

Report from the Expert Group on laboratory alignment for the measurement of tyre rolling resistance installed under Regulation (EC) No 1222/2009 and listed on the Commission registry of Expert Groups to the European Commission

*Interlaboratory Alignment Procedure for Rolling Resistance Measurement for
Implementation of the tyre labelling according to Regulation (EC) No 1222/2009*

2011-11-25

Content

1. Executive Summary	4
2. Introduction.....	5
2.1. Participants of the Expert Group	5
2.2. Approach for laboratory alignment.....	5
2.3. Procedure for Interlaboratory alignment.....	6
2.3.1. Choice of laboratories	6
2.3.2. Choice of alignment tyres	6
2.3.3. Pre-tests on each batch of tyres	7
2.3.4. Alignment tests for C1-C2 tyres.....	8
2.3.5. Alignment tests for C3 tyres.....	8
3. Results.....	8
3.1. Pre-tests results.....	8
3.2. Alignment tests results.....	9
4. Conclusion	9
Annex A – Equipment information.....	10
Annex B – Data report template.....	11
Annex C - Pre-tests results.....	12
1. Pre-tests results for C1-C2 tyres	12
1.1. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_A	12
1.2. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_B.....	14
1.3. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_C.....	16
1.4. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_D	18
1.5. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_E.....	20
2. Correction Factors for C1-C2 tyres.....	22
3. Pre-tests results for C3 tyres	24
3.1. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_G	24
3.2. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_H	26
3.3. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_J.....	28
3.4. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_K	30
3.5. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_L.....	32
4. Correction Factors for C3 tyres.....	34
Annex D - Alignment tests results	36
1. Raw data for C1-C2 tyres	36
2. Raw data for C3 tyres	40
3. Qualification of reference machines	43
3.1. Sigma m for C1-C2 machines	43
3.2. Sigma m for C3 machines	43
4. Calculation of assigned values.....	44
5. Statistical analysis of the regression functions.....	45
5.1. Analysis for C1-C2 tyres.....	45
5.2. Analysis for C3 tyres.....	51

6.	Regression functions.....	56
6.1.	Regression functions for C1-C2 machines.....	56
6.2.	Regression functions for C3 machines.....	56
Annex E - Template for candidate / reference laboratory alignment		57
A.	- General information of Applicant (Candidate laboratory):.....	57
B.	- General information of the Reference laboratory.....	58

1. Executive Summary

The Commission Communication of 19 October 2006 entitled ‘Action Plan for Energy Efficiency – Realising the Potential’ highlighted the possibility of reducing the total energy consumption by 20 % by 2020 by means of a list of targeted actions including the labelling of tyres. The Commission Communication of 7 February 2007 entitled ‘Results of the review of the Community strategy to reduce CO₂ emissions from passenger cars and light-commercial vehicles’ highlighted the potential for reducing CO₂ emissions by means of complementary measures for car components with the highest impact on fuel consumption, such as tyres¹.

Tyres, mainly because of their rolling resistance, account for 20 % to 30 % of the fuel consumption of vehicles. A reduction of the rolling resistance of tyres may therefore contribute significantly to the energy efficiency of road transport and thus to the reduction of emissions. Fuel-efficient tyres are cost-effective since fuel savings more than compensate for the increased purchase price of tyres stemming from higher production costs. Regulation (EC) No 661/2009 of the European Parliament and of the Council of 13 July 2009 concerning type-approval requirements for the general safety of motor vehicles, their trailers and systems, components and separate technical units intended therefor sets out minimum requirements for the rolling resistance of tyres. Technological developments make it possible to significantly decrease energy losses due to tyre rolling resistance beyond those minimum requirements. To reduce the environmental impact of road transport, it is therefore appropriate to lay down provisions to encourage end-users to purchase more fuel-efficient tyres by providing harmonised information on that parameter. Regulation (EC) No 1222/2009 establishes a framework for the provision of harmonised information on tyre parameters through labelling, allowing end-users to make an informed choice when purchasing tyres. The information to be provided under Articles 4, 5 and 6 of Regulation (EC) No 1222/2009 on the fuel efficiency class, the external rolling noise class and measured value, and the wet grip class of tyres shall be obtained by applying the harmonised testing methods referred to in Annex I of Regulation (EC) No 1222/2009. The fuel efficiency class must be determined on the basis of the rolling resistance coefficient (RRC) according to the specified ‘A’ to ‘G’ scale and measured in accordance with UNECE Regulation No 117 and its subsequent amendments.

As described in the proposed Annex IVa to Reg. (EC) 1222/2009 the procedure for inter-laboratory comparison for rolling resistance (RR) should be based upon the generation of assigned RRC values. For the definition of these “**assigned values**” establishment of reference laboratories will be essential.

A Network of Laboratories was created by the Committee on the Labelling of Tyres under Regulation (EC) No 1222/2009 including an Expert Group, composed of volunteer test laboratories (Technical Services, Tyre Manufacturers) to perform interlaboratory comparison tests on different samples of tyres, in order to establish reference data for rolling resistance measurements. The alignment method for laboratories has to measure tyre rolling resistance and this at the worldwide level.

¹ Official Journal of the European Union, L342/46-58, 22.12.2009: REGULATION (EC) No 1222/2009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 November 2009 on the labelling of tyres with respect to fuel efficiency and other essential parameters

2. Introduction

The European Regulation 1222/2009 is defining labelling classification based upon absolute rolling resistance coefficient (RRC) values. Under Annex I to Regulation 1222/2009 rolling resistance (RR) shall be measured according to Regulation ECE-R117 and its subsequent amendment.

This means that the revised ECE-R117 currently under adoption will apply.

According to experiences of the European tyre industry gained from previous Round-Robin tests for tyre rolling resistance the deviations in test results observed were up to more than 1 N/kN between laboratories.

Due to this observed dispersion between measurement machines, a machine alignment procedure is necessary to get comparative Rolling Resistance Coefficient (RRC) values and give an appropriate competitive playground for the declaration of RRC labelling values according to European Regulation (EC) 1222/2009.

2.1. Participants of the Expert Group

Conveners:

TÜV SÜD (Germany)

UTAC (France)

Tyre manufacturers:

Apollo Vredestein,

Bridgestone,

Continental,

Goodyear,

Michelin,

Pirelli.

Independent Test Laboratories:

UTAC (France),

IDIADA (Spain),

TÜV SÜD Automotive (Germany).

Observers:

JASIC (Japan),

RDW (Netherlands).

2.2. Approach for laboratory alignment

The procedure is based upon the generation of assigned RRC values as described in Annex IVa to Reg. (EC) 1222/2009.

The Expert Group had proposed a 2-steps process for laboratory alignment:

In the first step a Network of Laboratories for the definition of assigned values was created.

This Network of Laboratories is operating the RR test machines and equipment as listed in Annex A.

The preparation of the Laboratory alignment procedure consisted in following actions:

Assess number of alignment tyres for each category C1/C2 and C3

Fix details of alignment tyres (class, dimension, load index, standard or reinforced)

Set up logistics, shipment between laboratories,

Recommend tyre storage conditions.

Establish the test procedure and test conditions for interlaboratory comparison.

Based on the assigned values the Laboratories in the Network are correlated and aligned vs. this “virtual reference laboratory”.

In the second step, once the Network of Reference Laboratories has been established and the alignment vs. the assigned values has been completed, any candidate laboratory can align with any of the Network of Reference Laboratories.

2.3.Procedure for Interlaboratory alignment

The Network of Laboratories was created Sept 3, 2010 by the Committee on the Labelling of Tyres under Regulation 1222/2009.

2.3.1.Choice of laboratories

10 Laboratories were participating to the Interlaboratory alignment process.

The description and the information of the machines to be used for the interlaboratory alignment are given in Annex A

Test Laboratories	ID
TUEV	Lab 0
UTAC	Lab 1
IDIADA	Lab 2
Michelin	Lab 3
JASIC	Lab 4
Goodyear	Lab 5
Continental	Lab 6
Bridgestone	Lab 7
Pirelli	Lab 8
Apollo-Vredestein	Lab 9

2.3.2.Choice of alignment tyres

Five sets of alignment tyres for C1/C2 and five sets of alignment tyres for C3 category were selected by the Expert Group; selection of tyres was accomplished in such way to cover the Load Index and Rolling Resistance, coefficient and force, ranges in conformity with the requirements of Regulation ECE R117.

C1 / C2	LI 70 +/- 5	LI 80 +/- 5	LI 90 +/- 5	LI 100 +/- 5	LI 110 +/- 5
6 +/- 0.5 N/kN			Tyre A LI 91 Bridgestone RRC 6.4 / 31 N		
7 +/- 0.5 N/kN					
8 +/- 0.5 N/kN			Tyre B LI 91 Goodyear RRC 8.1 / 39 N		
9 +/- 0.5 N/kN				Tyre C LI 97 Vredestein RRC 9.2 / 53 N	
10 +/- 0.5 N/kN					Tyre D LI 108 Bridgestone RRC 10.4 / 82 N
11 +/- 0.5 N/kN					
12 +/- 0.5 N/kN	Tyre E LI 75 Continental RRC 11.8 / 36 N				

C3	LI 120 +/- 5	LI 130 +/- 5	LI 140 +/- 5	LI 150 +/- 5	LI 160 +/- 5
4 +/- 0.5 N/kN					
5 +/- 0.5 N/kN		Tire G LI 135 Michelin RRC 5.0 / 91 N			Tire L LI 160 Pirelli RRC 5.0 / 188 N
6 +/- 0.5 N/kN			Continental RRC 6.0 / 125 N		
7 +/- 0.5 N/kN					Tire J LI 156 Goodyear RRC 7.3 / 243 N
8 +/- 0.5 N/kN				Tire K LI 154 Michelin RRC 8.01 / 250 N	
9 +/- 0.5 N/kN					

The alignment tyres were provided by industry.

Tyre	Supplier	Size	LI	RRC (not yet aligned)	RR (N) not yet aligned	Design	Load (daN)	Infl. (kPa)	Rim width
A	Bridgestone	195/65R15	91	6.4	31	EP100S	483	210	6.00
B	Goodyear	205/55R16	91	8.1	39	EfficientGrip	483	210	6.50
C	Vredestein	235/50R18	97	9.2	53	Ultrac Cento	573	210	7.50
D	Bridgestone	235/65R17	108	10.4	82	D694	785	250	7.00
E	Continental	155/65R14	75	11.9	36	Uniroyal MS Plus 6	304	210	4.50
G	Michelin	215/75R17.5	135	5.0	91	XTA2+	1818	850	6.00
H	Continental	265/70R19.5	140	6.1	127	HSR1	2085	775	7.50
J	Goodyear	315/80R22.5	156	7.3	243	RHD II	3335	850	9.00
K	Michelin	315/70R22.5	154	8.0	250	Multiway XD	3127	900	9.00
L	Pirelli	385/65R22.5	160	5.0	188	ST01	3752	900	11.75

Test conditions:

Tyre	Supplier	Size	Design	LI / SS	Load (daN)	Infl. (kPa)	Rim width	Test Speed [km/h]
A	Bridgestone	195/65R15	EP100S	91	483	210	6.00	80
B	Goodyear	205/55R16	EfficientGrip	91	483	210	6.50	80
C	Vredestein	235/50R18	Ultrac Cento	97	573	210	7.50	80
D	Bridgestone	235/65R17	D694	108	785	250	7.00	80
E	Continental	155/65R14	Uniroyal MS Plus 6	75	304	210	4.50	80
G	Michelin	215/75R17.5	XTA2+	135J	1818	850	6.00	60
H	Continental	265/70R19.5	HSR1	140M	2085	775	7.50	80
J	Goodyear	315/80R22.5	RHD II	156L	3335	850	9.00	80
K	Michelin	315/70R22.5	Multiway XD	154L	3127	900	9.00	80
L	Pirelli	385/65R22.5	ST01	160K	3752	900	11.75	80

2.3.3.Pre-tests on each batch of tyres

As stipulated by the Expert Group the industry provided the alignment tyres with minimum production variation. But as tyres are never strictly identical, a process of initial measurement of each tyre (3 times) was established in order to assess the tyre category set's individual variance; each of the laboratories providing initial measurements did tests with one whole batch of alignment tyres (same category, brand and design).

