned (reference) values

Alignment if needed

Open Questions : Criteria and procedures for assigned reference value definition, organization and funding, new entrants: => TSG organisation by GR

Output from interlaboratory comparison

From ISO 5725

- Trueness analysis
- Precision analysis

If needed for application of annex 9

- Assigned (reference) values for each reference tyre based on general average of Technical Service results for this reference tyre

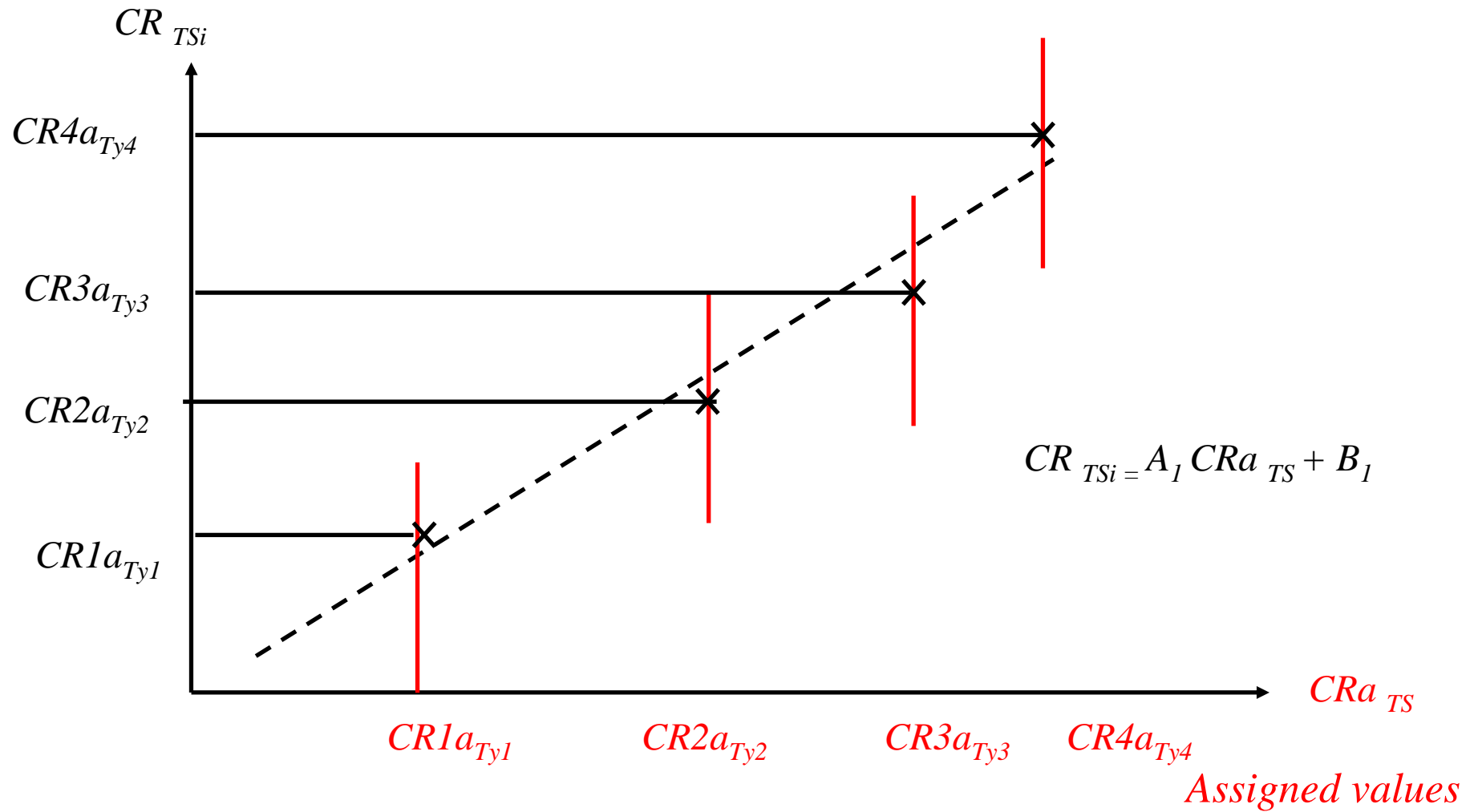# Annex 9 (informative)
Alignment procedure

Alignment Process

- **1st step: Determination of the assigned values:**

    - Each Technical Service measures similar set of tyres covering the range of rolling resistance coefficients.
    - The «general average » of rolling resistance of each tyre becomes the assigned value for this tyre.