Tyre	Pre-tests at Laboratory
A	JASIC
B	Michelin
C	Vredestein
D	JASIC
E	IDIADA
G	IDIADA
H	Continental
J	Goodyear
K	TUEV
L	Bridgestone

2.3.4. Alignment tests for C1-C2 tyres

Each sample of each set of 10 C1-C2 tyres has been tested on one of the 10 machines dedicated to this class of tyres

2.3.5. Alignment tests for C3 tyres

Each sample of each set of 8 C3 tyres has been tested on one of the 8 machines dedicated to this class of tyres

3. Results

The analysis of the results shows that all the Rolling Resistance Machines used comply with the requirement on Sigma m of Regulation (EC) No 1222/2009.

All the results have been collected and recorded on the template report shown in Annex B.

The data formats to be used for the computations and results have been defined by the group:

The measured RRC values corrected from drum diameter and temperature shall be rounded to 2 digits after the comma.

Then the computations will be made with all digits: There will be no further rounding except on the final alignment equations.

All standard deviation values will be displayed with 3 digits after comma.

All RRC values will be displayed with 2 digits after comma.

All alignment coefficients (A11, B11, A2c and B2c) will be rounded and displayed with 4 digits after comma.

These data formats shall be included in Annex IVa of Regulation (EC) No 1222/2009.

Deliverables of the Network of Laboratories Expert Group:

For pre-tests:

Raw data

Qualification of the data

Precision and uncertainty values

Correction factor for each batch

Conclusions

For alignment tests:

Raw data

Qualification of the data

Precision and uncertainty values

Assigned values

Qualification of the assigned value

Alignment curves for the network laboratories

Precision and uncertainty of predicted values

Alignment procedure for candidate laboratories

3.1. Pre-tests results

The repeatability of the pre-test data was analysed, these data include the variation of the RR measurement process as well as the evolution of the tyres during the pre-tests. The goal of the pre-tests was to analyse the variation within

a batch of tyres and to use the results to apply a correction factor if needed. The data and the analysis of these data are given in Annex C to this report.

The analysis of these data has shown that the first test out of three is generally not in line with the two following and for that reason the group has decided to run in the alignment tests four tests instead of three and to use only the three last measurements to calculate the average value. This is a proposal for amendment of the Annex IVa of Regulation (EC) No 1222/2009.

Another outcome from these pre-tests was the maximum variation of the measured RR coefficient for a set of 10 or 8 carefully selected tyres

For C1-C2 = -1.42% / +2.12%

For C3 = -1.92% / +2.51%

Even if we could consider that these results are not so bad for manufactured products, a correction factor was used to normalize the values for future computerization of regression function for each machine. This correction makes no change for assigned values calculation.

3.2. Alignment tests results

Each tyre has been tested on one machine four times and the average of three last measurements has been calculated after applying the correction factor of the tested tyre to each measurement. The data and the analysis of these data are given in Annex D to this report.

From the statistical analysis, when removing one laboratory from the group, the maximum deviation of the assigned values is 1% in the worst case. As a conclusion, the risk of laboratory effect is low and it was agreed to keep all the laboratories in the Network. The impact of corrected/non corrected values on the assigned values was in this case found almost insignificant. The group agreed to use corrected values to exclude variability amongst the tyres in one batch.

4. Conclusion

The experience gained during this Interlaboratory Alignment Procedure for Rolling Resistance Measurement has proved that a pre-test is needed to monitor the dispersion of the batch of tyres and improve the accuracy of alignment equation for each machine. Independent from the variation from one laboratory to another (if they are compliant with the requirement of Annex IVa of Regulation (EC) No 1222/2009) the system is robust.

The experience gained during the pre-test shows that a first test in the same conditions is necessary before starting the series of measurements.

The statistical analysis confirms that the correlation is very high.

Data formats to be used for the computations and results need to be defined in Annex IVa of Regulation 1222/2009.

The accuracy of measured value is improved by this alignment procedure:

Maximum deviation from assigned values before alignment

For C1-C2 = -5.10% / +6.35%

For C3 = -3.65% / ++4.45%

Maximum deviation from assigned values after alignment

For C1-C2 = -2.10% / +2.22%

For C3 = -1.63% / +1.86%

One other document is annexed to this report:

In Annex E: the template for candidate / reference laboratory alignment.

Part A shall be performed before proceeding with Part B

Annex A – Equipment information

	Michelin N°3		Goodyear N°5		Continental N°6		Vredestein N°9		Pirelli N°8	
	CERL Michelin - Magasin F43 Compte A. GIANETTI Zone Industrielle de Ladoux 63118 Cébazat France		Goodyear Innovation Center Luxembourg Avenue Gordon Smith L-7750 Colmar-Berg Luxembourg		Continental Reifen Deutschland GmbH Jaedekamp 30 30419 Hannover		Vredestein Banden BV Testdepartment Ir. E.L.C. Schiff Sr. Street 370 7547 RD Enschede The Netherlands		Pirelli Tyre SpA Sperimentazione Indoor viale Sarca, 222 20126 Milano ITALY	
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Tyre type	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3
Location	Ladoux - France		Colmar-Berg, Luxembourg		Hannover /Germany		Enschede / Netherlands		Milan - Italy	
Machine Identification #	1P/V V2	RRPL A1	M/C # 4	M/C # 5	M1300	M1100	Testmachine 12	-	#RR1	-
Machine operational	yes	yes	yes	yes	yes	yes	yes	-	yes	-
Machine complies to performance criteria										
Network Laboratories	yes	yes	yes	yes	yes	yes	yes	-	yes	-
Measurement method	Deceleration	Deceleration	Torque	Torque	Torque	Torque	Torque	-	Torque	-
Drum diameter [m]	2,706	2,706	2	1,702	2	2	2	-	2	-
Drum surface	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	-	Smooth steel	-
Max. test load [kg]	2 039	8 155	1 250	5 000	2 039	5 097	2 500	-	2 000	-

	Bridgestone N°7		IDIADA N°2		TUV SUD N°0		UTAC N°1		JASIC N°4	
	Bridgestone Technical Center Europe S.p.A. Via del Fosso del Salceto 13/15 00128 Rome Italy		IDIADA Automotive Technology, S.A. Workshop homologation Division Pol Ind L'Abomar, AP2 exit 12 E-43710 SANTA OLIVA		TUEV SUEDE Automotive GmbH Daimlerstrasse 15 85748 Garching/Munich, Germany		Autodrome de Linas-Monthéry 91310 Monthéry CEDEX		Japan Automobile Standards Internationalization Center (JASIC) 3F, SHOEI Bldg., 6, Rokubancho, Chiyoda-ku, Tokyo, 102-0085 JAPAN	
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Tyre type	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3
Location	Rome / Italy		Santa-Oliva/Spain		Garching/Germany		Garching/Ger	Ladoux-France	Tokyo / Japan	
Machine Identification #	T34001	HU-2	10 223	10 224	H8	H4	K1	RRPL A2	RD	RE
Machine operational	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Machine complies to performance criteria										
Network Laboratories	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Measurement method	Torque	Torque	Torque	Torque	Power	Power	Power	Deceleration	Force	Force
Drum diameter [m]	2	1,7	1,7	1,7	2,0	1,7	2,0	2,706	2	3
Drum surface	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel

Annex B – Data report template

TIRE ROLLING RESISTANCE TEST PROTOCOL

Test Lab											
General Data											
Test Lab/Location: TUV SUD / Garching, MUC					Report No.:						
Test-Rig: H4					Test Date:						
Drum Ø [m]: 1,70					Drum Surface: smooth steel						
Test Conditions: ECE-R 117					Test Method: Power method						
Test-Rim											
Diameter x Width["]:					Material:						
Tire											
Tire-ID:					Tire Class (C1, C2, C3): 3						
DOT-Nr.:					Brand-/Trade Name:						
Tire Manufacturer:					Reinforced yes/no:						
Size:					Speed Index:						
Nominal Diameter (m): 0,64					Load Index: 91						
Set Test-Data											
Setting	Warm-up [min]:	Speed [km/h]:	Load [daN]:	Camb. [°]:	p _{cold} [kPa]:	T _{amb} [°C]:					
1			483	0,0		25,0					
2			483	0,0		25,0					
3			483	0,0		25,0					
4			483	0,0		25,0					
Measurements											
Rec.	Speed [km/h]:	Load [daN]:	T _{amb} [°C]:			Remark: Average ambient temperature during whole process					
1	80,0	483	26,0								
2	80,0	483	26,2								
3	80,0	483	23,0								
4	80,0	483	23,0								
Results (non corrected results)											
Rec.	Skim Test Load (N)	F _r [N]:	Temp_corr ?	F _{PL} [N]:			Automatic Calc. c _r [N/kN]:				
1	100,0	43,47	1	12,00			9,00				
2	100,0	43,57	1	11,00			9,02				
3	100,0	43,37	1	12,00			8,98				
4	100,0	43,37	1	11,00			8,98				
Corrected Results (Temperature 25°C, Drum diameter 2.0m)											
Rec.	Correction Formula	Automatic Calc. F _r [N]:			F _{PL} [N]:			Automatic Calc. c _r [N/kN]:			
1	0,006	42,57			11,75			8,81			
2		42,67			10,77			8,83			
3		42,47			11,75			8,79			
4		42,47			10,77			8,79			
Please note:											
Version 1.1 26. October, 2011											
Comments:											
If Fr (N) in fields H31 to H34 and RRC in fields T31 to T34 are already temperature corrected, enter Temp_corr = 1 (otherwise 0)											
Temperature correction coefficient for C1 is 0.008, for C2 it is 0.01 and for C3 it is 0.006.											

Annex C - Pre-tests results

1. Pre-tests results for C1-C2 tyres

1.1. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_A

1.1.1. Average; standard deviation; coefficient of variation; expanded uncertainty in repeatability conditions

Tyre	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
A0	3	6.093	0.032	0.528	0.064
A1	3	6.063	0.045	0.744	0.090
A2	3	6.097	0.042	0.683	0.083
A3	3	6.070	0.030	0.494	0.060
A4	3	6.120	0.026	0.432	0.053
A5	3	6.120	0.017	0.283	0.035
A6	3	6.130	0.017	0.283	0.035
A7	3	6.153	0.006	0.094	0.012
A8	3	6.087	0.038	0.622	0.076
A9	3	6.120	0.017	0.283	0.035

1.1.2. Confidence interval of the average per tyre at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up
6.057	6.130
6.012	6.114
6.050	6.144
6.036	6.104
6.090	6.150
6.100	6.140
6.110	6.150
6.147	6.160
6.044	6.130
6.100	6.140

1.1.3. Between and within contribution for the factor tyre

Tyre	CEi	CDi
A0	2.02	11.79
A1	24.71	23.19
A2	1.05	19.77
A3	17.49	10.27
A4	3.01	7.98
A5	3.01	3.42
A6	8.52	3.42
A7	32.28	0.38
A8	4.88	16.35
A9	3.01	3.42

1.1.4. Global average; precision values; uncertainties of measurement

Variable	cr_corr
Global_average	6.105
Repeatability_standard_deviat	0.030
Limit_of_repeatability	0.083
Repeatability_exp_uncertainty	0.059
Reproducibility_stand_deviat	0.037
Limit_of_reproducibility	0.104
Reproducibility_exp_uncertaint	0.074

1.1.5. Express of the expanded uncertainties of measurement under repeatability and reproducibility condition in percent of the global average

Variable	cr_corr
Repe_exp_uncert_percent	0.97
Repro_exp_uncert_percent	1.22

1.1.6. Part of variation in percent of the tyres on the total variation

Variable	cr_corr
Variation_part_Sample	36.36

1.2. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_B

1.2.1. Average; standard deviation; coefficient of variation; expanded uncertainty in repeatability conditions

Tyre	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
B0	3	8.527	0.015	0.179	0.031
B1	3	8.527	0.040	0.474	0.081
B2	3	8.633	0.050	0.583	0.101
B3	3	8.517	0.064	0.746	0.127
B4	3	8.633	0.055	0.638	0.110
B5	3	8.420	0.026	0.314	0.053
B6	3	8.343	0.040	0.484	0.081
B7	3	8.453	0.067	0.788	0.133
B8	3	8.533	0.075	0.880	0.150
B9	3	8.453	0.085	1.006	0.170

1.2.2. Confidence interval of the average per tyre at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up
8.509	8.544
8.481	8.572
8.576	8.690
8.445	8.589
8.571	8.696
8.390	8.450
8.298	8.389
8.378	8.529
8.448	8.618
8.357	8.550

1.2.3. Between and within contribution for the factor tyre

Tyre	CEi	CDi
B0	0.70	0.75
B1	0.70	5.25
B2	22.76	8.15
B3	0.22	12.97
B4	22.76	9.75
B5	9.60	2.25
B6	35.12	5.25
B7	3.49	14.26
B8	1.17	18.11
B9	3.49	23.26

1.2.4. Global average; precision values; uncertainties of measurement

Variable	cr_corr
Global_average	8.504
Repeatability_standard_deviat	0.056
Limit_of_repeatability	0.156
Repeatability_exp_uncertainty	0.112
Reproducibility_stand_deviat	0.101
Limit_of_reproducibility	0.283
Reproducibility_exp_uncertaint	0.202

1.2.5. Express of the expanded uncertainties of measurement under repeatability and reproducibility condition in percent of the global average

Variable	cr_corr
Repe_exp_uncert_percent	1.31
Repro_exp_uncert_percent	2.38

1.2.6. Part of variation in percent of the tyres on the total variation

Variable	cr_corr
Variation_part_Sample	69.63

1.3. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_C

1.3.1. Average; standard deviation; coefficient of variation; expanded uncertainty in repeatability conditions

Tyre	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
C0	3	9.387	0.025	0.268	0.050
C1	3	9.430	0.052	0.551	0.104
C2	3	9.423	0.035	0.373	0.070
C3	3	9.457	0.029	0.305	0.058
C4	3	9.457	0.035	0.371	0.070
C5	3	9.350	0.044	0.466	0.087
C6	3	9.407	0.031	0.325	0.061
C7	3	9.393	0.049	0.525	0.099
C8	3	9.370	0.040	0.427	0.080
C9	3	9.403	0.031	0.325	0.061

1.3.2. Confidence interval of the average per tyre at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up
9.358	9.415
9.371	9.489
9.384	9.463
9.424	9.489
9.417	9.496
9.301	9.399
9.372	9.441
9.338	9.449
9.325	9.415
9.369	9.438

1.3.3. Between and within contribution for the factor tyre

Tyre	CEi	CDi
C0	4.02	4.39
C1	4.55	18.71
C2	2.24	8.55
C3	21.91	5.77
C4	21.91	8.55
C5	30.35	13.16
C6	0.01	6.47
C7	1.88	16.86
C8	12.95	11.09
C9	0.17	6.47

1.3.4. Global average; precision values; uncertainties of measurement

Variable	cr_corr
Global_average	9.408
Repeatability_standard_deviat	0.038
Limit_of_repeatability	0.106
Repeatability_exp_uncertainty	0.076
Reproducibility_stand_deviat	0.047
Limit_of_reproducibility	0.131
Reproducibility_exp_uncertain	0.093

1.3.5. Express of the expanded uncertainties of measurement under repeatability and reproducibility condition in percent of the global average

Variable	cr_corr
Repe_exp_uncert_percent	0.81
Repro_exp_uncert_percent	0.99

1.3.6. Part of variation in percent of the tyres on the total variation

Variable	cr_corr
Variation_part_Sample	33.78

1.4. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_D***1.4.1. Average; standard deviation; coefficient of variation; expanded uncertainty in repeatability conditions***

Tyre	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
D0	3	9.823	0.021	0.212	0.042
D1	3	9.777	0.029	0.295	0.058
D2	3	9.783	0.035	0.359	0.070
D3	3	9.550	0.026	0.277	0.053
D4	3	9.787	0.006	0.059	0.012
D5	3	9.590	0.036	0.376	0.072
D6	3	9.540	0.035	0.363	0.069
D7	3	9.483	0.021	0.220	0.042
D8	3	9.747	0.021	0.214	0.042
D9	3	9.760	0.044	0.447	0.087

1.4.2. Confidence interval of the average per tyre at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up
9.800	9.847
9.744	9.809
9.744	9.823
9.520	9.580
9.780	9.793
9.549	9.631
9.501	9.579
9.460	9.507
9.723	9.770
9.711	9.809

1.4.3. Between and within contribution for the factor tyre

Tyre	CEi	CDi
D0	13.31	5.10
D1	5.89	9.80
D2	6.76	14.51
D3	12.31	8.24
D4	7.22	0.39
D5	6.06	15.29
D6	14.21	14.12
D7	27.60	5.10
D8	2.69	5.10
D9	3.96	22.35

1.4.4. Global average; precision values; uncertainties of measurement

Variable	cr_corr
Global_average	9.684
Repeatability_standard_deviat	0.029
Limit_of_repeatability	0.082
Repeatability_exp_uncertainty	0.058
Reproducibility_stand_deviat	0.130
Limit_of_reproducibility	0.363
Reproducibility_exp_uncertaint	0.259

1.4.5. Express of the expanded uncertainties of measurement under repeatability and reproducibility condition in percent of the global average

Variable	cr_corr
Repe_exp_uncert_percent	0.60
Repro_exp_uncert_percent	2.68

1.4.6. Part of variation in percent of the tyres on the total variation

Variable	cr_corr
Variation_part_Sample	94.93

1.5. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_E

1.5.1. Average; standard deviation; coefficient of variation; expanded uncertainty in repeatability conditions

Tyre	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
E0	3	11.853	0.067	0.562	0.133
E1	3	11.640	0.108	0.929	0.216
E2	3	11.743	0.107	0.911	0.214
E3	3	11.633	0.120	1.033	0.240
E4	3	11.777	0.140	1.190	0.280
E5	3	11.820	0.114	0.961	0.227
E6	3	11.797	0.091	0.769	0.181
E7	3	11.757	0.081	0.693	0.163
E8	3	11.663	0.057	0.488	0.114
E9	3	11.860	0.115	0.972	0.231

1.5.2. Confidence interval of the average per tyre at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up
11.778	11.929
11.518	11.762
11.622	11.864
11.497	11.769
11.618	11.935
11.691	11.949
11.694	11.899
11.665	11.849
11.599	11.728
11.729	11.991

1.5.3. Between and within contribution for the factor tyre

Tyre	CEi	CDi
E0	15.39	4.19
E1	20.52	11.04
E2	0.19	10.79
E3	22.99	13.62
E4	0.78	18.53
E5	6.77	12.18
E6	2.81	7.77
E7	0.01	6.26
E8	13.00	3.05
E9	17.53	12.56

1.5.4. Global average; precision values; uncertainties of measurement

Variable	cr_corr
Global_average	11.754
Repeatability_standard_deviat	0.103
Limit_of_repeatability	0.288
Repeatability_exp_uncertainty	0.206
Reproducibility_stand_deviat	0.119
Limit_of_reproducibility	0.333
Reproducibility_exp_uncertaint	0.238

1.5.5. Express of the expanded uncertainties of measurement under repeatability and reproducibility condition in percent of the global average

Variable	cr_corr
Repe_exp_uncert_percent	1.75
Repro_exp_uncert_percent	2.02

1.5.6. Part of variation in percent of the tyres on the total variation

Variable	cr_corr
Variation_part_Sample	25.08

2. Correction Factors for C1-C2 tyres

Tyre	Test 1	Test 2	Test 3	Avg.	Correction Factor		
A0	6,07	6,13	6,08	6,09	1,002	min	99,22%
A1	6,02	6,11	6,06	6,06	1,007	max	100,69%
A2	6,05	6,11	6,13	6,10	1,001	range	1,47%
A3	6,04	6,10	6,07	6,07	1,006		
A4	6,15	6,10	6,11	6,12	0,998		
A5	6,11	6,14	6,11	6,12	0,998		
A6	6,14	6,14	6,11	6,13	0,996		
A7	6,16	6,15	6,15	6,15	0,992		
A8	6,13	6,06	6,07	6,09	1,003		
A9	6,11	6,11	6,14	6,12	0,998		
		Avg. total		6,11			

Tyre	Test 1	Test 2	Test 3	Avg.	Correction Factor		
B0	8,54	8,53	8,51	8,53	0,997	min	98,47%
B1	8,57	8,52	8,49	8,53	0,997	max	101,88%
B2	8,68	8,64	8,58	8,64	0,985	range	3,41%
B3	8,59	8,48	8,48	8,52	0,999		
B4	8,66	8,67	8,57	8,63	0,985		
B5	8,43	8,44	8,39	8,42	1,010		
B6	8,38	8,35	8,30	8,35	1,019		
B7	8,53	8,41	8,42	8,45	1,006		
B8	8,61	8,46	8,53	8,53	0,997		
B9	8,55	8,42	8,39	8,45	1,006		
<i>B10</i>	<i>8,57</i>	<i>8,49</i>	<i>8,46</i>	<i>8,51</i>			
		Avg. total		8,50			

Tyre	Test 1	Test 2	Test 3	Avg.	Correction Factor		
C0	9,41	9,39	9,36	9,39	1,002	min	99,48%
C1	9,49	9,40	9,40	9,43	0,998	max	100,62%
C2	9,46	9,39	9,42	9,42	0,998	range	1,13%
C3	9,49	9,44	9,44	9,46	0,995		
C4	9,49	9,46	9,42	9,46	0,995		
C5	9,40	9,33	9,32	9,35	1,006		
C6	9,44	9,40	9,38	9,41	1,000		
C7	9,45	9,37	9,36	9,39	1,002		
C8	9,41	9,37	9,33	9,37	1,004		
C9	9,43	9,37	9,41	9,40	1,000		
		Avg. total		9,41			