- **2d step: Alignment (if needed) of each Technical Service:**

    - A linear regression is performed from the measured values by the Technical Service versus the assigned values as following :

Alignment Process

Technical Service alignment

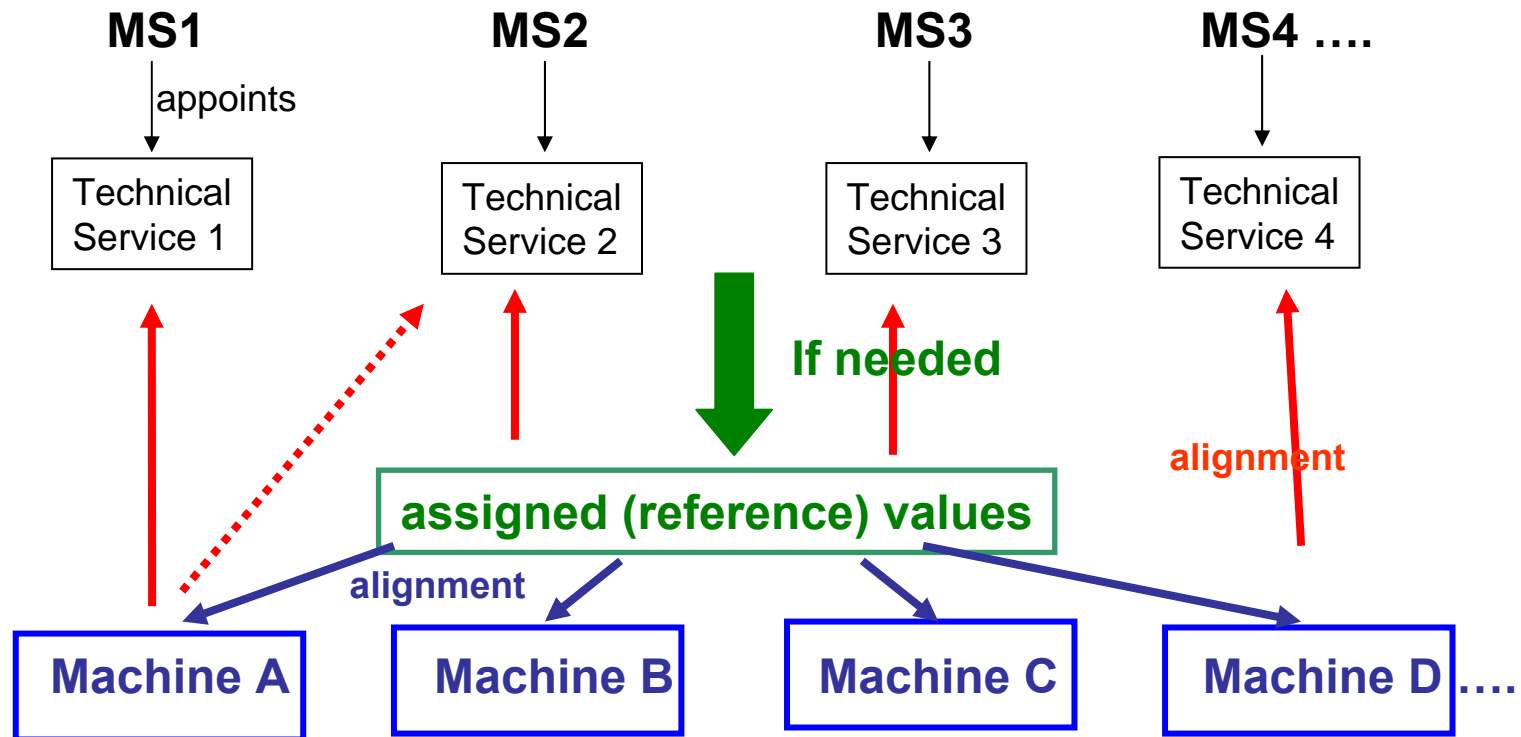*Measured values*

CR_{TSi}

$CR4a_{Ty4}$

$CR3a_{Ty3}$

$CR2a_{Ty2}$

$CR1a_{Ty1}$

$CR_{TSi} = A_1 CRa_{TS} + B_1$

CRa_{TS}

$CR1a_{Ty1}$ $CR2a_{Ty2}$ $CR3a_{Ty3}$ $CR4a_{Ty4}$

Assigned values

(y, x) = (RR(TSi, Tym), RR(TS, Tym))

France proposal

- Principle

MS1 **MS2** **MS3** **MS4 ….**

appoints

| Technical Service 1 | | Technical Service 2 | | Technical Service 3 | | Technical Service 4 |