Tyre	Test 1	Test 2	Test 3	Avg.	Correction Factor		
D0	9,80	9,83	9,84	9,82	0,986	min	98,58%
D1	9,81	9,76	9,76	9,78	0,991	max	102,12%
D2	9,82	9,78	9,75	9,78	0,990	range	3,53%
D3	9,56	9,57	9,52	9,55	1,014		
D4	9,79	9,79	9,78	9,79	0,990		
D5	9,62	9,60	9,55	9,59	1,010		
D6	9,56	9,56	9,50	9,54	1,015		
D7	9,49	9,50	9,46	9,48	1,021		
D8	9,77	9,73	9,74	9,75	0,994		
D9	9,79	9,78	9,71	9,76	0,992		
		Avg. total		9,68			

Tyre	Test 1	Test 2	Test 3	Avg.	Correction Factor		
E0	11,91	11,87	11,78	11,85	0,992	min	99,11%
E1	11,73	11,67	11,52	11,64	1,010	max	101,04%
E2	11,86	11,72	11,65	11,74	1,001	range	1,93%
E3	11,75	11,64	11,51	11,63	1,010		
E4	11,92	11,77	11,64	11,78	0,998		
E5	11,95	11,77	11,74	11,82	0,994		
E6	11,88	11,81	11,70	11,80	0,996		
E7	11,85	11,72	11,70	11,76	1,000		
E8	11,71	11,68	11,60	11,66	1,008		
E9	11,98	11,85	11,75	11,86	0,991		
		Avg. total		11,75			

3. Pre-tests results for C3 tyres

3.1. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_G

3.1.1. Average; standard deviation; coefficient of variation; expanded uncertainty in repeatability conditions

Tyre	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
G0	3	5.510	0.030	0.544	0.060
G1	3	5.467	0.038	0.693	0.076
G2	3	5.490	0.017	0.315	0.035
G3	3	5.530	0.046	0.829	0.092
G4	3	5.453	0.032	0.589	0.064
G5	3	5.467	0.047	0.864	0.095
G6	3	5.557	0.047	0.850	0.095
G7	3	5.480	0.046	0.836	0.092

3.1.2. Confidence interval of the average per tyre at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up
5.476	5.544
5.424	5.510
5.470	5.510
5.478	5.582
5.417	5.490
5.413	5.520
5.503	5.610
5.428	5.532

3.1.3. Between and within contribution for the factor tyre

Tyre	CEi	CDi
G0	2.84	7.30
G1	8.56	11.62
G2	0.20	2.43
G3	14.53	17.03
G4	18.86	8.38
G5	8.56	18.11
G6	44.19	18.11
G7	2.27	17.03

3.1.4. Global average; precision values; uncertainties of measurement

Variable	cr_corr
Global_average	5.494
Repeatability_standard_deviat	0.039
Limit_of_repeatability	0.110
Repeatability_exp_uncertainty	0.079
Reproducibility_stand_deviat	0.048
Limit_of_reproducibility	0.134
Reproducibility_exp_uncertain	0.096

3.1.5. Express of the expanded uncertainties of measurement under repeatability and reproducibility condition in percent of the global average

Variable	cr_corr
Repe_exp_uncert_percent	1.43
Repro_exp_uncert_percent	1.74

3.1.6. Part of variation in percent of the tyres on the total variation

Variable	cr_corr
Variation_part_Sample	32.69

3.2. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_H

3.2.1. Average; standard deviation; coefficient of variation; expanded uncertainty in repeatability conditions

Tyre	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
H0	3	6.053	0.031	0.505	0.061
H1	3	6.053	0.025	0.416	0.050
H2	3	5.997	0.015	0.255	0.031
H3	3	6.037	0.012	0.191	0.023
H4	3	6.023	0.049	0.819	0.099
H5	3	6.020	0.035	0.575	0.069
H6	3	6.057	0.040	0.667	0.081
H7	3	6.053	0.021	0.344	0.042

3.2.2. Confidence interval of the average per tyre at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up
6.019	6.088
6.025	6.082
5.979	6.014
6.024	6.050
5.968	6.079
5.981	6.059
6.011	6.102
6.030	6.077

3.2.3. Between and within contribution for the factor tyre

Tyre	CEi	CDi
H0	8.45	12.23
H1	8.45	8.30
H2	48.65	3.06
H3	0.00	1.75
H4	5.41	31.88
H5	8.45	15.72
H6	12.16	21.40
H7	8.45	5.68

3.2.4. Global average; precision values; uncertainties of measurement

Variable	cr_corr
Global_average	6.037
Repeatability_standard_deviat	0.031
Limit_of_repeatability	0.086
Repeatability_exp_uncertainty	0.062
Reproducibility_stand_deviat	0.033
Limit_of_reproducibility	0.093
Reproducibility_exp_uncertain	0.067

3.2.5. Express of the expanded uncertainties of measurement under repeatability and reproducibility condition in percent of the global average

Variable	cr_corr
Repe_exp_uncert_percent	1.02
Repro_exp_uncert_percent	1.10

3.2.6. Part of variation in percent of the tyres on the total variation

Variable	cr_corr
Variation_part_Sample	13.72

3.3. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_J

3.3.1. Average; standard deviation; coefficient of variation; expanded uncertainty in repeatability conditions

Tyre	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
J0	3	7.100	0.044	0.614	0.087
J1	3	7.097	0.058	0.814	0.115
J2	3	6.967	0.042	0.598	0.083
J3	3	7.093	0.046	0.651	0.092
J4	3	7.070	0.053	0.748	0.106
J5	3	7.053	0.047	0.670	0.095
J6	3	6.993	0.055	0.788	0.110
J7	3	7.037	0.051	0.729	0.103

3.3.2. Confidence interval of the average per tyre at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up
7.051	7.149
7.031	7.162
6.920	7.014
7.041	7.146
7.010	7.130
7.000	7.107
6.931	7.056
6.979	7.095

3.3.3. Between and within contribution for the factor tyre

Tyre	CEi	CDi
J0	13.75	9.60
J1	11.93	16.84
J2	41.38	8.75
J3	10.24	10.77
J4	2.03	14.14
J5	0.03	11.28
J6	19.40	15.32
J7	1.23	13.30

3.3.4. Global average; precision values; uncertainties of measurement

Variable	cr_corr
Global_average	7.051
Repeatability_standard_deviat	0.050
Limit_of_repeatability	0.139
Repeatability_exp_uncertainty	0.099
Reproducibility_stand_deviat	0.064
Limit_of_reproducibility	0.180
Reproducibility_exp_uncertain	0.128

3.3.5. Express of the expanded uncertainties of measurement under repeatability and reproducibility condition in percent of the global average

Variable	cr_corr
Repe_exp_uncert_percent	1.41
Repro_exp_uncert_percent	1.82

3.3.6. Part of variation in percent of the tyres on the total variation

Variable	cr_corr
Variation_part_Sample	39.92

3.4. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_K

3.4.1. Average; standard deviation; coefficient of variation; expanded uncertainty in repeatability conditions

Tyre	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
K0	3	8.930	0.142	1.588	0.284
K1	3	8.867	0.086	0.972	0.172
K2	3	9.013	0.097	1.078	0.194
K3	3	8.977	0.150	1.676	0.301
K4	3	8.813	0.129	1.459	0.257
K5	3	8.827	0.068	0.771	0.136
K6	3	8.907	0.080	0.901	0.160
K7	3	8.817	0.031	0.347	0.061

3.4.2. Confidence interval of the average per tyre at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up
8.770	9.090
8.769	8.964
8.903	9.123
8.806	9.147
8.668	8.959
8.750	8.904
8.816	8.997
8.782	8.851

3.4.3. Between and within contribution for the factor tyre

Tyre	CEi	CDi
K0	3.26	22.81
K1	1.82	8.43
K2	35.49	10.70
K3	17.06	25.68
K4	16.05	18.76
K5	11.17	5.26
K6	0.41	7.30
K7	14.74	1.06

3.4.4. Global average; precision values; uncertainties of measurement

Variable	cr_corr
Global_average	8.894
Repeatability_standard_deviat	0.105
Limit_of_repeatability	0.294
Repeatability_exp_uncertainty	0.210
Reproducibility_stand_deviat	0.114
Limit_of_reproducibility	0.320
Reproducibility_exp_uncertain	0.229

3.4.5. Express of the expanded uncertainties of measurement under repeatability and reproducibility condition in percent of the global average

Variable	cr_corr
Repe_exp_uncert_percent	2.36
Repro_exp_uncert_percent	2.57

3.4.6. Part of variation in percent of the tyres on the total variation

Variable	cr_corr
Variation_part_Sample	15.91

3.5. Results_interlaboratories_test_on_rolling_resistance RR_pretest_240511_tyre_L

3.5.1. Average; standard deviation; coefficient of variation; expanded uncertainty in repeatability conditions

Tyre	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
L0	3	5.373	0.025	0.468	0.050
L1	3	5.440	0.026	0.486	0.053
L2	3	5.490	0.040	0.729	0.080
L3	3	5.320	0.010	0.188	0.020
L4	3	5.530	0.046	0.829	0.092
L5	3	5.460	0.046	0.839	0.092
L6	3	5.453	0.045	0.827	0.090
L7	3	5.560	0.046	0.824	0.092

3.5.2. Confidence interval of the average per tyre at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up
5.345	5.402
5.410	5.470
5.445	5.535
5.309	5.331
5.478	5.582
5.408	5.512
5.402	5.504
5.508	5.612

3.5.3. Between and within contribution for the factor tyre

Tyre	CEi	CDi
L0	14.88	5.57
L1	0.41	6.16
L2	3.13	14.08
L3	41.34	0.88
L4	13.67	18.48
L5	0.10	18.48
L6	0.00	17.89
L7	26.46	18.48

3.5.4. Global average; precision values; uncertainties of measurement

Variable	cr_corr
Global_average	5.453
Repeatability_standard_deviat	0.038
Limit_of_repeatability	0.106
Repeatability_exp_uncertainty	0.075
Reproducibility_stand_deviat	0.084
Limit_of_reproducibility	0.236
Reproducibility_exp_uncertain	0.168

3.5.5. Express of the expanded uncertainties of measurement under repeatability and reproducibility condition in percent of the global average

Variable	cr_corr
Repe_exp_uncert_percent	1.38
Repro_exp_uncert_percent	3.09

3.5.6. Part of variation in percent of the tyres on the total variation

Variable	cr_corr
Variation_part_Sample	79.96

4. Correction Factors for C3 tyres

Tyre	Test 1	Test 2	Test 3	Avg.	Correction Factor		
G0	5,51	5,54	5,48	5,51	0,997	min	98,88%
G1	5,51	5,44	5,45	5,47	1,005	max	100,75%
G2	5,50	5,47	5,50	5,49	1,001	range	1,87%
G3	5,58	5,52	5,49	5,53	0,994		
G4	5,49	5,44	5,43	5,45	1,007		
G5	5,52	5,45	5,43	5,47	1,005		
G6	5,61	5,54	5,52	5,56	0,989		
G7	5,49	5,52	5,43	5,48	1,003		
		Avg. total		5,49			

Tyre	Test 1	Test 2	Test 3	Avg.	Correction Factor		
H0	6,08	6,06	6,02	6,05	0,997	min	99,65%
H1	6,08	6,03	6,05	6,05	0,997	max	100,69%
H2	6,00	6,01	5,98	6,00	1,007	range	1,04%
H3	6,05	6,03	6,03	6,04	1,000		
H4	6,08	5,99	6,00	6,02	1,002		
H5	6,06	6,00	6,00	6,02	1,003		
H6	6,10	6,05	6,02	6,06	0,997		
H7	6,07	6,06	6,03	6,05	0,997		
		Avg. total		6,04			

Tyre	Test 1	Test 2	Test 3	Avg.	Correction Factor		
J0	7,05	7,12	7,13	7,10	0,993	min	99,31%
J1	7,03	7,13	7,13	7,10	0,994	max	101,21%
J2	6,92	6,98	7,00	6,97	1,012	range	1,90%
J3	7,04	7,12	7,12	7,09	0,994		
J4	7,01	7,11	7,09	7,07	0,997		
J5	7,00	7,07	7,09	7,05	1,000		
J6	6,93	7,03	7,02	6,99	1,008		
J7	6,98	7,05	7,08	7,04	1,002		
		Avg. total		7,05			

Tyre	Test 1	Test 2	Test 3	Avg.	Correction Factor		
K0	9,09	8,88	8,82	8,93	0,996	min	98,68%
K1	8,96	8,85	8,79	8,87	1,003	max	100,91%
K2	9,12	8,99	8,93	9,01	0,987	range	2,22%
K3	9,12	8,99	8,82	8,98	0,991		
K4	8,96	8,76	8,72	8,81	1,009		
K5	8,88	8,85	8,75	8,83	1,008		
K6	8,99	8,90	8,83	8,91	0,999		
K7	8,85	8,81	8,79	8,82	1,009		
		Avg. total		8,89			

Tyre	Test 1	Test 2	Test 3	Avg.	Correction Factor		
L0	5,40	5,35	5,37	5,37	1,015	min	98,08%
L1	5,47	5,43	5,42	5,44	1,002	max	102,51%
L2	5,53	5,49	5,45	5,49	0,993	range	4,42%
L3	5,32	5,33	5,31	5,32	1,025		
L4	5,58	5,49	5,52	5,53	0,986		
L5	5,51	5,45	5,42	5,46	0,999		
L6	5,50	5,45	5,41	5,45	1,000		
L7	5,61	5,55	5,52	5,56	0,981		
		Avg. total		5,45			

Annex D - Alignment tests results

1. Raw data for C1-C2 tyres

Lab.	Tire	Class	Trial	Data without correction	Correction factor	Data with correction factor	Assigned value
Lab0	A0	C1-C2	1	6,36	1,002	6,37	5,960
Lab0	A0	C1-C2	2	6,32	1,002	6,33	5,960
Lab0	A0	C1-C2	3	6,30	1,002	6,31	5,960
Lab0	B0	C1-C2	1	8,62	0,997	8,60	8,397
Lab0	B0	C1-C2	2	8,66	0,997	8,64	8,397
Lab0	B0	C1-C2	3	8,60	0,997	8,58	8,397
Lab0	C0	C1-C2	1	9,37	1,002	9,39	9,156
Lab0	C0	C1-C2	2	9,36	1,002	9,38	9,156
Lab0	C0	C1-C2	3	9,39	1,002	9,41	9,156
Lab0	D0	C1-C2	1	10,08	0,986	9,94	9,795
Lab0	D0	C1-C2	2	10,03	0,986	9,89	9,795
Lab0	D0	C1-C2	3	10,10	0,986	9,96	9,795
Lab0	E0	C1-C2	1	11,77	0,992	11,67	11,527
Lab0	E0	C1-C2	2	11,77	0,992	11,67	11,527
Lab0	E0	C1-C2	3	11,71	0,992	11,61	11,527
Lab1	A1	C1-C2	1	6,06	1,007	6,10	5,960
Lab1	A1	C1-C2	2	6,08	1,007	6,12	5,960
Lab1	A1	C1-C2	3	6,04	1,007	6,08	5,960
Lab1	B1	C1-C2	1	8,65	0,997	8,63	8,397
Lab1	B1	C1-C2	2	8,66	0,997	8,64	8,397
Lab1	B1	C1-C2	3	8,60	0,997	8,58	8,397
Lab1	C1	C1-C2	1	9,32	0,998	9,30	9,156
Lab1	C1	C1-C2	2	9,30	0,998	9,28	9,156
Lab1	C1	C1-C2	3	9,23	0,998	9,21	9,156
Lab1	D1	C1-C2	1	10,07	0,991	9,97	9,795
Lab1	D1	C1-C2	2	10,05	0,991	9,95	9,795
Lab1	D1	C1-C2	3	9,99	0,991	9,90	9,795
Lab1	E1	C1-C2	1	11,71	1,010	11,83	11,527
Lab1	E1	C1-C2	2	11,78	1,010	11,90	11,527
Lab1	E1	C1-C2	3	11,77	1,010	11,89	11,527

Lab.	Tire	Class	Trial	Data without correction	Correction factor	Data with correction factor	Assigned value
Lab2	A2	C1-C2	1	6,10	1,001	6,11	5,960
Lab2	A2	C1-C2	2	6,11	1,001	6,12	5,960
Lab2	A2	C1-C2	3	6,07	1,001	6,08	5,960
Lab2	B2	C1-C2	1	8,44	0,985	8,31	8,397
Lab2	B2	C1-C2	2	8,39	0,985	8,26	8,397
Lab2	B2	C1-C2	3	8,46	0,985	8,33	8,397
Lab2	C2	C1-C2	1	9,28	0,998	9,26	9,156
Lab2	C2	C1-C2	2	9,35	0,998	9,33	9,156
Lab2	C2	C1-C2	3	9,29	0,998	9,27	9,156
Lab2	D2	C1-C2	1	10,02	0,990	9,92	9,795
Lab2	D2	C1-C2	2	10,00	0,990	9,90	9,795
Lab2	D2	C1-C2	3	9,95	0,990	9,85	9,795
Lab2	E2	C1-C2	1	11,77	1,001	11,78	11,527
Lab2	E2	C1-C2	2	11,74	1,001	11,75	11,527
Lab2	E2	C1-C2	3	11,68	1,001	11,69	11,527
Lab3	A3	C1-C2	1	5,81	1,006	5,84	5,960
Lab3	A3	C1-C2	2	5,82	1,006	5,85	5,960
Lab3	A3	C1-C2	3	5,87	1,006	5,90	5,960
Lab3	B3	C1-C2	1	8,35	0,999	8,34	8,397
Lab3	B3	C1-C2	2	8,30	0,999	8,29	8,397
Lab3	B3	C1-C2	3	8,31	0,999	8,30	8,397
Lab3	C3	C1-C2	1	9,11	0,995	9,06	9,156
Lab3	C3	C1-C2	2	9,06	0,995	9,01	9,156
Lab3	C3	C1-C2	3	9,06	0,995	9,01	9,156
Lab3	D3	C1-C2	1	9,54	1,014	9,67	9,795
Lab3	D3	C1-C2	2	9,61	1,014	9,74	9,795
Lab3	D3	C1-C2	3	9,60	1,014	9,73	9,795
Lab3	E3	C1-C2	1	11,57	1,010	11,69	11,527
Lab3	E3	C1-C2	2	11,50	1,010	11,62	11,527
Lab3	E3	C1-C2	3	11,45	1,010	11,57	11,527
Lab4	A4	C1-C2	1	6,08	0,998	6,07	5,960
Lab4	A4	C1-C2	2	6,11	0,998	6,10	5,960
Lab4	A4	C1-C2	3	6,10	0,998	6,09	5,960
Lab4	B4	C1-C2	1	8,33	0,985	8,21	8,397
Lab4	B4	C1-C2	2	8,22	0,985	8,10	8,397
Lab4	B4	C1-C2	3	8,26	0,985	8,14	8,397
Lab4	C4	C1-C2	1	8,98	0,995	8,93	9,156
Lab4	C4	C1-C2	2	8,98	0,995	8,93	9,156
Lab4	C4	C1-C2	3	8,99	0,995	8,94	9,156
Lab4	D4	C1-C2	1	9,78	0,990	9,68	9,795
Lab4	D4	C1-C2	2	9,72	0,990	9,62	9,795
Lab4	D4	C1-C2	3	9,67	0,990	9,57	9,795
Lab4	E4	C1-C2	1	11,43	0,998	11,41	11,527
Lab4	E4	C1-C2	2	11,46	0,998	11,44	11,527
Lab4	E4	C1-C2	3	11,33	0,998	11,31	11,527

Lab.	Tire	Class	Trial	Data without correction	Correction factor	Data with correction factor	Assigned value
Lab5	A5	C1-C2	1	5,71	0,998	5,70	5,960
Lab5	A5	C1-C2	2	5,67	0,998	5,66	5,960
Lab5	A5	C1-C2	3	5,63	0,998	5,62	5,960
Lab5	B5	C1-C2	1	8,20	1,010	8,28	8,397
Lab5	B5	C1-C2	2	8,12	1,010	8,20	8,397
Lab5	B5	C1-C2	3	8,12	1,010	8,20	8,397
Lab5	C5	C1-C2	1	8,88	1,006	8,93	9,156
Lab5	C5	C1-C2	2	8,81	1,006	8,86	9,156
Lab5	C5	C1-C2	3	8,83	1,006	8,88	9,156
Lab5	D5	C1-C2	1	9,64	1,010	9,73	9,795
Lab5	D5	C1-C2	2	9,59	1,010	9,68	9,795
Lab5	D5	C1-C2	3	9,55	1,010	9,64	9,795
Lab5	E5	C1-C2	1	11,25	0,994	11,19	11,527
Lab5	E5	C1-C2	2	11,22	0,994	11,16	11,527
Lab5	E5	C1-C2	3	11,18	0,994	11,12	11,527
Lab6	A6	C1-C2	1	5,73	0,996	5,71	5,960
Lab6	A6	C1-C2	2	5,78	0,996	5,76	5,960
Lab6	A6	C1-C2	3	5,80	0,996	5,78	5,960
Lab6	B6	C1-C2	1	8,18	1,019	8,34	8,397
Lab6	B6	C1-C2	2	8,14	1,019	8,30	8,397
Lab6	B6	C1-C2	3	8,18	1,019	8,34	8,397
Lab6	C6	C1-C2	1	9,01	1,000	9,01	9,156
Lab6	C6	C1-C2	2	8,97	1,000	8,97	9,156
Lab6	C6	C1-C2	3	8,99	1,000	8,99	9,156
Lab6	D6	C1-C2	1	9,46	1,015	9,60	9,795
Lab6	D6	C1-C2	2	9,45	1,015	9,59	9,795
Lab6	D6	C1-C2	3	9,49	1,015	9,63	9,795
Lab6	E6	C1-C2	1	11,25	0,996	11,21	11,527
Lab6	E6	C1-C2	2	11,28	0,996	11,24	11,527
Lab6	E6	C1-C2	3	11,25	0,996	11,21	11,527
Lab7	A7	C1-C2	1	5,91	0,992	5,86	5,960
Lab7	A7	C1-C2	2	5,90	0,992	5,85	5,960
Lab7	A7	C1-C2	3	5,92	0,992	5,87	5,960
Lab7	B7	C1-C2	1	8,52	1,006	8,57	8,397
Lab7	B7	C1-C2	2	8,52	1,006	8,57	8,397
Lab7	B7	C1-C2	3	8,50	1,006	8,55	8,397
Lab7	C7	C1-C2	1	9,17	1,002	9,18	9,156
Lab7	C7	C1-C2	2	9,17	1,002	9,18	9,156
Lab7	C7	C1-C2	3	9,15	1,002	9,16	9,156
Lab7	D7	C1-C2	1	9,63	1,021	9,83	9,795
Lab7	D7	C1-C2	2	9,65	1,021	9,85	9,795
Lab7	D7	C1-C2	3	9,59	1,021	9,79	9,795
Lab7	E7	C1-C2	1	11,63	1,000	11,63	11,527
Lab7	E7	C1-C2	2	11,67	1,000	11,67	11,527
Lab7	E7	C1-C2	3	11,65	1,000	11,65	11,527