If needed

assigned (reference) values

alignment

alignment

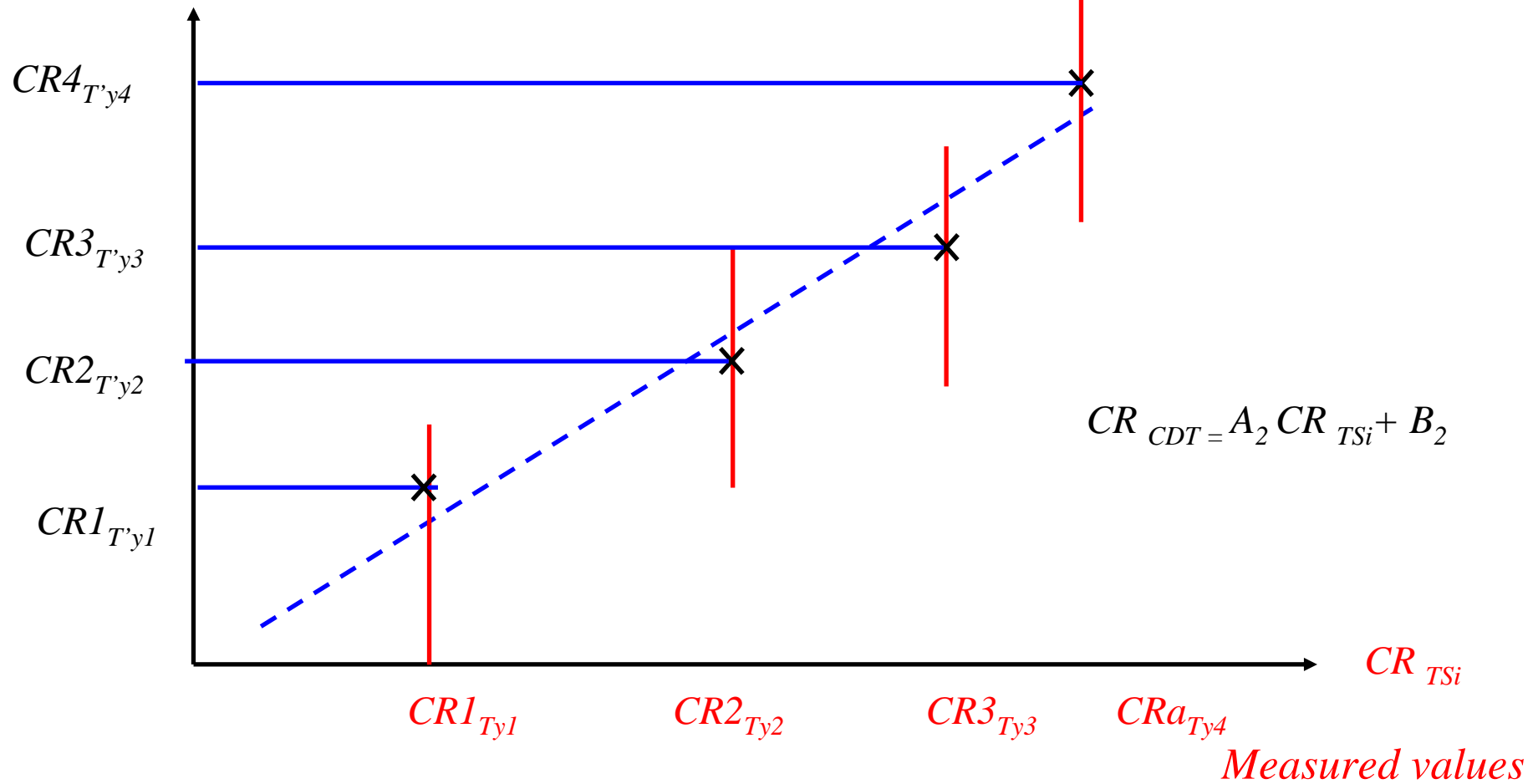| **Machine A** | | **Machine B** | | **Machine C** | | **Machine D** …. |

Alignement Process

- **3rd step: Determination of the linear regression between a candidate laboratory and a Technical Service.**

   - Both the candidate laboratory and the Technical Service measure a set of tyres and a linear regression is performed from the measured values.

Alignement Process

Measured values

CR candidate

Candidate laboratory measurements versus Technical Service measurements.

$CR_{CDT} = A_2 \, CR_{TSi} + B_2$

$CR4_{T'y4}$

$CR3_{T'y3}$

$CR2_{T'y2}$

$CR1_{T'y1}$

CR_{TSi}

$CR1_{Ty1}$ $CR2_{Ty2}$ $CR3_{Ty3}$ CRa_{Ty4}

Measured values

(y, x) = (RR(CDT, Tyn), RR(TSi, Tyn))

Alignment Process

– **4th step: Alignment of the candidate laboratory:**

From the 2d Step, the relationship between one Technical Service and the reference assigned consensus values agreed by the Technical Services through an interlaboratory comparison is:

$$CR\ TSi = A1\ CRa\ TS + B1$$

From the 3rd Step, the relationship between one Technical Service and the a candidate laboratory is:

$$CR\ CDT = A2\ CR\ TSi + B2$$

Then the final relationship between the candidate laboratory and the reference assigned consensus values is:

$$CR\ CDT = A2\ (A1\ CRa\ TS + B1) + B2 = A\ CRa\ TS + B$$