Lab.	Tire	Class	Trial	Data without correction	Correction factor	Data with correction factor	Assigned value
Lab8	A8	C1-C2	1	5,96	1,003	5,98	5,960
Lab8	A8	C1-C2	2	5,94	1,003	5,96	5,960
Lab8	A8	C1-C2	3	5,91	1,003	5,93	5,960
Lab8	B8	C1-C2	1	8,43	0,997	8,40	8,397
Lab8	B8	C1-C2	2	8,50	0,997	8,47	8,397
Lab8	B8	C1-C2	3	8,46	0,997	8,43	8,397
Lab8	C8	C1-C2	1	9,26	1,004	9,30	9,156
Lab8	C8	C1-C2	2	9,18	1,004	9,22	9,156
Lab8	C8	C1-C2	3	9,14	1,004	9,18	9,156
Lab8	D8	C1-C2	1	9,99	0,994	9,93	9,795
Lab8	D8	C1-C2	2	9,97	0,994	9,91	9,795
Lab8	D8	C1-C2	3	9,92	0,994	9,86	9,795
Lab8	E8	C1-C2	1	11,45	1,008	11,54	11,527
Lab8	E8	C1-C2	2	11,39	1,008	11,48	11,527
Lab8	E8	C1-C2	3	11,44	1,008	11,53	11,527
Lab9	A9	C1-C2	1	5,90	0,998	5,89	5,960
Lab9	A9	C1-C2	2	5,91	0,998	5,90	5,960
Lab9	A9	C1-C2	3	5,90	0,998	5,89	5,960
Lab9	B9	C1-C2	1	8,39	1,006	8,44	8,397
Lab9	B9	C1-C2	2	8,34	1,006	8,39	8,397
Lab9	B9	C1-C2	3	8,44	1,006	8,49	8,397
Lab9	C9	C1-C2	1	9,35	1,000	9,35	9,156
Lab9	C9	C1-C2	2	9,38	1,000	9,38	9,156
Lab9	C9	C1-C2	3	9,33	1,000	9,33	9,156
Lab9	D9	C1-C2	1	9,93	0,992	9,85	9,795
Lab9	D9	C1-C2	2	9,89	0,992	9,81	9,795
Lab9	D9	C1-C2	3	9,92	0,992	9,84	9,795
Lab9	E9	C1-C2	1	11,59	0,991	11,49	11,527
Lab9	E9	C1-C2	2	11,55	0,991	11,45	11,527
Lab9	E9	C1-C2	3	11,55	0,991	11,45	11,527

2. Raw data for C3 tyres

Lab.	Tire	Class	Trial	Data without correction	Correction factor	Data with correction factor	Assigned value
Lab0	G0	C3	1	5,24	0,997	5,22	5,196
Lab0	G0	C3	2	5,25	0,997	5,23	5,196
Lab0	G0	C3	3	5,26	0,997	5,24	5,196
Lab0	H0	C3	1	6,14	0,997	6,12	6,025
Lab0	H0	C3	2	6,16	0,997	6,14	6,025
Lab0	H0	C3	3	6,16	0,997	6,14	6,025
Lab0	J0	C3	1	6,72	0,993	6,67	6,597
Lab0	J0	C3	2	6,70	0,993	6,65	6,597
Lab0	J0	C3	3	6,70	0,993	6,65	6,597
Lab0	K0	C3	1	8,70	0,996	8,66	8,479
Lab0	K0	C3	2	8,64	0,996	8,60	8,479
Lab0	K0	C3	3	8,67	0,996	8,63	8,479
Lab0	L0	C3	1	5,26	1,015	5,34	5,264
Lab0	L0	C3	2	5,23	1,015	5,31	5,264
Lab0	L0	C3	3	5,22	1,015	5,30	5,264
Lab1	G1	C3	1	5,14	1,005	5,17	5,196
Lab1	G1	C3	2	5,10	1,005	5,13	5,196
Lab1	G1	C3	3	5,12	1,005	5,15	5,196
Lab1	H1	C3	1	5,97	0,997	5,95	6,025
Lab1	H1	C3	2	5,96	0,997	5,94	6,025
Lab1	H1	C3	3	5,95	0,997	5,93	6,025
Lab1	J1	C3	1	6,52	0,994	6,48	6,597
Lab1	J1	C3	2	6,50	0,994	6,46	6,597
Lab1	J1	C3	3	6,49	0,994	6,45	6,597
Lab1	K1	C3	1	8,20	1,003	8,23	8,479
Lab1	K1	C3	2	8,18	1,003	8,20	8,479
Lab1	K1	C3	3	8,17	1,003	8,19	8,479
Lab1	L1	C3	1	5,14	1,002	5,15	5,264
Lab1	L1	C3	2	5,13	1,002	5,14	5,264
Lab1	L1	C3	3	5,13	1,002	5,14	5,264

Lab.	Tire	Class	Trial	Data without correction	Correction factor	Data with correction factor	Assigned value
Lab2	G2	C3	1	5,37	1,001	5,37	5,196
Lab2	G2	C3	2	5,45	1,001	5,45	5,196
Lab2	G2	C3	3	5,45	1,001	5,45	5,196
Lab2	H2	C3	1	6,22	1,007	6,26	6,025
Lab2	H2	C3	2	6,20	1,007	6,24	6,025
Lab2	H2	C3	3	6,20	1,007	6,24	6,025
Lab2	J2	C3	1	6,68	1,012	6,76	6,597
Lab2	J2	C3	2	6,69	1,012	6,77	6,597
Lab2	J2	C3	3	6,64	1,012	6,72	6,597
Lab2	K2	C3	1	8,79	0,987	8,67	8,479
Lab2	K2	C3	2	8,77	0,987	8,65	8,479
Lab2	K2	C3	3	8,71	0,987	8,59	8,479
Lab2	L2	C3	1	5,43	0,993	5,39	5,264
Lab2	L2	C3	2	5,43	0,993	5,39	5,264
Lab2	L2	C3	3	5,40	0,993	5,36	5,264
Lab3	G3	C3	1	5,12	0,994	5,09	5,196
Lab3	G3	C3	2	5,10	0,994	5,07	5,196
Lab3	G3	C3	3	5,10	0,994	5,07	5,196
Lab3	H3	C3	1	5,90	1,000	5,90	6,025
Lab3	H3	C3	2	5,89	1,000	5,89	6,025
Lab3	H3	C3	3	5,88	1,000	5,88	6,025
Lab3	J3	C3	1	6,46	0,994	6,42	6,597
Lab3	J3	C3	2	6,46	0,994	6,42	6,597
Lab3	J3	C3	3	6,44	0,994	6,40	6,597
Lab3	K3	C3	1	8,30	0,991	8,22	8,479
Lab3	K3	C3	2	8,26	0,991	8,18	8,479
Lab3	K3	C3	3	8,22	0,991	8,14	8,479
Lab3	L3	C3	1	4,99	1,025	5,12	5,264
Lab3	L3	C3	2	4,97	1,025	5,09	5,264
Lab3	L3	C3	3	4,96	1,025	5,08	5,264
Lab4	G4	C3	1	5,06	1,007	5,10	5,196
Lab4	G4	C3	2	5,04	1,007	5,08	5,196
Lab4	G4	C3	3	5,06	1,007	5,10	5,196
Lab4	H4	C3	1	5,89	1,002	5,90	6,025
Lab4	H4	C3	2	5,86	1,002	5,87	6,025
Lab4	H4	C3	3	5,86	1,002	5,87	6,025
Lab4	J4	C3	1	6,44	0,997	6,42	6,597
Lab4	J4	C3	2	6,44	0,997	6,42	6,597
Lab4	J4	C3	3	6,42	0,997	6,40	6,597
Lab4	K4	C3	1	8,15	1,009	8,22	8,479
Lab4	K4	C3	2	8,11	1,009	8,18	8,479
Lab4	K4	C3	3	8,10	1,009	8,17	8,479
Lab4	L4	C3	1	5,16	0,986	5,09	5,264
Lab4	L4	C3	2	5,15	0,986	5,08	5,264
Lab4	L4	C3	3	5,12	0,986	5,05	5,264

Lab.	Tire	Class	Trial	Data without correction	Correction factor	Data with correction factor	Assigned value
Lab5	G5	C3	1	5,30	1,005	5,33	5,196
Lab5	G5	C3	2	5,27	1,005	5,30	5,196
Lab5	G5	C3	3	5,27	1,005	5,30	5,196
Lab5	H5	C3	1	6,16	1,003	6,18	6,025
Lab5	H5	C3	2	6,15	1,003	6,17	6,025
Lab5	H5	C3	3	6,13	1,003	6,15	6,025
Lab5	J5	C3	1	6,81	1,000	6,81	6,597
Lab5	J5	C3	2	6,79	1,000	6,79	6,597
Lab5	J5	C3	3	6,79	1,000	6,79	6,597
Lab5	K5	C3	1	8,78	1,008	8,85	8,479
Lab5	K5	C3	2	8,77	1,008	8,84	8,479
Lab5	K5	C3	3	8,76	1,008	8,83	8,479
Lab5	L5	C3	1	5,46	0,999	5,45	5,264
Lab5	L5	C3	2	5,45	0,999	5,44	5,264
Lab5	L5	C3	3	5,46	0,999	5,45	5,264
Lab6	G6	C3	1	5,16	0,989	5,10	5,196
Lab6	G6	C3	2	5,15	0,989	5,09	5,196
Lab6	G6	C3	3	5,15	0,989	5,09	5,196
Lab6	H6	C3	1	5,98	0,997	5,96	6,025
Lab6	H6	C3	2	5,95	0,997	5,93	6,025
Lab6	H6	C3	3	5,95	0,997	5,93	6,025
Lab6	J6	C3	1	6,54	1,008	6,59	6,597
Lab6	J6	C3	2	6,51	1,008	6,56	6,597
Lab6	J6	C3	3	6,48	1,008	6,53	6,597
Lab6	K6	C3	1	8,44	0,999	8,43	8,479
Lab6	K6	C3	2	8,39	0,999	8,38	8,479
Lab6	K6	C3	3	8,37	0,999	8,36	8,479
Lab6	L6	C3	1	5,27	1,000	5,27	5,264
Lab6	L6	C3	2	5,26	1,000	5,26	5,264
Lab6	L6	C3	3	5,25	1,000	5,25	5,264
Lab7	G7	C3	1	5,21	1,003	5,22	5,196
Lab7	G7	C3	2	5,18	1,003	5,19	5,196
Lab7	G7	C3	3	5,15	1,003	5,16	5,196
Lab7	H7	C3	1	6,06	0,997	6,04	6,025
Lab7	H7	C3	2	5,99	0,997	5,97	6,025
Lab7	H7	C3	3	5,98	0,997	5,96	6,025
Lab7	J7	C3	1	6,69	1,002	6,70	6,597
Lab7	J7	C3	2	6,73	1,002	6,74	6,597
Lab7	J7	C3	3	6,68	1,002	6,69	6,597
Lab7	K7	C3	1	8,68	1,009	8,76	8,479
Lab7	K7	C3	2	8,68	1,009	8,76	8,479
Lab7	K7	C3	3	8,65	1,009	8,73	8,479
Lab7	L7	C3	1	5,54	0,981	5,43	5,264
Lab7	L7	C3	2	5,49	0,981	5,38	5,264
Lab7	L7	C3	3	5,45	0,981	5,35	5,264

3. Qualification of reference machines

3.1. Sigma m for C1-C2 machines (based on raw data)

Laboratory	Sigma A	Sigma B	Sigma C	Sigma D	Sigma E	Sigma m
0	0,031	0,031	0,015	0,036	0,035	0,030
1	0,020	0,032	0,047	0,042	0,038	0,037
2	0,021	0,036	0,038	0,036	0,046	0,036
3	0,032	0,026	0,029	0,038	0,060	0,039
4	0,015	0,056	0,006	0,055	0,068	0,047
5	0,040	0,046	0,036	0,045	0,035	0,041
6	0,036	0,023	0,020	0,021	0,017	0,024
7	0,010	0,012	0,012	0,031	0,020	0,018
8	0,025	0,035	0,061	0,036	0,032	0,040
9	0,006	0,050	0,025	0,021	0,023	0,029

3.2. Sigma m for C3 machines (based on raw data)

Laboratory	Sigma G	Sigma H	Sigma J	Sigma K	Sigma L	Sigma m
0	0,010	0,012	0,012	0,030	0,021	0,018
1	0,020	0,010	0,015	0,015	0,006	0,014
2	0,046	0,012	0,026	0,042	0,017	0,032
3	0,012	0,010	0,012	0,040	0,015	0,021
4	0,012	0,017	0,012	0,026	0,021	0,018
5	0,017	0,015	0,012	0,010	0,006	0,013
6	0,006	0,017	0,030	0,036	0,010	0,023
7	0,030	0,044	0,026	0,017	0,045	0,034

4. Calculation of assigned values

4.1. Estimation of the variance of assigned values on corrected values for C1-C2 tyres

Batch	Assigned value	Repeatability standard_deviation	Reproducibility standard_deviation	Variance Assigned values	Standard_deviation Assigned values	Number of laboratories	Number of repetitions	Inf	Sup	Laboratory Variance
A	5,960	0,026	0,200	0,004	0,063	10	3	5,834	6,086	0,039
B	8,397	0,037	0,165	0,003	0,051			8,294	8,500	0,026
C	9,156	0,033	0,183	0,003	0,057			9,042	9,270	0,032
D	9,795	0,037	0,131	0,002	0,040			9,714	9,876	0,016
E	11,527	0,041	0,229	0,005	0,072			11,384	11,670	0,051

4.2. Estimation of the variance of assigned values on corrected values for C3 tyres

Batch	Assigned value	Repeatability standard_deviation	Reproducibility standard_deviation	Variance Assigned values	Standard_deviation Assigned values	Number of laboratories	Number of repetitions	Inf	Sup	Laboratory Variance
G	5,196	0,023	0,123	0,002	0,043	8	3	5,110	5,282	0,015
H	6,025	0,020	0,140	0,002	0,049			5,927	6,123	0,019
J	6,597	0,020	0,155	0,003	0,054			6,488	6,706	0,024
K	8,479	0,028	0,269	0,009	0,095			8,289	8,669	0,072
L	5,264	0,021	0,144	0,003	0,051			5,163	5,365	0,020

5. Statistical analysis of the regression functions

5.1. Analysis for C1-C2 tyres

RAPPORT DÉTAILLÉ	LABO_C1-C2							
<i>Statistiques de la régression</i>								
Coefficient de détermination multiple	0,999715779							
Coefficient de détermination R^2	0,999431639							
Coefficient de détermination R^2	0,999387919							
Erreur-type	0,04671888							
Observations	15							
ANALYSE DE VARIANCE								
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>			
Régression	1	49,89502698	49,89502698	22859,79967	1,74497E-22			
Résidus	13	0,028374498	0,002182654					
Total	14	49,92340148						
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>
Constante	-0,664267163	0,064834048	-10,24565315	1,35671E-07	-0,804332608	-0,524201719	-0,804332608	-0,524201719
Variable X 1	1,04880155	0,006936767	151,1945755	1,74497E-22	1,033815576	1,063787524	1,033815576	1,063787524

RAPPORT DÉTAILLÉ		LAB1_C1-C2							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple	0,999240957								
Coefficient de détermination R^2	0,998482489								
Coefficient de détermination R^2	0,998365758								
Erreur-type	0,076338971								
Observations	15								
ANALYSE DE VARIANCE									
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>				
Régression	1	49,84764218	49,84764218	8553,660734	1,0334E-19				
Résidus	13	0,0757593	0,005827638						
Total	14	49,92340148							
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>	
Constante	0,072652496	0,098170155	0,740067041	0,472413915	-0,139431229	0,284736221	-0,139431229	0,284736221	
Variable X 1	0,971280946	0,010501924	92,48600291	1,0334E-19	0,948592919	0,993968973	0,948592919	0,993968973	
RAPPORT DÉTAILLÉ		LAB2_C1-C2							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple	0,998467373								
Coefficient de détermination R^2	0,996937096								
Coefficient de détermination R^2	0,996701488								
Erreur-type	0,108454387								
Observations	15								
ANALYSE DE VARIANCE									
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>				
Régression	1	49,77049087	49,77049087	4231,337554	9,93275E-18				
Résidus	13	0,152910604	0,011762354						
Total	14	49,92340148							
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>	
Constante	0,077841592	0,139495393	0,558022675	0,586311039	-0,223519882	0,379203066	-0,223519882	0,379203066	
Variable X 1	0,980584734	0,015074617	65,04873215	9,93275E-18	0,948018004	1,013151465	0,948018004	1,013151465	

RAPPORT DÉTAILLÉ		LAB3_C1-C2							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple	0,999366742								
Coefficient de détermination R ²	0,998733886								
Coefficient de détermination R ²	0,998636492								
Erreur-type	0,069729552								
Observations	15								
ANALYSE DE VARIANCE									
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>				
Régression	1	49,86019274	49,86019274	10254,63498	3,18374E-20				
Résidus	13	0,063208735	0,00486221						
Total	14	49,92340148							
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>	
Constante	0,326517473	0,087205346	3,744236878	0,002454252	0,138121776	0,514913169	0,138121776	0,514913169	
Variable X 1	0,969793786	0,009576775	101,2651716	3,18374E-20	0,949104421	0,990483151	0,949104421	0,990483151	
RAPPORT DÉTAILLÉ		LAB4_C1-C2							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple	0,998045457								
Coefficient de détermination R ²	0,996094734								
Coefficient de détermination R ²	0,995794329								
Erreur-type	0,122463228								
Observations	15								
ANALYSE DE VARIANCE									
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>				
Régression	1	49,72843733	49,72843733	3315,838806	4,82047E-17				
Résidus	13	0,194964147	0,014997242						
Total	14	49,92340148							
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>	
Constante	-0,2608512	0,163344061	-1,596943169	0,134290615	-0,613734571	0,092032207	-0,613734571	0,092032207	
Variable X 1	1,044566904	0,018140095	57,58332055	4,82047E-17	1,005377612	1,083756197	1,005377612	1,083756197	

RAPPORT DÉTAILLÉ		LAB5_C1-C2							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple	0,998490215								
Coefficient de détermination R ²	0,99698271								
Coefficient de détermination R ²	0,996750611								
Erreur-type	0,107643781								
Observations	15								
ANALYSE DE VARIANCE									
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>				
Régression	1	49,77276809	49,77276809	4295,501814	9,00958E-18				
Résidus	13	0,150633387	0,011587184						
Total	14	49,92340148							
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>	
Constante	0,22576338	0,136239472	1,657106952	0,121420674	-0,068564109	0,520090863	-0,068564109	0,520090863	
Variable X 1	1,001976887	0,015288003	65,54007792	9,00958E-18	0,968949165	1,035004609	0,968949165	1,035004609	
RAPPORT DÉTAILLÉ		LAB6_C1-C2							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple	0,999200138								
Coefficient de détermination R ²	0,998400916								
Coefficient de détermination R ²	0,998277909								
Erreur-type	0,078363903								
Observations	15								
ANALYSE DE VARIANCE									
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>				
Régression	1	49,84356976	49,84356976	8116,653767	1,45241E-19				
Résidus	13	0,079831717	0,006140901						
Total	14	49,92340148							
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>	
Constante	0,048324135	0,101042675	0,478254702	0,640411491	-0,169965294	0,266613564	-0,169965294	0,266613564	
Variable X 1	1,016021542	0,011277541	90,09247342	1,45241E-19	0,991657896	1,040385188	0,991657896	1,040385188	

RAPPORT DÉTAILLÉ		LAB7_C1-C2							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple	0,999279846								
Coefficient de détermination R^2	0,99856021								
Coefficient de détermination R^2	0,998449457								
Erreur-type	0,074358396								
Observations	15								
ANALYSE DE VARIANCE									
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>				
Régression	1	49,85152226	49,85152226	9016,093377	7,34245E-20				
Résidus	13	0,071879223	0,005529171						
Total	14	49,92340148							
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>	
Constante	0,243619432	0,093856434	2,59566044	0,022187902	0,040854934	0,44638393	0,040854934	0,44638393	
Variable X 1	0,96755384	0,010189807	94,95311146	7,34245E-20	0,945540097	0,989567574	0,945540097	0,989567574	
RAPPORT DÉTAILLÉ		LAB8_C1-C2							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple	0,999565057								
Coefficient de détermination R^2	0,999130303								
Coefficient de détermination R^2	0,999063404								
Erreur-type	0,057791548								
Observations	15								
ANALYSE DE VARIANCE									
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>				
Régression	1	49,87998326	49,87998326	14934,73899	2,77127E-21				
Résidus	13	0,04341822	0,003339863						
Total	14	49,92340148							
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>	
Constante	0,002969952	0,074854138	0,039676519	0,968953883	-0,158742583	0,164682486	-0,158742583	0,164682486	
Variable X 1	0,995327798	0,008144554	122,2077697	2,77127E-21	0,977732558	1,012923037	0,977732558	1,012923037	

RAPPORT DÉTAILLÉ		LAB9_C1-C2						
<i>Statistiques de la régression</i>								
Coefficient de détermination multiple	0,998472509							
Coefficient de détermination R ²	0,99694735							
Coefficient de détermination R ²	0,996712531							
Erreur-type	0,10827268							
Observations	15							
ANALYSE DE VARIANCE								
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>			
Régression	1	49,77100283	49,77100283	4245,595503	9,71852E-18			
Résidus	13	0,152398653	0,011722973					
Total	14	49,92340148						
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>
Constante	0,04617578	0,139737116	0,330447518	0,746326874	-0,255707902	0,348059468	-0,255707902	0,348059468
Variable X 1	0,991579055	0,015218016	65,15823434	9,71852E-18	0,95870253	1,024455579	0,95870253	1,024455579

5.2. Analysis for C3 tyres

RAPPORT DÉTAILLÉ		LAB0_C3							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple	0,999774444								
Coefficient de détermination R^2	0,99954894								
Coefficient de détermination R^2	0,999514243								
Erreur-type	0,027382107								
Observations	15								
ANALYSE DE VARIANCE									
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>				
Régression	1	21,59963509	21,59963509	28807,97198	3,88361E-23				
Résidus	13	0,009747137	0,00074978						
Total	14	21,60938223							
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>	
Constante	0,114352595	0,037194211	3,074472952	0,008872147	0,033999388	0,194705802	0,033999388	0,194705802	
Variable X 1	0,968977193	0,005708963	169,7291135	3,88361E-23	0,956643728	0,981310657	0,956643728	0,981310657	
RAPPORT DÉTAILLÉ		LAB1_C3							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple	0,999635621								
Coefficient de détermination R^2	0,999271374								
Coefficient de détermination R^2	0,999215326								
Erreur-type	0,034801811								
Observations	15								
ANALYSE DE VARIANCE									
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>				
Régression	1	21,59363707	21,59363707	17828,79952	8,77087E-22				
Résidus	13	0,015745159	0,001211166						
Total	14	21,60938223							
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>	
Constante	-0,248471813	0,049949447	-4,974465707	0,000254177	-0,356381033	-0,140562592	-0,356381033	-0,140562592	
Variable X 1	1,061414235	0,007949208	133,5245278	8,77087E-22	1,044241015	1,078587455	1,044241015	1,078587455	

RAPPORT DÉTAILLÉ		LAB2_C3							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple		0,999151475							
Coefficient de détermination R^2		0,998303669							
Coefficient de détermination R^2		0,998173182							
Erreur-type		0,053101254							
Observations		15							
ANALYSE DE VARIANCE									
		<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>			
Régression		1	21,57272557	21,57272557	7650,599561	2,13188E-19			
Résidus		13	0,036656661	0,002819743					
Total		14	21,60938223						
		<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>
Constante		-0,21604933	0,075884926	-2,847065178	0,013734012	-0,379988747	-0,052109915	-0,379988747	-0,052109915
Variable X 1		1,005868275	0,011499882	87,46770582	2,13188E-19	0,981024291	1,030712259	0,981024291	1,030712259
RAPPORT DÉTAILLÉ		LAB3_C3							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple		0,999691346							
Coefficient de détermination R^2		0,999382787							
Coefficient de détermination R^2		0,999335309							
Erreur-type		0,032030742							
Observations		15							
ANALYSE DE VARIANCE									
		<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>			
Régression		1	21,59604464	21,59604464	21049,42381	2,98242E-22			
Résidus		13	0,01333759	0,001025968					
Total		14	21,60938223						
		<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>
Constante		-0,121710709	0,045110601	-2,698051125	0,018261699	-0,219166238	-0,02425518	-0,219166238	-0,02425518
Variable X 1		1,049223906	0,007231828	145,0841956	2,98242E-22	1,033600492	1,06484732	1,033600492	1,06484732

RAPPORT DÉTAILLÉ		LAB4_C3							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple		0,999540956							
Coefficient de détermination R^2		0,999082122							
Coefficient de détermination R^2		0,999011516							
Erreur-type		0,039060878							
Observations		15							
ANALYSE DE VARIANCE									
		<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>			
Régression		1	21,58954745	21,58954745	14150,10122	3,93459E-21			
Résidus		13	0,019834778	0,001525752					
Total		14	21,60938223						
		<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>
Constante		-0,088732174	0,054746999	-1,620767838	0,129059092	-0,207005874	0,029541525	-0,207005874	0,029541525
Variable X 1		1,043973537	0,008776265	118,954198	3,93459E-21	1,02501357	1,062933504	1,02501357	1,062933504
RAPPORT DÉTAILLÉ		LAB5_C3							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple		0,999617887							
Coefficient de détermination R^2		0,999235919							
Coefficient de détermination R^2		0,999177144							
Erreur-type		0,035638474							
Observations		15							
ANALYSE DE VARIANCE									
		<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>			
Régression		1	21,59287092	21,59287092	17000,91051	1,19447E-21			
Résidus		13	0,016511311	0,001270101					
Total		14	21,60938223						
		<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>
Constante		0,207798333	0,047713053	4,35516745	0,000779521	0,10472055	0,310876116	0,10472055	0,310876116
Variable X 1		0,93765026	0,007191257	130,3875397	1,19447E-21	0,922114497	0,953186028	0,922114497	0,953186028

RAPPORT DÉTAILLÉ		LAB6_C3							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple	0,999421464								
Coefficient de détermination R^2	0,998843263								
Coefficient de détermination R^2	0,998754283								
Erreur-type	0,043849723								
Observations	15								
ANALYSE DE VARIANCE									
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>				
Régression	1	21,58438585	21,58438585	11225,50741	1,76957E-20				
Résidus	13	0,024996377	0,001922798						
Total	14	21,60938223							
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>	
Constante	0,012133822	0,060530587	0,200457693	0,844224644	-0,118634562	0,142902206	-0,118634562	0,142902206	
Variable X 1	1,008092862	0,009514754	105,9504951	1,76957E-20	0,987537486	1,028648238	0,987537486	1,028648238	
RAPPORT DÉTAILLÉ		LAB7_C3							
<i>Statistiques de la régression</i>									
Coefficient de détermination multiple	0,998401132								
Coefficient de détermination R^2	0,99680482								
Coefficient de détermination R^2	0,996559037								
Erreur-type	0,072878115								
Observations	15								
ANALYSE DE VARIANCE									
	<i>Degré de liberté</i>	<i>Somme des carrés</i>	<i>Moyenne des carrés</i>	<i>F</i>	<i>Valeur critique de F</i>				
Régression	1	21,54033637	21,54033637	4055,628941	1,30751E-17				
Résidus	13	0,069045856	0,00531122						
Total	14	21,60938223							
	<i>Coefficients</i>	<i>Erreur-type</i>	<i>Statistique t</i>	<i>Probabilité</i>	<i>Limite inférieure pour seuil de confiance = 95%</i>	<i>Limite supérieure pour seuil de confiance = 95%</i>	<i>Limite inférieure pour seuil de confiance = 95,0%</i>	<i>Limite supérieure pour seuil de confiance = 95,0%</i>	
Constante	0,335278863	0,095720742	3,502677212	0,003894005	0,128486771	0,542070954	0,128486771	0,542070954	
Variable X 1	0,932887958	0,014648744	63,68382009	1,30751E-17	0,901241272	0,964534645	0,901241272	0,964534645	

6. Regression functions

6.1. Regression functions for C1-C2 machines²

Lab.	Intercept B_{1i}	Standard error Intercept	Slope A_{1i}	Standard error Slope	s (Residual standard deviation)
0	-0,6643	0,0648	1,0488	0,0069	0,047
1	0,0727	0,0982	0,9713	0,0105	0,076
2	0,0778	0,1395	0,9806	0,0151	0,108
3	0,3265	0,0872	0,9698	0,0096	0,070
4	-0,2609	0,1633	1,0446	0,0181	0,122
5	0,2258	0,1362	1,0020	0,0153	0,108
6	0,0483	0,1010	1,0160	0,0113	0,078
7	0,2436	0,0939	0,9676	0,0102	0,074
8	0,0030	0,0749	0,9953	0,0081	0,058
9	0,0462	0,1397	0,9916	0,0152	0,108

6.2. Regression functions for C3 machines

Lab.	Intercept B_{1i}	Standard error Intercept	Slope A_{1i}	Standard error Slope	s (Residual standard deviation)
0	0,1144	0,0372	0,9690	0,0057	0,027
1	-0,2485	0,0499	1,0614	0,0079	0,035
2	-0,2160	0,0759	1,0059	0,0115	0,053
3	-0,1217	0,0451	1,0492	0,0072	0,032
4	-0,0887	0,0547	1,0440	0,0088	0,039
5	0,2078	0,0477	0,9377	0,0072	0,036
6	0,0121	0,0605	1,0081	0,0095	0,044
7	0,3353	0,0957	0,9329	0,0146	0,073

² A_{1i} and B_{1i} are the coefficients defined in annex IVa of Regulation (EC) N° 1222/2009

Annex E - Template for candidate / reference laboratory alignment

A. - General information of Applicant (Candidate laboratory):

Company: _____
 Address: _____
 City: _____ P.O.Box: _____
 Contact person: _____ Position: _____
 Telephone : _____ Fax: _____ E-mail : _____

a) Tyre manufacturer b) Independent laboratory

Is your company integrated in a Group ? Yes No

If yes, indicate which one: _____

Candidate machine identification

Trade Mark: _____ Serial number: _____
 Test Lab location: _____ Year of make: _____

Date of last calibration: _____

The laboratory is certified/accredited/compliant to ISO 17025

The facility is certified / compliant to ISO /TS 16949

The laboratory complies with the specifications of ISO 28580 Annex A on test equipment tolerances

Drum Ø [mm]: _____

Drum Surface: _____

Drum material: _____

Where to send the test tyres after testing:

Address: _____

City: _____ P.O.Box: _____

Contact person: _____

Test tyres provided:

Tyre type: C1 C2 C3

Method: Force Torque Power Deceleration

Test results of the n+1 measurements (corrected for drum diameter and room temperature)

Tyre : Make - Size – Designation	RRC _{1,c} (kg/t)	RRC _{2,c} (kg/t)	RRC _{3,c} (kg/t)	RRC _{4,c} (kg/t)	RRC _{n+1,c} (kg/t)

All the information included by the company in this form will be confidential.

B. - General information of the Reference laboratory

Company: _____
 Address: _____
 City: _____ P.O.Box: _____
 Contact person: _____ Position: _____
 Telephone : _____ Fax: _____ E-mail : _____

- a) Tyre manufacturer b) Independent laboratory

Reference machine identification

Trade Mark: _____ Serial number: _____
 Test Lab location: _____ Year of make: _____

Date of last calibration: _____
 The laboratory is certified/ accredited/compliant to ISO 17025
 The facility is certified / compliant to ISO /TS 16949
 The laboratory complies with the specifications of ISO 28580 Annex A on test equipment tolerances
 Drum Ø [mm]: _____
 Drum Surface: _____
 Drum material: _____

Test characteristics:

Method: Force Torque Power Deceleration

Test results, average of measurement 2 – 4, corrected for drum diameter and temperature:

Tyre : Make - Size – Designation	RRC _{2,i} (kg/t)	RRC _{3,i} (kg/t)	RRC _{4,i} (kg/t)	RRC average reference lab (kg/t)

Candidate machine measurement reproducibility: σ_m (kg/t): _____

Regression formula³: RRC = aligned value (kg/t)
RRC_{m,c} = candidate’s measurement (kg/t)

RRC = a* RRC_{m,c} + b

a = _____
b = _____

a = A1_l * A2_c
b = A1_l * B2_c + B1_l

Date: _____
Stamp and Signature: _____

³A1_l, B1_l, A2_c and B2_c are the coefficients defined in annex IVa of Regulation (EC) N° 1222/2009
 RRC_{m,l} is the measured value of the rolling resistance coefficient by the reference laboratory (l) (including temperature and drum diameter corrections)
 RRC_{m,c} is the measured value of the rolling resistance coefficient by the candidate laboratory (c) (including temperature and drum diameter corrections)